

# WHITE PAPER

USDA Forest Service

Pacific Northwest Region

Umatilla National Forest

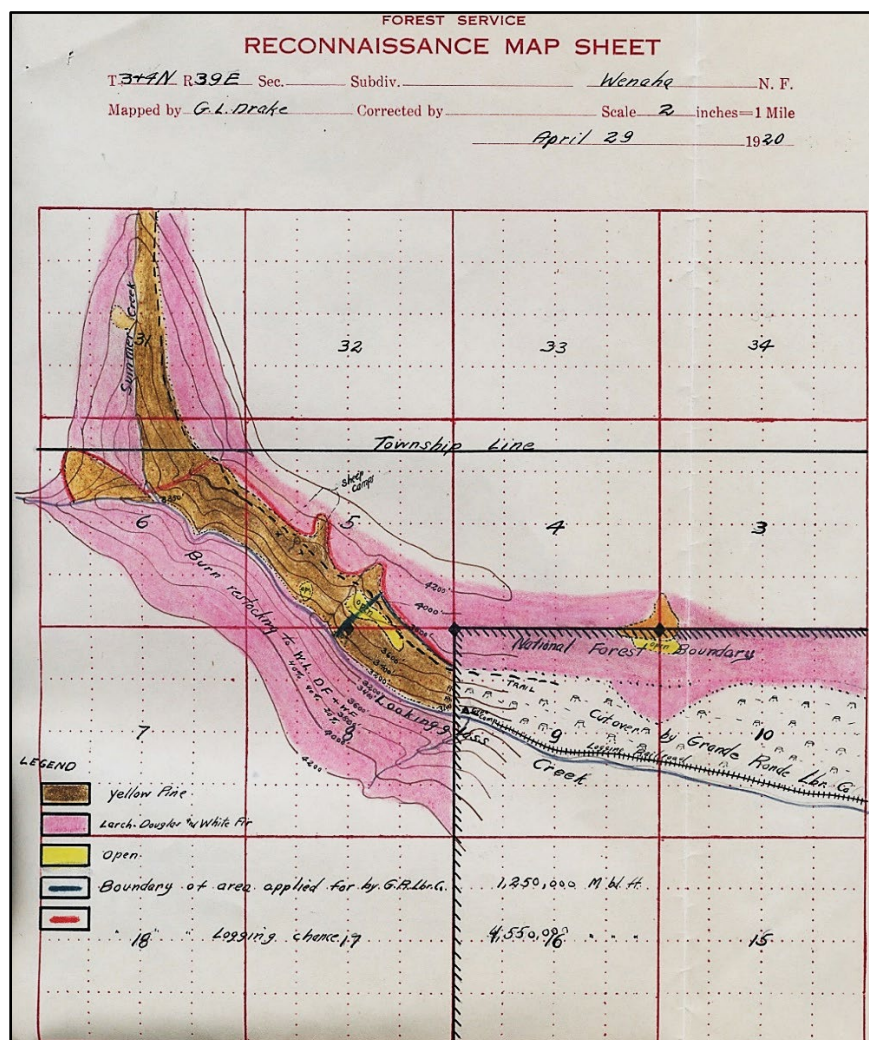
## WHITE PAPER F14-SO-WP-SILV-23

### Historical Vegetation Mapping

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## INTRODUCTION

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With the advent of ecosystem management, ecosystem analysis at the watershed scale, historical range of variability, and related concepts, there is increasing emphasis on using historical information to inform analysts about reference conditions (Churchill et al. 2017, Dillon et al. 2005, Hagmann et al. 2013, Johnston et al. 2018, Kaufmann et al. 1998, Meyer et al. 2005).

In response to this emphasis, the Umatilla National Forest silviculture library added an archives section in 1993 to organize and manage materials relating to historical vegetation conditions.

A silviculture library archives section contains books, aerial photographs, General Land Office survey notes, early government reports and records, journal articles, maps, newspaper articles, photographs, and similar items (Powell 1999).

Many of these items were obtained from National Archives and Records Administration, either from its regional branch in Seattle, Washington or the national NARA repository in College Park, Maryland.

Historical maps displaying vegetation conditions are valuable for comparing current or existing conditions with reference conditions. Many contemporary issues focus on changes in an ecosystem component through time (i.e., trends in old growth forest, big-tree abundance, etc.), particularly when current conditions are believed to deviate substantially from conditions at the time of Euro-American settlement (presettlement conditions).

As is the case with any data source, historical mapping can be ideal for some applications and present issues for other purposes (Egan and Howell 2001). An example is that some historical maps provide a relatively high amount of detail for commercial forest types but little or no information for nonforest and noncommercial types.



## OBJECTIVES

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**An objective of this document is to describe historical vegetation maps available from Supervisor's Office of Umatilla National Forest.**

Although maps described below are stored at Umatilla National Forest's Supervisor's Office, many of them pertain to the entire Blue Mountains, so they also characterize vegetation conditions for all or portions of the Malheur and Wallowa-Whitman National Forests.

This summary describes two types of maps:

- Those characterizing vegetation conditions directly, and
- Those portraying disturbance processes influencing vegetation conditions (insect outbreaks, wildfires, windstorms, etc.).

Other historical maps are available in the archives section, including forest visitor's maps dating back to 1904, but they are not included in this report unless they also provide information about vegetation conditions.

Several other white papers also describe maps depicting historical conditions for Umatilla National Forest.

White paper Silv-21, "Historical fires in headwaters portion of Tucannon River watershed" (Powell 2012), provides maps showing reconstructed locations for 40 historical fires (Heyerdahl 1997) occurring between years 1583 and 1898 for a portion of Tucannon River watershed, located on Pomeroy Ranger District of Umatilla National Forest.

White paper Silv-41, "Using General Land Office survey notes to characterize historical vegetation conditions for Umatilla National Forest" (Powell 2019), describes how GLO survey notes were analyzed to prepare a map depicting ecological systems (vegetation types) as they are believed to have existed during the presettlement era for Umatilla NF; this mapping pertains primarily to a period of 1879 to 1887.

## MAP DESCRIPTIONS

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The following vegetation and disturbance maps are included in an historical archives of Umatilla National Forest silviculture library; map descriptions are arranged chronologically from oldest source to most recent source.

1. Interpretation of General Land Office survey notes (1850s to 1930s).
  - a. **Source:** This map was derived from survey notes collected during land surveys conducted by General Land Office (GLO). For Umatilla National Forest, many townships were surveyed between 1879 and 1887.
  - b. **Description:** Between November 1995 and May 2001, Martha King interpreted GLO survey notes for 120 townships located within or adjacent to Umatilla National Forest. Bearing tree information, and many other data items, were entered in a non-normalized Paradox database (flat-file format), with each database record linked to its corresponding section corner or section line (quarter-corner data was referenced to section lines). This Paradox database was later migrated to a normalized (multi-table) Access database structure.
  - c. **Scale:** Not entered from GLO maps; a GIS coverage is available showing all section lines and corners for which interpreted data is available.
  - d. **Status:** A coverage is available in GIS where each section line and section corner was assigned a unique identification number. The unique ID allows the spatial location of each section line or corner to be linked with its corresponding database information.

Titan Geospatial Services and Oregon Natural Heritage Information Center prepared an interpolated vegetation coverage by cokriging GLO survey notes; this GLO map is depicted in appendix D, and is provided as a PDF file on the Forest's history website: [History Website](#)

Methodology and results of a project to interpret GLO survey notes for 120 townships involving Umatilla National Forest are described in a white paper (Powell 2019).
  - e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/glo
2. Map of state of Oregon showing classification of lands and forests (Thompson and Johnson 1900).
  - a. **Source:** This map was included with a report called "The forests of Oregon" by Henry Gannett (1902a).
  - b. **Description:** Shows forested areas within state of Oregon, as classified by using volume per acre, while also providing ancillary information about location of harvested areas, burns (forest fires), and the northern limit of redwood. Following items are included in the legend for this map source:
    - Timberless area;
    - Woodland;
    - 0 to 5,000 board feet per acre;
    - 5,000 to 10,000 board feet per acre;
    - 10,000 to 25,000 board feet per acre;
    - 25,000 to 50,000 board feet per acre;

- 50,000 and over board feet per acre;
  - Barren;
  - Burnt;
  - Cut timber, not restocking;
  - Cut timber, restocking; and
  - Northern limit of redwood.
- c. **Scale:** 1:1,000,000 (projection unknown); 29" × 23" colored thematic map sheet.
- d. **Status:** This map was photographically copied, and copies are hanging at several locations in Umatilla NF Supervisor's Office and in the Forest's Ranger District offices.
- This Oregon map is included in appendix D. It is also available in digital form (GIS), but only for the northeastern Oregon portion, including full extent for Malheur, Umatilla, and Wallowa-Whitman National Forests.
- A corresponding Washington map is also available – see item #3 below.
- Titan Geospatial Services prepared a display version of this map (Umatilla National Forest portion only); it is included in appendix D, and it is provided as a PDF file on the Forest's history website: [History Website](#)
- e. **GIS Pathname:** /fsfiles/ref/library/gis/bmprov/hveg\_1900
3. Map of Washington showing classification of lands (Plummer et al. 1902).
- a. **Source:** This map was included with a report called "The forests of Washington, a revision of estimates" by Henry Gannett (1902b).
- b. **Description:** Shows forested areas within state of Washington, as classified by using volume per acre, and it also provides ancillary information such as location of cut (harvested) areas and burns (forest fires). Following items are included in the legend:
- Cut areas;
  - Timberless area;
  - Burned areas;
  - 0 to 2,000 board feet per acre;
  - 2,000 to 5,000 board feet per acre;
  - 5,000 to 10,000 board feet per acre;
  - 10,000 to 25,000 board feet per acre;
  - 25,000 to 50,000 board feet per acre; and
  - 50,000 to 100,000 board feet per acre.
- c. **Scale:** 1:1,000,000 (projection unknown); 29" × 23" colored thematic map.
- d. **Status:** Two portions of this map were copied in color (one 11" × 14" sheet shows the map title, authors, and legend; another sheet shows southeastern Washington portion only).
- This Washington map is included in appendix D.
- It was not digitized (and is not available in GIS) because mapping is so coarse as to be unusable, and because southeastern quarter of this Washington map will not edge match with the greater detail provided by northeastern quarter of the Oregon map (item 2 above describes a corresponding Oregon map).

4. Location and extent of forest fires occurring in 1910 (Plummer 1912).
  - a. **Source:** Fire extents for 'fires of 1910' were presented for all of the western United States as figure 5 of a report: "Forest fires: their causes, extent and effects, with a summary of recorded destruction and loss" by Fred G. Plummer (1912).
  - b. **Description:** The original, large-scale map shows state boundaries and fire extents for the portion of the United States located west of the 100<sup>th</sup> meridian.  
Historical Context: 1910 is viewed as perhaps the worst fire year in United States history. In summer of 1910, wildfires in the northern Rockies covered millions of acres (app. 3 million in a 'Big Blowup' area of northern Idaho and western Montana), but Plummer's map (p. 37) clearly shows that 1910 fires affected much more of western US than just the northern Rockies. In fact, after entering Plummer's map data into GIS, it was found that for Umatilla NF, 1910 has more burn area than any other year (including 1996, when almost 100,000 acres burned in the Tower, Summit, Bull, and Wheeler Point fires).  
 Good accounts of the 1910 fire year are provided by several references, including Stephen Pyne's "Year of the fires: The story of the great fires of 1910" (Pyne 2001), Timothy Egan's "The big burn: Teddy Roosevelt and the fire that saved America" (Egan 2010), and an interesting booklet released by Northern Region (R-1) entitled "When the mountains roared: Stories of the 1910 fires" (USDA Forest Service 2010).
  - c. **Scale:** Scale and projection are unknown because this map source was published as a figure in a bulletin, and no legend or scale bar were included with the figure.
  - d. **Status:** Map was scanned at a high resolution, and the resulting image file was georeferenced by using state boundaries for topological control; location and extent of forest fires shown as occurring anywhere in a Blue Mountains province of northeastern Oregon and southeastern Washington were then entered into a geographical information system by using heads-up digitizing.  
 Figure 5 from Plummer (1912) is depicted in appendix D.
  - e. **GIS Pathname:** /fsfiles/ref/library/gis/bmprov/firehis\_pl
5. Insect control project, northeastern Oregon, 1911 (USDA Forest Service 1911?).
  - a. **Source:** This map was undoubtedly prepared to accompany one of a half dozen (or so) reports pertaining to an insect control project on Whitman National Forest, although it is unknown which one because the map margins provide few annotations or notes.
  - b. **Description:** Map extends from Burnt River on the south to Powder River and Antone Creek on the north (township 6 south, ranges 37 and 38 east). Towns of Hereford, Bourne, Baker City, and Sumpter, Oregon are shown on this map. Legend for this map includes three items:
    - Yellow (ponderosa) pine areas treated;
    - Lodgepole areas treated; and
    - Forest boundary.
  - c. **Scale:** 1:63,360 (projection unknown); 31" × 43" thematic map sheet.
  - d. **Status:** Not available in GIS, and not included in appendix D.



Note: legibility of this map is poor because an original copy at National Archives was a blue-line or diazo print (white lettering and lines on a dark blue background), and this copy was made on a normal (electrostatic) copier that did not handle the blue background well.

6. 1913 infestation of *Dendroctonus monticolae* (Pernot 1913a).
  - a. **Source:** This map accompanied a report called “The insect situation in 1913 on the Whitman National Forest” by J.F. Pernot (1913b).
  - b. **Description:** Base map shows entire Whitman NF, and it was compiled from Supervisor’s [Office] corrected atlas sheets in Portland, Oregon in April 1912 by draftsman R.H. Robertson. Legend for base map includes the following items:
    - National Forest boundary;
    - Ranger District boundary;
    - Stock driveways;
    - County lines;
    - Telephone lines;
    - Forest Service trails;
    - Old trails;
    - Ranger Station fences;
    - Ranger cabins; and
    - Fire toolboxes.Legend for thematic map includes three items:
    - Exterior limits of heavy areas of infestation prior to, and including 1912, according to map of Ranger Smith;
    - Areas of active infestation in lodgepole pine, noted in 1913; and
    - Areas of active infestation in yellow pine, noted in 1913.

