Flathead National Forest Plan

Wildlife Species and Habitats Monitoring Guide and Evaluation of Results (MON-WL)

Point of Contact

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Introduction

Wildlife monitoring items in this document include those relevant to wildlife habitat or species. The habitat monitoring questions and indicators in this section are intended to monitor key ecosystems and ecosystem characteristics for wildlife. Monitoring is based on standardized USFS datasets and procedures used for monitoring vegetation characteristics, as described in detail in the section of this guide for "Terrestrial Ecosystem and Vegetation, and Focal Species." Many of these monitoring items are reported in the terrestrial vegetation monitoring guide but are interpreted here in a wildlife context. Threatened and Endangered Species monitoring is included in a separate document.

Table 1. Monitoring Questions Related to Wildlife Species and Habitat (Chapter 5 of Flathead Forest Plan)

MON-WL-01: What is the status of habitat conditions that support flammulated owls during the nesting season?
MON-WL-02: What is the status of habitat that supports nesting harlequin ducks?
MON-WL-03: What is the status of habitat conditions that support fisher?
MON-WL-04: What is the status of forest conditions that support wildlife habitat connectivity for fisher and other species?
MON-WL-05: What is the status of habitat conditions that support Clark's nutcrackers during the nesting season?
MON-WL-06: What is the status of habitat conditions that support Townsend's big-eared bats and other bat species?
MON-WL-07: What is the status of habitat conditions that support common loons on code A territorial nesting lakes?
MON-WL-08: What is the status of habitat for wildlife species associated with hardwood tree habitats on NFS lands?
MON-WL-09: What is the status of habitat for wildlife species associated with grass/forb/shrub habitats on NFS lands?
MON-WL-10: What is the status of habitat for wildlife species associated with snags and potential live snag replacement trees in the 20-inch-or-greater d.b.h. class?
MON-WL-11: What is the status of habitat for wildlife species associated with snags and potential live snag replacement trees in the 10-inch or greater d.b.h. class?
MON-WL-12: What is the status of habitat for wildlife species associated with downed woody material?
MON-WL-13: What is the status of habitat for wildlife species associated with forests burned with moderate- to high-severity wildfire?
MON-WL-14: What is the risk of human disturbance in areas modeled as wolverine maternal denning habitat?
MON-WL-15: What is the status of the breeding season bird community on the Forest (including neo-tropical migratory birds)? Are we maintaining diverse avian communities?
MON-WL-16: What is the status of the aquatic amphibian community on the Forest?

MON-WL-17: What is the status of forest meso-carnivores (e.g., lynx, wolverine, fisher) on the Forest?

Purpose and Outline of this Document

Each individual monitoring item in the Forest Plan monitoring program (Chapter 5 of the Plan) has been addressed in a document such as this one, which is intended to serve as the primary location for information needed to conduct the monitoring and to record the results. It is designed to aid in the tracking and preservation of monitoring methods, data and results over the life of the plan. It is anticipated that these documents would be revisited and used as a guide to conduct the monitoring for each biennial reporting; to see past results and record new results; and updated where needed based on recommendations for change in the previous biennial report. This document is **NOT** the final Biennial Monitoring Evaluation Report (MER), but it should contain most if not all the information needed to prepare that report, and functions as project record material for the biennial MER.

Each monitoring item in this document is organized into five main sections:

- **Introduction:** Key information from the monitoring plan (i.e., indicators, plan component being monitored, data source/collection)
- **Methods**: Detailed information on how the monitoring will be accomplished, the intent of the selected indicators, data sources and confidence levels, etc.
- **Results:** Summary of the monitoring data used and the results for the current biennial monitoring report.
- **Discussion of Results**: A fact-based discussion of results. A list of general questions (see below) and in some cases more specific resource-based questions are provided to help guide this discussion
- **Evaluation of Results for Adaptive Management Finding:** evaluation of what the results mean in terms of management decisions. This information is incorporated into the Biennial Monitoring Evaluation Report.

Information on data sources common to all vegetation (habitat)-related monitoring

The Region 1 Forest Inventory and Analysis Summary Database (R1 FIA SDB) is the source of the data used to derive the estimates for the monitoring indicators in this document. At the regional level, reports are produced that provide estimates from the R1 FIA SDB for a host of vegetation conditions, as part of the Broad Scale Monitoring Strategy (BSMS reports). Detailed information on the R1 summary database and Information on downloading, accessing, and deriving estimates from this data base is found at: http://fsweb.r1.fs.fed.us/forest/inv/r1_tools/R1-FIA-SDA-Tools.shtml. The BSMS reports are provided periodically by the region when the R1 FIA SDB is updated with new FIA plot data (about every 5 years).

The vegetation information used to develop and analyze conditions for the 2018 Revised Flathead Forest Plan is summarized in the table below. NOTE that there is an updated FIA dataset (FIA Hybrid 2015) that is used to estimate vegetation conditions for this 2021 Monitoring Report. See the data source tables under each of the monitoring questions in this document for information on the data used for the item.

Table 2: Summary of Vegetation data sets used for the 2018 Revised Flathead Forest Plan (for the Baseline data)

Data Set	Data type	Date of data compilation/collection
Region 1 Vegetation Map (VMap) – version 12 for the Flathead NF	Spatially mapped existing vegetation derived using remote sensing techniques refined through sampling and verification	Uses satellite imagery data from 2009. Updated to the year 2012 by the Forest Plan revision team, primarily to identify recent stand disturbance activities since 2009 (i.e. fires) and differentiate early successional forest types from true non-forest areas
Region 1 Forest Inventory and Analysis Hybrid 2011 database (R1 FIA Hybrid 2011)	Spatially balanced sample of forest conditions gathered from field inventory plots across all lands. Data collection standards strictly controlled, scientifically designed and repeatable.	398 total plots, with most data (357 plots) collected from the years 2003 to 2011. FIA inventory plots are re-measured every 10 years.
Forest Activity Tracking System (FACTS)	Spatially mapped database recording all management activities and natural events that alter vegetation	Management activities from the 1940s through the year 2012.

Links:

VMap - https://www.fs.usda.gov/detailfull/r1/landmanagement/gis/?cid=stelprdb5331054&width=full

R1 FIA - http://fsweb.r1.fs.fed.us/forest/inv/fia_data/index.shtml

WILDLIFE SPECIES AND HABITATS MONITORING (MON-WL)

MON-WL-01: What is the status of habitat that supports nesting harlequin ducks?

Introduction

A desired condition for wildlife in the plan is to maintain ecological conditions on the forest that provide for wildlife diversity and connectivity. For the harlequin duck, key ecosystem characteristics include fast-moving, low-gradient (1-7%) streams and riparian management zones, with high water quality and flows that support abundant aquatic invertebrates for feeding. Dense shoreline cover is desired in nesting streams. Direction for harlequin duck within forest plan guideline FW-GDL-WL DIV-05 is being monitored by this item.

FW-GDL-WL DIV-05: "To reduce the risk of disturbance, new projects or new special-use authorizations for activities that are known to disrupt the select species listed in [Forest Plan (FP)] table 15 should not occur in key habitats during key time periods (see [FP] table 15) unless they include strategies designed to mitigate new disturbance. Exceptions to this guideline may occur for public health and safety or emergency activities."

Table 3. Excerpt from Forest Plan table 15 for harlequin duck

Species	Key Habitat	Key Time Period
Harlequin Duck	Active nesting stream reaches	April 15 to August 15

Table 4. MON-WL-01 - Plan components, indicators, data source, data collection interval

Plan Component(s)	Indicators	Data Source / Partner	Data Collection Interval
FW-GDL-WL DIV-05	**HARLEQUIN DUCK** IND-WL- 01. Stream habitat data on known harlequin duck nesting stream reaches (see aquatics monitoring section) 02. Number of projects authorized within the riparian management zone along known harlequin duck nesting stream reaches 03. Number of project authorizations that include timing requirements for harlequin duck nesting 04. Number of nesting stream reaches surveyed, number of harlequin duck broods detected, and size of broods, in cooperation with other partners	01: PIBO [Pacfish/Infish Biological Opinion] Data for Trail Creek, Sullivan Creek, Spotted Bear River, Upper and Lower Twin Creeks, South Fork Wilderness, Middle Fork Wilderness 02,03: Spreadsheet for projects across Forest 04: MNHP database and reports for Trail Creek, Sullivan Creek, Spotted Bear River, Upper and Lower Twin Creeks, South Fork Wilderness, Middle Fork Wilderness	Variable.

Table 5. Monitoring Evaluation Report – summary of data sources for MON-WL-01 - Harlequin duck indicators

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-01 PIBO water quality total index	2003-2018 baseline	High level of confidence in data. Using standardized PIBO datasets and procedures used for monitoring stream characteristics. For more details see Aquatics section IND-WTR-01.
2021	IND-WL-02 & 03	2021	Moderate. Biologists on planning teams must compile data because there is currently no tracking mechanism in FACTs.
2021	IND-WL-04	2017	Low. Surveys not conducted consistently.

Methods

IND-WL-01: Known nesting streams and reaches where one or more broods have been observed on FNF from 2006-2020 are listed by stream name. While harlequins have strong affinity to natal streams, the last 15 years is used for data collection because surveys have been sporadic. Streams with known broods include:

- North Fork drainage-- Trail Creek
- Middle Fork drainage—Granite Creek
- South Fork drainage --Sullivan Creek, Spotted Bear River, Upper and Lower Twin Creeks, Youngs Creek, White River).
- Additional streams will be added to the list if broods are detected.

The aquatics program leader provides the wildlife program leader with a spreadsheet of PIBO data, which is available for the following harlequin nesting streams in the South Fork Flathead watershed: Twin, Lower Twin, Sullivan, Spotted Bear River, Youngs Creek. The program leader makes a pivot table showing stream name, year, and the Total Index values. Watershed program lead with help with interpreting what the index means. Three sets of PIBO data are used to assess habitat conditions; 1) physical habitat integrity [TotalIndex on spreadsheet], 2) Average Temperature [AvgTemp on spreadsheet], and 3) score of Observed / Expected Macroinvertebrate Taxa [RIVPACS on spreadsheet]. HabIndex from PIBO data is an Index of Physical Habitat Integrity displayed as a Numeric score 0 (worst) - 100 (best) that ranks the habitat integrity of a reach. Index score is calculated by summing values of 6 metrics (residual pool depth, % pools, D50, % pool tail fines <6mm, large wood frequency, average bank angle) and scaling 0 - 100. Index was developed using data from reference reaches as a basis of comparison to managed sites. This is not a water quality index. Craig Kendall explained that the index numbers reflect stream habitat conditions, not water quality per se.

IND-WL-02: Compile number of projects authorized that are proposing activities in or adjacent to known nesting stream reaches. Project biologists to submit to forest biologist for decisions signed the previous 2 years – or since last monitoring report. (or in the case of the first monitoring report in 2021, from the time of the adoption of the revised forest plan in December 2018).

IND-WL-03: Compile number of project authorizations with proposed activities in or adjacent to known nesting stream reaches that include timing or RMZ vegetation management requirements for harlequin

duck nesting. Project biologists to submit to forest biologist for decisions signed the previous 2 years – or since last monitoring report.

IND-WL-04: Wildlife spreadsheet showing harlequin duck surveys and results on FNF lands by stream name, and year since 2004. The year 2004 is used since survey efforts have been sporadic. With partners in the harlequin duck working group, follow MNHP protocols to survey each breeding stream reach listed above for 3 years out of 5, in conjunction with statewide surveys.

Partnerships – MNHP and FWP—harlequin duck working group

- Name and number of stream reaches surveyed,
- Number of broods detected and percent of streams surveyed with broods detected.
- Number/name of stream reaches with known nesting in last 15 survey years
- Cumulative survey years
- Cumulative survey years with verified broods
- Percent of stream reaches with verified broods in at least 85 percent of years surveyed
- Percent of stream reaches with verified broods in at least 50 percent of years surveyed

Results

Table 6. IND-WL-01: PIBO Physical Habitat Integrity total index for harlequin duck nesting streams

Nesting Stream Name	2003	2007	2008	2012	2013	2017	2018
Lower Twin	32.2		52.4		54.2		52.9
Spotted Bear		34.5		42.8		47.4	
Sullivan	40.9		40.7		33.2		34.8
Twin	22.3		34.6		36.7		31.8
Youngs			53.9	50.6			51.7

Table 7. IND-WL-01: PIBO average water temperature for harlequin duck nesting streams

Nesting Stream Name	2003	2007	2008	2012	2013	2017	2018
Lower Twin	11.66		9.52		10.99		10.02
Spotted Bear		10.24				9.01	
Sullivan	8.81		6.96		7.92		7.29
Twin	10.59				10.49		
Youngs							12.14

Table 8. IND-WL-01: Score of Observed / Expected Macroinvertebrate Taxa for harlequin duck nesting streams (scores greater than 0.78 indicate good quality habitat)

Nesting Stream Name	2003	2007	2008	2012	2013	2017	2018
Lower Twin	0.96		1.23		0.96		
Spotted Bear		0.91		0.91		0.91	
Sullivan	0.86		1.15		0.86		
Twin	0.73		0.65		1.09		
Youngs			0.48	0.99			

Table 9. IND-WL-02 and 03: Projects in Harlequin Duck Nesting Stream Reaches

Stream Reach Name	2018-2020 Project Name	2021-2022 Project Name	Acres in RMZ	Timing Requirements
North Fork Flathead - Trail Creek	none			
South Fork Flathead - Sullivan Creek	none			
South Fork Flathead - Spotted Bear River	none			

Table 10. IND-WL-04: Harlequin Duck Brood Surveys-- baseline

Stream Reach Name	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*% Years Surveyed w/ Confirmed Broods*
North Fork Flathead - Trail Creek	*Y*	*N*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*	*	*	*	*92%*
South Fork Flathead - Sullivan Creek	*N*	*N*	*N*	*N*	*N*	*	*N*	*N*	*N*	*Y*	*Y*	*N*	*	*	*	*18%*
South Fork Flathead - Spotted Bear River	*Y*	*Y*	*	*Y*	*Y*	*	*Y*	*Y*	*Y*	*Y*	*N*	*Y*	*	*	*	*90%*
South Fork Flathead (may include Upper/Lower Twin, Youngs, White River)	*	*	*	*	*	*Y*	*Y*	*Y*	*Y*	*Y*	*	*	*	*	*	*100%*

Stream Reach Name	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*% Years Surveyed w/ Confirmed Broods*
Middle Fork Flathead (may include Granite, Schaefer, Dolly Varden, Morrison)	*	*	*N*	*	*	*	*Y*	*	*N*	*	*	*	*	*	*	*33%*

Data through 2016 compiled by Cara Staab, regional ecologist, summarized and updated by R. Kuennen.
* = no surveys conducted

Discussion of Results

What does the PIBO water quality index number indicate about condition of monitored nesting streams? What might be a contributing factor to the most recent status and variability of habitat conditions over time?

- At the forest scale, we don't see statistical differences between reference and managed streams for most habitat components. This means our streams are in really good shape and that our protection measures work (see Aquatics Section for more details). From 2003-2018 the stream habitat index has improved slightly or stayed about the same for all nesting stream reaches except Sullivan Creek (which has gone down slightly). Sullivan Creek is a reference stream, so there's minimal management upstream. Craig Kendall suspects the decline is due to wildfire and/or floods and is within the natural range of variation. Fire and floods are the primary mechanisms of disturbance and create this variability.

What does the macroinvertebrate data indicate about the condition of monitored nesting streams? What might be a contributing factor to the most recent status and variability of habitat conditions over time? (e.g., note very high or very low water year, high run-off during nesting time period, unusually high level of human activity during nesting time period, poor timing of survey or difficult survey conditions, etc.).

- Based on the three parameters discussed above, macroinvertebrate habitat conditions have remained stable over time. The exception to this is the invertebrate parameter for Twin Creek (2003 & 2008) and Youngs Creek (2008). Scores were below 0.78 during these years but improved by the time surveys were completed in 2012 and 2013. Beth Gardiner explained that a large wildfire in the Youngs' Creek drainage in 2007 likely impacted macroinvertebrate communities in the following years. No significant trends are being reported in 2021.

Have there been projects in RMZ's along known harlequin nesting stream reaches during the most recent monitoring period? If so, have projects incorporated timing requirements and other measures to protect harlequins?

- There have not been any projects.

Are the number of streams (reaches) with harlequin duck broods increasing, decreasing, or staying the same over long time periods?

- We are not able to answer this question – will need more time to confirm trends over the long term

Are there any streams that previously had broods detected that have not had broods detected in the last 5 years (provided a survey effort was made for 3 of those 5 years)? Were there singles or pairs detected?

- No streams.

Have surveys for harlequins been consistent? Are there problems with the ability to compare between years (for example survey not conducted on same reach, at same time, dense vegetation along stream made observation difficult, etc.)?

- Surveys have been most consistent for the Trail Creek and Spotted Bear River nesting stream reaches, which show high brood production. The South Fork and Middle Fork streams listed above are in wilderness and surveys have not been done consistently. Sullivan Creek needs to be surveyed consistently to see if it is now producing a brood each year. These surveys are influenced by the availability of funding and staff and many occur on an opportunistic timeline. As a result of these factors a small amount of data has been collected limiting our ability to compare between years with confidence.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 11. Summary of Findings for Monitoring Item MON-WL-01 – Habitat Conditions for Harlequin Ducks

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES -
Recommendations – na
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
Uncertain (B) – Although PIBO data show streams are within the natural range of variability considering effects that are likely due to wildfires and flood conditions and there have been no projects in RMZs along known nesting stream reaches. Indicator IND-WL-04 (brood detections) surveys have not been conducted for three years
Recommendation – *IND-WL-04:* There is a need for more consistent surveys to locate harlequin duck broods and determine nesting stream reaches. No harlequin duck monitoring was conducted on the FNF streams in 2018, 2019, or 2020 field seasons. Sullivan Creek is key for future monitoring since brood survey efforts have been variable and one stream quality index has gone down slightly.
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Monitoring Program: MNHP planned to conduct harlequin duck surveys on FNF in 2020 but did not due to COVID. Contact them in 2021 and 2022 to see if surveys were completed and include any results in 2023 report. We recommend that the Forest work with the harlequin duck working group to develop a consistent brood monitoring strategy and map

known nesting stream reaches on the FNF. This species was considered for SCC designation but there was insufficient information to include it as an SCC.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy

MON-WL-02. What is the status of habitat conditions that support flammulated owls during the nesting season?

Introduction

Desired condition FW-DC-WL DIV-01 states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 12. Excerpt from Forest Plan table 14 for flammulated owl

Associated Species	Key ecosystem and/or ecosystem characteristic	Desired condition description
Flammulated owl	Mixed ponderosa pine/Douglas-fir dominance types in the warm-dry and warm moist potential vegetation types	These forests provide the following habitat conditions for flammulated owls: old-growth forest (see glossary) and mature forest with presence of large and very large snags to provide for nesting, a mosaic of forest conditions that includes (1) areas with an open mid-story, (2) areas with dense Douglas-fir and ponderosa pine seedlings/saplings in the understory to provide roosting habitat, and (3) small openings to provide foraging habitat; at a scale that provides a cluster of potential home ranges for flammulated owls.

Table 13. MON-WL-02 plan components, indicators, data source, data collection interval, and point of contact

Plan Component	Indicators	Data Source/Partner	Data Collection Interval	Point of Contact
FW-DC-WL DIV-01	IND-WL- 05. Percentage of the warm-dry PVTs with presence of live trees and dead trees (ponderosa pine preferable) greater than or equal to 15 inches d.b.h. 06. Acres and percentage of the Forest that meets modeled habitat criteria for flammulated owl habitat (as classified in the R1Summary database, using FIA data). 07. Density (canopy cover) in the ponderosa pine dominance type forestwide 08. Number of acres of forest treated in the warm-dry and warm-moist PVT focused on promoting desired habitat	For indicators 05, 07: R1 FIA SUMMARY DATABASE REPORTS forested vegetation 06: R1 flammulated owl habitat model using FIA data Detailed information about the FIA program can be found at: http://fsweb.r1.fs.fed.us/forest/inv/fia_data/index.shtml Indicator 08: Project level decisions documents	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The R1 summary database is updated periodically, usually every 5 years.	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in obtaining and interpreting R1 Summary Database Reports and FIA data)

Methods

Across the forest, the warm dry PVT is most likely to support the type of habitat conditions associated with flammulated owl nesting territories, when compared to other PVTs. There is a minor amount of area in the warm moist PVT where ponderosa pine is common, particularly in the Swan Valley, where habitat for flammulated owls will also be monitored. Flammulated owls are known to nest in cavities excavated by pileated woodpeckers and flickers in ponderosa pine, Douglas-fir and western larch. In Montana, Seidensticker, Holt, and Larson (2013) found that ponderosa pine comprised 72 percent of all cavity-bearing trees used by flammulated owls.

IND-WL-05 and 07: These indicators were designed to monitor particular conditions associated with flammulated owl habitat, such as large/very large snags and live trees (especially ponderosa pine) and forest density in the ponderosa pine dominance type. They will be combined into one indicator (called IND-WL-05, with indicator 07 dropped) and will use the estimates that are produced in the regional BSMS reports for the purpose of monitoring of flammulated owl habitat. The BSMS report attributes are:

- Acres of Warm/Dry Broad PVT group with presence of live ponderosa pine 15"+ DBH
- Acres of Warm/Dry Broad PVT group with presence of dead ponderosa pine 15"+ DBH
- Acres of Warm/Dry Broad PVT group with presence of **both** live and dead ponderosa pine 15"+ DBH
- Acres of ponderosa pine cover type (dominance type) with canopy cover 40% or less
- Proportion of plots with ponderosa pine cover type (dominance type) with canopy cover 40% or less

IND-WL-06: This indicator reports acres from a model based on "A Conservation Assessment of the Northern Goshawk, Black-backed Woodpecker, Flammulated Owl, and Pileated Woodpecker in the Northern Region, USDA Forest Service" (2006) and updates to the habitat models documented in Bush and Lund. The estimated acres is stored in the “flammulated owl habitat” attribute field within the R1 FIA summary database. The R1 habitat model for flammulated owls will be updated based upon the best available science.

IND-WL-08. For tracking purposes, project biologists will fill out the Forest Biologist’s spreadsheet listing acres to be treated by vegetation management (fire, harvest, thinning to create 5 acre open patches, etc.) that is intended to make progress towards desired conditions listed under FW-DC-WL DIV-01 (see above). The spreadsheet will be filled out for project decisions signed after December 27, 2018 when the revised forest plan ROD was signed. Our intent is to develop a method to track accomplishment through the FACTS database in the future and report this item in the monitoring report once accomplished.

FACTS wildlife improvement or vegetation codes to be used (or local qualifier to be requested) for monitoring intended to move habitat towards desired conditions for flammulated owls: unknown at present.

Results

Table 14: Monitoring Evaluation Report – summary of data sources for MON-WL-02 – Flammulated owl habitat indicators

Year of Report	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-05 IND-WL-06	Hybrid FIA 2015 summary database – data collected on FIA plots 2006-2015.	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics
2021	IND-WL-08	Fiscal Year 2019 and 2020 acres accomplished in FACTS	High

Table 15: Monitoring report results for MON-WL-02 Flammulated owl habitat indicators

Indicator IND-WL-05: Attributes of flammulated owl habitat:	Forest Plan Baseline	Monitoring Summary: 2021	Monitoring Summary: 2022	Monitoring Summary: 2023
In the warm-dry PVT, acres with presence of live ponderosa pine 15"+ DBH (Large & Very Large size classes)	No estimates of these attributes were made for the Plan	20.3% of PVT in the large and very large forest size class (species unknown)		
In the warm-dry PVT acres with presence of dead ponderosa pine 15"+ DBH		unknown		
In warm-dry PVT acres with presence of **both** live & dead ponderosa pine 15"+ DBH		unknown		
In the Ponderosa pine Dominance type, Acres with canopy cover <=40%		unknown		
In the Ponderosa pine Dominance type, Proportion (%) with canopy cover <=40%		45% of warm-dry PVT has CC <=40%. Dominance types unknown		
IND-WL-06: R1 Modeled Flammulated Owl habitat				
Acres	5471 acres	5471 acres[1]		
Percentage of Forest	0.95% area	0.95% area		

[1] No change from previous monitoring report because the R1 FIA SDB not yet updated with new data for flammulated owl.

Table 16. Monitoring report results for MON-WL-02: habitat treatments

Indicator	Monitoring report 2021 (activities in years 2019 and 2020)			
IND-WL-08: Acres treated with focus on promoting desired habitat conditions for flammulated owls	0 acres			

Discussion of Results

Have there been changes in the estimated amount of flammulated owl habitat, according to the R1 BSMS report? Is the amount increasing, decreasing, or staying the same since the last update to the data source?

- The 2021 monitoring report represents the existing condition in 2015 and has not been updated-- we cannot yet answer this question.

If there are changes in the estimated amount of flammulated owl habitat shown in the R1 BSMS report, what is the reason for the change—changes in the model? An update to the dataset?

- No Change. R1 is running a report on flammulated owl habitat for the first time after updating the model.

Have treatments been accomplished (e.g. timber harvest, prescribed fire) that with a focus on promoting desired habitat conditions for flammulated owls? (lower stand density, create an open midstory, and create an understory consisting of small openings and patches of dense seedlings/saplings)

- No

If habitat providing forest structure and composition suitable for flammulated owls is trending downwards does the decrease appear to be due to natural succession creating more acres in the high canopy cover category within the mixed ponderosa pine/Douglas-fir dominance types?

- The 2021 monitoring report represents the existing condition in 2015 and has not been updated-- we cannot yet answer this question.

Are numbers of WL, PP, or DF live trees or snags greater than 15 inches d.b.h. in the warm-dry and warm-moist PVTs with PP/DF dominance type trending upwards, downwards or staying the same?

- The 2021 monitoring report represents the existing condition in 2015 and has not been updated-- we cannot yet answer this question.

If number of 15 inch trees is changing, is it due to timber harvest, insects/disease, prescribed fire, wildfire?

- The 2021 monitoring report represents the existing condition in 2015 and has not been updated-- we cannot yet answer this question.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of methods and monitoring results as documented above.

Table 17. Summary of findings for MON-WL-02 Flammulated owl habitat

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES, with the modification of some indicators to be consistent with the BSMS report estimates
Recommendations – IND-WL-06: The R1 BSMS report for flammulated owl habitat is being updated to conform with best available scientific information. Results should be reported in the 2023 report. IND-WL-05 and 07: Combining these into one indicator and using the flammulated owl attributes that are provided in the BSMS report. See discussion in methods section and the new indicator language below. (IND-WL-07, DROP) Change IND-WL-05 to the following: The conditions of five attributes associated with flammulated owl habitat. **1.** In the warm-dry PVT, acres with presence of live ponderosa pine 15"+ DBH **2.** In the warm-dry PVT acres with presence of dead ponderosa pine 15"+ DBH **3.** In the warm-dry PVT acres with presence of both live and dead ponderosa pine 15"+ DBH **4.** In the Ponderosa pine Dominance type, Acres with canopy cover <=40% **5.** In the Ponderosa pine Dominance type, Proportion (%) with canopy cover <=40%
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
UNCERTAIN. (B) At least 2 more years and additional data are needed to understand status or progress of the Plan Component(s)
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Plan monitoring program. For IND-WL-05, 07: We recommend modifying because we would have to do our own reports from FIA which would be multi-attribute level querying (skill level needed and not readily available at the forest level). Our reporting would duplicate what would be in the new and improved R1 flam model to be used for indicator IND-WL-06. This model accesses the same FIA data as FNF queries for these for species and snag monitoring indicators. By using the modeled flam outputs (when updated), we capture both the broad scale trends and that which may be occurring in habitat across the forest.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-03. What is the status of habitat conditions that support fisher?

Introduction

Desired condition FW-DC-WL DIV-01 states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 18. Excerpt from Forest Plan table 14 for fisher

Associated Species	Key ecosystem and/or ecosystem characteristic	Desired condition description
Fisher	Forests in the warm-moist potential vegetation type including western larch, white pine, cedar, or hemlock and excluding mixed ponderosa pine/Douglas-fir forest and forests in riparian management zones	These forests provide the following habitat conditions for fisher: • old-growth forest (see glossary) with presence of very large snags, down logs, and live trees with heart rot for denning and resting, • old-growth forest (see glossary) arranged in connected, complex shapes with few isolated patches (especially in riparian management zones) to allow fishers to travel and to avoid predation, • a mosaic of diverse forest conditions (early to late stages of succession) providing habitat for species preyed upon by fisher, at a scale that provides a potential home range for fisher, • large mean patch size of old-growth forest at a scale that provides a potential home range for fisher.

