CLEARWATER BASIN COLLABORATIVE
SELWAY-MIDDLE FORK CFLRP PROJECT AREA
ECOLOGICAL DATA COLLECTION AND ANALYSIS
TECHNICAL REPORT

Prepared for

Clearwater Basin Collaborative
Lewiston, Idaho

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LIST OF ACRONYMS

ADS	Aerial Detection Survey
BLM	Bureau of Land Management
BMP	Best Management Practices
BNF	Bitterroot National Forest

CBC	Clearwater Basin Collaborative
CEQ	Council on Environmental Quality
CNF	Clearwater National Forest
CFLRP	Collaborative Forest Landscape Restoration Program
CFR	Code of Federal Regulations
DBH	Diameter at breast height
FIA	Forest Inventory and Assessment
GPS	Global Position System
HRV	Historic Range of Variation
HUC	Hydrologic Unit Code
IDFG	Idaho Department of Fish and Game
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NNIS	Non-Native Invasive Species
NPNF	Nez Perce National Forest
TSMRS	Timber Stand Management Record System
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VRU	Vegetation Response Units
WUI	Wildland-urban interface

EXECUTIVE SUMMARY

Founded in 2008, the Clearwater Basin Collaborative (CBC) is an innovative partnership of twenty-one tribal, federal, state, local, industry, and conservation associations in central Idaho united by a shared vision: "to enhance and protect the ecological and economic health of the forests, rivers, and communities within the Clearwater Basin." The CBC develops resource management priorities among historically often conflicted parties, finding solutions that take all stakeholders' interests into account. The CBC has received competitive national awards from the U.S. Forest Service's (USFS) Collaborative Forest Landscape Restoration Program (CFLRP) annually since 2010 for its restoration and monitoring programs in the Selway-Middle Fork Project Area in the Clearwater Basin (project area). Ecosystem Research Group (ERG), an environmental consulting company based in nearby Missoula, Montana, was contracted in 2012 by the CBC to collect and analyze existing ecological baseline data, identify data gaps, and develop recommendations for monitoring of current conditions in the project area.

The initial data collection and analysis presented in this report will be an invaluable tool for understanding the management needs of the CBC's CFLRP project. The recommended additional and revised monitoring tasks provide a solid foundation for future efforts, in that they provide both baseline ecological data and methods for tracking the effectiveness of CFLRP treatments. This report presents comprehensive data gathered from various sources within one narrative, combining information in a meaningful way. It is a product of the CBC process, as was the extraordinarily successful recalibration workshop with the USFS, in which a long-needed update of the USFS's SIMPPLLE model was achieved through harmonizing VMap and other data sets. This SIMPPLLE update was a necessary step in developing the data analysis capabilities relied upon in this report. It was exactly the kind of multi-party accomplishment that the CBC's collaboration models and thus inspires.

The key findings of our initial data collection and analysis regarding ecological conditions are as follows:

EXISTING ECOLOGICAL CONDITIONS

- Wildfires, which were below Historic Range of Variation (HRV) from 1920 to 1980, are currently increasing, in both in severity and in acres burned.
- Forests are slightly older and denser than mean HRV, but not outside the normal range.
- Ponderosa pine, Western larch, and lodgepole pine are below HRV while Douglas-fir is currently above HRV.
- Bark beetle outbreaks are approaching epidemic levels in the lodgepole pine-dominated uplands. Defoliators, such as tussock moths, may be increasing as well. Root disease, while not detected,

is suspected to be increasing, based on known high densities on the adjacent Idaho Panhandle National Forests.

- Non-native invasive species (including St. John's wort and spotted knapweed) occur on large acreages on both developed and backcountry areas.
- Nutritious foraging habitat for elk (young or open stands) is dramatically below HRV. Even though inevitable future disturbances from wildfires and insects will increase the abundance of young or open stands, non-native invasive species will at the same time further reduce forage production in some areas. Since elk populations are currently low, predator populations are high, and alternate prey species such as deer are also minimal, predation will have a disproportionately negative effect on elk for a long time, even as forage levels and elk populations increase due to increasing disturbance.
- Roads and road crossings over fish-bearing streams are abundant and likely compromise fish production on the west end of the project area. The impact of those roads at the project scale, however, is minor. Restoration efforts to reduce negative effects on fisheries and watersheds have been well-planned, aggressive, and successful.

RECOMMENDED MONITORING

It is critical that the data presented in these pages and the momentum that has gathered be put to optimal use. Time is of the essence: we strongly suggest that field monitoring begin in 2013 in order to keep collaborators motivated and "in the loop." Are logging units producing desired short and long-term vegetation communities? Are prescribed burns resulting in more forage or reduced fuels and thus in the right locale at the optimal severity? Are weed treatments restoring healthy native plant communities in the long-term? Collaborators need to be assured as soon as possible that CFLRP projects are having positive results.

Having a first round of monitoring results available in the fall of 2013 would provide CBC collaborators with an opportunity, in workshop format, to review, critique, and ultimately modify those monitoring steps to determine the effectiveness of CFLRP projects, and the degree to which those projects meet desired conditions. The recommended monitoring items for the 2013 field season are:

- Random plots (to sample all vegetation/disturbance variables and avoid bias)
- Paired plots (of burned/unburned, logged/unlogged, and weed-treated/untreated plots) so that the effects of treatments and disturbances are fully understood. Plots would include all standard vegetation parameters including habitat type, cover type, forage production, recent disturbances, and soil productivity.

- Plots selected initially in 2013 would be those where data would be most useful for addressing immediate future CFLRP treatment priority decisions, i.e. project area lands scheduled for logging, burning, or weed treatments.

Taking these factors into account, we recommend two 2013 field season data collection options: a moderate approach and a more extensive one.

1. INTRODUCTION

The Clearwater Basin Collaborative (CBC) is unique partnership of twenty-one groups that have come together “to enhance and protect the ecological and economic health of the forests, rivers, and communities within the Clearwater Basin”: the Clearwater County Commissioners, Nez Perce Tribe, U.S. Forest Service (USFS), Clearwater Paper, Empire Lumber, Framing Our Community, Idaho Association of Loggers, Idaho Backcountry Hunters and Anglers, Idaho Conservation League, Idaho County Commissioners, Idaho Department of Commerce, Idaho Department of Fish and Game, Idaho Forest Group, Idaho Outfitters and Guides, Lewiston Off-Highway Vehicle Club, Public Lands Access Year-round, Rocky Mountain Elk Foundation, Great Burn Study Group, The Nature Conservancy, Wilderness Society, and Trout Unlimited. The CBC seeks to develop resource management priorities collaboratively among historically often conflicted parties, finding solutions that take all stakeholders’ interests into account. Since 2010, the CBC has received funding as part of the federal Collaborative Forest Landscape Restoration Program (CFLRP) for restoration and monitoring in the Selway-Middle Fork of the Clearwater project area, a 1.4 million acre portion of the 6 million acre Clearwater Basin in north-central Idaho.

Ecosystem Research Group (ERG) was contracted in 2012 by the CBC to collect and analyze existing ecological baseline data, identify data gaps, and develop recommendations for monitoring of current conditions in the Selway-Middle Fork Project Area. This report addresses these facets of the project area: the current ecological conditions, and the monitoring necessary for adaptive management and future project implementation.

THE HISTORY OF THE LANDSCAPE

The project area is composed of the mountainous, densely forested terrain of the Bitterroot Mountains and the wild Clearwater and Selway Rivers. It is largely roadless and federally owned, and appears to the eye as “untouched” by active use. The small towns located in the Selway-Middle Fork Project Area have traditionally relied on the area for woods work and fishing, hunting and relaxation. Several key events within the last century have shaped these recreational, social, and economic opportunities. The infamous wildfires of 1889 and 1910 created conditions conducive to the grazing of large herds of domestic sheep for several decades, which eventually ended due to USFS grazing restrictions and advancing conifer regeneration. The absence of sheep, in turn, improved forage conditions for large populations of elk, which peaked in the mid 1900s. In the meantime, the wildfires of 1910 catalyzed the USFS development of its wildfire suppression program. The “10 a.m. Policy,” which called for the suppression of all wildfires by 10 a.m. the day after the fire started, was adopted in 1935.

The agency’s wildfire suppression emphasis along with improved fire-fighting technology (the establishment of lookouts, improved road and trail access, smoke-jumpers, and retardant bombers), largely eliminated wildfire as a natural disturbance from 1920 to the late 1980s. As a result, forests in the project area are now older, denser, and disproportionately composed of climax rather than seral species when compared to the Historic Range of Variation (HRV) as discussed in Sections 3.1 and 3.2 of this report. This means that forests are susceptible to higher-than-normal severity wildfires, insect epidemics, and root disease outbreaks. The forest composition of wildlife species has also changed from species that are associated with young or open forests (elk, towhees, flammulated owls) to favor species that are associated with old and/or dense forests (martens, pileated woodpeckers, Hammond's flycatchers). Also in the meantime, white pine blister rust, an exotic pathogen that kills five-fascicled pines, was accidentally introduced to the western states from Europe around 1900. As a result, virtually all stands of western white pine have disappeared from the project area. Although some rust-resistant trees remain, none occur at stand-level densities.

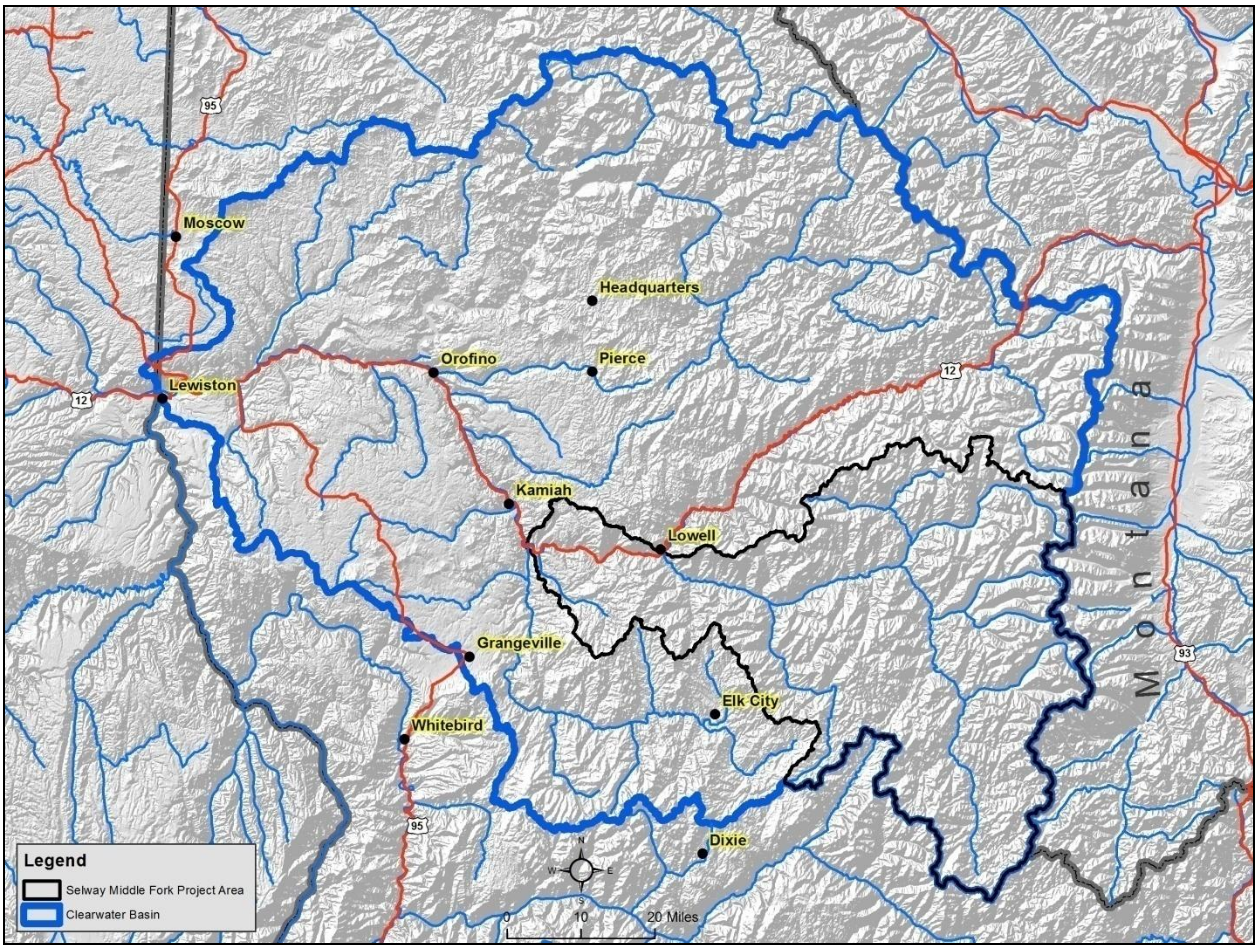

Figure 1 Selway Middle Fork Project Area location within the Clearwater Basin

In the early 1960s, the USFS began to prioritize timber harvest in the west end of the project area. Logging practices included the establishment of a high density of roads and small-patch (20 to 40 acre) regeneration harvests (clearcut, seed tree, shelterwood) and the promotion of regeneration of desired seral species (ponderosa pine, western larch, rust-resistant white pine). Tribal and corporate lands were also logged at comparable intensities during this period. In the early 1990s, multiple factors (the spotted owl controversy in the Pacific Northwest, declining forest yields, the ascendancy of ecosystem management as a USFS policy, litigation, and the complexity and expense of the National Environmental Policy Act (NEPA) process) combined to affect a decline in timber harvests in most Western national forests. The Selway-Bitterroot, Clearwater, and other Idaho National Forests were no exception. Local economies took a hard hit, and populations and wages declined. The last twenty years have also been a time of high-impact ecological changes: an increase in mountain pine beetle infestations and in acres burned, summers of record high temperatures, and a higher severity of wildfires.

PROJECT AREA

Land ownership in the project area is predominantly USFS (95%). A majority of this acreage (just over 68%) is designated wilderness under the Wilderness Act of 1964. Most of this wilderness lies within the Selway-Bitterroot Wilderness, with a portion of the Frank Church-River of No Return Wilderness comprising the southern tip of the project area. An additional 19.2% of the federally owned lands in the project area are designated roadless under the Idaho Roadless Rule of 2008. The three national forests in the project area are the Bitterroot National Forest (BNF), established in 1898, the Nez Perce National Forest (NPNF), designated in 1908 and the Clearwater National Forest (CNF) established in 1908.

The remaining 5% of land in the project area that is not under USFS management is a combination of private (3.5%) and state land (1.3%). Less than 1% of the project area is Bureau of Indian Affairs land held in trust, open water, Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service property. The private lands in the project area that have been developed with dwelling or business structures are located in the wildland-urban interface (WUI), and are managed under specific county regulations for WUIs. While the Idaho Department of Fish and Game (IDFG) does not manage any land itself, the elk herd units in the project area are under the management of the IDFG.

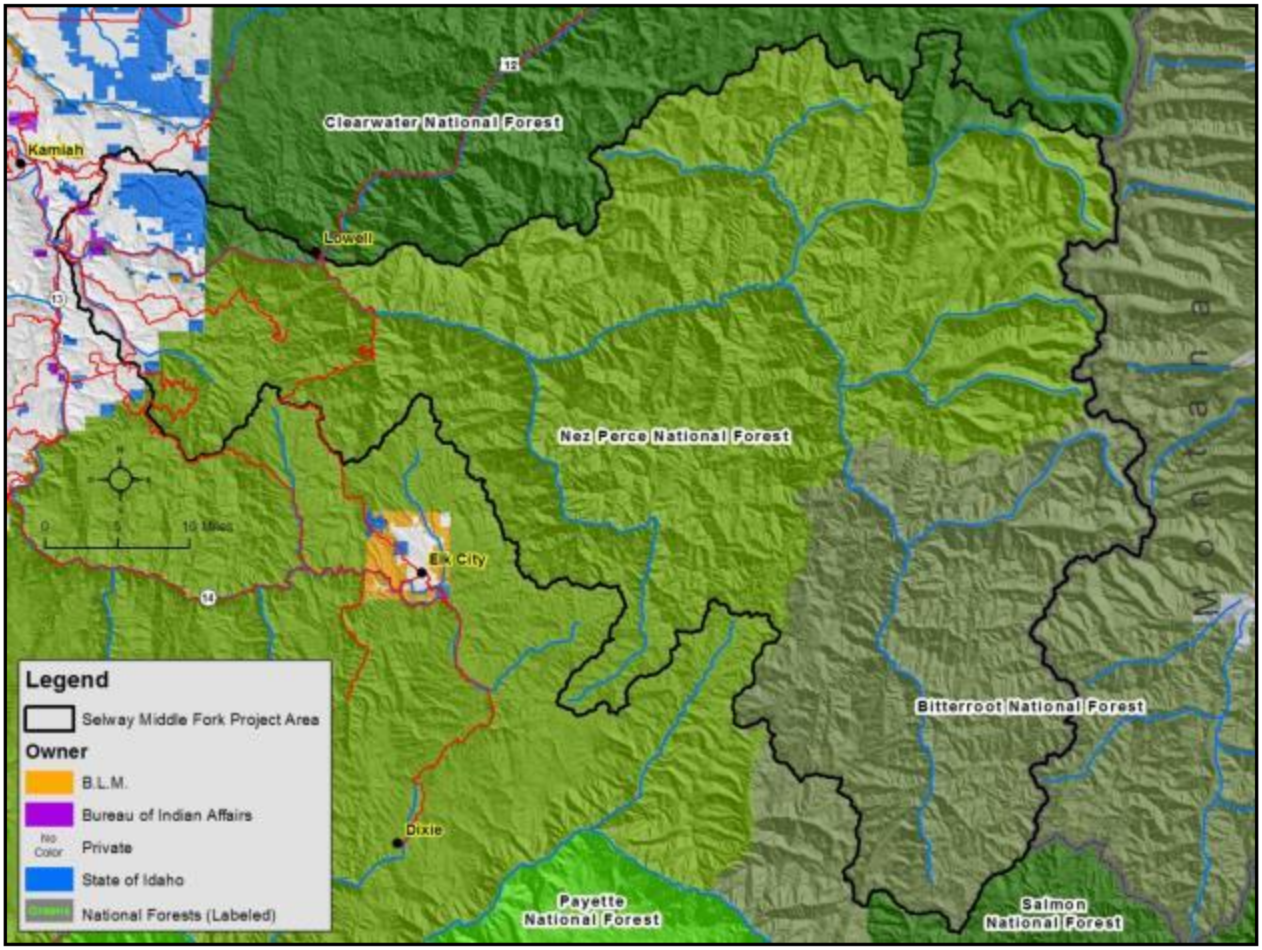

Figure 2 Selway Middle Fork Project Area land ownership

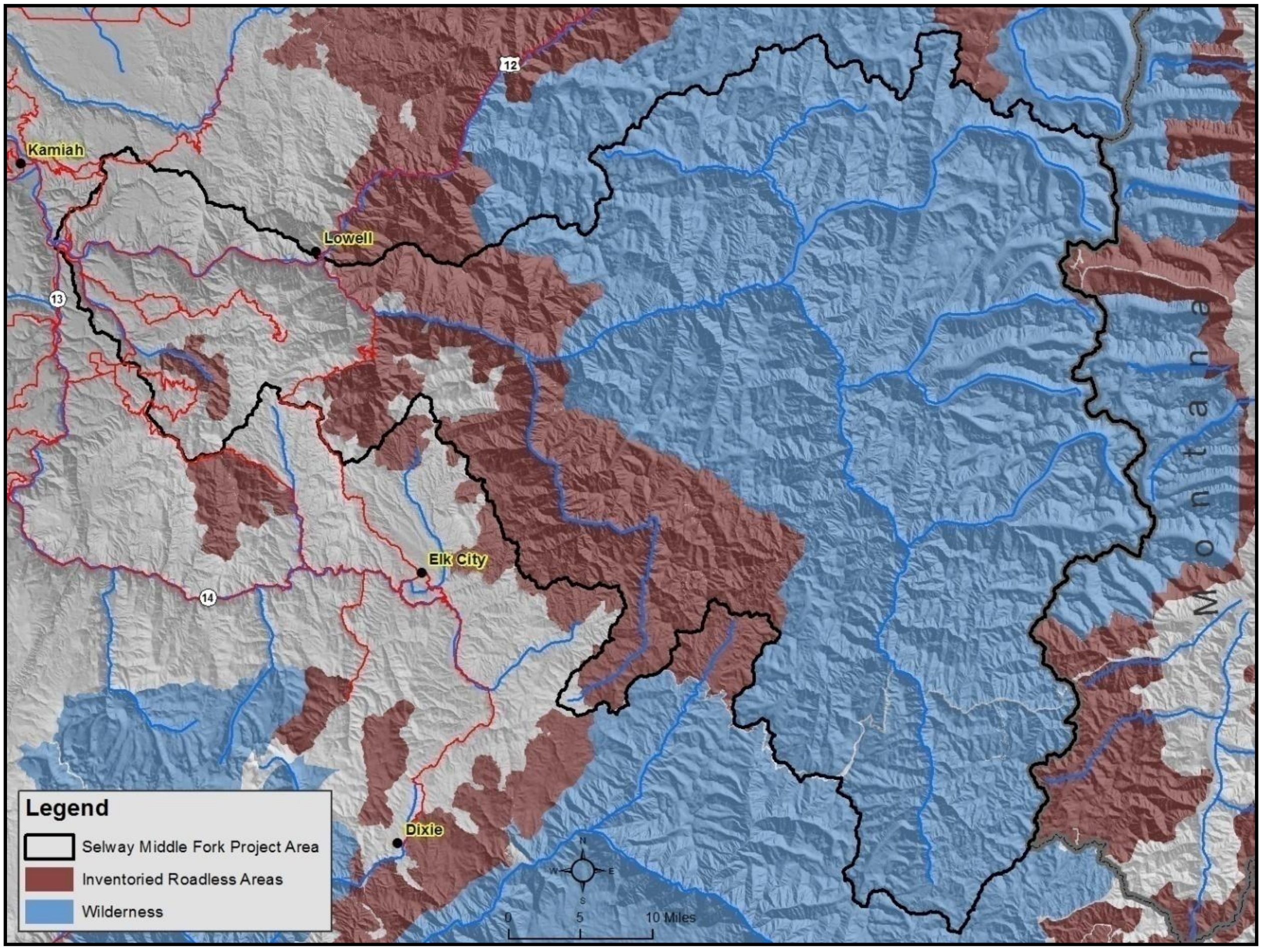

Figure 3 Inventoried Roadless and Wilderness Areas

OTHER LANDSCAPE ANALYSES

The *Current Ecological Condition and Restoration Needs in Forests on the Clearwater Basin, Idaho* report completed by The Nature Conservancy (TNC) (Haugo and Welch 2013) is a landscape scale assessment similar to this assessment in scale, but different in the questions that are addressed. Most notably, the TNC report utilizes LANDFIRE data to identify biophysical settings characterized by low, mixed, or high severity fire regimes. Those biophysical settings are further characterized by the degree of departure (high, moderate, and low) from historic conditions resulting from fire exclusion or logging practices. The report concludes that approximately 1.2 million acres in the low fire severity fire regime have a high degree of departure from historic conditions. Furthermore, approximately 3.7 million acres in the mixed fire regime have suffered a moderate departure from historic conditions. Acres needing restoration treatments are identified by biophysical setting.

This analysis utilizes R1-VMap data and the SIMPPLLE model and differs somewhat from TNC report in terms of the management questions asked. Management questions in this analysis include: 1) how will those variables affect the magnitude of future wildfires, insects, and disease; 2) how will vegetation and disturbance characteristics affect wildlife and plant species diversity and various wildlife species viability across the project area; and; 3) how do existing and future levels of habitat compare against the HRV? The TNC report and this analysis should be considered complimentary. The outcomes can be used interchangeably depending on the audience and/or questions asked by collaborators or the general public.

2. DATA COLLECTION AND METHODS

This section explains our data sources and analysis methodology used to develop the descriptions and assessments of the ecological condition of the project area. These conditions are addressed in Section 3. As the data came from a variety of agency sources, we also determined subject areas of missing or incomplete information necessary for informed decision-making and for monitoring at the project scale. Monitoring needs are outlined in Section 4 of this report. A table of all data sources (requested, received, and missing) is included at the end of this section. Not all data requested was received.

2.1 LAND OWNERSHIP AND MANAGEMENT HISTORY

Land ownership data (idown) was downloaded from the Idaho Department of Water Resources Geographic Information website at www.idwr.idaho.gov. The idown dataset is derived from BLM Surface Management Status Maps and was last updated in August of 2009. Spatial datasets for administrative Forest, district, wilderness, roadless, and other special management areas were downloaded from the USFS Region 1 (R1) geospatial data website.