Note: Most of North Fork John Day Ranger District, Umatilla NF, located in Grant County, OR was previously included in Whitman National Forest; this means that historical mapping for Whitman National Forest often provides useful information for southern third of Umatilla National Forest.
  - c. **Scale:** 1:126,720 (projection unknown); 33" × 38" thematic map sheet.
  - d. **Status:** Not available in GIS, and not included in appendix D.
7. 1912 sketch map showing areas of mountain pine beetle infestation, and areas being treated to control an infestation, on Whitman National Forest (Edmonston 1913).
  - a. **Source:** This map accompanied a report called “1912 report on northeastern Oregon project no. 38” by W.D. Edmonston (Edmonston 1913).
  - b. **Description:** A mountain pine beetle outbreak occurred in ponderosa and lodgepole pines in northern Blue Mountains and Wallowa Mountains in early 1900s (beginning no later than 1905). This map provides a rough approximation of infestation areas as of 1912, and it shows areas that received pine beetle control treatments in 1911 (control work began on April 5th and was completed by June 30th).

It is surmised that this insect control project was one of the first, if not the first, of its kind for western United States (Burke and Wickman 1990). An outbreak was still quite active in 1912: Edmonston judged that at least 200,000 infested lodgepole and whitebark pines existed between 5,000 and 7,000 feet elevation in an area ranging from Anthony Creek on the north to Elk Creek on the south, and then west to Elkhorn Range.

A Whitman National Forest map (dated 1912) shows treatment and infestation areas in color. This map has two legends:

- First one shows five different treated and inspected areas (differentiated by color), and area of lodgepole and whitebark pines;
- Second legend shows: area to be worked first, area to be worked second, main area to be protected, limit of forest growth, limit of infestation, insect-infested yellow pine forests, and insect-infested lodgepole pine forests.

Note: Most of North Fork John Day Ranger District, Umatilla NF, located in Grant County, OR was previously included in Whitman National Forest; this means that historical mapping for Whitman National Forest often provides useful information for southern third of Umatilla National Forest.

- c. **Scale:** 1:253,440 (projection unknown); 8, 8½" × 11" colored thematic map sheets.
  - d. **Status:** Not available in GIS, and it is not available on a Kodak PhotoCD. One map sheet portion is included in appendix D. This map was copied on a series of 8½" × 11" sheets because at the time of our visit in March of 1998, National Archives (College Park, MD) did not have large-format color copying equipment.
8. Extensive timberland classification for Wenaha, Umatilla, and part of Whitman National Forests (Kellogg 1916, Kendall 1914, Smith 1915).
- a. **Source:** This accession consists of a set of 32 map sheets providing a timber volume classification for Wenaha, Umatilla, and Whitman (portion) National Forests.
  - b. **Description:** These maps were most likely part of an early timber atlas. Legend for their thematic information is described below:

Code	Description
0	Voided areas
1	2-5 MBF per acre of timber volume
2	5-10 MBF per acre of timber volume
3	10-25 MBF per acre of timber volume
4	Woodland, cordwood, poles, etc.
5	Grasslands, parks, meadows, etc.
6	Sagebrush
7	Brushland
8	Land rejected on application under homestead act of June 11, 1906
9	Land applied for and classified by Secretary of Agriculture under acts of June 11, 1906 and August 10, 1912 as chiefly valuable for forestry
10	Unclassified land held for intensive classification
12	Unknown
77	Unknown

A base map depicts points of elevation (indicated by numbers), names and approximate locations of old Ranger Stations, locations of homesteads (including homesteader names in many instances!), names of watercourses, range (livestock) driveways, and certain other annotations.

Recommendation: livestock driveway locations and certain other information on base maps is valuable and should be entered into the Forest's GIS system at the first opportunity to do so.

- c. **Scale:** 1:63,360 (projection unknown); 32, 18" × 21" colored thematic map sheets.
- d. **Status:** Since National Archives (College Park, MD) lacked on-site equipment for large-format color copying, a vendor was used to photograph each sheet – color negatives were then scanned onto a Kodak PhotoCD.

In September 2001, a contract was awarded to Titan Geospatial Services Division (Portland, Oregon) to digitize these maps (by using heads-up digitizing from tif files contained on a PhotoCD), and then merge them into a single, continuous coverage. A merged coverage is now available in GIS.

Titan Geospatial Services prepared a display version of this map (Umatilla National Forest portion only); it is included in appendix D, and it is provided as a PDF file on the Forest's history website.

Note that 32 individual map sheets used to compile a merged GIS coverage are available from the history website ([Timberland Classification](#)). They are also presented as image files in appendix E.

- e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/hveg\_1916

9. Large-scale map of permanent Pw plot no. 1 (Smith 1914).

- a. **Source:** This large-format map accompanied a report describing the extent and impact of windfall associated with cutover areas on the Whitman National Forest (Smith and Weitknecht 1915a, 1915b).
- b. **Description:** This is an extremely detailed, large-format map (1-inch equals 50 feet) of the Pw-1 plot on the W.H. Eccles sale area (a timber sale awarded in December 1910). It shows the location, species, and size of every stump on the surveyed area, along with all live or windthrown trees. For the windthrown trees, their direction of fall is shown with an arrow.

Limited generalization was also done, primarily for small-diameter lodgepole pines (symbolology was included for them, but a stem count was given indicating that more than one tree was present in the vicinity of each symbol). Dotted lines encompass broad areas that were referred to as "lodgepole sapling areas." Contours are shown using a 5-foot contour interval.

Unfortunately, there is no certainty about the location of this 40-acre plot because although it is referenced to two numbered "forties" (86 and 93), there is no township, range, section, or other location information provided.

[November 2012 note: Nature Conservancy's office in Bend has recently determined a map location for this plot: it occurs on the northern portion of the Malheur National Forest (Austin quadrangle map) and south of Highway 26 in section 33, township

11 south, range 35½ east. No attempt has been made yet to reestablish its location on the ground. (Four corners of the exterior plot boundary were ostensibly marked with metal angle irons in 1914 when it was initially established, so perhaps a metal detector could be used to help relocate them.)

An attempt was made in July 2013 (fig. 1), involving FS and Nature Conservancy employees, to reestablish the 1914 plot location on the ground. Doing so would provide many opportunities for notable historical reconstructions, similar to what is described by Lydersen et al. 2013.]

- c. **Scale:** 1:600 (projection unknown); 28" × 29" thematic map sheet.
- d. **Status:** Not available in GIS, but a scanned version is provided in appendix D as an image file.

**10. Natural vegetation of Oregon (Lawrence 1915).**

- a. **Source:** This map was prepared by W.E. Lawrence, Department of Botany, Oregon State College.
- b. **Description:** The legend for thematic information is described here:

Code	Description
1	Mesophytic coniferous forest
2	Xerophytic coniferous forest
3	Yellow pine
4	Juniper
5	Alpine and subalpine forest
6	Alpine meadow
7	Chapparal
8	Grassland – west
9	Grassland – east
10	Semi-desert
11	Marsh

Note that a base map shows western boundary of range area.

- c. **Scale:** 1:1,000,000 (polyconic); 26" × 20" colored thematic map sheet.
- d. **Status:** Since the National Archives lacks on-site equipment for large-format color copying, a vendor was used to photograph this map – a color negative was then scanned onto a Kodak PhotoCD. In September 2001, a contract was awarded to Titan Geospatial Services Division (Portland, Oregon) to digitize this map; it is now available in GIS.

Titan Geospatial Services prepared a display version of this map (Umatilla National Forest portion only); it is depicted in appendix D, and is provided as a PDF file on the Forest's history website: [History Website](#)

- e. **GIS Pathname:** /fsfiles/ref/library/gis/Oregon/hveg\_oreg1915

**11. Reconnaissance map for proposed Grande Ronde Lumber Company timber sale in Looking-glass Creek (Drake 1920).**

- a. **Source:** This map was included with a reconnaissance/examination report for a proposed timber sale area applied for by Grande Ronde Lumber Company of Perry, Oregon.





**Figure 1** – Attempt to relocate Pw plot no. 1 (Smith 1914). Description for item #9 provides background information for this figure. What I term a ‘moving window’ analysis was used by Nature Conservancy staff to identify a geographically specific location for Pw plot no. 1 (a moving window analysis involves an automated process for comparing a 40-acre window comprised of digital elevation model data (size of Pw plot no. 1) with elevation contours on the original 1915 map image – if DEM-derived contours can be eventually matched to original map contours, within certain tolerance limits, then voila – an apparent match has been found). Top image shows general character of area where Pw plot no. 1 is believed to be located; bottom image shows Mike Tatum (left; retired Malheur NF Forest Silviculturist) and Stephen Fitzgerald (OSU Extension Service).

- b. Description:** This is a multi-color reconnaissance map showing boundary of an area applied for a timber sale, and some general vegetation types (yellow pine, larch-Douglas-fir-white fir, and open areas). It also includes some disturbance information: “burn re-stocking to western larch (40%), Douglas-fir (40%), and white fir (20%)” and “cutover by Grande Ronde Lumber Company.” Base map shows the location of a sheep camp, a trail up Lookingglass Creek and Summer Creek, and location of both creeks.

[Historical note: In USFS’s early days, range management was the agency’s primary workload (see Bright and Powell 2008 for an example), and although timber sale work occurred, it was not as common then as now. During this early era, it was typical for timber operators to find their own timber sale area and apply to a local Forest Ranger for a permit (an operator’s application would include a map showing a proposed sale area). A Ranger would examine the area being applied for, as Drake did for this example, and then prepare a report and map describing it. This timber-sale system also acknowledged that timber competition seldom existed during Drake’s era; it made little sense for FS to reconnoiter a sale area when there was no assurance that a sale would actually sell.]

- c. Scale:** 1:31,680 (projection unknown); 8½" × 11" colored thematic map sheet.
- d. Status:** Available in GIS. A scanned version of the original map is depicted in appendix D. Drake’s (1920) entire report is available from the Forest’s historical website: [Drake 1920](#)
- e. GIS Pathname:** /fsfiles/ref/library/gis/uma/hveg\_look1920

**12.** Forest type maps for Asotin, Columbia, Garfield, and Walla Walla counties in southeastern Washington (Kemp et al. 1935a, 1935b; Taylor et al. 1935), and for Grant, Morrow, Umatilla, Union, Wallowa, and Wheeler counties in northeastern Oregon (Buell et al. 1936a, 1936b; Pelto et al. 1936; Sankela and Lynch 1936a, 1936b; Sankela et al. 1936a, 1936b; Wolfe et al. 1936).

- a. Source:** This mapping was published by Pacific Northwest Forest Experiment Station, Forest Survey unit for east of Cascade Range.
- b. Description:** These blue-line sheets came from an early mapping effort providing an impressive amount of detail. Not only were forest-type codes provided, but information about stocking (poor, medium, well), age (10-year classes), associated species (western larch, Engelmann spruce, white pine), and evidence of past timber harvest were included. Type codes allowed deforested burns and non-restocked cutovers to be shown, with codes added for drought-killed, insect-killed, or windthrown stands. Each of 41 different cover types was denoted by using an alphanumeric code, sometimes in conjunction with cross-hatching or other annotations. Numbers for Castell or Dixon colored pencils were provided with the legend so that map users, if they so desired, could hand color the maps by using a standardized color scheme.
- c. Scale:** 1:63,360 (projection unknown); large-format, thematic map sheets.
- d. Status:** Many of these maps are available in GIS. Original copies of these maps (except Walla Walla County, Washington) are located at University of Washington libraries in Seattle. Regional Office Geometronics Unit digitized four of them in 1993 (by using a contract with Infotec in Portland; see Holt 1993); seven others were electronically scanned by Olympic Reprographics (Seattle) and then saved in Autocad format.



Note: maps for southern Umatilla, southern Union, and Wheeler counties were finally located in 2007, after diligent sleuthing, so a merged GIS coverage for the 1935-1936 county-level mapping is now available for entire Umatilla National Forest.

In September 2002, a contract was awarded to Titan Geospatial Services Division (Portland, Oregon) to edge match all eleven county maps and merge them into a single, seamless, geo-referenced GIS coverage covering entire Umatilla National Forest.

In July 2007, a contract was awarded to Tetra Tech EC (Bothell, Washington) to digitize maps for southern Umatilla, southern Union, and Wheeler counties, and then merge them into a Forest-wide coverage previously prepared by Titan Geospatial Services in 2002. At this point, complete GIS coverage of 1935-1936 county-level mapping is available for Umatilla National Forest!

Appendixes A and A1 provide a detailed description of this coverage's legend, including a lookup table relating map attributes to cover types, cover type groups, size classes, size class groups, stocking classes, structural classes, structural class groups, and timber harvest. Appendix D has an example (south Umatilla County) of this mapping.

Titan Geospatial Services and Tetra Tech EC prepared display versions of this mapping for species composition and forest structure classes (Umatilla National Forest portion only); they are provided in appendix D, and they are included as PDF files on the Forest's history website: [History Website](#)

e. **GIS Pathname:** /fsfiles/ref/library/gis/Oregon/hveg\_orwa1936

**13.** Forest type maps for southeastern Washington (Andrews and Cowlin 1936) and northeastern Oregon (Andrews and Cowlin 1937).

a. **Source:** This coverage consists of generalized forest type maps for southeastern quarter of Washington and northeastern quarter of Oregon. These 'quarter-state' maps were derived from detailed county-level mapping published during previous two years (see item 12 above).

b. **Description:** Unlike county-level mapping described in item 12 above, detailed information about forest conditions was not provided with this quarter-state mapping (such as stocking, age, seral species, or identification of timber harvest areas). Legend for these maps includes two nonforest types, three noncommercial types, and twenty timberland types (appendix B). Appendix D shows the NE Oregon map, as published.

c. **Scale:** 1:253,440 (Lambert projection); 36" × 61" colored thematic map sheets.

d. **Status:** This mapping is available in GIS (from a CD attached to the inside back cover of Harrington 2003). Refer to appendix B for a detailed description of its legend. Tetra Tech EC prepared a display version of this mapping for species composition (Umatilla National Forest portion only); it is included in appendix D, and is provided as a PDF file on the Forest's history website: [History Website](#)

e. **GIS Pathname:** /fsfiles/ref/library/gis/bmprov/hveg\_sene1936

**14.** Land exchange – First National Bank of Heppner (Wakeman 1936).

a. **Source:** This map accompanied "Report and accompanying appraisal of First National Bank of Heppner lands in Morrow County, Oregon" by William J. Wakeman (1936).

