

TERRESTRIAL ECOSYSTEMS

Historical Reference Conditions

Introduction

This appendix provides background and details on the process used to determine historical reference conditions for the terrestrial vegetation ecosystem characteristics of the Flathead National Forest (Flathead NF) as outlined in the assessment. Reference conditions are also sometimes referred to as the historical range of variability (HRV), or natural range of variation (NRV). All these terms refer to the variation in spatial, structural, and compositional characteristics of ecosystems over time, as affected by natural climate fluctuations and disturbances existing prior to modern-day human impacts. Within this appendix and in the assessment, the acronym HRV will be used to identify this concept and the analysis conducted on the Flathead NF.

HRV reflects the dynamic nature of the ecosystem over space and time, reflecting the full range of components and processes within a natural ecosystem. This range of variation denotes the fluctuating vegetation conditions under which the native plant and animal species have evolved and persisted. Variability in forests and landscape patterns is the rule, not the exception. As patterns change, different suites of species are favored. It is likely that this wide natural variation is part of a long-term survival strategy for terrestrial and associated aquatic species (Swanson and other 1994, and references therein). Variable area, connectivity, and pattern of patch types afford periods of plenty and need, boom and bust, which are advantageous to the adaptation and survival of native species in the long term, so long as habitats do not become overly fragmented or isolated (Hessburg et al 1999a).

The primary data source for evaluation of HRV of forest vegetation for this assessment is a historical range of variability analysis conducted in 1999 on the Flathead National Forest, which is described in detail in this appendix. A secondary source used mainly for assessing historical old growth conditions is the analysis documented in the Final Environmental Impact Statement (FEIS) for the Forest Plan Amendment 21 (A21), Management Direction Related to Old Growth Forests (USDA 1998). A21 documentation and information on the method used to determine historical old growth conditions can be found in the assessment record.

Application of historical range of variability concept

In this assessment and the forest plan revision process, HRV is used to provide a context for evaluating current ecosystem conditions and identifying major departures and associated risks to ecosystem components. The fields of conservation biology and landscape ecology provide a strong rationale for managing ecosystems within their natural (e.g. historical) range of variation. The assumption is that doing so will sustain native species and biodiversity; maintain ecosystem productivity; and provide for the long term sustainability of all ecosystem values and desired services (Duncan et al 2010, Landres et al 1999, Swanson et al 1994, Haufler 1999, Morgan et al 1994). The better we understand native ecosystem patterns and the processes that have and continue to shape them, the better we are able to develop plan components (such as desired conditions and management objectives) that cooperate with, rather than run contrary to, these patterns and processes.

This being said, it should not be automatically assumed that the HRV will equal the condition which we can or desire to achieve on the Flathead NF. Attempts to precisely recreate some past resource condition are not necessarily wise or even feasible in some situations (Hessburg et al 1999a, Swanson et al 1994, Reinhardt 2008, Duncan et al 2010). Humans and their modern influences, needs and desires are integral to ecosystems and should not be ignored. Future influences, including climate change, must be integrated as well. In the context of the forest plan revision process, input from a variety of sources, including the best and most recently available science

as well as members of the public, will be incorporated into the development of desired conditions for resources of the Flathead NF.

The HRV for the Flathead NF will generally be a reference to conditions that are assumed to have existed prior to the mid-1800s, before the rapid expansion and settlement of the area by European-origin Americans. The HRV does not imply an absence of human presence. It incorporates influences Native Americans had on ecosystem conditions. From the standpoint of vegetation impacts, this would largely have been the deliberate setting of fires for a variety of reasons, such as improving forage for horses and game, and clearing areas for ease of travel or hunting. On the Flathead NF, this use of fire is believed to have been most prevalent within the Flathead River valley bottom, the main Swan River valley, and portions of the North Fork and South Fork Flathead River valleys. Because of the methodology used for the Flathead NF HRV analysis (described below), the historical condition may also reflect some degree of modern-day impacts to forests in the easily accessible, lower elevation areas closest to the main river valleys, including some limited timber harvest and fire suppression activities.

Flathead National Forest HRV Analysis (Flathead NF HRV analysis)

In 1997, Flathead NF staff outlined a plan to address a long-recognized need to better understand landscape-scale dynamics of vegetation composition, structure and patterns as affected by disturbance regimes, particularly for the forest types and landscapes of the Flathead NF. Compared to the dry forest types (e.g. ponderosa pine types), there was a notable lack of information on the landscape dynamics surrounding these cool and cold, moist mixed species forest types that make up the vast majority of the Flathead National Forest. This hampered the ability of the Flathead NF to understand the overall ecosystem integrity, identify risks to sustaining desired ecosystem conditions, and gain support for restoration needs.

Identification of vegetation reference conditions (e.g., HRV) was a key component of this plan. This information was understood to be needed in order to better describe current ecosystem health and identify desired vegetation conditions for incorporation into forest and project level planning and decision-making. The Flathead NF researched the scientific literature and methods of other Forests in evaluating landscape dynamics and reference vegetation conditions. There were numerous and disparate methods, ranging from complicated computer simulation models, to intensive interpretation of historical and current aerial photography, to detailed dendrochronology (tree ring analysis) efforts, to compilation of various forms of written historical records, to paleoecological studies of pollen cores. All of these methods have their strengths and limitations. No single approach perfectly characterizes how and why vegetation patterns and disturbances have changed over time. The Flathead NF staff concluded that the methodology used for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) would best provide the desired information, and was a scientifically sound, peer reviewed method that would meet the needs of the Flathead NF. It had added benefits in that it would enable a clear connection to the findings and conclusions of the the interior Columbia River Basin landscape assessment.

The Flathead NF and the Northern Region Ecosystem Assessment and Planning staff employed the expertise of the ICBEMP scientists at the Pacific Northwest (PNW) Experiment Station (Wenatchee Lab) to conduct a forest-wide analysis of reference conditions for the Flathead NF. The analysis was designed to provide an estimate of current and historical range of variation for a variety of vegetation characteristics and an evaluation of differences (departure) between current and historical conditions. This project was called the “Flathead Basin Mid-Scale Historic Range of Variability Vegetation Analysis”, hereafter referred to as the Flathead NF HRV analysis, and was completed in 1999. Following is a summary of background information and elements of this analysis.

Background

The Pacific Northwest has long been involved in controversy over management of natural resources and concerns related to ecosystem conditions, such as wide-spread fire or insect mortality and changes in habitat for species associated with old growth. In response to this, in July 1993 President Clinton directed the Forest Service to

“develop a scientifically sound and ecosystem-based strategy” for management of publically owned forests east of the Cascades. The Forest Service (FS), along with the Bureau of Land Management (BLM), established the Interior Columbia Basin Ecosystem Management Project (ICBEMP) in January 1994. The overall assignment of the ICBEMP Science Integration Team (SIT) was to develop a scientific framework, to conduct detailed functional assessments, and to generate an integrated assessment. Several publications were produced, which documented results from this effort. A Draft Environmental Impact Statement (DEIS) and supplemental DEIS were also produced (ICBEMP 2000). The DEIS outlined broad-scale ecosystem-based management alternatives for FS and BLM lands in the interior Columbia Basin. No Final EIS or decision was ever completed.

An assessment of natural (or historical) variation in the composition, structure and pattern of forests was necessary to evaluate the status of current ecosystem conditions across the Columbia Basin. In an ideal situation, to determine a historical range you would sample vegetation conditions within an area at many different points in time over a relatively long period of similar climatic regime. In this way variation due to the natural stochasticity of environments, disturbance regimes and climate regimes could be captured and characterized. But this is essentially not feasible, as adequate historical data sets are not available. For the ICBEMP, a peer-reviewed methodology was developed by ecologists of the Science Integration Team (SIT), using empirical data (in this case aerial photography) to estimate natural variation in vegetation conditions. The SIT approach samples current and recent historical vegetation conditions within a sample set of watersheds of similar biophysical and climatic regimes, with the premise that differences in space are equivalent to differences in time. The sample would capture different stages and patterns of vegetation progression as it is influenced by disturbance history, site factors, climatic regimes, and other variables that are typical for that ecological site. Inferences can then be made regarding variation in spatial pattern that might occur at a single location over time. This “space-for-time” substitution in sampling was the methodology used by the SIT to conduct the Flathead NF HRV analysis.

Process

Detailed description of the HRV analysis methodology can be found in the publication by Hessburg and others (1999c), pages 5 through 72. It will be very briefly described in this section.

One of the first steps in conducting the HRV analysis for the ICBEMP involved grouping subwatersheds (6th field HUCs) across the Columbia Basin by similarity of area in habitat type groups (PVT), landtype associations and climatic variables (precipitation, temperature) (Hessburg et al 1999a, 2000a). These groups are referred to as ecological subregions (ESRs). A randomly selected set of subwatersheds within each of these ESRs were sampled, which included interpretation of historical (for the Flathead NF, 1934-1954) and current (for the Flathead NF, 1992-1994) aerial photography. Individual patches or stands were attributed for cover type, structure class, and other characteristics. This information was used to build continuous historical and current vegetation maps for the subwatersheds. Statistical techniques were used to estimate historical variation and current conditions in vegetation composition, structure and patterns for each ESR. Departures between historical and current conditions were evaluated to provide an estimate of trends and their significance. Analysis results for the ESRs were pooled up into broad “Ecological Reporting Units” (ERUs) for purposes of reporting trends and changes in vegetation conditions, and interpretation of the findings. ERUs are large geographic areas similar to provinces or subregions following the national hierarchical framework of ecological units (Cleland et al 1997, McNab 2005, ECOMAP 2007). The Flathead NF is in the Northern Glaciated Mountains ERU which closely matches the Northern Rocky Mountain Province boundaries.

Due to the large size of ERUs it was difficult to apply results reported in the ICBEMP assessment to the specific landscapes of the Flathead NF, or to determine if conclusions were applicable to Flathead NF sub-basins or subwatersheds. Therefore, for the Flathead NF HRV analysis, 37 additional randomly selected subwatersheds were sampled across the Flathead NF (added to the four subwatersheds that were already sampled for the ICBEMP). This provided the finer-scale data for interpreting conditions specifically for the Flathead NF. A

subwatershed on the Flathead NF averages about 15,000 acres in size, ranging from about 6000 to 40,000 acres. The historical and current vegetation in these subwatersheds was attributed and the statistical analysis conducted using the same methods described in the previous paragraph for the ICBEMP.

As with all attempts to estimate historical conditions, there are recognized limitations of this space-for-time method. One is the inadequate time depth of available empirical data to derive a true historical estimation, due to the lack of historical aerial photography prior to the 1920s. This limitation was understood and the SIT assumed that considerably change in vegetation conditions may have taken place in some subwatersheds before the time of the historical starting point. They caution that the results of such an analysis should not be interpreted as effects in comparison to a pristine pre-European settlement condition or even as a “natural” condition or range. The results are useful in that they provide a statistically sound, quantitative estimate of direction, rate and partial magnitude of change over recent historical time. They help us to gain greater understanding of the native ecosystem diversity, and provide valuable insight into trends that can be expected both temporally and spatially (Hessburg et al 1999c).

Ecological Sub-regions

As discussed above, ESRs are groupings of subwatersheds based on biophysical similarities, such as geology, landforms, potential vegetation features, and climate attributes. This provided the necessary context for evaluating and comparing ecological conditions across the landscape in a meaningful way, reflecting the inherent environmental variation. In a publication by Hessburg and others (2000a), the development and characteristics of the 53 ESRs identified for the interior Columbia Basin are described in detail. Six ESRs occur on the Flathead NF; however the vast majority (92%) of the Flathead NF is within only four of these ESRs – ESR 3, 17, 19 and 20. The Flathead NF HRV analysis focused on these four ESRs and results are reported out for each. Figure B-1 provides a map of the four ESRs and the six Geographic Areas (GAs) on the Flathead NF. The diagram below shows the general biophysical relationship between the ESRs and table B-1 displays acres and other information on the ESRs.

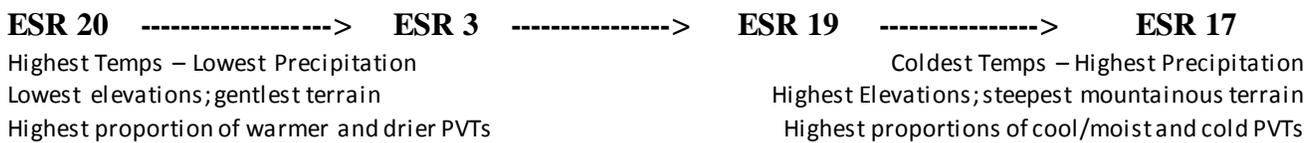


Figure B-1. Ecological Subregions (ESRs) and Geographic Areas (GAs) on the Flathead NF.

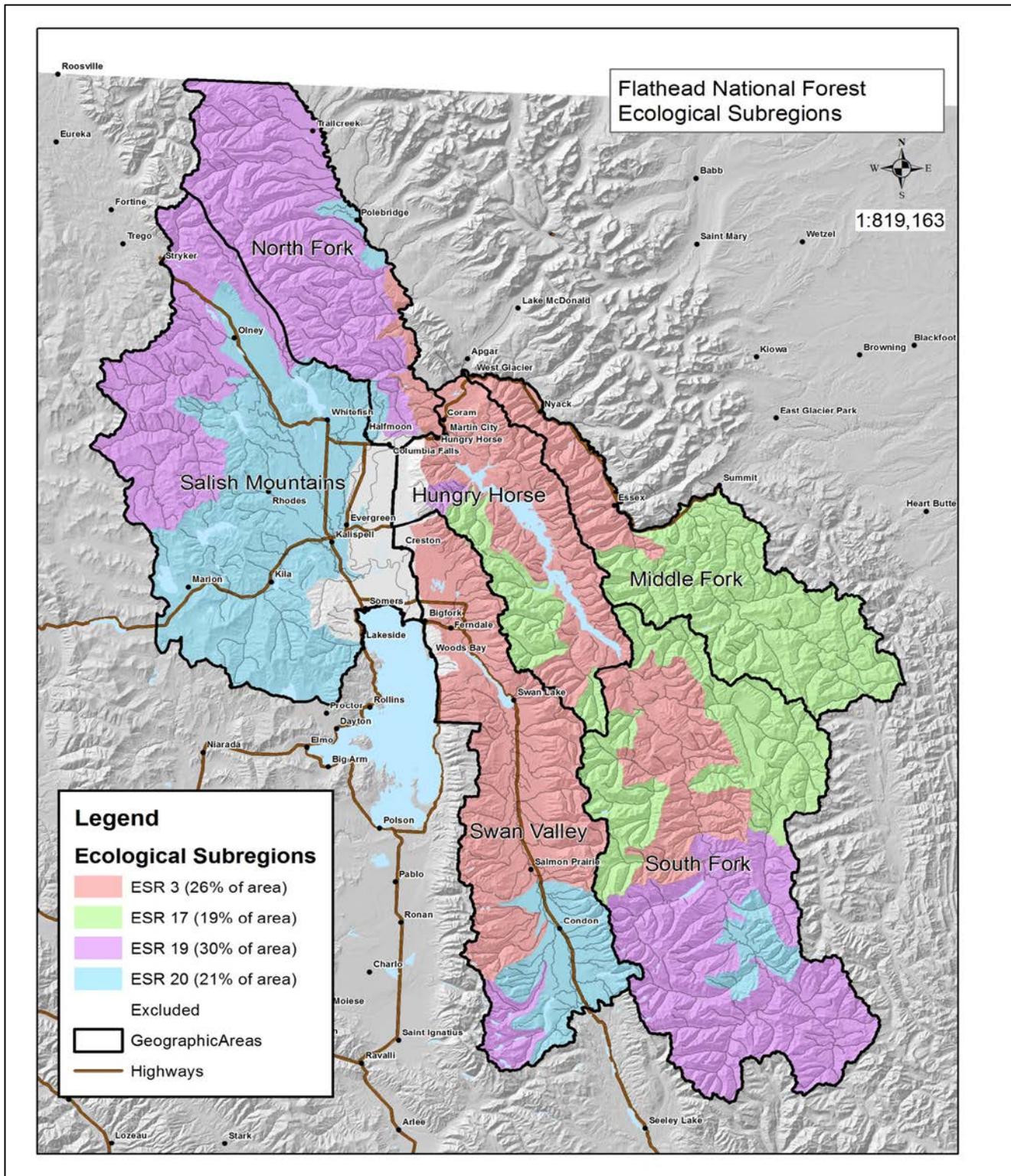


Table B-1. Acres and percent of total Flathead NF area within each Ecological Subregion, all land ownerships.

Ecological Subregion	Total Acres	Percent of Total Planning Area ¹	Percent in National Forest Ownership	Comments
3	855,291	26%	80%	Comprises the majority (nearly 70%) of the Hungry Horse and Swan Valley GAs, and portions of Middle Fork and South Fork GA. Especially prevalent in the somewhat warmer regions of these GAs.
17	612,958	19%	100%	Concentrated in the cool/cold and moist regions of the South Fork GA and the upper reaches of the Middle Fork Flathead River, in the Middle Fork GA.
19	977,536	30%	86%	Covers nearly all of the North Fork GA, west half of Salish Mountains GA, and the south half of South Fork GA. Five subwatersheds at the south end of the South Fork GA were originally in ESR 1, making up 4% of the Flathead NF. Since this was such a small proportion of the forest and in a remote portion of the wilderness, it was combined with the adjacent ESR 19 for purposes of the HRV analysis.
20	668,821	21%	36%	Occurs in general in the warmer and lower elevation regions of the forest, which is primarily the east half of Salish Mountains GA. A smaller area of ESR 20 lies at the far south end of the Swan Valley GA.
Excluded area	139,665	4%	15%	This area is the main Flathead River valley bottom, including small subwatersheds adjacent to the Flathead River. It was originally ESR 2, but it comprises a very small portion of the Forest and is mostly private lands. Therefore, it was not sampled or analyzed in the Flathead NF HRV analysis.
Total	3,254,271	100		

Potential Vegetation Types (PVT)

The Flathead NF HRV Analysis reported current and historical conditions across each ESR as a whole and by potential vegetation groups within each ESR. These PVT groups were developed by the scientists conducting the Interior Columbia Basin analysis to better frame their discussion of vegetation change and provide a basis to compare changes occurring in similar PVTs in differing geographic locations. See Hessburg et al 1999 (page 3) for details on how these PVTs were developed. These same PVT groups are used in the Flathead NF HRV Analysis for describing vegetation changes on the Flathead NF. Table B-2 lists the PVTs and proportion within each ESR on the Flathead NF. Table B-3 shows the crosswalk of the Flathead NF HRV PVTs to the PVT groups commonly used by the Forest Service in Region 1 and referenced in the Flathead NF forest plan assessment (USDA 2004).

Table B-2. Flathead NF HRV analysis potential vegetation groups by each Ecological Subregion

Flathead NF HRV PVT group ^a	ESR 3		ESR 17		ESR 19		ESR 20		exclusion	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
hc-abla/pien	59704	7.0	117757	19.2	159364	16.3	14946	2.2	364	0.3
cm-abla/pien	422264	49.4	277265	45.2	475211	48.6	202168	30.2	12569	9.0
cm-psme/abgr	84039	9.8	143	0.0	6577	0.7	35808	5.4	15995	11.5
cm-thpl/tshe	70445	8.2	269	0.0	25353	2.6	21012	3.1	426	0.3
wd-abla/pien	81999	9.6	153819	25.1	179322	18.3	54612	8.2	1349	1.0
wd-psme/abgr	71842	8.4	25084	4.1	81414	8.3	247749	37.0	33076	23.7
Grass, shrub, hrdwd, nf	64997	7.6	38621	6.3	50296	5.1	92525	13.8	74433	53.3

¹ The “planning area” refers to all land within the boundaries of the FNF Geographic Areas (see figure 1)

Flathead NF HRV PVT group ^a	ESR 3		ESR 17		ESR 19		ESR 20		exclusion	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Total Acres	855,291	0	612,958	0	977,536	0	668,821	0	139,665	0

^a HRV PVT group abbreviations:

wd-psme/abgr = warm dry Douglas-fir/Grand fir
 wd-abla/pien = warm dry subalpine fir/spruce
 cm-thpl/tshe = cool moist western red cedar/western hemlock
 cm-abla/pien = cool moist subalpine fir/spruce
 hc-abla/pien = harsh cold subalpine fir/spruce
 pico = lodgepole pine
 tsme = Mountain hemlock
 nf = non forest types

Table B-3. Crosswalk between the PVTs used in the Flathead NF Forest Plan Assessment and the Flathead NF HRV Analysis.