Table 19. MON-WL-03 plan components, indicators, data source, data collection interval, and point of contact

Plan Component	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-WL DIV-01	IND-WL- 09. Percentage of area in the warm-moist PVT where very large live trees and very large dead trees (>=20" DBH) are present. 10. Acres and percent of area in the warm moist PVT that meets modeled habitat criteria for fisher winter and summer habitat (as classified in the R1 Summary database, using FIA data).	R1 FIA SUMMARY REPORTS forested vegetation; R1 fisher habitat model	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The R1 Summary database is updated periodically, usually every 5 years.	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

Methods

IND-WL-09: It is recommended that this indicator be modified and added to in order to be consistent with data produced in the regional BSMS reports. Recommended changes are as follows:

The regional BSMS reports (the snag and live tree density reports) provide estimates of the presence of very large dead trees (snags 20"+ dbh) by Forest by PVT for the areas Inside Wilderness/Roadless and Outside Wilderness Roadless. It is recommended that the FNF monitoring indicator be changed to be consistent with this report and read as follows: (The estimate can be obtained directly from the wildlife indicator IND-WL-30, snag habitat).

> ***IND-WL-09a.*** *Percent of NFS lands in the Warm Moist PVT with at least 1 snag/acre greater than or equal to 20 inches d.b.h. Inside and Outside Wilderness/Roadless areas.*

Regional BSMS reports DO NOT provide estimates of large live tree presence (except for some limited data for the warm dry PVT, for flammulated owl habitat purposes). It is not anticipated that that large live tree by species and PVT data would be produced in the future in these regional reports. However, the BSMS reports (snag and live tree density report) DO PROVIDE estimates of live tree densities (tpa) for size groups 20"+. These estimates are reported out by PVT for the area INSIDE and OUTSIDE the wilderness/roadless lands. It is recommended that the FNF monitoring indicator for fisher be changed to be consistent with the regional reports and read as follows: (The estimate can be obtained directly from the terrestrial vegetation monitoring section, IND-TE&V-07).

> ***IND-WL-09b.*** *Density (tpa) of very large live trees in the warm moist PVT, Inside and Outside Wilderness/Roadless areas.*

In addition, in the terrestrial vegetation section, IND-TE&V-06 reports estimates of "large tree structure" – an attribute in the FIA data base that is reported out by PVT in the regional BSMS reports. The "Large tree structure" attribute defines minimum densities of large (15-20" dbh) and very large (20+" dbh) live trees which reflect quantities that contribute substantially to ecosystem functions, such as wildlife habitat. It is defined in detail in Milburn et al, 2019[1]. This estimate for the warm moist PVT would provide additional information on the conditions of large/very large tree components and contribute to monitoring of fisher habitat over time. Refer to the Terrestrial Vegetation monitoring guide for further description on the "large tree structure" attribute. It is recommended that an additional indicator be added to the fisher monitoring item that reads as follows: (The estimate can be obtained directly from the terrestrial vegetation monitoring section, IND-TE&V-06).

> ***IND-WL-9c****. Proportion of warm moist PVT where large and very large tree structural components occur at densities that contribute to ecosystem functions.*

IND-WL-10: This indicator uses the "Fisher summer habitat" and "Fisher winter habitat" attributes in the R1 FIA summary database to derive an estimate of acres across the forest with specific habitat criteria that are most likely to support fisher in the future. The model and background information is based on "A Conservation Assessment of the Northern Goshawk, Black-backed Woodpecker, Flammulated Owl, and Pileated Woodpecker in the Northern Region, USDA Forest Service" (2006)[3] and updates to the habitat

[1]Milburn, Amanda. Gunnar Carnwath, Shelagh Fox, Eric Henderson, Renate Bush. 2019. Region 1 Large Tree Structure Classification used for Broad-level Analysis and Monitoring. USDA Forest Service Region 1, Vegetation Classification, Mapping, Inventory and Analysis Report 19-3 v1.0. October 16, 2019. Missoula, MT.

models documented in Bush and Lundberg (2008)[4]. This model did not discern whether modeled habitat on the FNF was in the warm-moist PVT group or not.

The R1 habitat model for fisher will be updated based upon the best available science. The estimate for the FNF is not available for the 2021 report but will be updated once the new model data is available.

Results

Table 20: Monitoring Evaluation Report – summary of data sources for MON-WL-03 – Fisher habitat indicators

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-09a and 9b	The regional snag estimate tables are based on the Hybrid FIA 2011 database (same as used in the analysis for the 2018 FNF Forest Plan). Updates to the snag estimate tables based on Hybrid FIA 2015 database are not available.	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics
2021	IND-WL-09c	Regional BSMS report estimates are based on Hybrid FIA 2015 Summary database (data collected on FIA plots 2006-2015)	Same as above
2021	IND-WL-10	Regional BSMS report of modeled fisher habitat estimates based on Hybrid FIA 2011 Summary database (data collected on FIA plots 2006-2015). R1 is developing a new model but it is not available for the 2021 report.	Same as above

Table 21: Monitoring results for MON-WL-03 Fisher habitat indicators

Indicator	Forest Plan Baseline	Monitoring data results: 2021	Monitoring data results:	Monitoring data results:
IND-WL-09a. Percent of NFS lands in the Warm Moist PVT with at least one snag/acre greater than or equal to 20 inches d.b.h. Inside and Outside Wilderness/Roadless areas.	**IN**: 8.3 (0-25) **OUT**:10.3 (2.3-19.7)	No change (no new data estimates available)		
IND-WL-09b. Density (tpa) of very large live trees in the warm moist PVT, Inside and Outside Wilderness/Roadless areas.	**IN:** 6.0 (0-13.4) **OUT**: 2.2 (0.4-4.5)	No change (no new data estimates available)		
IND-WL-9c. Proportion of warm moist PVT where large and very large tree structural components occur at densities that contribute to ecosystem functions.	**LgTree Structure:** 31.06% (20-43) **VeryLg Tree Structure:** 9.47% (3-17)	**Lg Tree Structure:** 31.18% (20.8-42.8) **Very Lg Tree Structure:** 10.75% (4.5-20)		

Indicator	Forest Plan Baseline	Monitoring data results: 2021	Monitoring data results:	Monitoring data results:
IND-WL-10: R1 Modeled Fisher summer habitat acres on FNF	164,589	No change, model has not been rerun by R1		
IND-WL-10: R1 Modeled Fisher Winter habitat acres on FNF	88,235	No change, model has not been rerun by R1		

Discussion of Results

How many acres of NFS lands on the FNF are estimated to provide at least one snag/acres greater than 20 inches d.b.h. in the warm-moist PVT (excluding MX-PIPO)?

- See table under the results section above – baseline data only. No new data is yet available.

Are live trees or snags greater than 20 inches d.b.h. in the warm-moist PVT trending upwards, downwards, or staying the same (over multiple monitoring periods)?

- See table under the results section above – baseline data only. No new data is yet available

Are large and very large tree structure classes in the warm moist PVT (potential to provide fisher habitat) trending upwards, downwards or staying the same over time?

- Large tree structure has stayed essentially the same over the monitoring period, compared to the forest plan baseline data. Very large tree structure has shown an increase over this time of about 1.3%. This is a potential beneficial increase in forest structures that could provide fisher habitat. Several more monitoring periods are needed to determine whether this upward trend is consistent over time.

How many acres are estimated to provide modeled fisher summer or winter habitat?

- See table under the results section above - baseline data only. No new data is yet available.

Has modeled fisher habitat increased, decreased, or stayed the same (over multiple monitoring periods)?

- See table under the results section above - baseline data only. No new data is yet available.

If modeled fisher habitat appears to have changed, is it due to changes in the model? Or to changes due to forest succession, timber harvest, wildfire?

- See table under the results section above - baseline data only. No new data is yet available.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 22. Summary of Findings for Monitoring Item MON-WL-03 – Fisher Habitat

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES, with some modification in indicators to improve monitoring efficiency
Recommendations – Modify IND-WL-09 for purposes of monitoring efficiency and to be consistent with BSMS reports and provide additional information on the conditions of large/very large tree structure classes that contribute to monitoring of fisher habitat over time. The new IND-WL-09 will have three parts as follows: **IND-WL-09a.** Percent of NFS lands in the Warm Moist PVT with at least one snag/acre greater than or equal to 20 inches d.b.h. Inside and Outside Wilderness/Roadless areas. **IND-WL-09b.** Density (tpa) of very large live trees in the warm moist PVT, Inside and Outside Wilderness/Roadless areas. **IND-WL-9c**. Proportion of warm moist PVT where large and very large tree structural components occur at densities that contribute to ecosystem functions.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
UNCERTAIN (A) - Although data are available for IND-WL-9c, the availability of data or interval of data collection for IND-WL-9a, 9b, and 10 is beyond this reporting cycle. New data is anticipated to be available at next monitoring report.
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, <u>where</u> might that change might be needed?
Plan Monitoring Program. Modification of IND-WL-09 as described above. Also change wording of IND-WL-10: Acres ~~and percent of area in the warm moist PVT~~ that meets modeled habitat criteria for fisher winter and summer habitat (as classified in the R1 Summary database, using FIA data).

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-04. What is the status of forest conditions that support wildlife habitat connectivity for fisher and other species?

Introduction

Connectivity for wildlife was a public issue and was analyzed in the FEIS for the FNF revised forest plan (see 140041-140074 in the plan administrative record). At the Forest scale, cover was modeled as trees in the 5"+ DBH size class with at least 40% canopy cover. Cover conditions may be updated at the project level.

One of the forest plan components that addresses connectivity and is being monitored by this item is desired condition FW-DC-TE&V-19. The full text of this components follows:

> **FW-DC-TE&V-19:** Forest patterns contribute to connectivity of habitat for wildlife (e.g., Canada lynx, marten), movement within and between home ranges, and dispersal between populations. Desired conditions related to forest patterns across the landscape and within potential vegetation types are described below.
>
> > **Forestwide**: The forestwide pattern of forest patches trends towards the spatial and temporal arrangement that would occur under the natural fire regimes within this ecosystem (refer also to FW-TE&V-DC-25). Forest patches across the landscape vary widely in size, shape, and conditions (such as tree density, tree sizes, and number of canopy layers). The patch sizes and shapes of early successional seedling/sapling forest openings (less than 5 inches d.b.h.) are highly variable. They are dispersed widely and interspersed among patches of small, medium, and large forest size classes. The majority of seedling/sapling patches are less than 300 acres in size, but very large patches (those greater than 30,000 acres) may exist on the Forest, although less commonly (e.g., they may exist for one 20-year period over a 100-year time span). The largest seedling/sapling patch sizes occur predominantly within wilderness and large unroaded areas. The forestwide pattern of patches of small, medium, and large forest size classes (greater than or equal to 5 inches d.b.h.) also trends towards larger interconnected patches, as would occur under the natural range of variation.
>
> > **Warm-dry type:** Forest patterns in this type trend towards the spatial and temporal arrangement that might occur in a mixed-severity fire regime, where low- to moderate-severity burn conditions are most common. High-severity fires may have occurred periodically but are infrequent, generally smaller in size than on cool-moist types. Large-diameter trees capable of surviving fire occur across most of the area (e.g., ponderosa pine, Douglas-fir, and western larch). Forest patches of different sizes, shapes, and forest conditions form a complex and diverse pattern, resulting from both active vegetation management such as timber harvest and prescribed fire and natural processes such as succession. Across the landscape, early successional patches are interspersed with similarly sized patches dominated by medium- and larger-sized trees, often with relatively open midstory canopies. Small grass, forb, or shrub-dominated vegetation types occur within this matrix where gaps in the forest canopy or a very open-canopy forest are present. The larger early successional seedling/sapling-dominated patches (e.g., several hundred acres in size) generally occur in wilderness and large unroaded areas. Smaller clumps or patches (5 to 180 acres in size) of seedling/sapling-dominated forest are more common, particularly outside the unroaded areas. Within these patches, larger overstory trees are often present as scattered individuals, small groups, or patches. This diverse forest structure persists as the seedling/sapling trees grow into the small, medium, and large forest size classes.

Forests in the warm-dry type provide habitat for a variety of wildlife species over long time frames as climate, forest, and landscape conditions change. Disturbances create conditions suitable for the regeneration and maturation of ponderosa pine trees, promoting seed-producing trees that provide forage for wildlife species such as Clark's nutcrackers. Flammulated owls have a mosaic of patches of snags for nesting; dense patches of small Douglas-fir, ponderosa pine, and western larch for roosting; and openings for feeding. The mosaic pattern of forest conditions also consists of patches of large, full-crowned overstory trees that reduce snow depths, interspersed with patches of dense young trees and shrubs in the understory that provide food and shelter from the wind, which provides winter habitat for white-tailed deer and other big game species during harsh winters. Processes (e.g., fire, insect infestation and disease, vegetation management) that create diverse patches and patch sizes also create forest groundcover consisting of a variety of grasses, forb, and shrub species that provide wildlife forage and nesting sites. Wildlife species are able to move between patches of foraging and denning or nesting habitat.

Warm-moist type: Forest patterns in this type trend towards the variation that might occur in a mixed-severity fire regime, where low- and moderate-severity burned conditions are common. High-severity fires may have occurred periodically but are infrequent. Large-diameter trees capable of surviving fire (e.g., western larch, ponderosa pine, Douglas-fir, and western white pine) occur across most of the area. Forests form a complex, diverse pattern of conditions across the landscape and result primarily from active vegetation management (including timber harvests and limited use of fire) and from natural forest succession. Early successional seedling/sapling forests (< 5 inches d.b.h.) are interspersed across the landscape, with similarly sized forest patches dominated by small, medium, and larger tree sizes. Early successional seedling/sapling-dominated patches may be large (250 acres or more) but more often occur as smaller patches (20 to 200 acres in size). Within these patches there are usually live, fire-tolerant overstory trees present, from small to large size trees, as scattered individuals, small groups, or patches.

Forests in the warm-moist type provide habitat for a variety of wildlife species over long time frames as climate, forest, and landscape conditions change. From a wildlife standpoint, there are two sets of desired conditions for this potential vegetation type: one for forests where ponderosa pine, Douglas-fir, and western larch are the predominant species and one where western red cedar, western white pine, and western larch are the predominant species. For forests where ponderosa pine, Douglas-fir, and western larch are the predominant species (e.g., in the Swan Valley), desired conditions are as described above for the warm-dry potential vegetation type. For forests where western red cedar, western white pine, and western larch are the predominant species, desired conditions for the forest pattern are as follows.

Over time, forest stands will trend towards multiple canopy layers, with shade-tolerant species (e.g., grand fir, western red cedar) occupying the understory layers and larger-sized, usually fire-tolerant species (e.g., western white pine, western larch, Douglas-fir, western red cedar) dominating the overstory layers. Interconnected, complex patches of very large old cedar, hemlock, or western larch with heart rot provide denning and resting habitat for species such as fisher in a landscape mosaic of mature and young forest. The species, density, and size of overstory tree species vary widely, depending on factors such as site capability, stand history, and successional development. The mosaic pattern of forest conditions trends towards larger, interconnected patches of dense, mature trees that reduce snow depths, interspersed with patches of young trees and a complex structure that provides foraging habitat and shelter.

Processes (e.g., fire, wind, insects, and disease) that create diverse patches and patch sizes also create forest groundcover consisting of windblown lichens and a variety of grasses, forb, and

shrub species. Other than in areas of recent natural disturbance (such as stand-replacing wildfire or epidemic insect infestation), patches of shrubs and coniferous trees in the small to very large size classes (> 5 inches average d.b.h.) trend towards larger, more interconnected patches, allowing animals such as lynx, fisher, and marten to move within and between home ranges. The width and distribution of patches are highly variable due to environmental conditions that change over time (e.g., disturbance, forest succession), so their location changes over time. Areas providing cover are interspersed with more open areas providing spring, summer, and fall forage for species such as grizzly bears, elk, and mule deer.

In Canada lynx habitat and critical habitat (see map B-14), a mosaic of successional stages promotes the conservation of the Canada lynx and its critical habitat at the lynx analysis unit scale as well as at larger scales. Except in portions of the wildland-urban interface, young forests with high horizontal cover of abundant tall shrubs/dense saplings are interspersed with older forests, which provides food and cover for snowshoe hares (the primary prey of Canada lynx).

Cool-moist type: Forest patterns generally reflect the natural variation that might occur where moderate- and high-severity fire are prevalent, although very large high-severity fires occur infrequently. Natural disturbance processes (such as insects, disease, fires, avalanches) as well as vegetation management create patches of different tree sizes, species, and stand structures within the larger patch matrix. A mosaic pattern composed of relatively large patches of different forest size classes tends to occur across the landscape. Early successional openings (< 5 inches d.b.h.) across this landscape range from less than one hundred to several thousand acres in size. Even-aged, single canopy forest patches of shade-intolerant species (e.g., lodgepole pine, western larch, and Douglas-fir) are common, particularly in the early (seedling/sapling) and mid-successional stages of forest development. Over time, large patches of even-aged forest trend towards more diversity in size and structure as dense understory canopy layers of shade-tolerant trees (subalpine fir and spruce) develop and smaller disturbances occur that alter forest structures. Larger-sized, usually fire-tolerant species (e.g., western larch and Douglas-fir) occur in a discontinuous pattern across the landscape, sometimes in large patches and sometimes as scattered individual trees in younger stands, having survived one or more fire events.

Forests in the cool-moist potential vegetation type provide habitat for a variety of wildlife species over long time frames as climate, forest, and landscape conditions change. Processes (e.g., fire, wind, insects, and disease) that create diverse patches and patch sizes also create forest groundcover consisting of a wide variety of plant species that produce berries for grizzly bears as well as willow, alder, or yew that provide cover and forage for species such as snowshoe hares and moose. The more gently sloped moist basin areas are more densely stocked (e.g., 40 to 60 percent canopy cover), providing cover interspersed with more open areas providing spring, summer, and fall forage for species such as elk, moose, and mule deer.

Other than in areas of recent natural disturbance (such as stand-replacing wildfire or epidemic insect infestation), patches of shrubs and coniferous trees in the small to very large size classes (> 5 inches average d.b.h.) trend towards larger, more interconnected patches, allowing animals such as lynx, fisher, and marten to move within and between home ranges. The width and distribution of patches are highly variable due to environmental conditions that change over time (e.g., disturbance, forest succession), so their locations change over time.

In Canada lynx habitat and critical habitat (see figure A-1), a mosaic of successional stages promotes the conservation of the Canada lynx at the lynx analysis unit scale as well as at larger scales. Except in portions of the wildland-urban interface and in areas recently affected by large stand-replacing wildfire, the connectivity of mature forest as well as the patch shape and

adjacency of mature to young regenerating forest provides habitat capable of contributing to lynx reproductive success. Patches of dense, young seedling/sapling forest and mature multistory forest have branches touching the snow surface. Young forests with extremely high densities (greater than 14,000 stems per acre) occur following fires but are interspersed in a mosaic with young forests of much lower densities that are developing a multistoried stand structure. Large, stand-replacing wildfires may make large areas of lynx habitat temporarily unsuitable, but over time forest conditions within post-fire landscapes promote development of snowshoe hare and lynx habitat to support long-term persistence of lynx populations.

Cold type: Forest patterns across the area generally reflect the variation that might occur in a mixed-severity fire regime where low-, moderate-, and high-severity fires would occur. A very diverse mosaic pattern of vegetation conditions occurs, reflecting both the influence of natural disturbances and the complex arrangement of site and environmental conditions that prevent or delay the establishment and growth of trees. Variable size patches of small, medium, or large trees are intermingled with small and large grass/forb/shrub openings and other non-forest types such as avalanche chutes or high-elevation rocklands. Forest characteristics within patches are variable, usually composed of multiple canopy layers, tree ages, and size classes. The size of early successional seedling/sapling forest patches, originating mainly from fire, ranges from small (e.g., 20 acres) to large (e.g., several thousand acres).

Forests in the cold type provide habitat for a variety of wildlife species over long time frames as climate, forest, and landscape conditions change. Processes (e.g., fire, wind, insects, and disease) that create diverse patches and patch sizes also create openings in moister or more protected sites that support grass, forb, and shrub species that provide forage for a variety of wildlife. Harsh climate and fires create conditions suitable for regeneration and maturation of whitebark pine trees, particularly on dry and exposed ridges and slopes, resulting in seed-producing trees that provide forage for wildlife species such as Clark's nutcrackers. The more gently sloped, moist basin areas are more densely stocked (e.g., 40 to 60 percent canopy cover), providing cover interspersed with more open areas that offer spring, summer, and fall forage for species such as grizzly bears, elk, and mule deer and allowing animals to move within and between home ranges.

In Canada lynx habitat and critical habitat (see figure A-1), a mosaic of successional stages promotes the conservation of the Canada lynx at the lynx analysis unit scale as well as at larger scales. Other than in areas where harsh conditions limit tree growth or in areas of recent stand-replacing wildfire, the connectivity of mature forest, as well as the patch shape and adjacency of mature to young regenerating forest, provides habitat capable of contributing to lynx reproductive success. The width and distribution of patches are highly variable due to environmental conditions that change over time (due to disturbance, forest succession, etc.), so their locations change over time. Patches of dense, young, seedling/sapling forests and mature multistory forest have branches touching the snow surface. Young forests with extremely high densities (greater than 14,000 stems per acre) occur following fires but are interspersed in a mosaic with young forest of much lower densities that are developing a multistoried stand structure. Large, stand-replacing wildfires may make large areas of lynx habitat temporarily unsuitable, but over time forest conditions within post-fire landscapes promote development of snowshoe hare and lynx habitat to support long-term persistence of lynx populations.

Another forest plan component that addresses connectivity and is being monitored by this item is **desired condition FW-DC-WL DIV-01 which states: "**Ecological conditions provide for wildlife diversity

(including species of conservation concern[2]) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14." Table 14 includes desired conditions specific to a number of wildlife species.

An additional plan component addressing connectivity is **desired condition FW-DC-RMZ-06** which states: "Cover conditions in riparian management zones contribute to habitat connectivity for a variety of wildlife species (e.g., Canada lynx, grizzly bear, marten, and fisher)". The plan emphasizes providing habitat connectivity for multiple wildlife species in riparian management zones across the forest (IND-WL-12 and 13).

Specific to fisher, the main value of the Forest is in providing habitat for dispersal from adjacent national forests to the west as the climate changes. Olson and others (2014) modeled fisher habitat for northern Idaho. The Forest is at the eastern edge of the range for the western red cedar and hemlock forest types that are characteristic of the moist, maritime-influenced ecosystems. Habitat types in areas of the northern Rockies known to provide fisher home ranges are within this setting. The warm-moist potential vegetation type on the Forest includes moist sites that are largely limited to lower elevations and relatively productive, deep ash-capped soils. Monitoring item IND-WL-11 monitors cover within potential fisher home range areas. Fisher are tolerant of habitat mosaics. Since the warm-moist PVT is often naturally fragmented, the pattern of forest connectivity relative to fisher is assessed with consideration of the other intermingled PVTs (such as the cool moist PVTs capable of growing 25"+ DBH western larch that could be used for denning or resting)

Connectivity of cover is also monitored for broad connectivity areas across major roads and highways (IND-WL-14). These areas were delineated by American Wildlands and are referenced in the Geographic Areas of the plan (see Figure B-30 in the forest plan and figure 2 in FEIS appendix 3) The portions of these areas within the administrative boundary of the FNF were selected to monitor connectivity because they span the valleys where lands managed by the Forest are intermingled with other landownerships (see table below).

Table 23. MON-WL-04 - Forested conditions that support connectivity. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component (s)	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-19 FW-DC-WL DIV-01 FW-DC-RMZ-06	IND-WL- 11. In the areas of the Forest where the warm-moist PVT with presence of western red cedar or western hemlock is concentrated, what is the landscape pattern of forests with tree size class 5 inches or greater DBH (small, medium, large and very large forest size classes), and tree canopy cover is greater than 40%. 12. In riparian management zones: acres where tree size class is 5 inches or greater DBH (small, medium, large and very large forest size	Region 1 vegetation map (VMap) The Forest GIS library for riparian management zone and key connectivity areas (figure B-30 in the forest plan).	Baseline analysis will occur at time of first forest plan biennial report. Analysis repeated only after new VMap layer is available	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports

[2] Species of conservation concern are identified by the Regional Forester; more information is available at http://bit.ly/NorthernRegion-SCC.

Plan Component (s)	Indicators	Data Source / Partner	Data collection interval	Point of Contact
	classes), and tree canopy cover is greater than 40%. 13. In riparian management zones: distribution of areas where tree size class is 5 inches or greater DBH and tree canopy cover is greater than 40% 14. In key connectivity areas identified for the geographic areas: mapped distribution of forest cover with an average tree d.b.h. of 5 inches or greater and canopy cover greater than 40%	Storage: wildlife spreadsheet		and FIA data)

Methods

For all indicators: Select polygons in VMAP layer, for tree size class greater than or equal to 5 inches d.b.h. and canopy cover greater than 40 percent. Overlay these polygons with the GIS layers identified in each of the indicators below. For all indicators, examine map displays of recent wildfires and harvest activities that created openings, to provide information on the origin of open areas.

The evaluation of conditions for connectivity for the biennial monitoring reports would change only when a new version of VMap is developed at the regional level, or if new scientific information becomes available that might influence the evaluation. Major disturbances or other factors that have occurred since the previous analysis might also be discussed in each biennial report, if they may have had a major effect on connectivity.

When a new VMap version is available, the connectivity analysis would be updated as well. However, any new analysis conducted for the monitoring report that uses a new version of VMap should be evaluated independently of the previous analysis. It would be an inappropriate use of VMap data to compare the results of the new analysis directly with the previous analysis, and trends cannot be reliably determined. This is because each new VMap layer is developed independent of the previous version and would potentially incorporate new methodology and technology, new accuracy assessments, and thus a new and different basis for the classification and mapping of the vegetation conditions. It is not possible to be confident that changes in vegetation conditions from an older to newer version of VMap are due to actual changes in forest conditions over that time period, or to different methodology or classification techniques.

The monitoring discussion should consist of a qualitative description of conditions related to connectivity of forest cover within riparian management zones across the forest and within the individually named key connectivity areas (figure B-30), The created maps would be used to visually assess the distribution of forest cover. The monitoring report evaluation would be completed by the Forest Biologist, with focus on the criteria for connectivity as described in the desired conditions in the forest plan (FW-DC-TE&V-19; FW-DC-WL DIV-01; FW-DC-RMZ-06). New scientific information would be considered in the evaluation, if available.

IND-WL-11. Overlay VMAP layer above with the GIS layer showing potential fisher home ranges (see figures in results section below). Using the Olson binary climate model (2014) for habitat with the topographic and climatic conditions that could support a fisher home range, the Forest has drawn polygons that include enough contiguous acres of warm-moist and cool-moist PVTS to provide a fisher

home range of 12,355-24,715 acres (see "FNF Potential Fisher Habitat and Connectivity Monitoring Process" document in the monitoring record). We added some areas of the cool-moist PVT because we know they are capable of growing very large trees (such as white pine, western larch, or black cottonwood) that may be used by fisher for denning or resting in the future. Additionally, we know that there are some inclusions of western hemlock and western red cedar in wilderness areas that are not mapped, even though they are in the warm-moist PVT.

The use of Fragstats or other tools may be useful to help with evaluation from one time period to the next.

IND-WL-12 and 13. Overlay VMAP layer with riparian management zone GIS layer to create maps. Calculate acres of cover and % of total RMZ areas. Qualitatively assess the pattern of cover within the RMZs forest-wide.

IND-WL-14. Overlay VMAP layer with key connectivity area polygons (Forest Plan GIS library) to create a map and to assess pattern where cover occurs within the key connectivity polygons. The use of Fragstats or other tools may be useful to help with evaluation in the future as VMAP data is updated.

Results

Table 24. Monitoring Evaluation Report – summary of data sources for MON-WL-04 Wildlife Habitat Connectivity

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-11	Potential Fisher Habitat modeled based upon Olson et al. 2014. VMAP data for cover updated in 2012 so it provides a baseline for future comparison.	Moderate. The Olson model was based upon selection by fisher in areas of the northern Rockies where they currently exist (mainly Idaho). Future projections about habitat based upon climate change are less certain, although they show an increase in area of high-probability habitat under most dispersal assumptions.
2021	IND-WL-12 thru13	The Forest Plan Revision GIS library for 1) riparian management zones and 2) key connectivity area polygons (figure B-30).	High. RMZs were mapped for the forest plan revision, based upon the best available scientific information, but may be updated as field-verification takes place for projects.
2021	IND-WL-14		Moderate. The GIS polygons used for this analysis were developed in 2007 for the American Wildlands Northern Rockies Priority Linkage Assessment. The stated purposed of this dataset was to show the most important wildlife linkages needed for maintaining regional connectivity as identified by a group of wildlife biologist experts. https://www.sciencebase.gov/catalog/item/54949828e4b023f70296f7d6 The best available science for assessing connectivity is very broad and new analysis areas may be developed or refined in the future.

Table 25. Monitoring results for MON-WL-04 Wildlife Habitat Connectivity

Indicator	Indicators	Monitoring date 2021 Narrative Summary of findings		
All indicators: In areas where tree size class >=5" dbh and tree canopy cover >40%	11. Condition related to forest connectivity where warm moist PVTs are concentrated 12 &13. Condition related to forest connectivity within RMZs (acres and distribution within RMZ). 14. Condition related to forest connectivity in the Key connectivity areas identified in the plan for the geographic areas	Connectivity of forest cover on NFS lands is generally good except where there have been large wildfires. See figures and discussion below.		