- b. Description:** This map shows vegetation types in a large land exchange area in townships 4 and 5 south, range 28 east. The area ranged from Porcupine Ridge in the southwest to Shaw Creek in the northeast, all of which occurs on Heppner Ranger District. Legend for thematic information is described here:

Code	Description
0	Voided areas
1	Ponderosa pine, mature
2	Ponderosa pine, immature
3	Ponderosa pine, saplings and poles
4	Ponderosa pine, seedlings
5	White fir, larch, Douglas fir, mature
6	White fir, larch, Douglas fir, immature
7	White fir, larch, Douglas fir, seedlings
8	Douglas fir, mature
9	Lodgepole pine, immature
10	Grassland
11	Brush

A base map shows roads, ridges, elevations, section lines, landmark names, and presence of old burns.

- c. Scale:** 1:15,840 (projection unknown); 26" × 30" colored thematic map sheet.
- d. Status:** In September 2001, a contract was awarded to Titan Geospatial Services Division (Portland, Oregon) to digitize this map. A spatial coverage is now available in GIS. A scanned version of the original map (as an image file) is included in appendix D.
- e. GIS Pathname:** /fsfiles/ref/library/gis/uma/hveg\_hep1936
- 15. Location of Camas Creek timber sale unit (Stevenson 1937).**
- a. Source:** This map accompanied a report called "Sale prospectus and timber appraisal report; Camas Creek unit" by George E. Stevenson (1937).
- b. Description:** Camas Creek unit was a timber sale containing 221,308,000 board feet of national forest timber located in Umatilla National Forest. The sale area comprised an area of about 69,645 acres in townships 3, 4, 5, and 6 south, ranges 32, 33, 33½, and 34 east of the Willamette Meridian. It was located in watersheds of Camas and Meadow Creeks, with western boundary of the unit being about 10 miles east of Ukiah, Oregon.
- This color map shows a Camas Creek timber sale unit, and the following items as well: pine timber located south of the unit on both national forest and private land; location of Mt. Emily logging railroad; Mt. Emily Lumber Company timberland; and lands logged by Mt. Emily Lumber Company.
- c. Scale:** Scale and projection unknown; 1 color and 3 non-color, 8½" × 11" map sheets.
- d. Status:** Not entered into GIS, but a scanned version is provided in appendix D as an image file. More information about Camas Creek timber sale and Milton Box Company is available from Umatilla NF's Centennial website: [Camas Creek Timber Sale](#)
- 16. Vegetation classification of Desolation watershed from 1937-1940 aerial photography.**



- a. **Source:** Delineation of polygons, and characterization of vegetation conditions for each polygon, was accomplished by awarding a contract to BAF, Inc. (located in Pendleton, Oregon) in 1996 during a Desolation watershed analysis project (interpreter was Bill Alexander of Pendleton, OR).
- b. **Description:** Historical aerial photographs (1937-1940) covering Desolation watershed on North Fork John Day Ranger District (approximately 70,000 acres) were provided to a contractor, who then delineated polygons and classified vegetation conditions within each polygon.

All delineation was completed on acetate overlays, not on aerial photograph prints. Polygon delineation and vegetation classification standards were the same as those used for interpretation of contemporary aerial photography in 1996.

- c. **Scale:** 1:20,000 (scale of aerial photography used for delineation and classification).
- d. **Status:** Available in GIS. Contractor supplied a digital coverage containing polygon delineations and a digital database file containing classification data. Digital data is available as a dbf file for use with ArcGIS software.
- e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/hveg\_deso1940

**17. Location of aerial photograph centers for photography acquired between 1937 and 1981.**

- a. **Source:** A contract was awarded to BAF, Inc. (Pendleton, Oregon) in September 2001 to determine the center point for more than 15,000 aerial photographs acquired between 1937 and 1981. This includes all historical flights of aerial photography providing coverage for Umatilla National Forest (1930s, 1950s, 1960s, 1970s).
- b. **Description:** One print of each aerial photograph was supplied to a contractor, who registered an acetate overlay to a print by using its fiducial marks as registration points, determined a photo center and marked it on the overlay, and then digitized each photo center by using 1994 digital orthophoto quadrangles for georeferencing purposes.
- c. **Scale:** 1:20,000 or 1:15,840 depending upon year (project).
- d. **Status:** A process described above created a GIS coverage depicting the center (as point data) of each aerial photograph acquired for Umatilla National Forest between 1937 and 1981. This coverage allows analysts to determine historical aerial photographs occurring within a watershed or project planning area. Note that photo centers were already available in GIS for a late-1980s Forest-wide flight (1987-1988), and for recent, District-level flights completed during 1990s and early 2000s.
- e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/rpc

**18. Survey units no. 3 and 5: north and south Blue Mountain units of ponderosa pine region (Cowlin et al. 1942).**

- a. **Source:** These maps came from a report summarizing results of forest surveys completed during 1930s for eastern Oregon and eastern Washington (Cowlin et al. 1942).
- b. **Description:** When combined, these two maps depict generalized forest conditions for entire Blue Mountains province as they existed in late 1930s (ponderosa pine sawtimber, ponderosa pine second growth, other conifer sawtimber, other conifer second growth, noncommercial forest, deforested land, and nonforest land).

- c. **Scale:** no scale or projection information was provided; two irregular-sized, colored thematic map sheets.
- d. **Status:** Two maps from this document were digitized and are available in GIS: “survey unit no. 3 – north Blue Mountain unit – ponderosa pine region” and “survey unit no. 5 – south Blue Mountain unit – ponderosa pine region.” They were edge matched, and then merged into a single coverage.

Scanned versions of both maps are provided in appendix D as image files.

- e. **GIS Pathname:** /fsfiles/ref/library/gis/bmprov/hveg\_1942

**19. Areas defoliated by Douglas-fir tussock moth or western spruce budworm, and sprayed areas to control tussock moth, for season of 1947.**

- a. **Source:** This map accompanied a report called “Defoliator situation in the fir stands of eastern Oregon and Washington, season of 1947” by W.J. Buckhorn (1948).
- b. **Description:** Beginning in 1945, northern Blue Mountains mixed-conifer forest near Troy was defoliated by Douglas-fir tussock moth. By 1947, reports of insect-caused defoliation were common throughout eastern Oregon, although some defoliation attributed to tussock moth ultimately turned out to be caused by western spruce budworm. In order to sort out this confusing situation, it was decided to make an aerial survey of the 7,755,000 timbered acres of Blue Mountains region, and this map and its accompanying report provide results from that survey.

This turned out to be the first aerial survey conducted in Region 6 to determine the extent and severity of insect damage. Note that an aerial survey has been routinely conducted every year since then.

Buckhorn’s report includes several maps (Blue Mountains, northern Washington, and southern Oregon), but not all of them were copied. A color map showing Blue Mountains situation (tussock moth – sprayed, tussock moth – unsprayed, spruce budworm) was copied.

With respect to western spruce budworm activity, most severe defoliation anywhere in the region was on Umatilla NF near Dale in the Meadow Creek-Desolation Creek drainages (North Fork John Day RD). Another large area of budworm infestation was a 160,000-acre center near Wall Creek, ranging from Swale Creek (east) to Spray-Heppner highway (west). A relatively small infestation center near Battle Mountain State Park caused considerable public reaction due to its proximity to U.S. Highway 395.

On north half of Umatilla NF, a large outbreak covered about 67,000 acres near headwaters of three watersheds: Phillips Creek, Umatilla River, and Willow Creek.

- c. **Scale:** 1:126,720 (projection unknown); 6, 8½" × 11" colored thematic map sheets.
- d. **Status:** Map was copied on a series of 8½" × 11" sheets since National Archives did not have large-format color copying capability. Budworm defoliation areas included on this map have not been entered into GIS. Douglas-fir tussock moth mapping, all of which occurred on Umatilla NF near Troy, was digitized during a Grande Ronde-Rondowa watershed analysis effort in 2000; it shows two attributes: tussock moth – sprayed, and tussock moth – unsprayed.

Note: A white paper, "Douglas-fir tussock moth: A briefing paper" (White Paper F14-SO-WP-Silv-16) describes the mid-1940s tussock moth outbreak in more detail (Powell 2016).

e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/treat1947

**20. Areas of spruce budworm defoliation in 1948 (Furniss et al. 1948).**

- a. **Source:** This map accompanied a report called "The spruce budworm in Oregon and Washington, season of 1948" by R.L. Furniss, W.J. Buckhorn, and K.H. Wright (1948).
- b. **Description:** This source accompanied a report based on five years of observations, intensive surveys in 1947 and 1948, and an experimental control project and detailed biological studies completed in 1948. Maps show extent and intensity of budworm defoliation.

Two maps (Blue Mountains area, Oregon Cascades area) were present at end of the report, although map 1, Blue Mountains area, was only one copied because both maps were in color and oversized (and National Archives did not have on-site color copying equipment for oversized material).

During August and September of 1948, an intensive survey of budworm defoliation was made by aerial and ground methods; results of survey are generally summarized by using national forests as reporting units.

For Umatilla NF, total budworm defoliation increased more than 100% from 1947 (374,000 acres) to 1948 (807,000 acres). Heavy and very heavy defoliation on Umatilla NF comprised 392,000 acres of 1948's total amount.

- c. **Scale:** 1 inch = 12 miles (projection unknown); colored thematic map sheet.
- d. **Status:** Not entered in GIS. Blue Mountains map was copied on 4, 8½" × 11" sheets since National Archives did not have large-format color copying equipment.

**21. Forest type maps for Asotin, Columbia, Garfield, and Walla Walla counties in southeastern Washington (Spada et al. 1957a), and for Grant, Morrow, Umatilla, Union, Wallowa, and Wheeler counties in northeastern Oregon (Adams et al. 1953; Bones et al. 1958a, 1958b; Spada et al. 1954, 1957b, 1957c, 1960).**

- a. **Source:** This coverage was derived from county-level forest type maps published by Pacific Northwest Forest and Range Experiment Station.
- b. **Description:** These blue-line sheets came from an early mapping effort providing an impressive amount of detail. Not only were cover type codes provided, but information about stand size (based on diameter classes), stocking/density (nonstocked; poor, medium, well stocking), age (10-year classes), nonforest types (grass, shrub, nonvegetated, water), associated species (western larch, Engelmann spruce, white pine, and many others), and evidence of past partial cutting are also included.
- c. **Scale:** 1:63,360; polyconic projection; thematic map sheets.
- d. **Status:** These maps are available in GIS; original copies are located at University of Washington libraries in Seattle, or at University of Oregon libraries in Eugene. Regional Office Geometronics Unit digitized them in 1993 (by using a contract with Infotec in Portland; see Holt 1993).

Note: maps for Asotin, Columbia, Garfield, and Walla Walla counties were finally located in 2007, so a merged GIS coverage for late 1950s county-level mapping is now available for entire Umatilla National Forest.

In June 2003, a contract was awarded to Titan Geospatial Services Division (Portland, Oregon) to edge match and merge these maps into a single GIS coverage.

In July 2007, a contract was awarded to Tetra Tech EC (Bothell, Washington) to digitize maps for Asotin, Columbia, Garfield, and Walla Walla counties, and then merge them into a Forest-wide coverage previously prepared by Titan Geospatial Services in 2003.

At this point, complete GIS coverage for 1950s county-level mapping is available for Umatilla National Forest.

Appendixes C and C1 provide a detailed description for this coverage's legend, including a lookup table relating map attributes to cover types, size classes, stocking classes, structural classes, timber harvest, and purity (pure versus mixed composition).

Titan Geospatial Services and Tetra Tech EC prepared display versions of this mapping for species composition and forest structure classes (Umatilla National Forest portion only); they are depicted in appendix D, and are provided as PDF files on the Forest's history website: [History Website](#)

**e. GIS Pathname:** /fsfiles/ref/library/gis/Oregon/hveg\_ore1958.

**22. Location of 1958 forest inventory plots for Umatilla National Forest (USDA Forest Service, Date unknown).**

**a. Source:** This item consists of unpublished planimetric township maps mounted on yellow, 8½" x 11" paper.

**b. Description:** This source consists of more than a hundred maps, one per township, that provide two primary sources of information: center location of early to mid-1950s aerial photographs, and location of forest inventory plots installed and measured in 1958.

Note that a 1958 inventory was the first comprehensive (Forest-wide) plot-based inventory completed for Umatilla National Forest. Plots were installed on a systematic grid system with 1.7-mile spacing between plots. Each plot consisted of a three-point cluster; points two and three were installed at 6-chain intervals on a compass bearing from point one.

Each point consisted of nested sample plots with specific tree classes (live versus dead trees, for example) and tree sizes sampled on plots of different size; large-diameter trees were sampled on a 1/5-acre plot, and smaller plots (1/20th and 1/250th acre) were used for small-diameter trees. Note that USDA Forest Service (1957) provides more detail about codes and plot establishment procedures associated with Umatilla NF's 1958 inventory.

**c. Scale:** 1:63,360; projection unknown; thematic map sheets.

**d. Status:** Available in GIS; 1950s aerial photograph centers are also available in GIS (see item #17 above), but their location was determined from the photographs themselves, not from these maps.

**e. GIS Pathname:** /fsfiles/ref/library/gis/uma/hinv\_1958



**23.** Area sprayed with a chemical insecticide (DDT) to control Douglas-fir tussock moth populations (1974).

**a. Source:** This coverage is derived from an unpublished map (dated July 31, 1974) available in silviculture section of Supervisor's Office, Umatilla National Forest.

**b. Description:** A widespread outbreak of Douglas-fir tussock moth affected northern Blue Mountains and northern Rocky Mountains in early 1970s. By 1974, over 350,000 acres had been defoliated on Pomeroy and Walla Walla Ranger Districts.