PVT Description (R1 PVTs 2004) ^a	PVT code	Flathead NF Forest Plan Assessment PVT Groups	Flathead NF HRV PVT
Abies grandis (Grand Fir) moist type 2	abgr2	warm, dry	wd-psme/abgr
Pinus ponderosa (Ponderosa Pine) type	pipo	warm, dry	wd-psme/abgr
Pseudotsuga menziesii (Douglas-fir) warm dry type 1	psme1	warm, dry	wd-psme/abgr
Pseudotsuga menziesii (Douglas-fir) moist type 2	psme2	warm, dry	wd-psme/abgr
Pseudotsuga menziesii (Douglas-fir) cool dry type 3	psme3	warm, dry	wd-psme/abgr
Tsuga heterophylla (western Hemlock) type	tshe	warm, moist	cm-thpl/tshe
Thuja plicata (Western Red Cedar) moist type 2	thpl2	warm, moist	cm-thpl/tshe
Abies grandis (Grand Fir) wet type 3	abgr3	warm, moist	cm-psme/abgr
Pinus contorta (Lodgepole Pine) type	pico	cool, mod. dry	pico (wd-abla/pien) ^b
Abies lasiocarpa (Subalpine Fir) dry type 3	abla3	cool, mod. dry	wd-abla/pien
Abies lasiocarpa (Subalpine Fir) moist type 2	abla2	cool, moist	cm-abla/pien
Abies lasiocarpa (Subalpine Fir) moist type 2	abla2	cool, moist	cm-abla/pien
Picea (Spruce) species type	picea	cool, moist	cm-abla/pien
Abies lasiocarpa (Subalpine Fir) wet type 1	abla1	cool, wet	cm-abla/pien
Thuja plicata (Western Red Cedar) wet type 1	thpl1	cool, wet	cm-thpl/tshe
Larix laricina (Subalpine Larch) type	laly	cold	hc-abla/pien
Abies lasiocarpa (Subalpine Fir) cold type 4	abla4	cold	hc-abla/pien
Pinus albicaulis (Whitebark Pine) type	pial	cold	hc-abla/pien
Tsuga mertensiana (Mtn. Hemlock) with WBP in MT	tsme2	cold	tsme (hc-abla/pien) ^b
Populus tremuloides (Aspen) and upland deciduous type	poptre	NonFor-Decid	hdwd
Riparian deciduous forest type	ripdecid	NonFor-Decid	hdwd
Alpine and alpine grassland type	alpine	NonFor-Grass	grass/shrub
Dry species grassland type	drygrass	NonFor-Grass	grass/shrub
Festuca idahoensis (Idaho Fescue) grassland type	fesida	NonFor-Grass	grass/shrub
Festuca scabrella (Rough Fescue) grassland type	fessca	NonFor-Grass	grass/shrub
Mesic species shrubland type	mesicshrub	NonFor-Shrub	grass/shrub
Rock, talus/scree, barren areas, and mines	sparseveg	NonFor-Rock/Barren	nf
Water, lakes, reservoirs, and wide rivers	water	NonFor-Water	nf
Agricultural lands	agriculture	NonFor-Developed	nf
Urbanized areas (cities and towns)	urban	NonFor-Developed	nf

^a (USDA 2004) or also see assessment record for information on this PVT data layer and the habitat types within each PVT group.

^b The pico and tsme pvt's were evaluated individually in the Flathead NF HRV analysis, but because they cover such a very small acreage on the Flathead NF, they are included into the wd-abla/pien and hc-abla/pien PVT groups respectively for interpretation in this appendix.

Results

This next section of the appendix contains a summary and interpretation of some of the results of the Flathead NF HRV analysis. It begins by providing information to aid in understanding and interpreting the information in the HRV results tables. Then a narrative summary of the HRV findings and interpretation is provided for each ESR. Lastly, tables and charts displaying some of the quantified results of the analysis are included for the forest as a whole and for each of the four ESRs. These tables are only a portion of all the information that is available. A list of other vegetation attributes that were analyzed in the Flathead NF HRV analysis is provided at the end of this section. The assessment record contains the tables that quantify HRV results of all analyzed vegetation attributes.

Terms, abbreviations, definitions, other information to assist in interpretation.

Data source:

Unless otherwise specifically noted, all values in the tables and charts are from the Flathead NF HRV analysis, using the process and methodology described above. Current mean percent for cover type and structure classes as determined from VMap is also displayed in the tables. VMap and the Flathead NF HRV analysis use different methods and data sources to determine current vegetation condition, and evaluating their similarities and differences is useful when interpreting the HRV analysis results. Details on VMap development and attributes are found in the assessment record.

Statistical Analysis and Interpretation:

Change from historical to current conditions is an estimate of the mean difference between conditions, not as the percentage of change from historical conditions, to avoid the bias of establishing the historical conditions as an essential reference (Hessburg et al 1999c, pg 64). The mean or median value for the attribute was estimated by using methods for simple random samples, with subwatersheds as the sample units. *Statistically significant* change was determined by examining the 80% confidence interval around the mean difference for the ESR, which was estimated as the simple random mean from pairwise comparisons of historical and current subwatersheds. Most of the tables provide a range in variation at both 80% and 100% range of the sample median for the attribute of interest (e.g. reference variation RV). The 80% range provides a more meaningful measure of recent historical variation by excluding the extreme observations that might result from either unique environments or from rare events.

In addition to identification of statistically significant changes, changes that were considered *ecologically significant* were also determined. These are changes that may be unique or abnormal from an ecological perspective and deserving of special attention. Detailed discussion of the statistical analysis methodology used to determine ecological significance and all other metrics for the HRV analysis is found in the publication by Hessburg and others (1999c), pages 64-69.

Because most data distributions of current and historical vegetation conditions are highly skewed, the sample median value is a more accurate reflection of central tendency than the mean, and the median was used to calculate the 80% and 100% range of variation. An asterisk (*) within a table column indicates that the current or historical value for the metric (e.g. the change from historical to current cover type or structure class percent) is statistically significant and outside the estimated reference variation which is nominally the sample median 80% range of the metric.

Although mentioned above in the “Process” section, it deserves repeating that observations of significant change, or its lack, in this analysis should not be interpreted as effects from a pristine pre-European settlement condition. The objective of the analysis was to provide previously unavailable quantitative estimates of direction, rate and partial magnitude of change (Hessburg et al 1999c, pages 212-213), and contribute valuable insights into recent

trends that can be expected both temporally and spatially. Whether current or historical conditions of any subwatershed in the sample are “natural” is unknown.

The importance of scale:

The sample unit for the Flathead NF HRV analysis was the subwatershed, and the range in variation within the tables represent variation at this subwatershed scale (6th field HUCs). At this scale the natural or historical range of variation for a vegetation condition can be quite wide. There is a lot of “wobble” at this scale in the statistical evaluation. Large, stand replacing and mixed severity fires at relatively infrequent intervals are the predominant fire regimes, so it is not surprising that the natural range of variation in vegetation conditions, particularly forest structure, would be quite wide. If a range were to be determined at the level of the entire forest, it would probably be narrower, due to the effects of scale. A range of variation at the forest level was not explicitly provided by the scientists who conducted the Flathead NF HRV analysis. The HRV analysis noted many statistically significant changes in vegetation conditions (as indicated by the asterixes in the tables), but relatively few ecologically significant changes.

Tree size classes:

- Seedlings/saplings - <5.0” dbh
- Poles – 5 to 8.9” dbh
- Small trees – 9 to 15.9” dbh
- Medium trees – 16 to 25.0” dbh
- Large trees - > 25” dbh

(Note: VMap size classes are similar but are labeled differently and medium and large tree classes are combined into one)

Cover type abbreviations:

- PIPO - ponderosa pine
- LAOC - western larch
- PIMO - western white pine
- PSME - Douglas-fir
- TSME - mountain hemlock
- Other - nonforest, nonrange and other anthropogenic types (e.g. agriculture)
- PICO - lodgepole pine
- PIAL (=PIAL/LALY) - whitebark pine/subalpine larch
- ABLA2 (=ABLA2/PIEN)- subalpine fir/Engelmann spruce
- TSHE (=TSHE/THPL) - western hemlock/western redcedar
- ABGR - grand fir

B-4. Structural stage abbreviations and definitions²:

Structural Class	Definition	Description
Stand Initiation (si)	Openings, where growing space is reoccupied, typically by early successional ^a species, following a stand-replacing disturbance (e.g. fire, harvest).	1 canopy layer, either broken or continuous; 1 cohort ^b of seedling or sapling trees; grasses, forbs, shrubs may be present with early successional tree species
Stem Exclusion-open canopy (seoc)	Forested areas where crowns are open growing, canopy is broken/discontinuous (<70% crown cover). New trees have difficulty successfully establishing, primarily due to moisture limitations and competition with other trees; growing space is fully occupied.	1 broken canopy layer, 1 cohort, small, medium or large tree sizes. The lower percent of canopy closure allows a moderate amount of sunlight to reach the forest floor; Grasses, forbs shrubs present. Conditions may be maintained by frequent underburning or other disturbances that remove only some of the trees.

² Adapted from Hessburg, Paul F. et al. "Historical and Current Forest and Range Landscapes in the Interior Columbia River Basin and Portions of the Klamath and Great Basins. Part I: Linking Vegetation Patterns and Landscape Vulnerability to Potential Insect and Pathogen Disturbances." Columbia Basin Ecosystem Management Project, USDA, Forest Service, PNW Research Station.

Structural Class	Definition	Description
Stem Exclusion-closed canopy (secc)	Forest areas with continuous closed canopy conditions and tree crowns touching/intertwined (>70% crown cover). New trees have difficulty establishing, primarily due to light limitations and competition with other trees; growing space is fully occupied.	1 or more canopy layers; 1 cohort; small, medium or large tree sizes. Lower canopy layers if present are same age as upper layers. Grasses, forbs, shrubs present with shade-tolerant species dominating.
Understory Reinitiation (ur)	Overstory trees grow older and trees begin to appear as an established layer in the understory, primarily because of mortality in the overstory. More light able to reach the forest floor, allowing establishment of new trees and greater growth on already existing understory trees. Overstory typically a shade-intolerant early seral tree species; understory more shade-tolerant species.	2 or more canopy layers; 2 cohorts; small, medium or large trees in overstory, less dense than stem exclusion but still substantial crown cover (>60%). Seedling/sapling trees in understory. This condition may be created and maintained by partial/continual mortality in overstory tree layers (e.g. insect, disease, suppression, low intensity burn, selective harvest).
Young forest multi-story (yfms)	Several age (~size) groups of trees are established and stands are characterized by diverse horizontal and vertical distribution of trees and sizes. The additional light reaching the forest floor allows establishment/growth of understory trees.	More than 2 canopy layers; more than 2 cohorts; trees of all size classes usually present, including seedling/saplings. The overstory canopy is more broken/discontinuous than understory reinitiation (usually <60% crown cover). This type of stand may develop over time as overstory trees die (e.g. insect, disease, mixed fire intensities, harvesting), new trees establish, and/or existing understory trees are released.
Old Forest-multi-story (ofms) Old Forest-Single story (ofss)	Forested areas where very large (>25" dbh) trees dominate the overstory (>30% crown cover) These classes are rarely found on the Flathead NF (historically or currently), due to the differences in site productivity (e.g. tree growth potential), forest types and species, and disturbance regimes on this forest compared to areas further west. Old Growth forest exists on the Flathead NF, but is defined differently and on a site specific basis. Refer to discussions on old growth in the Assessment.	OFMS have more than 2 canopy layers and characterized by diverse horizontal and vertical distributions of trees and tree sizes. More typical on moist site conditions. OFSS have 1 canopy layer, may be broken (e.g. park-like) or continuous. More typical on drier sites, under low intensity/frequent fire regimes. Multiple cohorts and tree ages are typical for both ofms and ofss.
Herb, Shrub	Grasses and shrubs dominate, crown cover of trees <10%.	
Hdwd	Hardwood (deciduous) trees dominate, consisting of birch, aspen and cottonwood on the Flathead National Forest.	
Other	Non forest – non-range and anthropogenic (human caused) cover types, including rock, water, bare ground (which could be from burning or logging, or slumps, roadcuts), agricultural lands, urban/rural development	

^a **Successional stages:** *Early successional* – “young” forests, dominated by grasses, forbs, shrubs and tree seedlings or saplings (typically <5” dbh, <35 feet tall); Forest openings. *Mid successional* – represents “middle aged” forests, dominated by trees ±40 to ±120 years old, 5-15” dbh; very diverse in size, structure, density. *Late successional* – represents the “older” forests, usually dominated by older and larger trees >130/140 years old, >15” dbh (however, smaller trees may dominate, even though they may be old, due to suppressed growth, poor sites, etc). Old growth is within the late successional stage; however not all late successional forests have the characteristics that define them as old growth.

^b Trees within a **cohort** share a common disturbance history; they are those initiated or released after a disturbance. Tree ages within a cohort may span several decades.

Abbreviations used for the Flathead NF Geographic Areas:

For efficiency sake, the six geographic areas on the Flathead NF are abbreviated in this appendix as follows:

- Hungry Horse = HH GA
- Middle Fork = MFk GA
- North Fork = NFk GA
- South Fork = SFk GA
- Salish Mountains = SMt GA
- Swan Valley = SV GA

Summary of Findings

This section summarizes some of the findings for cover type, structural stage and patch density/size for the four ESRs, as documented by the scientists that conducted the HRV analysis, and the vegetation specialist on the Flathead NF Forest Plan Revision team. The focus is primarily on the mean [average] conditions, and provides a tentative interpretation of observed changes and trends.

Common to all the ESRs is the change in current vegetation conditions that have occurred since the HRV sample period (the mid-1990s), due to recent fires, timber harvest, land conversion/development and natural forest succession. Table B-5 below summarizes known natural and human activities that would cause the most change to vegetation. These considerations will be incorporated into the discussion and interpretation for each ESR that follows.

It is also important to be aware of the history of recorded large fire events within the planning area, as this also helps in the interpretation of the HRV analysis results, the historical conditions and the trends that were detected. As the assessment notes (see “Ecosystem Drivers and Stressors” section of the assessment), there were almost no large fires in the period 1930 through 1979, following a previous 40 year period where around 35% of the planning area had been burned, a large portion in stand replacing fire events. These fires were natural occurrences and the forest conditions and patterns they created are reflected in the analysis of historical conditions.

Table B-5. Disturbances in the last 20 years within the planning area that could potentially alter vegetation conditions and results of the Flathead NF HRV

WILDFIRE (ALL LAND OWNERSHIPS) SINCE THE MID 1990s			
		% of ESR	
ESR 3	56,234 (20% of total fire acres)	6% of ESR – SFk and HH GA	
ESR 17	54,413 (20% of total fire acres)	9% of ESR – MFk and SFk GA	
ESR 19	139,018 (50% of total fire acres)	14% of ESR – NFk, SFk, and SMt GA	
ESR 20	29,149 (10% of total fire acres)	4% of ESR – SFk and SV GA	
Total acres	278,814		
TIMBER HARVEST (NF LANDS ONLY)^a			
Harvest ~1994 to 2012 (harvest since the sampling period of the HRV analysis)			
	Acres Total^b	Regeneration cuts only	Approx. % of ESR acres
ESR 3	28000	15900	3% all hvst types, 2% regen.cuts. Most (~50%) in SV GA, 1/3 in HH GA, 10% each in NFk and SFk GA.
ESR 17	4500	500	1% all hvst types, <1% regen.cuts. HH and MFk GA.
ESR 19	40500	26800	4% all hvst types, 3% regen.cuts. Most (~70%) in SMt GA. Remainder in NFk GA.
ESR 20	23100	15000	3% all hvst types, 2% regen. cuts. SMt and SV GA.
Grand Total	96100	58200	
Harvest ~1965 to 1980 (Natural succession changes - Regeneration harvest was probably classified as stand initiation for HRV analysis, but most has now transitioned into mid successional forest structures)			

	Acres total ^b	Regeneration cuts only	Approx. % of ESR acres
ESR 3	74000	56000	8% all hvst, 6% regen. Most (~50%) SV GA; 33% HH GA; 10% SFk GA.
ESR 17	8900	7900	1% all hvst, 1% regen. HH, MFk, SFk GAs.
ESR 19	69000	50000	7% all hvst, 5% regen. NFK and SMT GAs.
ESR 20	31000	20000	5% all hvst, 3% regen. Most (60%) SMT GA; 1/3 SV GA.
Grand Total	182,900	133,900	

^a No estimate of harvest or other changes on private lands is available.

^b Acres rounded to nearest hundredth.

Ecological Subregion 3

Vegetative change over past 20 years: About 6% of the area within this ESR was impacted by wildfires, located in the SFk and HH GAs. These fires burned forests of all cover and structural stages, creating large patches of forest in a grass/shrub stage, rapidly progressing to the stand initiation forest structural stage. A relatively small portion (about 2%) of the ESR has also changed to stand initiation during this time period due to timber harvesting on National Forest lands, mainly in the SV and HH GAs. Much of this total change is balanced out, however, by the progression of an estimated 6% of the forests on national forest land from the stand initiation stage (mainly as a result of earlier harvesting) into mid successional forest structures (e.g. stem exclusion) through natural succession. These successional changes occurred primarily in the SV GA, with lesser amounts in the HH GA. Therefore the distribution of the stand initiation structural stage has changed somewhat across the ESR compared to 20 years ago, but the proportion of stand initiation has probably not changed dramatically. However, private and State lands comprise about 20% of this ESR and have also likely experienced additional timber harvesting or clearing/conversion of forest lands to other uses.

Because fire created a much larger patch size of early successional forest as compared to harvest, a shift in the average size and density of the stand initiation structural patches has occurred across portions of the landscape. This change would be noticeable in ESR 3 within the HH GA, but not in the SV GA, which did not experience recent fire but has experienced substantial harvesting over the past 20 years.

Cover Type: The most significant change is the reduction of western larch from nearly 20% of the subwatershed to 13%. Most of the change from western larch was to either subalpine fir or Douglas-fir cover types. Other statistically significant changes are decreases in ponderosa pine and western white pine, and increases in grand fir, herbland and other.

Interpretation: ESR 3 covers a large part of the SV GA and generally the warmer regions of the HH and SFK GAs. Though stand replacing fires did occur periodically, these areas tended to have more mixed severity fire regimes and fires of more moderate intensity than other areas of the forest. Fires were more frequent as well, both from natural causes (lightning) and from deliberate burning by Native Americans (especially in the SV GA and lower elevations of the SFK GAs). This favored development of stand structures that were less densely stocked and included large diameter, fire tolerant overstory trees of larch, ponderosa pine, Douglas-fir and western white pine. The cover type trends are likely due mostly to reduced fire frequency, especially of the low and moderate severity fires and substantial amounts of logging activity. Natural succession would convert the areas that used to be dominated by the early successional species, especially in the overstory tree canopy layers, to later successional more shade tolerant subalpine fir and grand fir types on the moist sites and Douglas-fir on the drier sites. This shift in cover types is likely to lead to increased bark beetle/root rot activity in the highly susceptible subalpine fir, Douglas-fir and grand fir. Fire severity is likely to increase with loss of fire-resistant western larch, ponderosa pine and western white pine.

Structural Class: The current proportion of stand initiation (12%) is significantly less than the historical amounts (30%). It is approaching the minimum reference (historical) value of 3%. The historical stand initiation

conditions have transitioned to all other structural classes with the exception of old forest, being replaced by an increased amount of stem exclusion, understory reinitiation, herbland and other.

Interpretation: Fire suppression has been quite effective, both of lethal stand replacing fire and mixed severity fires. Natural succession has converted historical openings that were created by fires into mid successional stand structures. The amount of regeneration harvest activity, which would create early successional forests, continues to be less than what historical fire would have created. The proportion of stand initiation has probably not changed dramatically due to vegetative disturbance events over the past 20 years, for reasons explained above. There is likely still a downward trend, concentrated in the Swan Valley portion of ESR 3 and the MFk GA, which also has experienced no fire and minimal harvesting.

Patch density and size: The average patch density increased between historical and current conditions for all structural stages. The increased patch density of stand initiation, stem exclusion classes, understory initiation, herbland and other is statistically significant. The size of patches has correspondingly decreased from historical to current conditions for most structure classes. The most significant decrease is in the stand initiation class where the average patch size decreased from about 490 acres to about 175 acres. Contrary to the general trend that there are currently more and smaller patches than historically for most structure classes, in the stem exclusion closed canopy class there are more and significantly larger average patch sizes.

Interpretation: Similar to cover type and structure classes, these results appear to be linked to the reduced frequency of fire and the patterns created by harvesting activity, which is much different than what fire would have created. Recent fires have reduced patch density and increased patch size of the stand initiation stage within portions of the ESR, mainly the HH and SFk GAs. Fires have likely altered patch metrics for other mid successional structural stages in these GAs as well, to the degree that these forest structures burned and returned to a stand initiation stage. These changes have not occurred in the ESR 3 portion of the SV GA, however. Landscapes are more fragmented today with the possible exception of stem exclusion closed canopy and understory reinitiation classes. The larger size of stem exclusion patches appear to be attributable to the transition of large historical stand initiation patches (created by fire) to current stem exclusion, and to some degree, understory reinitiation classes.

Ecological Subregion 17

Vegetative change over past 20 years: About 9% of the area within this ESR was impacted by wildfires, located in the MFk and SFk GAs. These fires burned forests of all cover and structural stages, creating large patches of forest in a grass/shrub stage, rapidly progressing to the stand initiation forest structural stage. Very small amounts of harvest ($\leq 1\%$ of the ESR) has occurred either historically or recently, as these lands are largely limited to higher elevation or areas of the forest designated as unsuitable for timber production. No private lands fall within this ESR. Natural succession of all forests has continued to occur over the past 20 years.