2.2 LANDFORM

Vegetation Response Units (VRU) data were downloaded from the NPNF and CNF geospatial data websites. The VRUs are ecological land units that produce similar landscape-scale vegetation patterns and have broadly similar disturbance responses. The VRUs were grouped into uplands, batholith-breaklands, and subalpine areas, following how the Forests had grouped these VRUs for determining Desired Conditions in their planning processes. VRUs allow attributes of the current condition to be assigned to given locales because problems associated with ecological health tend to be site specific rather than area-wide. Segregating the analysis area by developed and undeveloped lands further allows the findings to isolate ecological problems specific to developed or undeveloped lands.

2.3 VEGETATION

Vegetation data are tracked by several different agencies and modes of analysis and classification. Our GIS modeling and assessments were based on data from the following data sets, each of which is described in detail below: Timber Stand Management Record System, USFS 1-VMAP, LANDFIRE, Forest Inventory and Analysis Data, Rare Plant Occurrences, Non-native Invasive Plant Inventory Data, wildfire, and aerial detection surveys.

2.3.1 Timber Stand Management Record System

Timber Stand Management Record System (TSMRS) data are a summary of all past stand-level treatment activities, including silvicultural treatments, fuels treatments, and planting. TSMRS data were downloaded from the Forests' geospatial data websites. TSMRS data are only available for USFS lands.

2.3.2 USFS R1-VMAP

The R1Vegetation Classification, Mapping, Inventory and Analysis system (R1-VMap) provides the means to derive estimates of existing condition and monitor changes in vegetation attributes both temporally and spatially. R1-VMap provides information, with known accuracy, regarding lifeform, dominance type, canopy cover, size class, and vertical structure. R1-VMap ver.11 data were downloaded by Forest from the USFS R1 geospatial data webpage as it was the newest version available at the start of this analysis. Forest size class, forest cover type, and forest crown density were used to determine how susceptible forest stands are to natural disturbances such as mountain pine beetles or stand-replacing wildfire.

During February and March 2013, a SIMPPLLE model logic calibration workshop was held among the CBC and Forests. This series of meetings "crosswalked" vegetative attributes, meaning that existing data was translated from one format (VMap) to be useable in another (in this case, SIMPPLLE) for calculating HRV for the Selway-Middle Fork CFLRP project area. This effort utilized the recently updated R1-VMap ver.12 and is consistent with the data that is being used for forest planning.

2.3.3 LANDFIRE

LANDFIRE is another iteration of satellite imagery portraying vegetation similar to R1-VMap. LANDFIRE datasets were downloaded from the LANDFIRE website (http://landfire.cr.usgs.gov/viewer/). One major difference between R1-VMAP and LANDFIRE is that LANDFIRE uses tree heights rather than tree sizes. For this reason, it is more difficult to use for assessment of impacts on large-tree-dependent wildlife species. We used LANDFIRE data for the non-USFS portions of the project area (about 6%), since these are not covered by any R1-VMap data. LANDFIRE uses a Biophysical Settings layer to depict reference conditions of vegetation across landscapes.

2.3.4 Forest Inventory and Analysis Data

Forest Inventory and Assessment (FIA) records provide a suite of vegetative data across all forested landscapes, measured in a consistent and compatible manner on the national grid (2002). Vegetative parameters recorded include tree species, size class, cover type, tree mortality, and density. FIA data are highly accurate down to a HUC 5 scale, but unlike R1-VMap data, the data is not spatially explicit. We therefore used FIA data in conjunction with R1-VMap to corroborate our findings, or where R1-VMap data is found to have local error, in order to identify the range of error. FIA data was requested and received from USFS R1.

2.3.5 Occurrences of Rare Plants

Occurrences of rare plants data were received from the Idaho Natural Heritage Program's Idaho Fish and Wildlife Information System, and critical habitat data was received from the U.S. Fish and Wildlife Service (USFWS).

2.3.6 Non-native Invasive Plant Inventory Data

Non-Native Invasive Species (NNIS) data are USFS data collected by on-the-ground surveys. They identify coverage by species. These data were collected from the Clearwater, Nez Perce, and Bitterroot National Forests.

2.3.7 Wildfire

Boundaries of early turn-of-the-century wildfires (years 1889 and 1910) are identified by the presence of fire scars and their relative location in tree growth rings. More recent wildfires were mapped by aerial perimeter mapping. Evidence for large wildfire events older than 1889 has been documented (Losensky 1995). The boundaries of those earlier events, however, become increasingly difficult to map because the older the event, the more likely it is that successive wildfires consumed the fire scar evidence. Fire history spatial datasets were downloaded from the Nez Perce, Clearwater, and Bitterroot National Forests geospatial data websites.

2.3.8 Insects and Disease

The Forest Health Protection Aviation Program in USFS Regions 1 and 4 perform annual insect and disease detection surveys. Aerial Detection Survey (ADS) data are flight mapped occurrences of active insect and disease outbreaks including bark beetles, defoliators, and root disease. Such disturbances can often be explained by the presence of certain high-risk stand conditions. Data for the project area was downloaded from the ADS website for years 2008 through 2011.

2.4 WATERSHED CONDITION

Watershed condition was determined through analysis of data from the sources described below.

2.4.1 Fish Bearing Streams

Spatial datasets for fish distribution were collected from the Bitterroot, Nez Perce, and Clearwater National Forests geospatial data websites and from the Idaho Natural Heritage Program. Presence of fish by species is determined by the USFS and the State of Idaho by electro-fishing, flyrod sampling, and in some cases, extrapolation based on similarity to nearby sampled streams.

2.4.2 Roads

Road locations are USFS data downloaded from the Nez Perce, Clearwater, and Bitterroot National Forest geospatial data websites. Roads were initially mapped by azimuth and distance from known locations. Gaps in road locations have since been mapped using Global Position System (GPS) units. Density is expressed in road miles by square mile.

2.4.2.1 *Stream Crossings*

The intersections of roads with streams are possible sources of sediment and impediment to fish passage. We determined these locations through GIS intersections. Data was requested, but only minimal data was provided by the USFS or the State of Idaho regarding whether those crossings are bridges or culverts, or if fish passage is available, compromised, or blocked.

2.4.2.2 *Roads within the 150 Foot PACFISH Buffer*

PACFISH buffers of 150 feet are applied to permanently flowing non-fish bearing streams and are used to protect habitat from human-caused disturbance. The designation of PACFISH buffers facilitates Section 7 consultation with the USFWS. When PACFISH buffers are avoided in treatments or other projects, the consultation process is greatly simplified. Data are summarized by miles of road within the 150 foot PACFISH buffer.

2.4.2.3 *Roads within the 300 Foot PACFISH Buffer*

The 300 foot PACFISH buffer is applied to fish-bearing stream and lakes and is used to prevent disturbance that may cause moderate risk to fish. These data are summarized by miles of roads within the 300 foot PACFISH buffer.

2.5 TERRESTRIAL WILDLIFE

Species strongly associated with particular habitat characteristics can also be useful indicators for the health of that habitat (Carignan and Villard 2002). Our terrestrial wildlife conditions analysis was based on data drawn from the following sources.

2.5.1 Occurrence of Rare Animals

We requested data from the Idaho Natural Heritage Program regarding rare species occurrences in Idaho County. Sightings collected by Heritage Program staff include sightings reported by the public and have no "unit of effort" analysis or validation process. Nor were data generally collected on any kind of a scientifically-based random grid. Therefore, Heritage Program data cannot be used to assess species density or make habitat associations, and are simply called "species occurrences." Nonetheless, the documented occurrences of given species in the project area may add credibility to the species-by-species analyses which are based on habitat association research and the availability of given habitats based on vegetation data layers.

2.5.2 Management Indicator Species

The following species may be included as Management Indicator Species (MIS) in the revisions of the Nez Perce-Clearwater Forest Plan, and are considered potentially at risk due to habitat limitations: Northern goshawk, flammulated owl, American marten, and pileated woodpecker. For this report, we have developed and used a conceptual model which uses R1-VMap data to query existing levels of habitats for these species. Habitat queries are explained in Section 3.4.2 and are combination of published habitat association data and modified by local occurrences by site characteristics. R1-VMap is the foundation for applying vegetative attributes for the SIMPPLLE model of HRV and future habitat.

2.5.3 Elk Habitat and Population Trends

Data on elk habitat and population trends was requested and received from the following sources:

- FIA and R1-VMap data
- USFS invasive weed maps,
- USFS Digital Elevation Model data
- IDFG data (by elk management zone) and personal communication
- In-press, peer-reviewed wildlife biology data

2.5.4 Predator Population Trend Data

Predator population trend data was requested from the Nez Perce Tribe. No data was received as of March 1, 2013.

2.5.5 Furbearer Harvest Data

Furbearer harvest data was requested from IDFG. No data was received as of March 1, 2013.

2.6 SOILS

Data was not provided to ERG by the Clearwater-Nez Perce National Forests. As a result, analysis has not been completed. We have included a review of available National Forest monitoring protocols regarding soils in the project area in section 4.

2.7 SUMMARY OF DATA COLLECTED

A table of all data sets requested and received by March 6, 2013 is presented below.

Requested	
Received	
Obtained off web	Y
Not on web	N

Table 1 Summary of data collected

Resource Area	Dataset	Type	Federal			State of Idaho			Nez Perce Tribe
			BNF	CNF	NPNF	Game and Fish	Dept. of Lands	University of Idaho	
Boundaries	Forest	Spatial	Y	Y	Y				
	District	Spatial	Y	Y	Y				
	Designated Areas	Spatial							
	Wilderness	Spatial	Y	Y	Y				
	WSAs	Spatial	Y	Y	Y				
	WSRs	Spatial	Y	Y	Y				
	RNAs	Spatial	Y	Y	Y				
	IRAs	Spatial	Y	Y	Y				
	Ownership	Spatial	Y	Y	Y		Y		
	Range Allotments	Spatial	Y	Y	Y				
	Management Areas	Spatial	Y						
	VRUs	Spatial	Y	Y	Y				
	Wildland-Urban Interface	Spatial							
	IDFG Wildlife Management Areas	Spatial				Y			
Fish and Wildlife	Fish occurrence/distribution	Spatial	Y	Y	Y				Requested
	Other wildlife inventories	Spatial							Requested
	Habitat (TES/MIS)	Spatial							
	Elk Herd Units	Spatial	N/A	N/A	N/A	Y			
	TES and Sensitive Species	Spatial							
	Furbearer harvest summary data	Tabular							
	Elk herd composition data	Tabular							

Resource Area	Dataset	Type	Federal			State of Idaho			Nez Perce Tribe
			BNF	CNF	NPNF	Game and Fish	Dept. of Lands	University of Idaho	
	by herd unit								
	Mule deer/white-tailed deer composition data by herd unit								
	Harvest Information for:								
	Black bear	Tabular				2000-2010			
	Mountain lion	Tabular				2000-2010			
	Wolf	Tabular				2011-2013			
	Elk	Tabular				2000-2011			
	White-tailed deer	Tabular				2000-2011			
	Moose	Tabular				2000-2011			
	Any other species tracked	Tabular							
Hydrography	Streams	Spatial	Y	Y	Y				
	Impaired Streams	Spatial	Y	Y	Y		Y		
	PFC	Spatial							
	Fish barriers	Spatial							
	Riparian Areas	Spatial							
Insects/Disease	Aerial Detection Survey	Spatial	Y	Y	Y				
Modeling	SIMPPLLE Area files	Spatial	Y	Y	Y				
	Final Logic Files	Tabular	Requested	Requested	Requested				

Resource Area	Dataset	Type	Federal			State of Idaho			Nez Perce Tribe
			BNF	CNF	NPNF	Game and Fish	Dept. of Lands	University of Idaho	
Monitoring	Roads	Spatial or Tabular							
	Culverts	Spatial or Tabular		Not available	Not available				
	Wildlife	Spatial or Tabular							
	Effectiveness of treatment	Spatial or Tabular							
	Fire Severity	Spatial or Tabular							
	Rx Burn Severity	Spatial or Tabular							
	Travel Plan compliance	Spatial or Tabular							
	Any other Forest Plan Monitoring	Spatial or Tabular							
Transportation	Roads	Spatial	Y	Y	Y				
	Open	Spatial	N	N	N				
	Closed	Spatial	N	N	N				
	Obliterated	Spatial	N	N	N				
	Trails	Spatial	Y	Y	Y				
Vegetation	TES/MIS/sensitive species	Spatial							
	Noxious weeds	Spatial							
	Timber stands	Spatial	Y	Y	Y				Requested
	Timber activities	Spatial	Y	Y	Y				Requested
	R1-VMap ver.11	Spatial	Y	Y	Y				

Resource Area	Dataset	Type	Federal			State of Idaho			Nez Perce Tribe
			BNF	CNF	NPNF	Game and Fish	Dept. of Lands	University of Idaho	
	Forest Inventory and Analysis	Tabular							
	Other Vegetation Layers	Spatial							Requested
	R1-VMap	Spatial	Y	Y	Y				
	Landfire	Spatial	Y	Y	Y				
Wildfires	Fire History Datasets	Spatial	Y	Y	Y				

3. RESULTS AND ANALYSIS

This section provides a discussion and analysis of our findings of the following ecological baseline conditions: Existing Vegetation Conditions, Natural Disturbance (insects and disease), Existing Watershed Health, and Terrestrial Species Trends. This section also includes two additional analyses: Departure from HRV, and a Summary of Existing Ecological Conditions. Results are presented in GIS maps, tables, and in narrative form.

3.1 EXISTING VEGETATION CONDITIONS

In order to provide a baseline for existing vegetation conditions, we assessed past forest treatment activities, and evaluated size class, cover type, crown density, and invasive plant species.

3.1.1 Timber Management Status

Table 2 summarizes treatments activities within logged or roaded lands in the project area. Data is from each Forest's "activities database." As starting dates vary, ranges are included below.

Table 2 Treatment activity acres according to TSMRS data

HUC5	Regeneration (1968 to 2005)	Improvement Cut (1964 to 2012)	Pre-Commercial (1971 to 2011)	Treatment Total	Prescribed Burn (1956 to 2012)	Wildfire	Burns Total
Bear Creek				**0**		5,429	**5,429**
Clear Creek	159	79	897	**1,135**	5,168	1,134	**6,302**
Gedney Creek-Selway River	776	25		**801**	19,185	227	**19,413**
Little Clearwater River				**0**		8,918	**8,918**
Meadow Creek	1,386			**1,386**	11,329	12,450	**23,778**
Middle Fork Clearwater River	2,327	871		**3,197**	2,711	119	**2,830**
Moose Creek				**0**	7	17,525	**17,532**
Pettibone				**0**		29,582	**29,582**

HUC5	Regeneration (1968 to 2005)	Improvement Cut (1964 to 2012)	Pre-Commercial (1971 to 2011)	Treatment Total	Prescribed Burn (1956 to 2012)	Wildfire	Burns Total
Creek-Selway River							
Running Creek				**0**		4,955	**4,955**
Three Links Creek-Selway River				**0**	1,419	14,903	**16,322**
White Cap Creek				**0**		2,088	**2,088**
Grand Total	**4,647**	**975**	**897**	**6,519**	**39,820**	**97,331**	**137,150**

Upon visual review of the managed frontcountry the deficiencies of these data are clear. **Error! Reference source not found.** shows activities overlaid on 2011 aerial imagery. Notice the obvious treatment units that are not captured by the USFS dataset.

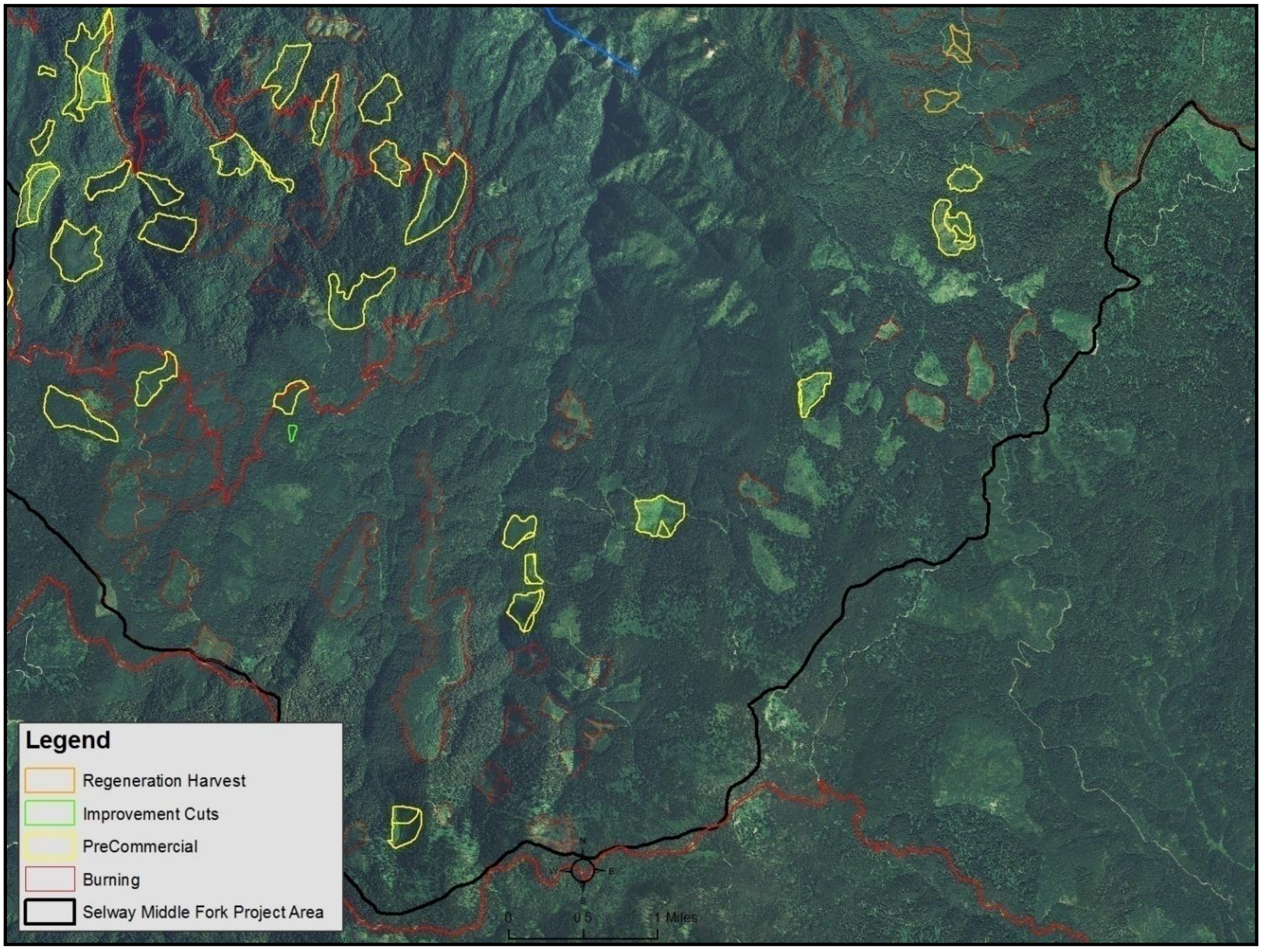

Figure 4 2011 aerial imagery showing treatment units in the project area

3.1.2 Biophysical Settings

The main biophysical settings, as provided by LANDFIRE version 110, for the project area are: Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland, Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest-Grand Fir, and Northern Rocky Mountain-Mesic Montane Mixed Conifer Forest. Table 3 indicates the percentage of the project area that is composed of the four most common biophysical settings.

Table 3 Main biophysical settings for the project area (LANDFIRE V. 110)

Biophysical Setting	Acres	% of Project Area
Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland	394,206	27.65%
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Grand Fir	354,381	24.86%

Biophysical Setting	Acres	% of Project Area
Northern Rocky Mountain Mesic Montane Mixed Conifer Forest	224,836	15.77%
Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Ponderosa Pine-Douglas-fir	165,691	11.62%

3.1.3 Size Class

Size class distribution is illustrated by project area (Figure 6) and more detailed information follows for HUC 5 watersheds (Table 4). The project area is dominated by pole, medium, and large diameter-sized stands. This is likely the result of both extensive turn-of-the-century wildfires that regenerated much of the landscape, and a lack of wildfire from 1920 to 1979 that allowed those stands to mature. Many of the pole-sized stands occur as dense lodgepole pine stands in the subalpine fir uplands, where the combination of the 1889, 1910, and 1934 wildfires resulted in delayed regeneration. Areas that burned in 1910 had large amounts of re-burned acres by the 1934 wildfires, resulting in loss of the seed source.

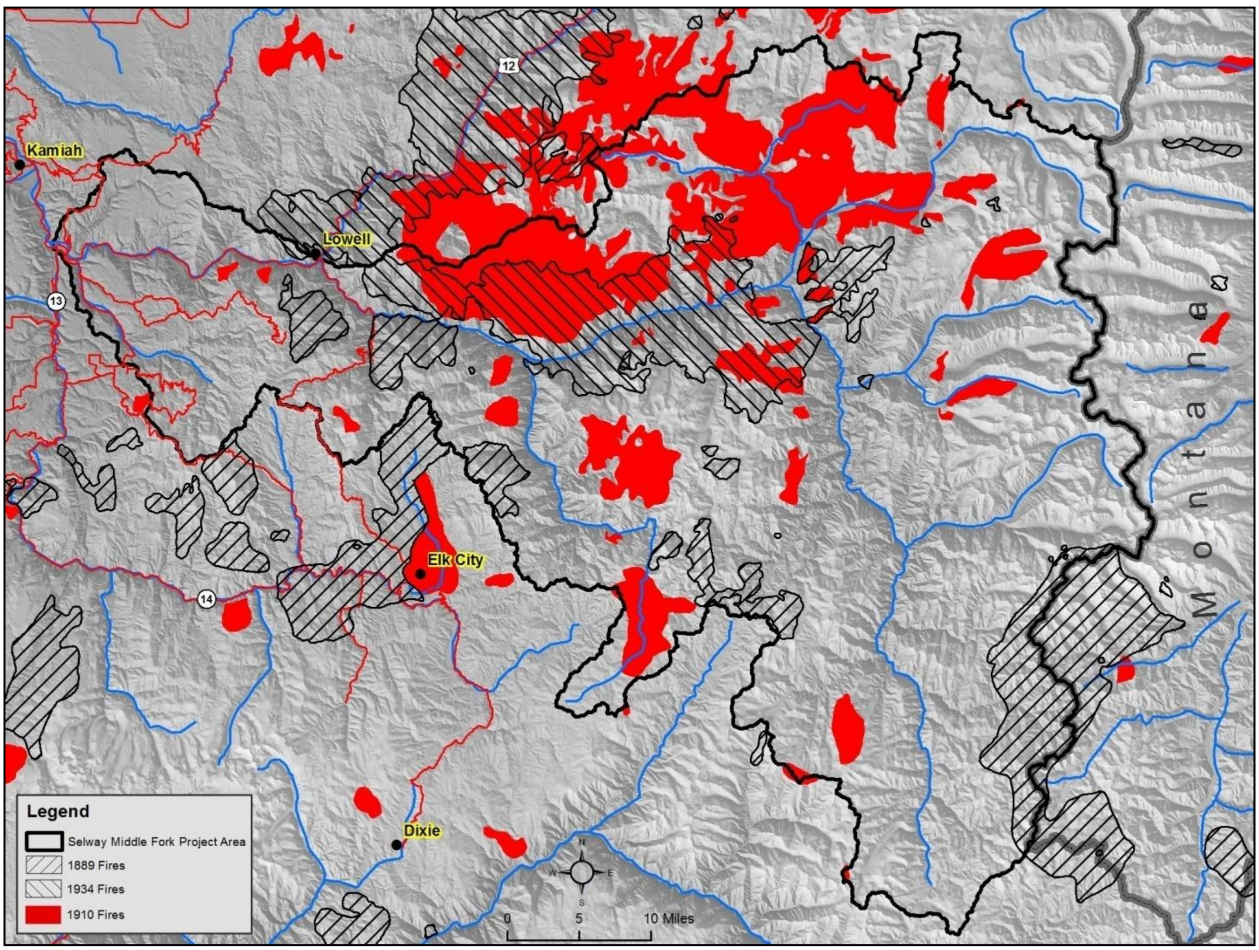

Figure 5 Location of 1889, 1910, and 1939 fires relative to project area

We used FIA data to corroborate and/or identify the levels of error in R1-VMap data for the project area. Summaries of FIA data for the project area were provided by the USFS. FIA data summaries are expressed as a range and were compared directly against R1-VMap data. Figure 6 shows that FIA and R1-VMap data are relatively comparable for size class. For instance, the differences between FIA and R1-VMap are 3-4% for the 0-4.9 inch size class, and almost equal for the 5-9.9 inch size class. The largest difference is in the 10-14.9 inch size class at 24-30.5% respectively.