Figure 1. Potential Fisher Habitat PVTs on the Flathead National Forest based upon Olson binary climate model: Indicator IND-WL-11

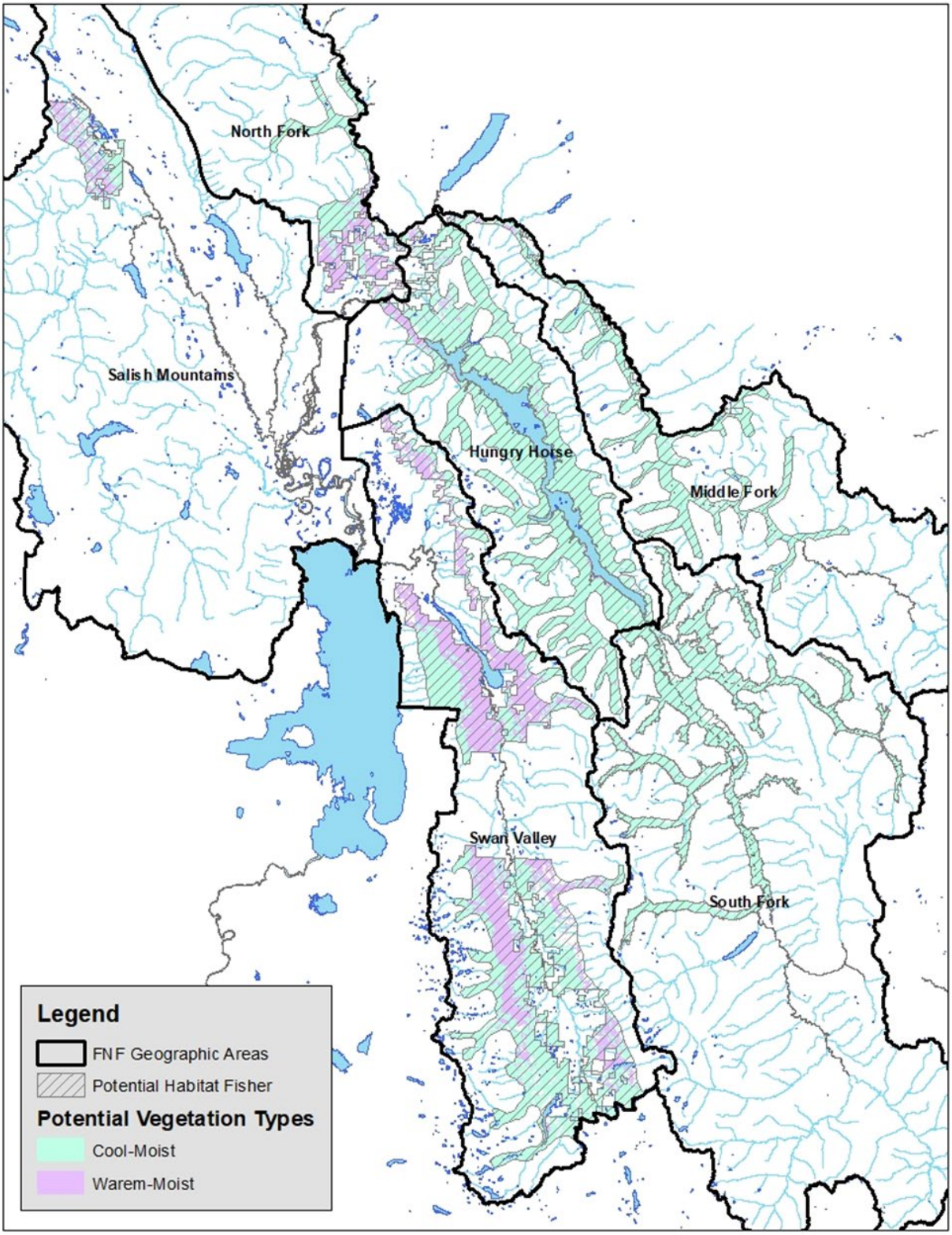


Figure 2. Connectivity of cover in Potential Fisher Habitat on the Flathead National Forest: Indicator IND-WL-11

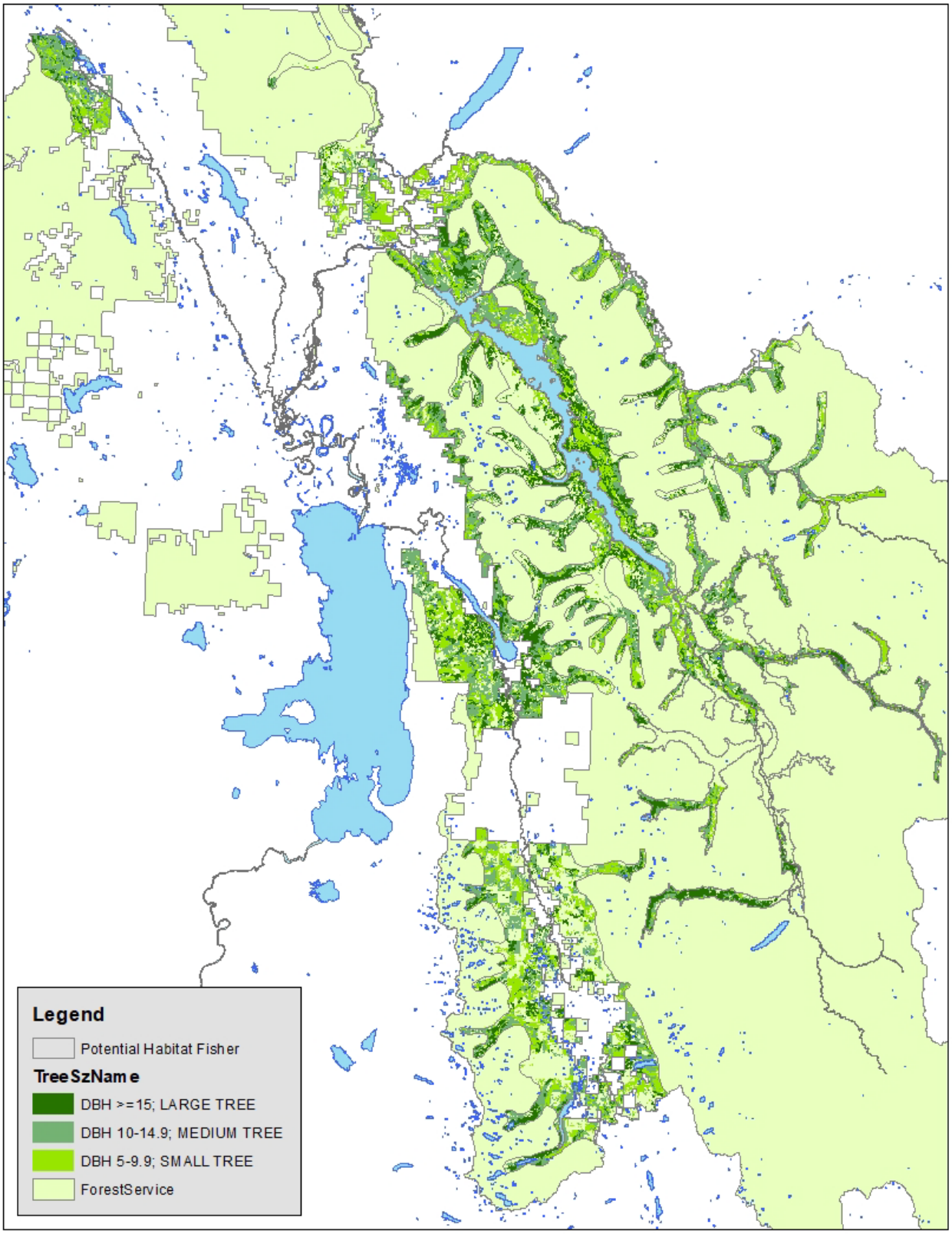


Figure 3. RMZs on the FNF: Indicators IND-WL-12 and 13

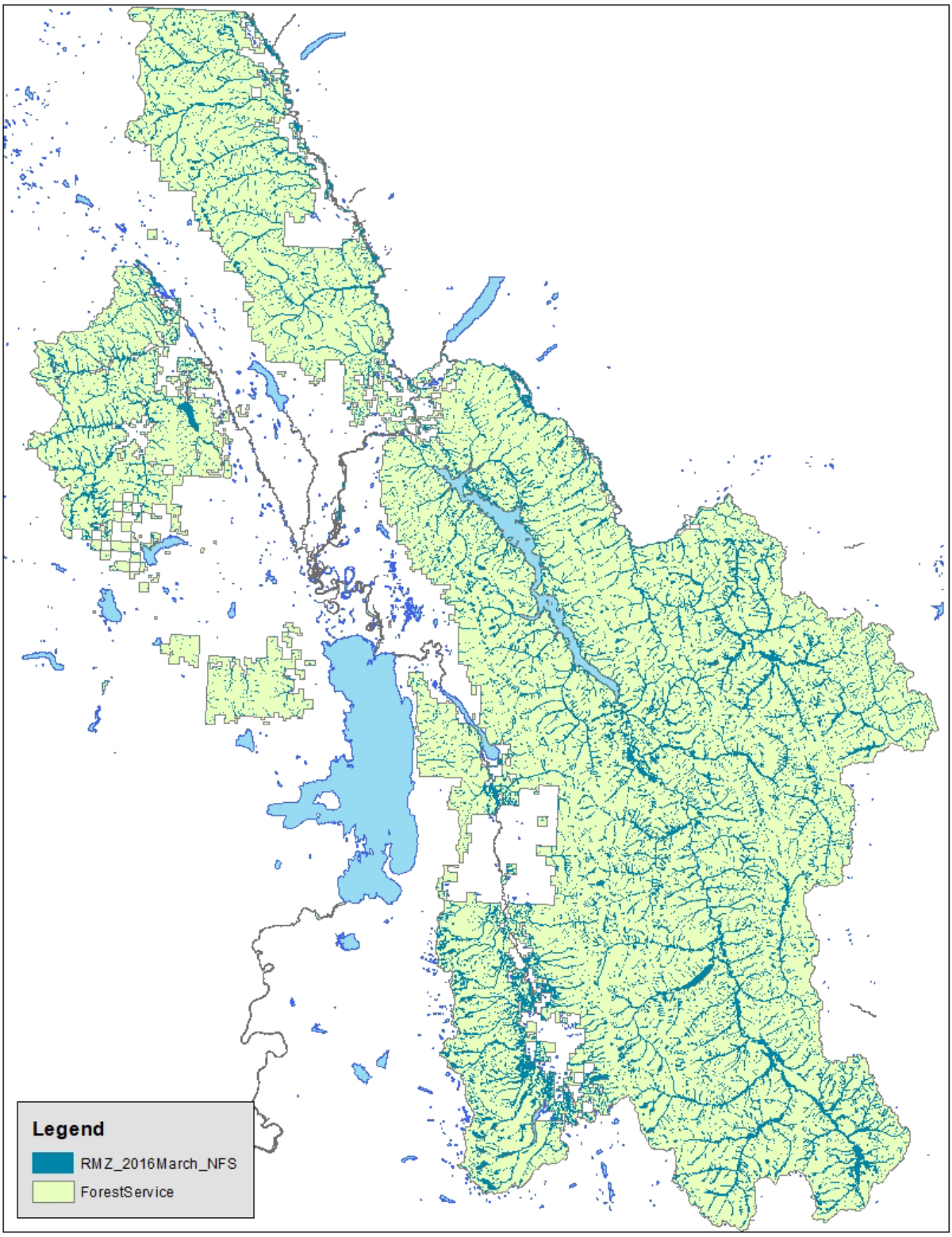


Figure 4. Connectivity in American Wildlands Key Connectivity Areas: Indicator IND-WL-14

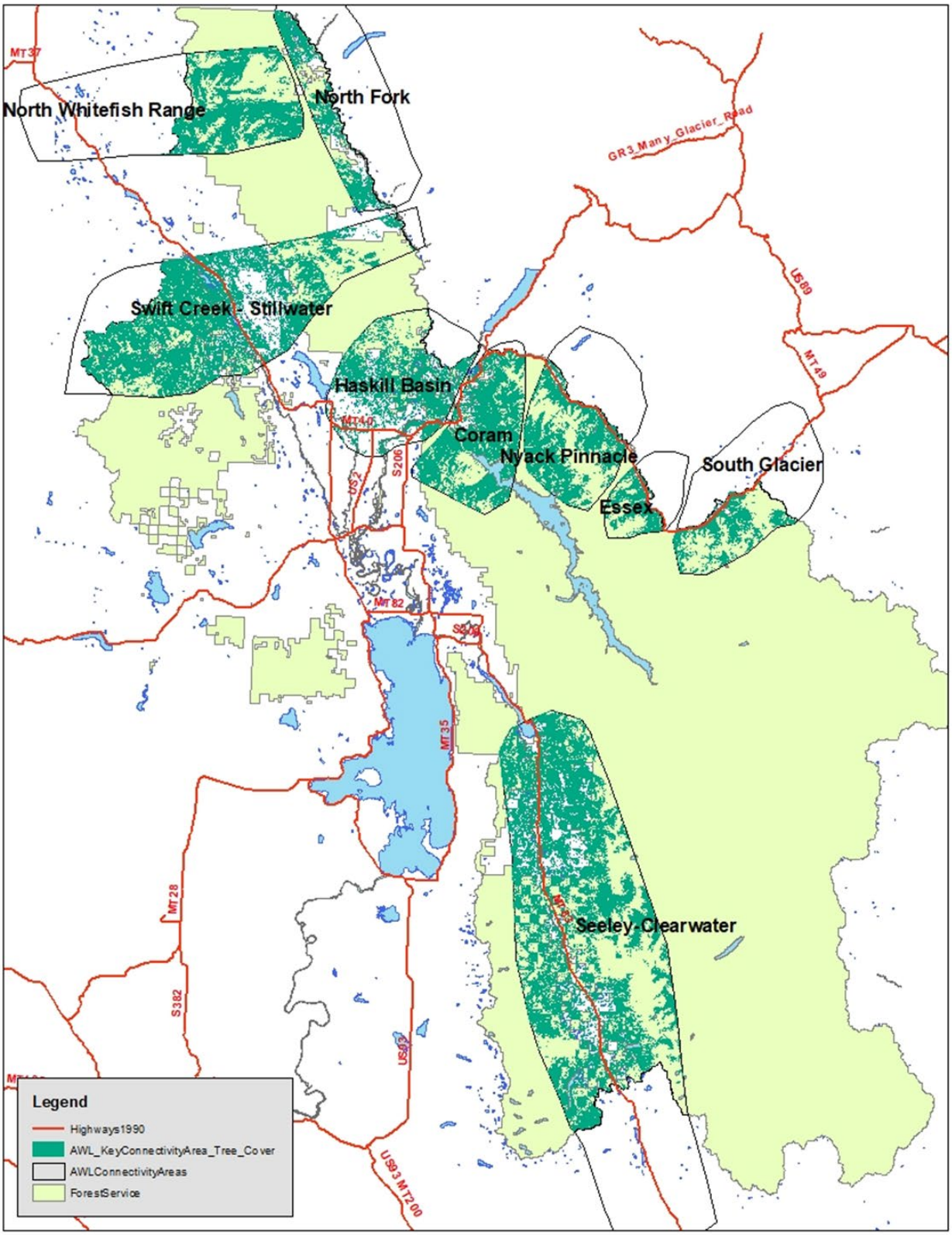


Table 26. Land ownership within FNF administrative boundary and key connectivity area polygons

Connectivity Area Name	Forest Service % of total area	State % of total area	Other % of total area	Total acres
Big Mountain	40.3%	10.6%	49.1%	42,748
Camas Creek	99.5%	0.0%	0.5%	10,831
Coram	85.5%	0.0%	14.5%	80,451
Essex	94.2%	0.0%	5.8%	19,780
Haskill Basin	41.1%	1.0%	57.9%	96,944
Idaho Hill	14.2%	5.6%	80.2%	100,081
Lost Trail - Kenelty	83.0%	0.0%	17.0%	18,449
North Fork	54.1%	14.7%	31.2%	38,308
North Whitefish Range	96.3%	0.8%	2.9%	78,676
Nyack Pinnacle	96.4%	0.5%	3.1%	65,776
Seeley-Clearwater	73.0%	15.2%	11.9%	343,993
South Glacier	97.2%	0.0%	2.8%	41,270
Swan Lake	76.3%	2.4%	21.3%	19,825
Swift Creek - Stillwater	64.0%	21.8%	14.2%	204,690
Total	**67.3%**	**9.9%**	**22.8%**	**1,161,822**

Discussion of Results

IND-WL-11: ***Connectivity of potential fisher home ranges:*** *In potential fisher home ranges, what is the landscape pattern of forests with tree size class 5 inches or greater DBH (small, medium, large and very large forest size classes), and tree canopy cover is greater than 40%?*

- See the Monitoring Record for maps of each unit's potential fisher habitat.
- South Fork Fisher Unit does not have mapped warm-moist but we know it has some very large western hemlock and larch trees in the wilderness. VMAP was updated in 2015 for this geographic unit due to very large wildfires (such as the Bear Creek and Trail Creek wildfires) that greatly reduced connectivity. Wilderness areas along Little Salmon and Gorge Creeks have much of the remaining 15"+ trees.
- Swan Valley South – timber harvest on former PCTC lands created the section-by-section checkerboard pattern and reduced connectivity. Very few 15"+ tree patches—most are along streams such as Elk Creek, Glacier Creek, and tributaries coming in and out of Crystal and Lindberg Lakes.
- Swan Valley North – patch mosaic with good connectivity. Lower elevations on west side of Swan Lake and How, Groom and Sixmile Creeks on east side of Swan Lake have 15"+ trees
- Salish Mountains- connectivity of 5"+ and 40% cc is good. Much of 15"+ is in LeBeau RNA
- Hungry Horse North- connectivity of 5"+ and 40% cc is good along east side of reservoir, but is not as good along west side of reservoir due to large wildfires that have occurred. Riparian areas

along Doris, Wounded Buck, and Lid Creeks have large patches of 15"+ and 40% cc. Much of 15"+ is on the east side of reservoir (especially northern end along Abbott Creek over to Emery Creek).

- Hungry Horse South- connectivity of 5"+ and 40% cc is good along reservoir with a patch mosaic of different age classes created by past timber harvest. Riparian areas along Graves Bay, Quintonkon Creek,
- Ball Creek and Hoke Creeks have large patches of 15"+ and 40% cc.
- Middle Fork- this watershed does not have any warm-moist PVT and does not have many patches of 15"+ trees, but it provides good connectivity of forest with 5"+ trees and 40% cc to Glacier National Park.

IND-WL-12: *In riparian management zones, how many acres have a tree size class is 5 inches or greater DBH and tree canopy cover is greater than 40%?*

- Riparian management zones total about 432,800 acres on the FNF. Acres of tree cover greater than 5" DBH and 40% canopy cover in RMZs totals about 249,000 acres or 57.5% of the RMZ total.

IND-WL-13: *In riparian management zones, what is the distribution of areas where tree size class is 5 inches or greater DBH and tree canopy cover is greater than 40%?*

- See the Monitoring Record for maps of each GA.

Is RMZ connectivity severed by wildfires or management activities or is connectivity of forest cover in riparian management zones (as mapped at the programmatic scale using the Forest GIS layers) being maintained over time (over multiple monitoring periods)?

- The baseline condition for RMZ connectivity is good across much of the Forest. It is too soon to tell if RMZ connectivity is being maintained over time.

If connectivity has been severed in RMZs or in the key connectivity areas, what is the cause (i.e., wildfire, harvest on NFS or other land ownership, etc.)?

- This responds to:1) FW-GDL-WL DIV-06 which states that connectivity of forest cover should not be severed by management activities. There are areas in the western portion of the Salish Geographic Area (GA), North Fork GA, as well as the wilderness portions of the South and Middle Fork GAs where large areas are lacking in cover of trees greater than 5" DBH and 40% canopy cover due to large wildfires in the last two decades (see maps in monitoring record).

IND-WL-14: *In key connectivity areas identified for the geographic areas, what is the mapped distribution of forest cover with an average tree d.b.h. of 5 inches or greater and canopy cover greater than 40%?*

- As shown in the figures below, connectivity of cover on NFS lands has not been severed in any of the key connectivity area polygons. However, there are large areas currently lacking in cover due to wildfires in the North Whitefish Range, Swift Creek Stillwater, Nyack Pinnacle, South Glacier, and Seeley Clearwater Connectivity areas. In the Seeley Clearwater Connectivity area, connectivity of cover has also been impacted by timber harvest on lands previously owned by Plum Creek Timber Company, which were acquired by the Forest Service.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 27. Summary of Findings for Monitoring Item MON-WL-04 – Habitat Conditions for Wildlife Connectivity

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES, with edits to IND-WL-11
Recommendations – See below.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN – (B) Too soon to tell. GIS analysis provides a baseline but it will take more time to determine how 2018 forest plan direction is affecting cover for connectivity as projects have not yet been implemented. In addition, VMAP classification will need to be updated.
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Forest plan monitoring program. Change IND-WL-11, which now *says "In the areas of the Forest where the warm-moist PVT with presence of western red cedar or western hemlock is concentrated, what is the landscape pattern of forests with tree size class 5 inches or greater DBH (small, medium, large and very large forest size classes), and tree canopy cover is greater than 40%".* Instead say *"In areas of the Forest modelled as potential fisher habitat, what is the landscape pattern…..".* This change is because we are unable to map areas where western red cedar or hemlock is concentrated in warm-moist PVTs. Instead we modeled potential fisher habitat based upon the Olson binary climate model (Olson et. al. 2014) including areas where the warm-moist PVT is concentrated. We also added areas shown in the Olson climate model that are in the cool-moist PVT and capable of growing very large western larch.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES** for where change may be needed include: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy

MON-WL-05: What is the status of habitat conditions that support Clark's nutcrackers during the nesting season?

Introduction

Desired condition FW-DC-WL DIV-01 states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 28. Excerpt from Forest Plan table 14 for Clark's nutcracker

Associated Species	Key ecosystem and/or ecosystem characteristic	Desired condition description
Clark's nutcracker	Whitebark pine forests in the cold potential vegetation type and Ponderosa pine forests in the warm-dry and warm moist potential vegetation types	Summer habitat: forests in the cold vegetation type contain live, seed-producing whitebark pine trees to provide food and nest sites for Clark's nutcrackers during the breeding season. Winter habitat: forests in the warm-dry and warm-moist types contain live, seed-producing ponderosa pine trees to provide food in winter.

Also being monitored are objectives related to treatment to promote whitebark pine habitat. **FW-OBJ-PLANT-01 states the following:** "Treat 8,000 to 19,000 acres for the purpose of sustaining or restoring whitebark pine in the ecosystem and contributing to achieving desired conditions for the presence of this species across the landscape." These treatments would be the total over the life of the plan (15 years).

Table 29. MON-WL-05 Clark's nutcracker habitat. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-WL DIV-01 FW-OBJ-PLANT-01	IND-WL- 15. Trees per acre of live whitebark pine greater than or equal to10 inches d.b.h., in the Cold PVT 16. Basal area per acre of live whitebark pine greater than or equal to 10 inches d.b.h., in the Cold PVT 17. Acres of whitebark pine habitat (i.e., acres in the cold PVT) affected by recent wildfire. 18. Acres of vegetation management treatments that contribute to restoration of whitebark pine	IND-WL-15, 16: R1 FIA SUMMARY REPORTS forested vegetation IND-WL-17: FNF mappable wildfire GIS layer and VMap IND-WL-18: R1 Restoration and Resilience Report, derived from FACTS database	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The region 1 summary database is updated periodically, usually every 5 years. Wildfires updated annually. Vmap periodic updates at regional level FACTS database records activities accomplished on an annual basis	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

NOTE: For additional indicators and assessments of WBP conditions, see Monitoring item **MON-PLANT-02** in the monitoring guide for PLANTS-T&E-SCC-INVASIVES, which addresses the question: *How are ecological conditions in the cold PVT affecting whitebark pine populations and habitats?*

Methods

IND-WL-15: This indicator provides an estimate of the average trees per acre for 10-inch d.b.h. and larger whitebark pine in the Cold PVTs. It will provide information on the trend of larger potentially seed producing WBP over time. This information is NOT provided by the regionally produced BSMS reports. Forest personnel would need to access the FIA database using the estimator form, selecting the fields as indicated in the figure below. It is recommended to change wording of IND-WL-15: "Trees per acre of live whitebark pine greater than or equal to10 inches d.b.h. ~~in the Cold PVT~~." Since FNF has whitebark pine in the cool PVT we recommend deleting the last portion of the indicator to monitor its presence wherever it may occur.

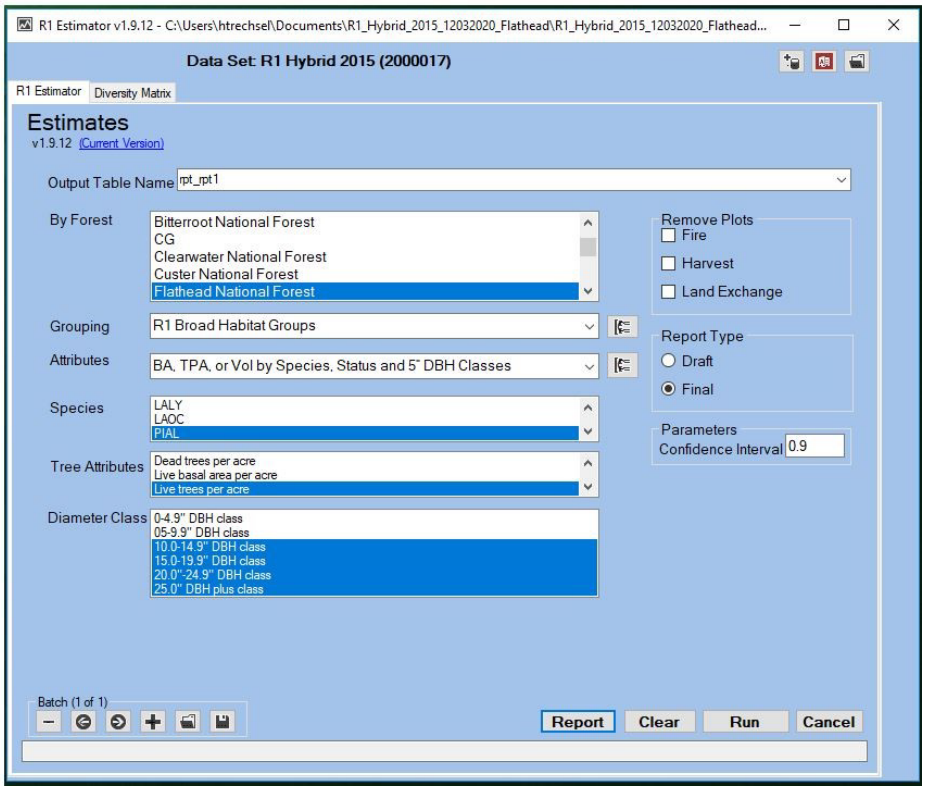
IND-WL-16: This indicator is attempting to address the levels of stocking of seed producing WBP trees known to levels known to support Clark's nutcrackers (at least 21.8 sq. ft./acre basal area as per McKinney et al. 2009 or updated). This indicator would provide an average basal area estimate for WBP across the entire Cold PVT area, which does not really provide the specificity that the research data is based on and is not directly comparable to the 21.8 sq. ft./acre basal area figure in the literature. It is recommended to drop this indicator as being an unhelpful addition to the suite of WBP based indicators that are already readily available.

IND-WL-17: This will involve a GIS spatial analysis, using the FNF PVT layer and the FNF mappable wildfire GIS layer. Though whitebark pine also occurs on upper elevation sites in the cool-moist PVT, sites most suited to supporting whitebark pine occur in the cold PVT. Therefore, the "cold PVT**"** will be used to represent whitebark pine habitat for purposes of this monitoring item. PVTs are an attribute within the forest plan revision VMap layer, or they may be accessed directly from the "Jones PVT" layer that is also located in the Forest GIS library.

To get this data, from the Forest's GIS fire layer, select the polygons that burned within the previous 10 years **OR** since the year the forest plan was signed (November 2018), whichever is less. The intent of forest plan monitoring items is to monitor components in the new forest plan, so only fire events since the year 2019 (the first fire season following the adoption of the plan) will be selected. Overlay the fire polygons with the PVT layer and report out the acres burned over the previous 10 (or less) years. Each biennial report will therefore have a different set of polygons that are termed as "recent fires".

IND-WL-18: This indicator is the same as **IND-PLANT-05** under the monitoring item **MON-PLANT-03.** Acres treated are obtained directly from the annual Region 1 Restoration and Resilience Report. For each biennial report the previous 2 years of accomplished vegetation treatments that contribute to the restoration of WBP would be added together.