Cover Type: The most significant change is the reduction of lodgepole pine [PICO] from slightly more than 15% of the subwatershed to 11.4%. Most of the change from lodgepole pine is made up of a significant increase in subalpine fir cover type. Other statistically significant changes are decreases in shrubland and other. Decreases in whitebark pine has also occurred. In all cases, there is a corresponding transition to subalpine fir. Altogether, subalpine fir increased from nearly 50% of the subwatershed to nearly 60%.

Interpretation: Large and often high severity fires are characteristic of this ESR, and a substantial portion of the area experienced stand replacing wildfires in 1900 and 1910, particularly in the MFk GA. Lodgepole pine was undoubtedly a major species that regenerated on these sites. As it matured, losses to mountain pine beetle contributed to the decrease in this cover type. Loss of whitebark pine to blister rust and mountain pine beetle also was more extensive in this ESR than in others, due to the high proportion of higher elevation cold, moist PVTs. Subalpine fir is naturally the most common cover type in this ESR, but its dominance is likely to keep increasing

due to continued loss of whitebark pine. Fire could alleviate this trend to some degree by re-initiating early successional, mainly lodgepole dominated forests. This shift in cover type towards high proportions of subalpine fir will likely lead to increased root disease activity and mortality in subalpine fir. Fire severity is likely to increase proportionally with the increase in subalpine fir.

Structural Class: The current proportion of stand initiation (approx. 35%) is significantly less than the historical amounts (approx 50%). The historical stand initiation conditions have transitioned to all other structural classes with the exception of old forest. Decreased stand initiation is replaced by increases in stem exclusion, understory reinitiation, young forest multistory, herbland and other.

Interpretation: These changes are due to the natural successional changes within forest stands, particularly those that were initiated after the fires in the early 1900s, and fire suppression/exclusion. Younger-aged, lodgepole pine cover types are moving into older, subalpine fir cover types and mid successional structure classes.

Patch density and size: The density of patches increased for all structural stages. The increase in understory reinitiation and young forest multistory were statistically significant. The size of patches has correspondingly decreased from historical to current conditions for most structure classes. The most significant decrease is in the stand initiation class where the average patch size decreased from about 1665 acres to about 440 acres. Contrary to the general trend that there are currently more and smaller patches than historically for most structure classes, in the understory reinitiation class there are more and larger patches.

Interpretation: This ESR has the largest historical proportion and average patch size for stand initiation structures of all the ESRs, due to a fire regime characterized by large, lethal and relatively infrequent fires. These changes in patterns appear to be attributable to the transition of large historical stand initiation patches to current understory reinitiation classes dominated by subalpine fir, and the continued exclusion/suppression of fire. Subalpine fir tends to form more dense and multi-canopied forests over time. Landscapes are more fragmented today with the possible exception of understory reinitiation classes.

Ecological Subregion 19

Vegetative change over past 20 years: About 14% of the area within this ESR was impacted by wildfires, located in the NFk, SFk and SMt GAs. These fires burned forests of all cover and structural stages, creating large patches of forest in a grass/shrub stage, rapidly progressing to the stand initiation forest structural stage. An additional small percentage of the ESR (estimated 3%) has also changed to stand initiation during this time period due to timber harvesting on National Forest lands, most (70%) in the SMt GA, with the remainder in the NFk GA. There was also undoubtedly harvest or land conversions on private and state lands in this ESR, though these lands comprise a fairly small portion (about 14%) of the total ESR area. ESR 19 has probably seen an increase in the stand initiation structural stage over the estimate of 20 years ago. Progression of previous stand initiation stands into mid successional stages does not compensate for the amount of stand initiation that has been recently created mostly from fires. There could be as much as 10% of the area in this ESR (around 100,000 acres) additional stand initiation structural stage currently as compared to 20 years ago, dispersed through the SFk, NFk and SMt GAs. Also, because fire creates a much larger patch size of early successional forest as compared to harvest, a shift in the average size and density of the stand initiation structural patches has occurred across this ESR, concentrated in these three GAs.

Cover Type: The most significant change is the reduction of shrubland from 7% of the subwatershed to 3% and the reduction of hardwood from 3% to 1.4%. These changes contribute to a small, yet statistically significant increase in subalpine fir from an average of 39.3% of the subwatersheds to 43.5%. A decrease in larch cover type also occurred.

Interpretation: These trends have been altered by the recent fires, which increased shrubland/herbland and the proportion of early successional species, such as lodgepole pine and western larch. Hardwood cover types also have the potential to increase as well. Accordingly, subalpine fir cover type would be reduced.

Structural Class: The current proportion of stand initiation as determined 20 years ago (approx. 12%) was significantly less than the historical amounts (approx. 20%). Nearly all other forested structure classes had corresponding increases above historic conditions. Similar to stand initiation there had been a loss of more than half of the historic shrublands. They too had transitioned into later seral forested structural classes. There had been a small, but statistically significant, increase in old forest classes

Interpretation: This ESR experienced a large amount of fire early in the 20th century, which created the historical pattern of relatively large proportion and patch size of stand initiation forest. Fire suppression since the 1930s has been very effective in reducing the amount of early successional conditions – until recently. The recent fires have increased the proportion of stand initiation, perhaps to a point that is close to the historical mean value of 20%.

Patch density and size: The increase in patch density was statistically significant for all forested structural stages. The increase in stand initiation patch density from about 45 patches per 10,000 acres to 85 patches per 10,000 acres was considered to be ecologically significant, meaning the current value was greater than the maximum reference value of 71.7 patches per 10,000 acres. There have been statistically significant decreases in patch size for most forested classes. The exception is a significant increase in stem exclusion - closed canopy patch size. This appears to be attributable to the transition of large historical stand initiation patches to current understory reinitiation classes.

Interpretation: The recent fires have alleviated these conditions, at least within some portions of the ESR. Landscapes have become less fragmented. Subwatersheds that did not burn probably still have significantly reduced patch size and increased in patch density, especially for the stand initiation stage.

Ecological Subregion 20

Vegetative change over past 20 years: Only about 4% of the area within this ESR was impacted by wildfires, located in the SFk and SV GAs. These fires burned forests of all cover and structural stages, creating large patches of forest in a grass/shrub stage, rapidly progressing to the stand initiation forest structural stage. An additional small percentage of the ESR (estimated 2%) has also changed to stand initiation during this time period due to timber harvesting on National Forest lands, located in the SMt and SV GAs. The amount of forest on national forest lands that progressed from stand initiation to mid successional stages during this time period (estimated 3%) would essentially balance out this addition. A large portion of this ESR (about 64%) is private or state lands, and there has been substantial change to forests on these lands over the last 20 years from harvesting or land conversion. On balance, it is probable that the amount of stand initiation stage, as well as forest structures associated with partial cutting practices (such as understory reinitiation and young forest multi-story) have increased in proportion in ESR 20 over the past 20 years. Patch metrics (density, size) have also been altered, probably with decreases in patch sizes and increases in patch densities that are typically associated with timber harvest patterns.

Cover Type: There were no significant changes noted in the average cover type conditions between the historical and current periods. Small decreases in Douglas-fir, larch and grand fir occurred, and corresponding small increases in subalpine fir and herbland.

Interpretation: This ESR is generally at lower elevations and has a higher proportion of the warmer PVTs than other ESRs on the forest. Where other ESRs indicated little visible logging in the historical time period [<10%], this ESR indicates that nearly 25% of the subwatershed had evidence of logging visible on the historical aerial

photography. It may be that shifts in cover type had already occurred prior to the historical photography and these proportions have been maintained by harvest. It is likely that continued harvest, combined with fire in some portions of the ESR, have continued to maintain similar proportions of the cover types.

Structural Class: In contrast to other ESRs, the current average proportion of stand initiation (approx. 15%) is not significantly less than the historical amounts (approx. 17%). There has been a small, but statistically significant, increase in old forest classes and in understory reinitiation. In contrast to other ESRs, there has been a significant decrease in young forest multistory.

Interpretation: Possible reasons for these findings are related again to the low-elevation, warmer types and readily accessible landscapes that dominate this ESR. Mixed severity fire regimes, with more frequent low and moderate intensity fires predominate, which tend to perpetuate more variable and diverse forest structure classes across the landscape (such as young multi-storied forest and understory reinitiation), and smaller patches of stand initiation forest. Timber harvest, and especially partial cutting practices, are more likely to perpetuate this historical pattern. The effects of timber harvest and other human impacts were readily evident in the historical photography.

Fires tend to be more easily suppressed in these areas as well, due both to lower intensities and easier access. Because of the higher historical frequency of fires, the effects of fire exclusion are more quickly and readily apparent. It is likely that fire suppression as well as harvesting practices had already made their mark on the landscape prior to the historical photography. This may be also be a factor in the low amount of historical stand initiation in this ESR compared to the rest of the forest. Harvesting appears to be perpetuating more simplified stand initiation forest structures and reducing more complex young forest multi-story structures.

Patch density and size: The increase in average patch density is statistically significant for all forested and non-forested structural stages between historical and current conditions, except old forest multistoried. The increase in stand initiation patch density from about 40 patches per 10,000 acres to 72 patches per 10,000 acres is considered to be ecologically significant. The current value is greater than the maximum reference value of 59.3 patches per 10,000 acres. The increase in stem exclusion average patch density from about 22 patches per 10,000 acres to 42 patches per 10,000 acres is also considered to be ecologically significant. The current value is greater than the maximum reference value of 35 patches per 10,000 acres.

There have been statistically significant decreases in patch size for stem exclusion classes, young forest multistory, old forest single story, shrubland and other. The decrease in average patch size of young forest multistory from 875 acres to about 215 acres is considered to be ecologically significant. The exception is a significant increase in stem exclusion - closed canopy patch size. This appears to be attributable to the transition of large historical stand initiation patches to current understory reinitiation classes.

Interpretation: Of all the ESRs, this one has been the most heavily impacted by human impacts such as harvest, land development, and fire exclusion. Harvest is largely responsible for the patterns and trends in the structure classes. Historically fire, even the mixed severity fires characteristic of this ESR, would have created larger patches of stand initiation than are currently created by regeneration harvesting, as well as larger patches of more diverse mid or late successional forest structures, particularly young forest multistory and understory reinitiation. Landscapes are more fragmented today.

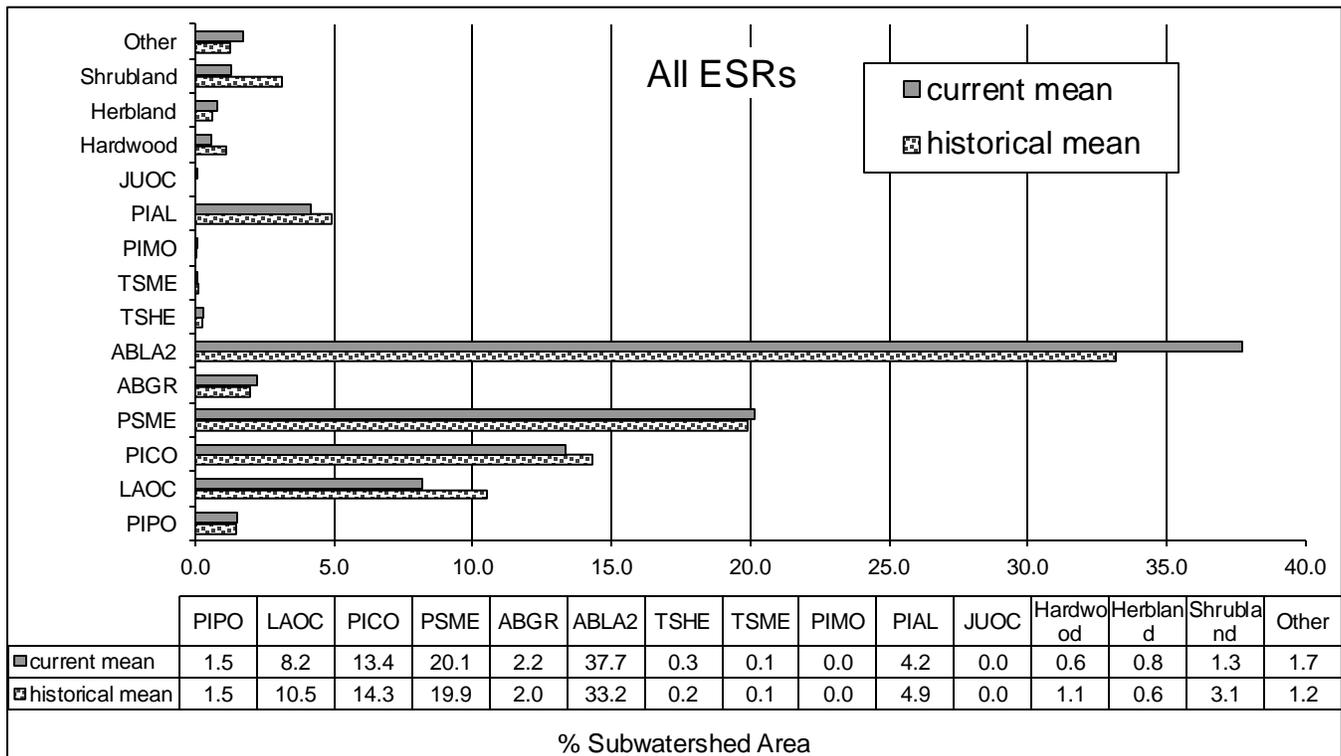
**HISTORICAL and CURRENT CONDITION TABLES and CHARTS FOR
COVER TYPES, STRUCTURE CLASSES, PATCH DENSITY AND PATCH SIZE
FOREST-WIDE and by ECOLOGICAL SUBREGION**

Forest Wide – All ESRs

***** COVER TYPES FOREST-WIDE *****

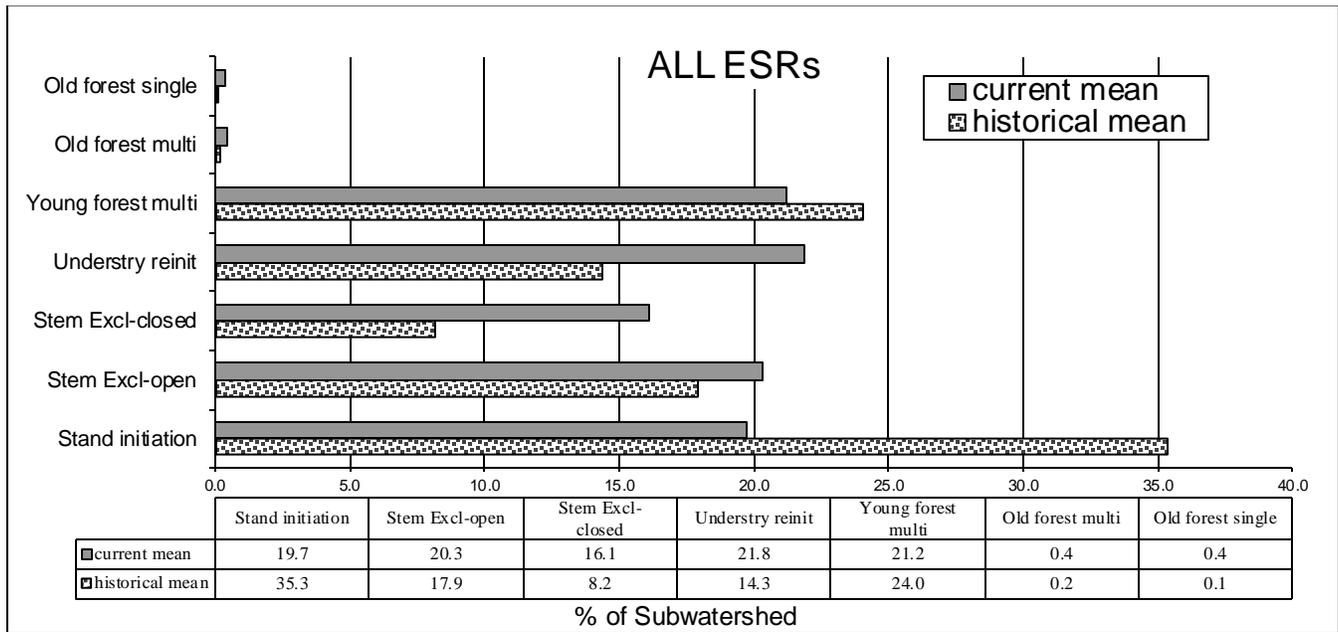
COVER TYPE	PERCENT LAND AREA ¹						CURRENT MEAN % (VMap data)
	Historical mean	Current mean	Mean Diff	RV-80% Range			
				Min	Max		
PIPO	1.5	1.5	0.0	0.0	3.6	0.8	
LAOC	10.5	8.2	-2.3	0.0	31.5	10.7	
PICO	14.3	13.4	-1.0	0.2	32.6	14.0	
PSME	19.9	20.1	0.2	0.6	52.9	21.8	
ABGR	2.0	2.2	0.2	0.0	4.3	0.1	
ABLA2	33.2	37.7	4.5	11.4	65.3	23.1	
TSHE	0.2	0.3	0.0	0.0	0.4	0	
TSME	0.1	0.1	0.0	0.0	0.2	0	
PIMO	0.0	0.0	0.0	0.0	0.0	0	
PIAL	4.9	4.2	-0.8	0.0	13.4	0.5	
Hardwood	1.1	0.6	-0.5	0.0	1.2	1.3	
Herbland	0.6	0.8	0.2	0.0	1.7	27%	
Shrubland	3.1	1.3	-1.8	0.0	9.9		
Other	1.2	1.7	0.5	0.0	2.9		
TOTAL	92.8	92.2	-0.6				
Non-Forest PVTs	7.2	7.8					

¹ Weighted average of all the ESRs. No measure of statistical or ecological significance was determined for the All-Forest analysis.



***** STRUCTURE CLASSES FOREST-WIDE *****

Structure Classes	PERCENT LAND AREA	
	Historical %	Current %
Stand Initiation	34.03	17.47
Stem Exclusion Open Canopy	17.23	18.00
Stem Exclusion Closed Canopy	7.87	14.27
Understory Reinitiation	13.81	19.32
Young Forest Multi Story	23.13	18.77
Old Forest Single Story	0.16	0.37
Old Forest MultiStory	0.12	0.33
Total Forested	96.3	88.5
Non forest PVTs	16.84	11.7

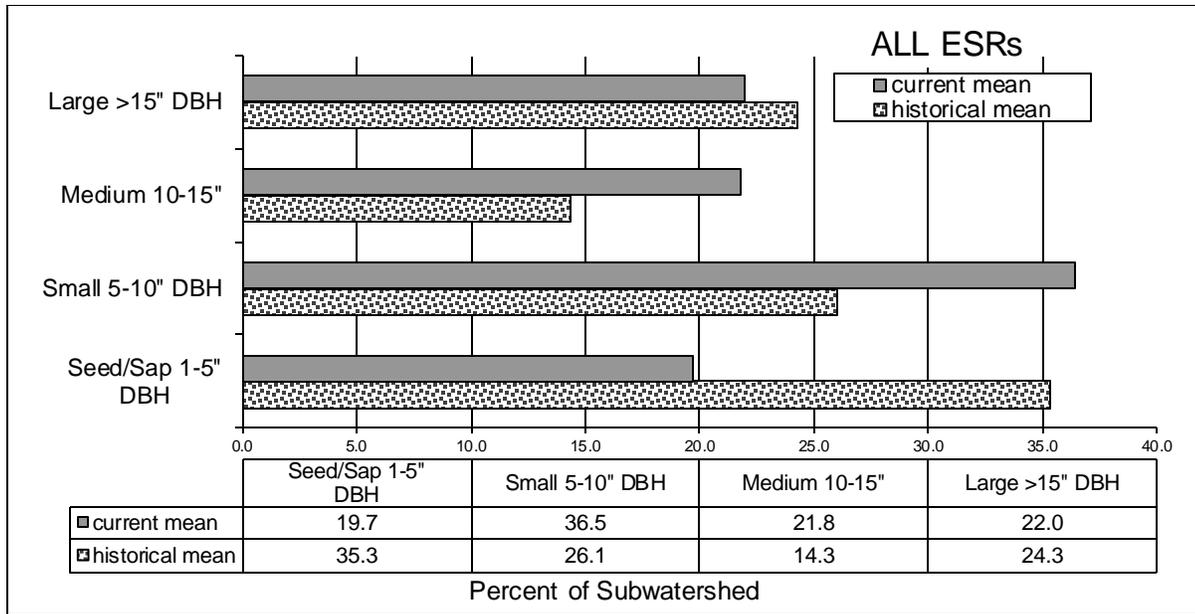


Cross-walk of Flathead NF HRV analysis forest structure classes to VMap Forest Size classes.

Within Forested PVTs only		PERCENT LAND AREA		RV - 80% Range	
		Historical %	Current %	min	max
Stand Initiation	Seed/Sap 1-5" DBH	35.34	19.74	5.29	76.01
Stem Exclusion Open Canopy	Small 5-10" DBH	17.89	20.34	3.39	38.44
Stem Exclusion Closed Canopy	Small 5-10" DBH	8.17	16.12	0.00	20.28
Understory Reinitiation	Medium 10-15"	14.34	21.83	0.66	32.80
Young Forest Multi Story	Large >15" DBH	24.02	21.20	3.09	45.04
Old Forest Single Story	Large >15" DBH	0.16	0.42	0.00	0.46
Old Forest MultiStory	Large >15" DBH	0.13	0.37	0.00	0.38

Final table and chart showing Forest Size Classes using VMap Classification.