According to VMap data all HUC 5 watersheds have small amounts (3-4%) of the seedling sapling size class (0-5 inch diameter at breast height [DBH]). This is clearly the result of the lack of wildfire or active management since 1920, although the resurgence of wildfire in the last three decades is causing an increase in this size class. One exception is in managed front country where regeneration logging, including clearcut, seed tree, and shelterwood cuts, has resulted in considerable amounts (~10%) of seedling sapling stands. Many of these stands are on the verge of becoming pole-sized stands.

Large diameter stands (≥15 inch DBH) are relatively abundant on all HUC 5 watersheds. This is the result of either rapid regeneration followed by rapid growth on highly productive sites following the 1910 fires, or these stands were missed entirely or underburned in the 1910 wildfires. The percentage of large diameter stands on developed lands is lower than on undeveloped lands, yet still relatively abundant.

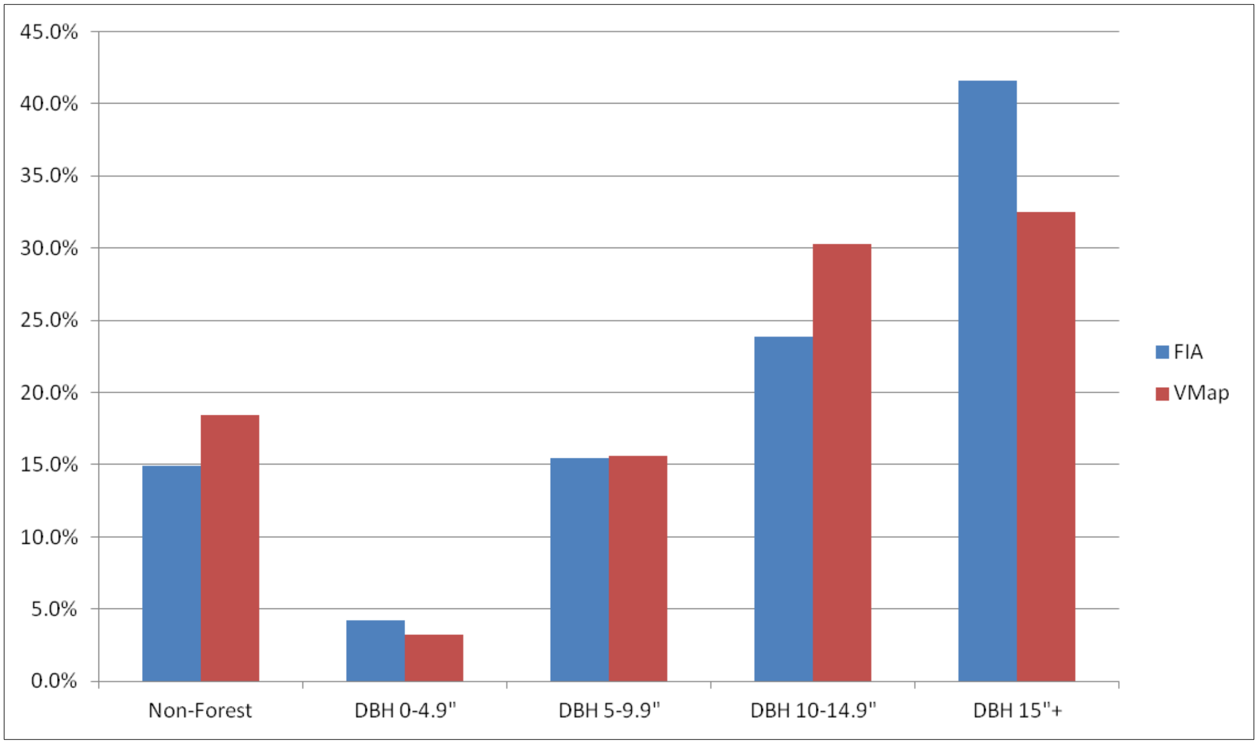

Figure 6 Size class distributions in the project area according to FIA and VMap

Table 4 Acres in each size class presented by HUC 5 watersheds according to VMap

HUC 5 Name	Non-Forest	DBH 0-4.9"	DBH 5-9.9"	DBH 10-14.9"	DBH 15"+	Total Acres
Moose Creek	49,768	6,688	37,143	81,420	63,734	238,753
Meadow Creek	9,012	2,149	32,595	50,610	60,719	155,084
Gedney Creek-Selway River	20,003	14,593	9,863	22,650	70,184	137,293
Bad Luck Creek-Selway River	18,577	759	22,449	57,922	34,114	133,821
Three Links Creek-Selway River	21,659	9,476	12,292	31,163	55,269	129,858
Bear Creek	34,643	1,724	15,205	32,131	31,051	114,754
Pettibone Creek-Selway River	23,264	1,288	11,396	28,599	31,881	96,429
Headwaters Selway River	28,556		27,518	33,943	6,314	96,331
White Cap Creek	28,979	783	11,116	23,142	20,214	84,233
Running Creek	6,648	64	11,171	22,051	18,192	58,126

HUC 5 Name	Non-Forest	DBH 0-4.9"	DBH 5-9.9"	DBH 10-14.9"	DBH 15"+	Total Acres
Little Clearwater River	6,580	2	15,927	19,168	3,648	45,325
Clear Creek	1,610	3,442	3,056	4,837	29,891	42,837
Middle Fork Clearwater River	1,640	2,863	2,190	3,400	15,473	25,566
Total Acres	**250,940**	**43,829**	**211,921**	**411,036**	**440,684**	**1,358,410**

3.1.4 Cover Type

R1-VMap cover type data are illustrated in Figure 7. This data shows that Douglas-fir mix is the most abundant cover type in the project area. Lodgepole pine mix is also abundant, though less so than it has been historically. Shrub, grand fir mix, subalpine fir mix, and Engelmann spruce mix each cover about 150,000 acres of the project area. Remaining significant cover types are ponderosa pine mix (about 115,000 acres), and herb and red cedar, with about 75,000 acres each. Ponderosa pine, Western larch, and lodgepole pine are below HRV while Douglas-fir is currently above HRV. For a full description of HRV and a comparison to current conditions, please see the Ecological Indicators report..

Western larch dominated stands are almost non-existent, as this species requires periodic mixed severity fires or comparable human disturbance to regenerate. Historic mixed severity wildfires were an important disturbance process in the highly productive batholiths-uplands, suggesting that western larch was much more abundant than today (Fischer and Bradley 1987). The near total loss of wildfire in the 1920-1979 timeframe explains some of that decline. Developed lands have a higher percentage of larch compared to undeveloped lands, because larch regeneration was prioritized following logging.

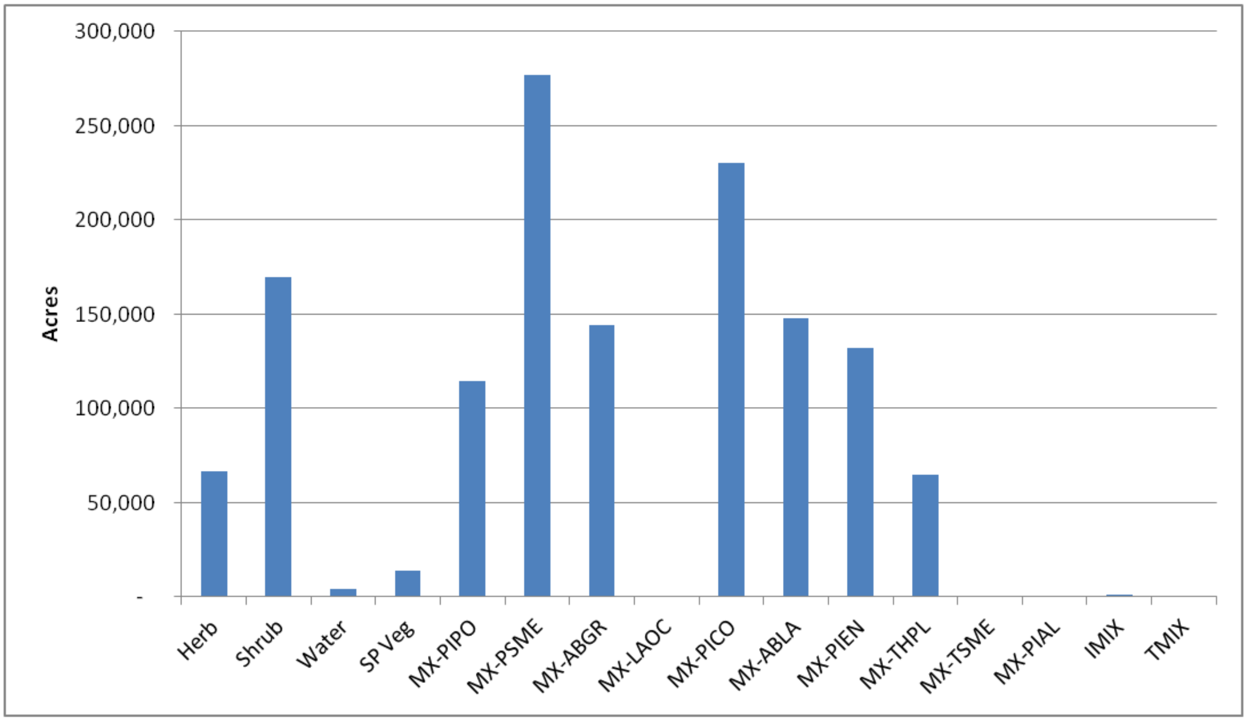

Figure 7 Cover type data for the project area

SP Veg = sparse vegetation; MX-PIPO = ponderosa pine mix; Mix-PSME = Douglas-fir mix; MX-ABGR = grand fir mix; MX-LAOC = western larch mix; MX-PICO = lodgepole pine mix; MX-ALBA = subalpine fir mix; MX-PIEN = Engelmann spruce mix; MX-THPL = western red cedar mix; MX-TSME = mountain hemlock mix; MIX-PIAL = whitebark pine mix; IMIX = shade intolerant mix; TMIX = shade tolerant mix

Historically, stands of western white pine covered substantial portions of northern Idaho (Neuenschwander et al. 1999). White pine blister rust, an exotic disease, virtually eradicated white pine-dominated communities across northern Idaho by the mid-twentieth century. The project area is on the periphery of the range of western white pine, with most of the occurrence north of the Lochsa River. . These scarce occurrences of western white pine in the project are scattered along the lower Selway River near Lowell. While these individual white pine trees persist, they are not detectable by R1-VMap stand-level data. These individuals are part of the 1-5% of trees that exhibit some natural resistance to blister rust (Hagle et al. 2003; Lockman pers. comm.). Additionally, rust-resistant nursery stock was grown and planted extensively following timber harvests in the 1970s and 1980s. With the decline in regeneration timber harvest, opportunities for white pine recovery have slowed. However, there may be enough naturally rust-resistant individuals or rust-resistant planted nursery stock across the project area to provide for eventual recovery of the species (Bollenbacher pers. comm.), although full recovery may take centuries.

3.1.5 Canopy Cover

Figure 8 shows the distribution of canopy cover in the project area according to R1-VMap. Figure 9 shows differences between FIA, R1-VMap, and LANDFIRE for canopy cover in the project area. Open stands (10-24% crown closure) show little difference between FIA and R1-VMap at 13.5-15%, respectively. Dense stands (>60% crown closure), conversely, show large differences between FIA and VMap at 13-27% crown closure in that order. LANDFIRE data provides that 19% of the project area consist of open stands (10-30% crown closure[1]) and that 24% of the project area is comprised of dense stands (>60% crown closure).

Table 5 displays crown closure by uplands, batholith-breaklands, and subalpine area landforms within the project area determined by VMap. Lacking are open stands with less than 40% crown closure, even on the breaklands where normally-occurring low and mixed severity wildfires would have historically resulted in relatively open stands.

[1] LANDFIRE categories are grouped differently than FIA and VMAP. Rather than 10-25% like VMAP, LANDFIRE open crown closure includes 10-30%.

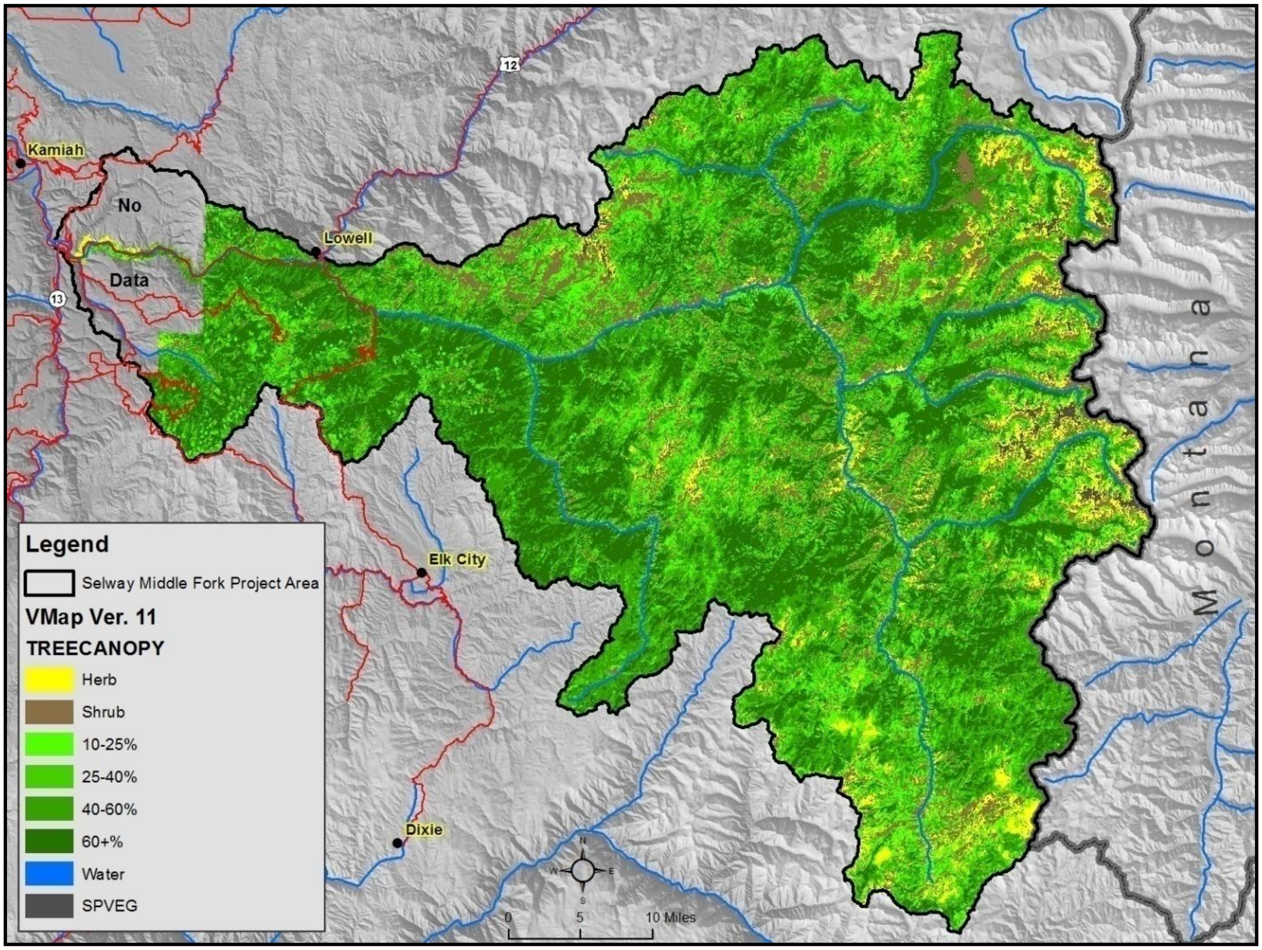

Figure 8 Canopy cover in the project area

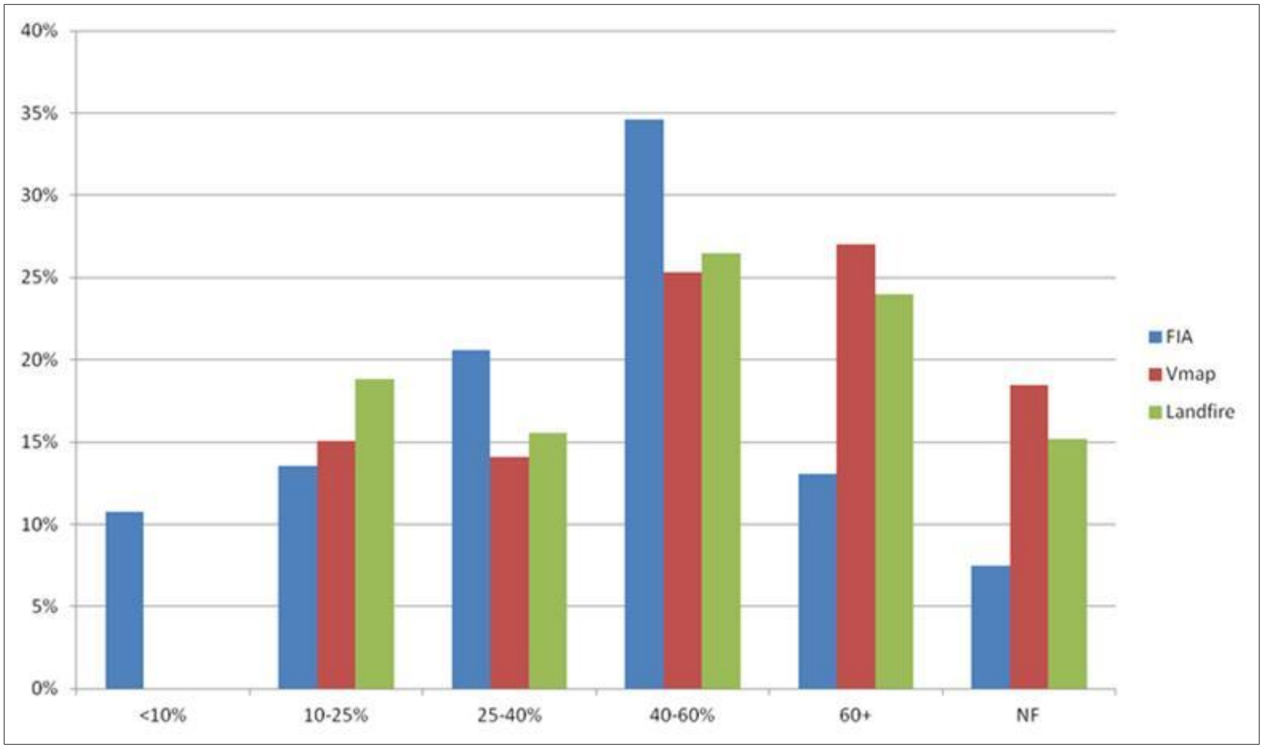

Figure 9 Canopy closure distributions in the project area according to FIA, VMap, and LANDFIRE data

Table 5 Crown closure by VRU group according to VMap

VRU Group	Non-Forest	10-24%	25-39%	40-59%	60+%
Breaklands	76,554	66,648	67,200	122,580	190,003
Subalpine	171,510	126,000	110,330	189,204	139,829
Uplands	6,572	13,828	14,913	33,669	38,343
Grand Total	**254,636**	**206,476**	**192,442**	**345,452**	**368,174**

3.1.6 Occurrence of Rare Plants

Figure 10 discloses locations of USFS Region One sensitive plants. The circles are enlarged to hide the actual point locations. The Region's sensitive plant program is comprised of the following elements: 1) sensitive plants are listed by habitat association based on research, inventories, and monitoring; 2) ground-disturbing activities are screened to identify potential habitat for those sensitive species; 3) where suitable habitats are likely present, those sites are inventoried prior to ground-disturbing activities; 4) if ground-disturbing activities are likely to negatively affect those suitable habitats, contract stipulations or other protective measures are imposed on the activity to avoid adverse effects; and 5) monitoring is done at a Regional scale to determine how those plants responded in the affected area(Shelly pers. comm.). The latter activity is especially important to test the response to disturbance. For instance, some plants like Howell's gumweed or clustered lady-slipper appear tolerant, or even dependent upon, some level of disturbance. Monitoring, therefore, provides a feedback mechanism to the Regional sensitive plant strategy so that the strategy can be modified where necessary to accommodate long-term viability of the plants.

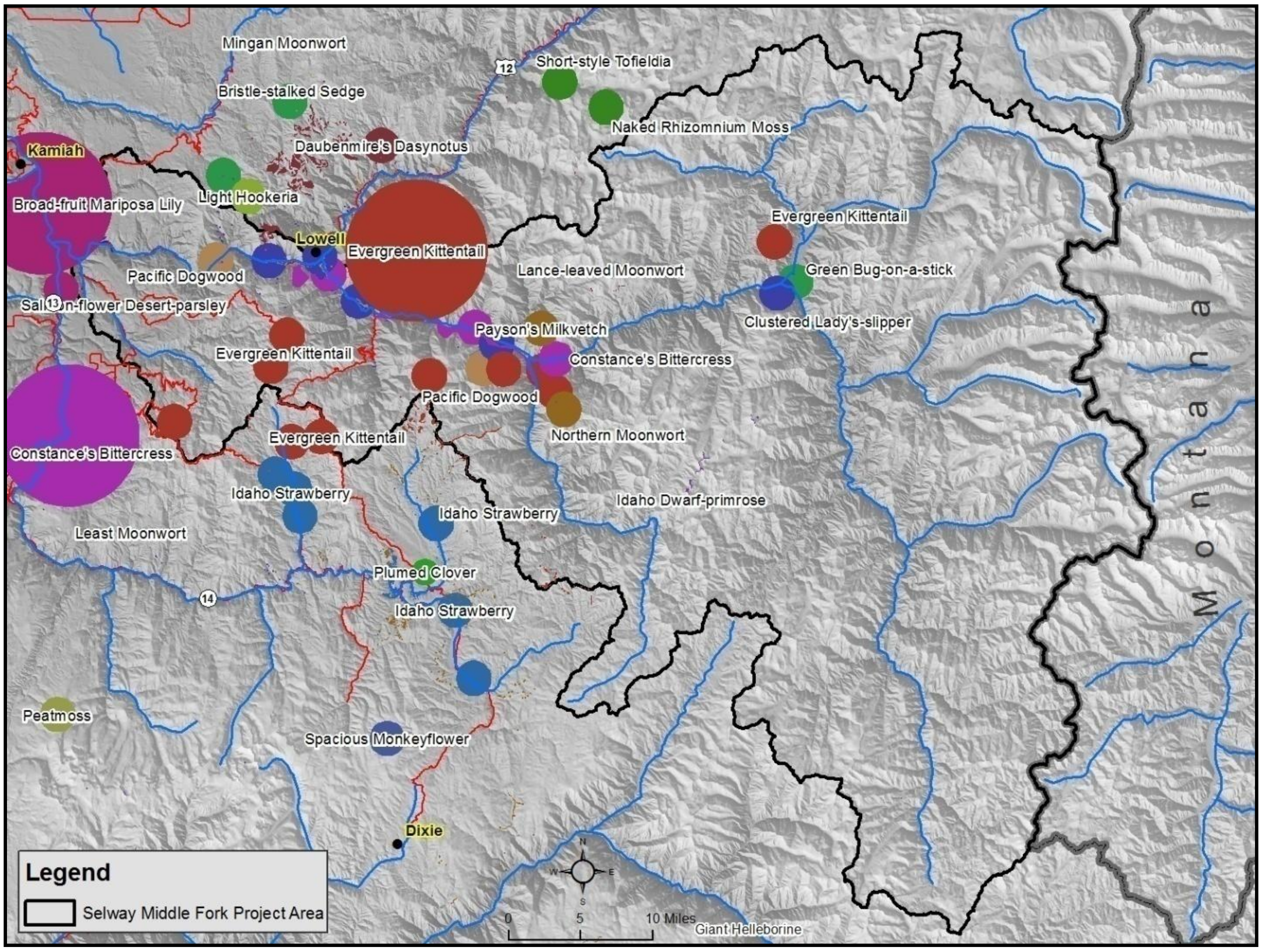

Figure 10 Occurrence of rare plants in the project area

3.1.7 Non-native Invasive Plants

As the data provides weed species by mapped polygon, it is not possible to determine the density of weeds per acre or the degree to which weeds are competing with native plants. The USFS weed coverage data does indicate that invasive weeds are extensive in the project area (Figure 11). The interior of the project area is infested with spotted knapweed, sulphur cinquefoil, and St. John's wort. Weeds on the western fringe of the project area also include leafy spurge, starthistle, and Dalmatian toadflax. The map shows that invasive weeds, knapweed in particular, are concentrated along major branches of the rivers and this may indicate that surveys are more readily performed in these access corridors.