Figure 5. Image of the estimator form used to obtain estimates for IND-WL-15 directly from the R1 FIA Summary Database. Fields to select on the form are shown highlighted in blue



Results

Table 30: Monitoring Evaluation Report – summary of data sources for MON-WL-05, Clark's Nutcracker nesting habitat

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL- 15-16	Regional BSMS report estimates based on Hybrid FIA 2015 Summary database (data collected on FIA plots 2006-2015)	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics
2021	IND-WL-17	Forest GIS data updated annually for fire events. Data from time of adoption of forest plan (November 2018) will be used for purposes of monitoring this item. VMap layer – no update from the layer used in forest plan revision has occurred at this time	High confidence.
2021	IND-WL- 18	Restoration and Resilience report data from 2019 and 2020	High confidence

Table 31: Monitoring results for MON-WL-05, Clark's Nutcracker Nesting habitat

Indicator	Forest Plan Baseline	Monitoring Data Results for 2021		
IND-WL-15. Trees per acre of live whitebark pine greater than or equal to 10 inches d.b.h., ~~in the Cold PVT~~	No data	**4.79 tpa** (90% CI of 2.14 – 8.42)		
IND-WL-17. Acres NF lands affected by wildfire over the past 10 years	2008-2017: Fire in Cold PVT 41,000 acres	25,054 acres of fire from 2011-2020 in Cold PVT		
IND-WL-18. Acres of vegetation treatments contributing to WBP habitat restoration	No data	2019 = 96.6 acres (no data available yet for 2020)		

Discussion of Results

What is the trend in density of 10" and larger DBH whitebark pine (potentially seed-producing) and how does this support Clark's nutcrackers?

- No trends available – This 2021 monitoring report is providing the baseline to compare with future monitoring results.

Is the cumulative amount of wildfire occurring in the cold PVT of concern, relative to what might be expected under a natural disturbance regime? Is WBP present in past wildfire areas?

- Cumulative amount of fire in previous decade is trending downward, indicating there has been less fire over the past few years across the Cold PVT on the FNF. This is a desirable trend, considering the large amount of fire that occurred on the forest in the decade 2000 to 2010.

Are restoration activities continuing to occur over time?

- Yes. About 100 acres occurred in the year 2019. It is hoped that this continues at an accelerated rate and well distributed across areas that support the species.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 32. Summary of Findings for Monitoring Item MON-WL-05, Clark's Nutcracker nesting habitat

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES except for one indicator
Recommendations: Drop indicator IND-WL-16 – It does not provide the specificity that the research data is based on and is not directly comparable to the 21.8 sq. ft./acre basal area figure in the literature. It is data not provided in regional BSMS reports and does not add substantially to the information gained from the other indicators. Modify slightly indicator IND-WL-15 by change the wording to: "Trees per acre of live whitebark pine greater than or equal to10 inches d.b.h.~~in the Cold PVT~~." Since FNF has whitebark pine in the cool PVT we recommend deleting the last portion of the indicator to monitor its presence wherever it may occur.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
UNCERTAIN. **(B) Uncertain -** More time/data are needed to understand status or progress of the Plan Component(s)
Recommendation
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Plan monitoring program: Recommend dropping IND-WL-16 because data are not directly comparable to desired condition.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-06: What is the status of habitat conditions that support Townsend's big-eared bats and other bat species?

Introduction

Desired condition FW-DC-WL DIV-01 states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 33. Excerpt from Forest Plan table 14 for Townsend's big-eared bat and other bats

Associated Species	Key ecosystem and/or ecosystem characteristic	Desired condition description
Townsend's big-eared bats and other bats	Caves, old mines, old buildings, and bridges and riparian management zones	These habitats provide the following conditions: o sites used as maternity roosts or hibernacula are accessible to bats, o sites used as maternity roosts or hibernacula are free of diseases that bats are susceptible to, and o human disturbance at sites used for maternity roosts or hibernacula does not preclude roosting or hibernation. Riparian management zones provide the following habitat conditions: o diverse structure (e.g., including shrubs and trees) to support nocturnal flying insects for food, and o snags and decaying trees to provide for roosting

Also being monitored by this question is **FS-GDL-CAVES-03** which states "In order to prevent loss of bat habitat, if caves being used as roosts or hibernacula by bats are closed, for example, to reduce safety hazards or vandalism, bat-friendly closures should be installed unless alternative entries for bats are known to be available."

Table 34. MON-WL-06 Habitat for bats. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data collection interval	Data Source / Partner	Point of Contact
FW-DC-WL DIV-01 FW-GDL-CAVES-03	IND-WL- 19. Number of caves or structures (e.g., old buildings) surveyed and number of detections of Townsend's big-eared bats or other bat species 20. Number of evaluations for closure or removal of structures used by bats and measures specified to mitigate or provide for bat use	IND-WL-19: Dependent on funding, staffing, and equipment availability. Acoustic surveys for FNF were last done in 2017. We are uncertain when they may be repeated. IND-WL-20: as needed.	Bigfork Caving Club Surveys Portion of statewide bat spreadsheet for the Forest. MNHP database MTNHP Zoology Publications for long-term acoustic monitoring reports. District biologists survey structures when informed of projects to remove structures.	Forest wildlife biologist

Methods

IND-WL-19. Historically the Forest has gotten data from Bigfork High School caving club surveys in the North, Middle and South Fork drainages; USFS surveys of an old mine in the Island Unit; and old buildings surveyed sporadically for presence of bats and guano. The Bigfork High School caving club has surveyed four caves on the Forest: Columbia Mountain, Twilight, Limestone, and Little Bitterroot Canyon Ice Cave. Caving club data is available from 2012 through 2017. These surveys appear to focus primarily on the identification of Townsend's big-eared bats as other species are often difficult to identify without handling individuals or collecting acoustic data.

At the time the revised plan was being developed there were some difficulties in correctly identifying species using acoustic surveys. Those have now been worked out and R1 BSMS will soon include compilation of acoustic survey data. Montana Bat Working Group data for MT is being entered into NA BAT (North American Bat Monitoring Program) and should be available to provide a baseline for the 2023 monitoring report (Bryce Maxell pers. comm. to Katie Eaton, 2021). The partner portal allows us to send in a data request. As of 2020, FNF only had stationary acoustic point data for red grid cells shown in NA bat. In the future, we should be able to get summaries by species and year. Sensitive location data such as hibernacula and maternity roosts are not being shared at the grid cell level—only acoustic fixed point and transect data. NRM is anticipated to become the USFS web-based platform in the future.

The Montana Natural Heritage Program (MTNHP) has established three long-term, ultrasonic acoustic monitoring sites on the Forest. Data from these surveys are available to managers through the MTNHP Map Viewer as well as their General Zoology Publications. The consistency of data collection at these sites is dependent on available funding, staffing, and equipment. Due to the time needed to process and vet acoustic data, data collected at these long-term sites needs two years for processing. Currently, 2017 is the most recent long-term acoustic data available.

IND-WL-20. District biologist coordination with engineers and recreation specialists. District biologists report by fall of each year for accomplishment report.

Partnerships -- MFWP, MNHP, and Bigfork High School caving club.

Results

Table 35. Monitoring Evaluation Report – summary of data sources for MON-WL-05 - Habitat for bats

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-19	Bigfork High School Cave Club Surveys: Feb 2012-Oct 2017 MTNHP Long-term Acoustic Surveys: July 2014-Aug 2016	High level of confidence in NA bat acoustic data. Using standardized national datasets and procedures for monitoring bats.
2021	IND-WL-20	January 2019-January 2021	High for Townsend's Big-eared bats. Surveys must occur before cave entrances, buildings, or old mines are closed

Table 36. Indicator IND-WL-19: Number of caves or structures (e.g., old buildings) surveyed. Number of detections of Townsend's big-eared bats or other bat species detected during long-term acoustic surveys. Bat species detected by year during long-term acoustic surveys

Bat Species Detected	Surveys completed: 2014	Surveys completed: 2015	Surveys completed: 2016	Baseline Condition (Forest Plan) 2018	Number of grid cells where species was detected
California Myotis (*Myotis californicus*)	X	X	X	No survey data at time of reporting	3
Silver-haired Bat (*Lasionycteris noctivagans*)	X	X	X	No survey data at time of reporting	3
Long-eared Myotis (*Myotis evotis*)	X	X	X	No survey data at time of reporting	3
Hoary bat (*Lasiurus cinereus*)	X	X	X	No survey data at time of reporting	3
Little Brown Myotis (*Myotis lucifugus*)		X	X	No survey data at time of reporting	2
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	X	X		No survey data at time of reporting	2
Western Small-footed Myotis (*Myotis ciliolabrum*)		X	X	No survey data at time of reporting	2
Big Brown Bat (*Eptesicus fuscus*)	X			No survey data at time of reporting	2

X = surveys were completed in that year.

Table 37. Indicator IND-WL-19: Number of caves or structures (e.g., old buildings) surveyed and number of detections of Townsend's big-eared bats detected by the Bigfork High School Caving Club

Dates of Survey	Columbia Mountain Cave	Twilight Cave	Limestone Cave	Little Bitterroot Canyon Ice Cave
Feb-2012	13	No Survey Data	No Survey Data	No Survey Data
Oct-2012	11	No Survey Data	No Survey Data	No Survey Data
Dec-2012	8	No Survey Data	No Survey Data	No Survey Data
Jan-2013	No Survey Data	No Survey Data	No Survey Data	7
Feb-2013	No Survey Data	1	No Survey Data	No Survey Data
Sep-2013	No Survey Data	No Survey Data	No Survey Data	2
Oct-2014	No Survey Data	No Survey Data	1	No Survey Data
Dec-2014	6	No Survey Data	No Survey Data	No Survey Data
Feb-2015	No Survey Data	No Survey Data	No Survey Data	6
Feb-2015	No Survey Data	No Survey Data	No Survey Data	7
Oct-2017	No Survey Data	No Survey Data	1	No Survey Data
Oct-2017	No Survey Data	No Survey Data	1	No Survey Data

Table 38. Indicator IND-WL-20: Number of evaluations for closure or removal of structures used by bats and measures specified to mitigate or provide for bat use. Bat surveys completed.

FNF Ranger District evaluation	2019	2020	2021	2022	2023
Swan Lake Ranger District	1	1			
Tally Lake Ranger District	0	0			
Hungry Horse Ranger District	0	0			
Glacier View Ranger District	0	0			
Spotted Bear Ranger District	0	0			

Discussion of Results

How many acoustic survey grid cells had Townsend's Big-eared bat detections? 2 grid cells in 2014 and 2015.

- No acoustic surveys were completed in 2018, 2019, or 2020.

How many caves had Townsend's Big-eared bat detections?

- From 2012-2017 four caves were surveyed by the Bigfork High School Caving Club all four had detections of Townsend's big-eared bats, although each cave was not surveyed each year.

Are the number of bat species detected increasing, decreasing, or staying the same? In the acoustic surveys there were six bat species detected across three survey grids in 2014, increasing to seven in 2015, and back down to six in 2016.

- There was no available survey data for 2013 or 2017. The number of species detected across the sampling years remained relatively static. The interpretation of this data should reflect the limited number of grids sampled over a limited timeframe.

Are there any bat species that were detected in the past that are no longer detected?

- There is no available data for the previous three years and a small dataset for the years prior so this question can only be answered partially and with limited confidence. There are individual species that were detected and not detected in subsequent years at the Spotted Bear River and Mud Lake grid cells. In the Mud Lake grid cell long-eared myotis, hoary, little brown myotis, Townsend's big-eared, and western small-footed myotis were detected in 2015 and not in 2016 (the final year of data we have available). In 2014, the big brown bat was detected while no detections were registered in 2015 or 2016. At the Spotted Bear River grid cell Townsend's big-eared bats were detected in 2015 but not in 2016. Similar to the Mud Lake grid cell, the Spotted Bear River grid cell also detected big browns in 2014 but not in 2015 and 2016. Limestone cave is the only cave surveyed by the Bigfork High School club that had Townsend's big-eared bats detected in 2017, the last year of data that is available. The remaining caves have had detections in the past but there were no detections in 2017. It is unclear from the data if the years where no detections were submitted reflected surveys where no detections were made or if there were no surveys completed during those years.

Are there any grid cells caves, mines, or buildings that previously had bats detected that have not had bats detected in the last 5 years?

- There is no available data for the previous three years and a small dataset for the years prior so this question can only be answered partially and with limited confidence. All three grid cells had bats detected in the years they were surveyed. There are individual species that were detected and then no longer detected in subsequent years at the Spotted Bear River and Mud Lake grid cells. Both Twilight and Columbia Mountain caves have had Townsends big-eared bats detected in the past but none in the last five years. It is unclear from the data if the years where no detections were submitted reflected surveys where no detections were made or if there were no surveys completed during those years.

Have grid cells, caves, mines, or buildings been surveyed consistently? Are there problems with the ability to compare between years?

- Grid cells, caves, mines, and buildings are not being surveyed consistently. All of these surveys are being done on a very limited and inconsistent basis. These surveys are influenced by the availability of funding, staff, and equipment and many occur on an opportunistic timeline. As a result of these factors a small amount of data has been collected limiting our ability to compare between years with confidence.

Have there been any indications of infection with White Nosed Syndrome or other diseases? If so, where and in what species?

- Not to date on or close to Flathead National Forest.

Have there been any evaluations for closure or removal of structures used by bats and measures specified to mitigate or provide for bat use?

- Yes, one on Swan Lake Ranger District in each of 2019 and 2020. No other closures were proposed during this time period.

Evaluation of Results and Adaptive Management Finding

NA Bat is not up to date with FNF survey data, this may be a resource in the future. NA BAT data submit partner portal data request to get:1) summaries by species and year. 2) map of FNF stationary acoustic point grid survey cells.

As a passive monitoring method we should have the ability to deploy monitors in a minimum of three grid cells annually.

Grid cell acoustic surveys for bats are now more reliable than sporadic surveys of caves, buildings and old mines conducted in the past. As a passive monitoring method, we should have the ability to deploy monitors in a minimum of three grid cells on the Forest annually, including caves where bats are known to occur, as well as caves in the wilderness portion of the South Fork Flathead River watershed, where most of the caves on the Forest occur.

Currently the Bigfork High School Cave Club surveys the caves on the FNF incidentally, efforts should be made to support the completion of surveys in caves where Townsend's big-eared bat have been detected in the past on an annual basis. Brian Heeringa from USFS Region 9 is working on getting national bat data since 2015 into the USFS NRM database. Bat acoustic data will be available thru EDW and the Geospatial interface in the future. Data input needs to occur on an annual basis and one consistent database should be used so that reliable information can be obtained without having to access multiple databases.

The following findings and recommendations from the evaluation of monitoring methods and results as documented above.

Table 39. Summary of Findings for Monitoring Item MON-WL-06 – Habitat Conditions for Townsend's Big-eared bats and Other Bat Species

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES – with modification of wording for IND-WL-19
Recommendations – See below.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN – (C) - Methods inadequate to assess the status or progress toward achieving plan component(s); Monitoring data results thus far are not sufficient to determine where key habitat occurs for a variety of bat species or understand the status of bat-related plan components. Surveys are influenced by the availability of funding, staff, and equipment and many occur on an opportunistic timeline. As a result of these factors a small amount of data has been collected limiting our ability to compare between years with confidence. IND-WL-19: The Bigfork High School Cave club will continue to survey caves opportunistically for the presence of Townsend's big-eared bats. This data can be used to identify potential hibernacula habitat but is not sufficient to detect trend. IND-WL-20: Surveys have been and will continue to be conducted on a case by case basis if any project proposes changes that may affect bats.
Recommendation – Change IND-WL-19 (see below).

3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Forest Plan Monitoring Program: Modify Indicator IND-WL-19 to be consistent with best available methods to use and data that results. Change to: "Number of grid cell acoustic surveys and number of detections of each bat species"

[1] PLAN IMPLEMENTATION STATUS: (A) Uncertain - Availability of data or Interval of data collection beyond this reporting cycle (indicate date of next time this monitoring item will be evaluated); (B) Uncertain - More time/data are needed to understand status or progress of the plan component(s); (C) Uncertain - Methods inadequate to assess the status or progress toward achieving plan component(s); (D) NO - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired; (E) YES - Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy

MON-WL-07: What is the status of habitat conditions that support common loons on code A territorial nesting lakes?

Introduction

Desired condition FW-DC-WL DIV-01 states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 40. Excerpt from Forest Plan table 14 for common loon

Associated Species	Key ecosystem and/or ecosystem characteristic	Desired condition description
Common loon	Lakes greater than 13 acres	Loons are not harassed or displaced from nesting due to human activities. Lakes and ponds with potential for nesting have shoreline or island sites with overhead cover. Small fish are available to provide food.

Objective FW-OBJ-WL DIV-01 states "Install structures such as floating signs and nest platforms to promote successful common loon reproduction on three to ten occupied lakes annually, as needed."

Guideline FW-GDL-WL DIV-05 states: "To reduce the risk of disturbance, new projects or new special-use authorizations for activities that are known to disrupt the select species listed in [FP] table 15 should not occur in key habitats during key time periods (see [FP] table 15) unless they include strategies designed to mitigate new disturbance. Exceptions to this guideline may occur for public health and safety or emergency activities."

Table 41. Excerpt from Forest Plan table 15 for common loons

Species	Key Habitat	Key Time Period
Common Loon	Within 150 yards of active common loon nesting/nursery sites	April 1 to August 1

Table 42. MON-WL-07 Common loon nesting. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data collection interval	Data Source / Partner	Point of Contact
FW-DC-WL DIV-01 FW-OBJ-WL DIV-01 FW-GDL-WL DIV-03	IND-WL- 21 Number of code A territorial nesting lakes surveyed for loon presence (Hammond 2009 or subsequent updates), in cooperation with other partners 22. Number of loon breeding pairs/chicks detected on code A territorial nesting lakes during July 23. Structures installed to support common loon nesting (if needed) 24. Number of projects authorized on NFS lands within 150 yards of active loon nesting sites and number that included activity timing	Data Collection: Yearly in May and July Data compiled annually in October	MT Common Loon Working Group	Forest wildlife biologist

Methods

IND-WL-21-22. Follow methods for May and July surveys in Common Loon Conservation Plan for Montana, as updated. As a minimum, code A nesting lakes will be surveyed each year, but additional lakes with loon pairs will be surveyed and included in the report if data is available. If additional lakes are not surveyed every year, indicate which years were surveyed and which were not.

IND-WL-23-24. District biologists report by fall of each year for accomplishment report.

Partnerships – MT Fish, Wildlife and Parks, Dept. of Natural Resources and Conservation, MT Loon Society, Blackfeet Tribe, Confederated Salish and Kootenai Tribes, MT Natural Heritage Program, Glacier National Park

Results

Table 43. Monitoring Evaluation Report – summary of data sources for MON-WL-07 - Common Loon

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-07	2020 nesting seasons	High level of confidence in data. Using standardized loon working group datasets and procedures. Data has been collected since 2006 but summaries are not yet available for years prior to 2020.

Table 44. IND-WL-06. Common Loon Nesting Lakes – chicks detected

Lake Name (Lakes on NFS lands with loon pairs)	2020 Survey				
Ashley Lake	*Y*				
Bailey Lake	*Y*				
Bootjack Lake	*Y*				
Cedar Creek Reservoir	*Y*				
Dog Lake	*Y*				
Finger Lake	*N*				
Half Moon Lake	*N*				
Holland Lake	*Y*				
Loon Lake Ferndale	*N*				
Loon Lake Kraft Creek	*N*				
Lost Coon Lake	*Y*				
Lower Stillwater Lake	*N*				
Mud Garnet Lake	*Y*				
Pierce Lake	*Y*				
Skyles Lake	*Y*				
Spencer Lake	*N*				

Lake Name (Lakes on NFS lands with loon pairs)	2020 Survey				
Spoon Lake	*N*				
Stanton Lake	*Y*				
Tally Lake	*N*				
Teepee Lake	*Y*				
Upper Stillwater Lake	*N*				
Van Lake	*N*				
Total Lakes with Pairs	*22*				
Total Lakes with Chicks	*12*				

Y-chicks detected, N=chicks not detected, *= not surveyed

Table 45. Monitoring Summary of Results for Common Loon (MFWP loon database)

Indicators	Monitoring Year 2020	Monitoring Year	Monitoring Year	Monitoring Year
IND-WL-21. Number of code A territorial nesting lakes surveyed for loon presence (Hammond 2009 or subsequent updates), in cooperation with other partners	22 surveyed per year in May and July			
IND-WL-22. Number of loon breeding pairs/chicks detected on code A territorial nesting lakes during July	12 breeding pairs/chicks detected in 2020			
IND-WL-23. Structures installed to support common loon nesting (if needed)	4 structures installed in 2020 Lower Stillwater, Pierce, Spoon, Tepee Lakes			
IND-WL-24. Number of projects authorized on NFS lands within 150 yards of active loon nesting sites and number that included activity timing	1 project with activity timing requirements in 2019 Crystal Cedar (2 units near Spoon Lake, 1 on Cedar Creek Reservoir)			

Discussion of Results

How many lakes have known loon nesting territories? Are the number of lakes on FNF lands with known loon pairs increasing, decreasing, or staying the same?

- In 2020 there were 22 lakes with loon nesting territories and the number appears to be staying the same when compared with past years.

How many lakes have known loon chick production? Are the number of territories on FNF lakes with loons producing chicks increasing, decreasing, or staying the same?

- In 2020 there were 12 of 22 lakes with known loon chick production and the number appears to be staying the same when compared with past years.

Are there any known nesting territories that have not had successful production of loon chicks in the past 3 years?

- Yes, Tally Lake

What may be contributing factors to the changes above? (e.g. high levels of human activity, storms/flooding/AIS, use of floating platforms as an adaptive strategy for fluctuating water levels, use of signs and/or loon rangers to reduce disturbance, etc.).

- High levels of lake-related recreation

Have nesting loon lakes been surveyed consistently? Are there problems with the ability to compare between years?

- Yes, they have been surveyed consistently, currently there is a data management problem accessing old data. A MT FWP IT person is merging and moving the databases, which is expected to be completed in March 2021. Until then, it is not possible to query the database. Data in the table above will be included in the 2023 monitoring report, for the 15-year time period 2008-2022.

Are projects being conducted within150 yards of active loon nesting sites? Do these projects include activity timing?

- Yes.

Evaluation of Results and Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 46. Summary of Findings for Monitoring Item MON-WL-07 – Habitat Conditions for Common Loons

1. Plan Monitoring Results: Did the monitoring results provide the information necessary to answer the monitoring question and understand the status of the associated plan component listed above?
YES
Recommendations – need to correct one of the plan components being monitored
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
YES Collaborative with the Common Loon Working Group May and July surveys yield population metrics for occupancy, distribution, and trend.
Recommendation – We recommend maintaining May and July surveys on FS lands in conjunction with the Montana Common Loon Working Group recommendations.
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?

CORRECTION to the plan components being monitored. FW-GDL-WL DIV-03 should be changed to FW-GDL-WL DIV-05.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain –** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy

MON-WL-08: What is the status of habitat for wildlife species associated with hardwood tree habitats on NFS lands?

Introduction

In the mountainous West, hardwood tree communities are disturbance dependent and may also be associated with high water tables such as seeps, springs, and areas which flood periodically. Beaver activity also helps to maintain hardwood communities. On the Forest, hardwood tree communities are composed of black cottonwood, aspen, paper birch, and water birch. Examples of key ecosystem characteristics for many species associated with this habitat include soft, decayed, or hollow trunks and a branching structure that provides nesting sites. Paper birch is known for loose bark that provides shelter as well as sap and catkins that provide food. Wildlife species associated with hardwood forests are known to nest, den, or rest in very large cottonwood trees where available (Fred L. Bunnell et al., 2002).

There are two categories of hardwood habitats on the FNF: persistent (due to soil conditions) and transitory (due to prescribed burning and/or timber harvest).

FW-DC-TE&V-09 states, "Persistent aspen or paper birch communities are rare across the Forest but occur in areas such as seeps where soil conditions tend to severely limit coniferous forest are present…." and "Through natural succession, coniferous species become more dominant, but hardwood species (especially aspen and birch) are present within these stands for several decades, providing habitat for a wide variety of wildlife species, including decayed hardwood trees for cavity nesters".

Objectives in the plan are designed to help achieve this desired condition. **FW-OBJ-TE&V-03** states: "Vegetation management treatments (e.g., timber harvest, planned ignitions, thinning, planting) occur on 500 to 5,000 acres of the Forest to contribute to restoration of diverse native hardwoods and associated wildlife species."

Table 47. MON-WL-08 hardwood tree habitat. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-09 FW-OBJ-TE&V-03	IND-WL- 25. Percentage of NFS lands with presence of hardwood tree species (birch, aspen or cottonwood). 26. Number of acres with vegetation management treatments focused on promoting hardwood tree species (birch, aspen or cottonwood).	IND-WL-25: R1 FIA SUMMARY REPORTS forested vegetation IND-WL-26: R1 Restoration and Resilience Report derived from FACTS database tracks activities to improve aspen to be more resilient.	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The region 1 summary database is updated periodically, usually every 5 years. FACTS database records activities accomplished on an annual basis	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

Methods

IND-WL-25: These estimates can be obtained directly from regional BSMS reports. Refer to vegetation monitoring item MON-TE&V-01 for indicator IND-TE&V-02 (Species presence) and copy the estimates for hardwood species from that table.

IND-WL-26. Treatments that would be included in this indicator are those that have as an objective the promotion or maintenance of hardwood tree species. Treatment could be either fire or mechanical. The Region 1 Restoration and Resilience Report (produced annually) reports acres of activities that occur with an objective of promoting Aspen, for purposes of "improving species composition to be more resilient". Estimate of acres for this indicator can be pulled directly from this report for the monitoring period (previous 2-year period).

Results

Table 48: Monitoring Evaluation Report – summary of data sources for MON-WL-08, Wildlife associated with hardwood tree habitat

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL- 15-16	Regional BSMS report estimates based on Hybrid FIA 2015 Summary database (data collected on FIA plots 2006-2015)	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics
2021	IND-WL- 18	Restoration and Resilience report data from 2019, 2020	High confidence

Table 49: Monitoring results for MON-WL-08, Wildlife associated with hardwood tree habitat

Indicator	Forest Plan Baseline	Forest Plan Desired Condition	Monitoring date and data results			
			2019	2020	2021	
IND-WL-25: Percent area (and total acres) with presence of hardwood tree species (birch, aspen, or cottonwood)	2.0% Cottonwood; 1.4% Birch; 0.9% Aspen Aspen/Hardwood dominance type 25,023 acres (12,341 – 45,415) 90% CI	**Species presence** 4 - 6 percent forestwide Where one or more species are present (cottonwood, birch and aspen)	NA	NA	**Species Presence**: 1.77% Cottonwood, 1.49% Birch 1.60% Aspen 4.86% combined total (acres may overlap) Aspen/Hardwood dominance type 32,286 acres Forestwide	
IND-WL-26. Acres of vegetation treatments focused on promoting			405 acres	No 2020 data available at time of report		

Indicator	Forest Plan Baseline	Forest Plan Desired Condition	Monitoring date and data results			
			2019	2020	2021	
hardwood tree species						

Discussion of Results

See the list of general discussion questions on page 1 of this document. Other potential questions to consider:

What is the forest-wide acreage where hardwood trees are present?

- As of 2020, the aspen/hardwood dominance type occurred on 32,286 acres forestwide

Are hardwood tree habitats stable, increasing, or are they consistently trending downwards (over multiple monitoring periods)?

- The acres in the aspen/hardwood dominance type are slightly higher than acres shown previously (see table above). The percent of the Forest with presence of aspen also increased slightly.

Are management activities addressing the need to maintain or create hardwood tree habitats where appropriate? How many acres have been accomplished towards meeting FW-OBJ-TE&V-03?

- Yes. As shown in the table above, 405 acres were treated in 2019.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring results as documented above.

Table 50. Summary of Findings for Monitoring Item MON-WL-08, Wildlife associated with hardwood tree habitat

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
Yes.
Recommendations – na
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
Yes. (E). This is based on slight increase in aspen/hardwood acres and actions maintaining hardwood habitats accomplished in appropriate locations.
Recommendation -- na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
NA

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-09. What is the status of habitat for wildlife species associated with grass/forb/shrub habitats on NFS lands?

Introduction

There are two categories of grass/forb/shrub habitats on the FNF: persistent (due to soil conditions or repeated, frequent wildfires) and transitory (due to prescribed burning and timber harvest). Both provide important winter forage for ungulates, especially elk. Persistent grass/forb/shrub habitats are often susceptible to weed invasion due to naturally low plant density, poor soil conditions, droughty conditions, and/or seed spread along trails used by stock. In these areas, weeds may also be persistent unless treated. Many private partners have helped to fund and implement weed control projects over the years, including but not limited to county Resource Advisory Committees (RAC), Backcountry Horseman, and Rocky Mountain Elk Foundation. Lack of fire and forest succession can also cause grass/forb/shrub areas to decrease in size and/or quality. Timber harvest and/or prescribed fire can be used to maintain or create grass/forb/shrub habitats.

The forest plan component monitored **is desired condition FW-DC-TE&V-09** which states: "Non-coniferous vegetation types are present across the Forest and meet the characteristics described in [FP] table 5. These communities provide habitat for associated wildlife species." Forest plan table 5 for this desired condition is provided below.

Table 51. Forest Plan table 5: Current and desired conditions forestwide for non-coniferous plant communities.