Within Forested PVTs only	PERCENT LAND AREA					Current Mean % (VMap data source)
	Historical%	Current %	RV - 80%Range			
			min	max		
Seed/Sap 1-5" DBH	35.34	19.74	5.29	76.01	16	
Small 5-10" DBH	26.06	36.46	3.39	58.72	26	
Medium 10-15"	14.34	21.83	0.66	32.80	29	
Large >15" DBH	24.31	22.00	3.09	45.88	9	

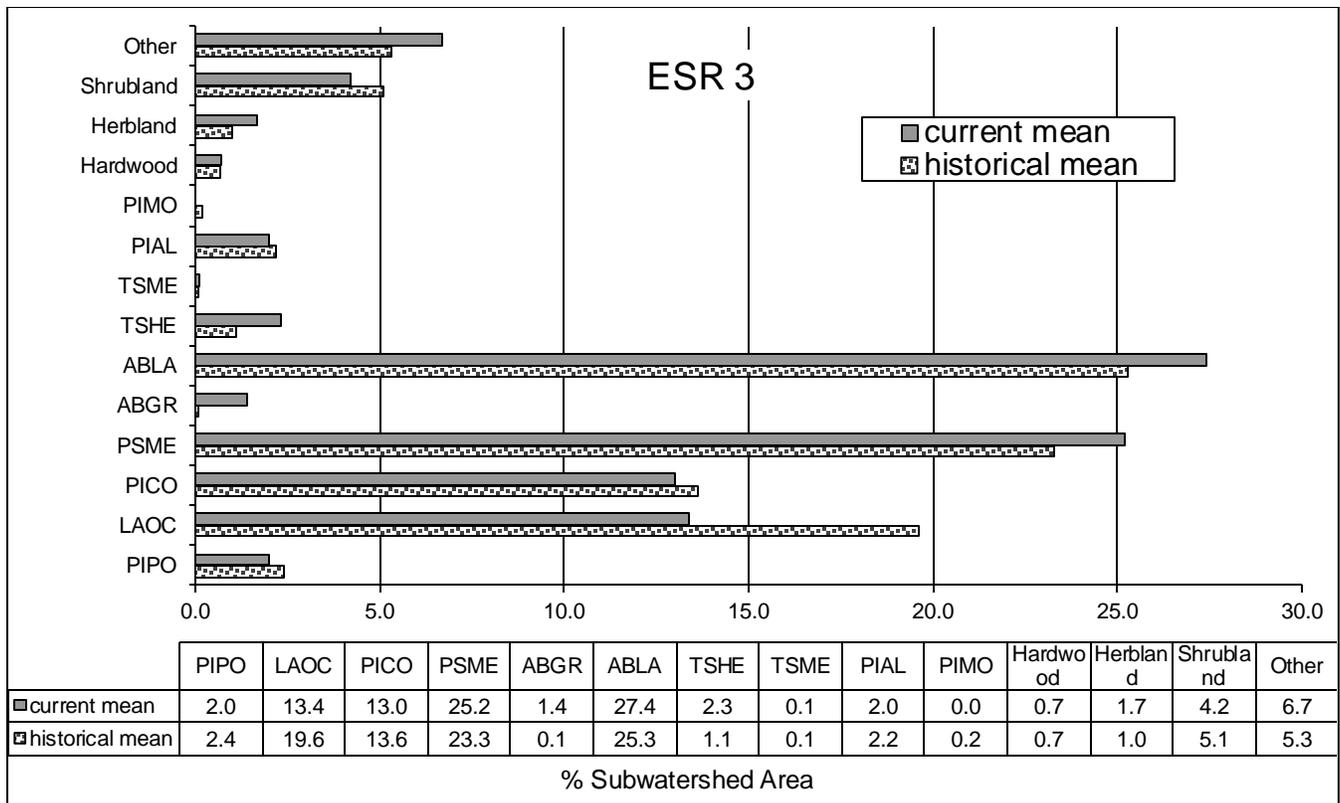


Structure Class Patch size and density – All ESRs (weighted average)						
All ESRs	Mean patch size		Patch density (n/10,000 acs)		RV 80% Range	
	Current mean	Historical mean	Current mean	Historical mean	min	max
si	198	607	70	43		
seoc/secc (single canopy forests)						
ur/yfms (multi-canopy forests)						

Ecological Subregion 3

***** COVER TYPES within ESR 3 *****

ESR3 Cover Types	PERCENT LAND AREA										CURRENT MEAN PERCENT (VMap data)
						RV - 80%		100%			
	historical		current		mean difference	Range		Range			
	mean	median	mean	median		min	max	min	max		
PIPO	2.4	0.0	2.0	0.0	-0.4	*	0.0	3.5	0.0	23.0	0.9
LAOC	19.3	13.7	13.2	7.6	-6.1	*	1.2	36.9	0.0	57.7	17.4
PICO	13.4	10.0	12.8	9.2	-0.6		2.4	26.9	0.0	53.5	10.9
PSME	23.1	19.9	24.7	22.3	1.8		8.8	46.5	3.4	59.1	23.7
ABGR	0.1	0.0	1.3	0.0	1.3	*	0.0	0.2	0.0	1.1	0.4
ABLA2	25.2	24.9	27.4	27.8	2.2		3.9	44.9	2.2	55.7	20.5
TSHE	1.1	0.0	2.3	0.0	1.2		0.0	4.1	0.0	7.5	0
TSME	0.1	0.0	0.1	0.0	-0.1		0.0	0.0	0.0	2.6	0
PIAL	2.2	0.0	2.0	0.0	-0.2		0.0	7.7	0.0	17.0	0.2
PIMO	0.2	0.0	0.0	0.0	-0.2	*	0.0	0.1	0.0	2.6	0
HDWD	0.5	0.0	0.4	0.0	-0.1		0.0	0.9	0.0	5.8	2.1
Herbland	0.3	0.1	0.9	1.0	0.6		0.0	0.8	0.0	6.9	20
Shrubland	1.5	1.4	1.4	1.5	-0.1		0.0	3.8	0.0	26.6	
Other	5.3	2.0	6.7	4.3	1.4	*	0.2	15.4	0.0	28.5	



Cover Types by PVT within ESR 3.

ESR3 Cover Types by PVT	PERCENT LAND AREA					
	Historical Mean	Current Mean	Mean difference		RV - 80% Range	
					Min	Max
Warm/dry - Douglas-fir/grand fir PVT						
PIPO ¹	0.8	0.8	-0.1	*	0.0	0.4
LAOC	0.3	0.2	-0.1		0.0	1.2
PICO	0.2	0.2	0.0		0.0	0.3
PSME	0.3	0.3	0.0		0.0	0.4
ABLA ²	0.0	0.1	0.0	*	0.0	0.0
Herbland	0.0	0.1	0.1		0.0	0.0
Other	0.1	0.2	0.1		0.0	0.1
Cool/moist - Douglas fir/grand fir PVT						
PIPO	1.0	0.7	-0.3	*	0.0	2.1
LAOC	0.9	0.6	-0.3	*	0.0	1.3
PICO	0.9	0.8	-0.1		0.0	0.6
PSME	2.5	3.4	0.9	*	0.0	9.6
ABGR	0.0	0.1	0.1		0.0	0.0
ABLA ²	0.0	0.1	0.0	*	0.0	0.0
Herbland	0.0	0.0	0.0	*	0.0	0.0
Shrubland	0.1	0.0	-0.1		0.0	0.1
Other	0.5	0.3	-0.2		0.0	0.1
Warm/dry - western redcedar/western hemlock PVT						
LAOC	1.6	1.2	-0.4	*	0.0	6.2
PICO	0.5	0.4	-0.1		0.0	1.7
PSME	0.7	1.0	0.3		0.0	2.2
ABGR	0.1	0.1	0.0		0.0	0.0
ABLA ²	0.1	0.1	0.1	*	0.0	0.2
TSHE	0.4	0.4	0.0		0.0	0.9
PIMO	0.0	0.0	0.0	*	0.0	0.0
Hardwood	0.0	0.0	0.0	*	0.0	0.0

ESR3 Cover Types by PVT	PERCENT LAND AREA						
						RV - 80% Range	
	Historical Mean	Current Mean		Mean difference		Min	Max
Herbland	0.0	0.0		0.0	*	0.0	0.0
Other	0.0	0.1		0.1	*	0.0	0.0
Cool/moist - western redcedar/western hemlock PVT							
PIPO	0.0	0.1		0.0		0.0	0.1
LAOC	4.0	2.2		-1.8	*	0.0	16.6
PICO	1.4	0.8		-0.6	*	0.0	5.2
PSME	2.4	3.0		0.7	*	0.0	8.7
ABGR	0.0	0.0		0.0	*	0.0	0.0
ABLA2	0.8	1.2		0.3	*	0.0	3.2
TSHE	0.5	1.6		1.1	*	0.0	0.9
TSME	0.1	0.1		-0.1		0.0	0.0
PIMO	0.1	0.0		-0.1	*	0.0	0.1
Hardwood	0.0	0.2		0.1	*	0.0	0.0
Herbland	0.0	0.1		0.0		0.0	0.1
Shrubland	0.1	0.1		0.0		0.0	0.0
Other	0.3	0.5		0.2	*	0.0	0.6
Mountain hemlock PVT							
LAOC	0.1	0.0		-0.1	*	0.0	0.1
PSME	0.0	0.1		0.0		0.0	0.0
Lodge pole pine PVT							
PICO	0.1	0.1		0.0		0.0	0.0
Warm/dry - Engelmann spruce/subalpine fir PVT							
LAOC	0.5	0.3		-0.2	*	0.0	1.5
PICO	0.4	0.3		-0.1		0.0	1.4
PSME	0.6	0.8		0.2	*	0.0	1.2
ABLA2	0.2	0.2		0.0		0.0	0.5
TSHE	0.0	0.1		0.0		0.0	0.0
PIMO	0.0	0.0		0.0	*	0.0	0.0
Other	0.0	0.1		0.1	*	0.0	0.1
Cool/moist - Engelmann spruce/subalpine fir PVT							
PIPO	0.5	0.4		0.0		0.0	1.7
LAOC	12.0	8.8		-3.2	*	0.1	31.1
PICO	9.7	9.7		0.0		0.8	21.6
PSME	14.8	14.7		-0.2		0.9	30.4
ABGR	0.0	1.2		1.2	*	0.0	0.2
ABLA2	21.3	23.0		1.7		3.0	40.8
TSHE	0.1	0.2		0.1		0.0	0.1
PIAL	1.7	0.9		-0.8		0.0	3.8
Hardwood	0.5	0.2		-0.3	*	0.0	0.9
Herbland	0.2	0.6		0.4		0.0	0.7
Shrubland	1.1	1.2		0.1		0.0	3.4
Other	0.9	1.3		0.5	*	0.0	1.6
Harsh/cold - Engelmann spruce/subalpine fir PVT							
PICO	0.3	0.7		0.4	*	0.0	0.1
PSME	1.8	1.4		-0.4	*	0.0	2.4
ABLA2	2.7	2.8		0.0		0.0	10.7
PIAL	0.5	1.1		0.6		0.0	0.7
Shrubland	0.1	0.0		-0.1	*	0.0	0.3
Other	0.1	0.1		0.0		0.0	0.1

Cover type patch density and size

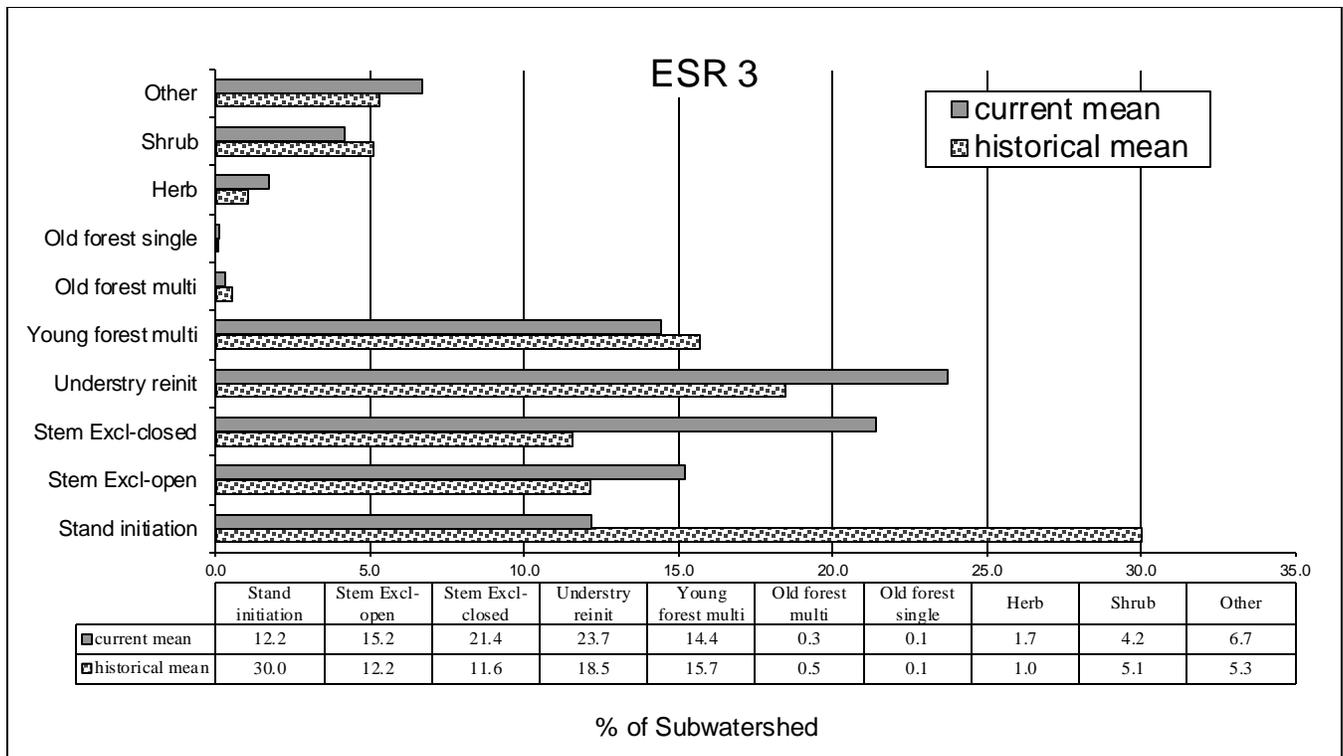
ESR 3 Cover type patch density	Cover Type Patch Density (n/10,000 acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	4.9	0.0	7.4	0.0	0.0		0.0	19.8	0.0	32.1
LAOC	29.7	24.7	37.1	34.6	7.4		4.9	51.9	0.0	128.5
PICO	34.6	34.6	39.5	32.1	4.9	*	4.9	64.2	0.0	86.5

ESR 3 Cover type patch density	Cover Type Patch Density (n/10,000 acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PSME	42.2	39.5	49.4	44.5	7.4		17.3	56.8	7.4	135.9
ABGR	0.0	0.0	2.5	0.0	2.5	*	0.0	2.5	0.0	4.9
ABLA2	29.7	22.2	34.6	29.7	4.9	*	9.9	61.8	4.9	71.7
TSHE	4.9	0.0	9.9	0.0	4.9	*	0.0	14.8	0.0	32.1
TSME	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	24.7
PIAL	7.4	0.0	4.9	0.0	-2.5	*	0.0	24.7	0.0	59.3
PIMO	0.0	0.0	0.0	0.0	0.0		0.0	2.5	0.0	7.4
Hardwood	4.9	0.0	4.9	0.0	0.0		0.0	19.8	0.0	37.1
Herbland	7.4	2.5	12.4	9.9	4.9	*	0.0	19.8	0.0	51.9
Shrubland	17.3	7.4	22.2	14.8	7.4		0.0	44.5	0.0	64.2
Other	24.7	12.4	42.0	29.7	19.8	*	4.9	42.0	0.0	150.7

ESR 3 Cover type patch Size	Cover Type Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	75.9	0.0	56.2	0.0	-19.6		0.0	276.0	0.0	439.0
LAOC	540.2	288.1	199.5	135.5	-340.7	*	60.3	1694.0	0.0	2538.7
PICO	277.7	187.0	205.3	172.8	-72.4		64.9	464.3	0.0	1903.8
PSME	428.0	271.9	471.3	338.4	43.3		160.7	753.4	79.6	2040.1
ABGR	16.9	0.0	89.9	0.0	73.0	*	0.0	69.8	0.0	139.8
ABLA2	795.4	423.0	805.5	390.7	10.1		130.0	1809.0	65.8	3603.0
TSHE	68.6	0.0	42.0	0.0	-26.6		0.0	222.4	0.0	563.1
TSME	2.8	0.0	2.9	0.0	0.1		0.0	0.0	0.0	65.1
PIAL	64.0	0.0	113.8	0.0	49.8		0.0	166.8	0.0	490.5
PIMO	21.1	0.0	4.6	0.0	-16.5		0.0	9.1	0.0	279.9
Hardwood	22.7	0.0	85.7	0.0	63.0		0.0	83.1	0.0	190.9
Herbland	50.6	15.3	60.9	34.2	10.3		0.0	131.8	0.0	379.9
Shrubland	124.5	87.0	117.7	41.1	-6.9		0.0	318.4	0.0	436.6
Other	180.8	84.0	148.0	55.7	-32.9		8.2	413.9	0.0	936.5

***** STRUCTURE CLASSES within ESR 3 *****

ESR3 Structure Class	PERCENT LAND AREA										CURRENT CONDITION (VMap data)	
	historical		current		mean difference	RV - 80% Range		100% Range		Forest Size Class used in Forest Plan Revision	Mean percent	
	mean	median	mean	median		min	max	min	max			
si	30.0	22.1	12.2	12.4	-17.8	*	3.0	58.1	0.2	83.5	Seedling/Sapling	12.8
seoc	12.2	7.5	15.2	13.9	3.1	*	1.1	30.2	0.7	41.4		
secc	11.6	11.0	21.4	16.0	9.9	*	0.0	23.2	0.0	51.9	Small Tree	24.0
ur	18.5	15.2	23.7	20.7	5.2	*	1.5	40.7	0.0	61.0	Medium Tree	30.8
yfms	15.7	11.3	14.4	9.8	-1.3		5.9	27.6	3.9	56.2		
ofms	0.5	0.0	0.3	0.0	-0.2		0.0	0.1	0.0	7.8		
ofss	0.1	0.0	0.1	0.0	0.1		0.0	0.0	0.0	1.1	Large Tree	13.0



Structure Class by PVT within ESR 3.