Although DDT had been banned in 1972, an emergency authorization was granted for its use against tussock moth in 1974. Over 30,000 acres were sprayed on the Umatilla NF in June and July of 1974. This map shows areas sprayed with DDT in 1974 to control tussock moth populations.

**c. Scale:** 1:126,720 (projection unknown); 38" × 43" colored thematic map sheet.

**d. Status:** Don Justice digitized many, if not all, of the Umatilla NF treatment areas shown on this map source during a Grande Ronde-Rondowa watershed analysis effort in 2000.

Note: A white paper, "Douglas-fir tussock moth: A briefing paper" (White Paper F14-SO-WP-Silv-16) describes the early-1970s tussock moth outbreak in more detail (Powell 2016).

**e. GIS Pathname:** /fsfiles/ref/library/gis/uma/treat1974

**24.** Vegetation classification for Umatilla National Forest as based on 1987-1988 aerial photography.

**a. Source:** Delineation of polygons, and characterization of vegetation conditions for each polygon, was accomplished by awarding a contract to Camp-II Contracting in 1989.

**b. Description:** After selecting an aerial photograph to represent vegetation complexity for an entire 7½-minute quadrangle, Forest Service delineated polygons by using R-6 mapping and classification standards, and then provided the delineated photograph to a contractor. The contractor subsequently completed a walk-through field examination for each polygon on the delineated photograph.

Walk-through exam results formed the basis for a contractor's delineation and classification of all other aerial photographs for the same quad (note: from November 1989 to June 1990, contractor established an office in Pendleton area when completing a delineation and classification phase of this contract).

Forest Service inspected at least 20% of contractor's work. Contractor transferred delineations to orthophoto overlays, numbered the polygons, and matched classification data (on coding sheets) with numbered polygons.

After submitted work was inspected, Forest Service scanned and edited orthophoto overlays, and then entered classification data into an Oracle database (data keypunching was not completed until spring 1991).

Historical Note: polygon and vegetation characterization information produced by this project formed the basis for Umatilla NF's EVG database system. EVG (Existing Vegetation) was an Oracle database system storing information about existing vegetation conditions at a stand (polygon) level. Original EVG data was based on interpretation of aerial photography acquired in 1987-88.

- c. **Scale:** 1:12,000 (scale of natural-color aerial photography used for polygon delineation and classification).
- d. **Status:** Available in GIS. The digital data is available as a dbf file for use with Arc GIS software.
- e. **GIS Pathname:** /fsfiles/ref/library/gis/uma/hveg\_1987

## APPENDIX A: LEGEND AND TYPE DEFINITIONS

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### 1935-1936 County-Level Forest Cover Type Maps<sup>1</sup>

<u>TYPE</u>	<u>DEFINITIONS</u>
1	BARRENS: Areas too rocky, exposed, or soil-less to support a real vegetative cover.
2	NONFOREST LAND: Cultivated, pasture, grass, grass swamp, sagebrush, and brush lands.
3	NONFOREST LAND: Agricultural land, including forestlands cleared for agricultural uses (this code was not included in original legend for forest survey of eastern Oregon).
4	OAK: A forest containing 60% or more of oak.
5A	DENSE JUNIPER: A juniper forest occupying over 10% of the land area.
5B	SCATTERED JUNIPER: A juniper forest occupying from 5 to 10% of the land area.
5Mm	Indicates a stand with a predominance of mountain mahogany.
5½	PONDEROSA PINE WOODLAND: A scattered stand of mature ponderosa pine characteristic of the desert fringes.
6	DOUGLAS FIR, LARGE OLD GROWTH: A forest containing over 60% Douglas fir, over 40" DBH.
7	DOUGLAS FIR, SMALL OLD GROWTH: A forest containing over 60% Douglas fir, 20-40" DBH.
8	DOUGLAS FIR, LARGE SECOND GROWTH: A forest containing over 60% Douglas fir, 20-40" DBH.
9A	DOUGLAS FIR, LARGE POLES: A forest containing over 60% Douglas fir, 12-20" DBH.
9B	DOUGLAS FIR, SMALL POLES: A forest containing over 60% Douglas fir, 6-12" DBH.
10	DOUGLAS FIR, SEEDLINGS AND SAPLINGS: A forest containing over 60% Douglas fir, 0-6" DBH.
11	SPRUCE: A forest containing 50% or more, by volume, of spruce (this code was not included in original legend for forest survey of eastern Oregon).
17	WESTERN RED CEDAR, LARGE: A forest containing over 40% western red cedar, over 24" DBH.
19A	WESTERN RED CEDAR, LARGE SECOND GROWTH: A forest containing over 40% western red cedar, 12-24" DBH.
19B	WESTERN RED CEDAR, SMALL SECOND GROWTH: A forest containing over 40% western red cedar, 0-12" DBH.
20	PONDEROSA PINE, LARGE: A forest containing 50-80% ponderosa pine, over 22" DBH.

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<sup>1</sup> Legend descriptions are derived from USDA Forest Service (1935, 1936).



<u>TYPE</u>	<u>DEFINITIONS</u>
20.5	PURE PONDEROSA PINE, LARGE: A forest containing over 80% ponderosa pine, over 22" DBH.
20A	PONDEROSA-SUGAR PINE, MIXTURE, LARGE: A forest containing over 50% ponderosa pine and 20% or more of sugar pine, over 22" DBH.
20B	SUGAR PINE MIXTURE, LARGE: A forest containing 20% or more of sugar pine and less than 50% ponderosa pine, over 22" DBH.
21	PONDEROSA PINE, SMALL: A forest containing over 50% ponderosa pine, either selectively cut or immature stands, 12-22" DBH.
22	PONDEROSA PINE, SEEDLINGS, SAPLINGS, AND POLES: A forest containing over 50% ponderosa pine, 0-12" DBH.
23	BALSAM FIRS-MOUNTAIN HEMLOCK, LARGE: A forest containing over 50% of either noble, silver, subalpine, or Shasta fir and/or mountain hemlock, over 12" DBH.
24	BALSAM FIR-MOUNTAIN HEMLOCK, SMALL: A forest containing over 50% of either noble, silver, subalpine, or Shasta fir and/or mountain hemlock, under 12" DBH.
25	LOGEPOLE PINE, LARGE: A forest containing over 50% lodgepole pine, over 12" DBH.
26	LOGEPOLE PINE, MEDIUM: A forest containing over 50% lodgepole pine, 6-12" DBH.
26A	LOGEPOLE PINE, SMALL: A forest containing over 50% lodgepole pine 0-6" DBH.
27	PINE MIXTURE, LARGE: A mixed forest containing from 20-50% ponderosa pine, over 12" DBH.
28	PINE MIXTURE, SMALL: A mixed forest containing from 20-50% ponderosa pine, 0-12" DBH.
27.5	UPPER SLOPE MIXTURE, LARGE: A mixed forest of larch, white fir, subalpine fir, Douglas fir, Engelmann spruce, lodgepole pine, or white pine, over 12" DBH.
27.5ES	UPPER SLOPE MIXTURE, ENGELMANN SPRUCE PREDOMINATING, LARGE: A mixed forest containing over 50% Engelmann spruce, over 12" DBH.
27.5WP	UPPER SLOPE MIXTURE, WESTERN WHITE PINE PREDOMINATING, LARGE: A mixed forest containing over 40% western white pine, and over 12" DBH. Used only in Spokane, Stevens, and Pend Oreille Counties, Washington.
27.5WL	UPPER SLOPE MIXTURE, WESTERN LARCH PREDOMINATING, LARGE: A mixed forest containing over 50% larch, and over 12" DBH. Used in all counties.
28.5	UPPER SLOPE MIXTURE, SMALL: A mixed forest of larch, white fir, subalpine fir, Douglas fir, Engelmann spruce, lodgepole pine, or white pine, 0-12" DBH.
28.5ES	UPPER SLOPE MIXTURE, ENGELMANN SPRUCE PREDOMINATING, SMALL: A mixed forest containing over 50% Engelmann spruce, under 12" DBH.

<u>TYPE</u>	<u>DEFINITIONS</u>
28.5WP	UPPER SLOPE MIXTURE, WESTERN WHITE PINE PREDOMINATING, SMALL: A mixed forest containing over 40% western white pine, under 12" DBH. Used only in Spokane, Stevens, and Pend Oreille Counties, Washington.
28.5WL	UPPER SLOPE MIXTURE, WESTERN LARCH PREDOMINATING, SMALL: A mixed forest containing over 50% larch. Used in all counties.
29	WHITE FIR, LARGE: A forest containing over 50% white fir, over 12" DBH.
30	WHITE FIR, SMALL: A forest containing over 50% white fir, under 12" DBH.
31	HARDWOODS: A stand in which maple, aspen, or cottonwood predominate.
31.5	Indicates a hardwood type of merchantable size.
33	SUBALPINE: A forest at the upper limits of tree growth, usually unmerchantable.
34	LOGGED: The number 34 does not represent a type but is a prefix to indicate that the area has been logged, either clean cut or selectively, and is now restocking. Whenever the combination symbol 34-21, 34=22, etc. is used, the encircled number indicates the type. Therefore, the type designation 34=22 indicates a cut-over area containing ponderosa pine reproduction 0 to 6" DBH, uneven-aged, and with medium stocking. 21+A80 would indicate an even-aged stand of 80 year-old well stocked ponderosa pine 12 to 22" DBH occurring on an old burn, and not on cut-over land.
35	NONRESTOCKED CUT-OVERS: Logged areas not satisfactorily restocked and not carrying a residual stand of 1 M board feet per acre.
35A	Cut after 1920;
35B	Cut before 1920.
36	RECENT CUT-OVER: An area clean-cut since 1920, regardless of status of regeneration (code was not included in original legend for forest survey of eastern Oregon).
37	DEFORESTED BURNS: Any non-restocked burn, not cut over.
37A	Drought killed,
37B	Insect killed,
37S	Killed by smelter fumes,
37W	Wind thrown.
38	NONCOMMERCIAL ROCKY AREAS. In type 38, the second number represents the predominating species and size class, i.e., 38 6 is a noncommercial rocky area with old-growth Douglas fir and will be colored with green dots; 38 20 would be colored with orange dots.

## NOTES

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For even-aged second growth stands, symbols indicating age and density will also be shown on the map. The age is shown by 10-year classes (e.g., A20 or A30) and the stocking by bars, either –, =, +. For uneven-aged stands, stocking only will be shown.

- (poorly stocked) means the area is from 10 to 40% stocked.
- = (medium stocked) means the area is from 40 to 70% stocked.
- + (well stocked) means the area is from 70 to 100% stocked.

The following description of the 1935-1936 forest survey was taken from: “Forest Statistics for Umatilla and Union Counties, Oregon” by MacLean and Orr (1960). Appendix C in Harrington (2003) provides additional information about the 1930s inventory of eastern Oregon and eastern Washington.

“The inventory of the counties’ forests was conducted in 1936 by what is known as the ‘compilation method.’ In this method, existing information on forest types, timber volumes, logged areas, and other inventory data were collected from private timber owners and various public agencies. These data were checked in the field for reliability and were adjusted to Forest Survey specifications and standards. Forest-type and timber-volume data for areas not covered by reliable existing information were obtained through field reconnaissance. Timber-volume estimates for immature stands were determined from normal yield tables adjusted for site, age, and density of stand.

All land in the counties was classified as either forest or nonforest. Forestland was further classified as commercial or noncommercial; the commercial was still further classified by forest type, stand-size or condition class, and – in the case of young-growth stands – by stocking and age classes. Only the even-aged immature forest stands, those in which most of the dominant trees were less than 22 inches in diameter, were classified according to age in 10-year classes and according to their density in three degrees of stocking. All such types and classes were mapped in place on a 1-inch-to-the-mile base map of each forested township.

Next, these township type maps were superimposed over current ownership-status plats and dot counted to obtain forest-type area statistics by ownership class. Type delineation on the township maps was then transferred to a base map of each county to form a county forest type map. The commercial forestland was also classified as to site quality, or forest productive capacity.

In-place, timber-volume estimates were based on 1) existing cruises collected and adjusted to the Forest Survey standard, 2) field samples, and 3) ocular appraisals. Cruises made by commercial cruisers were obtained for most of the privately owned timber, and Forest Service cruises were available for a large part of the national-forest lands. Separate volume estimates were computed for each of the commercial tree species and for each ownership class. Methods used in this inventory did not permit a statistical computation of accuracy of the estimate.”

**APPENDIX A1:** Description of lookup (cross-walk) table for 1935-1936 county-level forest type maps.

A lookup table was prepared for the 1935-1936 county-level forest type mapping. It relates the map attributes (codes) with 5 primary characteristics (cover type, size class, stocking class, structural class, and evidence of timber harvest) and 3 secondary (calculated) characteristics (cover type group, size class group, and structural class group). The lookup table is too long to reproduce in its entirety here (13 pages) but the coding associated with each of its fields is described. The lookup table itself is available in the same directory where the GIS coverage is stored.

**Map code** is the attribute code associated with each polygon; see legend described previously for more information about the original map codes.