Plant Community	Current condition [a] (%)	Desired range (%)	Desired Condition
Hardwood tree communities (primarily black cottonwood, paper birch, quaking aspen)	Dominance type 1.3 (0.4-1.9) Species Presence Cottonwood: 2.0 (1.0-2.9) Birch: 1.4 (0.7-2.3) Aspen: 0.9 (0.3-1.6)	Dominance type (persistent community) 1-2.5 Species presence 4-6 one or more of these species are present	Persistent[b] cottonwood communities occur across the forest in areas associated with high and/or fluctuating water tables, providing habitat for a wide variety of wildlife species. Very large black cottonwood trees occur along large, low-gradient streams where seasonal flooding sustains a variety of age and size classes and a variety of patch sizes from less than an acre to over 100 acres, depending upon site capability. Persistent aspen or paper birch communities are rare across the Forest but occur in areas such as seeps where soil conditions tend to severely limit coniferous forest development. Hardwood tree communities have a high diversity of in the understory. Transitional hardwood communities occur most commonly in the early successional stage, such as after a fire or harvest, where hardwood trees comprise 40% or greater of the tree canopy cover. These communities are most abundant on warm-moist types and in riparian areas. Through natural succession, coniferous species become more dominant, but hardwood species (especially aspen and birch) are present within these stands for several decades, providing habitat for a wide variety of wildlife species, including decayed hardwood trees for cavity nesters. Canopy gaps and small openings are periodically created over time within the coniferous forest landscape by disturbances (such as fire or harvest) to provide sites where hardwoods continue to successfully regenerate and/or grow into larger-sized trees. Refer also to desired conditions related to early successional and recently burned coniferous forest types (FW-DC-TE&V-10, 11, and 25).
Grass/forb/shrub communities	Persistent communities 5 Transitional communities See estimated percent for seedling/sapling size class and burned forest FW-DC-TE&V-10, 11, and 25	Persistent communities 5-7 Transitional communities See desired conditions for seedling/sapling size class and burned forest (FW-DC-TE&V- 10, 11, and 25)	Grass/forb/shrub plant communities are dispersed widely across the Forest, including persistent types, providing habitat for a variety of wildlife species. The common types of grass/forb/shrub communities are (1) Persistent[b] communities on mid- to high-elevation moist to wet sites; may be wet meadows or shrub dominated. Maintained by avalanches, a high water table, or harsh site conditions that slow or preclude establishment of trees. (2) Persistent communities on mid- to low-elevation relatively dry sites; may be grass dominated but may also have abundant forbs and shrubs. Maintained by site and soil conditions that slow or preclude establishment of trees. (3) Transitional communities occurring within all forested potential vegetation types during the early successional stages after disturbances such as fire or harvest. This the most common non-coniferous plant community type. It persists for one or more decades and is eventually replaced through natural succession by coniferous forest types.

a. Data source: Dominance Mid 40 and species presence attribute, R1 Summary Data Base, Hybrid 2011, from data produced by the Forest Service's Inventory and Analysis program. Estimated mean across all the Forest's NFS land, displaying lower and upper bounds at 90% confidence interval. Reports were run in 2016.
b. For purposes of this desired condition, these plant communities are considered persistent if they remain hardwood- or grass/forb/shrub-dominated for 50 or more years.

Objective FW-OBJ-TE&V-04 helps achieve these desired conditions and reads as follows: "Vegetation management treatments (e.g., planned ignitions, slashing, control of non-native, invasive plants) occur on 1,500 to 5,000 acres of the Forest to promote persistence of grass/forb/shrub plant communities, focusing on key habitats for big game species and pollinators, to improve conditions for native plant establishment and growth and reduce non-native plants."

Objective FW-OBJ-NNIP-01 also contributes to achieving the desired condition and reads as follows: "Treat 12,000 to 16,000 acres to contain or reduce non-native invasive plant density, infestation area, and/or occurrence. Greatest attention will be given to treating potential invaders or new invaders most likely to negatively impact native plant communities and ecosystem integrity, especially in areas identified as high priority (see FW-DC-NNIP-01). "

Table 52. MON-WL-09 grass/forb/shrub habitats. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-09 FW-OBJ-TE&V-04 FW-OBJ-NNIP-01	IND-WL- 27. Percentage of NFS lands in the grass/forb/shrub condition class. 28. Number of acres treated to promote grass/forb/shrub habitats for wildlife 29. Number of key ungulate winter habitat acres treated to control non-native invasive plants	IND-WL-27: R1 FIA SUMMARY REPORTS Non-forested vegetation IND-WL-28, 29: ???	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The region 1 summary database is updated periodically, usually every 5 years.	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

Methods

IND-WL-27: Estimates for acres and percent of non-forest types will come directly from the R1 FIA Summary database, as summarized in the regionally produced BSMS reports. The BSMS report that summarizes the "LIFEFORM" attribute should be used for monitoring non-forest types on the Flathead. "Lifeform" is a classification of the dominant plants found on a site. FIA survey protocol assigns a "Tree" lifeform if at the time of measurement the Basal Area is >20 sq ft or trees per acre is >100. All other plots fall into a non-forest type of lifeform. The FNF has the following non-forest lifeform classes: Forb, Grass, Shrub, Sparse Veg, and Non-Veg. On the FNF, many of these non-forest lifeforms are relatively persistent over time, for example sites of very low productivity that support few to no trees in perpetuity. However, some are more transitory and will eventually support sufficient numbers of trees to qualify as a tree lifeform, but it may take several decades due to environmental or other factors.

The "Seedling" forest size class typically has a high proportion of grass, forbs and shrubs, in addition to the tree seedlings, depending on the particular site. This forest size class provides important grass/forb/shrub wildlife habitat, though for shorter time period than the non-forest vegetation types. The natural fire regimes of the Flathead have periodically produced large areas of transitory

seedling/grass/forb/shrub habitats. The estimate for seedling size class can be found in the Terrestrial Vegetation calculation spreadsheet where all the BSMS reports are "converted" to vegetation results tables (*Monitoring_Guide_TERRESTRIAL_VEG_FIA_Calculations spreadsheet*.) Refer to 'SizeClassFW' tables in this spreadsheet.

The recommendation is to modify this indicator to be consistent with the FIA summary database attributes and the desire to monitor both persistent and transitory grass/forb/shrub types. New indicator is:

IND-WL-27. Percentage/acres of NFS lands that are grass, forb or shrub non-forest lifeform and percentage/acres of NFS lands that are seedling forest size class.

IND-WL-28: Treatments that would be included in this indicator are those that have a specific objective maintaining or improving grass/forb/shrub habitats for wildlife. Most often these would be prescribed burns, but mechanical treatments may also be used. For tracking purposes, project biologists will fill out the Forest Biologist's spreadsheet listing acres to be treated by vegetation management with the specific intention of maintaining grass, forb or shrub habitats. The spreadsheet will be filled out for project decisions signed after December 27, 2018 when the revised forest plan ROD was signed. Our intent is to develop a method to track accomplishment through a database in the future and report this item in the monitoring report once accomplished.

The recommendation is to modify this indicator slightly FROM: "Number of acres treated to promote grass/forb/shrub habitats for wildlife" TO "Number of acres treated to maintain or restore key ungulate winter grass/forb/shrub habitats."

IND-WL-29: In transitory grass/forb/shrub areas, invasive plant infestations are also generally transitory because most weeds do not survive once trees become dominate on a site. Monitoring item IND-WL-29 will track treatment of weeds in key grass/forb/shrub winter habitats. The highest acreage is on the Spotted Bear Ranger District (e.g., the Dry Park, Horse Ridge, and multiple areas in Wilderness). Biologists, working with the invasive plant coordinator and Spotted Bear personnel, would compile acres treated.

Results

Table 53: Monitoring Evaluation Report – summary of data sources for MON-WL-09, Wildlife species associate with grass/forb/shrub habitat

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-27	Regional BSMS report estimates based on Hybrid FIA 2015 Summary database (data collected on FIA plots 2006-2015)	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics
2021	IND-WL-28, 29	Accomplishment reporting data from 2019 and 2020	High confidence

Table 54: Monitoring results, IND-WL-27. Percentage/acres of NFS lands that are grass, forb or shrub non-forest lifeform and percentage/acres of NFS lands that are seedling forest size class.

Indicator	Forest Plan Baseline	Monitoring data results: 2021	Monitoring data results	Monitoring data results
IND-WL-27: Acres and % area forestwide: Grass, forb, or shrub lifeform or Seedling forest size class	GFS: 194,794 acres/ 8.8% Seedling: 123,643 acres/ 5.26%	GFS: 232,154 acres/ 10.28% Seedling: 149,133 acres/ 6.34%		

Table 55. Monitoring Results, IND-WL-28. Acres of vegetation treatments focused specifically on maintaining grass/forb/shrub non-forest types for wildlife habitat

Project	2018			2019			2020
	Acres	Partner	Part. $	Acres	Partner	Part. $	
Wild Cramer	381			149			
Swan Valley Bottom	104				RMEF, NWTF	$8,000, $2,000	
Total	485			149		$10,000	0

Table 56. Monitoring Results, IND-WL-29. Acres in key ungulate winter habitat treated to control non-native invasive plants

Project	2018			2019			2020
	Acres	Partner	Part. $	Acres	Partner	Part. $	
Swan Lake Ranger District Weed Treatments	587	RMEF	$3,000	1,000			0

Discussion of Results

What is the trend in the amount of grass/forb/shrub habitats?

- Amount of grass/forb/shrub habitat, including the seedling forest size class, has increased slightly (about 1%) over the monitoring period. Natural disturbances, particularly fire, is the likely cause for this degree of change. More time is needed to determine whether this trend upwards will be persistent for a period of time, or fluctuate in response to natural disturbance events, and to a lesser degree management activities.

*Are management activities addressing the need to maintain or restore grass/forb/shrub habitats towards meeting **FW-OBJ-TE&V-04**?*

- Yes. 634 acres treated from 2018, the baseline year, to 2021. No activities were completed in 2020 due to Covid-19 restrictions.

*Are management activities addressing the need to treat invasive plant infestations in key grass/forb/shrub winter habitats towards meeting **FW-OBJ-NNIP-01?***

- Yes. 1587 acres treated from 2018, the baseline year, to 2021. No activities were completed in 2020 due to Covid-19 restrictions.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 57. Summary of Findings for MON-WL-09, Wildlife species associate with grass/forb/shrub habitat

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES , with some minor clarification of wording in IND-WL-27, 28
Recommendations – Modify wording of Indicator 27 and 28 to clarify intent
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
YES, based on slight increase of habitat and acres treated
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Plan monitoring program. Change wording to: IND-WL-27. Percentage/acres of NFS lands that are grass, forb or shrub non-forest lifeform and percentage/acres of NFS lands that are seedling forest size class. IND-WL-28. Number of acres treated to maintain or restore key ungulate winter grass/forb/shrub habitats.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s);.(**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-10: What is the status of habitat for wildlife species associated with snags and potential live snag replacement trees in the 20-inch-or-greater d.b.h. class?

MON-WL-11: What is the status of habitat for wildlife species associated with snags and potential live snag replacement trees in the 10-inch-or-greater d.b.h. class?

Introduction

Snags provide key ecosystem characteristics for a wide variety of wildlife species. The forest plan adopted desired conditions for snags in FW- DC-TE&V-15 (Table 58) which states:

> "Desired conditions for snag densities across the Forest are displayed in [FP] table 10. At the landscape scale, snag presence, distribution, density, size, and species are highly variable both spatially and over time. Individual stands or sites may have no snags in these size categories or a much higher number of snags per acre, depending upon the unique conditions and disturbance history. The highest densities of snags are generally found in the areas with lower direct human influence, such as wilderness or unroaded areas, in riparian management zones, and in areas that have burned in the recent past or have had recent insect and disease infestations. The lowest densities of snags are found in areas where concern for fire hazard is elevated (such as in portions of the wildland-urban interface); in fuel breaks; in areas with concern for human safety (such as developed recreation sites); and in areas within 200 feet of open roads accessible to firewood cutting (especially those close to human communities). Snags suitable for nesting and denning, particularly in very large sizes (i.e., greater than 20 inches d.b.h.), are present not only in old-growth forests but across the matrix of forest lands, contributing to the diversity of forest structure and to the sustainability of wildlife and pollinator species associated with snags (such as flammulated owls and fisher)."

Table 58. Forest Plan table 10: Desired minimum in average snags per acre of conifer species, as measured across all forested acres of the Forest, by forest dominance type, potential vegetation type, and snag diameter

Forest dominance types	Potential vegetation type	Desired minimum in average number of snags per acre greater than or equal to 10 inches d.b.h.	Desired minimum in average number of snags per acre greater than or equal to 20 inches d.b.h.
All except lodgepole pine	Warm-dry	5.0	0.7
All except lodgepole pine	Warm-moist	13.0	1.8
All except lodgepole pine	Cool-moist	15.0	1.2
All except lodgepole pine	Cold	10.0	0.9
Lodgepole pine	All	6.0	0.1

Desired condition FW-DC-TE&V-16 also is being monitored and reads: "Snags contribute to cavity habitat distribution in managed areas of the Forest in the short and long term. Snags or decaying and broken-topped live trees greater than 20 inches d.b.h. are present, predominantly ponderosa pine or western larch (which have the greater longevity and value as snags), providing habitat for primary cavity nesters (a variety of woodpecker species), secondary cavity-nesters (such as flammulated owls), and mammals (such as marten and fisher). These and other snags greater than 15 inches d.b.h. are also available for boreal owls, chickadees, bluebirds, and numerous other species associated with tree cavities".

Table 59. MON-WL-10 and 11 plan components, indicators, data source, data collection interval, and point of contact

Plan Component	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-15, 16	IND-WL- 30. Percentage of NFS lands with presence of snags greater than or equal to 20 inches d.b.h. in each PVT 31. Average number of snags per acre on NFS lands greater than or equal to 20 inches d.b.h. in each PVT 32. Average number of live trees per acre greater than or equal to 20 inches d.b.h. in each PVT 33. Percentage of NFS lands with presence of snags greater than or equal to 10 inches d.b.h. in each PVT 34. Average number of snags per acre on NFS lands greater than or equal to 10 inches d.b.h. in each PVT 35. Average number of live trees per acre greater than or equal to 15 inches d.b.h. in each PVT	R1 FIA SUMMARY REPORTS - snag and live tree reports	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The region 1 summary database is updated periodically, usually every 5 years.	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

Methods

For all indicators, estimates are derived from the R1 FIA SDB, reported in the Snag and Live tree density reports.

IND-WL-31 and 34: These indicators are consistent with the regional snag and live tree density reports, and also the same data reported for the snag density indicator in the terrestrial vegetation section (MON-TE&V-01, indicator IND-TE&V-08). Pull the data directly from this indicator in the Terrestrial vegetation section.

IND-WL-30, 32, 33 and 35: These indicators are not consistent with the regional reporting, and these estimates cannot be obtained directly from the BSMS or snag/live tree regional reports. For efficiency of Forest Plan monitoring, it is recommended that the indicators be modified as described below.

IND-WL-30 and 33. The regional "Snag and Live Tree Density" reports has estimates on snag presence by PVT for areas on the Forest INSIDE Wilderness/Roadless and OUTSIDE Wilderness/Roadless. The indicators in the FNF plan indicators can be modified to be consistent with regional reporting as follows:

IND-WL-30. *Percent of NFS lands with presence of at least 1 snag per acre greater than or equal to 20 inches d.b.h. in each PVT, Inside and Outside Wilderness/Roadless areas.*

IND-WL-33. *Percent of NFS lands with presence of at least 1 snag per acre greater than or equal to 10 inches d.b.h. in each PVT, Inside and Outside Wilderness/Roadless areas.*

Modification of monitoring item IND-WL-33 is to be consistent with the Broad Scale Monitoring Strategy reporting resulting in improved efficiency of the monitoring task. Data would still be accessible through both FIA and through other fine scale means (i.e., Common Stand Exams) for assessment of snag densities relative to Flathead Forest Land Management Plan Direction project planning.

IND-WL-32 and 35**:** Similarly, to snags, there is no regional report providing data on live tree presence by PVT on a forestwide basis. However, there is data (in the "Snag and Live Tree Density" reports) on live tree presence by PVT for areas on the Forest INSIDE Wilderness/Roadless and OUTSIDE Wilderness/Roadless. The indicators in the FNF plan should be modified to be consistent with regional reports as follows:

IND-WL-32. *Density (tpa) of Live trees greater than or equal to 20 inches d.b.h. (tpa) in each PVT, Inside and Outside Wilderness/Roadless areas.*

IND-WL-35. *Density (tpa) of Live trees greater than or equal to 15 inches d.b.h. (tpa) in each PVT, Inside and Outside Wilderness/Roadless areas.*

Results

Table 60: Monitoring Evaluation Report – summary of data sources for MON-WL-10 and 11, Habitat for species associated with snags and potential live snag replacement trees

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-30, 31, 32, 33, 34, 35	The regional snag estimate tables are based on the Hybrid FIA 2011 database (same as used in the analysis for the 2018 FNF Forest Plan)	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring vegetation characteristics

Table 61: Monitoring results for monitoring questions MON-WL-10 and 11, Habitat for species associated with snags and potential live snag replacement trees. ("Wild/Rdlss" = Wilderness/Roadless).

Indicator	Forest Plan Baseline [3]	Monitoring Data Results: 2021	Monitoring Data Results:	Monitoring Data Results:
IND-WL-30: % area with at least 1 snag/acre >=20" dbh	Bush & Reyes 2020 Appendix B, Table 6	No new data. Snag and live tree density		

[3] Data source is: Bush, Renate, and Brian Reyes. 2020. Estimates of Snag and Live-Tree Densities for Western Montana Forests in the Northern Region Based on FIA Hybrid 2011 Analysis Dataset. Region One Vegetation

Indicator	Forest Plan Baseline [3]	Monitoring Data Results: 2021	Monitoring Data Results:	Monitoring Data Results:
WD PVT Inside Wild/Rdlss WD PVT Outside Wild/Rdlss	7.4 (1-15.6) 1.4 (0-5)	reports were not updated with new FIA dataset in time for the monitoring report		
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	8.3 (0-25) 10.3 (2.3-19.7)			
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	10.4 (7.1-14.2) 6.6 (3.2-10.3)			
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	8.5 (3.9-13.6) 3.6 (0-12.5)			
IND-WL-31: Density of snags per acre >=20" dbh	Bush & Reyes 2020 Appendix B, Table 1			
Warm-dry PVT	1.2 (0.2-2.6)			
Warm-moist PVT	1.5 (0.3-3.1)			
Cool-moist PVT	2.1 (1.4-3.0)			
Cold PVT	1.4 0.6-2.5)			
IND-WL-32: Density of live trees per acre >=20" dbh	Bush & Reyes 2020 Appendix B, Table 3			
WD PVT Inside Wild/Rdlss WD PVT Outside Wild/Rdlss	4.5 (2.1-7.1) 4.7 (2.0-7.9)			
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	6.0 (0-13.4) 2.2 (0.4-4.5)			
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	6.8 (5.0-8.8) 5.5 (3.9-7.2)			
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	1.5 (0.6-2.6) 9.5 (2.4-18.1)			
IND-WL-33: % area with at least 1 snag/acre >=10" dbh	Bush & Reyes 2020 Appendix B, Table 6			
WD PVT Inside Wild/Rdlss	32.9 (20-46.4)			

Classification, Mapping, Inventory and Analysis Report 20-02 v. 1.0. USDA Forest Service Region 1, Missoula, MT. October 16, 2020.

Indicator	Forest Plan Baseline [3]	Monitoring Data Results: 2021	Monitoring Data Results:	Monitoring Data Results:
WD PVT Outside Wild/Rdlss	16.7 (6.3-28.8)			
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	41.7 (0-75) 26.5 (12.5-42.2)			
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	42.1 (36.4-48.4) 25.5 (19.5-31.8)			
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	 32.2 (23.8-40.8) 53.6 (30-75)			
IND-WL-34: Density of snags per acre >=10” dbh	Bush & Reyes 2020 Appendix B, Table 1			
Warm-dry PVT	11 (6.3-16.3)			
Warm-moist PVT	11.1 (5.2-18.0)			
Cool-moist PVT	18.6 (15.3-22.3)			
Cold PVT	17.2 (12.2-22.8)			
IND-WL-35: Density of live trees per acre >=10” dbh	Bush & Reyes 2020 Appendix B, Table 3			
WD PVT Inside Wild/Rdlss WD PVT Outside Wild/Rdlss	13.5 (7.7-19.7) 17 (8.5-26.5)			
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	14 (0-30) 15.2 (9.2-21.7)			
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	16.0 (13-19.3) 14.7 (11.5-18)			
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	 8.2 (5-11.8) 18.9 (8.4-30.1)			

Discussion of Results

How does the density of snags greater than 20" DBH compare to desired conditions for each PVT?

Table 62. IND-WL-31. Forest Plan baseline conditions compared to desired conditions: Habitat for species associated with snags greater than or equal to 20 inches DBH

PVT Inside/Outside Wilderness	Forest Plan Baseline Condition Density of snags per acre >=20" dbh	Desired Condition for density of snags per acre >=20" dbh from Forest Plan table 10.
Warm-dry PVT	1.2 (0.2-2.6)	0.7
Warm-moist PVT	1.5 (0.3-3.1)	1.8
Cool-moist PVT	2.1 (1.4-3.0)	1.2
Cold PVT	1.4 0.6-2.5)	0.9

Table 63. IND-WL-34. Forest Plan baseline conditions compared to desired conditions: Habitat for species associated with snags greater than or equal to 10 inches DBH

PVT Inside/Outside Wilderness	Forest Plan Baseline Condition Density of snags per acre >=10" dbh	Desired Condition for density of snags per acre >=10" dbh from Forest Plan table 10.
Warm-dry PVT	11 (6.3-16.3)	5.0
Warm-moist PVT	11.1 (5.2-18.0)	13.0
Cool-moist PVT	18.6 (15.3-22.3)	15.0
Cold PVT	17.2 (12.2-22.8)	10.0

The density of snags per acre >=20" dbh exceeds the minimum desired numbers except for the warm-moist PVT. The density of snags per acre >=10" dbh exceeds the minimum desired numbers except for the warm-moist PVT.

How does the density of live trees per acre greater 20" DBH affect the potential for future snags?

Table 64. IND-WL-32. Potential for future snags greater than or equal to 20 inches DBH. Future habitat for species associated with snags greater than or equal to 20 inches DBH

PVT Inside/Outside Wilderness	Forest Plan Baseline Condition Density of live trees per acre >=20" dbh	Potential to meet desired conditions for snags in the future
WD PVT Inside Wild/Rdlss WD PVT Outside Wild/Rdlss	4.5 (2.1-7.1) 4.7 (2.0-7.9)	There are 6-7 times more live trees per acre than needed to meet desired future snag densities, both inside and outside wilderness
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	6.0 (0-13.4) 2.2 (0.4-4.5)	There are about 3 times more live trees per acre than needed to meet desired future snag densities inside wilderness. Outside wilderness there are about 1.5 times more live trees per acre than needed to meet desired future snag densities.

PVT Inside/Outside Wilderness	Forest Plan Baseline Condition Density of live trees per acre >=20" dbh	Potential to meet desired conditions for snags in the future
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	6.8 (5.0-8.8) 5.5 (3.9-7.2)	There are 5-6 times more live trees per acre than needed to meet desired future snag densities inside wilderness and about 3 times more live trees per acre than needed to meet desired future snag densities outside wilderness
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	1.5 (0.6-2.6) 9.5 (2.4-18.1)	There are about 1.6 times more live trees per acre than needed to meet desired future snag densities inside wilderness. Outside wilderness there are about 10.5 times more live trees per acre than needed to meet desired future snag densities.

Live trees per acre >=20" dbh are probably sufficient to provide snags as trees die over time, except possibly in the warm moist PVT outside wilderness and in the cold PVT inside wilderness. In these two categories, it is unlikely that trees would die fast enough to produce the desired number of snags. Future project decisions may need to emphasize marking and retention of snags and live trees >=20" dbh to provide future snags—especially those with heart rot and broken tops, but also including trees that are sound.

How does the density of live trees per acre greater 10" DBH affect the potential for future snags?

Table 65. IND-WL-35. Potential for future snags greater than or equal to 10 inches DBH. Future habitat for species associated with snags greater than or equal to 10 inches DBH

PVT Inside/Outside Wilderness	Forest Plan Baseline Condition Density of live trees per acre >=10" dbh	Potential to meet desired conditions for snags in the future
WD PVT Inside Wild/Rdlss WD PVT Outside Wild/Rdlss	13.5 (7.7-19.7) 17 (8.5-26.5)	There are 3 times more live trees per acre than needed to meet desired future snag densities, both inside and outside wilderness
WM PVT Inside Wild/Rdlss WM PVT Outside Wild/Rdlss	14 (0-30) 15.2 (9.2-21.7)	There are about equal live trees per acre existing as needed to meet desired future snag densities both inside and outside wilderness
CM PVT Inside Wild/Rdlss CM PVT Outside Wild/Rdlss	16.0 (13-19.3) 14.7 (11.5-18)	There are about equal live trees per acre existing as needed to meet desired future snag densities both inside and outside wilderness
COLD PVT Inside Wild/Rdlss COLD PVT Outside Wild/Rdlss	8.2 (5-11.8) 18.9 (8.4-30.1)	There are slightly less live trees per acre existing as needed to meet desired future snag densities inside wilderness. Outside wilderness there are about twice as many live trees per acre as needed to meet desired future snag densities.

Live trees per acre >=10" dbh are probably sufficient to provide snags as trees die over time, except in the warm moist PVT outside wilderness and in the cold PVT inside wilderness. In these two

categories, it is unlikely that trees would die fast enough to produce the desired number of snags. Future project decisions may need to emphasize marking and retention of snags and live trees >=10" dbh to provide future snags, including trees that are sound.

Since there is no new data, there is no discussion of results for this monitoring period for the questions below.

At next monitoring cycle, updates to the snag and live tree density reports at the regional level will have occurred and results will be discussed. To guide the discussion in future monitoring cycles, here are some potential questions to consider:

1. *Is the presence and density of snags in >=10" dbh and in 20"+ dbh class in each PVT increasing, decreasing or staying the same over time?*
2. *Is the density of live trees per acre >= 20 inches d.b.h. in each PVT increasing, decreasing or staying the same over time?*
3. *What might be reasons for observed trends? Consider possible mortality factors, such as fire, insect outbreaks, drought. Consider forest successional processes, shifting of successional stage distribution and snag conditions over time. Consider management actions such as timber harvest or temporary opening of roads for firewood cutting.*
4. *Are there potential implications of trends to wildlife habitat?*
5. *Review results for monitoring item MON-TE&V-05, which is the monitoring associated with implementation of the snag retention standards for harvest units. Results of this monitoring may be useful in the interpretation of trends*

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of methods and monitoring results as documented above.

Table 66. Summary of Findings for Monitoring Item MON-WL-10 and 11, Habitat for species associated with snags and potential live snag replacement trees

1. **Plan Monitoring Results**: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES, with some changes to four indicators.
Recommendations –modify four of the indicators related to live trees and snags, to be consistent with regional BSMS reports. New indicator language: **IND-WL-30.** Percent of NFS lands with presence of at least 1 snag per acre greater than or equal to 20 inches d.b.h. in each PVT, Inside and Outside Wilderness/Roadless areas. **IND-WL-32.** Density (tpa) of Live trees greater than or equal to 20 inches d.b.h. (tpa) in each PVT, Inside and Outside Wilderness/Roadless areas. I**ND-WL-33.** Percent of NFS lands with presence of at least 1 snag per acre greater than or equal to 10 inches d.b.h. in each PVT, Inside and Outside Wilderness/Roadless areas. **IND-WL-35**. Density (tpa) of Live trees greater than or equal to 15 inches d.b.h. (tpa) in each PVT, Inside and Outside Wilderness/Roadless areas.

2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
UNCERTAIN. (A) New data for 2021 monitoring report not yet available
Recommendation - NA
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, <u>where</u> might that change might be needed?
Forest Plan Monitoring Program

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-12. What is the status of habitat for wildlife species associated with downed woody material?

Introduction

Downed woody material is created by wildfire, prescribed fire, forest insects/disease, and timber harvest. On the Forest, snags of all sizes and downed woody material provide essential habitat features for at least 60 species of birds, mammals, and amphibians. Several small mammal, amphibian, and invertebrate species use accumulations of large, downed woody material on the forest floor for shelter (Carey, 1996). Species such as the pileated woodpecker and fisher are associated with forest structure that has snags and downed wood in the very large size class for nesting, resting, feeding, and/or denning. Down wood habitats provide instream nesting or loafing sites for species such as Harlequin ducks. The exact minimum and maximum amounts needed by each species and for a healthy ecological community are not known.