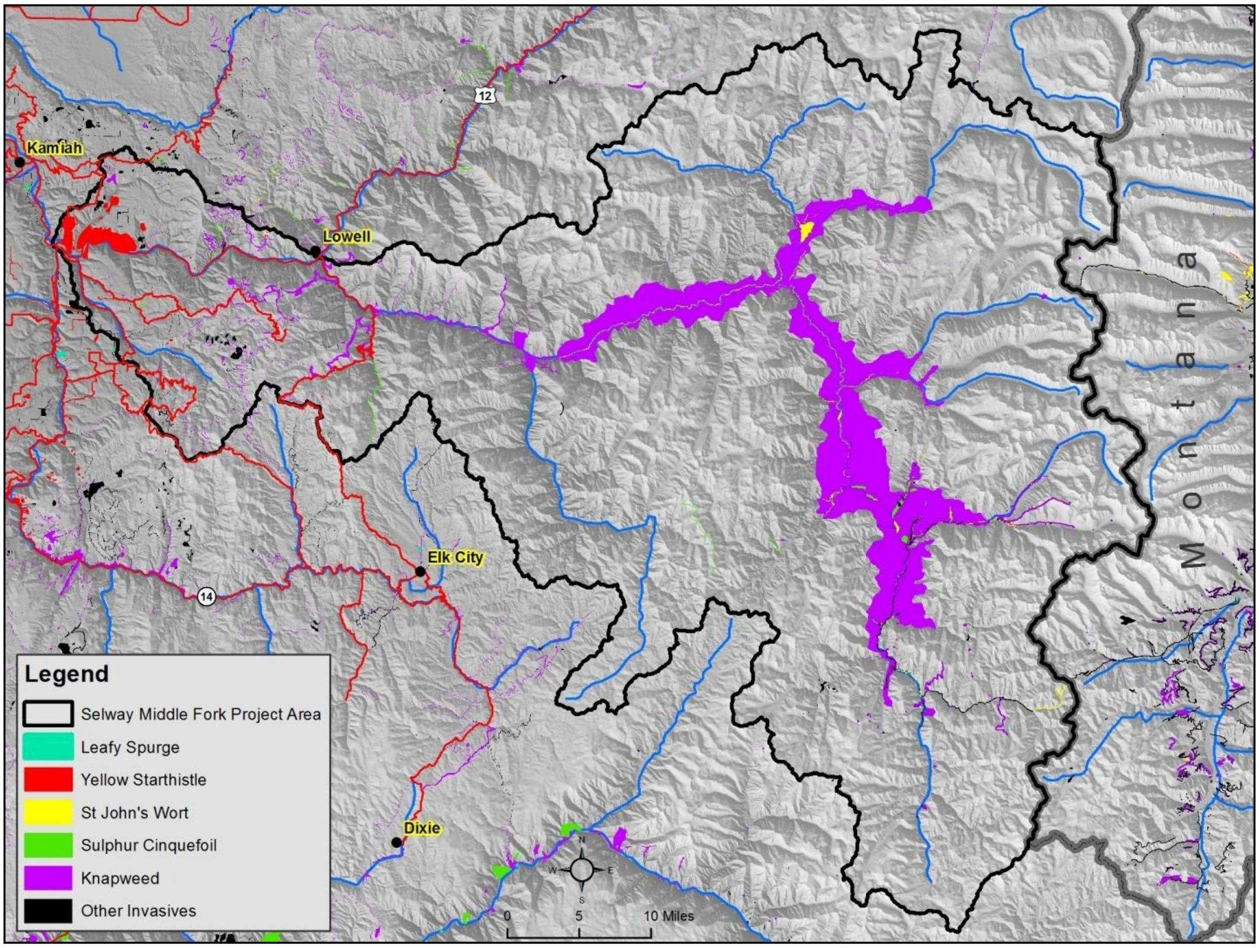

Figure 11 Non-native invasive plants in the project area

3.2 NATURAL DISTURBANCE

The natural disturbances analyzed are wildfire and insects, both described in detail below.

3.2.1 Wildfire

Wildfire history has determined much of the current cover type, crown closure, and size class distribution within the project area. Wildfire acreages are summarized in Figure 12 for four epochs: 1870-1919, 1920-1979, 1980-2011 and 2012. We have isolated 2012 data from previous years to illustrate that active past year. Wildfires before 1920 were dominated by the 1910 burns, although large wildfires of comparable magnitude occurred earlier, particularly in 1889. Although data exists for other previous active wildfire years (1850 and 1720), wildfire history data from before 1889 is increasingly uncertain because successive wildfires tend to mask the fire scar evidence from earlier fires (Losensky 1995). The years 1920-1979 are lumped because little wildfire occurred during that sixty-year period, due to reduced fuels resulting from the 1910 wildfires and from logging, and from the use of modern fire-fighting technology (USDI 2000). The 1980-2011 timeframe shows a return of active wildfires, including major fire years in 1988, 2000, and 2003. This increase in wildfires was due to an accumulation of fuels brought about by long-term suppression, an increase in highly volatile beetle-killed, budworm-defoliated, or root disease-killed stands, and warmer, drier weather (Littell et al. 2009; USDA 2010).

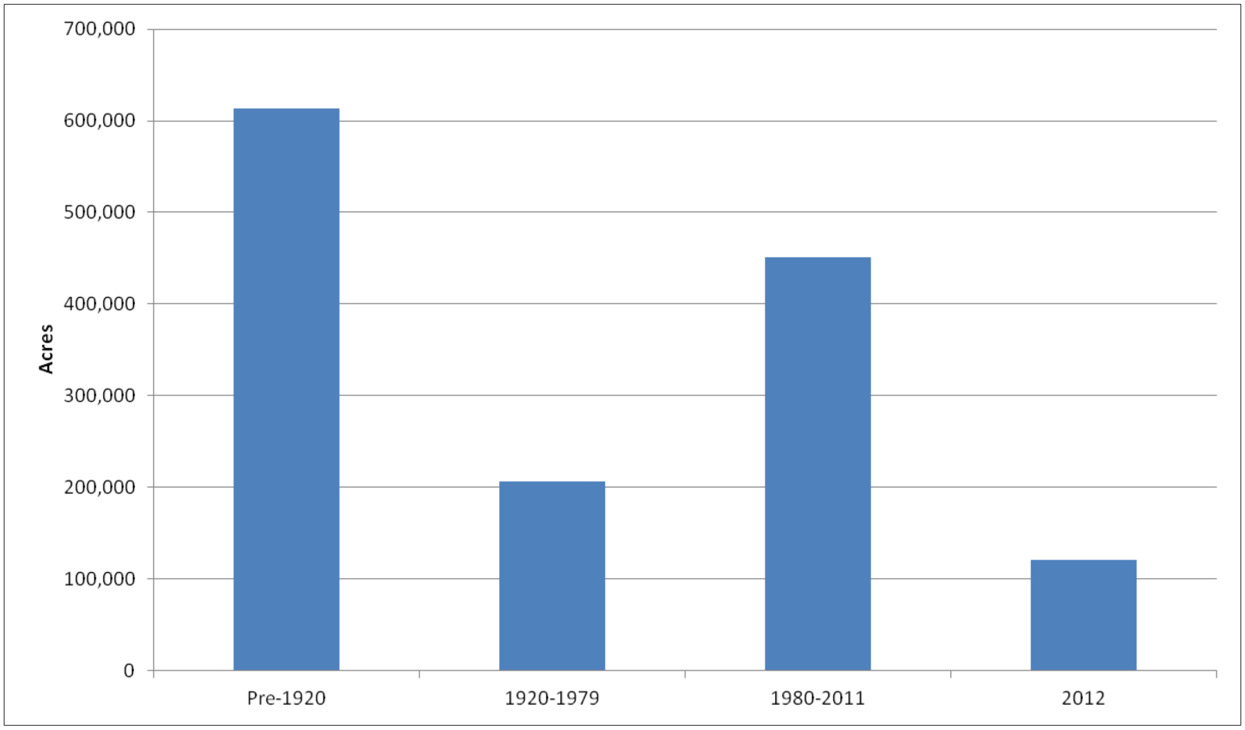

Figure 12 Acres burned in the project area from 1870 to 2012

3.2.2 Insects and Root Disease

ADS data for acres damaged by bark beetles and defoliators are displayed in Table 6 and Figure 13. Acres impacted by frost, wind, and avalanches are also included.

Table 6 Acres damaged by insects, frost, wind, and avalanches, 2008-2011

Disturbance Agent	2008	2009	2010	2011
Western Pine Beetle	252	104	36	80
Mountain Pine Beetle	128,537	97,522	117,143	10,709
Douglas-fir Beetle	611	189	50	739
Spruce Beetle				2

Disturbance Agent	2008	2009	2010	2011
Western Balsam Bark Beetle	1,004			
Pine Engraver		5	4	
Fir Engraver	3,016	269	151	493
Western Spruce Budworm	57			
Forest Tent Caterpillar			1,122	
Douglas-fir Tussock Moth				25,949
Balsam Woolly Adelgid	1,208	200		4
Needlecast			2,288	376
Larch Needle Cast			1,781	
White Pine Blister Rust	38	120	8	
Frost	2,306			
Wind-tornado			88	
Avalanche				
Subalpine Fir Mortality			391	260
Root pathogens	Not available	Not available	Not available	Not available
No Data	349		540	
Totals	137,377	98,409	123,602	38,611
Area Flown	1,039,051	457,959	456,452	270,607
Percent of Project Area Flown	73%	32%	32%	19%

Mountain pine beetle infestations are extensive, as are acres defoliated by tussock moths in 2011. Lockman (pers. comm.) noted that all insect and disease outbreaks are linked to an absence of natural disturbances. Other researchers have concluded that bark beetle outbreaks progress from endemic levels to epidemic levels when pole-sized lodgepole pine stands are the predominant size class, a condition usually due to wildfire suppression (Six and Skov 2009). Naturally-occurring landscapes contain a mix of size classes, including younger, smaller trees less susceptible to beetle attacks.

The adjacent Idaho Panhandle National Forest has, according to ADS data, nearly one million acres of root disease-affected acres. Since the project area is similar in terms of productivity and abundance of highly susceptible grand fir-Douglas-fir stands, it seems likely that root disease is present at measurable levels.

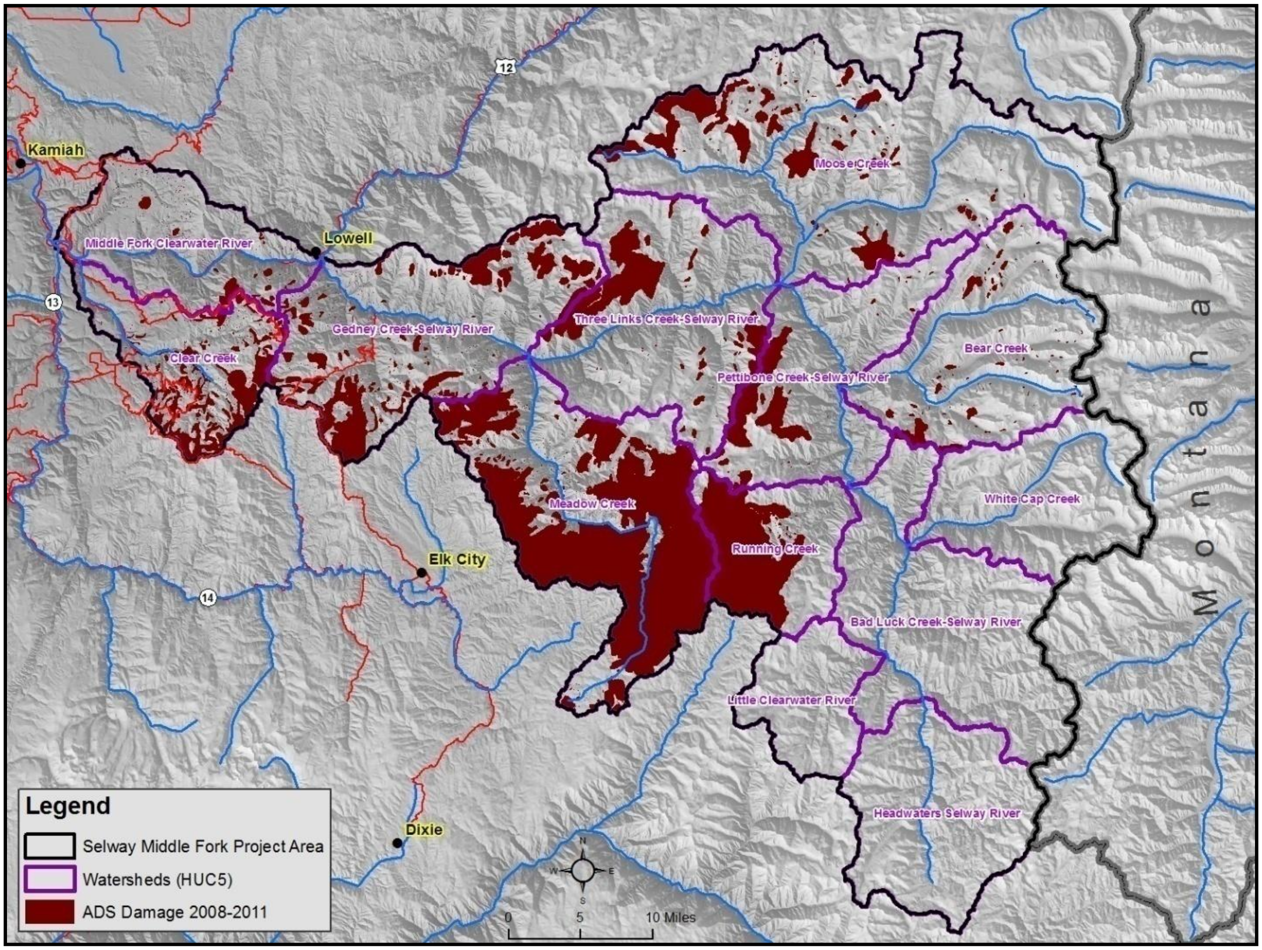

Figure 13 ADS data for disturbance agents

3.3 EXISTING WATERSHED HEALTH

We analyzed stream crossings and reviewed the USFS watershed condition class assessment to evaluate the existing watershed condition.

3.3.1 Fish Bearing Streams

Threats to anadromous fish are numerous and complex. At the Columbia Basin scale, Columbia River mainstem dams pose by far the greatest threats to the long-term survival of anadromous fish. At a local scale, roads pose the biggest threat by either blocking upstream passage via undersized or poorly designed culverts and by contributing sediment to streams. Threats to native resident fish include hybridization with and competition from introduced exotic fish species and the aforementioned effects of local roads.

For this analysis, threats to anadromous and resident fish (Figure 15) are limited to roads, since the effects of dams and exotic fish introductions are outside the scope of project options available to the CBC.

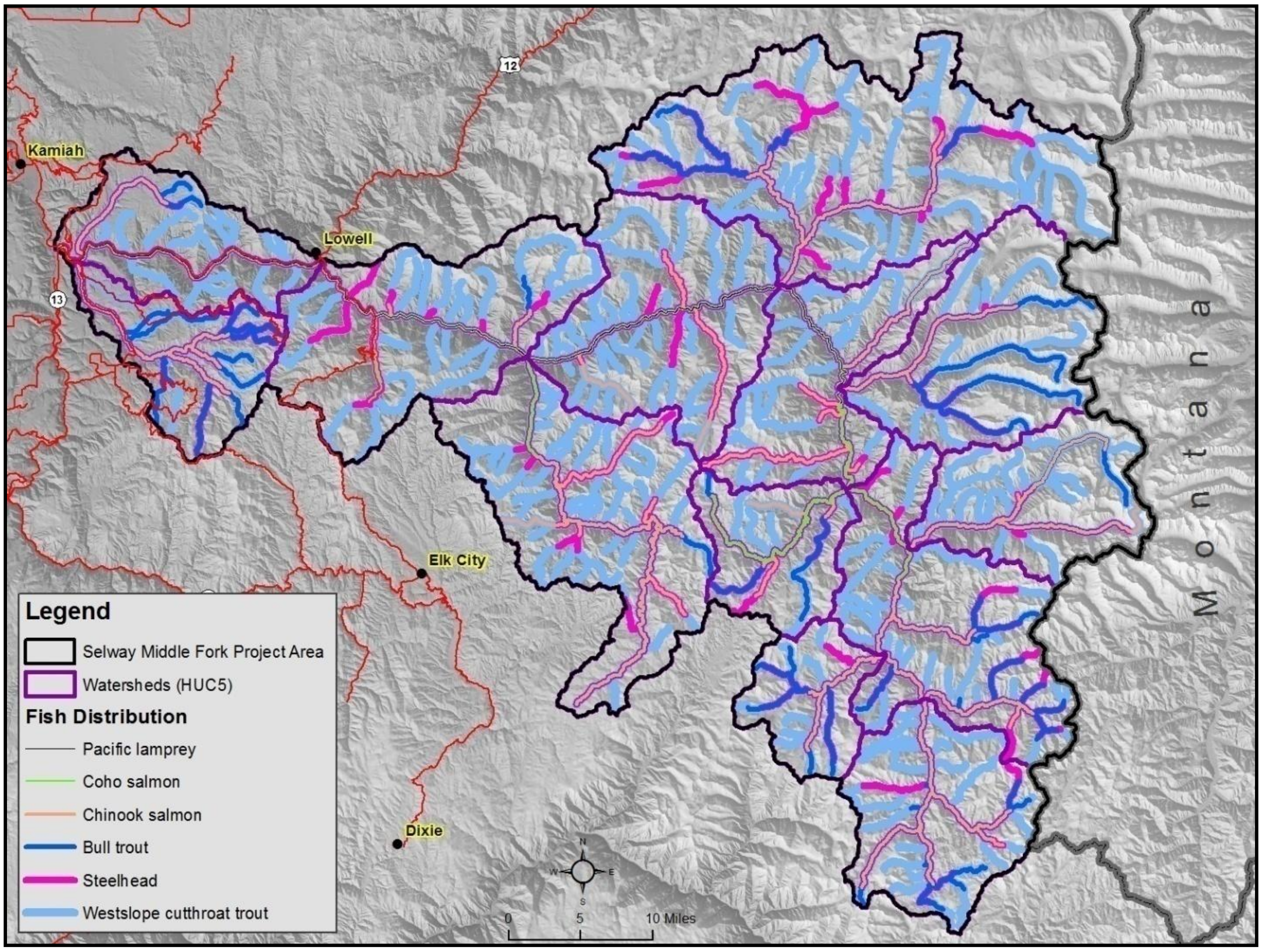

Figure 14 Fish distribution in the project area

3.3.1.1 *Stream Crossings*

Total crossings, in the form of culverts or bridges, were identified by using GIS to intersect where fish-bearing streams are crossed by roads. This information is organized by the thirteen HUC 5watersheds in the project area. Of these thirteen HUC 5 watersheds, six have no roads that cross fish-bearing streams. Three HUC 5 watersheds (Headwaters Selway River, Meadow Creek, and Running Creek) have one, eleven, and eleven crossings, respectively. The remaining four HUC 5 watersheds, Bad Luck Creek-Selway River, Clear Creek, Gedney Creek-Selway River, and Middle Fork Clearwater River have from 42 to 68 road crossings.

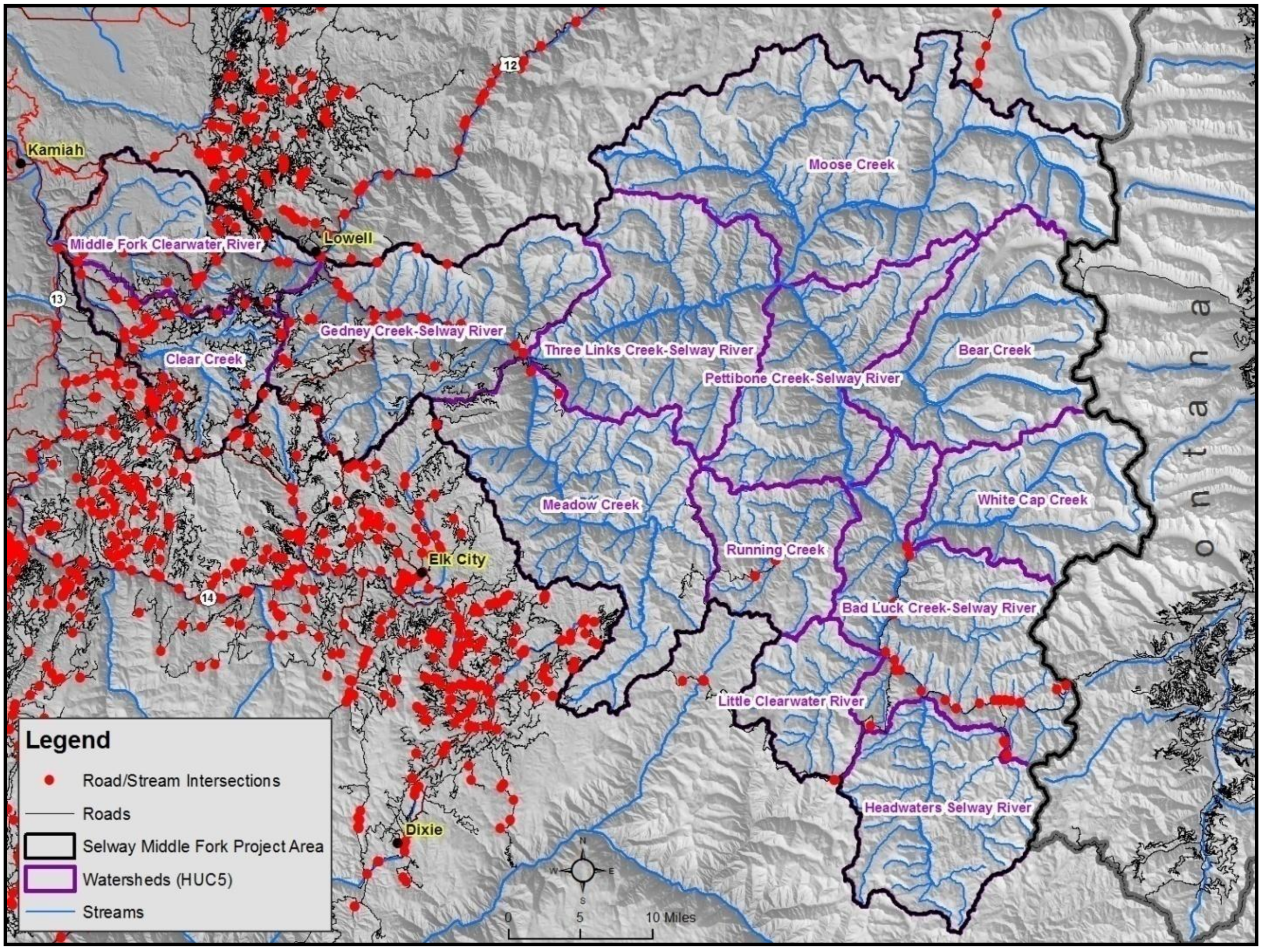

Figure 15 Fish bearing stream crossings

3.3.1.2 *Roads within the 150 and 300 Foot PACFISH Buffer*

Miles of roads located within the 150-footbuffer of fish-bearing streams are shown in Table 7. The four HUC 5 watersheds with a considerable number of crossings (Bad Luck Creek-Selway River, Clear Creek, Gedney Creek-Selway River, and Middle Fork-Clearwater River) also contain a high percentage of roads within the 150-foot buffer. For instance, 27% of salmon-bearing streams within the Bad Luck Creek-Selway River HUC5 fall within 150 feet of roads. The Clear Creek HUC5 is similarly impacted, but less so, with 13% of fish-bearing streams (all native salmonid) within 150 feet of forest roads.

Miles of roads within 300 feet of fish-bearing streams are also shown in Table 7. The four HUC5 watersheds with many roads (Bad Luck Creek-Selway River, Clear Creek, Gedney Creek-Selway River, and Middle Fork Clearwater River) contain substantial percentages of roads within the 300 foot PACFISH buffer. Within the Gedney Creek-Selway River HUC 5, 40.1% of all roads are within 300 feet of fish-bearing streams. At the low range of the four most impacted HUC 5 watersheds, the Clear Creek HUC 5 has 29.1% of all roads within 300 feet of fish-bearing streams.