**Cover type** characterizes the existing vegetation composition of each polygon. If one species was assumed to comprise more than half of the total stocking for a polygon, then the cover type was assigned using the majority species (e.g., ABGR where grand fir comprised more than 50% of the stocking). If no single species comprised more than half of the stocking, then the cover type was named for the plurality species along with a prefix (mix) to denote the mixed-species composition (e.g., mix-ABGR where grand fir was predominant but did not exceed 50% of the total stocking). Cover type codes are:

Code	Description
ABGR	Grand fir is the majority species
ABLA	Subalpine fir is the majority species
JUOC	Western juniper is the majority species
LAOC	Western larch is the majority species
mix-ABGR	Mixed forest; grand fir is the plurality species
mix-ABLA	Mixed forest; subalpine fir is plurality species
mix-JUOC	Mixed forest; western juniper is plurality species
mix-LAOC	Mixed forest; western larch is plurality species
mix-PICO	Mixed forest; lodgepole pine is plurality species
mix-PIEN	Mixed forest; Engelmann spruce is plurality species
mix-PIPO	Mixed forest; ponderosa pine is plurality species
mix-POTR2	Mixed forest; black cottonwood is the plurality species
mix-PSME	Mixed forest; Douglas-fir is plurality species
Nonforest	Grass/herb and shrub sites
PICO	Lodgepole pine is the majority species
PIEN	Engelmann spruce is the majority species
PIPO	Ponderosa pine is the majority species
POTR2	Black cottonwood is the majority species
PSME	Douglas-fir is the majority species
Unknown	Cover type is unknown (perhaps indicating incorrect coding) or could not be inferred from the original coding

**Cover type group** is a generalized characterization of existing vegetation composition for broad-scale mapping purposes. Cover type group codes are:

Code	Description
Douglas-fir	Combination of the PSME and mix-PSME cover types
Grand fir	Combination of the ABGR and mix-ABGR cover types
Lodgepole-Larch	Combination of the LAOC, mix-LAOC, PICO, and mix-PICO cover types
Nonforest	Nonforest cover type
Ponderosa Pine	Combination of the PIPO and mix-PIPO cover types

<b>Code</b>	<b>Description</b>
Other Forest	Combination of the JUOC, mix-JUOC, POTR2, mix-POTR2, and unknown cover types
Spruce-Fir	Combination of the ABLA, mix-ABLA, PIEN, and mix-PIEN cover types

**Size class** characterizes the predominant tree size (based on diameter) for forested polygons. Size class codes are:

<b>Code</b>	<b>Description</b>
2	Seedlings and saplings mixed (trees 1-4.9" DBH)
4	Saplings and poles mixed (trees 1-8.9" DBH)
6	Poles and small trees mixed (trees 5-14.9" DBH)
7.5	Small trees 15-20.9" DBH
8	Small and medium trees mixed
9	Medium trees 21-31.9" DBH
10	Medium and large trees mixed
[blank]	Size class could not be inferred from the original coding

**Size class group** is a generalized characterization of existing tree size (based on diameter) for broad-scale mapping purposes. Size class group codes are:

<b>Code</b>	<b>Description</b>
Small	Combination of the 2 and 4 size class codes
Medium	The 6 size class code
Large	Combination of the 7.5, 8, 9, and 10 size class codes
Other	Blank size class codes

**Stocking class** characterizes forest (tree) density for forested polygons. For forested polygons where this item is blank, the stocking class is either nonstocked (less than 10 percent) or a stocking condition could not be inferred from the original coding. Note that stocking was supposed to be coded for "even-aged immature forest stands" only (Harrington 2003), so stands that were uneven-aged, or even-aged but mature-overmature, may not have been coded for stocking intentionally. Stocking codes are:

<b>Code</b>	<b>Description</b>
L	Low stocking (poorly stocked; 10 to 40 percent)
M	Medium stocking (40 to 70 percent)
H	High stocking (70 to 100 percent)
[blank]	Stocking class could not be inferred from the original coding

**Structural class** is a derived field characterizing vertical structure. Structural class determinations were based on professional judgment; they were designed to replicate the Forest's structural class queries as closely as possible (see appendix 3 in "Description of composite vegetation database" by Powell 2004). Structural class codes are:

<b>Code</b>	<b>Description</b>
NF	Nonforest (grass/herb and shrub cover types)
OFMS	Old Forest Multi Strata structural class
OFSS	Old Forest Single Stratum structural class
SECC	Stem Exclusion Closed Canopy structural class
SEOC	Stem Exclusion Open Canopy structural class
SI	Stand Initiation structural class
UR	Understory Reinitiation structural class
YFMS	Young Forest Multi Strata structural class

Code	Description
WOSS	Woodland Old Single Stratum structural class
[blank]	Structural class could not be inferred from the original coding

**Structural class group** is a generalized characterization of existing vertical structure for broad-scale mapping purposes. Structural class group codes are:

Code	Description
Old Forest	Combination of the OFMS and OFSS structural classes
Stem Exclusion	Combination of the SECC and SEOC structural classes
Stand Initiation	The SI structural class
Understory Reinitiation	Combination of the UR and YFMS structural classes
Other	Combination of the NF and WOSS structural classes

**Timber Harvest** characterizes whether the polygon could be considered a residual stand after partial cutting. This field records the presence of timber harvest only; a Y in this field indicates that the polygon is a residual stand after a partial cutting timber harvest.



## APPENDIX B: LEGEND AND TYPE DEFINITIONS

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### 1936-1937 State-Level Forest Cover Type Maps

<u>NUMBER</u>	<u>TYPE DEFINITION</u>
---------------	------------------------

#### **NONFOREST LAND TYPES**

- |    |  |
|----|--|
| 01 | NON-FOREST LAND.<br>Includes barrens, cities, natural grass areas, brush, desert, sand dunes, tide-flats, and agricultural areas with less than 10 percent of the area in woods. |
| 02 | AGRICULTURAL ZONES.<br>Large areas of land used principally for agriculture but with some incidental wooded areas ordinarily too small and scattered to be mapped in place.      |

#### **NONCOMMERCIAL FOREST TYPES**

- |    |  |
|----|--|
| 03 | SUBALPINE AND CERTAIN NONCOMMERCIAL FORESTS.<br>Includes areas at upper limits of tree growth, usually unmerchantable because of poor form and small size, and areas within the range of commercial timber types and below the limits of subalpine types, which are too rocky, steep, sterile, or swampy to produce a stand of commercial size, density, or quality. |
| 04 | LOGEPOLE PINE.<br>Forests containing more than 50 percent by volume of lodgepole or knobcone pine, usually almost pure. Includes all size and age classes.   |
| 05 | JUNIPER.<br>Forests composed principally of any species of juniper of any size class and degree of density. Occasionally includes small areas of ponderosa pine woodland.  |

#### **TIMBERLAND TYPES**

- |    |   |
|----|---|
| 06 | DOUGLAS-FIR, OLD GROWTH.<br>Forests containing over 60 percent old growth Douglas-fir regardless of size.   |
| 07 | DOUGLAS-FIR, LARGE SECOND GROWTH.<br>Forests, not yet mature, containing over 60 percent Douglas-fir where the majority of the volume is in trees 20 to 40 inches in diameter.              |
| 08 | DOUGLAS-FIR, SMALL SECOND GROWTH.<br>Young forests containing over 60 percent Douglas-fir, in which most of the volume is in trees 6 to 20 inches in diameter.                              |
| 09 | DOUGLAS-FIR, SEEDLINGS AND SAPLINGS.<br>Very young forests containing over 60 percent Douglas-fir, in which most of the trees are 6 inches and under in diameter.                           |
| 10 | SPRUCE-HEMLOCK, LARGE.<br>Forests containing over 50 percent by volume of either western hemlock or Sitka spruce, in which most of the volume is in trees over 20 to 24 inches in diameter. |

<u>NUMBER</u>	<u>TYPE DEFINITION</u>
11	<p>SPRUCE-HEMLOCK-CEDAR, SMALL.</p> <p>Forests containing over 50 percent by volume of either western hemlock, Sitka spruce, western red cedar, or Port Orford cedar, in which most of the volume is in trees under 20 to 24 inches in diameter.</p>
12	<p>CEDAR-REDWOOD, LARGE.</p> <p>Forests of sawtimber size containing either 40 percent or more by volume of western red cedar, 20 percent of Port Orford cedar, or 80 percent of redwood, in which the majority of the volume is in trees over 24 to 30 inches in diameter.</p>
13	<p>PONDEROSA PINE, LARGE.</p> <p>Forests containing at least 50 percent by volume of ponderosa pine, sugar pine or Jeffrey pine, or all of them in combination, where the predominating trees are over about 22 inches in diameter (over about 150 or 200 years old), and where no material amount of the stand has ever been cut.</p>
14	<p>PURE PONDEROSA PINE, LARGE.</p> <p>Forests containing at least 80 percent by volume of ponderosa or Jeffrey pine, where the predominating trees are over about 22 inches in diameter (over about 150 or 200 years old), and where no material amount of the stand has ever been cut.</p>
15	<p>PONDEROSA PINE, SMALL.</p> <p>Forests containing at least 50 percent by volume of either ponderosa pine, sugar pine, or Jeffrey pine, or all of them in combination, where the majority of the volume is in immature trees ordinarily between 12 and 22 inches in diameter and amounts to more than 1,000 board feet per acre; such stands may consist either of (a) selectively cut stands of any age, or (b) uncut immature stands (so called "bull pine" stands, under 150 or 200 years old).</p>
16	<p>PONDEROSA PINE, SEEDLINGS, SAPLINGS, AND/OR POLES.</p> <p>Forests on old burns or heavily cut land where the majority of the trees under 12 inches in diameter are ponderosa pine and the stand of larger ponderosa pine, if any, amounts to less than 1,000 board feet of sawtimber per acre.</p>
17	<p>PINE MIXTURE, LARGE.</p> <p>A mixed forest in which ponderosa pine comprises about 20 to 50 percent by volume, with a variable amount of western larch, white fir, Douglas-fir, white pine, and other species, where the majority of the volume is in trees over 12 inches in diameter and where no material amount of cutting has been done.</p>
18	<p>PINE MIXTURE, SMALL.</p> <p>A mixed forest where 20 to 50 percent of the dominant trees are ponderosa pine and are less than 12 inches in diameter.</p>

<u>NUMBER</u>	<u>TYPE DEFINITION</u>
19	<p>BALSAM FIRS, MOUNTAIN HEMLOCK, AND UPPER SLOPE TYPES, LARGE.</p> <p>Forests in which either noble fir, silver fir, Shasta red fir, white fir, mountain hemlock or occasionally western hemlock, western larch, Engelmann spruce, or any combination of these species, comprise over 50 percent of the volume of the stand. Small amounts of alpine fir, Douglas-fir, lodgepole pine, white pine, and occasionally other species, may also be found in mixture. Commonly found on upper slopes of the mountain ranges. The majority of the dominant trees are over about 16 inches in diameter where this type is used west of the summit of the Cascade Range and over 12 inches in diameter east of the summit of the Cascade Range.</p>
20	<p>BALSAM FIRS, MOUNTAIN HEMLOCK, AND UPPER SLOPE TYPES, SMALL.</p> <p>Forests with the same species combination as in type 19, where most of the dominant trees are under about 16 inches in diameter west of the summit of the Cascade Range and under 12 inches east of the summit of the Cascade Range.</p>
21	<p>HARDWOODS—ALDER, ASH, MAPLE.</p> <p>Forests in which alder, ash, maple, cottonwood, or myrtle predominate, of any size and age class.</p>
22	<p>HARDWOOD—OAK, MADRONE.</p> <p>Forests composed of approximately 60 percent or more of any species of oak (including tan oak) or madrone, or any combination of them, of any size class.</p>
23	<p>RECENT CUT-OVERS.</p> <p>Areas clean-cut since January 1920, regardless of the status of regeneration. Used only for that part of Oregon and Washington west of the summit of the Cascade Range.</p>
24	<p>NONRESTOCKED CUT-OVERS.</p> <p>West of the summit of the Cascade Range includes areas clean-cut prior to 1920, which are less than 10 percent restocked and are not put to other than forest use. East of the summit of the Cascade Range includes areas logged over at any time, which are less than 10 percent restocked.</p>
25	<p>DEFORESTED BURNS.</p> <p>Lands not cut over on which the stand has been killed by fire, and which are less than 10 percent restocked.</p>

## **APPENDIX C: LEGEND, COUNTY-LEVEL FOREST COVER TYPE MAPS**

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To be used with maps dated after January 1, 1949 (except Coos Co., OR)

### PREFIXES TO FOREST TYPE SYMBOLS

R            Residual stand after partial cutting

### COMMERCIAL FOREST TYPES

C            Cedar; composition symbols show whether the type is Western Red, Port Orford, Alaska Yellow or Incense cedar

D            Douglas-fir

FM          True fir-mountain hemlock

H            Western hemlock

HD          Hardwoods; composition symbols show the species

LP          Lodgepole pine

P            Ponderosa pine

S            Sitka spruce

W            White pines; composition symbols show whether type is Western white or Sugar pine

WF          White fir

WL          Western larch

F            Area deforested by fire

I            Area deforested by insects

WT          Area deforested by wind throw

X            Recent clear-cut area; non-stocked

XO          Old clear-cut area; non-stocked

### NONCOMMERCIAL FORESTS AND WOODLAND

J            Sierra juniper

NR          Non-commercial rocky; area within commercial forest zone too rocky, steep, or sterile to be commercial

OM          Oak-madrone scrub stands

SA          Subalpine; non-merchantable stands above commercial forest zone

### NONFOREST

G            Cultivated, grass or brush pasture, or brush non-forest

O            Open; non-vegetative land including barrens and cities

W            Water; streams, lakes, and tide-flats

### STAND-SIZE CLASSES (first numeric character)

1            seedlings and saplings; 0 to 5 inches D.B.H.

2            pole timber; 5 to 11 inches D.B.H.

3            small saw timber; 11 to 21 inches D.B.H., mainly young growth

4            large saw timber; 21 inches and larger D.B.H., mainly old growth (except for D4 which is chiefly so-called 'red fir')

- 5 large old growth Douglas-fir saw timber; 21 inches and larger D.B.H., so-called “yellow fir”

#### DENSITY OF STOCKING CLASS SYMBOLS (second numeric character)

Density of stocking determined from either stocked quadrant counts of number of stems or from aerial photos on basis of degree from crown closure. Absence of this portion indicates nonstocked.

blank	Nonstocked; less than 10 percent
1	Poorly stocked; 10 to 40 percent
2	Medium stocked; 40 to 70 percent
3	Well stocked; 70 to 100 percent

#### AGE CLASSES AND SYMBOLS

Year of origin to nearest decadal year is shown thus: 1890, 1940, etc. Year of stand originating in 1944 would be shown as 1940, 1945 as 1950.

#### ASSOCIATED SPECIES COMPOSITION

No species is recognized unless it comprises at least 20% of type unit based on cubic-foot volume; symbols are listed in decreasing order of abundance based on cubic-foot volume; ordinarily only 3 species are recognized in any type unit.