Desired condition in the plan **FW-DC-TE&V-17** pertains to downed wood and reads as follows:

> "Downed wood, especially the larger material (9 inches or larger in diameter), is present across the matrix of forested lands, contributing to forest structural diversity, soil ecological function, and habitat for wildlife species associated with downed wood for feeding, denning, resting, and cover such as pollinators, Canada lynx, grizzly bears, pileated woodpeckers, marten, and fisher. The desired condition for downed wood is displayed in [FP] table 11, which is expressed as a forestwide minimum average amount across all forested acres within each potential vegetation type. Downed wood is highly variable in amount, sizes, species, and stages of decay, both across the landscape and over time. Specific stands or sites may have much lower or higher amounts of downed wood per acre, depending upon the unique conditions, site-specific management objectives, and disturbance history. Lowest amounts of downed wood (e.g., less than 10 tons per acre) are found in areas where concern for fire hazard is elevated, such as in portions of the wildland-urban interface and in areas within 200 feet of open roads accessible to firewood cutting. Highest amounts are generally found in areas that have experienced fire or insect and disease infestations more than 10 years previously and in riparian management zones.
>
> The table below is [FP] table 11 in the downed woody desired condition and displays desired minimum for average total tons per acre downed wood, as measured across all forested acres within each potential vegetation type on the Forest."

Table 67. FW-DC-TE&V-17: [FP] table 11 describing downed woody desired condition

Potential vegetation type	Desired minimum in total tons per acre as a forestwide average
Warm-dry	14
Warm-moist	22
Cool-moist	25
Cold	15

Table 68. MON-WL-12 downed woody habitat. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-17	IND-WL- 36: Average tons per acre on NFS lands in each PVT of downed woody material, both total tons and tons greater than 3 inches diameter.	R1 FIA SUMMARY REPORTS forested vegetation	FIA plots across the Forest are remeasured on a scheduled basis, with individual plots remeasured every 10 years. The region 1 summary database is updated periodically, usually every 5 years.	Primary: Forest wildlife biologist Secondary: Forest silviculturist (to assist in interpreting R1 Summary Database Reports and FIA data)

Methods

IND-WL-36: Data for monitoring of downed wood comes from the R1 FIA Summary database. Regional BSMS reports will not provide this data at this time. If they have the skills, FNF personnel could generate reports from the summary database using the estimator form. However, there are some issues with the calculated values for tons per acre of downed woody material in the FIA database, as explained below.

There is uncertainty as to whether the values are actually correctly being calculated by the FSVeg function, which is much more complicated with downed woody than it is for other types of vegetation data. The functions have not been validated 100% to ensure they are calculating correctly. The recommendation from Regional specialists is to wait until the estimates of downed woody material can be validated, after which reports can be run by the region to provide estimates for the forest. This task may take some time before it is done. The FNF will incorporate estimates of downed woody in the monitoring report when these issues have been corrected, as recommended by the Regional specialist.

Results

Table 69: Monitoring Evaluation Report – summary of data sources for MON-WL-12, Downed Woody Material

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL- 15-16	Regional BSMS report estimates based on Hybrid FIA Summary database	Low level of confidence in downed woody estimates at present time, but the plan is to correct this issue in the future.

Table 70: Monitoring results for MON-WL-12, Habitat for species associated with downed woody material

Indicator	Forest Plan Baseline	Monitoring data results:	Monitoring data results:	Monitoring data results:
IND-WL-36: Ave. tons per acre of downed woody material, Total tons per acre, all diameters				
Warm-dry PVT	13.7			

Indicator	Forest Plan Baseline	Monitoring data results:	Monitoring data results:	Monitoring data results:
Warm-moist PVT	22.5			
Cool-moist PVT	25.2			
Cold PVT	15.2			
IND-WL-36: Ave. tons per acre of downed woody material, Tons >3" diameter (coarse woody material)				
Warm-dry PVT	3.8			
Warm-moist PVT	8.6			
Cool-moist PVT	11.9			
Cold PVT	8.8			

Discussion of Results

There is no data for this monitoring cycle (see reasons in 'Methods' section above)

For future monitoring cycles, when data becomes available, the following points and discussion questions may be considered:

Is there variation by PVT?

- We know of no science indicating minimum amounts of downed woody material for wildlife species, only that it is needed.

How is the tons per acre of down woody material in each PVT changing over time, if at all?

- Trends over time can be noted, and probable causes of the trends (such as recent wildfire, insect/disease epidemics, natural succession and forest size class (age) distributions).

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 71. Summary of Findings for Monitoring Item MON-WL-12, Habitat for species associated with downed woody material

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES – it is the right question, but the data is not available at this monitoring cycle
Recommendations – na

2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item?
Uncertain (A). Availability of data or interval of data collection beyond this reporting cycle. It is uncertain when data will be available. The FNF will incorporate estimates of downed woody in the monitoring report when these issues have been corrected.
Recommendation -- na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
na

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2]**CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-13. What is the status of habitat for wildlife species associated with forests burned with moderate- to high-severity wildfire?

Introduction

Examples of key ecosystem characteristics of burned forests are very high densities of dead trees for nesting, an enhanced insect prey base following fire-induced tree mortality, and open canopy and understory conditions when compared to unburned coniferous forests. Species such as Black-backed woodpeckers are known to feed upon dead trees for up to about 10 years post-fire.

Desired condition FW-DC-TE&V-25 in the plan is for burned forests and reads as follows:

> "Planned and unplanned ignitions occur periodically and create recently burned forest conditions (a fire event within the preceding 10 years) that trend towards desired conditions for plant and wildlife species associated with burned forest (such as the black-backed woodpecker and northern hawk owl). Recently burned forests are consistent with the natural range of variation at the landscape scale. Salvage within burned forests to meet desired conditions may occur in certain circumstances, as described in other sections of this forest plan (see Forest Vegetation Products: Timber section and suitability determinations under each management area). Desired characteristics for recently burned forests are described in [FP] table 13."

[FP] Table 13. Estimated natural range of variation and desired conditions forestwide for recently burned forest conditions (forests that have had a fire event within the preceding 10 years)

Severity	Natural range of variation [a]	Desired condition
Moderate- (greater than 40% mortality of trees in small to large size classes) to high-severity recently burned forest (greater than 70% mortality of trees)	1-18% of NFS lands	Recently burned forest conditions in areas that burn with moderate to high severity are distributed across the Forest and vary widely in amount, pattern, and frequency over time and space. Very few acres of burned forest may exist in cool and/or moist climatic periods; greater acreages exist in warm and/or dry climatic periods. Recently burned forest conditions are most consistent with the natural range of variation in wilderness areas and larger unroaded areas, which will have the majority of acres burned, the greatest number of dead trees, and the largest patch sizes. Burned patches may be over 20,000 acres in size in these areas, though events that create these larger patches occur infrequently. Outside the wilderness and large unroaded areas, burned forests will occur over fewer acres overall and patch sizes are smaller (e.g., less than 1,000 acres), especially in the warm-moist and warm-dry types. Recently burned forest conditions are characterized by an abundance of native grasses, forbs, and shrubs that provide forage for wildlife (such as big game species, small mammals, and birds) along with low to very high densities of fire-killed trees. In areas burned with moderate severity, individuals or small patches of live overstory trees survive the fire. Within a few years, coniferous tree seedlings (and aspen and birch on some sites) are widespread and eventually dominate most burned sites. Periodically, fire-killed conifers in a range of sizes from 9 to over 20 inches d.b.h. are present at the forestwide scale for nesting and feeding by black-backed woodpeckers and other wildlife species associated with forest patches that burn with moderate to high severity.

Severity	Natural range of variation [a]	Desired condition
Low-severity recently burned forest (less than 30% mortality of trees in medium and larger size classes)	0-2% of NFS lands	Recently burned forest conditions in areas that burn with low severity are uncommon across the Forest, with most occurring on the warm-dry potential vegetation type and with small amounts on the warm-moist, cool-moist, and cold types. Patch sizes and patterns of forest burned at low severity are highly variable and are dictated mainly by the pattern of forest conditions (tree species, densities, amount of downed fuels) and site variations (potential vegetation type, topography) across the landscape. Low-severity burned forest conditions most commonly occur as smaller patches within the larger moderate- to high-severity burned forest conditions. Larger patches of low-severity burn conditions may occur on harsher sites on the cold potential vegetation type and in warm-dry types with ponderosa pine present. In patches burned at low severity, tree density is reduced, but many, if not most, trees survive the fire, particularly those in the medium and larger tree size classes and the fire-tolerant species (e.g., ponderosa pine, Douglas-fir, western larch, and whitebark pine). Mortality is mostly in small tree sizes (e.g., less than 9 inches d.b.h.) and in species sensitive to fire, such as lodgepole pine and subalpine fir. Low-severity burned sites support an abundance of native grasses, forbs, and shrubs that provide forage for wildlife (such as big game species, small mammals, and birds). Live tree densities are low to moderate. Fire-scorched conifers over 20 inches d.b.h. are present for cavity nesting or denning species. Smaller snags are abundant in some areas, depending on pre-fire conditions.

a. Source: Estimated natural range of variation in amount of fire per decade, using the SIMPPLLE model. The amount of fire is based on decadal variation (i.e., amount over a 10-year period).

Guidelines in the revised forest plan are intended to address the needs of wildlife species associated with burned forests.

Forest Plan Guidelines (FW-GDL-TIMB)

01 If salvaging timber in areas burned by wildfire, unburned patches or patches burned with low severity (less than 20 percent mortality of trees) within the burn perimeter should be retained to contribute to wildlife habitat diversity.

02 If salvaging timber in areas burned by mixed or high-severity wildfire, clusters of burned trees with a variety of sizes should be retained to provide habitat for wildlife species associated with burned habitats.

03 If salvaging timber in areas with high-severity disturbance (e.g., fire, insect or disease epidemic) that were verified old-growth forest prior to the fire, standing (and down) live, dying, and dead western larch, ponderosa pine, and black cottonwood trees greater than 20 inches d.b.h. should be retained to contribute to diverse forest structure for wildlife, even if the forest stand no longer meets the old-growth forest definition. If these retained trees fall down due to natural causes (e.g., wind) or are deliberately felled for reasons of human safety, they should not be removed but should be left on the ground to contribute to large, downed woody material.

Table 72. MON-WL-13 plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data Source / Partner	Data collection interval	Point of Contact
FW-DC-TE&V-25 FW-GDL-TIMB-01 through 03	IND-WL- 37. Forestwide acres burned by wildfire by severity class (low, medium, high) in previous decade. 38. Percent of area burned by wildfire in the previous decade that was salvage harvested. 39. For wildfires with salvage harvest, acres of unburned forest or forest burned with low-severity retained within burn perimeter 40. For wildfires with salvage harvest, size range of burned forest patches retained within burn perimeter 41. For wildfires with salvage harvest, number of trees per acre greater than 20 inch d.b.h. retained within salvage harvest units that were verified old-growth forest prior to the fire	IND-WL-37: FNF GIS Library for all mappable fires. IND-WL-38: FACTS for accomplishment report of salvage harvesting. IND-WL-39-41: Reported after accomplishment of project activities for individual fire salvage projects.	IND-WL-37: Updated annually IND-WL-38: FACTS database updated annually IND-WL-39-41: Varies as to whether fire salvage projects occur. Project level planning record for each fire salvage project. Post-treatment field surveys.	Primary: Forest wildlife biologist Secondary: Forest fire specialist for obtaining fire perimeters and general fire severity. Silviculturist (to assist in obtaining FACTS data

Methods

IND-WL-37: This is the same data that is reported in MON-TE&V-02, indicator IND-TE&V-09. It is determined via data stored in an area available to USFS employees. In the Flathead Forest T drive, go to: *T:\FS\Reference\GIS\r01_flt\LayerFile\Fire\Fire History Perimeters.lyr,* select the polygons showing perimeters of wildfires that burned within the previous 10 years. Use GIS to clip the fire polygon information to FNF ownership only. The intent of this monitoring indicator is an understanding of habitat availability for species such as the black-backed woodpecker, which are known to use high severity fire areas for a 10-year period following a wildfire. Each biennial report will have a different set of polygons that are termed as "recent fires" going back the previous 10 years.

We cannot get data on burn severity using the FNF fire GIS layers, so it is recommended that the monitoring indicator be reworded to remove the requirement to report acres by low, medium and high severity. Modification of IND-WL-37 is to be consistent with the Broad Scale Monitoring Strategy reporting resulting in improved efficiency of the monitoring task. Not all fires have burn severity measured. Updating the indicator to be consistent with the data source provides a more transparent and straightforward measure. The revised indicator is sufficient to approximate desired conditions for wildlife that use burned forests at the forest-scale. Other national/regional level data sets may provide fire data by severity (Remote Sensing Application Center (RSAC) analysis and MTBS, "monitoring trends in burn severity" Reports) but this data is only available for fires larger than 1000 acres, the data is 2 years behind, and it is very difficult to summarize at the forest level. Therefore, we have chosen to use FNF GIS data on fire events instead, which is reported annually. We know from personal observations, such as post-fire Burn Area Rehab projects, that most areas burned on the FNF burn at higher severities, killing

most or all trees. If the R1 BSMS is able to summarize and report out the MTBS data for the Forests in the future, the data source for monitoring this item could be changed.

IND-WL-38: The intent of this monitoring indicator is to monitor components in the revised forest plan, so only fire salvage since the year 2019 (the first fire season following the adoption of the plan) will be selected. Salvage harvest is recorded annually in the FACTS database.

Fire salvage is shown in FACTS typically coded as a regeneration harvest with wildfire as the triggering event. Each biennial report will have a different set of polygons showing perimeters of "recent fires" (going back until 2019, up to a total of 10 years as time goes on. Determine whether salvage harvest occurred in this set of selected wildfires, and if so how many acres. These acres would be compared to the total area burned by wildfire during the same time period. Eventually, this will essentially be a running total of decadal burn and salvage acres over time.

IND-WL-39, 40: These indicators are tied to fire salvage projects and are designed to track project consistency with forest plan guidelines FW-GDL-TIMB-01 and 02 (see introduction above) regarding acres and patches of unburned or low-severity fire, not salvage harvested. Therefore, only salvage harvest accomplishments that result from project-level NEPA decisions dating from December 2018 (date of revised Forest Plan decision) would be included.

At each monitoring report period, fill out a table for each of these decisions with any fire salvage with a NEPA decision and/or on-the-ground accomplishment in the previous 2 years. For each project, this table should summarize the conclusions in the project record as to how it met the purposes of FW-GDL-TIMB-01 and 02. If alternate means were selected to meet these purposes, state what these means are and how they were designed to meet the purposes equally as well or better. In a separate column, narratively describe whether implementation matched the project's design for these two guidelines. Use records in the FACTS database and/or maps in decision documents.

IND-WL-41. This indicator is tied to fire salvage projects and designed to track project consistency with forest plan guideline FW-GDL-TIMB-03 (see introduction above) regarding large-diameter trees and logs that are to be left in former old growth that was salvage harvested after fire. Therefore, only salvage harvest accomplishments that result from project-level NEPA decisions dating from December 2018 (date of revised Forest Plan decision) would be included. The modification to IND-WL-41 would add downed wood as an indicator acknowledging the importance of downed wood to the ecosystem.

At each monitoring report period, fill out a table for each of these decisions with any fire salvage with a NEPA decision and/or on-the-ground accomplishment in the previous 2 years. For each project, this table should summarize the conclusions in the project record as to how it met the purposes of FW-GDL-TIMB-03. If an alternate means was selected to meet its purpose, state what this means was and how it was designed to meet the guideline's purpose equally as well or better. In separate columns, provide the average densities of standing and downed trees >20" DBH in burned old growth across the project after implementation of salvage harvest. During project planning, make sure salvaged former old growth (or an informative subset of it) is high priority for post-treatment field surveys.

Results

Table 73. Monitoring Evaluation Report – summary of data sources for MON-WL-37 through 41, Habitat for wildlife associated with forests burned at moderate to high severity

Year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-37	The Forest's GIS layer of wildfire perimeters updated each January for the previous year. Refer to MON-TE&V-02 for data summary of recent wildfire activity.	High
	IND-WL-38	FACTS regeneration harvest and initiating event is wildfire, updated annually.	High
2021	IND-WL-39-40	Spreadsheet updated with project information once a decision has been signed for salvage harvest after fire, plus FACTS data and/or timber sale contract maps.	Moderate
2021	IND-WL-41	Spreadsheet updated with project information once a decision has been signed for salvage harvest after fire, plus field survey data for large standing and downed tree retention in former old growth.	Moderate

Table 74. Monitoring results for MON-WL-37 and -38, Habitat for wildlife associated with forests burned at moderate to high severity.

Indicator	Monitoring data results: 2021	Monitoring data results:	Monitoring data results:
IND-WL-37: Acres burned forestwide by wildfire in the previous decade	Approximately 183,000 acres burned from 2011-2019		
IND-WL-38. Percent of burned area that was salvage harvested since the last monitoring report. (2019 and 2020)	None in 2019 0r 2020		

Table 75. Monitoring results for MON-WL-39 and -40 within wildfires where salvage harvest occurs - Narrative Summary of retention of area and patches of unburned or low-severity fire (Implementation of FW-GDL-TIMB-01 and -02).

Fire Salvage Project Name and Decision Date	Summary of conclusions as to how project met purposes of FW-GDL-TIMB-01 and -02	Alternate means if chosen to meet these purposes and how designed to meet the purposes equally as well or better.	Salvage Harvest Years	Discussion of whether implementation was consistent with the project's design for FW-GDL-TIMB-01 and -02
No projects to report on for 2021 monitoring report				

Table 76. Monitoring results for MON-WL-41, Within wildfires where salvage harvest occurs - Retention of large-diameter standing and downed trees in burned former old growth (Implementation of FW-GDL-TIMB-03).

Fire Salvage Project Name and Decision Date	Summary of conclusions as to how project met purposes of FW-GDL-TIMB-03	Alternate means if chosen to meet these purposes and how designed to meet the purposes equally as well or better.	Salvage Harvest Years	Average densities of field-measured standing and downed trees >20" DBH in burned old growth across the project after implementation
No projects to report on for 2021 monitoring report				

Discussion of Results

How many acres were burned by wildfire in the last decade and how was this habitat distributed? Most of the acres were on the Spotted Bear Ranger District.

- There were a very few small wildfires on the Hungry Horse and Swan Lake Ranger Districts in 2019/20.

What is the trend in the amount of burned forest in the last decade compared to previous reporting periods?

- This is the first monitoring report – no trends to detect at this time.

Since December 2018 when the Revised Forest Plan Decision was signed, what percentage of forest burned by wildfire in the previous decade had salvage harvest?

- There was no salvage of forest burned by wildfire during this time.

How did the salvage projects implement the timber harvest guidelines associated with retention of unburned/low burn severity patches, the retention and measurement of standing and downed trees greater than 20 " DBH in salvage areas that were verified old-growth prior to the fire? If alternate means of meeting these guidelines were chosen, were they as effective or better at achieving their purposes?

- Not applicable. No salvage harvest decisions were signed in 2019 or 2020.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring results as documented above.

Table 77. Summary of Findings for Monitoring Item MON-WL-37 through 41, Habitat for wildlife associated with forests burned at moderate to high severity

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES
Recommendations – Reword IND-WL-37, removing requirement to summarize acres by fire severity class.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for with this monitoring item? We are not able to monitor forestwide burn severity at this time. In the future, if R1 BSMS reports provide burn severity acres by Forest using MTBS data or other data, it will be reported.
UNCERTAIN (B) – At least 2 more years and additional data are needed to understand status or progress of the Plan Component(s)
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Forest Plan Monitoring Program: Change IND-37 FROM "Forestwide acres burned by wildfire by severity class (low, medium, high) in previous decade" TO "Forestwide acres burned by wildfire in the previous decade". Change IND-41 to include downed trees: "For wildfires with salvage harvest, number of standing and downed trees per acre greater than 20 inch d.b.h. retained within salvage harvest units that were verified old-growth forest prior to the fire."

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain -** Availability of data or interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-14. What is the risk of human disturbance in areas modeled as wolverine maternal denning habitat?

Introduction

This question monitors compliance with guidelines listed below:

FW-GDL-WL-04: New projects or activity authorizations involving low-altitude helicopter flights or landings in areas of modeled wolverine maternal denning habitat (identified in cooperation with USFWS and the USFS Rocky Mountain Research Station) should not occur from February 15 to May 15 unless they include strategies or design features to mitigate disturbance to wolverines. Exceptions to this guideline may occur for public health and safety, emergency activities, or other approved administrative activities, such as site maintenance.

FW-GDL-REC-04: To limit the risk of cumulative impacts to female wolverines with dependent young, there should be no net increase in percentage of modeled wolverine maternal denning habitat where motorized over-snow vehicle use is identified as suitable on NFS lands at a forestwide scale. Specific locations of routes or areas suitable for motorized over-snow vehicle use are specified in figure B-11.

Table 78. MON-WL-14 modeled wolverine maternal denning habitat. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data collection interval	Data Source / Partner	Point of Contact
FW-GDL-REC-04 FW-GDL-WL-04	IND- WDL- 42: Projects or activity authorizations in modeled maternal denning habitat and design features to reduce the risk of disturbance 43: Percentage of modeled maternal denning habitat where public motorized over-snow vehicle use is allowed (Modeling based upon Copeland and Yates or subsequent updates for the northern Rocky Mountains by the USFWS or USFS Rocky Mountain Research Station)	Annually	GIS layer of modeled maternal denning habitat for forest plan revision, or subsequent update by USFWS and/or RMRS, spreadsheet. Project decisions	Forest wildlife biologist

Methods

IND-WL-42. This will only be reported for activities involving helicopter use between February 15 - May 15. Examples may include activities such as authorizations to install, remove, service or repair communications infrastructure, ski area infrastructure, etc. District biologists report after each relevant authorization or project decision.

IND-WL-43. This will only be reported if Forest does NEPA to add or close routes designated on the MVUMs or motorized over-snow vehicle use areas based upon revised forest plan suitability. If new routes or areas are opened in modeled habitat, other areas in modeled habitat must be closed in the same decision to meet the guideline for no net increase. Use the same model as used for forest plan revision (Copeland et al. 2011 model persistent spring snow 5 years of 7) or other model if adopted by USFWS or USFS Rocky Mountain Research Station.

Results

Table 79. Monitoring Evaluation Report – summary of data sources for MON-WL-14. Wolverine

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-42	2020	High. This comes from project NEPA documents.
2023	IND-WL-43	2022	High. This will come from the site-specific winter travel project NEPA document. As directed by the RF objection letter, this project will begin in 2021. The Forest will report on compliance with the guideline based upon GIS analysis for the selected alternative. See figure B-11 in plan for suitability.

Table 80. IND-WL-42. Projects with design features for wolverine

Project Name	Year Decision Signed	Project Design Features Specified in Decision
Hellroaring Basin Improvements	2020	Proposed activities would be completed between June 1 and November 30 each year to limit impacts to wildlife and to minimize ground disturbance during wet time periods in the springtime. Helicopter flights for chairlift installation would be limited to five days for construction of each chairlift to minimize disturbance to wildlife. Additional days may be approved in writing by the Forest in extenuating circumstances. No helicopter flights or landings would be allowed on the north side of the Whitefish Range divide nor to the west or northwest of the Hellroaring drainage, unless needed for safety or emergency situations.

Discussion of Results

Based on the best available scientific information, have projects included measures to reduce the risk of human disturbance in areas modelled as maternal denning wolverine habitat?

- Yes.

Based on the best available scientific information, how do project design features reduce the risk of disturbance?

- Hellroaring Basin Improvements Project was the only project to occur in modeled wolverine maternal denning habitat in 2019 or 2020. Design features limited the location, season, and duration of helicopter disturbance to reduce the risk to wolverines that may use habitat along Whitefish Divide.

Did the Forest complete NEPA analysis to add or close routes/areas designated on the MVUMs for motorized over-snow vehicle use based upon revised forest plan suitability?

- No.

If new routes or areas are to be opened in modeled wolverine maternal denning habitat, were other areas closed in the same decision to meet the guideline FW-GDL-WL-04 for no net increase?

- NA

Was the same model used as that used for forest plan revision (Copeland et al. 2011 model persistent spring snow 5 years of 7)? If not, why was a new model used?

- NA

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 81. Summary of Findings for Monitoring Item MON-WL-14 – Habitat Conditions for Wolverines

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES
Recommendations – na
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN (B) – Although sufficient data are available for IND-WL-42, more time/data are needed to understand status or progress of the Plan Component(s) for IND-WL-43; Winter travel planning is scheduled to begin in 2021. Monitoring results may be available for the 2023 report if a decision has been made.
Recommendation -- na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
NA

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain –** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy

MON-WL-15: What is the status of the breeding season bird community on the Forest (including neo-tropical migratory birds)? Are we maintaining diverse avian communities?

Introduction

This monitoring item is intended to monitor ecological diversity as it relates to diversity of wildlife, as stated in the following desired condition:

> Desired condition **FW-DC-WL DIV-01** states **"**Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species). For desired conditions for select wildlife species, see [FP] table 14."

Table 82. MON-WL-15. Bird species: Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicator(s)	Data Source(s)/ partners	Data measurement interval	Point of contact
FW-DC-WL DIV-01	IND-WL- 44. Bird species presence on the Forest based upon data collected for Integrated Monitoring in Bird Conservation Regions. 45. Bird species density on the Forest based upon data collected for Integrated Monitoring in Bird Conservation Regions. 46. Bird species for which there are statistically significant changes in Bird Conservation Region 10.	Bird Conservancy of the Rockies (BCR) provides USFS with an annual report with results listed by Forest and larger regions.	The Northern Region annually funds data collection and analysis of the IMBCR program. Data can be accessed on the Rocky Mountain Avian Data Center interactive website. Trends will be examined every 10 years.	Primary: Regional Wildlife Ecologist Secondary: Forest wildlife biologist

The R1 Broadscale Monitoring Strategy (BSMS) for birds provides a framework to uniformly collect and analyze data for purposes of providing context and relevancy for the biennial plan-level monitoring evaluation reports (see table below). The monitoring question MON-WL-15 considers data at two scales: the Flathead National Forest and the portion of Bird Conservation Region 10 (Northern Rockies) that occurs within the state of Montana (which includes the entire Flathead NF). The Northern Region, in conjunction with the Bird Conservancy of the Rockies and other partners, employs the program entitled "Integrated Monitoring in Bird Conservation Regions" (IMBCR) to provide reliable population estimates for breeding landbirds at a variety of scales.

The Integrated Monitoring in Bird Conservation Regions (IMBCR) program was designed to provide reliable population estimates for breeding landbirds at a variety of scales. These scales, or strata, reflect areas to which IMBCR partners wish to make inference about bird populations. In the USFS Northern Region, each Forest and Grassland unit has at least two strata, with the idea that intra-Forest comparisons can be made as samples accumulate over time (e.g., roaded vs. unroaded areas, or between different grassland subunits). Each unit's strata are also combined into a single "superstratum" to provide estimates

at a larger scale (e.g., for a whole Forest or Grassland unit). These superstrata can be further rolled up into larger superstrata such as States or Bird Conservation Regions (BCRs) to provide more context.

Table 83. ***R1 BSMS Management Question:*** **Are we maintaining diverse avian communities?**

Monitoring Question	Indicator	Measurement	Scale	Data Source
What is the change in number of bird species detected through IMBCR bird monitoring program?	Actual survey detections	# of species detected,	Nested scales: Managed/unmanaged areas Forest/Grassland Region Bird Conservation Region	Integrated Monitoring in Bird Conservation Regions (IMBCR)
What is the change in relative abundance among species?	Density and abundance	Density and abundance estimates, adjusted for detection probability	Nested scales: Managed/unmanaged areas Forest/Grassland Region Bird Conservation Region	Integrated Monitoring in Bird Conservation Regions (IMBCR)
What is the change in occupancy of R1 avian emphasis species?	Occupancy	Occupancy probability, adjusted for detection probability	Nested scales: Managed/unmanaged areas Forest/Grassland Region Bird Conservation Region	Integrated Monitoring in Bird Conservation Regions (IMBCR)

Methods

IND-WL-44-46. Data is provided as part of the R1 broadscale monitoring strategy. The Forest coordinates with the Regional Wildlife Ecologist. The Forest can request spreadsheets of its raw IMBCR bird detections and survey locations each year, and also spreadsheets of the population estimates for the Forest and larger regions (i.e. MT-BCR10) -- contact jennifer.timmer@birdconservancy.org. The IMBCR program also provides species detections, survey effort, and population estimates through the Avian Data Center (ADC) http://rmbo.org/v3/avian/ExploretheData.aspx. The ADC user-interface can give statistics on occupancy and density for any species, stratum, or superstratum, and copies of the annual IMBCR report are also available on the site. Follow this link and click the red "Run Query" button above the map to pull out species detections and occupancy and density estimates for the FNF and the Montana-portion of BCR10.

IND-WL-44 FNF Bird Species Occupancy. For the FNF, bird species occupancy or probability of occurrence is estimated annually and accounts for species present but not detected on a survey (i.e., detection probability). Our spreadsheet shows; 1) the years in which IMBCR monitoring occurred and the species detected, 2) the number of 1-km^2 transects on which it was detected (Transects), 3) the occupancy probability or proportion of 1- sq. km. transects occupied by a species and adjusted for detection probability (Psi), and 4) standard error (SE) and coefficient of variation (%CV) as indicators of reliability for the occupancy estimates (smaller is better). For example, in the data table, a Psi of 0.27 means a species is estimated to occur across 27% of 1-km^2 grid cells within a Forest.