Table 7 Miles of Roads within Stream Buffers and Number of Stream Crossings

HUC 5 Watershed	Species	Total Distribution (Miles)	Miles within the 150' Road Buffer	Miles within the 300' Road Buffer	Total Miles	Percent in Road Buffer	Number of Crossings
Bad Luck Creek-Selway River	Bull trout	66.8	13.4	12.7	26.1	0.4	42
	Chinook salmon	40.4	11.1	11.8	22.8	0.6	
	Coho salmon	9.7	1.0	1.6	2.6	0.3	
	Steelhead	76.2	13.4	12.6	26.0	0.3	
	Westslope cutthroat trout	154.1	14.4	14.1	28.6	0.2	
Bad Luck Creek-Selway River Total		**347.1**	**53.3**	**52.8**	**106.1**	**0.3**	
Bear Creek	Bull trout	60.1				0.0	0
	Chinook salmon	17.3				0.0	
	Steelhead	30.5				0.0	
	Westslope cutthroat trout	97.9				0.0	
Bear Creek Total		**205.8**				**0.0**	
Clear Creek	Bull trout	73.8	8.7	11.2	20.0	0.3	68
	Chinook salmon	25.7	2.8	4.7	7.5	0.3	
	Steelhead	45.2	3.2	5.3	8.4	0.2	
	Westslope cutthroat trout	71.6	13.6	13.3	26.9	0.4	
Clear Creek Total		**216.3**	**28.3**	**34.6**	**62.9**	**0.3**	
Gedney Creek-Selway River	Bull trout	24.9	2.6	13.7	16.4	0.7	57
	Chinook salmon	29.3	4.5	15.3	19.9	0.7	
	Coho salmon	26.7	4.4	15.3	19.6	0.7	
	Pacific lamprey	19.0	2.6	13.8	16.3	0.9	
	Steelhead	46.1	4.8	15.6	20.4	0.4	
	Westslope cutthroat trout	141.5	6.2	16.6	22.9	0.2	
Gedney Creek-Selway River Total		**287.6**	**25.2**	**90.3**	**115.5**	**0.4**	
Headwaters Selway River	Bull trout	48.4		0.1	0.1	0.0	1
	Chinook salmon	32.7		0.1	0.1	0.0	

HUC 5 Watershed	Species	Total Distribution (Miles)	Miles within the 150' Road Buffer	Miles within the 300' Road Buffer	Total Miles	Percent in Road Buffer	Number of Crossings
	Steelhead	46.2		0.1	0.1	0.0	
	Westslope cutthroat trout	123.2	0.2	0.3	0.5	0.0	
Headwaters Selway River Total		**250.6**	**0.2**	**0.5**	**0.7**	**0.0**	
Little Clearwater River	Bull trout	32.8	0.0	0.0	0.0	0.0	0
	Chinook salmon	12.3	0.0	0.0	0.0	0.0	
	Steelhead	29.0	0.0	0.0	0.0	0.0	
	Westslope cutthroat trout	49.2	0.0	0.0	0.0	0.0	
Little Clearwater River Total		**123.4**	**0.1**	**0.1**	**0.2**	**0.0**	
Meadow Creek	Bull trout	49.1	1.1	0.1	1.2	0.0	11
	Chinook salmon	69.0	1.1	0.1	1.2	0.0	
	Coho salmon	7.3	1.1	0.1	1.2	0.2	
	Steelhead	73.0	1.1	0.1	1.2	0.0	
	Westslope cutthroat trout	187.3	1.2	0.2	1.4	0.0	
Meadow Creek Total		**385.7**	**5.5**	**0.7**	**6.3**	**0.0**	
Middle Fork Clearwater River	Bull trout	39.1	0.1	11.7	11.8	0.3	53
	Chinook salmon	33.6	0.1	11.7	11.8	0.4	
	Coho salmon	23.0	0.1	11.6	11.7	0.5	
	Pacific lamprey	23.0	0.1	11.6	11.7	0.5	
	Steelhead	34.6	0.1	11.7	11.8	0.3	
	Westslope cutthroat trout	86.8	4.9	15.6	20.5	0.2	
Middle Fork Clearwater River Total		**240.1**	**5.4**	**74.0**	**79.4**	**0.3**	
Moose Creek	Bull trout	56.7				0.0	0
	Chinook salmon	31.3				0.0	
	Steelhead	87.7				0.0	
	Westslope cutthroat trout	240.0				0.0	
Moose Creek Total		**415.7**				**0.0**	

HUC 5 Watershed	Species	Total Distribution (Miles)	Miles within the 150' Road Buffer	Miles within the 300' Road Buffer	Total Miles	Percent in Road Buffer	Number of Crossings
Pettibone Creek-Selway River	Bull trout	34.4				0.0	0
	Chinook salmon	54.2				0.0	
	Coho salmon	19.6				0.0	
	Pacific lamprey	11.8				0.0	
	Steelhead	48.1				0.0	
	Westslope cutthroat trout	119.0				0.0	
Pettibone Creek-Selway River Total		**287.1**				**0.0**	
Running Creek	Bull trout	37.8	0.3	0.4	0.8	0.0	11
	Chinook salmon	29.4	0.4	0.5	0.9	0.0	
	Coho salmon	18.9	0.2	0.3	0.4	0.0	
	Steelhead	36.1	0.6	0.7	1.2	0.0	
	Westslope cutthroat trout	64.0	0.6	0.7	1.2	0.0	
Running Creek Total		**186.2**	**2.0**	**2.5**	**4.5**	**0.0**	
Three Links Creek-Selway River	Bull trout	21.0	0.1	0.6	0.7	0.0	0
	Chinook salmon	45.1	0.1	0.6	0.7	0.0	
	Coho salmon	21.0	0.1	0.6	0.7	0.0	
	Pacific lamprey	21.0	0.1	0.6	0.7	0.0	
	Steelhead	43.6	0.1	0.6	0.7	0.0	
	Westslope cutthroat trout	160.1	0.2	0.6	0.8	0.0	
Three Links Creek-Selway River Total		**311.6**	**0.9**	**3.5**	**4.4**	**0.0**	
White Cap Creek	Bull trout	34.7	0.3	0.6	0.9	0.0	0
	Chinook salmon	34.2	0.3	0.6	0.9	0.0	
	Steelhead	23.6	0.3	0.6	0.9	0.0	
	Westslope cutthroat trout	90.7	0.3	0.6	0.9	0.0	
White Cap Creek Total		**183.2**	**1.3**	**2.3**	**3.6**	**0.0**	
Grand Total		3,440.6	**122.2**	**261.2**	**383.4**	0.1	243

3.3.2 Summary of Collective Watershed Health at the HUC 6 Scale

The Forests have summarized watershed health by HUC 6 sub-watersheds (USDA Forest Service 2013), as illustrated in Figure 16. Out of the 63 HUC6 watersheds in the project area, 61 have been assigned a watershed score in the WCATT database. The two watersheds that have not been assessed by WCATT are assumed to be in fair to poor condition due to high road densities, past management activities, and the presence of non-federal lands. Seven percent of the assessed watersheds are classified as 'Fair' or better (Condition Rating 1.7 to 2.2), while the remaining 93% of the watersheds are in 'Good' condition rating (Condition Rating 1 to 1.6). For a complete explanation of the watershed condition classification, see the USFS Watershed Condition Classification Technical Guide (Potyondy and Geier 2011). **Error! Reference source not found.** presents the condition ratings for the project area, obtained from the USDA's Watershed Condition Framework (USDA Forest Service 2011).Areas assigned a high risk rating correspond to areas with multiple stream crossings (Figure 15).

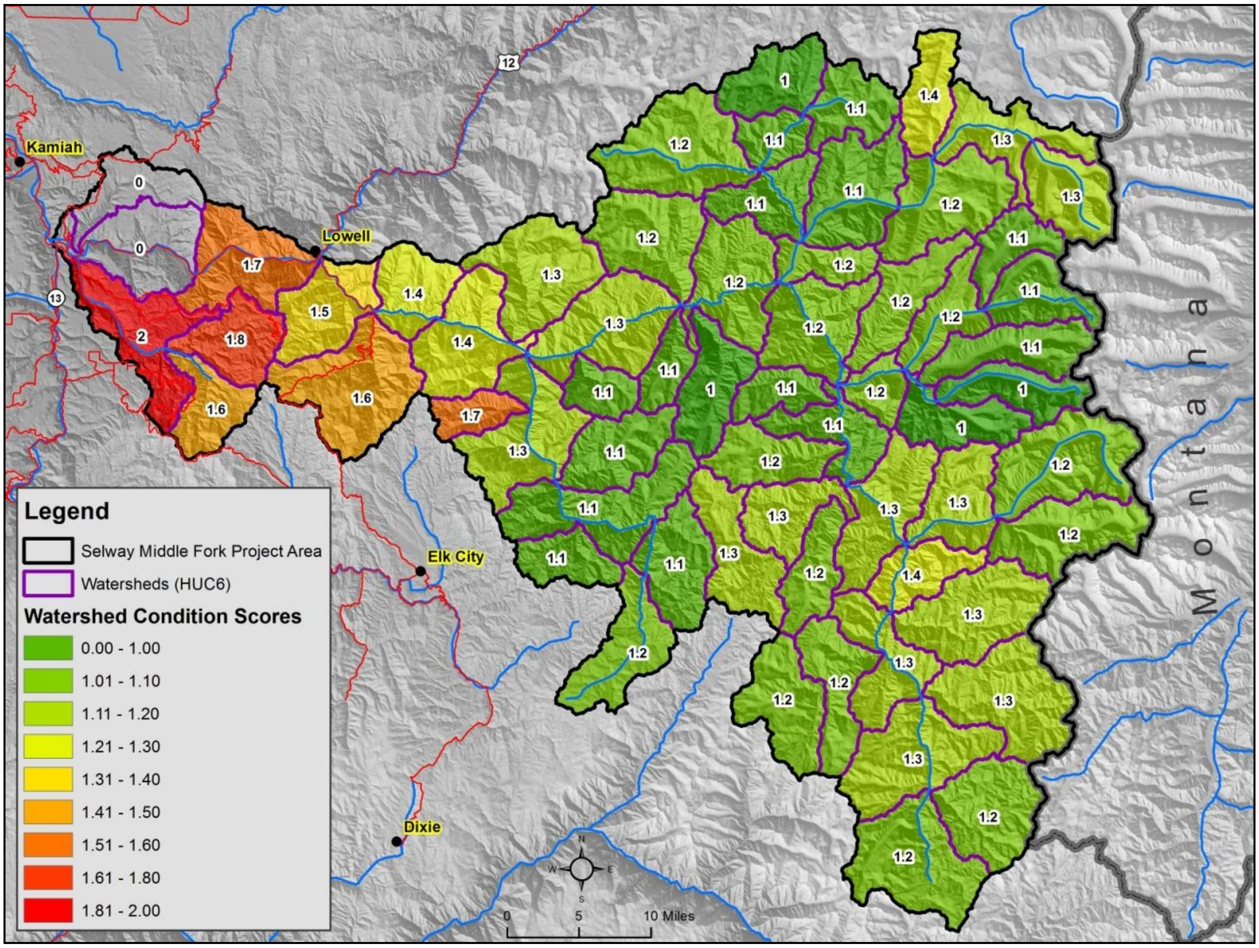

Figure 16 USFS watershed condition class scores

3.4 TERRESTRIAL SPECIES

Our analysis of existing terrestrial species baseline conditions includes assessments of the occurrences of rare animals, species likely to be considered Management Indicator Species in the Nez Perce and Clearwater Forest Plan revisions (northern goshawk, flammulated owl, American marten, and pileated woodpecker), and an extensive discussion of elk habitat, nutrition, and population trends. These findings are presented below.

3.4.1 Occurrence of Rare Animals

Figure 17 discloses locations of USFS Region One sensitive and federally listed animals. As previously mentioned these observations include sightings reported by the public that have not been verified. The data shows numerous wolverine sightings in the backcountry. Factors that make the project area highly desirable as wolverine habitat include the lack of human disturbance and presence of high elevation, natal den habitat—which is characterized by north-facing cirques and avalanche chutes (Copeland 1996). Unfortunately, since wolverines are highly dependent upon carrion from winter-killed ungulates (Inman et al. 2008), the crash in elk populations may compromise the project area's current potential to support wolverines.

The data also show several Canada lynx sightings. These sightings may be less accurate because lynx are easily confused with bobcat. This analysis did not include an assessment of lynx habitat components (stand-initiation hare habitat and multi-storied hare habitat) as defined in the Northern Rockies Lynx Management Direction (USDA 2007b). However, existing size class and crown closure distributions suggest that lynx habitat within the project area is currently poor quality. The small percentage of seedling-sapling stands (0-5 inch DBH) indicates that stand-initiation hare habitat is severely lacking. The lack of open stands indicates that multi-storied hare habitat is equally limited since dense overstories typically do not allow for stand re-initiation understory development—which are stand structures that constitute multi-storied hare habitat.

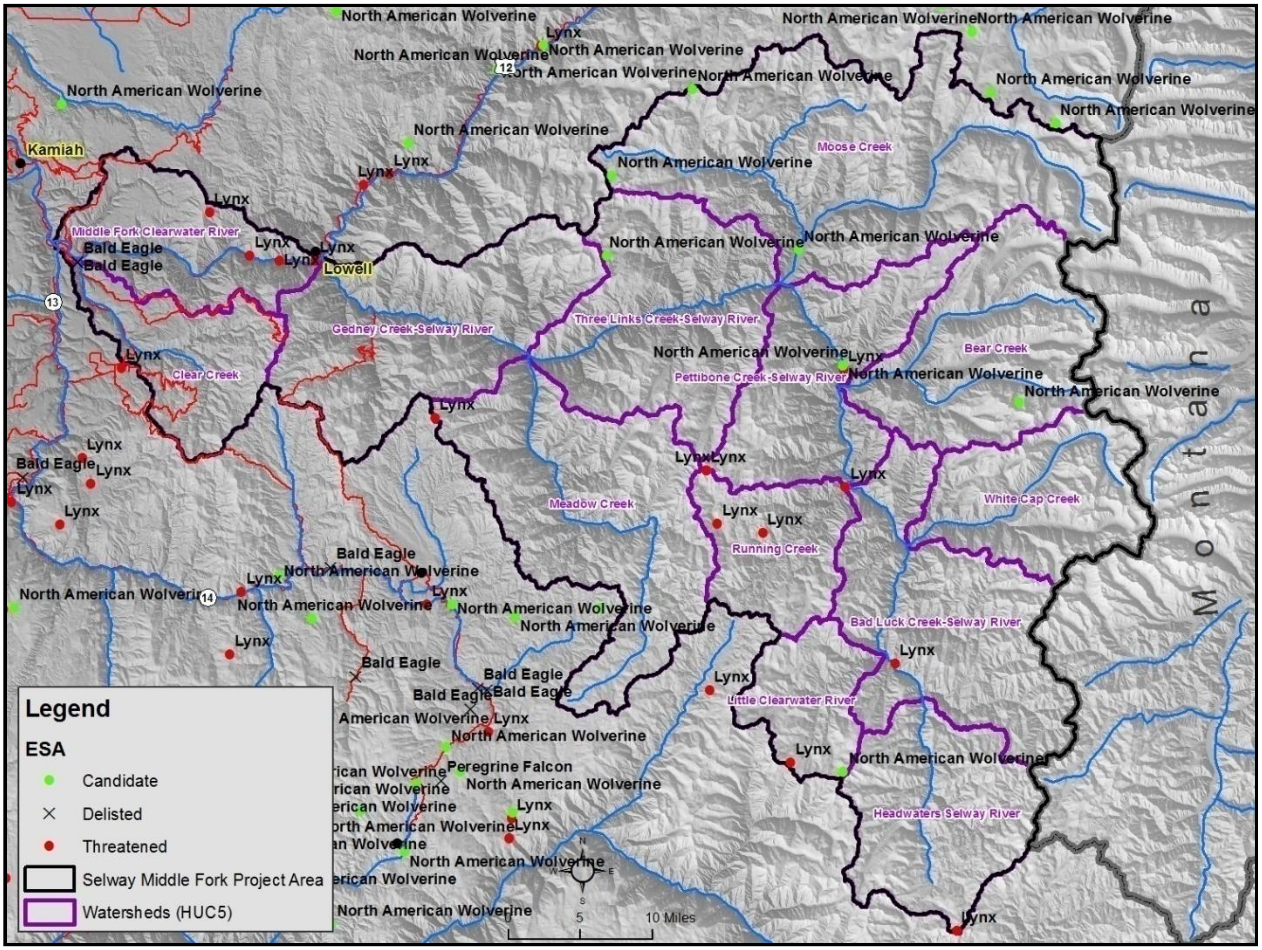

Figure 17 Occurrence of rare animals in the project area

3.4.2 Management Indicator Species

The following species may be included as MIS in the revisions of the Clearwater and Nez Perce Forest Plans, and are considered potentially at risk due to habitat limitations. For this report, we have developed and used a conceptual model which uses R1-VMap data to query existing levels of habitats for these species. R1-VMap is the foundation for applying vegetative attributes for the SIMPPLLE model of HRV and future habitat.

3.4.2.1 *Northern Goshawk*

Northern goshawks generally select nest sites in mature coniferous forests with relatively closed canopies and open, multi-storied stands (Brewer et al. 2007; Kennedy 2003; Reynolds et al. 1992; Reynolds et al. 2008) of 30 acres or greater (Reynolds et al. 1994). Northern goshawks are adept at finding dense, multi-storied microsites suitable for nesting within dry, cold lodgepole pine-dominated stands that otherwise do not appear suitable for nesting (Squires and Ruggiero 1996). Trees used as nest sites average 14-inch DBH in the USFS Northern Region (Samson 2006a). Northern goshawks use all cover types and age classes for foraging habitat (Kennedy 2003) and are not limited to continuous old growth(USDI 1998).

The R1-VMap query used to identify habitat for northern goshawks limited nest habitat to stands having all of the following characteristics:

- All forested habitat groups in elevation up to but not including whitebark pine and alpine larch
- All size classes greater than 15 inches DBH
- All canopy closure classes greater than 40% crown closure

This query was validated using 154 nest locations on the Idaho Panhandle and Kootenai National Forests (USDA 2012). A significant percentage of those 154 nests were in stands smaller and/or more open than the aforementioned query, making the query used in this assessment conservative (e.g. habitat will be under-predicted). Reynolds et al. (1994) limited suitable nest stands to no less than 30 acres. No attempt was made to exclude habitat within isolated polygons less than 30 acres, however, suitable habitat occurring in less than 30 acres patches appeared to represent less than 1% of the predicted habitat based on the habitat map generated.

The locations of existing northern goshawk nesting habitat are illustrated in Figure 18 and acres of habitat available by HUC 5 watershed are summarized in Table 8. Because northern goshawks nest in relatively small stands of suitable habitat (≥ 30 acres), within territories that are very large (5000-10,000 acres), the amount of habitat within the project area is likely sufficient to support northern goshawks at near maximum density based on species territoriality. Exceptions may exist in some of the batholith-subalpine fir landforms, where local shortages of medium and large-sized stands may preclude nest occupancy of some 5000 acre-plus landscapes. In the project area, there are few 5000 acre-or-greater-sized landscapes that are lacking multiple 30 acre-plus stands of suitable nest habitat that would provide nest stands, alternate stands, and suitable primary fledgling habitat. Developed lands in the project area have approximately the same amount and arrangement of nest habitat as undeveloped lands. Further evidence of northern goshawk nest habitat status can be made by comparing current habitat to the HRV (in progress).

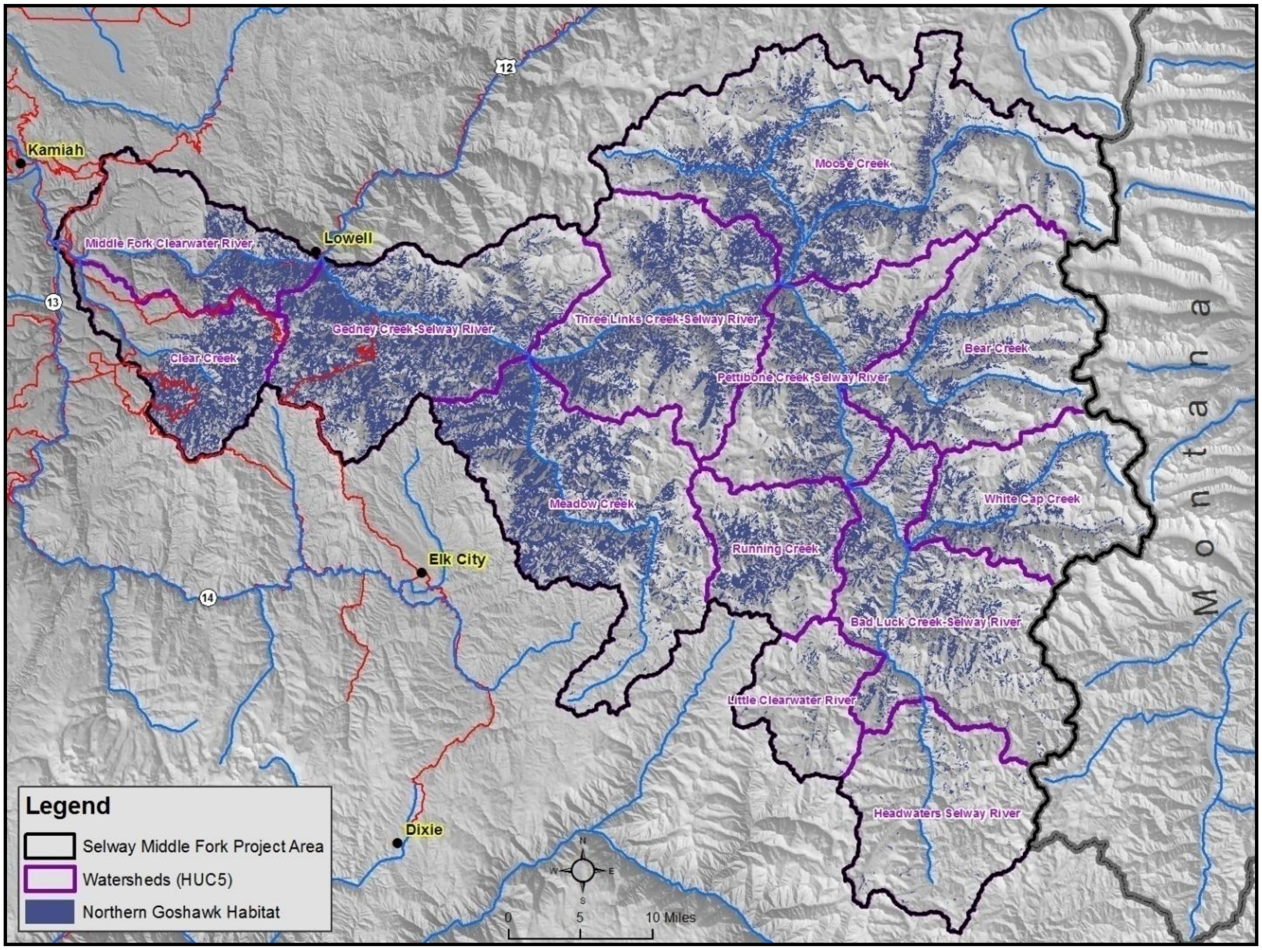

Figure 18 Northern goshawk habitat in project area

Table 8 Acres of northern goshawk nesting habitat by HUC 5 watersheds

HUC 5 Watershed	Acres of Northern Goshawk Nesting Habitat	Percent of Watershed
Bad Luck Creek-Selway River	24,394	18.2%
Bear Creek	19,598	17.1%
Clear Creek	25,752	39.6%
Gedney Creek-Selway River	58,128	42.0%
Headwaters Selway River	2,216	2.3%
Little Clearwater River	1,764	3.9%
Meadow Creek	52,038	33.5%
Middle Fork Clearwater River	14,849	19.9%
Moose Creek	46,241	19.8%
Pettibone Creek-Selway River	22,134	22.9%
Running Creek	15,396	26.5%

HUC 5 Watershed	Acres of Northern Goshawk Nesting Habitat	Percent of Watershed
Three Links Creek-Selway River	41,911	32.3%
White Cap Creek	13,005	15.4%
Total	337,425	23.7%

3.4.2.2 *Flammulated Owl*

Flammulated owls nest in open, large diameter, dry, ponderosa pine or Douglas-fir forests (Hayward and Verner 1994; Wright 2000; Wright 1996). Flammulated owls require open understories to successfully forage for moths and grasshoppers(Hayward and Verner 1994).

The R1-VMap query used to identify habitat for flammulated owls limited nesting and foraging habitat to stands having all of the following characteristics:

- Low elevation, dry ponderosa pine up through dry Douglas-fir habitat groups
- All size classes greater than 15 inches DBH
- 15-40% crown closure

Limited data was available to validate this query. Montana Natural Heritage Program data was limited largely to road locations on the periphery of the analysis area.