ESR3 Structure Classes by PVT	PERCENT LAND AREA									
	historical		current		mean difference	RV - 80%		100%		
	mean	median	mean	median		Range		Range		
						min	max	min	max	
Warm/dry - Douglas-fir/grand fir PVT										
si ¹	0.5	0.0	0.1	0.0	-0.4	*	0.0	1.0	0.0	6.0
seoc	0.6	0.0	0.5	0.0	-0.1		0.0	0.0	0.0	12.9
secc	0.1	0.0	0.2	0.0	0.1		0.0	0.2	0.0	0.7
ur	0.1	0.0	0.3	0.0	0.2	*	0.0	0.4	0.0	1.3
yfms	0.4	0.0	0.4	0.0	0.0		0.0	0.4	0.0	6.1
Herbland	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.8
Other	0.1	0.0	0.2	0.0	0.1		0.0	0.1	0.0	1.0
Cool/moist - Douglas fir/grand fir PVT										
si	2.4	0.1	0.9	0.0	-1.5	*	0.0	11.6	0.0	13.1
seoc	0.7	0.0	0.3	0.0	-0.4		0.0	3.5	0.0	6.0
secc	0.7	0.0	0.9	0.0	0.2		0.0	1.4	0.0	8.7
ur	0.6	0.0	2.1	0.1	1.5	*	0.0	1.1	0.0	6.2
yfms	1.1	0.0	0.9	0.0	-0.2		0.0	2.2	0.0	13.1
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.3
Shrubland	0.1	0.0	0.0	0.0	-0.1		0.0	0.1	0.0	2.9
Other	0.5	0.0	0.3	0.0	-0.2		0.0	0.1	0.0	10.4
Warm/dry - western redcedar/western hemlock PVT										
si	0.9	0.0	0.3	0.0	-0.5	*	0.0	2.9	0.0	9.3
seoc	0.2	0.0	0.2	0.0	0.0		0.0	0.9	0.0	1.2
secc	0.3	0.0	0.9	0.0	0.6	*	0.0	1.6	0.0	2.5
ur	1.4	0.0	1.5	0.0	0.0		0.0	4.1	0.0	13.8
yfms	0.4	0.0	0.2	0.0	-0.2	*	0.0	2.1	0.0	3.0
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.1
Other	0.0	0.0	0.1	0.0	0.1	*	0.0	0.0	0.0	0.5

ESR3 Structure Classes by PVT	PERCENT LAND AREA										
							RV - 80%		100%		
	historical		current		mean difference	*	Range		Range		
	mean	median	mean	median			min	max	min	max	
Cool/moist - western redcedar/western hemlock PVT											
si	4.1	0.0	0.9	0.0	-3.1	*	0.0	12.8	0.0	39.0	
seoc	0.4	0.0	0.4	0.0	0.0		0.0	0.9	0.0	3.6	
secc	1.0	0.0	2.9	0.0	1.9	*	0.0	3.7	0.0	10.7	
ur	2.0	0.0	4.1	0.0	2.1		0.0	6.0	0.0	15.0	
yfms	1.9	0.0	0.8	0.0	-1.1	*	0.0	7.8	0.0	20.3	
Herbland	0.0	0.0	0.1	0.0	0.0		0.0	0.1	0.0	0.6	
Shrubland	0.1	0.0	0.1	0.0	0.0		0.0	0.0	0.0	1.4	
Other	0.3	0.0	0.5	0.0	0.2	*	0.0	0.6	0.0	4.0	
Mountain hemlock PVT											
ur	0.1	0.0	0.1	0.0	0.0		0.0	0.0	0.0	1.1	
Lodgepole pine PVT											
seoc	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	
Warm/dry - Engelmann spruce/subalpine fir PVT											
si	0.6	0.0	0.3	0.0	-0.3	*	0.0	1.8	0.0	6.1	
seoc	0.3	0.0	0.1	0.0	-0.2		0.0	0.2	0.0	6.1	
secc	0.6	0.0	0.7	0.0	0.1	*	0.0	1.1	0.0	9.8	
ur	0.1	0.0	0.4	0.0	0.3	*	0.0	0.5	0.0	1.0	
yfms	0.2	0.0	0.2	0.0	0.0		0.0	0.4	0.0	1.6	
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	
Other	0.0	0.0	0.1	0.0	0.1	*	0.0	0.1	0.0	0.2	
Cool/moist - Engelmann spruce/subalpine fir PVT											
si	19.3	12.6	7.8	7.1	-11.6	*	0.5	50.3	0.2	71.0	
seoc	7.7	5.2	10.1	8.5	2.4	*	0.3	21.4	0.0	27.7	
secc	8.4	6.8	14.9	11.3	6.4	*	0.0	16.9	0.0	35.1	
ur	13.8	7.8	13.9	13.6	0.1		0.4	37.0	0.0	49.9	
yfms	10.8	8.0	8.9	6.1	-1.9	*	2.7	19.1	0.5	55.0	
ofms	0.5	0.0	0.3	0.0	-0.3		0.0	0.1	0.0	7.8	
ofss	0.0	0.0	0.1	0.0	0.1	*	0.0	0.0	0.0	0.8	
Herbland	0.2	0.0	0.6	0.2	0.4		0.0	0.7	0.0	1.2	
Shrubland	1.2	0.3	1.2	0.2	0.0		0.0	3.5	0.0	4.8	
Other	0.9	0.4	1.3	0.6	0.5	*	0.0	1.6	0.0	4.8	
Harsh/cold - Engelmann spruce/subalpine fir PVT											
si	1.9	0.0	1.4	0.0	-0.5	*	0.0	5.3	0.0	19.2	
seoc	1.9	0.0	2.2	0.0	0.4		0.0	3.8	0.0	17.9	
secc	0.4	0.0	0.5	0.0	0.1		0.0	1.0	0.0	3.9	
ur	0.4	0.0	0.7	0.0	0.3	*	0.0	0.8	0.0	6.8	
yfms	0.9	0.0	0.8	0.0	-0.1		0.0	2.0	0.0	11.4	
Shrubland	0.1	0.0	0.0	0.0	-0.1	*	0.0	0.3	0.0	1.5	
Other	0.1	0.0	0.1	0.0	0.0		0.0	0.1	0.0	2.1	

Structure Class Patch density and size in ESR 3

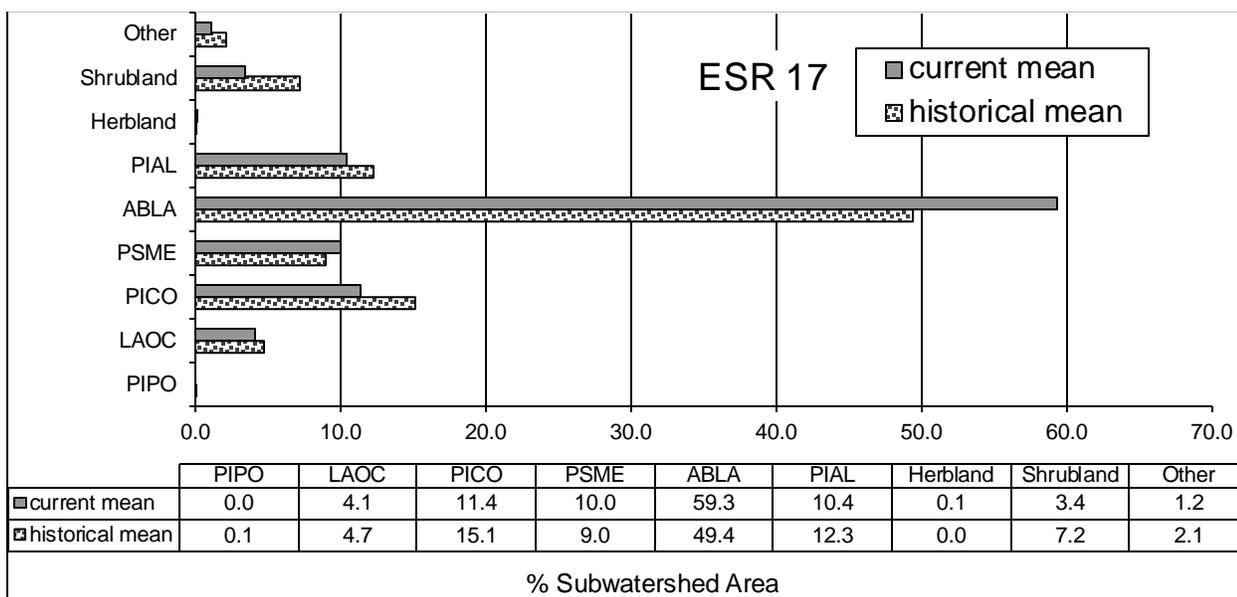
ESR 3 Structure Class Patch Density	Forest Structure Patch Density (n/10,000 acres)									
	historical		current		mean difference	*	RV 80% Range		RV 100% Range	
	mean	median	mean	median			min	max	min	max
si	47.0	42.0	59.3	59.3	12.4	*	19.8	86.5	4.9	155.7
seoc	39.5	32.1	69.2	66.7	27.2	*	14.8	69.2	2.5	145.8
secc	29.7	27.2	44.5	47.0	14.8	*	0.0	49.4	0.0	101.3
ur	34.6	29.7	47.0	37.1	12.4	*	4.9	66.7	0.0	91.4
yfms	51.9	47.0	56.8	51.9	4.9		17.3	86.5	4.9	177.9
ofms	0.0	0.0	0.0	0.0	0.0		0.0	2.5	0.0	4.9
ofss	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	9.9
Herbland	7.4	2.5	12.4	9.9	4.9	*	0.0	19.8	0.0	51.9
Shrubland	17.3	7.4	22.2	14.8	7.4		0.0	42.0	0.0	64.2
Other	24.7	12.4	42.0	29.7	19.8	*	4.9	42.0	0.0	150.7

ESR 3 Structure Class Patch Size	Forest Structure Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
si	490.8	317.6	175.2	111.9	-315.7	*	68.4	1335.6	19.6	1978
seoc	185.0	121.4	148.4	92.5	-36.5		56.4	430.4	25.9	594
secc	201.9	175.3	269.2	249.9	67.2	*	9.6	351.1	0.0	655
ur	383.4	257.6	427.5	315.8	44.1		64.6	900.4	0.0	1529
yfms	534.1	135.4	201.0	105.0	-333.2		82.0	449.6	54.3	7714
ofms	80.2	0.0	20.7	0.0	-59.4		0.0	29.0	0.0	1336
ofss	3.7	0.0	10.9	0.0	7.2	*	0.0	0.0	0.0	78
Herbland	50.6	15.3	60.9	34.2	10.3		0.0	131.8	0.0	379
Shrubland	125.9	87.0	115.5	41.1	-10.4		0.0	324.0	0.0	436
Other	180.8	84.0	148.0	55.7	-32.8		8.2	413.9	0.0	936

Ecological Subregion 17

***** COVER TYPES within ESR 17 *****

ESR17 Cover Types	PERCENT LAND AREA										CURRENT MEAN PERCENT (VMap data)
	historical		current		mean difference	RV - 80% Range		100% Range			
	mean	median	mean	median		min	max	min	max		
PIPO	0.1	0.0	0.0	0.0	-0.1		0.0	0.4	0.0	0.9	0
LAOC	4.7	1.1	4.1	1.5	-0.6		0.0	15.3	0.0	16.4	1.8
PICO	15.1	1.6	11.4	1.4	-3.7	*	0.0	37.6	0.0	42.2	21.2
PSME	9.0	11.7	10.0	9.3	1.0		0.7	16.7	0.0	19.7	11.5
ABLA2	49.4	45.4	59.3	52.9	9.9	*	36.8	70.1	34.6	78.0	37.4
PIAL	12.3	10.9	10.4	7.7	-1.9		0.0	25.6	0.0	38.1	0.4
Herbland	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.1	
Shrubland	7.2	4.8	3.4	0.6	-3.7	*	0.6	16.0	0.2	20.1	28
Other	2.1	0.5	1.2	0.4	-1.0	*	0.0	5.3	0.0	6.7	



Cover Types by PVT in ESR 17.

ESR 17 Cover Types by PVT	PERCENT LAND AREA									
	historical		current		mean difference	RV - 80% Range		100% Range		
	mean	median	mean	median		min	max	min	max	
Cool/moist - Douglas fir/grand fir PVT										
PICO ¹	0.1	0.0	0.1	0.0	0.0		0.0	0.3	0.0	0.8
PSME	0.9	0.0	1.1	0.0	0.2		0.0	2.9	0.0	3.9
Cool/moist - Engelmann spruce/subalpine fir PVT										
LAOC	4.7	0.9	3.1	1.5	-1.6		0.0	15.3	0.0	16.4
PICO	14.2	1.6	10.5	0.7	-3.6	*	0.0	36.0	0.0	38.7
PSME	4.2	2.3	4.5	2.6	0.4		0.7	9.7	0.0	15.0
ABLA2	30.5	25.5	38.8	35.6	8.2	*	17.3	51.4	17.0	59.8
PIAL	4.3	3.3	3.1	2.7	-1.3		0.0	9.4	0.0	12.3
Herbland	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.1
Shrubland	2.2	0.2	0.3	0.1	-1.9	*	0.1	5.7	0.0	8.1
Other	0.3	0.0	0.1	0.0	-0.2	*	0.0	0.7	0.0	0.9
Harsh/cold - Engelmann spruce/subalpine fir PVT										
PIPO	0.1	0.0	0.0	0.0	-0.1		0.0	0.4	0.0	0.9
LAOC	0.0	0.0	1.1	0.0	1.1		0.0	0.0	0.0	0.0
PICO	0.8	0.0	0.8	0.1	0.0		0.0	2.2	0.0	3.5
PSME	4.0	1.7	4.1	0.0	0.1		0.0	11.9	0.0	12.3
ABLA2	18.8	19.0	20.5	20.9	1.7		12.7	23.9	12.7	27.9
PIAL	8.0	2.4	7.3	2.6	-0.7		0.0	20.6	0.0	30.5
Shrubland	1.7	0.5	0.4	0.2	-1.3	*	0.0	4.9	0.0	5.1
Other	1.0	0.0	0.1	0.0	-0.9	*	0.0	2.8	0.0	3.9
Mountain shrub PVT										
Shrubland	0.5	0.0	0.6	0.0	0.1		0.0	1.5	0.0	2.3
Alpine herbland/low shrub PVT										
PSME	0.0	0.0	0.3	0.0	0.3		0.0	0.0	0.0	0.0
Shrubland	2.1	0.0	1.5	0.0	-0.6	*	0.0	6.6	0.0	9.6
Other	0.0	0.0	0.2	0.0	0.2	*	0.0	0.0	0.0	0.1
Non-forest/non-range and other anthropogenic types										
Shrubland	0.6	0.0	0.6	0.0	0.0		0.0	1.8	0.0	4.4
Other	0.8	0.4	0.8	0.4	-0.1	*	0.0	2.3	0.0	2.6

Cover Types Patch density and size in ESR 17.

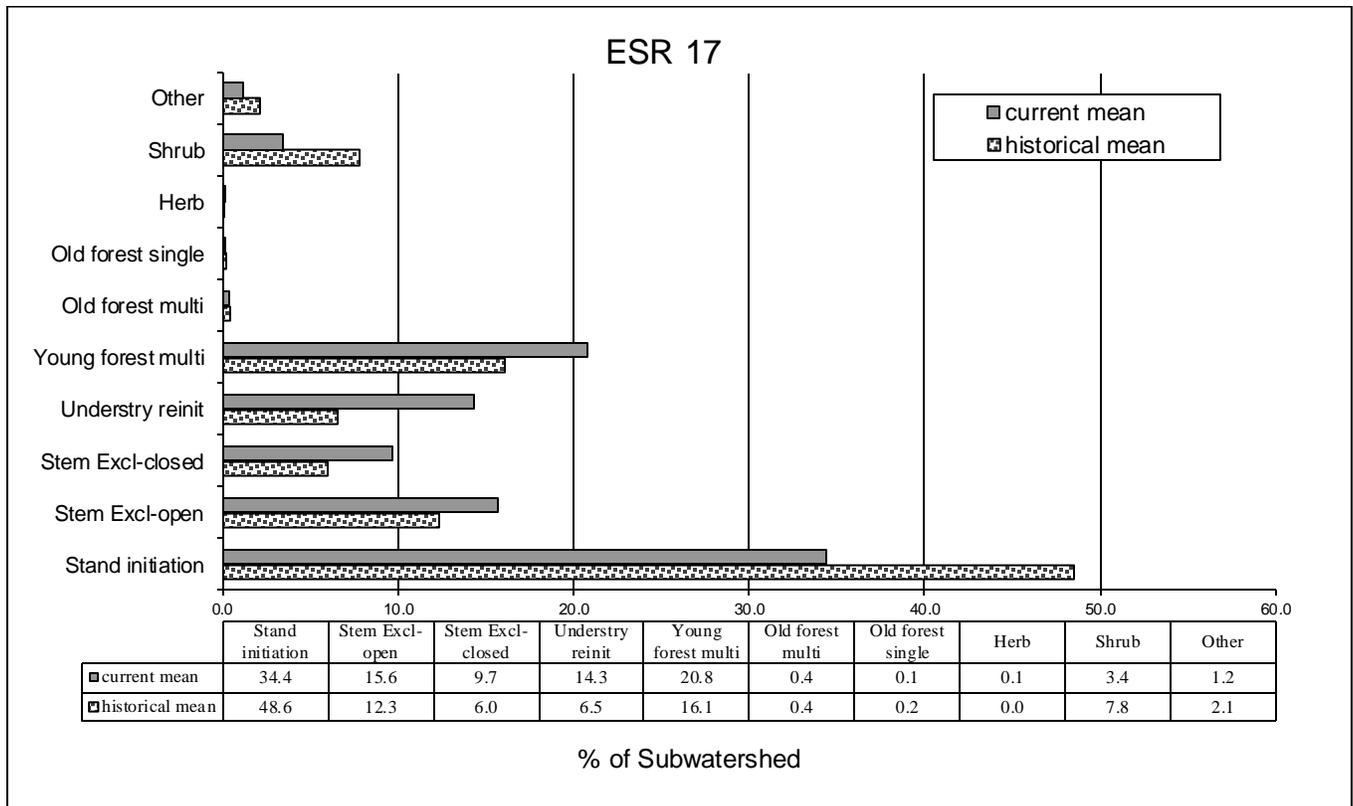
ESR 17 Cover Type Patch density	Cover Type Patch Density (n/10,000 acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	2.5
LAOC	4.9	4.9	9.9	4.9	4.9	*	0.0	12.4	0.0	14.8
PICO	9.9	7.4	14.8	19.8	4.9	*	0.0	24.7	0.0	24.7
PSME	22.2	22.2	17.3	12.4	-4.9	*	9.9	34.6	0.0	44.5
ABLA2	32.1	29.7	34.6	34.6	2.5		14.8	49.4	4.9	59.3
PIAL	27.2	17.3	19.8	14.8	-7.4	*	0.0	61.8	0.0	93.9
Herbland	0.0	0.0	2.5	0.0	2.5		0.0	0.0	0.0	2.5
Shrubland	24.7	22.2	19.8	9.9	-2.5		7.4	44.5	2.5	44.5
Other	17.3	9.9	12.4	4.9	-2.5	*	0.0	42.0	0.0	44.5

ESR 17 Cover Type Patch Size	Cover Type Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	20.5	0.0	0.0	0.0	-20.5		0.0	57.5	0.0	143.6
LAOC	444.9	50.2	199.4	165.8	-245.5		0.0	1335.7	0.0	2087.8

ESR 17 Cover Type Patch Size	Cover Type Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PICO	809.2	136.3	315.5	56.2	-493.7	0.0	2149.5	0.0	3740.2	
PSME	203.0	267.8	345.8	192.7	142.8	23.9	349.4	0.0	367.0	
ABLA2	1852.1	942.7	3039.5	948.5	1187.4	*	440.8	3971.0	7930.3	
PIAL	327.1	137.4	366.3	103.6	39.2	0.0	841.8	0.0	1263.4	
Herbland	2.1	0.0	11.1	0.0	9.0	*	0.0	5.9	14.7	
Shrubland	160.5	178.6	51.3	31.0	-109.2	*	34.6	279.8	292.9	
Other	45.8	30.0	30.1	25.1	-15.7	*	0.0	102.1	106.2	

***** STRUCTURE CLASSES within ESR 17 *****

ESR17 Structure Class	PERCENT LAND AREA										CURRENT CONDITION (VMap data)	
	historical		current		mean difference	RV - 80% Range		100% Range		Forest Size Class used in Forest Plan Revision	Mean percent	
	mean	median	mean	median		min	max	min	max			
si	48.6	47.8	34.4	34.0	-14.1	*	17.2	78.9	15.1	85.9	Seedling/Sapling	15.0
seoc	12.3	11.9	15.6	14.8	3.3		8.6	16.5	6.1	21.4	Small Tree	27.0
secc	6.0	3.5	9.7	2.9	3.7		0.0	14.7	0.0	27.2	Medium Tree	29.0
ur	6.5	5.2	14.3	8.7	7.7		0.0	14.5	0.0	17.2	Large Tree	10.1
yfms	16.1	4.5	20.8	15.9	4.8		1.1	43.6	0.6	61.2		
ofms	0.4	0.0	0.4	0.0	0.0		0.0	1.1	0.0	2.7		
ofss	0.2	0.0	0.1	0.0	-0.1		0.0	0.5	0.0	1.2		



Forest Structure Classes by PVT within ESR 17.

ESR 17 Structure Classes by PVT	PERCENT LAND AREA										
	historical		current		mean difference	RV - 80% Range		100% Range			
	mean	median	mean	median		min	max	min	max		
Cool/moist - Douglas fir/grand fir PVT											
si ¹	0.7	0.0	0.0	0.0		-0.7	*	0.0	2.5	0.0	2.7
secc	0.2	0.0	0.6	0.0		0.4		0.0	0.6	0.0	1.4
ur	0.0	0.0	0.3	0.0		0.3		0.0	0.0	0.0	0.0
yfms	0.1	0.0	0.2	0.0		0.1		0.0	0.2	0.0	0.6
Cool/moist - Engelmann spruce/subalpine fir PVT											
si	28.2	26.5	18.7	22.9		-9.6	*	7.9	53.7	6.7	59.5
seoc	5.6	6.1	8.6	7.1		3.1		2.4	9.1	1.9	10.1
secc	4.3	0.2	8.1	1.8		3.8		0.0	11.7	0.0	22.2
ur	6.3	5.2	8.2	7.3		1.9		0.0	13.7	0.0	17.2
yfms	12.8	1.8	15.9	11.6		3.1		0.6	36.4	0.0	55.0
ofms	0.4	0.0	0.4	0.0		0.0		0.0	1.1	0.0	2.7
ofss	0.2	0.0	0.1	0.0		-0.1		0.0	0.5	0.0	1.2
Herbland	0.0	0.0	0.1	0.0		0.1		0.0	0.0	0.0	0.1
Shrubland	2.3	0.2	0.3	0.1		-2.0	*	0.1	6.1	0.0	8.1
Other	0.3	0.0	0.1	0.0		-0.2	*	0.0	0.7	0.0	0.9
Harsh/cold - Engelmann spruce/subalpine fir PVT											
si	19.6	12.1	15.7	19.3		-3.9		8.2	35.9	6.4	59.4
seoc	6.8	4.7	6.7	5.7		-0.1		2.3	14.0	1.6	18.6
secc	1.5	0.2	1.0	0.4		-0.5		0.0	4.8	0.0	5.0
ur	0.2	0.0	5.7	0.9	*	5.5		0.0	0.6	0.0	1.4
yfms	3.2	2.6	4.7	3.8		1.6		0.5	6.9	0.4	8.0
Shrubland	2.2	0.5	0.4	0.2		-1.9	*	0.0	4.9	0.0	5.1
Other	1.0	0.0	0.1	0.0		-0.9	*	0.0	2.8	0.0	3.9
Mountain shrub PVT											
Shrubland	0.5	0.0	0.6	0.0		0.1		0.0	1.5	0.0	2.3
Alpine herbland/low shrub PVT											
seoc	0.0	0.0	0.3	0.0		0.3		0.0	0.0	0.0	0.1
Shrubland	2.1	0.0	1.5	0.0		-0.6	*	0.0	6.6	0.0	9.6
Other	0.0	0.0	0.2	0.0		0.2	*	0.0	0.0	0.0	0.1
Non-forest/non-range and other anthropogenic types											
Shrubland	0.6	0.0	0.6	0.0		0.0		0.0	1.8	0.0	4.4
Other	0.8	0.4	0.8	0.4		-0.1	*	0.0	2.3	0.0	2.6

Forest Structure Class Patch Density and Size by ESR 17.