Occupancy estimates are relatively stable for most common species from year to year. Occupancy is a good characteristic to look at for birds that are rare on the landscape because it requires fewer detections to estimate occupancy than density. It's also useful to look at occupancy estimates for species with large home ranges and that don't breed during the survey time period or are difficult to detect. Occupancy is more likely to change over the long-term, rather than short-term, and so is a better indicator of forest management changes which occur over long periods of time. For example, occupancy is more relevant for a species such as the Clark's nutcracker--a species that occurs at naturally low densities and is nomadic in response to variations in the environment (such as irruptive cone crops).

For 2021, the Forest will list the names and years a species was detected based upon IMBCR survey observations at the FNF stratum level. This information will tell the Forest if a species that was previously detected is no longer detected, or if a new species is detected. The FNF will also examine occupancy estimates for each species over a period of several monitoring reports to see they are increasing, decreasing, or remaining relatively the same. The Forest will note if there are any changes for these species over a period of several monitoring years and if they are more or less likely to occur within the Forest.

IND-WL-45: FNF Density Estimates. Bird species density is estimated annually and accounts for species present but not detected on a survey (i.e., detection probability). It provides information on how abundant a species is and is more sensitive to changes in the local environment and annual variation in weather, food, etc. Density estimates are also more useful for species that do not have a larger home range than the survey grids are designed to detect, such as a songbird. For species that are less common and less likely to be detected at the FNF scale, we will only look at occupancy estimates and not density estimates. For these species, density estimates will be examined at the MT-BCR10 scale because there will likely be more detections to use to estimate density. For example, Clark's nutcracker has a low density on the Forest (0.2-1.08/km^2. over the last 10 years), is nomadic in response to resource availability, and may not be present on the Forest during the time period when surveys are being conducted, so we will not report on density estimates at the Forest level. If we look at the MT-BCR10 scale, Clark's nutcracker density ranges from 1.07-1.53 birds/km^2 because it is more likely to be detected throughout the MT-BCR10 region during the survey period. Below is a description of what each column shows in the density output table on the ADC and in the spreadsheet from Bird Conservancy (Jen Timmer):

- D: density or the estimated number of birds per 1-km^2. This estimate is more sensitive to management and environmental variability (e.g., disturbance, weather, forage productivity) each year than occupancy estimates.
- N: total estimated number of individuals within a stratum (i.e., estimated population size). This number is calculated by multiplying the estimated density (D) by the total area of the stratum or superstratum.
- Percent CV: coefficient of variation or the ratio of the standard deviation to the mean; we recommend %CV's <50% as reliable.
- n: number of detections used in the analysis; if the %CV is high, it might be because there were not a lot of detections for that species in a year.

IND-WL-46: MT-BCR10 Trend Estimates

Trend estimates are produced annually from the IMBCR data and describe the change in bird populations over time within the Forest and how confident we are in the direction of that change. We use the density estimates to calculate the trend estimates, so a species that is less abundant each year will likely have a

negative population trend. We will look at trend estimates at the MT-BCR10 scale when trend estimates are not reliable for species at the Forest-scale. We will use LCI95 and UCI95 to identify statistically significant trends. If we look at the trend estimates for the Clark's nutcracker, it appears to be declining in MT-BCR10 because LCI95 is .872 and UCI95 is .978 (both values are below 1). At the FNF scale its trend is unknown at the 95% credible interval because LCI95 is .517 and UCI95 is 2.501—one well below 1 and the other well above 1, with a broad range between the numbers. Below is a description of what each column shows in the trend spreadsheet from Bird Conservancy (Jen Timmer), which can also be accessed from the ADC:

- Mean: mean trend estimate per year based on all years a stratum was surveyed; a value of 1 indicates the population is stable, <1 indicates the population is declining and >1 is an increasing population
- Percent CV: see above
- N.Strata: the number of individual strata contained in a superstratum (minimum number of strata within a superstratum is 2); this column will contain an "NA" for individual strata. The median trend estimate per year is based on all years a superstratum (such as a national forest or a bird conservation region) was surveyed.
- N. Detect: the number of detections used to estimate trend for each species superstratum (Flathead National Forest).
- SD: standard deviation or amount of variation in the data; similar to standard error.
- LCI 95: lower 95% credible interval; the true estimate lies within the lower and upper 95% credible intervals with 95% probability
- UCI 95: upper 95% credible interval; the true estimate lies within the lower and upper 95% credible intervals with 95% probability
- Median: value that represents the midpoint of the distribution; Jennifer recommends reporting the median rather than the mean because some credible intervals have long tails (so the means can be quite a bit higher than the medians), especially for estimates near 0, and medians are also more representative of the distributions.

FNF will report on trend for those species where both LCI95 and UCI95 are above 1.0 = statistically significant upward density trend. FNF will report those species with a median below 1 and where both LCI95 and UCI95 are below 1.0 = statistically significant downward density trend.

Reporting Frequency: Evaluate every 10 years. The 2021 report will include data beginning with 2010 through 2020. This timespan occurred before the new Plan was implemented and can serve as a baseline for future monitoring reports. We will likely not be able to detect management changes more frequently than every 10 years due to annual variation.

Partners – Funded by USFS Northern Regional Office in cooperation with other partners; contact for IMBCR in 2021 is Jennifer Timmer jennifer.timmer@birdconservancy.org

Results

Table 84. Monitoring Evaluation Report – summary of data sources for MON-WL-15 Bird Species, Populations, Trend

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-44-46	2010-2020	High level of confidence in data. Standardized IMBCR datasets and procedures are used for monitoring bird populations for FNF and MT-BCR10, and occupancy, density, and trend estimates account for detection probability. Transects have been surveyed each year, but the number of transects surveyed on the FNF has varied from 9-13, with 87-133 survey point locations. At the MT-BCR10 scale, survey point locations have ranged from 1099-1600.

IND-WL-44. The table below shows the 121 bird species detected on the FNF **from 2010-2020** through IMBCR surveys. Not all bird species known to occur on the FNF were detected on survey transects, nor were these species detected every year. Additionally, numbers of a species can vary to a great degree due to the timing of the surveys, weather conditions, etc.

The plan monitoring record also includes a table showing the occupancy probabilities, which can be calculated for a species each year as long as it was detected within the Forest and was detected IMBCR-wide on 10 different transects. These occupancy probabilities can help shed light on differences between birds with low numbers of detections. For example, some species were detected infrequently between 2010-2020. They are similar in having only 1-2 detections on the Forest's transects, but their occupancy probabilities have a wide range from .017 to .78 (see bird tables in monitoring record). These species illustrate that the grid transect surveys used may not be suitable for all bird species (e.g., species with large home ranges, species associated with specific habitats like streams or rivers). For example, the American dipper has a high occupancy probability (.74) in 2016 but a low number of detections. This species is commonly observed in fast-moving streams on the Forest, but there may not be many survey transect locations on suitable streams. The black-backed woodpecker is an example of a species that is nomadic in response to a very specific type of natural variation in the environment (high intensity wildfires) and so has variability in number of detections each year. The peregrine falcon is an example of a specie that is rare on the Forest and has a large home range. While these species have a low number of detections on the FNF that does not necessarily mean that there is concern about the health of their populations.

Table 85. Monitoring results IND-WL-44. Bird species and numbers detected on FNF transects 2010-2020

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
Alder Flycatcher	1	0	0	0	0	0	0	0	0	0	0	1
American Crow	3	1	0	6	2	0	0	0	0	0	0	12
American Dipper	0	0	0	0	0	1	1	0	0	0	0	2
American Kestrel	1	0	1	2	0	3	0	2	2	0	1	12
American Redstart	2	1	0	2	0	1	4	4	8	1	4	27

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
American Robin	41	33	71	85	33	42	39	50	51	26	38	509
American Three-toed Woodpecker	6	1	9	0	0	3	0	4	3	0	0	26
Bald Eagle	1	0	0	0	1	2	0	0	0	0	0	4
Barred Owl	0	0	0	0	0	1	0	0	0	0	0	1
Belted Kingfisher	1	2	0	1	0	1	0	0	0	0	0	5
Black-backed Woodpecker	0	0	1	0	0	0	0	0	1	0	0	2
Black-capped Chickadee	11	5	1	15	1	6	7	3	1	4	6	60
Black-headed Grosbeak	6	8	16	2	9	6	10	13	21	21	16	128
Boreal Chickadee	0	0	1	1	1	2	7	4	8	5	4	33
Brewer's Blackbird	2	0	0	0	0	0	0	0	0	0	0	2
Brown Creeper	2	3	11	3	3	2	2	9	6	2	2	45
Brown-headed Cowbird	0	1	4	9	0	7	2	5	2	0	0	30
Bullock's Oriole	0	0	0	0	0	0	0	0	1	0	0	1
Calliope Hummingbird	2	0	0	0	0	3	0	1	1	1	2	10
Canada Goose	1	0	0	36	0	0	0	0	0	0	1	38
Canada Jay	12	0	10	17	17	9	7	9	15	9	5	110
Canyon Wren	0	1	0	0	0	0	0	0	0	0	0	1
Cassin's Finch	8	3	8	6	0	5	7	4	5	5	7	58
Cassin's Vireo	10	17	13	25	6	26	17	24	12	14	15	179
Cedar Waxwing	9	3	2	1	4	13	3	3	1	0	12	51
Chestnut-backed Chickadee	2	3	4	0	2	7	1	0	3	1	10	33
Chipping Sparrow	62	39	91	90	109	58	93	77	121	44	68	852
Clark's Nutcracker	0	5	2	1	2	3	5	6	1	2	1	28
Common Loon	0	0	1	1	0	0	0	1	0	2	2	7
Common Merganser	0	0	1	0	0	0	0	0	0	0	0	1
Common Nighthawk	0	1	0	0	0	0	0	0	1	0	1	3
Common Poorwill	0	0	0	0	0	1	0	0	0	0	0	1
Common Raven	10	31	13	12	24	20	9	11	19	23	18	190

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
Common Yellowthroat	7	2	3	2	0	3	1	9	3	2	3	35
Cooper's Hawk	2	0	0	0	0	0	0	1	0	1	1	5
Cordilleran Flycatcher	0	0	0	0	0	0	0	4	0	0	0	4
Dark-eyed Junco	66	63	105	73	85	80	43	151	105	40	76	887
Dark-eyed Junco (Oregon)	13	0	17	0	3	4	1	17	2	6	9	72
Downy Woodpecker	0	0	0	1	0	0	0	0	0	0	1	2
Dusky Flycatcher	13	20	34	16	18	18	36	38	47	18	29	287
Dusky Grouse	1	0	1	2	2	0	0	1	1	1	1	10
Evening Grosbeak	6	14	16	15	21	36	8	22	11	9	8	166
Fox Sparrow	8	1	21	5	15	10	10	6	25	10	14	125
Golden-crowned Kinglet	36	16	66	23	14	40	16	23	23	8	22	287
Great Blue Heron	0	0	0	0	0	0	0	0	0	0	1	1
Great Horned Owl	0	0	1	0	0	0	0	0	0	0	0	1
Hairy Woodpecker	19	1	5	5	4	9	2	9	4	4	4	66
Hammond's Flycatcher	9	5	9	20	6	19	8	11	15	6	9	117
Hermit Thrush	23	11	43	26	24	21	12	33	35	9	36	273
House Wren	0	0	0	1	0	1	2	0	1	2	0	7
Lazuli Bunting	5	4	27	16	33	17	8	23	24	2	7	166
Least Flycatcher	0	0	0	0	1	0	0	1	0	3	0	5
Lincoln's Sparrow	3	0	1	2	1	6	0	3	1	0	2	19
MacGillivray's Warbler	40	16	81	82	49	51	79	97	59	41	53	648
Mallard	1	0	0	1	0	0	0	0	0	0	0	2
Marsh Wren	0	0	0	0	0	0	0	1	0	0	0	1
Merlin	0	0	0	0	0	1	0	0	0	0	0	1
Mountain Bluebird	18	3	12	1	7	2	4	12	4	3	5	71
Mountain Chickadee	43	16	60	50	40	32	25	47	44	11	40	408
Mourning Dove	0	0	0	0	0	0	0	0	0	1	0	1
Nashville Warbler	2	0	0	0	3	0	1	3	3	3	1	16

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
Northern Flicker	9	14	25	13	17	24	14	23	18	12	23	192
Northern Flicker (Red-shafted)	13	0	1	1	0	3	0	3	2	0	0	23
Northern Goshawk	2	0	0	0	0	0	0	0	2	0	1	5
Northern Harrier	1	0	0	0	0	0	0	0	0	0	0	1
Northern Pygmy-Owl	1	0	0	0	0	0	1	1	2	0	0	5
Northern Rough-winged Swallow	0	0	0	5	0	1	3	0	0	0	1	10
Northern Waterthrush	3	0	10	19	6	7	5	14	10	7	8	89
Olive-sided Flycatcher	15	6	24	4	27	14	19	19	39	19	23	209
Orange-crowned Warbler	11	17	27	32	9	41	39	47	40	14	53	330
Osprey	0	0	0	0	2	0	2	0	1	0	0	5
Ovenbird	4	0	0	0	0	0	0	0	0	0	0	4
Pacific Wren	7	10	40	22	11	20	12	21	20	3	10	176
Pacific-slope Flycatcher	0	0	3	0	0	0	0	0	0	0	0	3
Peregrine Falcon	0	0	0	0	0	0	0	0	0	1	0	1
Pileated Woodpecker	4	3	2	4	0	1	2	3	4	2	2	27
Pine Grosbeak	8	1	7	2	3	2	2	4	5	5	7	46
Pine Siskin	76	74	216	83	27	83	65	101	92	33	215	1065
Red Crossbill	29	1	32	10	5	59	0	29	12	24	9	210
Red-breasted Nuthatch	30	13	47	33	11	45	48	57	46	49	56	435
Red-eyed Vireo	4	0	0	0	0	0	3	0	8	0	1	16
Red-naped Sapsucker	8	4	8	3	1	24	3	12	4	2	2	71
Red-tailed Hawk	3	1	5	1	0	4	1	5	2	0	1	23
Ruby-crowned Kinglet	58	27	66	87	64	83	86	85	114	66	90	826
Ruffed Grouse	0	1	1	10	1	13	14	5	5	0	1	51
Rufous Hummingbird	6	0	6	3	1	7	0	11	8	3	7	52

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
Sharp-shinned Hawk	0	0	0	3	0	0	0	1	0	1	0	5
Song Sparrow	8	8	6	15	5	3	5	4	8	4	2	68
Spotted Sandpiper	1	0	1	2	1	0	0	0	2	3	0	10
Spotted Towhee	0	1	0	0	4	0	0	0	1	0	0	6
Spruce Grouse	2	0	2	0	0	5	0	1	2	0	3	15
Steller's Jay	6	5	11	5	8	6	4	8	6	5	6	70
Swainson's Thrush	100	110	191	152	120	133	114	212	197	200	135	1664
Tennessee Warbler	2	0	7	0	0	1	1	0	1	0	0	12
Townsend's Solitaire	8	7	15	23	8	12	17	13	18	14	5	140
Townsend's Warbler	85	38	132	113	78	106	100	80	117	34	138	1021
Tree Swallow	0	5	2	7	5	12	4	14	10	2	0	61
Trumpeter Swan	0	0	0	1	0	0	0	0	0	0	0	1
Turkey Vulture	0	1	1	0	0	0	2	0	1	0	2	7
Varied Thrush	50	27	45	46	26	23	27	29	34	17	41	365
Vaux's Swift	0	1	1	0	0	2	0	1	3	0	0	8
Veery	1	0	0	0	0	0	0	0	0	0	0	1
Vesper Sparrow	0	0	0	0	0	0	0	0	0	1	0	1
Violet-green Swallow	21	0	0	0	0	3	0	0	0	0	7	31
Warbling Vireo	60	26	65	39	69	53	74	62	74	74	74	670
Western Bluebird	0	0	0	0	0	2	0	0	0	0	0	2
Western Flycatcher	0	0	0	0	1	0	1	0	2	0	2	6
Western Tanager	41	42	77	80	37	66	67	114	71	87	78	760
Western Wood-Pewee	3	0	2	1	0	0	1	3	0	0	0	10
White-breasted Nuthatch	0	0	0	0	0	0	2	0	0	0	0	2
White-crowned Sparrow	3	1	0	7	6	4	2	11	10	4	15	63
White-crowned Sparrow (Mountain)	0	0	13	0	0	0	0	0	1	0	0	14
White-throated Sparrow	0	0	0	0	0	0	0	1	0	0	0	1

Common Name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total Number Detected
White-winged Crossbill	9	0	4	1	0	0	0	0	2	3	1	20
Williamson's Sapsucker	0	0	0	0	0	1	6	3	0	0	3	13
Willow Flycatcher	0	6	0	2	2	1	9	1	4	1	7	33
Wilson's Snipe	0	3	0	1	0	1	0	0	1	2	0	8
Wilson's Warbler	17	5	13	14	11	17	15	9	21	10	24	156
Yellow Warbler	0	8	1	2	5	1	3	5	6	3	2	36
Yellow-rumped Warbler	1	50	115	122	110	81	92	145	134	62	118	1030
Yellow-rumped Warbler (Audubon's)	111	0	4	1	5	4	3	7	1	0	3	139

IND-WL-45: For many species, density and trend estimates may not be as reliable at the Flathead National Forest scale, because they were detected infrequently within the Forest, but estimates are more reliable at the scale of MT-BCR10. Density estimates (see project record for bird density tables) are considered reliable if the percent coefficient of variation (%CV) is <50%. A species may be infrequently detected within the Forest but detected more commonly across the larger MT-BCR10 region, so density estimates will likely be more reliable at the larger scale for these species. For example, hairy woodpecker density estimates are reliable at the MT-BCR10 scale (%CV = 17), but not at the FNF-scale (%CV = 61). Chipping sparrows were detected frequently in both the FNF and MT-BCR10, so density estimates for this species at both scales are reliable (%CV <50). Density estimates can also be compared between the Forest scale and the MT-BCR10 region scale for context to see how weather, food availability, disturbances, etc. might be impacting the local population, but not necessarily the regional population. For example, olive-side flycatcher density is higher on the FNF compared to the surrounding region, indicating that the FNF has the necessary habitat conditions for the species.

IND-WL-46: For the trend estimates (see table below), if the 95% lower and upper credible intervals displayed in the table are both less than 1, there is a high level of certainty the species is declining. If the 95% lower and upper credible intervals displayed in the table are both greater than 1, there is a high level of certainty the species is increasing. As with density estimates, trend estimates can be compared between the Forest-scale and the MT-BCR10 region-scale to see if patterns in local populations are also occurring in regional populations.

Table 86. Monitoring results IND-WL-46. Lower and Upper Credible Intervals (LCI and UCI) for trend estimates on the FNF and MT-BCR10; 2010-2019

Bird Species	Upward Trend, FNF (95% CI)	Downward Trend, FNF 95% CI	Unknown Trend, FNF 95% CI	Upward Trend, MT-BCR10 95% CI	Downward Trend, MT-BCR10 95% CI	Unknown Trend, MT-BCR10 95% CI
American Crow		*.446-.974*				*X*
American Redstart			*X*	*1.004-1.979*		

Bird Species	Upward Trend, FNF (95% CI)	Downward Trend, FNF 95% CI	Unknown Trend, FNF 95% CI	Upward Trend, MT-BCR10 95% CI	Downward Trend, MT-BCR10 95% CI	Unknown Trend, MT-BCR10 95% CI
American Three-toed Woodpecker			X		.674-.895	
American Wigeon				1.004-2.564		
Black-billed Magpie			X		.631-.991	
Black-capped Chickadee		.612-.998			.704-.851	
Brewer's Blackbird			X		.498-.935	
Cassin's Vireo			X	1.097-1.275		
Cedar Waxwing			X	1.023-1.439		
Chipping Sparrow			X	1.027-1.132		
Clark's Nutcracker			X		.872-.978	
Dark-eyed Junco			X	1.039-1.099		
Dusky Flycatcher			X	1.015-1.154		
European Starling			X		.473-.894	
Evening Grosbeak			X	1.019-1.321		
Golden-crowned Kinglet		.816-.987				X
House Sparrow			X		.201-.776	
Killdeer			X		.529-.863	
Least Flycatcher			X		.431-.996	
Marsh Wren			X		.424-.989	
Mountain Bluebird			X		.816-.967	
Northern Flicker			X		.861-.996	
Northern Harrier			X		.441-.970	
Northern Pintail			X	1.192-3.128		
Northern Waterthrush			X	1.016-1.517		

Bird Species	Upward Trend, FNF (95% CI)	Downward Trend, FNF 95% CI	Unknown Trend, FNF 95% CI	Upward Trend, MT-BCR10 95% CI	Downward Trend, MT-BCR10 95% CI	Unknown Trend, MT-BCR10 95% CI
Orange-crowned Warbler	*1.031-1.180*			*1.029-1.389*		
Osprey			*X*		*.509-.532*	
Red-winged Blackbird			*X*		*.584-.858*	
Rock Wren			*X*		*.569-.938*	
Ruby-crowned Kinglet			*X*	*1.032-1.133*		
Swainson's Thrush			*X*	*1.005-1.080*		
Tree Swallow	*1.028-1.682*		*X*	*1.085-1.351*		
Varied Thrush		.792-.944			*.790-.956*	
Vesper Sparrow			*X*	.	*.836-.932*	
Western Flycatcher	*1.122-5.422*					*X*
Western Tanager			*X*	*1.033-1.111*		
White-winged Crossbill			*X*		*.486-.962*	
Wild Turkey			*X*	*1.073-2.120*		
Wilson's Snipe			*X*		*.623-.845*	
Winter Wren		.168-.722			*.258-.694*	
TOTAL SPECIES WITH KNOWN TREND	***3***	5		***16***	***21***	

Discussion of Results

What is the number of individual bird species detected on the Forest over a 10-year time period?).

- From 2010-2020 there were 121 diverse bird species detected on FNF transects (see spreadsheet in monitoring record). Some species were detected only once or twice. This compares to 236 species detected across Montana portions of BCR10. More species are detected at larger scales due to factors such as a broader variety of habitats, more transects, timing of surveys, etc.

Have there been any new species detected during the most recent reporting period? Are there any species that were detected in 2010-20 that were not detected in subsequent reporting periods? If so, which species?

- Too soon to tell. 2020 is the baseline year for the monitoring report.

Has there been a decrease or increase in the proportion of 1- sq. km. transects occupied (Psi, adjusted for detection probability) by species that are expected to be sustained by habitats that occur on the Forest?

- Too soon to tell. 2020 is the baseline year for the monitoring report.

What species have reliably higher or lower density estimates at the Forest-scale compared to the MTBCR10 scale?

- This could indicate which species aren't doing well in the Forest compared to the surrounding region or are doing better within the forest compared to the surrounding region. For example, several species have higher densities on the Forest compared to the surrounding MT-BCR10 (varied thrush, olive-sided flycatcher, chipping sparrow), but Cassin's vireo, a species of concern, had lower density estimates on the forest compared to the surrounding region in 2018 and 2019.

How do trend estimates of bird species on the FNF compare to MT-BCR10?

- On the FNF there are 3 species with statistically significant upward trends and 5 with downward trends. In MT-BCR10 there are 16 species with statistically significant upward trends and 21 with downward trends. There are more statistically significant trends at the scale of MT-BCR10. This is to be expected at larger scales with more samples. At the FNF scale, most trends are unknown at the 95% confidence level.

Are there any species that have conflicting significant trend estimates between the FNF and MT-BCR10 scales, indicating that a species isn't doing well within the forest compared to the surrounding region and vice versa?

- There were no conflicting significant trends detected.

Which species had a statistically significant increasing or decreasing trend in density at both the FNF and MT-BCR10 scales?

- Only the Varied Thrush, black-capped chickadee, and Winter Wren show a downward trend at both scales. Only the Orange-crowned Warbler and Tree Swallow show an upward trend at both scales. Both of these species are neotropical migratory birds.

Have there been any widespread changes in habitat on the Forest (such as drought, large wildfires or insect outbreaks, timber harvest) over a 10-year time period that may be associated with observed trends?

- There have been several large wildfires on the FNF in the last 10 years that could be associated with an increasing trend for species such as the Western Flycatcher. Species with a declining trend on the FNF are associated with mesic habitats at relatively low elevations. Some of the wildfires that have occurred in the last 10 years have burned mesic areas, including riparian areas, with high severity.

How are bird densities changing over time for key habitats?

- This feature isn't currently available but is anticipated to be in the future.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 87. Summary of Findings for Monitoring Item MON-WL-15 – Habitat Conditions for Breeding-season Birds

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES with modifications of some of the indicators
Recommendations – Some of the monitoring indicators should be changed based upon improved understanding of our ability to detect significant changes at the Forest scale. Density varies from year to year, so it is more appropriate to report significant trends in density.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN (B) **Too soon to tell.** This assessment provides a baseline condition before on-the-ground implementation of the revised plan.
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?
Forest Plan Monitoring Program Continue to use IMBCR data because it is reliable, objective, and is consistently measured at multiple levels including the Forest and MT-BCR10, enabling us to make comparisons over time. Cara Staab, Regional Ecologist, stated that occupancy is more meaningful for some species while density is more appropriate for others. Therefore, both should be reported. When looking at statistically significant trends, R1 will use the 95% credible interval. It is useful to compare statistically significant trends at the Forest and MT-BCR10 scales to see which species have common trends and which have divergent trends. Change the wording of monitoring indicator #44 to “Bird species observations and occupancy on the Forest based upon data collected for Integrated Monitoring in Bird Conservation Regions”. Change the wording of monitoring indicator #46 to “Bird species for which there are statistically significant (95% credible interval) population changes (trends) -- compare FNF with MT-Bird Conservation Region 10”.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain –** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-16: What is the status of the aquatic amphibian community on the Forest?

Introduction

This monitoring item is intended to monitor ecological diversity and integrity of wetlands, addressed by two desired conditions:

FW-DC-WL DIV-01 Ecological conditions provide for wildlife diversity (including species of conservation concern[15]) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species).

The ecological conditions of known boreal toad breeding lakes, ponds, and wetlands support boreal toad breeding, feeding, and metamorphosis. Known breeding sites are free of invasive species.

FW-DC-WTR-12 Habitats and native assemblages of aquatic and riparian-associated plants and animals are free of persistent non-native species such as zebra mussels, New Zealand mud snails, quagga mussels, Eurasian milfoil, and brown trout. Non-native species (e.g., non-native bullfrogs, Chytrid fungus, yellow flag iris, or reed canary grass) are not expanding into waterbodies.

Table 88. MON-WL-16, Amphibians and wetland habitats. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data collection interval	Data Source / Partner	Point of Contact
FW-DC-WL DIV-01 FW-DC-WTR-12	IND-WL- 47. Aquatic sites surveyed for amphibian presence, in cooperation with other partners. 48. Amphibian species detections, whether there is evidence of reproduction 49. Percentage of sites surveyed where aquatic invasive species (plants or animals) are detected	Annually: each ranger district has monitoring 1 out of every 5 years	NRM, local GIS feature class	Forest wildlife biologist

Methods

IND-WL-47 and -48. From 2005-2017 wildlife and fish biologists surveyed a minimum of 5 wetland sites per year, recording data on amphibians as well as reptiles. Surveys were completed using the Forest standardized protocol and data sheet. There was an annual rotation of which district would host the event. Basic wetland information was collected on sites that were visited and counts of adults, larvae, and egg masses were observed. Additional surveys were completed at the discretion of the district biologist. The Forest intends to identify key sites for monitoring amphibian community diversity by selecting 1-3 sites on each district with detections of species of special interest or less common species (e.g. Pacific Tree Frog, Pacific Chorus Frog). These sites would be monitored on a rotating basis so that sites for each district are monitored once every 5 years. In addition, 'Frog Day' citizen science day surveys would be completed to provide additional information in collaboration with the forest education outreach coordinator and other forest personnel, their families, and volunteers.

Starting in 2019, nine wetlands (three per functional unit) were selected for annual long-term Vanguard monitoring (see table below). For the 2021 field season, two sites were added on the Spotted Bear Ranger District. Sites were chosen to compliment Montana Natural Heritage Programs Sentinel Wetland Monitoring. As part of their Wetland Program Plan, they want to establish a statewide sentinel wetland network, representing the best condition found in the wetland's ecoregion, and under the management of a public land agency so that access remains possible. This sentinel network will allow us and our successors to monitor how natural stressors — drought, climate change — impact wetlands over time, as well as tracking interannual variability resulting from naturally shifting levels and seasonality of precipitation. Four sites chosen for the Vanguard monitoring are also Sentinel wetlands (see table below). For the remaining sites, collaboration with the forest botany group to conduct a floristic inventory on a schedule similar to the Sentinel Wetland monitoring program.