The locations of existing flammulated owl nesting habitat are illustrated in Figure 19and acres of habitat available by HUC 5 watershed are summarized in Table 9. Relatively few acres of habitat are present in the project area, not simply from a lack of large diameter stands, but rather from a lack of open (<40% crown closure), large diameter stands. Existing stands of flammulated owl habitat are largely concentrated within batholith-breaklands settings. Some of those existing stands underburned during the 1910wildfires, and then filled in with shrubs to a degree that precluded further conifer regeneration. While this disturbance history may explain some of the existing habitat levels, wildfire suppression has also reduced habitat by allowing stands to fill in at high density (>40% crown closure), making conditions unsuitable for flammulated owls. The predominance of low and mixed severity fire regimes in the breaklands suggests flammulated owl habitat was more abundant prior to wildfire suppression.

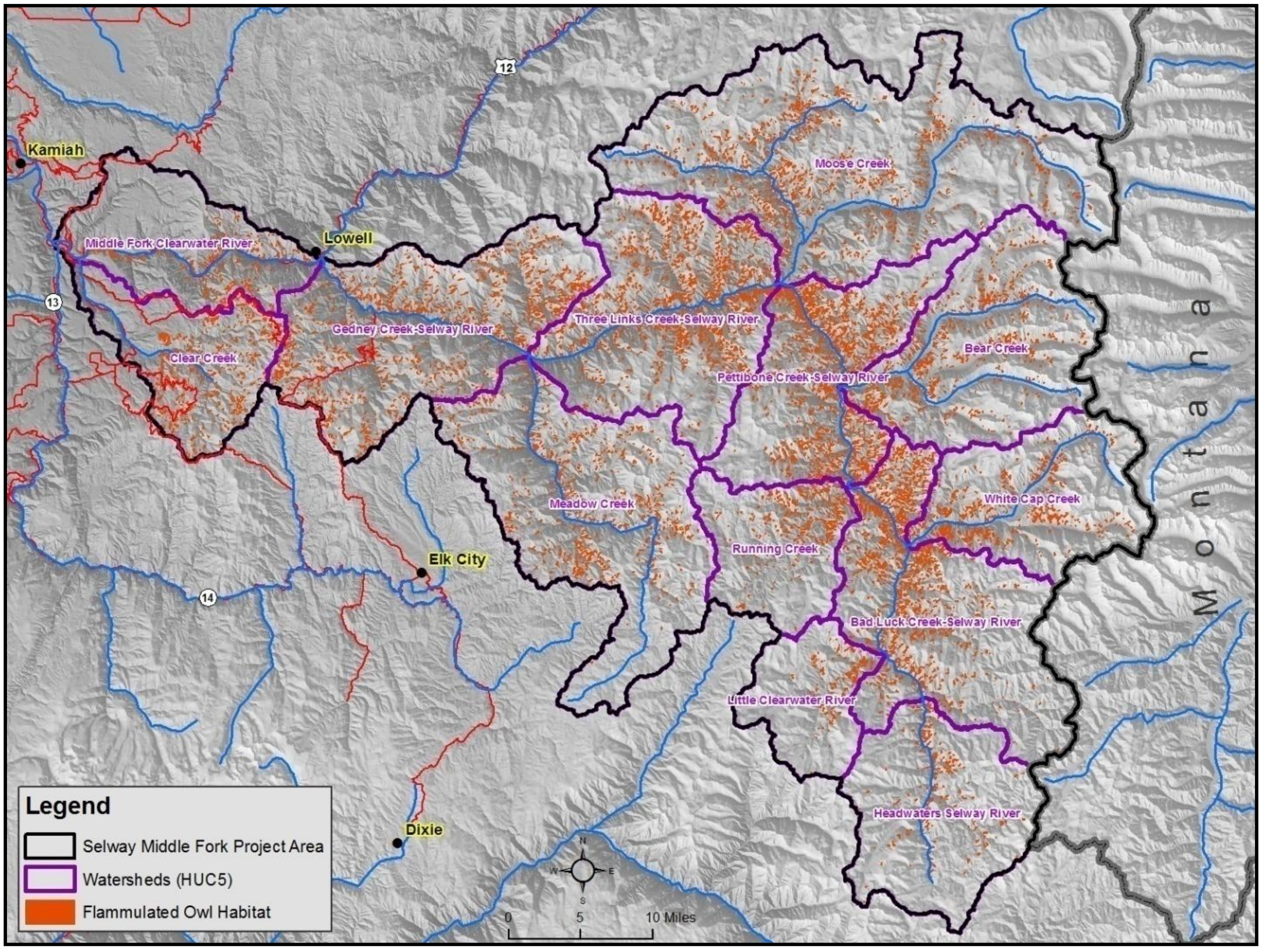

Figure 19 Flammulated owl habitat in the project area

Table 9 Acres of flammulated owl habitat by HUC 5 watersheds

HUC 5 Watersheds	Acres of Flammulated Owl Habitat	Percent of Watershed
Bad Luck Creek-Selway River	6,115	4.6%
Bear Creek	3,700	3.2%
Clear Creek	2,491	3.8%
Gedney Creek-Selway River	5,807	4.2%
Headwaters Selway River	1,349	1.4%
Little Clearwater River	703	1.6%
Meadow Creek	3,511	2.3%
Middle Fork Clearwater River	1,831	2.5%
Moose Creek	5,662	2.4%
Pettibone Creek-Selway River	6,634	6.9%
Running Creek	1,636	2.8%

HUC 5 Watersheds	Acres of Flammulated Owl Habitat	Percent of Watershed
Three Links Creek-Selway River	6,679	5.1%
White Cap Creek	2,475	2.9%
Total	48,592	3.4%

3.4.2.3 *American Marten*

American marten (also known as pine marten) have a preference for mid-to late-seral coniferous forests with moderate- to high-canopy closure at mid-to-high elevations(Ruggiero et al. 1994). Marten are often labeled as interior forest species since they prefer large patches of late-seral forest (Ruggiero et al. 1994). Marten prefer high densities of snags and coarse woody debris (Buskirk et al. 1989), as complex physical structure near the ground provides refuge sites, access to prey, and a protective thermal environment (Buskirk and Ruggerio 1994). Martens are subnivean foragers(Ruggiero et al. 1994), meaning they are well-suited to deep snow conditions.

The R1-VMap query used to identify habitat for American marten limited habitat to stands having all of the following characteristics:

- Mid-elevation, mesic, western redcedar habitat groups up through high elevation spruce-fir habitat groups, but not including whitebark pine or alpine larch
- All size classes greater than 9 inches DBH
- Greater than 70% crown closure

A recent study on the Idaho Panhandle National Forests (Wasserman et al. 2010) suggested that the western redcedar cover type was used at a level nearly 2:1 over other cover types by martens. All other studies (Ruggiero et al. 1994; Tomson 1999), however, concluded that all of the aforementioned habitat groups are suitable for martens if tree size and density are adequate. Therefore, for this analysis no attempt was made to weight redcedar at a higher value than other cover types. Ruggerio et al. (1994) suggested that small, isolated patches may be unavailable to martens. Tomson (1999) concluded that while martens may use stands isolated by openings; martens may be at increased vulnerability to predation in those situations. In this analysis, no attempt was made to limit patch size assuming that a parallel fragmentation analysis using the FRAGSTAT model will be performed.

The locations of existing American marten habitat are illustrated in Figure 20and acres of habitat are summarized by HUC 5 watershed in Table 10. Suitable habitat is extensive and well-distributed in the project area, largely because of the high percentage of undeveloped lands, and the lack of wildfire disturbance from 1920-1979, which allowed stands to become both large and relatively dense.

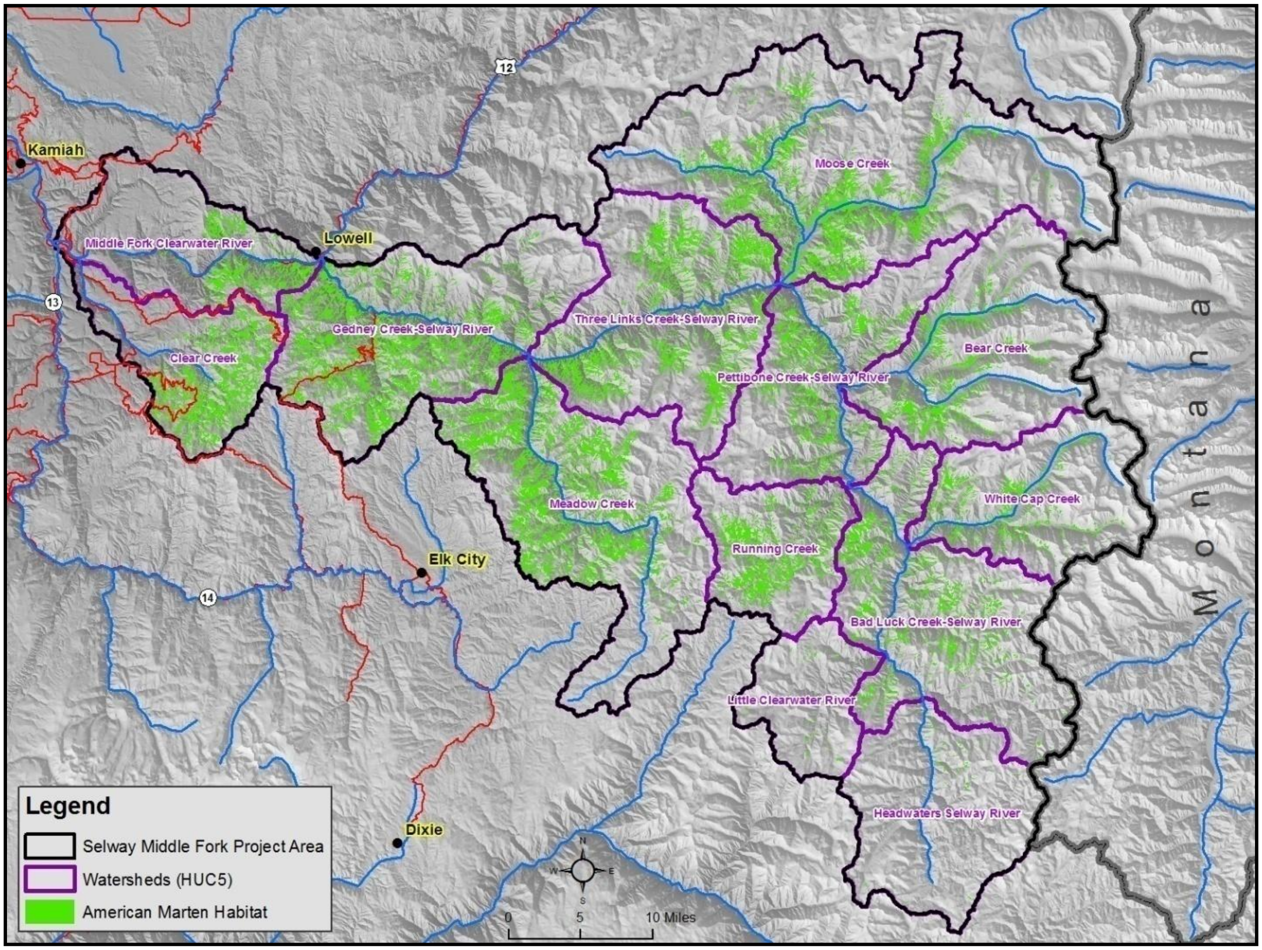

Figure 20 American marten habitat in the project area

Table 10 Acres of American marten habitat by HUC 5 watersheds

HUC 5 Watersheds	Acres of American Marten Habitat	Percent of Watershed
Bad Luck Creek-Selway River	12,950	9.7%
Bear Creek	10,812	9.4%
Clear Creek	13,426	20.6%
Gedney Creek-Selway River	29,389	21.3%
Headwaters Selway River	517	0.5%
Little Clearwater River	490	1.1%
Meadow Creek	31,283	20.1%
Middle Fork Clearwater River	7,112	9.5%
Moose Creek	25,783	11.1%
Pettibone Creek-Selway River	11,903	12.3%
Running Creek	9,828	16.9%

HUC 5 Watersheds	Acres of American Marten Habitat	Percent of Watershed
Three Links Creek-Selway River	22,137	17.0%
White Cap Creek	6,843	8.1%
Total	182,472	12.8%

3.4.2.4 *Pileated Woodpecker*

Pileated woodpeckers are most often associated with mature forests (Ritter et al. 2000; Shackelford and Conner 1997) . The species is a primary cavity excavator that nests in western larch, ponderosa pine, and black cottonwood snags (Bull 1987; McClelland 1977). Snags selected for nesting are large diameter (≥20-inch DBH) and tall (≥40 feet) (Bull 1987; McClelland 1977). Pileated woodpeckers selectively prefer western larch and ponderosa pine for nest sites (McClelland and McClelland 1999).

The R1-VMap query used to identify habitat for pileated woodpeckers limited nesting habitat to stands having all of the following characteristics:

- Low elevation, ponderosa pine-dominated habitat groups, up to the upper elevation limits of western larch
- Cover types with ponderosa pine, Douglas-fir, western larch, and western redcedar
- All size classes greater than 15 inches DBH

The locations of existing pileated woodpecker nesting habitat are illustrated in Figure 21 and acres of habitat are summarized by HUC 5 watershed in Table 11. Habitat that meets the query standards is abundant and widespread. While pileated woodpecker habitat is currently adequate, long-term snag recruitment for nesting may be compromised by a long-term absence of disturbance. Although the query identified stands containing suitable sized trees and tree species known to provide pileated woodpeckers nesting snags, FIA data was not used to validate the assumption that large diameter snags actually occur at densities suitable for nesting. A comparable SIMPPLLE-based analysis performed for the adjacent Idaho Panhandle and Kootenai National Forests was validated using FIA data (Bollenbacher et al. 2009a; Bollenbacher et al. 2009b) and it was found that snags were widespread in the larger size classes.

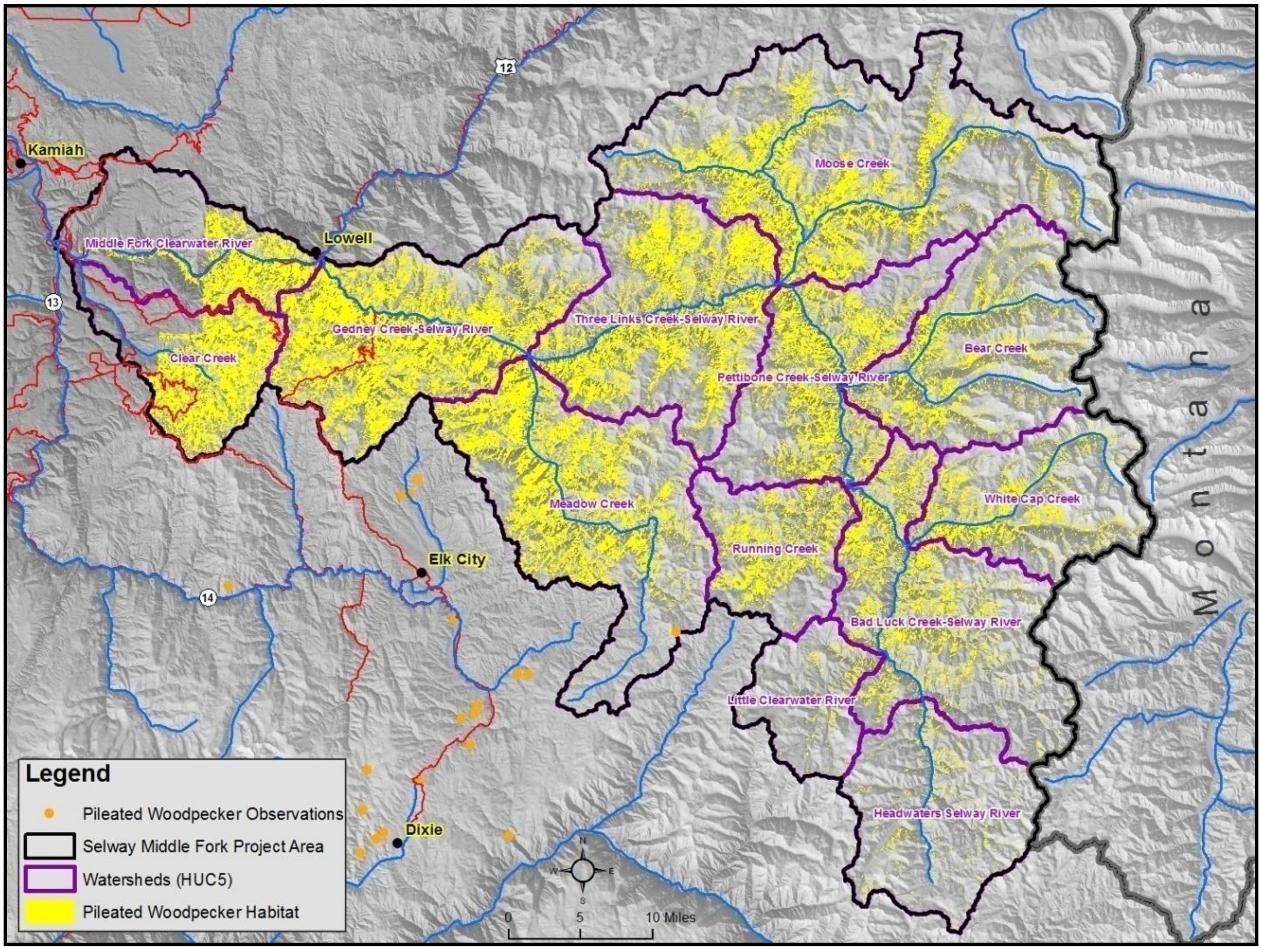

Figure 21 Pileated woodpecker habitat in the project area

Table 11 Acres of pileated woodpecker habitat by HUC 5 watersheds

HUC 5 Watersheds	Acres of Pileated Woodpecker Habitat	Percent of Watershed
Bad Luck Creek-Selway River	24,846	18.6%
Bear Creek	21,106	18.4%
Clear Creek	27,269	41.9%
Gedney Creek-Selway River	63,161	45.7%
Headwaters Selway River	3,972	4.1%
Little Clearwater River	2,006	4.4%
Meadow Creek	48,376	31.2%
Middle Fork Clearwater River	16,638	22.3%
Moose Creek	48,789	20.9%
Pettibone Creek-Selway River	26,040	27.0%
Running Creek	13,450	23.1%

HUC 5 Watersheds	Acres of Pileated Woodpecker Habitat	Percent of Watershed
Three Links Creek-Selway River	45,896	35.3%
White Cap Creek	14,565	17.3%
Total	356,113	25.0%

3.4.3 Elk Habitat and Population Trends

The project area covers a large portion of the Selway Elk Management Zone (EMZ) and a small section of the Elk City EMZ. Elk populations in the adjacent Lolo EMZ have declined sharply in recent decades and likely parallel declines in the Selway EMZ. The magnitude of this decline in elk populations in the Lolo EMZ is illustrated in Figure 22. There has been a decline from sixteen thousand elk in that EMZ in 1988 to only two thousand elk in 2010. It is important to note that the decline, outside of the steep dip in 1996–1997, has been consistent since 1988. The population crash apparent in 1996–1997 can be attributed to severe snow during that winter. Elk populations were already in decline prior to the arrival of wolves. The reference to initial observation of wolves in Figure 22 is not to suggest that wolves had an immediate impact on elk populations. Rather, as wolves began to fully occupy the watershed, predation impacts on local elk populations increased. When considered along with predation impacts from mountain lions and black bears, wolf predation may have an additive effect on elk herds within the project area. IDFG officials have concluded that “Lolo elk populations, adjacent to the project area, have been in decline for years, dating back to the early 1990s,” and have conducted “extensive research that indicates wolf predation is the leading cause of death of adult cow elk and calves older than six months, while black bear and mountain lion predation is the leading cause of death for younger elk calves”(Idaho Department of Fish and Game 2011).

Predation can have sizeable effects upon elk populations (Toweill and Thomas 2002). However, numerous other variables can also explain population declines including weather, changes in forage productivity due to wildfire exclusion and invasive species, disease, competition with livestock, and losses of winter range due to human expansion.

The construction of Dworshak Dam and creation of the 53-mile long Dworshak Reservoir in 1972 is another variable in the cause for elk population declines in the Clearwater Basin. Dworshak Reservoir submerged over fifteen thousand acres of elk winter range along the Clearwater River, and potentially blocked traditional migration routes used by elk to reach winter ranges at lower elevations (Hansen 1998).

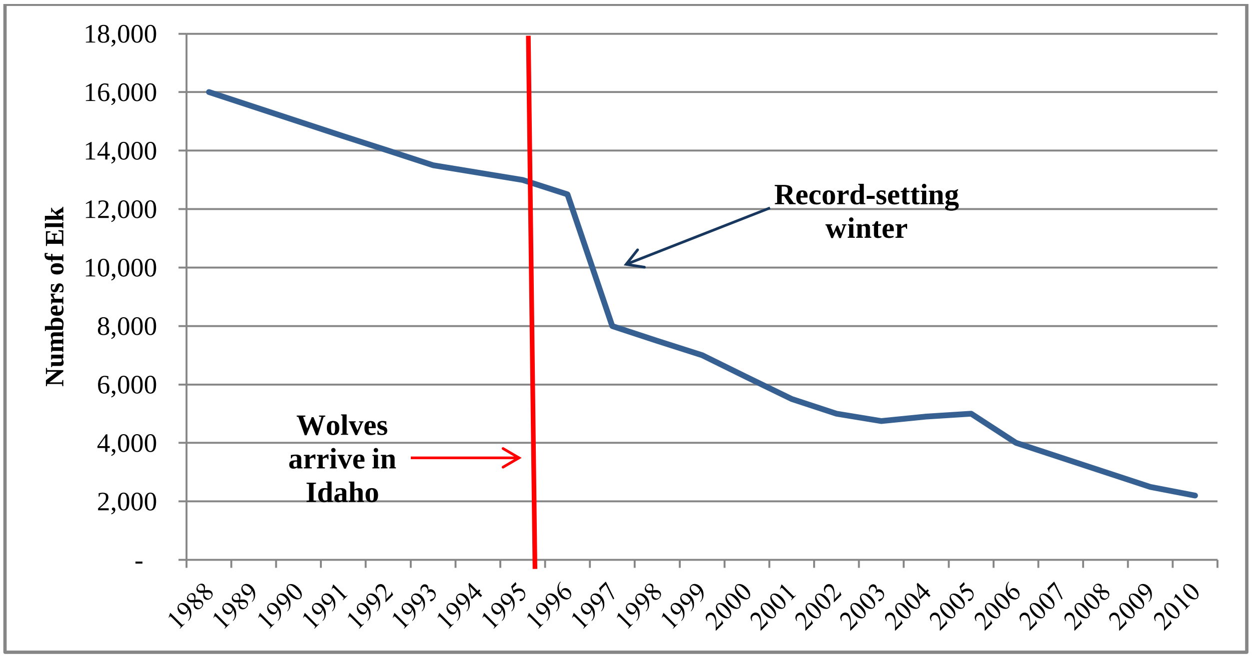

Figure 22 Elk population trends in the Lolo EMZ, 1988–2011

3.4.4 Elk Nutrition

Elk populations in the Lolo and Selway EMZs have likely declined due to the following additional variables, analyzed below: levels of wildfire by decade, availability of seedling-sapling stands, availability of open, low crown closure stands, and invasive weeds. ERG staff is aware of the CBC's efforts to fund a cooperative/multi-agency approach for monitoring elk response to landscape-level restoration.

3.4.4.1 *Elk Nutrition Changes Potentially Attributable to Wildfire*

Reductions in burned acres and resulting changes in forage productivity have been suggested as reasons for declines in elk populations. Reductions in burned acres also correlate with the changes in the abundance of seedling-sapling stands and the abundance of open stands. Figure 23shows the decade-by-decade levels of wildfire in the project area since the late 1800s. The increase in burned acreages since the 1980s will likely cause an increase in forage in the project area; however, because of the period of few wildfires between the 1940s and the 1970s, ongoing and future wildfires are likely to burn at higher severities and this variable may affect forage production.