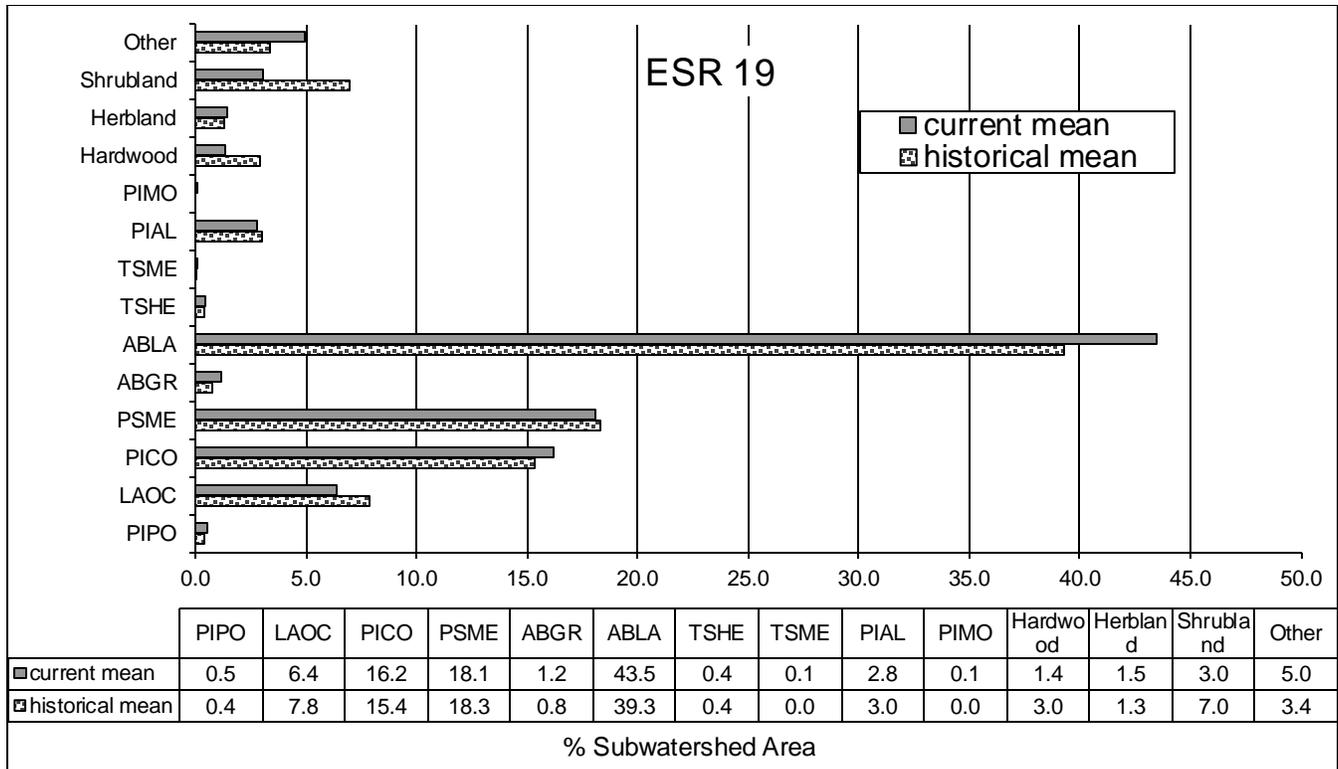
ESR 17 Structure Class patch density	Forest Structure Patch Density (n/10,000 acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
si	42.0	34.6	59.3	64.2		17.3		9.9	74.1	9.9	106.3
seoc	51.9	54.4	59.3	59.3		7.4		27.2	71.7	22.2	76.6
secc	14.8	17.3	17.3	24.7		2.5		0.0	29.7	0.0	37.1
ur	9.9	4.9	19.8	19.8		9.9	*	0.0	24.7	0.0	29.7
yfms	24.7	12.4	42.0	32.1		17.3	*	7.4	49.4	2.5	54.4
ofms	0.0	0.0	2.5	0.0		0.0		0.0	2.5	0.0	4.9
ofss	0.0	0.0	0.0	0.0		0.0		0.0	2.5	0.0	4.9
Herbland	0.0	0.0	2.5	0.0		2.5		0.0	0.0	0.0	2.5
Shrubland	24.7	22.2	19.8	9.9		-4.9		7.4	47.0	2.5	49.4
Other	17.3	9.9	12.4	4.9		-2.5	*	0.0	42.0	0.0	44.5

ESR 17 Structure Class patch size	Forest Structure Mean Patch Size (acres)									
	historical		current		mean difference	*	RV 80% Range		RV 100% Range	
	mean	median	mean	median			min	max	min	max
si	1664.6	586.8	440.2	393.7	-1224.4	*	196.6	4632.9	171.0	4751.9
seoc	193.8	109.8	165.0	137.7	-28.8		84.8	389.9	83.5	578.2
secc	157.9	102.3	231.4	198.5	73.5		0.0	376.6	0.0	700.9
ur	392.9	262.6	1339.2	239.4	946.3		0.0	873.5	0.0	1235.5
yfms	599.5	191.0	402.6	294.8	-196.8		79.4	1494.3	52.0	3109.9
ofms	56.4	0.0	18.9	0.0	-37.5		0.0	157.9	0.0	394.8
ofss	24.2	0.0	3.8	0.0	-20.4		0.0	67.8	0.0	169.4
Herbland	2.1	0.0	11.1	0.0	9.0	*	0.0	5.9	0.0	14.7
Shrubland	164.8	178.7	51.3	31.0	-113.5	*	34.6	296.2	25.9	301.3
Other	45.8	30.2	30.1	25.1	-15.8	*	0.0	102.1	0.0	106.2

Ecological Subregion 19

***** COVER TYPES within ESR 19 *****

ESR19 Cover Types	PERCENT LAND AREA										CURRENT MEAN PERCENT (VMap data)	
						RV - 80%		100%		Range		Range
	historical		current		mean difference	min	max	min	max			
mean	median	mean	median	min						max	min	max
PIPO	0.4	0.0	0.5	0.0	0.1	0.0	1.0	0.0	6.4	0.03		
LAOC	7.8	4.6	6.4	3.9	-1.4	0.0	22.7	0.0	52.7	8.9		
PICO	15.4	11.2	16.2	9.0	0.8	0.1	37.8	0.0	71.6	16.4		
PSME	18.3	12.1	18.1	13.9	-0.2	0.0	40.3	0.0	61.2	14.9		
ABGR	0.8	0.0	1.2	0.0	0.4	0.0	2.4	0.0	9.0	0.03		
ABLA2	39.3	35.9	43.5	35.8	4.2	*	11.6	62.6	4.1	89.9	31.4	
TSHE	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	7.9	0		
TSME	0.0	0.0	0.1	0.0	0.0	*	0.0	0.0	0.2	0		
PIAL	3.0	0.3	2.8	0.5	-0.2	0.0	12.8	0.0	16.3	1.2		
PIMO	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0		
HDWD	3.0	0.0	1.4	0.0	-1.6	*	0.0	0.3	33.5	0.6		
Herbland	1.3	0.3	1.5	0.2	0.2	0.0	3.2	0.0	9.7	25		
Shrubland	7.0	0.9	3.0	1.9	-3.9	*	0.0	17.2	0.0		31.0	
Other	3.4	0.9	5.0	1.0	1.6	*	0.0	9.1	0.0		19.8	



Cover Types by PVT within ESR 19.

ESR 19 Cover Types by PVT	PERCENT LAND						RV 80% Range		RV 100% Range	
	historical		current		mean difference	min	max	min	max	
	mean	median	mean	median						
Warm/dry - Douglas-fir/grand fir PVT										
LAOC ¹	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
PICO	0.1	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	2.5	11.3
PSME	0.8	0.0	0.6	0.0	-0.2	0.0	0.4	0.0	0.0	11.3
Other	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Cool/moist - Douglas fir/grand fir PVT										
PIPO	0.4	0.0	0.3	0.0	-0.1	0.0	0.3	0.0	6.2	6.2
LAOC	0.3	0.0	0.0	0.0	-0.2	0.0	0.8	0.0	3.2	3.2
PICO	3.7	0.0	0.8	0.0	0.1	0.0	2.6	0.0	5.7	5.7
PSME	3.9	0.7	4.7	0.6	0.8	0.0	9.0	0.0	22.3	22.3
ABGR	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	5.5	5.5
ABLA ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hardwood	0.4	0.0	0.1	0.0	-0.3	0.0	0.4	0.0	4.2	4.2
Herbland	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.6	0.6
Shrubland	0.5	0.0	0.1	0.0	-0.4	0.0	1.7	0.0	4.5	4.5
Cool/moist - western redcedar/western hemlock PVT										
LAOC	0.1	0.0	0.1	0.0	-0.1	0.0	0.8	0.0	1.1	1.1
PICO	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	2.1	2.1
PSME	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	2.5	2.5
ABGR	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	2.1	2.1
ABLA ²	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.8	0.8
TSHE	0.5	0.0	0.4	0.0	0.0	0.0	0.1	0.0	7.9	7.9
Mountain hemlock PVT										
PSME	0.1	0.0	0.0	0.0	-0.1	0.0	0.1	0.0	0.9	0.9
TSME	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Lodgepole pine PVT										
PICO	1.2	0.0	1.2	0.0	0.0	0.0	0.2	0.0	22.4	22.4

ESR 19 Cover Types by PVT	PERCENT LAND						RV 80% Range		RV 100% Range	
	historical		current							
	mean	median	mean	median		mean difference	min	max	min	max
Warm/dry - Engelmann spruce/subalpine fir PVT										
LAOC	0.3	0.0	0.5	0.0		0.2	0.0	0.4	0.0	4.3
PICO	1.8	0.0	1.8	0.3		0.0	0.0	4.6	0.0	11.2
PSME	4.5	0.0	3.1	0.0		-1.4	0.0	21.1	0.0	38.3
ABGR	0.0	0.0	0.0	0.0		0.0	*	0.0	0.0	0.3
ABLA2	4.3	2.0	5.6	1.7		1.3	*	0.0	11.8	19.2
Hardwood	0.1	0.0	0.0	0.0		-0.1	0.0	0.0	0.0	1.0
Shrubland	0.4	0.0	0.1	0.0		-0.3	*	0.0	1.3	2.6
Other	0.0	0.0	0.3	0.0		0.2		0.0	0.1	0.2
Cool/moist - Engelmann spruce/subalpine fir PVT										
PIPO	0.0	0.0	0.2	0.0		0.1		0.0	0.0	0.7
LAOC	7.0	3.7	5.3	1.5		-1.8	*	0.0	21.9	52.3
PICO	11.1	5.0	11.4	3.9		0.3		0.0	21.6	69.6
PSME	8.3	2.1	9.0	4.4		0.7		0.0	26.0	39.9
ABGR	0.4	0.0	0.8	0.0		0.4		0.0	1.1	4.2
ABLA2	27.2	24.1	30.0	27.1		2.8	*	8.0	46.5	49.6
PIAL	1.3	0.0	1.1	0.0		-0.2		0.0	5.4	6.2
Hardwood	2.6	0.0	1.4	0.0		-1.2		0.0	2.6	28.9
Herbland	0.6	0.1	0.7	0.1		0.2		0.0	2.2	4.6
Shrubland	2.9	0.3	0.7	0.5		-2.2	*	0.0	11.7	17.9
Other	0.4	0.1	1.0	0.1		0.6	*	0.0	1.4	1.6
Harsh/cold - Engelmann spruce/subalpine fir PVT										
LAOC	0.2	0.0	0.5	0.0		0.3		0.0	0.5	2.3
PICO	0.9	0.0	1.5	0.0		0.6		0.0	1.5	14.3
PSME	1.6	0.0	1.2	0.0		-0.4		0.0	1.6	24.4
ABLA2	5.1	0.1	5.4	0.3		0.3	*	0.0	23.4	36.9
PIAL	1.7	0.0	1.7	0.1		-0.1		0.0	6.8	10.8
PIMO	0.0	0.0	0.1	0.0		0.1		0.0	0.0	0.0
Hardwood	0.1	0.0	0.0	0.0		-0.1		0.0	0.0	1.6
Herbland	0.1	0.0	0.1	0.0		-0.1		0.0	0.1	1.9
Shrubland	0.4	0.0	0.1	0.0		-0.3	*	0.0	1.0	5.5
Other	0.3	0.0	0.0	0.0		-0.2	*	0.0	1.0	2.5
Mountain shrub PVT										
Herbland	0.3	0.0	0.4	0.0		0.1		0.0	0.2	5.0
Shrubland	1.5	0.0	0.7	0.0		-0.8		0.0	3.4	13.7
Other	0.2	0.0	1.0	0.0		0.8		0.0	0.5	2.3
Mountain riparian low shrub PVT										
Herbland	0.1	0.0	0.0	0.0		-0.1		0.0	0.0	1.1
Shrubland	0.1	0.0	0.1	0.0		0.1		0.0	0.4	0.4
Alpine herbland/low shrub PVT										
Herbland	0.1	0.0	0.1	0.0		0.0		0.0	0.1	1.0
Shrubland	1.2	0.0	1.1	0.0		-0.1	*	0.0	3.5	8.8
Other	0.0	0.0	0.1	0.0		0.1		0.0	0.1	0.5
Non-forest/non-range and other anthropogenic types										
Herbland	0.1	0.0	0.2	0.0		0.1	*	0.0	0.2	1.2
Shrubland	0.3	0.0	0.2	0.0		0.0		0.0	0.5	2.5
Other	2.6	0.2	2.6	0.2		0.1		0.0	7.9	17.8

Cover Type Patch density and size in ESR 19.

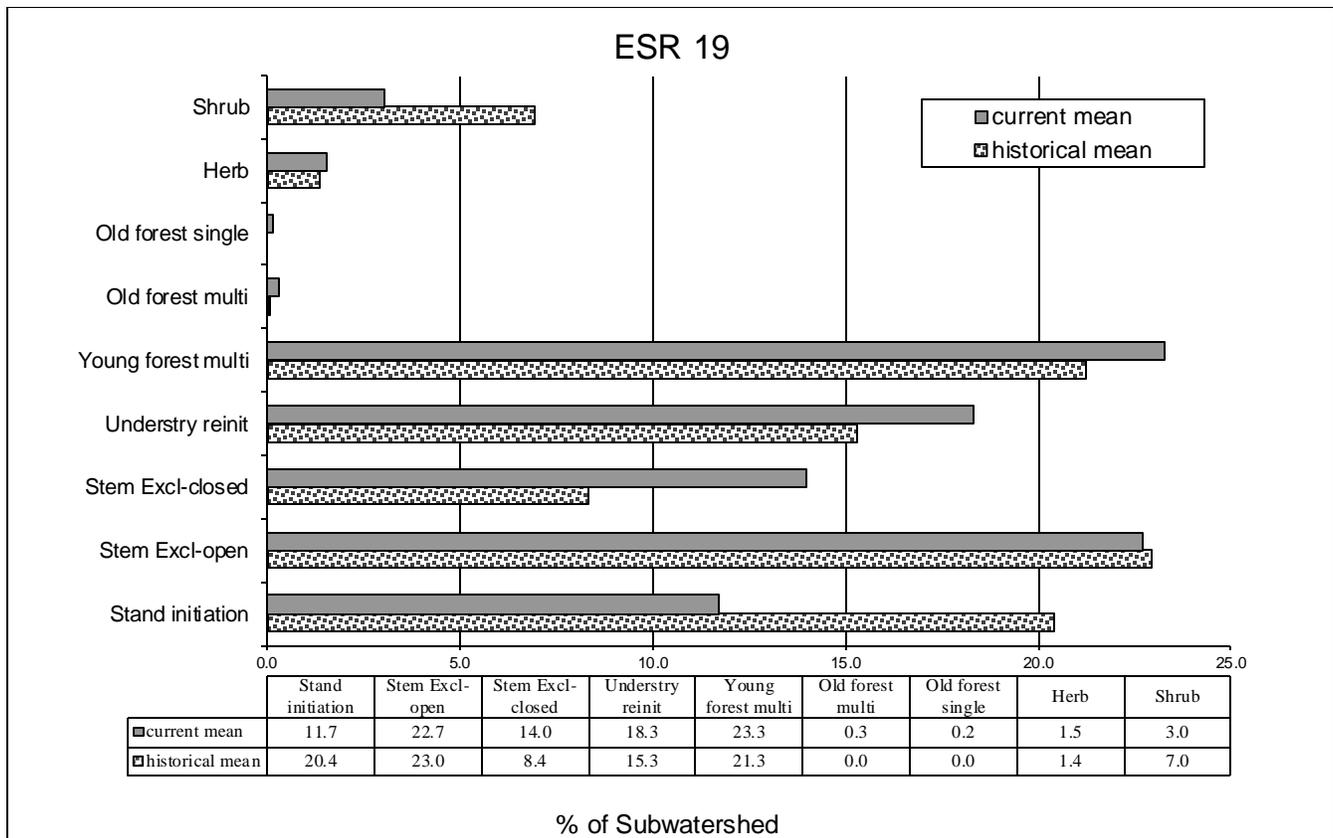
ESR19 Cover type patch density	Cover Type Patch Density (n/10,000 acres)									
	historical		current				RV 80% Range		RV 100% Range	
	mean	median	mean	median		mean difference	min	max	min	max
PIPO	2.5	0.0	2.5	0.0		2.5	0.0	4.9	0.0	17.3
LAOC	22.2	14.8	32.1	9.9		9.9	*	0.0	54.4	111.2
PICO	42.0	24.7	49.4	49.4		9.9	*	4.9	93.9	111.2

ESR19 Cover type patch density	Cover Type Patch Density (n/10,000 acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
PSME	32.1	22.2	44.5	37.1	14.8	*	0.0	76.6	0.0	91.4	
ABGR	2.5	0.0	4.9	0.0	2.5		0.0	17.3	0.0	19.8	
ABLA2	42.0	29.7	49.4	44.5	7.4		14.8	64.2	12.4	135.9	
TSHE	0.0	0.0	2.5	0.0	0.0		0.0	0.0	0.0	12.4	
TSME	0.0	0.0	2.5	0.0	0.0	*	0.0	0.0	0.0	7.4	
PIAL	9.9	4.9	9.9	7.4	0.0		0.0	29.7	0.0	54.4	
PIMO	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
Hardwood	12.4	0.0	12.4	0.0	0.0		0.0	7.4	0.0	150.7	
Herbland	9.9	4.9	14.8	4.9	2.5		0.0	22.2	0.0	49.4	
Shrubland	32.1	14.8	27.2	22.2	-2.5		0.0	93.9	0.0	131.0	
Other	22.2	12.4	22.2	12.4	2.5		0.0	59.3	0.0	79.1	

ESR19 Cover type patch size	Cover Type Mean Patch Size (acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
PIPO	22.5	0.0	28.3	0.0	5.7		0.0	80.3	0.0	228.3	
LAOC	209.4	114.6	111.7	100.0	-97.7	*	0.0	371.0	0.0	1641.7	
PICO	270.1	121.0	176.3	86.8	-93.9	*	21.3	416.9	0.0	2042.8	
PSME	487.6	196.4	578.6	212.8	91.0		0.0	1173.1	0.0	3300.0	
ABGR	24.4	0.0	28.6	0.0	4.2		0.0	70.2	0.0	290.9	
ABLA2	1012.0	595.5	1321.8	461.6	309.7		115.2	3116.4	69.9	4030.7	
TSHE	35.8	0.0	16.7	0.0	-19.1		0.0	0.0	0.0	383.1	
TSME	0.9	0.0	3.6	0.0	2.7	*	0.0	0.0	0.0	19.1	
PIAL	101.9	29.6	100.8	30.1	-1.1		0.0	183.3	0.0	885.5	
PIMO	0.0	0.0	7.8	0.0	7.8		0.0	0.0	0.0	0.0	
Hardwood	21.0	0.0	12.9	0.0	-8.1		0.0	34.5	0.0	242.8	
Herbland	40.4	26.6	40.8	14.4	0.4		0.0	84.3	0.0	255.9	
Shrubland	95.5	73.6	51.2	50.1	-44.4	*	0.0	195.3	0.0	467.4	
Other	60.9	31.3	94.2	22.6	33.3	*	0.0	161.6	0.0	289.8	

***** STRUCTURE CLASSES within ESR 19 *****

ESR19 Structure Class	PERCENT LAND AREA (Flathead NF HRV analysis data source)										CURRENT CONDITION (VMap data)	
						RV - 80%		100%		Forest Size Class used in Forest Plan Revision	Mean percent	
	historical		current		Range		Range					
	mean	median	mean	median	min	max	min	max				
si	20.4	10.3	11.7	10.7	-8.7	*	2.7	51.7	0.0	65.9	Seedling/Sapling	22.2
seoc	23.0	23.5	22.7	18.6	-0.2		5.2	47.2	4.3	64.2	Small Tree	25.3
secc	8.4	7.0	14.0	6.7	5.6	*	0.0	20.1	0.0	40.6		
ur	15.3	7.9	18.3	15.0	3.0		2.3	43.8	1.1	66.6	Medium Tree	28.8
yfms	21.3	15.5	23.3	16.9	2.0		5.7	43.2	1.3	69.8	Large Tree	10.6
ofms	0.0	0.0	0.3	0.0	0.3	*	0.0	0.0	0.0	0.2		
ofss	0.0	0.0	0.2	0.0	0.2	*	0.0	0.0	0.0	0.0		



Forest Structure Classes by PVT within ESR 19.