<b>Code</b>	<b>Species</b>
A	Pacific silver fir
AF	Subalpine fir
B	Western paper birch, northwestern paper birch
BC	Black cottonwood, quaking aspen
C	Western cedar
CH	Golden chinkapin
CLO	Canyon live oak
CO	California black oak
D	Douglas-fir
ES	Engelmann spruce
H	Western hemlock
IC	Incense cedar
J	Western juniper
LP	Lodgepole pine, shore pine, knobcone pine
M	Bigleaf maple
MAD	Pacific madrone
MH	Mountain hemlock
MY	California laurel
NF	Noble fir
OA	Oregon ash
OO	Oregon white oak
P	Ponderosa pine, Jeffrey pine

<b>Code</b>	<b>Species</b>
PC	Port Orford cedar
R	Redwood
RA	Red alder
S	Sitka spruce
SP	Sugar pine
SRF	Shasta red fir
TO	Tanoak
W	Western white pine, whitebark pine
WF	White fir, grand fir
WL	Western larch, alpine larch
YC	Alaska cedar

### **NOTES**

UNKNOWN indicates that the attribute on the original map was indecipherable or absent.

Some character substitution occurred to insure compatibility with MOSS capabilities. Thus, periods (.) were generally replaced with underscores (\_). Attributes circled on the map were bracketed with capital Z's (Z). Opening and closing brackets "( )" were replaced with carets (^).

The following description of the 1953-1960 forest survey was taken from: "Forest Statistics for Umatilla and Union Counties, Oregon" by MacLean and Orr (1960).

"In the reinventory of 1957-58, the forest type maps of both counties were completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos that covered all the land area in the two counties. In mapping on aerial photos, types whose classification was difficult were examined more closely in the field. Likewise, species composition of mixed stands was checked on the ground.

The use of aerial photos in mapping resulted in type delineations of much greater accuracy and detail than was possible through the ground reconnaissance employed in the initial inventory (1936). In the preparation of a revised type map, the delineations on the aerial photos were transferred to a 2-inch county base map through use of a reflecting projector.

For those areas outside the national forests, and for the Union and Elkhorn Working Circles of the Wallowa-Whitman National Forests, type areas were determined by a dot count on the forest type map. The average per-acre volumes for sawtimber, poletimber, and seedling and sapling stands were obtained through a sampling procedure in which stands were sampled with a systematic grid of plots evenly distributed over each county.

A different procedure was used for the remainder of the national-forest area. Land classification for the North Fork, Grande Ronde, and Wenaha working circles of the Umatilla National Forest was based on a systematic grid of plots. Each subplot was first classified as commercial forest, noncommercial forest, or nonforest.



The ratio of subplots in each class to the total number of subplots was applied to the total land area to determine the acreage of each classification. Subplots falling on commercial forestland were also classified by forest type and stand-size class as indicated by plot tally. The percentage of subplots falling in each type was applied to the total area of commercial forestland in the working circle to determine the acreage of land in that type."

**APPENDIX C1:** Description of lookup (cross-walk) table for 1953-1960 county-level forest type maps.

A lookup table was prepared for the 1953-1960 county-level forest type mapping. It relates the map attributes (codes) with 5 primary characteristics (cover type, size class, stocking class, structural class, and evidence of timber harvest) and 3 secondary (calculated) characteristics (cover type group, size class group, and structural class group). The lookup table is too long to reproduce in its entirety here (29 pages) but the coding associated with each of its fields is described. The lookup table itself is available in the same directory where the GIS coverage is stored.

**Map code** is the attribute code associated with the polygons; this code is a concatenated string consisting of the items described previously for the original map legend (cover type code + stand size class + density, if available + age class, if available + associated species, if available).

**Cover type** characterizes the existing vegetation composition of each polygon. If one species was assumed to comprise more than half of the total stocking for a polygon, then the cover type was assigned using the majority species (e.g., ABGR where grand fir comprised more than 50% of the stocking). If no single species comprised more than half of the stocking, then the cover type was named for the plurality species along with a prefix (mix) to denote the mixed-species composition (e.g., mix-ABGR where grand fir was predominant but did not exceed 50% of the total stocking). Cover type codes are:

<b>Code</b>	<b>Description</b>
ABGR	Grand fir is the majority species
ABLA	Subalpine fir is the majority species
Grass	Grass is the majority species
JUOC	Western juniper is the majority species
LAOC	Western larch is the majority species
mix-ABGR	Mixed forest; grand fir is the plurality species
mix-ABLA	Mixed forest; subalpine fir is plurality species
mix-LAOC	Mixed forest; western larch is plurality species
mix-PICO	Mixed forest; lodgepole pine is plurality species
mix-PIEN	Mixed forest; Engelmann spruce is plurality species
mix-PIMO	Mixed forest; western white pine is plurality species
mix-PIPO	Mixed forest; ponderosa pine is plurality species
mix-POTR2	Mixed forest; black cottonwood is plurality species
mix-PSME	Mixed forest; Douglas-fir is plurality species
Nonveg	Nonvegetated sites (exclusive of water)
PICO	Lodgepole pine is the majority species
PIEN	Engelmann spruce is the majority species
PIMO	Western white pine is the majority species
PIPO	Ponderosa pine is the majority species
POTR2	Black cottonwood is the majority species
PSME	Douglas-fir is the majority species
Water	Water (lakes, rivers, etc.)
[blank]	Cover type is unknown (perhaps indicating incorrect coding) or could not be inferred from the original coding

**Cover type group** is a generalized characterization of existing vegetation composition for broad-scale mapping purposes. Cover type group codes are:

<b>Code</b>	<b>Description</b>
Douglas-fir	Combination of the PSME and mix-PSME cover types
Grand fir	Combination of the ABGR and mix-ABGR cover types
Lodgepole-Larch	Combination of the LAOC, mix-LAOC, PICO, and mix-PICO cover types
Nonforest	Combination of the grass, nonveg, water, and some blank cover types
Ponderosa Pine	Combination of the PIPO and mix-PIPO cover types
Other Forest	Combination of the JUOC, PIMO, mix-PIMO, POTR2, mix-POTR2, and some blank cover types
Spruce-Fir	Combination of the ABLA, mix-ABLA, PIEN, and mix-PIEN cover types

**Size class** characterizes the predominant tree size (based on diameter) for forested polygons. Size class codes are:

<b>Code</b>	<b>Description</b>
2	Seedlings and saplings mixed (trees 1-4.9" DBH)
6	Poles and small trees mixed (trees 5-14.9" DBH)
7.5	Small trees 15-20.9" DBH
10	Medium trees 21-31.9" DBH and large trees 32-47.9" DBH

**Size class group** is a generalized characterization of existing tree size (based on diameter) for broad-scale mapping purposes. Size class group codes are:

<b>Code</b>	<b>Description</b>
Small	The 2 size class code
Medium	The 6 size class code
Large	Combination of the 7.5 and 10 size class codes
Other	Blank size class codes

**Stocking class** characterizes forest (tree) density for forested polygons. For forested polygons where this item is blank, the stocking condition is either nonstocked (less than 10 percent) or a stocking class could not be inferred from the original coding. Stocking codes are:

<b>Code</b>	<b>Description</b>
L	Low stocking (poorly stocked; 10 to 40 percent)
M	Medium stocking (40 to 70 percent)
H	High stocking (70 to 100 percent)
[blank]	Stocking class could not be inferred from the original coding

**Structural class** is a derived field characterizing vertical structure. Structural class determinations, which were based on professional judgment, were designed to replicate the Forest's structural class queries as closely as possible (see appendix 3 in "Description of composite vegetation database" by Powell, 2001). For forested polygons where this item is blank, a structural class condition could not be inferred. Structural class codes are:

<b>Code</b>	<b>Description</b>
BG	Bare Ground structural class
NF	Nonforest (grass/herb, shrub, water, nonvegetated cover types)
OFMS	Old Forest Multi Strata structural class
OFSS	Old Forest Single Stratum structural class
SECC	Stem Exclusion Closed Canopy structural class
SEOC	Stem Exclusion Open Canopy structural class
SI	Stand Initiation structural class
UR	Understory Reinitiation structural class

<b>Code</b>	<b>Description</b>
YFMS	Young Forest Multi Strata structural class
WOSS	Woodland Old Single Stratum structural class
WSI	Woodland Stand Initiation structural class
[blank]	Structural class could not be inferred from the original coding

**Structural class group** is a generalized characterization of existing vertical structure for broad-scale mapping purposes. Structural class group codes are:

<b>Code</b>	<b>Description</b>
Old Forest	Combination of the OFMS and OFSS structural classes
Stem Exclusion	Combination of the SECC and SEOC structural classes
Stand Initiation	Combination of the BG and SI structural class
Understory Reinitiation	Combination of the UR and YFMS structural classes
Other	Combination of the NF, WOSS, WSI and blank structural classes

**Timber Harvest** characterizes whether the polygon could be considered a residual stand after partial cutting. This field records timber harvest presence only; a Y in this field indicates that the polygon is a residual stand after a partial cutting timber harvest.

## APPENDIX D: IMAGES FOR MAP DESCRIPTIONS SECTION ITEMS

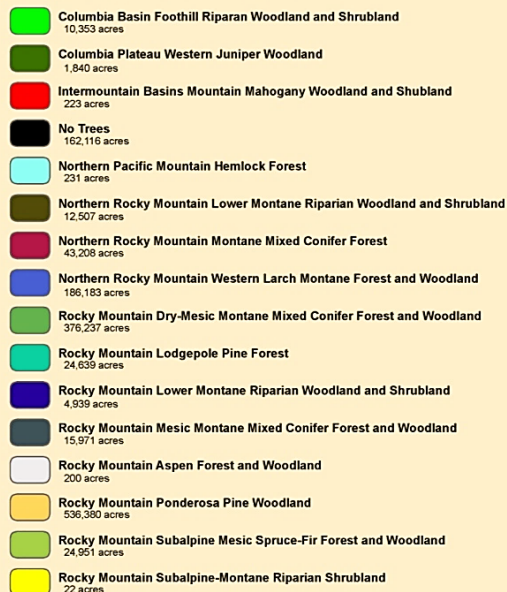
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This appendix provides image files for many historical maps described in this document. Image files were derived from GIS presentation maps (PDF format) prepared for the history website ([History Website](#)), or by scanning a map from an original report or other source material. The following maps are provided in this appendix:

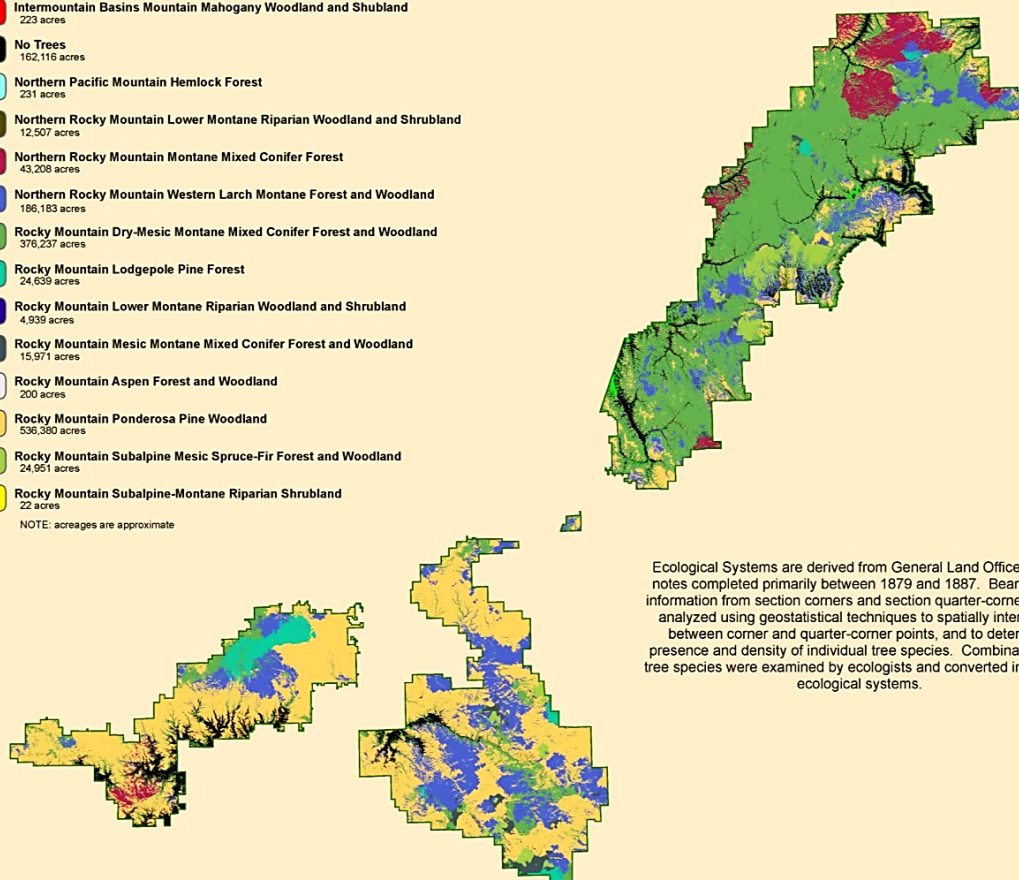
General Land Office survey notes (GLO) – see item #1.....	39
Oregon land and forests (Thompson and Johnson 1900) – see item #2.....	40
1900 map of the state of Oregon, Umatilla NF portion only – see item #2.....	41
Map of Washington showing classification of lands (Plummer et al. 1902) – see item #3.....	42
Location and extent of forest fires in 1910 – see item #4.....	43
1912 sketch map (portion) showing mountain pine beetle infestation – see item #7.....	44
Extensive timberland classification – see item #8.....	45
Large-scale map of permanent Pw plot no. 1 – see item #9.....	46
Natural Vegetation of Oregon map from 1915 – see item #10.....	47
Natural vegetation of Oregon – see item #10.....	48
Reconnaissance map of Lookingglass Creek timber sale – see item #11.....	49
County-level forest type mapping for 1935-36 (south half of Umatilla County) – see item #12...	50
County forest type mapping for 1935-36 – see item #12.....	51
County forest structural stage mapping for 1935-36 – see item #12.....	52
Northeastern Oregon quarter-state forest type map – see item #13.....	53
Quarter-state forest type mapping for 1936-37 – see item #13.....	54
Poster: The Forests of Washington and Oregon in the 1930s – see items 12 & 13.....	55
Land exchange area on Heppner Ranger District (1936) – see item #14.....	56
Camas Creek timber sale unit map – see item #15.....	57
Survey unit #3 – north Blue Mountain unit – see item #18.....	58
Survey unit #5 – south Blue Mountain unit – see item #18.....	59
County forest type mapping for 1950s – see item #21.....	60
County forest structural stage mapping for 1950s – see item #21.....	61

# Umatilla National Forest Historic Vegetation

## Ecological Systems



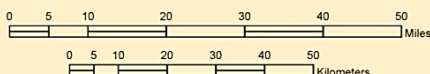
NOTE: acreages are approximate



Ecological Systems are derived from General Land Office survey notes completed primarily between 1879 and 1887. Bearing tree information from section corners and section quarter-corners were analyzed using geostatistical techniques to spatially interpolate between corner and quarter-corner points, and to determine presence and density of individual tree species. Combinations of tree species were examined by ecologists and converted into forest ecological systems.