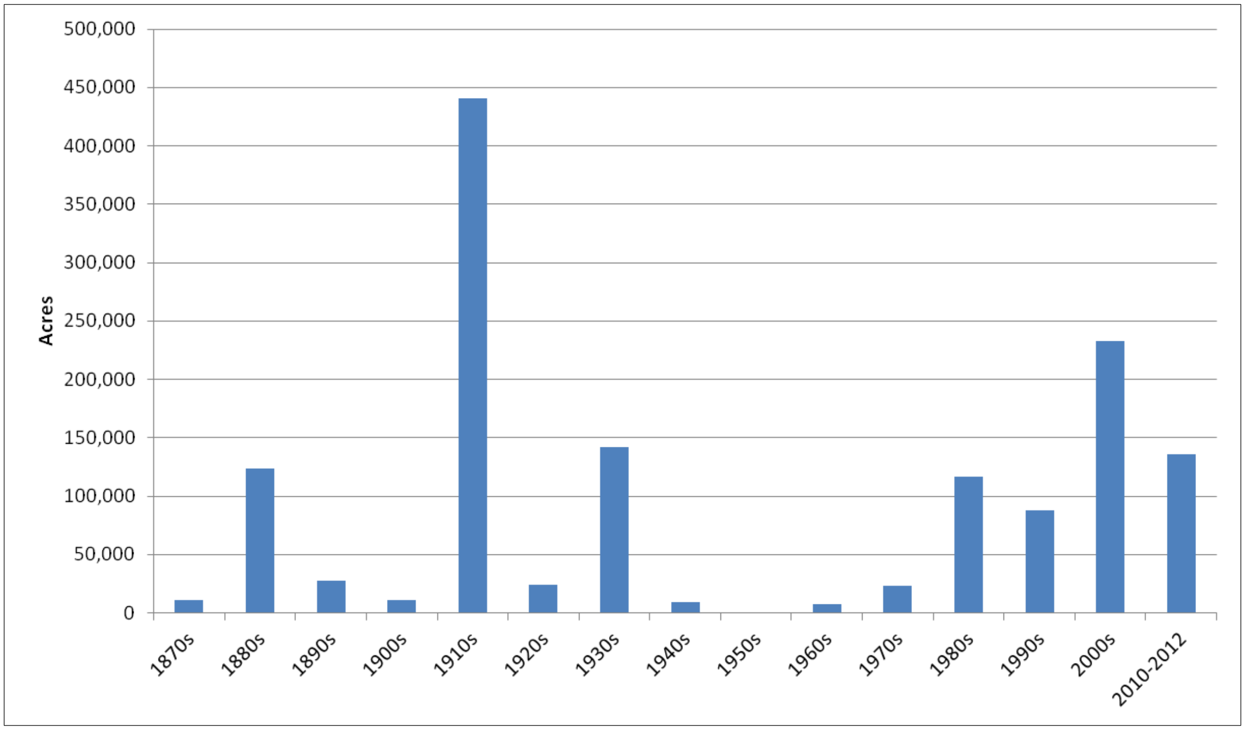

Figure 23 Levels of wildfire in project area by decade, 1870–2012

3.4.4.2 *Elk Nutrition as Influenced by the Availability of Seedling-sapling Stands*

The abundance of seedling-sapling size classes were used to assess the availability of nutritious forage in the project area. It is recognized that there is a huge variation in forage quality and quantity across the project area based on the timeframe since last disturbance, severity of last disturbance, and season of use by elk. Nonetheless, the availability of seedling-sapling stands at all elevations and aspects, can be an important surrogate in disturbance-prone landscapes for identifying changes in forage potential when compared against historic levels. Figure 6 shows the availability of seedling-sapling stands. FIA and R1-VMap data are comparable (3% and 4% respectively). The percentage of seedling-sapling stands is very low compared to the 1850 HRV (Hessburg et al. 1994; Losensky 1995).

3.4.4.3 *Elk Nutrition as Influenced by the Availability of Open Stands*

Declines in elk populations in Oregon and Washington have been linked to reductions in nutritious forage resulting from increasing forest crown closure (Wisdom et al. 2003). Toweill and Thomas (2002) conclude that nutritious forage is generally higher in post-disturbance situations where forest crown closure is low, due to the effect that increased sunlight has on plant vigor.

The abundance of open stands with crown closure <10% (high forage potential) and 10-24% (moderate forage potential) allows for an evaluation of nutritious forage availability; however, it is recognized that there is a huge variation in forage quality and quantity across the project area, based on Pfister habitat type, timeframe since last disturbance, severity of last disturbance, and season of use by elk. Elk may not necessarily prefer the most open conditions particularly in late summer and fall. Moderately-stocked canopies may delay forage "curing" and thus provide more foraging options later in the season than very open stands. Like seedling-sapling stands, however, the availability of open stands at all elevations and aspects, can be an important surrogate in disturbance-prone landscapes for identifying changes in forge potential when compared against historic levels.

3.4.4.4 *Elk Nutrition as Influenced by Non-native Invasive Weeds*

USFS invasive weed maps were compared against digital elevation model data to identify the slopes and aspects, and R1-VMap data were used to identify vegetative conditions, where weeds are most problematic. Figure 24 and Figure 25 show the distribution of weeds by those variables. We made assumptions about how weeds affect elk seasonal forage based on known and documented elk behavior. Furthermore, lands with comparable slope, aspect, and vegetation where weeds have not yet been identified may present an additional risk.

The USFS weed data coverage map suggests invasive weeds are extensive (Figure 11). No specificity is provided to indicate the density of weeds per acre or the degree to which weeds are competing with or have over-topped native forage plants. Thus, the degree to which weeds are affecting elk forage is largely unknown.

Elk do eat a small percentage (~10%) of invasive weeds (spotted knapweed and cheatgrass) according to Kohl et al. (2012). Spotted knapweed is high in protein, although the taste apparently discourages consumption except during the winter when other palatable forage is scarce (Kohl et al. 2012). Wright and Kelsey (1997) assessed the effects of spotted knapweed on an elk and mule deer winter-spring range along the Selway River in Idaho and suggested, based on composition in winter and spring diets of elk and mule deer, that knapweed be considered as a potential food source when calculating carrying capacity.

Weeds are a high risk on droughty open, non-forested sites (Rice et al. 2008) that may provide important winter or spring forage. Disturbance from wildfires, which potentially improves forage on non-weed-infested lands, makes those sites much more likely to be invaded by invasive weeds. This suggests that efforts to reintroduce fire into areas to improve forage, could be counter-productive if those sites become heavily-invaded by invasive weeds.

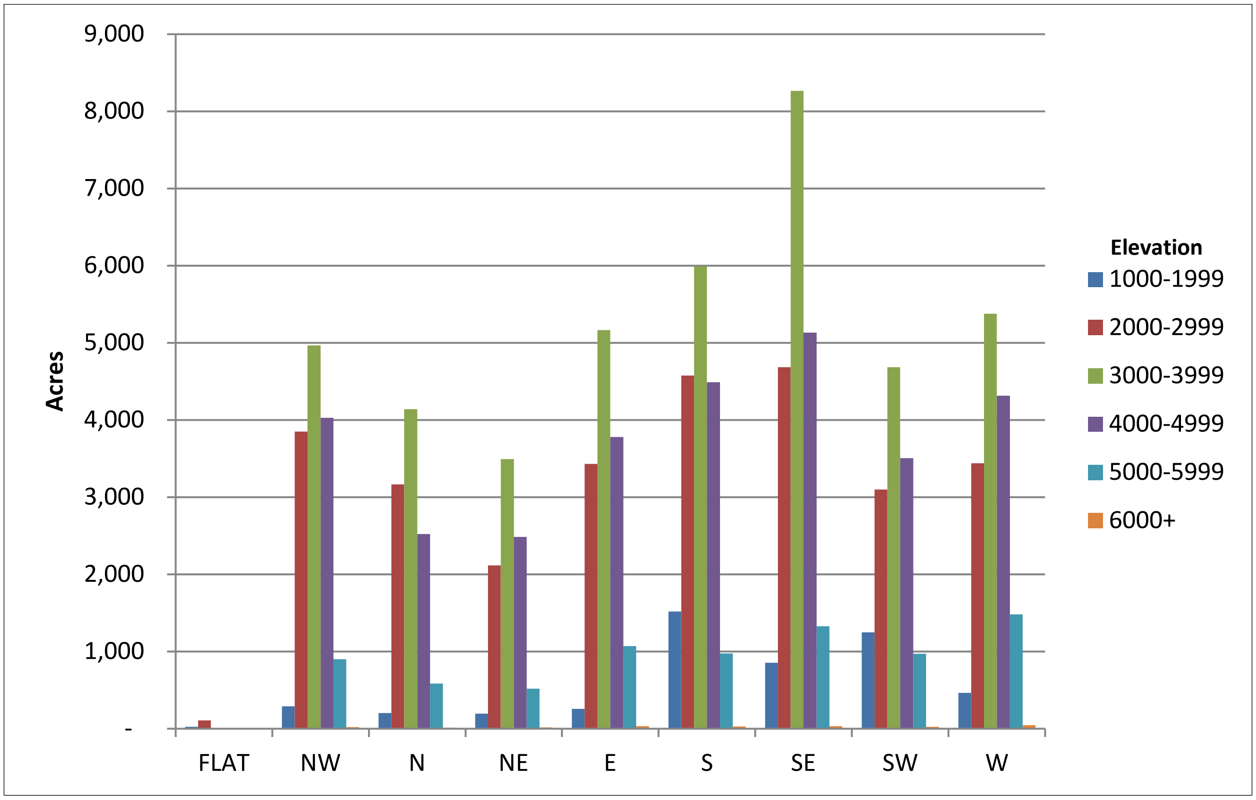

Figure 24 Weed distribution by aspect and elevation

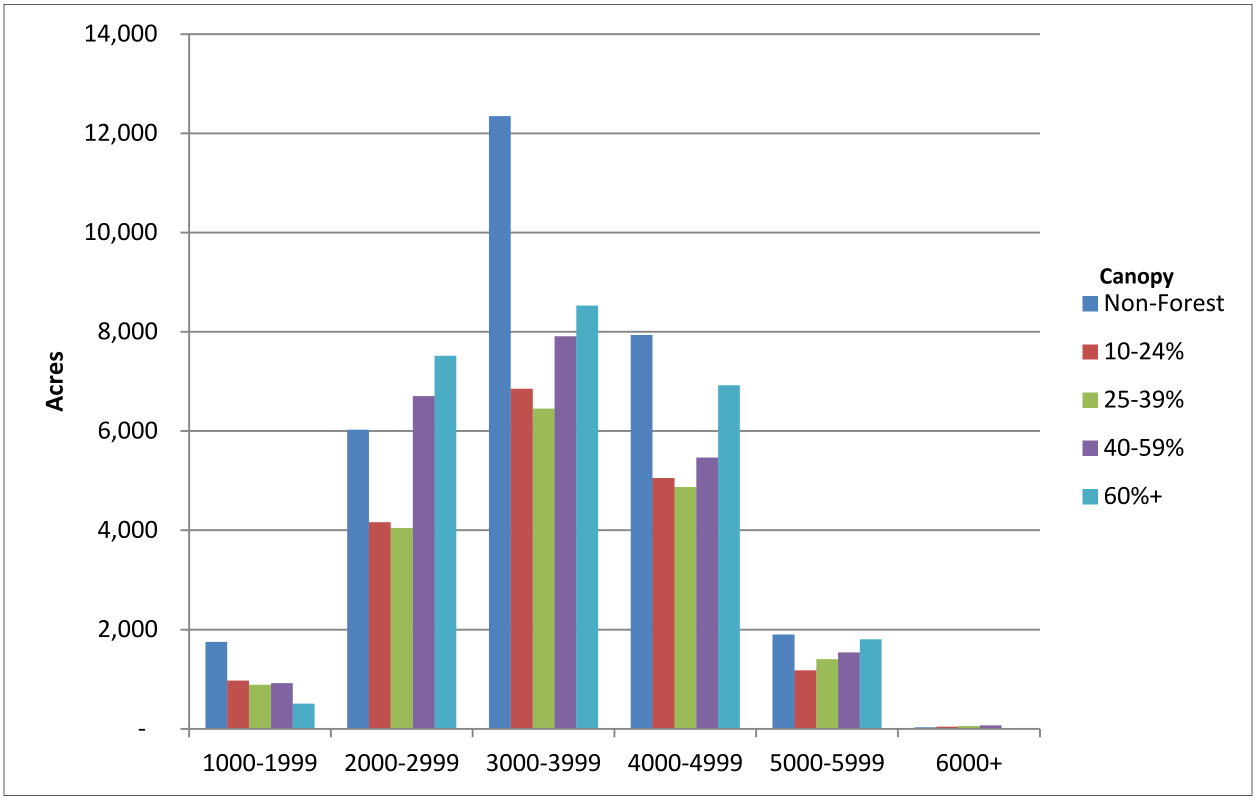

Figure 25 Weed distribution by elevation and forest canopy cover

The distribution of existing weed-infested sites is largely concentrated in areas with warm aspects, low-mid elevations, and with low tree canopy closure. In addition, Figure 11 shows that there are substantial acres with comparable aspect, elevation, and tree cover that are not weed-infested based on the inventory, but are obviously at-risk—if not already infested. Also, there are considerable acres with warm aspects, low-mid elevation where existing tree cover may be inhibiting weeds, but which would become highly vulnerable after a moderate to high severity wildfire.

While the presence of weeds suggests the availability of nutritious forage could further decline with further negative effects upon elk, especially if weed-infested sites are burned, there is simply not enough information to determine how weeds will affect elk in the future. More thorough inventories to identify weed presence by species, weed coverage, presence and vigor of native forage plants, and presence and density of biological agents are needed. Additionally, an in-depth analysis of at risk lands not currently infested with weeds would be proactive.

3.4.4.5 *Variables that May Explain Why Other Elk Populations are Thriving*

Variation in the status of elk populations compared to officially set population objectives is common in all western states. The reason or causal factors influencing these variations, above or below population objectives, are often highly complex. Seldom are these variations driven or significantly influenced by a single factor. Even within a specific state, and individual watersheds, each elk population has relatively unique sets of circumstances and historical events that helped shape present conditions. This is particularly relevant when considering habitat quality, hunter harvest, intensity of agricultural operations, impacts from predation, nutrition, herd productivity, and overall cultural influences that shape the state's approach to management in any given area.

Only a few of Idaho's elk populations are in decline.[2] The Clearwater Basin supports, perhaps, the most infamous of these declining elk herds. However, elk population trends in the Selway/Elk City EMZs (16, 16A and 17) which represent the majority of the Selway/Middle Fork Project Area are either stable (EMZ 16 or sharply declining (EMZs 16A and 17). Areas of Idaho that meet or exceed elk population objectives occur on landscapes that exhibit diverse habitats, land-uses, and cover types. Some of the most recent research on elk suggests that elk occupying lower quality habitats do not possess the nutritional resources to accommodate sufficient productivity to compensate for high rates of hunter harvest and predation by large carnivores (Hebblewhite 2013). Some of the areas in Idaho supporting elk herds below objective are clustered in the densely-forested center of the State. However, to suggest that a lack of wildfire occurrence alone is responsible for these declines is problematic. Most of the areas in Idaho that have experienced elk population declines involve habitats that are considered lower quality compared to other areas of the State. These areas also have significant influence from increased presence of large carnivores, weed infestations, residential and commercial development, densely roaded drainages and a general lack of highly productive agricultural lands. Individually, these observations are anecdotal. However, when combined with a more comprehensive evaluation, they lend support toward defining the relationship between declining elk populations, changes in abundance and quality of elk forage, and a host of other factors that incrementally build the intensity of negative influences on elk habitat.

Another variable in elk population dynamics is the presence of domestic livestock within the watershed and how depredation by wolves plays into this equation. Many of the management actions associated with wolves involve responses to depredation events on domestic livestock. Often, wolf populations are held at artificially lower levels in areas where consistent depredations occur. These management actions (mortalities) on wolves may decrease predation pressure on local elk populations. The general lack of domestic livestock within the project area, relative to landscapes toward the western boundary, may allow

[2] http://fishandgame.idaho.gov/public/docs/rules/bgElk.pdf.

wolves to have a greater influence on elk populations compared to landscapes that support greater numbers of domestic livestock.

Forage availability and predation are only two of many factors affecting elk populations and ‘effective’ elk habitat. Analysis of radio collared elk in the Sapphire and Bitterroot Mountain Ranges on the eastern edge of the project area indicates that availability of highly nutritious forage, especially in recently burned areas, only partially explains elk preference for certain locales (Brodie et al. 2013; Hebblewhite 2013). Non-forage influences caused elk to occupy sites with potentially lower forage availability or nutritional value. Those factors, based on thousands of the GPS radio locations included disturbance from hunters, predation, deep snow, warmer-than-desired summer temperatures, level of motorized access and the creation of what are effectively elk refuge on private lands, where minimal or no public hunting occurs.

3.4.5 Furbearer Harvests

No data has been received as of March 1, 2013.

3.5 SUMMARY OF EXISTING ECOLOGICAL CONDITIONS

- Size class and canopy cover are measurably altered as a result of long-term wildfire suppression. This is contributing to increased insect disturbance and higher-than-normal severity wildfires.
- Western white pine has largely disappeared from the project area as a result of disease and recovery is inhibited by a lack of disturbance. Western larch has substantially decreased due to a lack of disturbance. Douglas-fir has increased and is above HRV.
- Habitat for northern goshawks and martens is abundant, and at no long-term risk.
- Habitat for flammulated owls and other open-forest-associated species is limited, although an increase in wildfires will likely improve the situation over time.
- Pileated woodpecker habitat is adequate, but long-term snag recruitment for nesting may be compromised by a long-term absence of disturbance.
- Elk populations have declined. The lack of nutritious forage due to long-term wildfire suppression is likely a factor, as explained by the past wildfire history, limited seed-sapling stands and limited open (<25% crown closure) stands.
- Weeds are abundant on winter and spring ranges, and are likely increasing. Efforts to restore wildfire to increase forage may prove counter-productive if fires occur on high weed risk lands. Data on weeds is insufficient to develop weed treatment strategies and plan prescribed burns that do not increase weed levels.

- Recent data (Brodie et al. 2013; Hebblewhite 2013) suggests widely variable response of forage following wildfire. Response of palatable plants to fire in the project area is insufficient to plan "when, where, and how" fire should be reintroduced.
- Elk recovery, assuming a return to increased wildfires, will be slow due to predation and invasive weeds and will probably not reach population levels experienced during the 1970s and 1980s.
- Watershed values within a small percentage of the project area are compromised by roads (Figure 15) and these areas correlate with USFS condition class scores that indicate that the subwatershed is functioning at risk, or if functioning properly has attributes that are considered functioning at risk (Section 3.3.2).

4. CROSSWALK OF CURRENT AND PLANNED CFLRP TREATMENT PROJECTS WITH EXISTING MONITORING PLANS

This section of the report briefly describes the current monitoring as understood from the data supplied to ERG, and discussion with Forest staff and CBC participants. A summary of existing monitoring performed by various parties is identified and gaps in monitoring are discussed in Section 5.

4.1.1 USFS Monitoring – Vegetation

The CNF and NPNF monitor the degree to which regeneration units were restocked within five years, changes in timber suitability, and the degree to which logging-created openings met the maximum allowable size or, if not, whether or not the appropriate Regional Forester approval was granted (USDA 2004a; USDA 2009). The NPNF monitors acres harvested by prescription (USDA 2004a). The NPNF also monitors vegetation responses following treatments; however, the result is discussed purely qualitatively and includes no hard data on how grasses, forbs, shrubs, and trees actually responded to disturbance in terms of production, cover, and vigor (USDA 2004a). The NPNF also monitors whether or not the appropriate silvicultural exams were conducted in a timely manner (USDA 2004a). The CNF monitors insect activity as identified from ADS data (USDA 2009).

4.1.2 USFS Monitoring – Wildlife

Both the CNF and the NPNF monitor acres of big game winter range habitat improved, largely via prescribed burning (USDA 2004a; USDA 2009). Neither Forest monitors fire severity, tree mortality, changes in crown closure, or forage response (USDA 2004a; USDA 2009). Although the monitoring is supposedly specific to winter ranges, both Forests track acres of treatments on summer ranges as well (USDA 2004a; USDA 2009). Both Forests identify non-native invasive weeds as major risks to big game habitat forage production, but collecting data on occurrence, weed density, or non-infested areas at risk of invasion is an ongoing process (USDA 2004a; USDA 2009).

Although not periodic monitoring per se, a broad-scale, basin-wide assessment done in 1999 (*Broad-scale Habitat Restoration on a Watershed Scale*, (USDA 1999)) addressed many of the same ecological issues assessed in this document. Some of the findings in the 1999 assessment included:

- "early successional stages, which historically covered 35-45% of the analysis area, now occupy approximately 14%, or approximately one-third of its normal availability in this (formerly) fire dominated landscape" (USDA 1999)
- "The biggest change… has been the loss of western white pine to white pine blister rust…"
- "This has created a shift from shade-intolerant species resistant to fire, insects, and disease to those susceptible to fire, insect, and disease…"

- "The suppression of lethal/non-lethal fires, particularly on south-facing break-lands and colluvial midslope LTA groups has increased stand densities…"

Both Forests monitor changes in non-game habitat. The CNF discusses species viability for several management indicator species (pileated woodpeckers, northern goshawks, and American martens) using as a reference a Region One species viability assessment (Samson 2006b) that was based on FIA data. While defensible in 2006, no updated information is provided that would account for recent burns, insect outbreaks, or forest succession and growth. The CNF also monitors old growth forests based on an FIA analysis and identifies current levels of old growth at mean, high and low range levels (USDA 2009). The NPNF monitors effects to old growth largely in terms of whether or not treatment activities were compatible with old growth objectives (USDA 2004a). The NPNF also monitors several species (pileated woodpeckers, northern goshawks) by conducting nest surveys, albeit at a rather low intensity (USDA 2004a). Both Forests monitor changes in previously threatened and endangered species including bald eagles, peregrine falcons and gray wolves (all currently de-listed) and track observations of Canada lynx (USDA 2004a; USDA 2009).

The CNF identifies measures to restrict road access, but provides no data for road miles closed, method used, effectiveness of closures, or level of animal security provided (USDA 2009).

4.1.3 USFS Monitoring – Watershed/Fisheries

The Watershed Condition Framework (USDA Forest Service 2013) was completed for the NPNF and CNF by Forest fisheries biologists, watershed specialists, and other Forest staff. These data were supplied to ERG and are depicted as Figure 16. One of the stated reasons for this framework is to "improve national-scale reporting and monitoring of program accomplishments". The Watershed Condition Framework is thought to help outcome based program accomplishments and therefore may be part of a CFLRP monitoring effort, though the scale may be too large to detect the effects of small treatments.

Both Forests monitor miles of fish habitat improved including such things as improved road drainage, culverts replaced, and in-stream habitat improved (USDA 2004a; USDA 2009). Both Forests monitor stream condition—the CNF does so with a fairly detailed list of variables including stream temperatures, stream temperature correlated against air temperature, degree to which individual streams meet state spawning standards, natural and anthropogenic disturbances, and effectiveness of riparian fences to avoid cattle damage; the effects of which are measured at the HUC 5 scale (USDA 2009). The NPNF, conversely, monitors stream conditions in purely qualitative measures (USDA 2004a). The CNF monitors fish populations and mussel populations, albeit at modest scales as funding has decreased (USDA 2009). The NPNF monitors compliance with PACFISH standards (USDA 2004a). The NPNF also monitors fisheries habitat trend by drainage, although no data is provided to support the habitat trend conclusions (USDA 2004a). The NPNF also monitors effects of anthropogenic activities on fisheries habitat, but again the results are described qualitatively rather than quantitatively (USDA 2004a).

4.1.4 USFS Monitoring – Soils

A decade ago, the Clearwater National Forest soil scientist/ecologist monitors 100% of all new road construction on the Clearwater National Forest for BMP implementation. An internal audit showed that in 2002, BMPs were implemented on all projects, as measured by degree of skidding, the then-30% limitation, number of skid trails, appropriateness of tractor size, and cable yarding (USDA 2002a). The Clearwater NF maintained an inventory of areas needing soil restoration, slated for completion as funding allowed. The Clearwater soil productivity strategy included development of cost-effective methods of evaluating sources of soil productivity damage caused by compaction, displacement, and severe burning (USDA 2002a). In 2003, the Clearwater NF emphasized the maintenance of soil productivity by limiting soil disturbance to 15% of activity areas, per direction of the Clearwater Forest Plan and the Northern Region Soil Quality Monitoring Supplement (USDA 2003). In 2004, the Clearwater NF soil monitoring efforts, conducted by the Forest Soil Scientist and District personnel, focused on the effects of past activities in project areas currently undergoing planning (USDA 2004a). Available Clearwater NF monitoring reports for the subsequent years (through 2009) do not indicate this level of monitoring detail. In later years, the monitoring strategy no longer included a stipulation to check for soil erosion and compaction for 100% of all new road construction, but BMP application and effectiveness continue to be monitored (USDA 2006; USDA 2007a; USDA 2008; USDA 2009).