ESR 19 Structure Classes by PVT	PERCENT LAND AREA					RV 80% Range		RV 100% Range	
	historical		current		mean difference	min	max	min	max
	mean	median	mean	median					
Warm/dry - Douglas-fir/grand fir PVT									
si ¹	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.5
seoc	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.2
secc	0.3	0.0	0.1	0.0	-0.2	0.0	0.0	0.0	5.3
ur	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	6.5
yfms	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	2.3
Other	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Cool/moist - Douglas fir/grand fir PVT									
si	1.5	0.0	0.5	0.0	-1.0	* 0.0	7.1	0.0	8.1
seoc	2.3	0.0	1.7	0.0	-0.6	* 0.0	7.2	0.0	10.8
secc	0.3	0.0	1.3	0.0	1.0	* 0.0	0.3	0.0	3.5
ur	0.6	0.0	1.1	0.0	0.5	* 0.0	1.5	0.0	5.0
yfms	0.8	0.0	1.3	0.0	0.5	0.0	3.3	0.0	5.0
Herbland	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.6
Shrubland	0.5	0.0	0.1	0.0	-0.4	* 0.0	1.7	0.0	4.5
Cool/moist - western redcedar/western hemlock PVT									
si	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.3
seoc	0.1	0.0	0.2	0.0	0.2	* 0.0	0.0	0.0	0.9
secc	0.3	0.0	0.4	0.0	0.1	* 0.0	0.0	0.0	6.9
ur	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	3.6
yfms	0.3	0.0	0.2	0.0	-0.1	* 0.0	0.2	0.0	5.2
Mountain hemlock PVT									
seoc	0.0	0.0	0.1	0.0	0.0	* 0.0	0.0	0.0	0.3
yfms	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.9

ESR 19 Structure Classes by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range		
	historical		current				min	max	min	max	
	mean	median	mean	median		mean difference					
Lodgepolepine PVT											
si	0.9	0.0	0.0	0.0		-0.8		0.0	0.1	0.0	17.2
seoc	0.1	0.0	0.0	0.0		-0.1	*	0.0	0.0	0.0	1.3
secc	0.2	0.0	1.1	0.0		0.9		0.0	0.0	0.0	4.1
Warm/dry - Engelmann spruce/subalpine fir PVT											
si	1.4	0.0	1.4	0.0		0.1		0.0	3.4	0.0	11.9
seoc	1.7	0.2	1.8	0.2		0.1		0.0	4.8	0.0	5.8
secc	2.0	0.0	1.7	0.1		-0.3		0.0	1.7	0.0	26.7
ur	3.7	0.0	4.0	0.0		0.3		0.0	9.4	0.0	32.4
yfms	1.8	0.0	1.5	0.1		-0.3		0.0	6.1	0.0	11.1
ofms	0.0	0.0	0.1	0.0		0.1		0.0	0.0	0.0	0.0
ofss	0.0	0.0	0.1	0.0		0.1		0.0	0.0	0.0	0.0
Shrubland	0.4	0.0	0.1	0.0		-0.3	*	0.0	1.2	0.0	2.6
Other	0.0	0.0	0.2	0.0		0.2		0.0	0.1	0.0	0.2
Cool/moist - Engelmann spruce/subalpine fir PVT											
si	13.4	6.8	8.4	6.2		-5.0	*	1.5	45.5	0.0	48.4
seoc	16.2	9.7	15.8	9.5		-0.4		4.1	35.3	0.7	54.0
secc	4.8	4.9	8.3	3.0		3.4	*	0.0	10.7	0.0	12.8
ur	9.2	7.0	10.7	8.5		1.5		0.8	20.7	0.0	34.0
yfms	15.1	###	16.2	13.0		1.1		2.6	28.4	0.9	68.1
ofms	0.0	0.0	0.2	0.0		0.2	*	0.0	0.0	0.0	0.2
ofss	0.0	0.0	0.0	0.0		0.0	*	0.0	0.0	0.0	0.0
Herbland	0.6	0.1	0.7	0.1		0.2		0.0	2.2	0.0	4.6
Shrubland	2.8	0.2	0.7	0.5		-2.1	*	0.0	11.4	0.0	17.9
Other	0.4	0.1	1.0	0.1		0.6	*	0.0	1.4	0.0	1.6
Harsh/cold - Engelmann spruce/subalpine fir PVT											
si	3.1	0.0	1.2	0.1		-1.9	*	0.0	7.1	0.0	30.8
seoc	2.4	0.0	2.9	0.6		0.5		0.0	4.3	0.0	18.0
secc	0.4	0.0	1.2	0.0		0.8		0.0	1.4	0.0	4.1
ur	1.3	0.0	1.9	0.0		0.6		0.0	2.1	0.0	12.3
yfms	3.0	0.2	4.0	0.2		1.0		0.0	10.4	0.0	31.7
Herbland	0.1	0.0	0.1	0.0		-0.1		0.0	0.0	0.0	1.9
Shrubland	0.4	0.0	0.1	0.0		-0.3	*	0.0	0.9	0.0	5.5
Other	0.3	0.0	0.0	0.0		-0.2	*	0.0	0.9	0.0	2.5
Mountain shrub PVT											
yfms	0.0	0.0	0.0	0.0		0.0	*	0.0	0.0	0.0	0.0
Herbland	0.3	0.0	0.4	0.0		0.1		0.0	0.0	0.0	5.0
Shrubland	1.5	0.0	0.7	0.0		-0.8		0.0	2.6	0.0	13.7
Other	0.2	0.0	0.9	0.0		0.8		0.0	0.4	0.0	2.3
Mountain riparian low shrub PVT											
ur	0.0	0.0	0.0	0.0		0.0	*	0.0	0.0	0.0	0.0
Herbland	0.1	0.0	0.0	0.0		-0.1		0.0	0.0	0.0	1.1
Shrubland	0.1	0.0	0.1	0.0		0.1		0.0	0.3	0.0	0.4
Alpine herbland/low shrub PVT											
seoc	0.0	0.0	0.0	0.0		0.0	*	0.0	0.0	0.0	0.0
Herbland	0.1	0.0	0.1	0.0		0.0		0.0	0.0	0.0	1.0
Shrubland	1.1	0.0	1.0	0.0		-0.1	*	0.0	2.9	0.0	8.8
Other	0.0	0.0	0.1	0.0		0.1		0.0	0.1	0.0	0.5
Non-forest/non-range and other anthropogenic types											
Herbland	0.1	0.0	0.2	0.0		0.1	*	0.0	0.2	0.0	1.2
Shrubland	0.3	0.0	0.2	0.0		0.0		0.0	0.5	0.0	2.5
Other	2.5	0.3	2.5	0.2		0.1		0.0	7.3	0.0	17.8

Forest Structure Class Patch density and size in ESR 19.

ESR 19 Structure Class Patch density	Forest Structure Patch Density (n/10,000 acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
si	44.5	42.0	84.0	79.1	*	39.5	*	14.8	71.7	0.0	111.2
seoc	56.8	47.0	74.1	71.7		17.3	*	34.6	84.0	7.4	192.7
secc	32.1	22.2	47.0	37.1		17.3	*	0.0	79.1	0.0	91.4
ur	24.7	14.8	49.4	49.4		22.2	*	4.9	69.2	4.9	91.4
yfms	49.4	47.0	66.7	66.7		17.3	*	17.3	86.5	14.8	143.3
ofms	0.0	0.0	2.5	0.0		2.5	*	0.0	0.0	0.0	2.5
ofss	0.0	0.0	2.5	0.0		2.5	*	0.0	0.0	0.0	0.0
Herbland	9.9	7.4	14.8	4.9		2.5		0.0	22.2	0.0	49.4
Shrubland	32.1	14.8	27.2	22.2		-2.5		0.0	93.9	0.0	131.0
Other	22.2	12.4	22.2	12.4		2.5		0.0	59.3	0.0	79.1

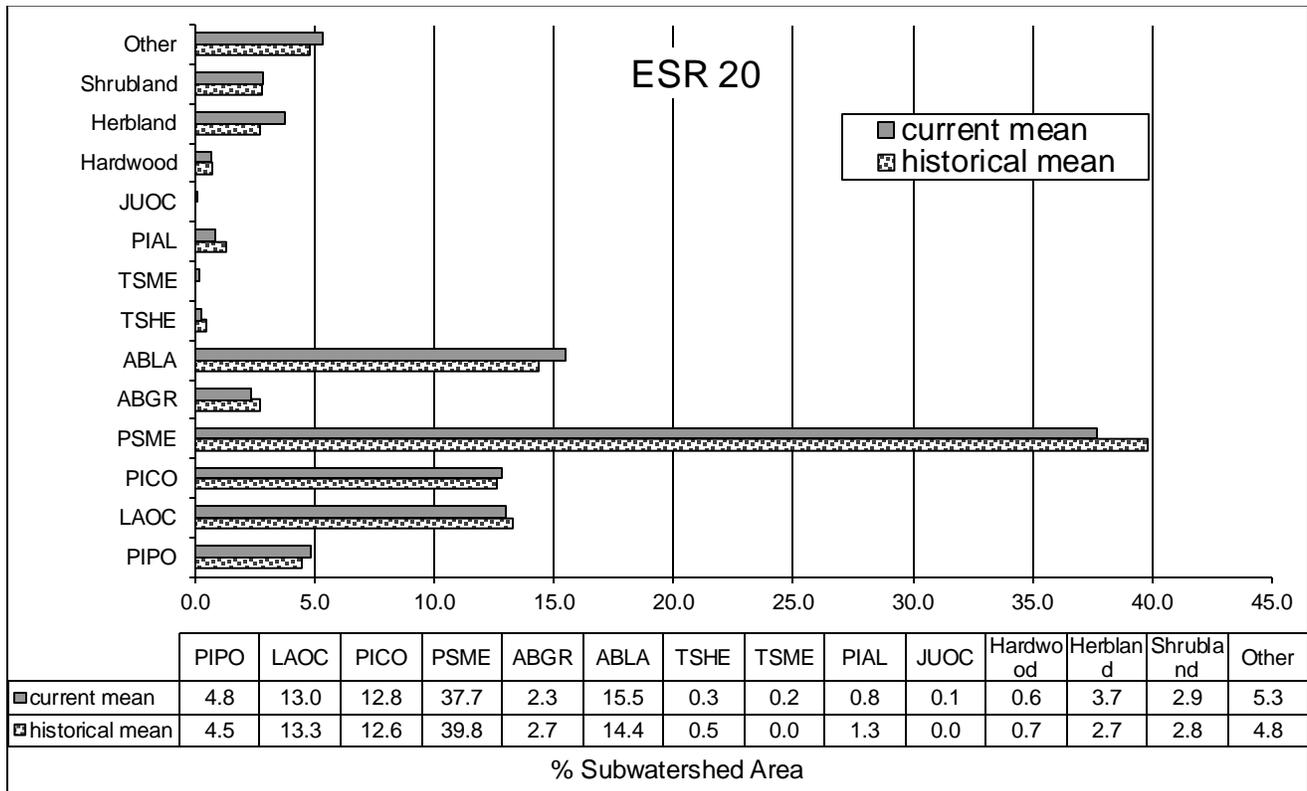
ESR 19 Structure Class Patch Size	Forest Structure Mean Patch Size (acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
si	282.5	148.9	87.4	75.3		-195.1	*	60.3	592.6	0.0	1109.4
seoc	293.3	212.3	210.2	138.1		-83.1	*	96.0	526.8	44.6	1130.1
secc	143.2	101.5	209.8	110.2		66.6	*	0.0	412.6	0.0	547.5
ur	677.0	251.9	302.8	193.6		-374.2	*	98.7	2588.1	66.3	4429.3
yfms	384.2	194.8	255.3	127.4		-129.0	*	65.5	614.7	37.6	2359.6
ofms	1.9	0.0	17.1	0.0		15.2	*	0.0	0.0	0.0	40.5
ofss	0.0	0.0	6.3	0.0		6.3	*	0.0	0.0	0.0	0.0
Herbland	44.8	28.8	41.1	14.4		-3.7		0.0	90.7	0.0	255.9
Shrubland	95.5	73.6	51.2	50.1		-44.4	*	0.0	195.3	0.0	467.4
Other	60.9	31.3	94.3	22.6		33.3	*	0.0	161.6	0.0	289.8

Ecological Subregion 20

***** COVER TYPES within ESR 20 *****

ES R20 Cover Types	PERCENT LAND AREA									CURRENT MEAN PERCENT (VMap data)
						RV - 80%		100%		
	historical		current		mean difference	Range		Range		
mean	median	mean	median	min		max	min	max		
PIPO	4.5	0.9	4.8	1.7	0.3	0.0	15.6	0.0	21.6	1.9
LAOC	13.3	12.9	13.0	10.9	-0.3	0.7	24.3	0.0	46.6	14.5
PICO	12.6	8.8	12.8	10.2	0.2	0.2	26.2	0.0	69.1	10.4
PSME	39.8	37.3	37.7	40.3	-2.1	18.9	57.5	0.0	64.5	38.7
ABGR	2.7	0.0	2.3	0.0	-0.4	0.0	4.1	0.0	33.6	0.01
ABLA2	14.4	9.7	15.5	9.9	1.1	4.6	31.7	3.7	38.5	5.4
TSHE	0.5	0.0	0.3	0.0	-0.2	0.0	0.0	0.0	6.7	0
TSME	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0
PIAL	1.3	0.0	0.8	0.0	-0.5	0.0	4.7	0.0	6.9	0.09

ESR 20 Cover Types	PERCENT LAND AREA										CURRENT MEAN PERCENT (VMap data)
						RV - 80%		100%			
	historical		current			Range		Range			
	mean	median	mean	median	mean difference	min	max	min	max		
HDWD	0.7	0.0	0.6	0.0	0.0	0.0	2.0	0.0	0.0	6.1	1.4
Herbland	2.7	1.2	3.7	2.1	1.0	0.0	9.1	0.0	0.0	12.0	25
Shrubland	2.8	1.6	2.9	0.9	0.0	0.0	6.3	0.0	0.0	7.0	
Other	4.8	3.1	5.3	4.7	0.5	0.2	8.5	0.0	0.0	23.2	



Cover Types by PVT within ESR 20.

ESR 20 Cover Types by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range	
	historical		current							
	mean	median	mean	median	mean difference		min	max	min	max
Warm/dry - Douglas-fir/grand fir PVT										
PIPO ¹	1.8	0.0	1.9	0.0	0.2		0.0	6.0	0.0	12.8
LAOC	1.2	0.0	0.9	0.0	-0.3	*	0.0	3.8	0.0	8.7
PICO	1.0	0.0	1.1	0.0	0.2		0.0	4.2	0.0	5.6
PSME	6.0	0.3	6.4	0.3	0.4		0.0	20.0	0.0	41.2
Herbland	0.4	0.0	0.3	0.0	-0.1		0.0	0.9	0.0	3.7
Shrubland	0.5	0.0	0.1	0.0	-0.4		0.0	1.5	0.0	4.8
Other	0.1	0.0	0.2	0.0	0.1		0.0	0.4	0.0	0.6
Cool/moist - Douglas fir/grand fir PVT										
PIPO	2.5	0.0	2.6	0.0	0.1		0.0	9.3	0.0	16.2
LAOC	1.7	0.2	1.2	0.0	-0.5		0.0	6.4	0.0	8.6
PICO	0.8	0.0	1.3	0.0	0.5		0.0	2.0	0.0	7.4

ESR 20 Cover Types by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range	
	historical		current		mean difference	min	max	min	max	
	mean	median	mean	median						
PSME	13.9	1.6	13.2	7.2	-0.7	0.0	36.5	0.0	52.1	
ABGR	1.9	0.0	1.9	0.0	0.0	0.0	0.3	0.0	28.0	
ABLA2	0.3	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	3.7	
Hardwood	0.1	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	1.9	
Herbland	0.7	0.0	0.6	0.0	-0.2	0.0	1.0	0.0	9.1	
Shrubland	0.4	0.0	1.5	0.0	1.1	0.0	1.9	0.0	3.0	
Other	0.3	0.0	0.4	0.0	0.2	0.0	0.8	0.0	2.2	
Warm/dry - western redcedar/western hemlock PVT										
PICO	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	
PSME	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	1.9	
Cool/moist - western redcedar/western hemlock PVT										
LAOC	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.9	
PICO	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	
PSME	0.1	0.0	0.2	0.0	0.1	0.0	0.3	0.0	0.8	
ABGR	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.7	
ABLA2	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.1	
TSHE	0.4	0.0	0.3	0.0	-0.2	0.0	0.0	0.0	6.5	
Shrubland	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.1	
Mountain hemlock PVT										
ABLA2	0.2	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	2.2	
TSME	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	
Lodgepole pine PVT										
PICO	0.4	0.0	0.4	0.0	0.0	0.0	1.5	0.0	2.0	
PSME	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	
Herbland	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	
Warm/dry - Engelmann spruce/subalpine fir PVT										
PIPO	0.1	0.0	0.0	0.0	-0.1	0.0	0.3	0.0	1.0	
LAOC	3.2	0.0	1.8	0.0	-1.4	0.0	8.0	0.0	24.5	
PICO	2.9	0.0	3.6	0.0	0.7	0.0	6.6	0.0	22.3	
PSME	8.9	3.0	8.4	0.2	-0.5	0.0	23.8	0.0	27.6	
ABGR	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1.0	
ABLA2	1.9	0.0	2.7	0.0	0.9	0.0	7.3	0.0	10.6	
Herbland	0.2	0.0	0.2	0.0	0.0	0.0	0.5	0.0	1.9	
Shrubland	0.3	0.0	0.3	0.0	0.0	0.0	0.9	0.0	1.2	
Other	0.4	0.0	0.7	0.0	0.3	*	0.0	0.6	3.7	
Cool/moist - Engelmann spruce/subalpine fir PVT										
PIPO	0.2	0.1	0.3	0.0	0.1	0.0	0.4	0.0	0.6	
LAOC	7.2	1.8	8.9	2.4	1.7	0.0	16.9	0.0	46.6	
PICO	7.6	1.2	6.2	3.8	-1.4	0.0	17.2	0.0	66.4	
PSME	10.7	7.9	9.4	5.4	-1.3	1.5	22.0	0.0	37.3	
ABGR	0.6	0.0	0.1	0.0	-0.5	0.0	1.1	0.0	6.6	
ABLA2	11.4	8.2	11.7	9.5	0.2	3.8	26.0	2.9	34.8	
PIAL	0.5	0.0	0.3	0.0	-0.2	0.0	1.9	0.0	3.6	
Hardwood	0.4	0.0	0.5	0.0	0.1	0.0	0.6	0.0	5.4	
JUOC	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	
Herbland	0.1	0.0	0.5	0.0	0.4	0.0	0.2	0.0	0.9	
Shrubland	0.7	0.2	0.6	0.0	-0.2	0.0	2.7	0.0	4.4	
Other	0.3	0.0	0.5	0.2	0.2	0.0	0.9	0.0	1.9	
Harsh/cold - Engelmann spruce/subalpine fir PVT										
PICO	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
PSME	0.2	0.0	0.1	0.0	0.0	0.0	0.4	0.0	1.3	
ABLA2	0.7	0.0	0.8	0.0	0.1	0.0	2.7	0.0	4.1	
PIAL	0.8	0.0	0.5	0.0	-0.2	0.0	1.6	0.0	6.2	
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.1	
Shrubland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	
Other	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	
Cottonwood PVT										
PICO	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	
Hardwood	0.1	0.0	0.1	0.0	0.0	0.0	0.5	0.0	0.7	
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	

ESR 20 Cover Types by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range	
	historical		current		mean difference	min	max	min	max	
	mean	median	mean	median						
Shrubland	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.2	
Fescue grassland PVT										
Herbland	0.3	0.0	0.5	0.0	0.3	0.0	0.1	0.0	3.7	
Shrubland	0.4	0.0	0.0	0.0	-0.4	0.0	0.0	0.0	5.9	
Other	0.1	0.0	0.2	0.0	0.1	0.0	0.5	0.0	1.3	
Salix/carex PVT										
Shrubland	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.0	1.0	
Mountain riparian lowshrub PVT										
Shrubland	0.1	0.0	0.1	0.0	0.0	*	0.0	0.4	0.0	0.6
Riparian sedge (no salix) PVT										
PICO	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Herbland	0.1	0.0	0.1	0.0	0.0	*	0.0	0.3	0.0	1.0
Alpine herbland/lowshrub PVT										
Shrubland	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Fescue with conifer encroachment PVT										
Herbland	0.5	0.0	0.7	0.0	0.2	*	0.0	1.1	0.0	5.6
Other	0.2	0.0	0.0	0.0	-0.2	*	0.0	0.6	0.0	1.4
Non-forest/non-range and other anthropogenic types										
Herbland	0.3	0.0	0.7	0.0	0.5	*	0.0	0.6	0.0	2.8
Shrubland	0.2	0.0	0.0	0.0	-0.2	*	0.0	0.9	0.0	1.2
Other	3.4	1.4	3.2	1.4	-0.2		0.0	7.9	0.0	19.4

Cover Type Patch Density and Size in ESR 20.