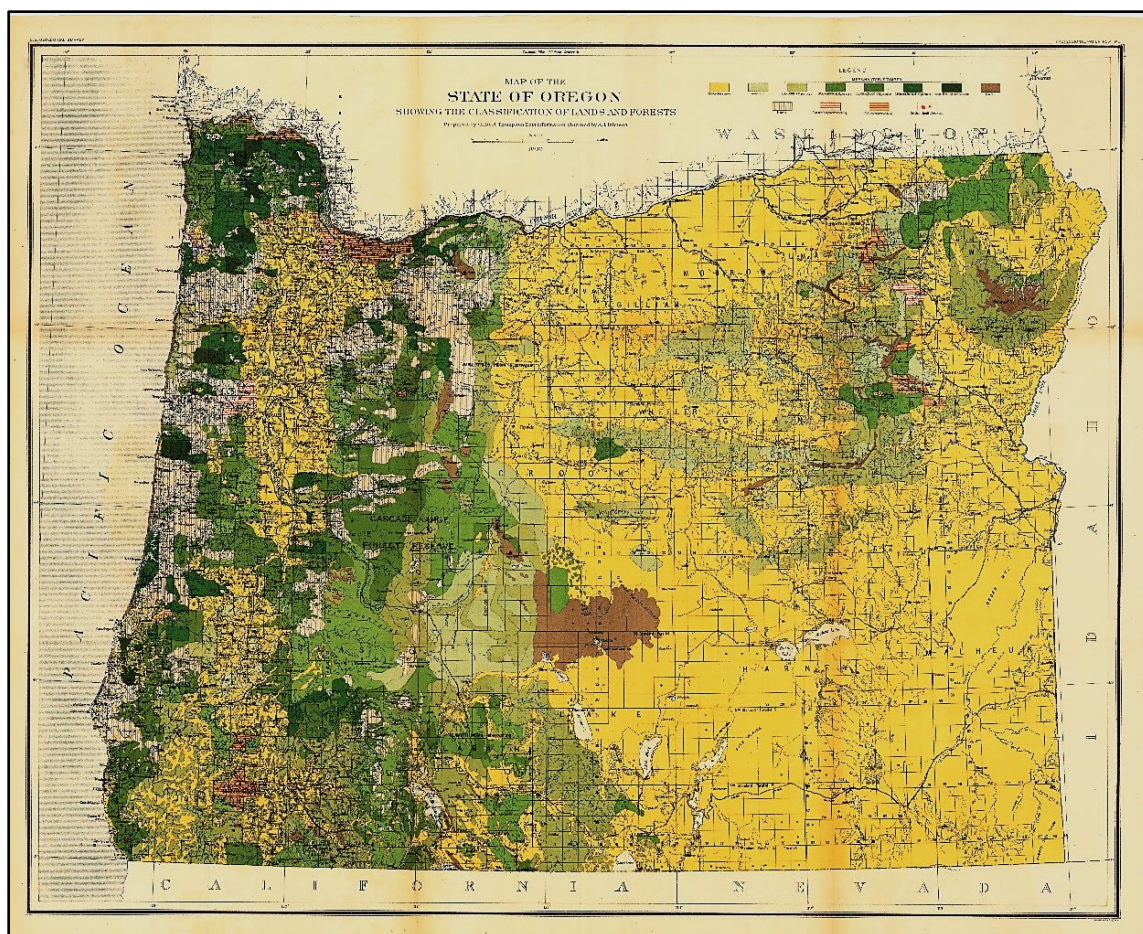
1:600,000



The Forest Service cannot assure the reliability or suitability of this information for any particular purpose. Original data elements were compiled from a variety of sources and may not meet National Mapping Accuracy Standards. This information may be updated, corrected, or otherwise modified without notification.

General Land Office survey notes (GLO) – see item #1

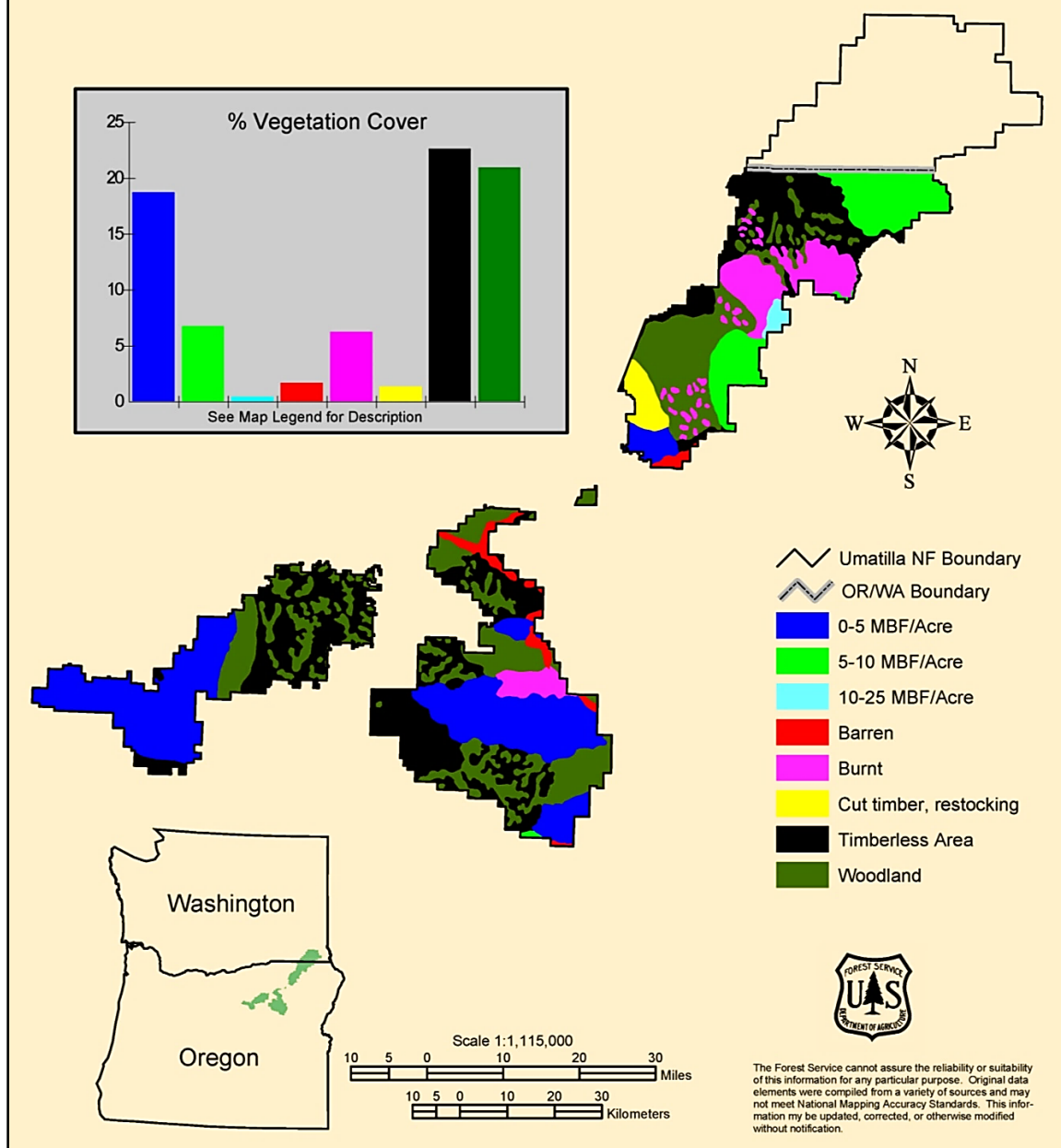




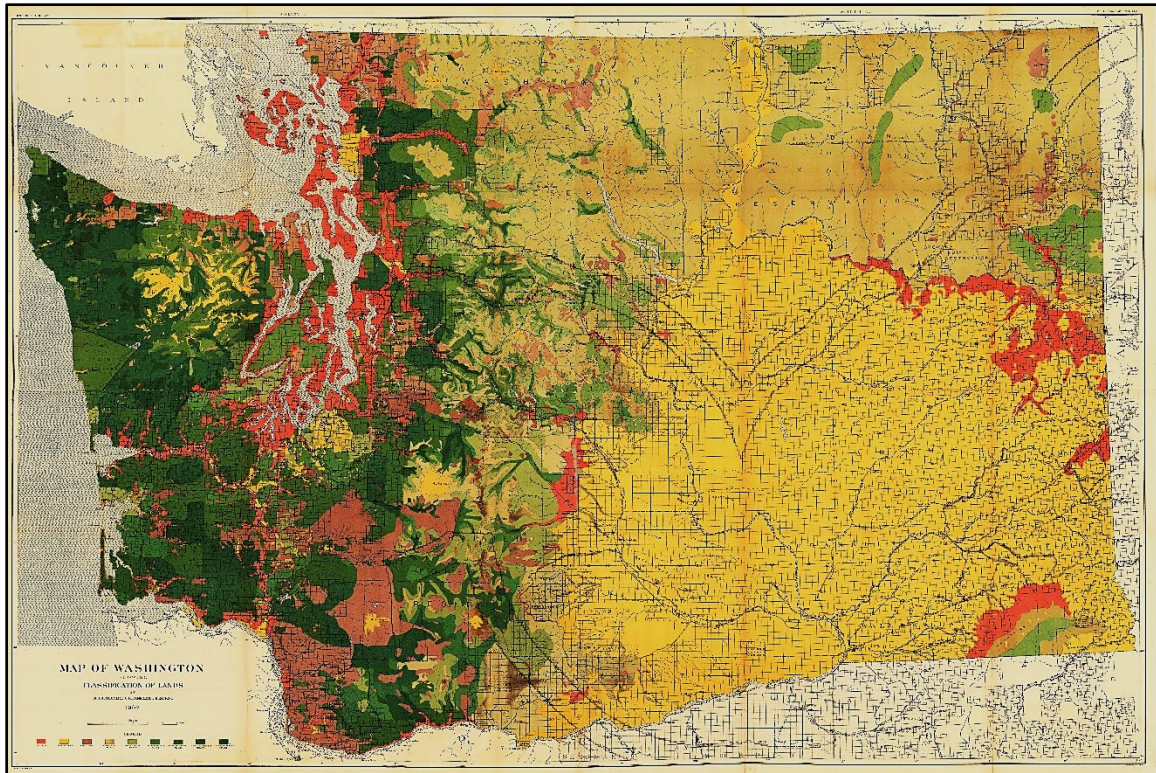
Oregon land and forests (Thompson and Johnson 1900) – see item #2



# Umatilla National Forest 1900 Forests of Oregon



1900 map of the state of Oregon, Umatilla NF portion only – see item #2



Map of Washington showing classification of lands (Plummer et al. 1902) – see item #3