The Nez Perce National Forest report for 2002 indicated that the Forest understands the importance of monitoring the effects of treatments on soils, but it is unclear to what extent the Nez Perce NF engaged in monitoring activities at that time (USDA 2002b). In subsequent years, the Nez Perce Forest accomplished soil and water quality improvements thanks to one-time additional funding, and conducted detailed soil erosion monitoring of timber sales. The Nez Perce National Forest groups its monitoring into three categories: implementation monitoring, which "determines if the potential for soil damage was evaluated during project development and if BMPs were applied;" effectiveness monitoring, which determines the percentage of the activity area was kept in a productive condition after a treatment; and validation monitoring, which "determines whether the data, assumptions, and coefficients used in soil and vegetation response models were correct" (USDA 2004b).

4.1.5 Idaho Department of Fish and Game (IDFG) Monitoring – Wildlife

IDFG biologists monitor elk populations using a variety of techniques. One of the most intensive methods is aerial surveys during winter or spring to collect herd composition and population trend data. These surveys are flown every 3-5 years for each Elk Management Unit (EMU). Multiple EMUs makeup individual Elk Management Zones (EMZ). This project area covers portions of the Selway and Elk City

EMZs (Units 16, 16A, and 17). The data from these surveys are used to calculate ratios of bulls and calves/100 cows and to build long-term population trend information for each EMU and EMZ. IDFG's survey strategy is to fly each survey area intensively during 'year 1', then use that data to model the population trends over the following 3-4 years.

Local IDFG wildlife biologists sent ERG elk herd composition and population data for the Clearwater basin including EMU and EMZ composition and trend data from 1985-2011. Status of elk herds across Idaho are available based on population objectives on the IDFG website. These data are useful for comparing elk populations across landscapes dominated by dense forests, like the project area where populations are consistently below objective, to elk populations occurring on landscapes comprised of parcels of open non-forested or agricultural lands, where populations are consistently at or above objective.

No data on moose or other ungulates have been received by ERG to date. No data on furbearer harvest have been received by ERG as of March 2013, although furbearer harvest data, without age and sex information, is a poor metric for estimating furbearer population trends or dynamics.

4.1.6 Idaho Department of Fish and Game Monitoring – Fisheries

No fisheries population trend data have been received by ERG as of March 2013. Fish occurrence data collected by IDFG, by stream reach and species (cutthroat, steelhead, salmon), and available through USFS data sources, is considered highly reliable and sufficient for assessing the status of fisheries at multiple scales.

4.1.7 Nez Perce Tribe

No monitoring data of tribal activities have been received by ERG as of March 2013.

Table 12 Comparison of CFLRP treatment projects and existing monitoring

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
Fenn Face Prescribed Fire	**Treatment:** prescribe burn 3,100 acres **Objectives:** reintroduce fire to restore a mosaic of vegetation in a fire-adapted landscape, restore forage vigor to grasses and shrubs for ungulates and habitat for songbirds, and reduce hazardous fuels in WUI. **Implementation:** 2012-2015	• Acres of prescribed burn accomplished (perimeter only) • Acres of winter range habitat improvement accomplished (same as above) • Compliance with PACFISH buffers (assuring that fires do not encroach into buffer)	• Pre and post fire conditions (duff and fuel plots) • Percent mortality in mature forest canopy • Percent tree mortality within the Riparian Habitat Conservation Area (RHCA) • Maximum patch size mortality within the mature tree canopy • Maximum patch size mortality within mature tree canopy within the RHCA • Fire severity within the prescribed burn • Fire severity within the RHCA • Photo plots to sample various burn attributes including fuel loading, and dead and downed material
Smith Creek Road Decommissioning	**Treatment:** decommission 6 miles of system USFS roads, decommission 10 miles of non-system USFS roads, and convert 0.7 miles of	• Miles of roads decommissioned • Miles of stream improved via road de-commissioning	• None identified

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
	roads to non-motorized trail. Treatments include invasive weed treatment where weeds are present, ripping, re-contouring, or out-sloping decommissioned roads, removing all culverts and ditches from decommissioned roads, and removing gates from non-commissioned roads. **Objectives:** reduce watershed impacts on roads no longer needed **Implementation:** 2013	• Culverts improved or replaced • Changes in stream conditions (water temperature, correlation between air and water temperature, degree to which adjacent stream meet state spawning standards where applicable)	
Interface Fuels Phase 2	**Treatment:** commercial thin 1,193 acres, pre-commercial thin 30 acres, salvage 212 acres of dead/dying trees, prescribe underburn 155 acres, and construct 1.5 miles of temporary road. **Objectives:** reduce hazardous fuels in the WUI **Implementation:** In progress	• Changes in insect activity (ADS) as a result of treatments • Acres of prescribed burns designed to reduce hazardous fuels • Acres of winter range improved (assuming some of the project area is winter based on elevation and aspect, although no data was provided to identify the areas as winter range)	• Water temperatures in Swan and Little Smith Creeks adjacent to Forest Road 101 • Visual Quality Objective (VQO) compliance in unit 12 as seen from the Wildlife and Scenic River • PACFISH compliance around landslide-prone areas

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
Selway Winter Range Improvement	**Treatment:** slash, using hand tools, approximately 3,000 acres of tall shrubs **Objectives:** improve forage for elk and other ungulates, release understory conifers, and allow future natural disturbances. **Implementation: 2012-2013**	• Acres of big game winter range and other seasonal range enhanced • Acres of non-game habitat enhanced	• None identified
South Fork/West Fork Clear Creek Road Decommissioning	**Treatment:** decommission 8.5 (adjusted via modifications to 9.6) miles of system USFS roads, decommission 73 miles of non-system USFS roads, remove all culverts from decommissioned roads. Treat non-native invasive weeds where present, rip, re-contour, or out-slope decommissioned roads, retain 2 foot wide trail where designated. **Objectives:** objectives are assumed to include reduce road impacts on watershed and fisheries, and, where roads cross fish-bearing streams reduce fish barriers and sediment. **Implementation:** 2012-2013	• Miles of road decommissioned • Miles of stream habitat improved • Stream condition (qualitative) • Compliance with PACFISH buffers • Effects of anthropogenic activities on fish (qualitative)	• None identified

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
Clear Creek Culvert Replacements	**Treatments:** replace 10 culverts, remove one culvert, and re-vegetate disturbed ground **Objectives:** improve fish passage and reduce risk of failure, ensure that new culverts can accommodate a 100-year runoff event **Implementation:** 2012-2013	• Miles of stream habitat improved • Stream condition (qualitative) • Compliance with PACFISH buffers • Effects of anthropogenic activities on fish (qualitative)	• None identified
Lodge Point Project	**Treatments:** commercially thin 1,777 acres, construct 2.5 miles of temporary roads, maintain 17.2 miles of system roads, reconstruct 13.6 miles of road, reconstruct 5.8 miles of temporary road that were previously decommission, prescribe burn an unspecified number of acres in ponderosa pine-dominated stands, remove culverts from decommissioned roads. **Objectives:** reduce risk of wildfire, insects, and disease. Increase the proportion of seral ponderosa pine while reducing the density of climax Douglas-fir. Reduce wildfire risks in the WUI. **Implementation:** 2012-2013	• Acres treated by harvest prescription • Vegetation response following treatment (qualitative) • Whether or not silvicultural exams were conducted in a timely manner • Acres prescribed burned to benefit wildlife (assuming ponderosa pine-dominated stands have some unspecified wildlife value) • Miles of road maintained, reconstructed, or decommissioned • Miles of fish habitat improved	• Annual PACFISH compliance (higher frequency than Forest Plan monitoring mandate) • Effectiveness of soil loss prevention measures • Weekly monitoring to assure that treatments are within designated boundaries and within timber sale contract prescriptions

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
		from road maintenance, reconstruction, decommissioning, or culvert removal • Stream condition (qualitative) • PACFISH compliance • Fish habitat trend (qualitative) • Effects of anthropogenic activities on fisheries (qualitative)	
Clear Creek Integrated Restoration Project	**Treatments:** regenerate under "variable retention" spacing, followed by prescribed burning, up to 2,500 acres, in openings often exceeding 40 acres, commercially thin 7,810 acres, commercially remove understory trees on 311 acres, construct temporary roads (miles unspecified), pre-commercially thin 1,865 acres, prescribe burn 42 acres of mixed timber/bunchgrass, reduce the spread of non-native invasive weeds, prescribed burn 1,400 acres of forested lands, maintain or improve 100 to 130 miles of system roads within the project area including culvert upgrading or replacement where necessary, maintain or	• Acres treated by harvest prescription • Acres prescribe burned • Vegetation response following treatment (qualitative) • Whether or not silvicultural exams were conducted in a timely manner • Openings within the 40 acre maximum, or units exceeding 40 acres approved by the Regional Forest • Acres prescribed burned to	• None identified

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
	improve 20 miles of system roads outside the project area, and decommission 2 to 5 miles of system road **Objectives:** manage forest vegetation to restore more natural disturbance patterns, improve long term resistance/resilience, reduce fuels, improve watershed conditions, and improve elk habitat and habitat for early seral species. **Implementation:** Expected 2014	benefit wildlife • Old growth protected • Miles of road maintained, reconstructed, or decommissioned • Miles of fish habitat improved from road maintenance, reconstruction, decommissioning, or culvert removal • Stream condition (qualitative) • PACFISH compliance • Fish habitat trend (qualitative) • Effects of anthropogenic activities on fisheries (qualitative)	
Iron Mountain Vegetation Project	**Treatments:** recover commercial value for dead and dying lodgepole pine by regenerating 600 to 800 acres of mixed spruce-fir/lodgepole pine forest. Plant desired seral species including western larch and Douglas-fir, and, where suitable, whitebark pine. Build 3.5 miles of temporary road. Maintain up to six miles of	• Acres treated by harvest prescription • Acres prescribe burned • Openings within the 40 acre maximum, or units exceeding 40 acres approved by the Regional Forester	• None identified

Selway-Middle Fork CFLRP Treatment Areas	Project Description	Forest Plan Mandated Monitoring	Additional Project Specified Monitoring
	existing system road. **Objectives:** utilize dead and dying lodgepole pine, recover timber commodity values and associated jobs, restore a desired mix of seral species including whitebark pine, make stands more resilient to insect and disease, and reduce fuels within the Elk City and surrounding area WUI. **Implementation:** 2013	• Vegetation response following treatment (qualitative) • Whether or not silvicultural exams were conducted in a timely manner • Acres prescribed burned to benefit wildlife • Miles of road maintained, reconstructed, or decommissioned • Miles of fish habitat improved from road maintenance, reconstruction, decommissioning, or culvert removal • Stream condition (qualitative) • PACFISH compliance • Fish habitat trend (qualitative) • Effects of anthropogenic activities on fisheries (qualitative)	

5. IDENTIFICATION OF GAPS IN EXISTING MONITORING FOR CFLRP TREATMENT AREAS

The nine CFLRP projects all have treatments that are fully consistent with restoring ecological health. For instance, the Fenn Face project's 3,100 acres of prescribed burning should improve ungulate forage by reducing conifer crown cover and stimulating grass, forbs, and shrubs. Similarly, the Smith Creek Road Decommissioning project should improve watershed and fisheries condition by removing sediment sources and restoring fish passage. Likewise, the Clear Creek Integrated Restoration project's combination of commercial thinning and prescribed burning should improve the distribution of desired seral species, make forests more resilient to disturbances, and recruit young stands to benefit wildlife.
What is lacking in for all of the projects, from a monitoring standpoint, is *effects monitoring* (i.e. did treatment have the desired result?). The following are examples by resource where current monitoring will not show whether treatments are actually having the desired result.

5.1.1 Post-fire Forage Response

A consistent finding for broad-scale analyses that include the project area is that an absence of natural disturbance in the last century has compromised species that are dependent upon grasses, forbs, and shrubs, and/or very small trees. CFLRP projects have been designed to apply treatments to address that ecological problem. Unfortunately, the response of forage plants to wildfire varies widely. The variables that determine forage response to wildfire likely include fire severity, season burned, habitat type, post-fire crown closure, and presence or vulnerability of the site to non-native invasive weeds. There may be other variables that affect forage response. Both the CNF and the NPNF are monitoring acres burned defined by fire perimeters. Neither Forest is monitoring actual forage response to burns, measured in pounds of forage per acres, fire severity within prescribed burns, including WUI treatments, or actual acres burned within the fire perimeter. Most importantly, neither Forest is monitoring those key parameters including fire severity, habitat type, post-fire crown closure, and invasive weed presence that would allow biologists to better predict future forage response, and better plan where, when, and how future fires should be ignited to optimize forage response.

5.1.2 Species Response to Habitat Improvement

Well-monitored and documented habitat improvements such as increased forage for elk, improved open stand structure and composition for flammulated owls, or improved fish passage for steelhead provide compelling arguments that species will respond favorably to those improvements. Nonetheless, litigants have made equally compelling court arguments that imply that until the agency can "show me the data" that those habitat improvements indeed benefitted species, that those actions are not scientifically justified. The 1982 Planning Regulations are explicit about the need for species monitoring as is the 2012 Planning Rule. We suggest the lack of the species specific response monitoring items makes both Forests vulnerable to legal challenge. The following are some examples that could meet that planning regulation requirement:

- Forage improvement treatments – were post-burn pellet groups or ungulate utilization data collected to document increased use?

- Road restoration/culvert replacement projects – did electro-fishing show improved fish distribution?

- Silvicultural treatments to restore natural forest structures – did focused neotropical migrant bird point counts show a change in passerine species composition consistent with the intended result?

- IDFG wildlife biologists gathered body condition data on adult cow elk during recent capture operations in areas adjacent to the project area. Information collected during those operations indicated elk are in good to very good condition (Hickey pers. comm.). Several variables influence body condition in maternal cow elk. However, this information may suggest elk populations in the research area are not pushing the limits of nutritional carrying capacity.

- Also, lack of fire and timber harvest may be compressing elk calving into smaller, more confined habitats which influences the potential predation impact from black bears (Hickey pers. comm.)Disturbances that enhance and increase elk calving habitat may act to increase calf recruitment.

5.1.3 Improved Resilience to Unplanned Disturbances

Projects across Region One have consistently stressed the need to make forests more resilient to disturbances including wildfire, insects, and disease. While the science clearly concludes that treatments are needed to improve resiliency, monitoring has generally failed to show that such actions improve forest resiliency. To demonstrate that treatments do improve resiliency, more monitoring is needed. Key monitoring items missing in the current monitoring programs are wildfire severity including unburned islands within fire perimeters, pre-burned forest structural characteristics including fuel loads, and project-wide ADS surveys.

5.1.4 Non-native Invasive Weeds

Weeds are difficult to treat in steep, backcountry situations where treatments options are generally limited to prevention (e.g. use of weed seed free hay), biological controls, or spot spraying to contain new invasions. Consequently, whereas existing backcountry weed invasions may be having minimal effects on ungulate forage availability, especially considering the current low elk densities and forage needs, those weeds may be a "time bomb" that could seriously de-rail future efforts to restore the elk herd and enhance population of other ungulates.

5.1.5 Fisheries and Watershed Response to Restoration Treatments

Again, the CFLRP projects are well-designed to restore fisheries and watershed problems. Implementation monitoring will clearly show that the work will get done as designed. Unfortunately, monitoring will not demonstrate that those actions are having the desired results. For instance, there is no monitoring to show that improved road surface drainage resulted in reduced in-stream sediment, or if over-sized culverts had reduced levels of debris blockages. Nor is there any monitoring to show that improved culverts had reduced flow velocities for fish passage.

6. INDICATOR MEASURES BASED ON HISTORIC RANGE OF VARIATION

The CBC has been working collaboratively with the USFS to setup the spatially explicit/spatially interactive landscape model SIMPPLLE. The CBC has hosted a series of seven meetings to formulate a crosswalk to assign the landscape with SIMPPLLE's required attributes from a variety of spatial datasets, and to calibrate the model. This process—meeting, reviewing logic, highlighting areas to adjust, making adjustments, and reviewing test simulations calibrates SIMPPLLE for the unique successional and disturbance processes in the project area. Once this process is complete, indicator measures will be developed based on the HRV results. This effort has been funded by the National Forest Foundation.

7. RECOMMENDATIONS FOR CBC-FUNDED MONITORING PROJECTS

ERG has developed monitoring recommendations based on the data received and the analysis described in previous sections of this report; the CBC issue areas of interest as described in the monitoring Request for Proposals (2012); the Best Available Scientific Information (BASI) policy (FSH 1909.12); the USFS definition of monitoring (noted below), and the monitoring requirements for CFLRP projects which states "Sec. 4003 (g) (4) requires multiparty monitoring for at least 15 years after implementation commences to assess the ecological, social, and economic effects. Monitoring will need to follow established protocols where they exist. Reportable ecological, social, and economic measures needed for the five-year reports required in Sec. 4003 (h) are being identified, but will rely on existing reportable measures to the extent practical." The USFS Monitoring Handbook (FSH 1909.12) defines monitoring (36 CFR 219.5) as:

> *Monitoring*. Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness (§ 219.12). The monitoring program includes plan-level and broader-scale monitoring. The plan-level monitoring program is informed by the assessment phase; developed during plan development, plan amendment, or plan revision; and implemented after plan decision. The regional forester develops broader-scale monitoring strategies. Biennial monitoring evaluation reports document whether a change to the plan or change to the monitoring program is warranted based on new information, whether a new assessment may be needed, or whether there is no need for change at that time. (36 CFR 219.5)

There is little ongoing monitoring that demonstrates that actions taken to improve the resiliency of forests to disturbances are having the desired effect. This section provides options for resolving that deficiency by type of activity. Monitoring must be part of any restoration project or program. Schultz et al. (2012) in their recent paper in the *Journal of Wildlife Management*[3] describe many key Planning Rule policy implications for monitoring but perhaps sum it up best with the statement:

> Because restoration requires: 1) an assessment of the current system state relative to desired future conditions; 2) measurement of the system subsequent to management activities; and 3) a comparison of the observed to the desired state, restoration is critically dependent on monitoring.

There are two types of monitoring suggested; 1) monitoring of current and proposed projects to address the monitoring requirements for the CFLRP, and 2) monitoring to address related ecological information where there are data gaps or weaknesses in the existing data described in this section. The monitoring proposed should be considered as a suite of monitoring activities that can be added to or subtracted from based on CFLRP priorities and available budgets.

[3] Wildlife Conservation Planning under the United States Forest Service's 2012 Planning Rule.

Monitoring recommendations for CFLRP treatment areas have been prioritized as shown in Table 13 and are based on treatment objectives, monitoring gaps identified, and the ability to monitor treatment effectiveness. Number 1 represents the highest level priority and number 9 represents the lowest level priority. ERG proposes to work with the USFS and CBC to develop the specific plot locations and intensity of monitoring.

Table 13 Monitoring recommendations priority rankings

Selway-Middle Fork CFLRP Treatment Areas	Emphasis Area #1 – Soil Productivity	Emphasis Area #2 – Roads	Emphasis Area #3 – Diversity of Vegetative Communities	Emphasis Area #4 – Invasive Species	Emphasis Area #5 – Fish and Wildlife	Emphasis Area #6 – Water Quality
Fenn Face Prescribed Fire – Implementation	6		6	4	2	
Smith Creek Road Decommissioning	N/A	3	N/A	5	N/A	3
Interface Fuels Phase 2	2		2	2	4	
Selway Winter Range Improvement	5		5	3	3	
South Fork/West Fork Clear Creek Road Decommissioning	N/A	1	N/A	6	N/A	1
Clear Creek Culvert Replacements	N/A	2	N/A	9	N/A	2
Lodge Point Project	3		3	7	5	
Clear Creek Integrated Restoration Project	1		1	1	1	
Iron Mountain Vegetation Management	4		4	8	6	

7.1 POST-FIRE FORAGE RESPONSE

The response of forage plants due to fire or anthropogenic disturbance varies widely. The variables that determine forage response to fire likely include fire severity, season burned, habitat type, post-fire crown closure, and presence or vulnerability of the site to non-native invasive weeds. Monitoring activities that would address identified gaps include the following.

7.1.1 Pre-disturbance Control Monitoring for Forage Production

- Canopy coverage or other relevant measurement of grass, forb, or shrub by species on the plot to be eventually compared against plants selected by Wisdom and Rowland's "tame elk"
- Habitat type
- Crown closure measured by spherical densitometer
- Clipped dry weight by species
- Invasive weeds to be included if present

7.1.2 Post-Disturbance Monitoring for Forage Production

- Create a forage response curve by repeat clipping performed for several years until forage has bottomed out
- Canopy coverage or other relevant measurement of grass, forb, or shrub by species on the plot
- Habitat type
- Crown closure measured by spherical densitometer
- Clipped dry weight by species in pounds per acre
- Invasive weeds to be included if present
- If disturbance was the result of prescribed fire or wildfire, measured fire severity including low, mixed, high severity, and a charred category if tree cambium was consumed
- If disturbance was the result of logging, slashing, or pre-commercial thinning, include treatment prescription

7.1.2.1 *Recommended Sampling Intensity*

Monitoring and sampling for pre- and post-disturbance forage production can be conducted at various levels of intensity. Examples are provided below.

High intensity Sampling

- All six habitat groups
- All commonly occurring habitat types
- Control and all severity classes of disturbance
- All four crown closure categories

Moderate Intensity Sampling

- All six habitat groups
- Only the most common habitat type in the six habitat groups
- Control and all four severity classes of disturbance
- All four crown closure categories

Low Intensity Sampling

- Four habitat groups (dry/warm through cool/moist, ignore cool/dry and extremely cold as likely having poor forage potential)
- Only the most common habitat type in the four habitat groups
- Control and all four severity classes of disturbance
- All four crown closure categories

7.2 CHANGES IN COVERAGE OF BACKCOUNTRY WEEDS

The effectiveness of treatments applied should be monitored. Answering the following questions would also help address the severity of the concern, and identify actions needed to resolve or minimize adverse future effects of invasive weeds:

- What are the coverage and cover classes of existing weeds by species?
- What is the relative risk of weed invasion on adjacent sites?
- Are there biological control species present, and if so, how are they distributed?
- At what rate are individual weed species increasing in acres infested?
- How do treatments influence plant community composition?

7.3 SPECIES RESPONSE TO HABITAT IMPROVEMENTS

As discussed above, demonstrating that species actually benefitted from habitat improvement is something lacking in the current monitoring actions. Actions that would address those missing elements are discussed below by type of project activity.

7.3.1 Forage Improvement Projects –Pre-disturbance Control and Post-treatment Monitoring

- Elk pellet transects
- Forage utilization clipping transects (comparison of total production versus pounds consumed)
- Two years minimum to compare treatment results against control

7.3.2 Treatments to Improve Forest Structure for Wildlife – Control and Post-treatment Monitoring

- Project-scale neotropical migrant bird point count transects

7.3.3 Fisheries Improvement Projects – Control and Post-treatment Monitoring

- Electro-fishing stream reaches above and below treatment areas
- Standard methodology as used by collaborators

7.3.4 Treatments Designed to Improve Forest Health and Resiliency to Disturbances – Control and Post-treatment Monitoring

- Increased ADS to cover the entire project area, including an emphasis on acres impacted by insects
- Fire severity mapping
- SIMPPLE analyses to assess risks of disturbance in the next 50 years
- Changes in forest structure and species composition
- Improved diversity at appropriate scale

7.4 EFFECTS OF WATERSHED/FISHERIES IMPROVEMENT PROJECTS

Watershed/fisheries restoration work in the project area has been conducted by the Forests and Nez Perce Tribe[4]. However, there has been no monitoring work that confirmed the degree to which the improved culverts, drainage structures, and re-vegetated road surfaces have resulted in less debris-plugged culverts, less sediment entering streams, or reduced velocities within culverts, or – most importantly – the degree to which fish are using restored or improved passages. The following recommended activities would address those discrepancies. Methodology should be determined with input from Forest engineering and fisheries staff.

7.4.1 Culvert replacement – Control and Post-project Monitoring

For culvert replacement improvement projects, conduct post-runoff season road surveys to identify debris jams in all 239 stream crossings in the project area. Determine the difference between degree to which debris jams occur in upgraded culverts and in original culverts.

7.4.2 Road Decommissioning – Post-project Monitoring

For road decommissioning improvement projects, monitor the effectiveness of invasive weed control measures through tracking presence, coverage, and potential for further spread of weeds. Determine the effectiveness of travel plan changes, including the closing of the area to motor vehicles. Measure reduction of sedimentation and the degree to which cobbles are embedded.

[4] See http://www.fs.fed.us/restoration/Watershed_Restoration/success/NezPerceNFRoadDecom.shtml

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