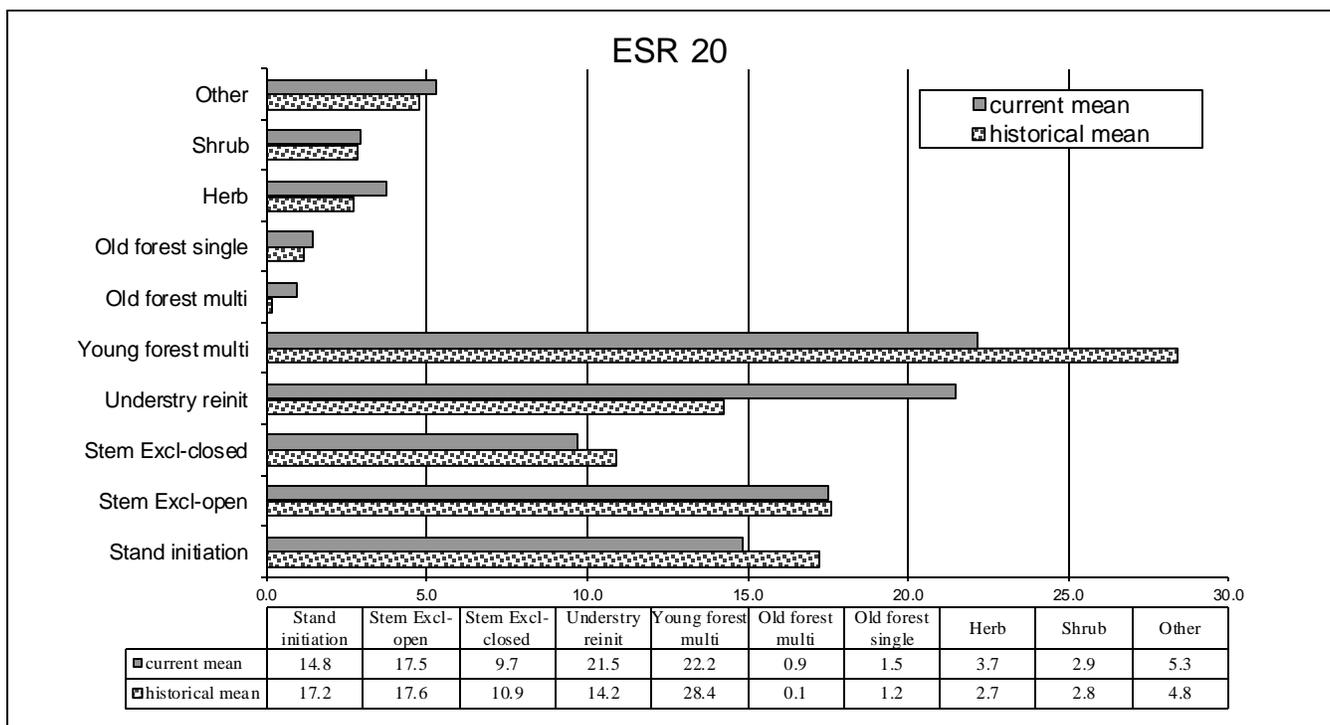
ESR20 Cover Type Patch Density	Cover Type Patch Density (n/10,000 acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	9.9	7.4	14.8	12.4	4.9	0.0	24.7	0.0	24.7	
LAOC	34.6	32.1	42.0	34.6	7.4	* ²	4.9	61.8	0.0	74.1
PICO	27.2	29.7	32.1	34.6	4.9	*	2.5	51.9	0.0	64.2
PSME	37.1	34.6	56.8	44.5	22.2	*	9.9	64.2	0.0	74.1
ABGR	7.4	0.0	7.4	0.0	0.0		0.0	12.4	0.0	79.1
ABLA2	29.7	29.7	39.5	29.7	12.4	*	7.4	49.4	4.9	51.9
TSHE	2.5	0.0	2.5	0.0	0.0		0.0	0.0	0.0	39.5
TSME	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
PIAL	4.9	0.0	4.9	0.0	0.0		0.0	14.8	0.0	29.7
PIMO	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Hardwood	2.5	0.0	4.9	0.0	2.5	*	0.0	7.4	0.0	12.4
Herbland	17.3	12.4	27.2	17.3	9.9	*	0.0	29.7	0.0	93.9
Shrubland	12.4	12.4	29.7	12.4	17.3	*	2.5	27.2	0.0	37.1
Other	17.3	19.8	34.6	34.6	17.3	*	2.5	34.6	0.0	34.6

ESR20 Cover Type patch Size	Cover Type Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
PIPO	171.0	29.2	295.2	76.1	124.2		0.0	534.2	0.0	742.5
LAOC	211.5	168.5	199.4	134.9	-12.1		45.5	378.6	0.0	654.4
PICO	203.5	162.1	184.4	152.8	-19.1		27.9	280.4	0.0	1182.2
PSME	1053.4	629.9	921.1	323.5	-132.4		206.2	2828.6	0.0	3718.1
ABGR	36.7	0.0	16.4	0.0	-20.4	*	0.0	162.4	0.0	260.3
ABLA2	525.5	202.2	281.3	161.8	-244.2	*	99.1	1578.0	88.7	1981.8

ESR20 Cover Type patch Size	Cover Type Mean Patch Size (acres)									
	historical		current		mean difference	RV 80% Range		RV 100% Range		
	mean	median	mean	median		min	max	min	max	
TSHE	6.9	0.0	3.3	0.0	-3.6	0.0	0.0	0.0	0.0	103.7
TSME	0.0	0.0	17.4	0.0	17.4	0.0	0.0	0.0	0.0	0.0
PIAL	92.0	0.0	36.0	0.0	-56.0	*	0.0	345.7	0.0	534.0
PIMO	0.0	0.0	6.2	0.0	6.2		0.0	0.0	0.0	0.0
Hardwood	46.4	0.0	34.4	0.0	-12.0		0.0	218.1	0.0	277.9
Herbland	76.3	31.7	93.4	49.8	17.0		0.0	257.1	0.0	346.1
Shrubland	150.4	83.0	43.1	42.3	-107.3	*	3.1	246.9	0.0	994.0
Other	142.1	109.8	82.5	50.2	-59.5	*	14.5	262.0	0.0	589.4

***** STRUCTURE CLASSES within ESR 20 *****

ESR19 Structure Class	PERCENT LAND AREA										CURRENT CONDITION (VMap data)	
	historical		current		mean difference	RV - 80% Range		100% Range		Forest Size Class used in Forest Plan Revision	Mean percent	
	mean	median	mean	median		min	max	min	max			
si	17.2	17.0	14.8	12.9	-2.4	5.4	28.9	0.7	47.3	Seedling/Sapling	13.3	
seoc	17.6	12.2	17.5	15.4	-0.1	5.5	35.4	3.7	44.0	Small Tree	30.1	
secc	10.9	8.1	9.7	7.7	-1.2	0.2	21.4	0.0	27.3	Medium Tree	28.2	
ur	14.2	9.9	21.5	14.6	7.2	*	3.7	31.0	2.2	35.1	Medium Tree	28.2
yfms	28.4	25.3	22.2	17.1	-6.2	*	14.1	44.0	8.3	75.4	Large Tree	3.6
ofms	0.1	0.0	0.9	0.0	0.8	*	0.0	0.0	0.0	2.2	Large Tree	3.6
ofss	1.2	0.0	1.5	0.0	0.3	*	0.0	0.0	0.0	17.3	Large Tree	3.6



Forest Structure Classes by PVT within ESR 20.

ESR 20 Structure Classes by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range	
	historical		current		mean difference	*	min	max	min	max
	mean	median	mean	median						
Warm/dry - Douglas-fir/grand fir PVT										
si ¹	1.9	0.0	1.3	0.0	-0.6		0.0	4.8	0.0	10.6
seoc	2.7	0.0	3.3	0.0	0.6		0.0	7.0	0.0	19.8
secc	0.8	0.0	1.3	0.0	0.5	*	0.0	1.7	0.0	8.5
ur	1.1	0.0	2.0	0.0	0.8	*	0.0	3.4	0.0	8.4
yfms	3.4	0.2	2.1	0.1	-1.3	*	0.0	12.6	0.0	14.2
ofms	0.0	0.0	0.3	0.0	0.3		0.0	0.0	0.0	0.0
ofss	0.0	0.0	0.2	0.0	0.2		0.0	0.0	0.0	0.0
Herbland	0.4	0.0	0.3	0.0	-0.1		0.0	0.9	0.0	3.7
Shrubland	0.5	0.0	0.1	0.0	-0.4		0.0	1.5	0.0	4.8
Other	0.1	0.0	0.2	0.0	0.1		0.0	0.4	0.0	0.6
Cool/moist - Douglas fir/grand fir PVT										
si	3.3	1.5	3.5	0.6	0.3		0.0	9.5	0.0	17.8
seoc	5.2	0.5	4.5	1.2	-0.8		0.0	17.4	0.0	29.6
secc	2.4	0.0	2.1	0.1	-0.3		0.0	10.0	0.0	15.5
ur	3.0	1.4	6.2	0.8	3.3	*	0.0	7.0	0.0	17.8
yfms	6.6	1.3	2.9	1.5	-3.7	*	0.0	16.6	0.0	32.5
ofms	0.0	0.0	0.4	0.0	0.4		0.0	0.0	0.0	0.6
ofss	0.6	0.0	0.7	0.0	0.1		0.0	0.0	0.0	9.1
Herbland	0.7	0.0	0.6	0.0	-0.2		0.0	1.0	0.0	9.1
Shrubland	0.4	0.0	1.5	0.0	1.1		0.0	1.9	0.0	3.0
Other	0.3	0.0	0.4	0.0	0.2		0.0	0.8	0.0	2.2
Warm/dry - western redcedar/western hemlock PVT										
si	0.1	0.0	0.0	0.0	-0.1		0.0	0.0	0.0	1.2
seoc	0.0	0.0	0.1	0.0	0.0		0.0	0.0	0.0	0.4
ur	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.0
Cool/moist - western redcedar/western hemlock PVT										
si	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.0
seoc	0.1	0.0	0.0	0.0	-0.1		0.0	0.0	0.0	2.0
secc	0.2	0.0	0.1	0.0	-0.1		0.0	0.0	0.0	2.7
ur	0.0	0.0	0.1	0.0	0.1	*	0.0	0.0	0.0	0.1
yfms	0.3	0.0	0.4	0.0	0.1		0.0	1.0	0.0	2.2
ofms	0.1	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.9
ofss	0.2	0.0	0.3	0.0	0.1		0.0	0.0	0.0	2.5
Shrubland	0.0	0.0	0.2	0.0	0.2		0.0	0.0	0.0	0.1
Mountain hemlock PVT										
ur	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.0
yfms	0.1	0.0	0.1	0.0	0.0		0.0	0.0	0.0	1.5
Lodgepole pine PVT										
si	0.2	0.0	0.0	0.0	-0.2	*	0.0	1.0	0.0	1.3
secc	0.1	0.0	0.4	0.0	0.3	*	0.0	0.0	0.0	1.7
Herbland	0.1	0.0	0.0	0.0	0.0		0.0	0.2	0.0	0.4
Warm/dry - Engelmann spruce/subalpine fir PVT										
si	4.0	0.0	1.5	0.2	-2.4		0.0	7.4	0.0	39.3
seoc	3.1	0.3	3.3	0.6	0.2		0.0	7.5	0.0	15.5
secc	1.7	0.0	3.3	0.0	1.5		0.0	5.6	0.0	12.0
ur	3.4	0.6	5.0	0.7	1.6	*	0.0	11.9	0.0	14.7
yfms	4.6	0.9	3.4	3.0	-1.3	*	0.0	10.7	0.0	14.2
ofms	0.0	0.0	0.2	0.0	0.1		0.0	0.0	0.0	0.5
ofss	0.2	0.0	0.2	0.0	-0.1		0.0	0.0	0.0	3.4
Herbland	0.2	0.0	0.2	0.0	0.0		0.0	0.5	0.0	1.9
Shrubland	0.3	0.0	0.3	0.0	0.0		0.0	0.9	0.0	1.2
Other	0.4	0.0	0.7	0.0	0.3	*	0.0	0.6	0.0	3.7
Cool/moist - Engelmann spruce/subalpine fir PVT										
si	7.1	3.5	7.8	3.3	0.7		0.5	19.7	0.2	24.0
seoc	5.9	4.6	6.0	4.6	0.1		0.8	9.8	0.0	21.6
secc	5.6	3.1	2.5	1.8	-3.1	*	0.0	12.7	0.0	27.3
ur	6.7	4.3	7.8	5.4	1.1	*	0.3	14.7	0.0	29.0

ESR 20 Structure Classes by PVT	PERCENT LAND AREA						RV 80% Range		RV 100% Range	
	historical		current		mean difference	*	min	max	min	max
	mean	median	mean	median						
yfms	12.9	4.6	13.0	5.6	0.1		1.2	35.8	0.4	71.0
ofss	0.2	0.0	0.2	0.0	0.0	*	0.0	0.0	0.0	2.4
Herbland	0.1	0.0	0.5	0.0	0.4		0.0	0.2	0.0	0.9
Shrubland	0.7	0.2	0.6	0.0	-0.1		0.0	2.7	0.0	4.4
Other	0.3	0.0	0.5	0.2	0.2		0.0	0.9	0.0	1.9
Harsh/cold - Engelmannspruce/subalpine fir PVT										
si	0.6	0.0	0.5	0.0	-0.1		0.0	1.1	0.0	5.3
seoc	0.4	0.0	0.3	0.0	-0.2		0.0	1.6	0.0	3.4
ur	0.1	0.0	0.2	0.0	0.2	*	0.0	0.0	0.0	0.8
yfms	0.6	0.0	0.5	0.0	0.0		0.0	1.9	0.0	3.1
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.1
Shrubland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Cottonwood PVT										
si	0.1	0.0	0.1	0.0	0.0		0.0	0.1	0.0	0.7
seoc	0.1	0.0	0.1	0.0	0.0		0.0	0.0	0.0	0.7
Herbland	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Shrubland	0.0	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.2
Fescue grassland PVT										
Herbland	0.3	0.0	0.5	0.0	0.3		0.0	0.1	0.0	3.7
Shrubland	0.4	0.0	0.0	0.0	-0.4		0.0	0.0	0.0	5.9
Other	0.1	0.0	0.2	0.0	0.1		0.0	0.5	0.0	1.3
Salix/carex PVT										
Shrubland	0.1	0.0	0.1	0.0	0.0		0.0	0.2	0.0	1.0
Mountain riparian lowshrub PVT										
Shrubland	0.1	0.0	0.1	0.0	0.0	*	0.0	0.4	0.0	0.6
Riparian sedge (no salix) PVT										
secc	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
Herbland	0.1	0.0	0.1	0.0	0.0	*	0.0	0.3	0.0	1.0
Alpine herbland/lowshrub PVT										
Shrubland	0.0	0.0	0.1	0.0	0.0		0.0	0.0	0.0	0.6
Fescue with conifer encroachment PVT										
Herbland	0.5	0.0	0.7	0.0	0.2	*	0.0	1.1	0.0	5.6
Other	0.2	0.0	0.0	0.0	-0.2	*	0.0	0.6	0.0	1.4
Non-forest/non-range and other anthropogenic types										
Herbland	0.3	0.0	0.7	0.0	0.5	*	0.0	0.6	0.0	2.8
Shrubland	0.2	0.0	0.0	0.0	-0.2	*	0.0	0.9	0.0	1.2
Other	3.4	1.4	3.2	1.4	-0.2		0.0	7.9	0.0	19.4

Forest Structure Class Patch density and size by ESR 20.

ESR20 Structure Class patch density	Forest Structure Patch Density (n/10,000 acres)										
	historical		current		mean difference	*	RV 80% Range		RV 100% Range		
	mean	median	mean	median			min	max	min	max	
si	39.5	42.0	71.7	64.2	*	32.1	*	19.8	59.3	12.4	61.8
seoc	51.9	49.4	84.0	76.6		32.1	*	17.3	81.5	9.9	93.9
secc	22.2	22.2	42.0	39.5	*	17.3	*	2.5	34.6	0.0	103.8
ur	27.2	27.2	51.9	44.5		22.2	*	12.4	44.5	12.4	59.3
yfms	47.0	47.0	69.2	64.2		19.8	*	24.7	71.7	4.9	91.4
ofms	2.5	0.0	4.9	0.0		2.5		0.0	0.0	0.0	19.8
ofss	9.9	0.0	12.4	0.0		2.5	*	0.0	0.0	0.0	143.3
Herbland	17.3	12.4	27.2	17.3		9.9	*	0.0	29.7	0.0	93.9
Shrubland	12.4	12.4	32.1	12.4		17.3	*	2.5	27.2	0.0	37.1
Other	17.3	19.8	34.6	34.6		17.3	*	2.5	34.6	0.0	34.6

ESR20 Structure Class patch size	Forest Structure Mean Patch Size (acres)										
	historical		current		mean difference	RV 80% Range		RV 100% Range			
	mean	median	mean	median		min	max	min	max		
si	262.4	193.5	170.5	118.4	-91.9	103.1	495.8	32.5	666.9		
seoc	238.3	164.7	131.0	105.7	-107.2	*	99.0	398.0	86.5	681.8	
secc	293.3	286.5	125.2	131.3	-168.2	*	15.4	620.2	0.0	623.3	
ur	362.5	229.0	303.5	225.3	-59.0		98.5	599.8	69.8	1578.0	
yfms	874.0	301.1	217.4	138.0	*	-656.7	*	154.3	862.7	69.9	7963.9
ofms	4.5	0.0	38.5	0.0	34.0		0.0	0.0	0.0	67.2	
ofss	4.9	0.0	14.6	0.0	9.7	*	0.0	0.0	0.0	73.3	
Herbland	76.4	31.6	93.4	49.8	17.0		0.0	257.1	0.0	346.1	
Shrubland	150.4	83.0	48.5	50.7	-101.9	*	3.1	247.0	0.0	994.0	
Other	142.1	109.8	82.5	50.2	-59.5	*	14.5	262.0	0.0	589.4	

Other vegetation attributes for which historical condition tables are available

Below is the list of all vegetation attributes that were evaluated in the Flathead NF HRV analysis and for which tables similar to those included in this appendix are available for each Ecological Subregion. For each of these attributes, the Historical and Current Mean and Median; the Mean Difference between historical and current; and the Reference Variation at the 80% and 100% range were calculated for the Percentage Area, Patch Density, Mean Patch Size, Mean Nearest Neighbor, and Edge Density.

Vegetation attributes:

1. Physiognomic conditions (forest, woodland, shrubland, herbland, other)
2. Cover types (*included in this appendix*)
3. Structure classes (*included in this appendix*)
4. Cover type – Structure class couplets (e.g. PIPO-stand initiation; PIPO-stem exclusion open canopy; etc)
5. Potential vegetation type – cover type couplets (e.g. warm/dry-Douglas-fir/grand fir PVT – LAOC; warm/dry-Douglas-fir/grand fir PVT – PICO; etc. (*included in this appendix*))
6. Potential vegetation type – structure type couplets (e.g. warm/dry-Douglas-fir/grand fir PVT – stand initiation; warm/dry-Douglas-fir/grand fir PVT – understory reinitiation; etc.) (*included in this appendix*)
7. Potential vegetation type – cover type – structure class triplets (e.g. warm/dry-Douglas-fir/grand fir PVT – LAOC – stand initiation; warm/dry-Douglas-fir/grand fir PVT – LAOC – understory reinitiation; etc)
8. Total crown cover (10-30%, 40-50%, 60-80%, 90-100%, no tree cover)
9. Canopy layers (1, 2, >2, no tree cover)
10. Tree cover in clumps (no tree cover, yes, no)
11. Density of tree cover clumps (no tree cover, low, moderate, high)
12. Size of tree cover clumps (no tree cover, <1 ac, 1-5 acs, 5-10 acs)
13. Riparian/wetland status (yes, no)
14. Percentage of trees dead or as snags (none, <10%, 10-39%, 40-70%, >70%)
15. Logging entry (none, regenerated, selective, thinned, patch clearcut (openings <10 acs))
16. Forest understory species (tree species)
17. Grass-forb-shrub-bareground and conifer-hardwood understory species (combined understories)
18. Large and medium tree size classes (<16" dbh, 16-25" dbh, >25" dbh, >16" dbh)
19. Medium and large tree crown cover (none, 10-30%, 40-60%, 70-100%)
20. Remnant large tree (not old forest, ofms, ofss, no large trees)

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