Using a slightly modified MT NHP lentic survey form, information about the wetland would be collected as well as species observed in dipnet protocol and photo points. The following objectives were developed for developing the wetland monitoring program:

- Monitor water level and water temperature continuously (single reading per day) using data loggers
- Select wetlands known to contain long-toed salamander (a native, amphibian species with long term habitat use and sensitive to changes in the environment);
- Conduct timed and consistent effort to record all amphibian and reptile species encountered;
- Utilize Montana Natural Heritage Program Map Viewer Aquatic Invasive Species data to collect data on invasive species presence across the Forest;
- Collect point sampling of digital photographs;
- Conduct call-back surveys to target species whose know detection rates tend to be lower in dip-net surveys;
- Utilize partnerships including Montana Natural Heritage program and other non-profit groups to expand our ability to monitor wetlands. Potential include additional sites to monitor species richness;
- Provide training to partners with quality control in order to utilize their help with data collection. If sufficient help available, allow expansion of monitoring into additional wetlands;
- Gather input from other experts, other agencies and citizens (henceforth: partners) on survey design;
- Share cost of equipment and supplies;
- Store information as GIS attributes, photographs and Excel spreadsheet on FS servers. Provide information whenever requested. Summarize trend data every four years in report;
- Review data every four years with partners to determine if program needs to be kept, modified, or otherwise updated.

Table 89. Name of wetland for Vanguard monitoring and its associated district.

District and Site Name	MT NHP Sentinel Wetland
Glacier View Ranger District	
Dragonfly Lake	
Hungry Horse Ranger District	
Betsy Bog	
Velour Pond	
Swan Lake Ranger District	
Antler Spring	x
Bens Bog	x
Morgen Pond	x
Tally Lake Ranger District	
Bootjack Pond	
Kookaburra Pond	x
Miller Creek Moose Pond	
Spotted Bear Ranger District	
Trail Creek Fen	
Red Creek Site (#1)	

IND-WL-47 and 48. Record the name/number sites surveyed each year; name of species detected, reproduction detected yes or no, note any invasive species detected.

For the 2021 report, the Forest used the SDE file S_R1_FLT.HerpData and queried it for the years 2005 and forward, (which ended in 2017), then added the new method for monitoring that we are refining.

IND-WL-49 Invasive species are reported in the MT Natural Heritage Database- query and reported by species and site name. (Note: eDNA surveys may be useful in the future, but this method has not yet been verified).

Partnerships: Citizen-science volunteers, Montana Natural Heritage Program, MT Conservation Corps/Youth Conservation Corps

Results

Table 90. Monitoring Evaluation Report – summary of data sources for MON-WL-16

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-16	Data was pulled from SDE file S_R1_FLT.HerpData and queried for years 2005 and forward which ended in 2017. For 2019 and 2020 data was saved to a GBD after surveys were performed and summarized 12/16/2020. Aquatic invasive species data was collected on 12/17/2020 from the Montana Natural Heritage Map Viewer program.	Low level of confidence in data from 2005-2017. Sites have been surveyed very sporadically, often with groups of young citizen scientists who may not be able to reliably identify signs of amphibian reproduction or aquatic species invasion. Level of effort varied from year to year as well as the number of sites surveyed. Data from 2019 and 2020 was collected by district wildlife and fisheries staff which gives a higher degree of confidence in the data. Protocols are still being refined for how to summarize data and exact information collected.

The tables below summarize the number of surveys that have been conducted on each district as well as a summary of species detected between 2005-2017. Tables also summarize the species detected by site and year and the total number of individuals counted by life stage. The last set of tables summarize species observed and their life stages from data collected under the new protocol for 2019 and 2020 respectively.

Table 91. MON-WL-47. Monitoring Results - Summary of number of wetland sites monitored by district from 2005-2017.

District	Glacier View	Hungry Horse	Spotted Bear	Swan Lake	Tally Lake	Count of Total Survey Years
Count of Survey Years 2005 - 2017	54	176	53	282	273	838

Table 92. MON-WL-48. Monitoring Results - Summary of the total number of amphibian and reptile observations by species and life stage between 2005-2017.

Species Detected by District	Sum of ADULT_JUVE	Sum of TADPOLES	Sum of EGG_MASSES
GLACIER VIEW	**169**	**523**	**69**
Common Garter Snake	8	0	0
Long-toed Salamander	1	203	69
Pacific Chorus Frog	1	0	0
Painted Turtle	1	0	0
Spotted Frog	148	120	0
Western Terrestrial Garter Snake	4	0	0
Western Toad	6	200	0
HUNGRY HORSE	**355**	**7793**	**1**
Common Garter Snake	36	1	0
Long-toed Salamander	12	1617	1

Species Detected by District	Sum of ADULT_JUVE	Sum of TADPOLES	Sum of EGG_MASSES
Pacific Chorus Frog	3	86	0
Painted Turtle	1	0	0
Spotted Frog	294	5287	0
Western Terrestrial Garter Snake	6	0	0
Western Toad	3	802	0
SPOTTED BEAR	**130**	**926**	**0**
Common Garter Snake	9	0	0
Long-toed Salamander	7	146	0
Spotted Frog	110	580	0
Western Terrestrial Garter Snake	4	0	0
Western Toad	0	200	0
SWAN LAKE	**1783**	**39324**	**7**
Common Garter Snake	136	0	0
Long-toed Salamander	5	2116	4
Painted Turtle	24	0	0
Spotted Frog	539	2685	3
Western Terrestrial Garter Snake	17	0	0
Western Toad	1062	34523	0
TALLY LAKE	**472**	**39863**	**52**
Common Garter Snake	50	0	0
Long-toed Salamander	11	3018	39
No Herps Collected	0	0	10
Pacific Chorus Frog	14	419	0
Pacific Tree Frog	0	783	0
Painted Turtle	3	0	0
Spotted Frog	358	1314	3
Western Terrestrial Garter Snake	22	0	0
Western Toad	14	34329	0

Table 93. MON-WL-48. Monitoring Results - Sum of FNF amphibian observations by species and life stage.

Species	Life Stage		
	Egg Mass	Tadpoles	Adults/Juveniles
Long-toed Salamander	113	7100	36
Pacific Chorus Frog	0	505	18

Species	Life Stage		
	Egg Mass	Tadpoles	Adults/Juveniles
Pacific Tree Frog	0	783	0
(Columbian) Spotted Frog	6	9986	1449
Western Toad	0	70054	1085

See separate Word document in monitoring record for results of each pond monitored by year, species detected, and life form.

Table 94. MON-WL-48. Monitoring Results - 2019 Species results by life form and Survey Site

Site Name	Taxonomic Group	Species Name	Age Classes Detected (Amphibian)	Age Classes Detected (Reptile)
Amok Bog	Amphibian	Columbia Spotted Frog	Larvae, Adults	<Null>
Antler Spring	None Detected		<Null>	<Null>
Ben's Bog	Reptile	Common Garter snake	<Null>	Adults
Ben's Bog	Amphibian	Columbia Spotted Frog	Adults	<Null>
Ben's Bog	Amphibian	Longtoed Salamander	Juveniles	<Null>
Betsy Bog	Amphibian	Columbia Spotted Frog	Larvae	<Null>
Betsy Bog	Amphibian	Longtoed Salamander	Larvae	
Betsy Bog	Reptile	Common Garter snake		Adults
Bootjack Pond	Amphibian	Columbia Spotted Frog	Adults	<Null>
Bootjack Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Bootjack Pond	Reptile	Common Garter snake		Adults
Dragonfly Lake	Amphibian	Longtoed Salamander	Larvae	<Null>
Kookaburra Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Kookaburra Pond	Amphibian	Columbia Spotted Frog	Larvae	<Null>
Miller Creek Moose Pond	Amphibian	Columbia Spotted Frog	Adults	<Null>
Miller Creek Moose Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Miller Creek Moose Pond	Reptile	Common Garter snake		Adults
Morgan Pond	None Detected		<Null>	<Null>
Velour Pond	Amphibian	Columbia Spotted Frog	Adults	
Velour Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Velour Pond	Amphibian	Columbia Spotted Frog	Larvae	

Site Name	Taxonomic Group	Species Name	Age Classes Detected (Amphibian)	Age Classes Detected (Reptile)
Velour Pond	Reptile	Common Garter snake		Adults

Table 95. MON-WL-48. Monitoring Results - 2020 Species results by life form and Survey Site

Site	Taxonomic Group	Species Name	Age Classes Detected (Amphibian)	Age Classes Detected (Reptile)
Dragonfly Lake	Amphibian	Longtoed Salamander	Larvae	<Null>
Velour Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Velour Pond	Amphibian	Columbia Spotted Frog	Larvae	
Velour Pond	Reptile	Common Garter snake		Adults
Velour Pond	Amphibian	Columbia Spotted Frog	Adults	
Betsy Bog	Amphibian	Columbia Spotted Frog	Larvae	<Null>
Betsy Bog	Amphibian	Longtoed Salamander	Larvae	
Betsy Bog	Reptile	Common Garter snake		Adults
Antler Spring	None Detected		<Null>	<Null>
Amok Bog	Amphibian	Columbia Spotted Frog	Larvae and adults	<Null>
Ben's Bog	Reptile	Common Garter snake	<Null>	Adults
Ben's Bog	Amphibian	Columbia Spotted Frog	Adults	<Null>
Ben's Bog	Amphibian	Longtoed Salamander	Juveniles	<Null>
Morgan Pond	None Detected		<Null>	<Null>
Miller Creek Moose Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Miller Creek Moose Pond	Amphibian	Columbia Spotted Frog	Adults	<Null>
Miller Creek Moose Pond	Reptile	Common Gartersnake		Adults
Kookaburra Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Kookaburra Pond	Amphibian	Columbia Spotted Frog	Larvae	<Null>
Bootjack Pond	Amphibian	Longtoed Salamander	Larvae	<Null>
Bootjack Pond	Amphibian	Columbia Spotted Frog	Adults	<Null>
Bootjack Pond	Reptile	Common Gartersnake		Adults

None of the sites that had been monitored from 2005-2017 had aquatic invasive species discovered during the surveys. No aquatic invasive were detected under the new protocol in 2019 or 2020. Using the Montana Natural Heritage Map View, Aquatic Invasive Species tool, several sites throughout the Flathead National Forest have had detections of invasive animal species. Plant invasive species were not included in this report.

Table 96. MON-WL-49. Monitoring Results - Aquatic invasive species with their most recent year of detection on the Flathead National Forest by district and site name.

Site Name	Aquatic Invasive Species Name	Year of Most Current Observation
Tally Lake		
Ashley Lake	American Bullfrog (Lithobates catesbeianus)	2003
	Orconectes virilis (Virile Crayfish)	2020
Tally Lake	Orconectes virilis (Virile Crayfish)	2020
Hungry Horse		
Lion Lake	Orconectes virilis (Virile Crayfish)	2019
Swan Lake		
Swan Lake	Orconectes virilis (Virile Crayfish)	2019
	Flowering rush (Butomus umbellatus)	2018
Van Lake	Orconectes virilis (Virile Crayfish)	2020
Holland Lake	American Water-lily (Nymphaea odorata)	2020

Discussion of Results

Have there been any changes in amphibian species presence on the Forest over a 10-year period?

- Based upon data collected between 2005-2017 it is hard to detect change in amphibian species presence due to the low confidence in data collected as well as the sporadic nature of the data collection. Some sites were surveyed 3-4 times between 2005-2017 and others were surveyed only once. See Tables 91 & 92 in the monitoring project file for a summary by species observed and the number of surveys conducted. Under the new survey protocol, there is not enough data collected to detect a change at this time.

Have there been any changes in invasive species presence on the Forest over a 10-year period?

- Table 96 does list four sites that have had recent invasive animal species detected from the Montana Natural Heritage Program (NHP) Map Viewer website. When considering plant species, the vanguard wetland sites were chosen because they are considered “unimpacted” wetlands. If invasive plant species are detected at those sites, it may be a signal of a trend for other wetland sites across the forest. When vegetation inventory data is collected, that information can be compared overtime to monitor invasive species presence. For a general look across the forest, data from NHP Aquatic Invasive Species Map Viewer tool can be gathered and compared to see if new sites are becoming infested or currently infested sites are having greater effect.

Have there been changes in water levels and water temperature at key sites over a 10-year period?

- Water bodies fluctuate from year to year due to natural variation. General water level data was collected during the 2005-2017 monitoring period. Because the data was reported in 1-meter increments and inconsistency of survey effort and intervals, accurate changes are hard to detect and not included in this report. Starting in 2019 some of the nine wetlands designated to be surveyed annually had water level staff gauges installed which will give accurate and precise water level readings. Not all sites have these gauges installed, but pending funding, will have

them in the near future. Currently there is not enough data between 2019 and 2020 to discern any water level changes.

Have there been any changes in amphibian community species diversity over a 10-year period, as evidenced by changes in detection of less common species on the Forest (Pacific Tree Frogs, Pacific Chorus frogs, or Western Toads)? Has there been a sustained reduction in sites occupied by these 3 species?

- Sites have not been monitored consistently enough to answer this question. The current monitoring program with the vanguard sites will be able to inform this question over time. If staffing capacity and funding allows over the next 10 years, we intend to monitor key water bodies with less common amphibian species on the Forest (Pacific Tree Frog, Pacific Chorus Frog, Boreal [Western] Toad) and note if they are changing over the long-term. This will hopefully be accomplished utilizing targeted partners for a citizen science wetland monitoring program.

Has there been a sustained reduction in sites occupied by amphibians, reduction in species diversity, or lack of evidence of reproduction at a site where there was previous evidence of reproduction over a 6–10-year time period?

- Tables 92 and 93 display adult/juvenile and tadpole numbers detected between 2009-2017 by site name and species. Because of the inconsistency of survey effort and interval, accurate changes are hard to detect, but general abundances of each stage at the Forest level can be gleaned from the results. Generally, long toed salamander and western toad tadpoles followed by spotted frog were the most common species observed even if adults were detected in lower numbers across each district (Table 3). With the new Vanguard monitoring, this question will be answered over time for those specific sites. Over time, if an increase in monitoring by forest personnel is paired with a citizen science arm, a better picture across the forest could be drawn.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 97. Summary of Findings for Monitoring Item MON-WL-16 – Habitat Conditions for Aquatic Amphibians

1. Plan Monitoring Results: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES
Recommendations – Monitoring question and indicators are good, but the methods will be changed. Because of the unreliability of the data collected through the opportunistic citizen science program many of the questions could not be answered with certainty. With the new protocol that is being refined, the monitoring questions will likely be answered with more certainty. More funding to purchase stage gauges and data loggers as well as support from line officers to continue to make time to conduct surveys and analyze data are needed.
2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN – (B, C) IND-WL-47: (C) **-** Aquatic sites surveyed for amphibian presence, in cooperation with other partners. *The 'frog day' model of data collection rotating between districts was not a rigorous survey method and did not allow for many conclusions to*

be drawn from the data (Table 92-93). The new protocol started in 2019 will provide more accurate information. In coming years once protocol is refined, citizen science may be implemented with an 'adopt a wetland' concept with specific groups assigned a wetland to monitor on an annual basis using the updated protocol.

IND-WL-48: (B) - Amphibian species detections; whether there is evidence of reproduction. L*ong toed salamander and western toad tadpoles followed by spotted frog were the most common species observed even if adults were detected in lower numbers across each district (Table 93). There has been evidence of reproduction under the new protocol (Table 94-95), but more data is needed to identify changes.*

IND-WL-49: (B) - Percentage of sites surveyed where aquatic invasive species (plants or animals) are detected. *Invasive species data across the forest will be collected by utilizing the Aquatic Invasive Species identifier tool on the Montana Natural Heritage Website.*

Recommendation – na

3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, where might that change might be needed?

Monitoring Program. In order to answer the monitoring question, the Vanguard monitoring sites should be consistently monitored to detect changes in habitat as well as species occupancy and reproduction.

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain –** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for where change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.

MON-WL-17: What is the status of forest meso-carnivores (e.g., lynx, wolverine, fisher) on the Forest?

Introduction

This monitoring item is intended to monitor ecological diversity as it relates to diversity of wildlife, as stated in the following desired condition:

> **Desired condition FW-DC-WL DIV-01**: "Ecological conditions provide for wildlife diversity (including species of conservation concern) and wildlife habitat connectivity (including seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species)."

The R1 Broadscale Monitoring Strategy (BSMS) for meso-carnivores is a goal-efficient monitoring (GEM) framework designed to collect and compile data at scales larger than one planning unit. The GEM has four main components that make it uniquely able to solve rare species monitoring problems:

1. Tiered monitoring questions that address the finest-scale local needs but can scale up appropriately because of their tiered nature;
2. Monitoring questions that correspond to well-defined and discernable population states of interest;
3. A well-developed understanding of the processes of transitioning between or staying within a population state; and
4. Defined maximum scale at which each state is relevant.

By tracking state transitions (i.e. not present, singles present, multiple individuals of certain sex, multiple individuals of all sexes), answers to the tiered GEM questions when aggregated over time will provide monitoring trend estimates. See Golding, J. D., Schwartz, M. K., McKelvey, K. S., Squires, J. R., Jackson, S. D., Staab, C., Sadak, R. B., ... Rocky Mountain Research Station (Fort Collins, Colo.). (2018). Multispecies mesocarnivore monitoring: USDA Forest Service multiregional monitoring approach. 60 pgs. (https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr388.pdf). This effort is intended to occur on a rotational basis, with three National Forests within Region 1 conducting monitoring each year, leading to a 3-year rotation across all forests in Region 1.

Additionally, a Montana Fish, Wildlife and Parks fisher survey occurred in the Salish Mountains of the Flathead Forest in 2019 using a similar grid-based approach to stratify the survey effort. A 4-state wolverine survey was completed in 2017. This effort included locations on the Flathead Forest. The number of cells on the Flathead surveyed and the species findings were included and considered in the Forest Plan FEIS. However, statistical analysis on wolverine occupancy from the data was published by Lukacs et al. in 2020.

Table 98. MON-WL-17 Mesocarnivore detections. Plan components, indicators, data source, data collection interval, and point of contact

Plan Component(s)	Indicators	Data collection interval	Data Source / Partner	Point of Contact
FW-DC-WL DIV-01	IND-WL- 50. Grid cells surveyed and number of detections/non-detections of each meso-carnivore species on the Forest, in cooperation with other partners.	BSMS: Every 3 years. In addition to BSMS monitoring, the FNF intends to survey 4 grid cells per year with the help of partners, if funding and manpower allow.	R1 Meso-carnivore Report/USFS Rocky Mountain Research Station Survey effort by year and population state: FNF monitored in 2019 and data analyzed in 2020. MT FWP Northern Rockies Fisher Survey/ MT FWP	Forest wildlife biologist

Methods

IND-WL-50. Follow methods for snow tracking, eDNA collection, and multispecies bait station surveys in the USFS Region 1 multispecies meso-carnivore monitoring document, as updated. On the Forest, mesocarnivore monitoring is conducted only during the grizzly bear denning season due to safety concerns regarding use of lure or bait in conjunction with remote cameras or hair snares.

Specific grid cells are used to determine presence of a species, identification of males and females, and evidence of successful breeding. Collect and store samples so that high quality samples are sent to the DNA lab in Missoula.

Surveys aim to detect multiple species, based upon region 1 broadscale monitoring procedures. Calculate number of detections of each species/number of grid cells surveyed to get % of grid cells with detections for each species. Data is aggregated and analyzed by Forest and other broadscale ecological units.

The central database will be maintained through RMRS and at a minimum will include monitoring location information, date, species detection information (including the method used to identify the species), and individual identification or genetic information (if applicable). Monitoring information will also be compatible with and stored in the Forest Service corporate wildlife database, NRM Wildlife, so that it is accessible to the USFS.

If time and funding allow, survey a minimum of 4 grid cells on the Forest each year, in addition to BSMS survey efforts conducted across Region 1. Grid cells may be selected to target areas of specific interest to the Forest and should be rotated between districts from year to year.

Partnerships: Rocky Mountain Research Station, US Fish and Wildlife Service, MT Natural Heritage Program, Swan Valley Connections, Defenders of Wildlife, MT Fish Wildlife and Parks, Dept. of Natural Resources and Conservation,

Results

Results for most species are reported for 2018 (baseline year) and for subsequent years in which surveys are conducted on the Flathead National Forest (FNF). Additionally, results are reported for wolverine in 2017 because this is the year Montana FWP participated in a four-state wolverine survey effort.

The following tables summarize multiple survey efforts with differing objectives between 2017 and 2020. Protocols and strategies for survey differ between survey objectives, however results were pooled by year as a particular survey effort may still detect a species of interest outside the focal species in a season. For example, the Northern Rockies Fisher project led by MT FWP was designed to inventory fisher, however wolverine or lynx may also be detected and reported. The Multi-State Wolverine Survey may also detect marten or lynx, despite that the survey was designed for wolverine.

Table 99. Monitoring Evaluation Report – summary of data sources for MON-WL-17 Mesocarnivores

Evaluation year	Indicator	Date of Data Collection/Compilation	Data confidence
2021	IND-WL-17	2018-20	High level of confidence in data. Using standardized USFS datasets and procedures used for monitoring mesocarnivores

Table 100. MON-WL-17 Monitoring Results - Canada Lynx Detections on FNF

Year	Grid Cells Surveyed	Grid Cells with Species Detections	Species Detections/Grid Cell Surveyed
2018	2	1	1/2
2019*	23	3	3/23
2020	2	0	0/2
Total	**26**	**3**	**4/26 2018-2020**

*Grid cells surveyed explicitly for R1 BSMS with the objective of targeting lynx presence.

Table 101. MON-WL-17 Monitoring Results - Wolverine Detections on FNF

Year	Grid Cells Surveyed	Grid Cells with Species Detections	Species Detections/Grid Cell Surveyed
2017 Four-state wolverine study	9*	4	4/9
2018	2	1	1/2
2019	23	0	0/23
2020	2	1	1/2
Total	**26**	**2**	**2/26 2018-2020**

*Grid cells surveyed explicitly for Multi-State Wolverine Survey. Additional survey was completed in Swan Valley SWCC efforts in 2017 that is not reported here. This information was reported in the FNF Forest Plan FEIS. Two of the four wolverine detections were previously reported as part of the SWCC baseline carnivore monitoring report.

Table 102. MON-WL-17 Monitoring Results - Fisher Detections on FNF

Year	Grid Cells Surveyed	Grid Cells with Species Detections	Species Detections/Grid Cell Surveyed
2018	2	0	0/2
2019	23	0	0/23
2020	2	0	0/2
Total	**26**	**0**	**0/26 2018-2020**

Table 103. MON-WL-17 Monitoring Results - Marten Detections on FNF

Year	Grid Cells Surveyed	Grid Cells with Species Detections	Species Detections/Grid Cell Surveyed
2018	2	0	0/2
2019	23	2*	2/23
2020	2	0	0/1
Total	**26**	**2**	**2/26 2018-2020**

*MT FWP Northern Fisher project surveyed 12 cells on the Flathead Forest. Data for marten detected for these 12 cells was not available at the time of this report. No Wolverine, Lynx or Fisher were detected (pers comm J. Coltrane 2/2/21).

Discussion of Results

How many grid cells on the Forest were surveyed?

- Twenty-six grid cells were surveyed from 2018 through 2020. In 2019, 9 cells on the Salish Mountains on the Tally Lake Ranger District and 2 cells in the North Fork on the Glacier View district, were surveyed in as part of the Regional 1 BSMS for mesocarnivores. Separately, MT Fish, Wildlife and Parks led the Northern Rockies Fisher Survey which included survey of 12 cells in the Salish Mountains that did not overlap with cells surveyed for the Region 1 BSMS effort. In 2020, 2 grid cells were surveyed in the Swan Valley of the Swan Lake Ranger District. In 2017, the survey for wolverine occurred on the Flathead Forest as part of a Multi-State Wolverine Survey. Nine cells were surveyed explicitly for this effort.

How many grid cells had detections of each species (i.e. primary: Canada lynx, wolverine, fisher, secondary: American marten, Pacific marten, mountain fox)? This monitoring method does not monitor every region 1 forest every year, nor does it monitor every species every year.

- Wolverine was detected in 1 grid cell 2020 on SLRD via game camera. In 2019, marten (species unknown) was detected in 2 grid cells (1 - TLRD, 1 - GVRD). These detections came via eDNA from a sampled snow track. In 2019, the R1 BSMS survey had three unique eDNA lynx detections on the Flathead National Forest (1 - TLRD, 2 - GVRD) near Big Creek, Kletomus Creek, and Martin Creek.

What is the state of each species; not present, singles present, multiple individuals of certain sex, multiple individuals of all sexes?

- Based on the findings, the state of each species did not change from 2018: Wolverine – multiple individuals of all sexes; Lynx – multiple individuals of all sexes; Fisher – not present (fisher have not been confirmed on the Forest for over 15 years). In 2019, survey was restricted to the Tally Lake Ranger District (TLRD) in the Salish Mountains to explore the question of lynx presence on that particular portion of the Forest. Lynx were detected on TLRD confirming presence in this area of the forest (Multispecies Mesocarnivore Monitoring 2016-2020 Summary Report, 2021).

Is the state of a species changing? If so, what does this indicated about the trend?

- No state changes was detected or is known for primary or secondary target species. Insufficient information exists for any indication of trend.
- Lukacs et al. (2020) summarized wolverine occupancy data of the Northern Continental Divide Ecosystem which includes the Flathead Forest. The data for this analysis was collected in 2017.

The study found that this ecosystem has the highest wolverine occupancy of the rest of the ecosystems sampled over a 4-state area.

What factors may be contributing to a change in state? (e.g., large wildfires, poor timing of survey or difficult survey conditions, etc.).

- Too little survey effort was completed across the three winters (2018 to 2020) to provide information about a change in state or contributing factors. The 2019 BSMS survey effort was heavily limited due to a 35-day federal government shutdown. While the data above includes all methods and efforts when reporting surveyed cells and species detected, different approaches may target different species. For example, the BSMS in 2019 specifically inventoried for lynx in the Salish Mountains rather than distribute survey effort in other areas to target wolverine etc.

Have cells been surveyed consistently? Are there problems with the ability to compare the state of a species between years?

- Both survey effort and survey location were not consistent between 2018 and 2020. Two cells were surveyed in 2018 (one is Salish Mountains and one in Swan Valley). The Salish Mountains were primarily surveyed in 2019 and only 2 grid cells were surveyed anecdotally in the Swan Valley in 2020. Conclusions for detection of primary target species are not possible with inconsistent and disparate survey effort for the three years. The R1 BSMS mesocarnivore survey effort does not occur on the Flathead Forest each winter. The effort is scheduled to occur again on the Flathead Forest in 2022. Additionally, in 2021, surveys in the SWCC portion of the Flathead Forest (Swan Valley) would resume inventory efforts.

Have there been two consecutive winters of surveys with no tracks, photos, or DNA evidence for a species that was previously detected or lack of detection of any species in a grid cell over multiple years?

- No. Based on the survey effort between 2018 to 2020, too little inventory was completed to be conclusive for either primary or secondary species. Even with disparate effort, all previously detected species have been inventoried in consecutive winters.

Is there evidence of reproduction?

- There has not been evidence of reproduction collected using the techniques employed for the R1 BSMS survey or the MT FWP Northern Rockies Fisher Survey. While these efforts may collect DNA data to identify species, sex, or individual, information on reproduction or lineage is unlikely to be obtained.

Evaluation of Results for Adaptive Management Finding

The following findings and recommendations resulted from the evaluation of monitoring methods and results as documented above.

Table 104. Summary of Findings for Monitoring Item MON-WL-17 – Habitat Conditions for Wildlife Species Associated with Forest Mesocarnivores

1. **Plan Monitoring Results**: Does the monitoring question and indicator(s) provide the information necessary to understand the status of the associated plan component listed above?
YES
Recommendations – na

2. Plan Implementation Status [1]: Do monitoring results demonstrate progress of the associated plan components for this monitoring item?
UNCERTAIN – (A) Availability of data or Interval of data collection beyond this reporting cycle. Insufficient survey effort has occurred to provide information to answer the monitoring question. No change recommended. The R1 BSMS survey effort was minimal in 2019-2020 due to Covid-19 but is scheduled to occur in 2022. Additionally, survey effort as part of the Southwest Crown of the Continent is ongoing in the winter of 2021 and is also scheduled to occur in 2022. Data from 2021 and 2022 survey efforts will be reported in 2023 monitoring report. The timelines for analysis will not align at first (every 2 years vs. every 3 years of survey will take a few cycles to iron out). Survey effort occurs each season, which demonstrates progress. The R1 mesocarnivore monitoring program should provide needed information once it has consistently collected data for several rotations on the Forest.
Recommendation – na
3. Type of change under consideration [2]: If corrective action/change was indicated under either #1 or #2, <u>where</u> might that change might be needed?
NA

[1] **PLAN IMPLEMENTATION STATUS: (A) Uncertain –** Availability of data or Interval of data collection beyond this reporting cycle (*indicate date of next time this monitoring item will be evaluated*); **(B) Uncertain -** More time/data are needed to understand status or progress of the plan component(s)**; (C) Uncertain -** Methods inadequate to assess the status or progress toward achieving plan component(s); (**D**) **NO** - Implementation of plan component(s) ARE NOT trending, progressing, and/or conducted as desired**; (E) YES -** Implementation of plan component(s) ARE trending, progressing, and/or conducted as desired

[2] **CHOICES for <u>where</u> change may be needed include**: Monitoring program, plan component, management activity, plan assessment, program strategy or approaches documents, public engagement strategy.