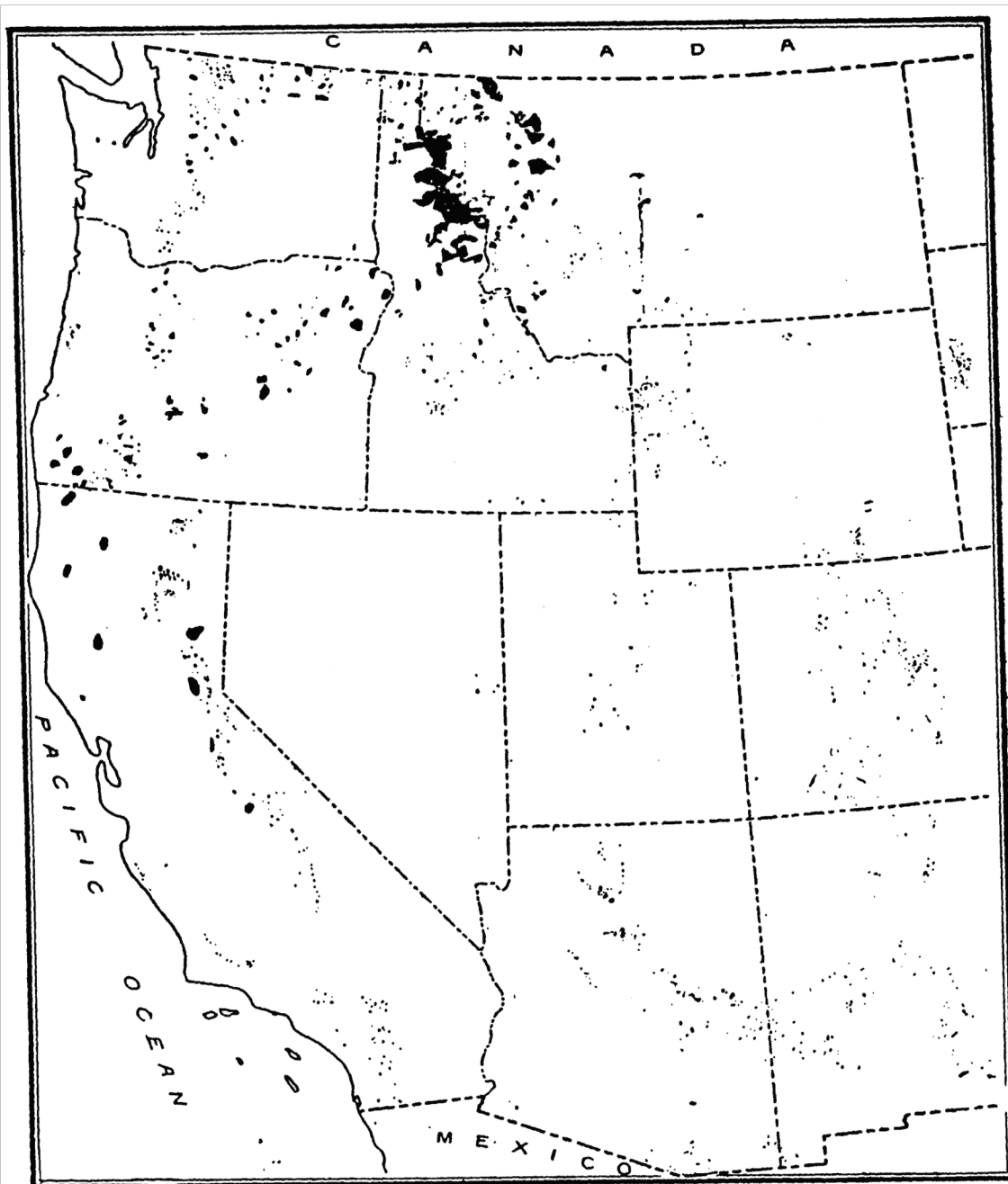
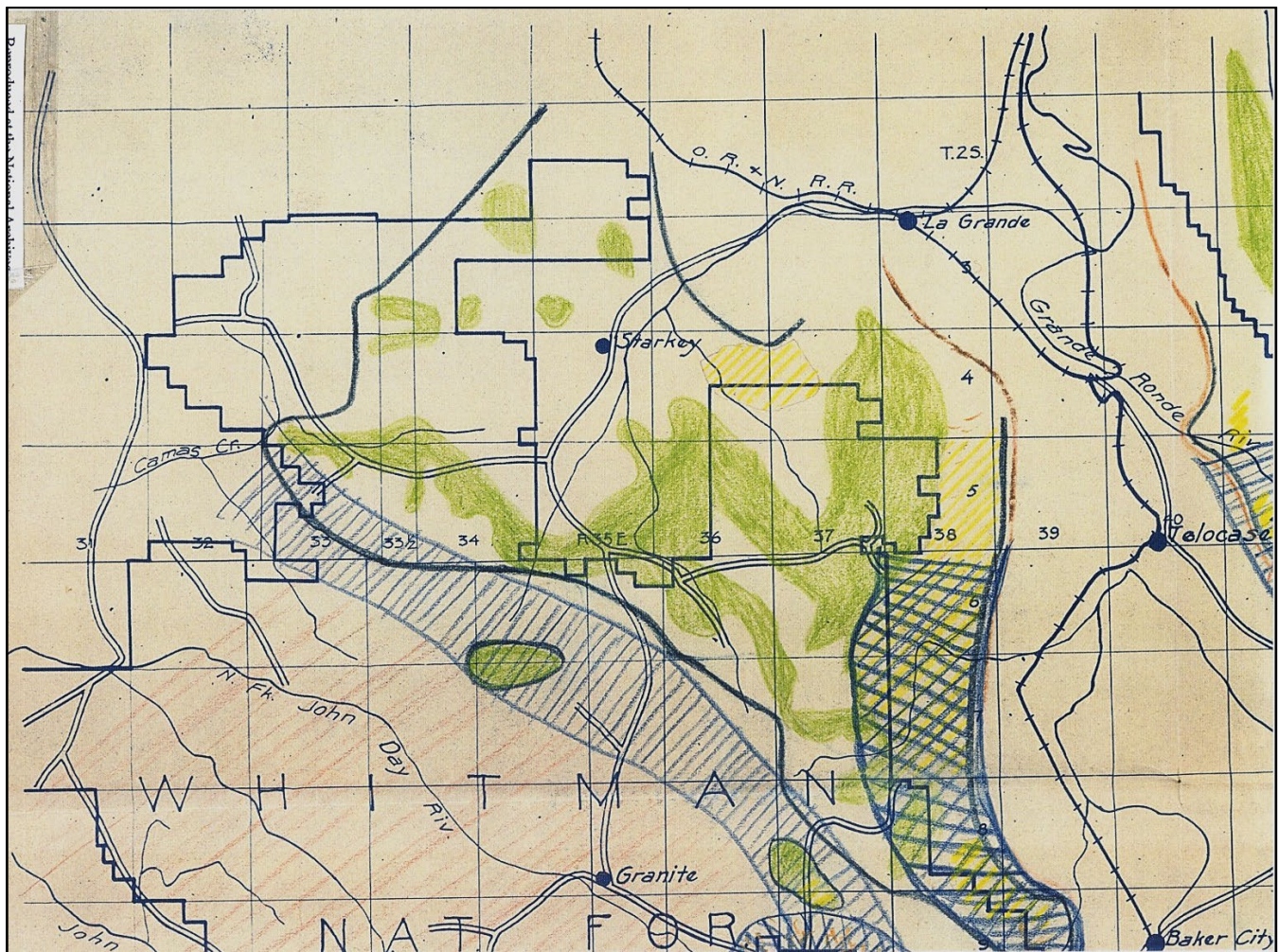


FIG. 5.—Fires of 1910 in the western United States.

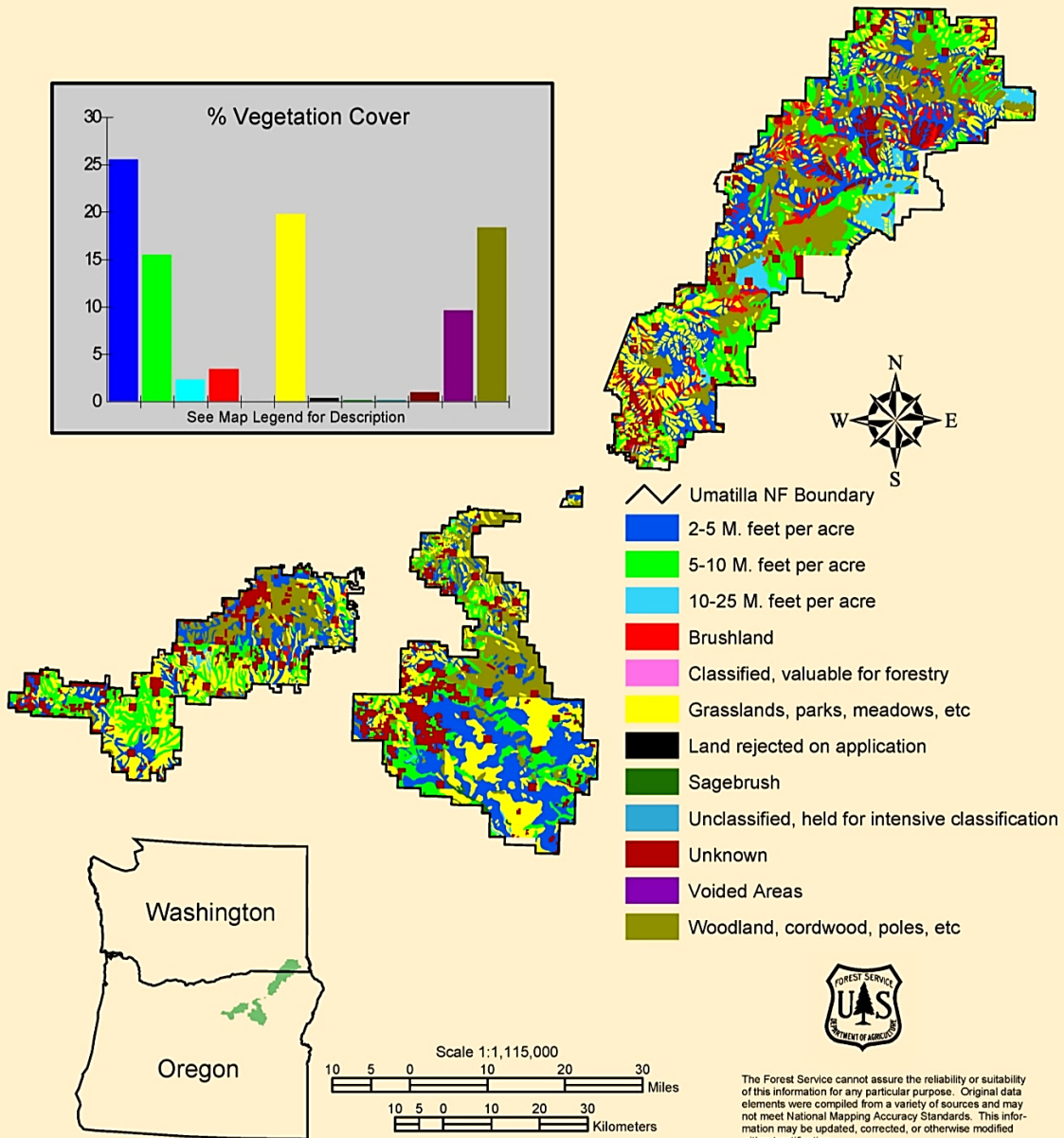
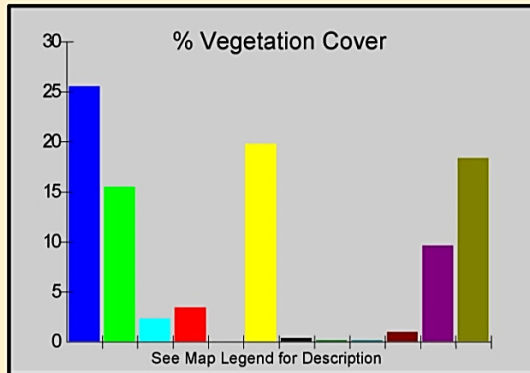
Location and extent of forest fires in 1910 – see item #4



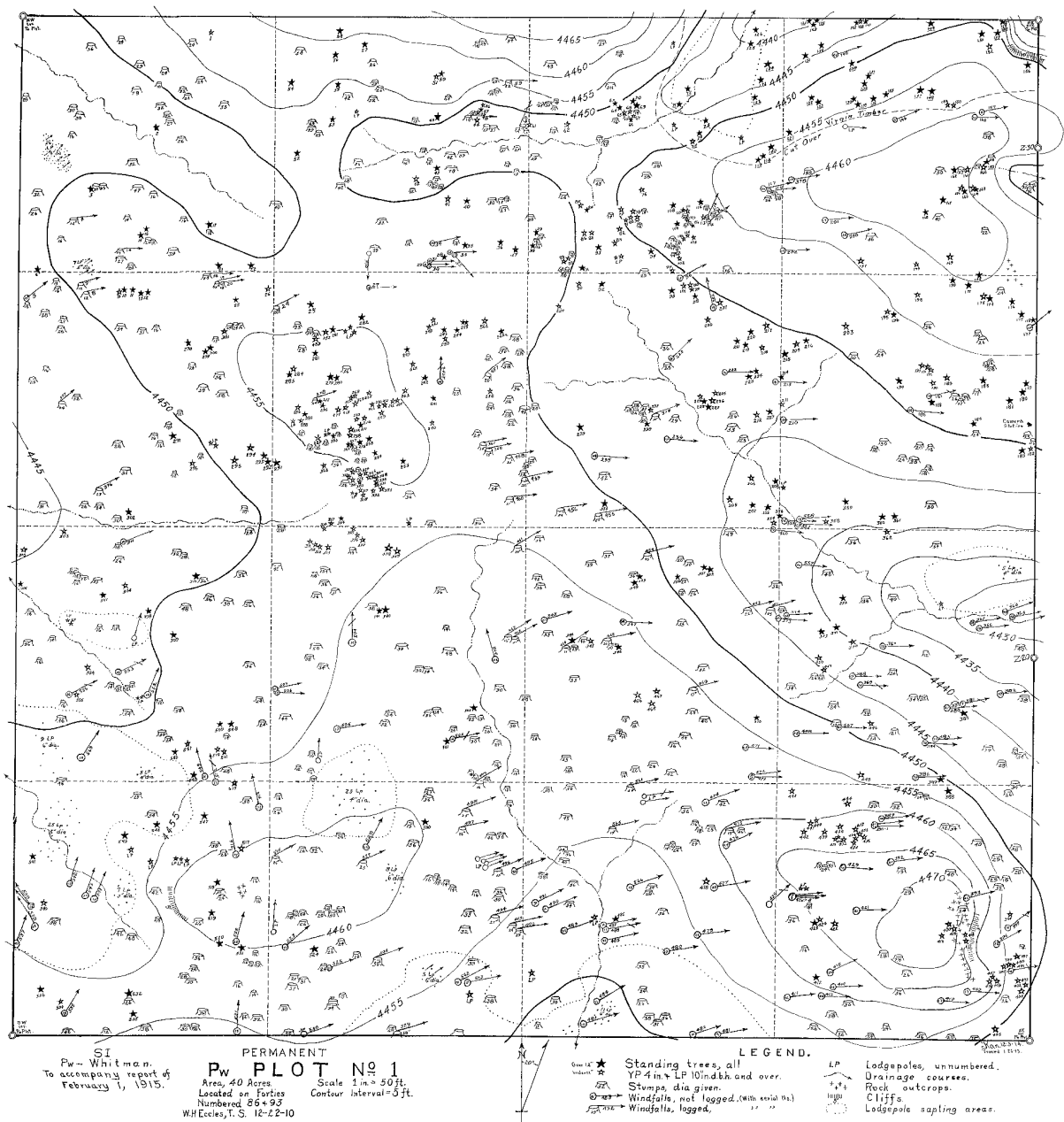


1912 sketch map showing areas of mountain pine beetle infestation (Edmonston 1913) – see item #7

# Umatilla National Forest 1914-1916 Timberland Classification

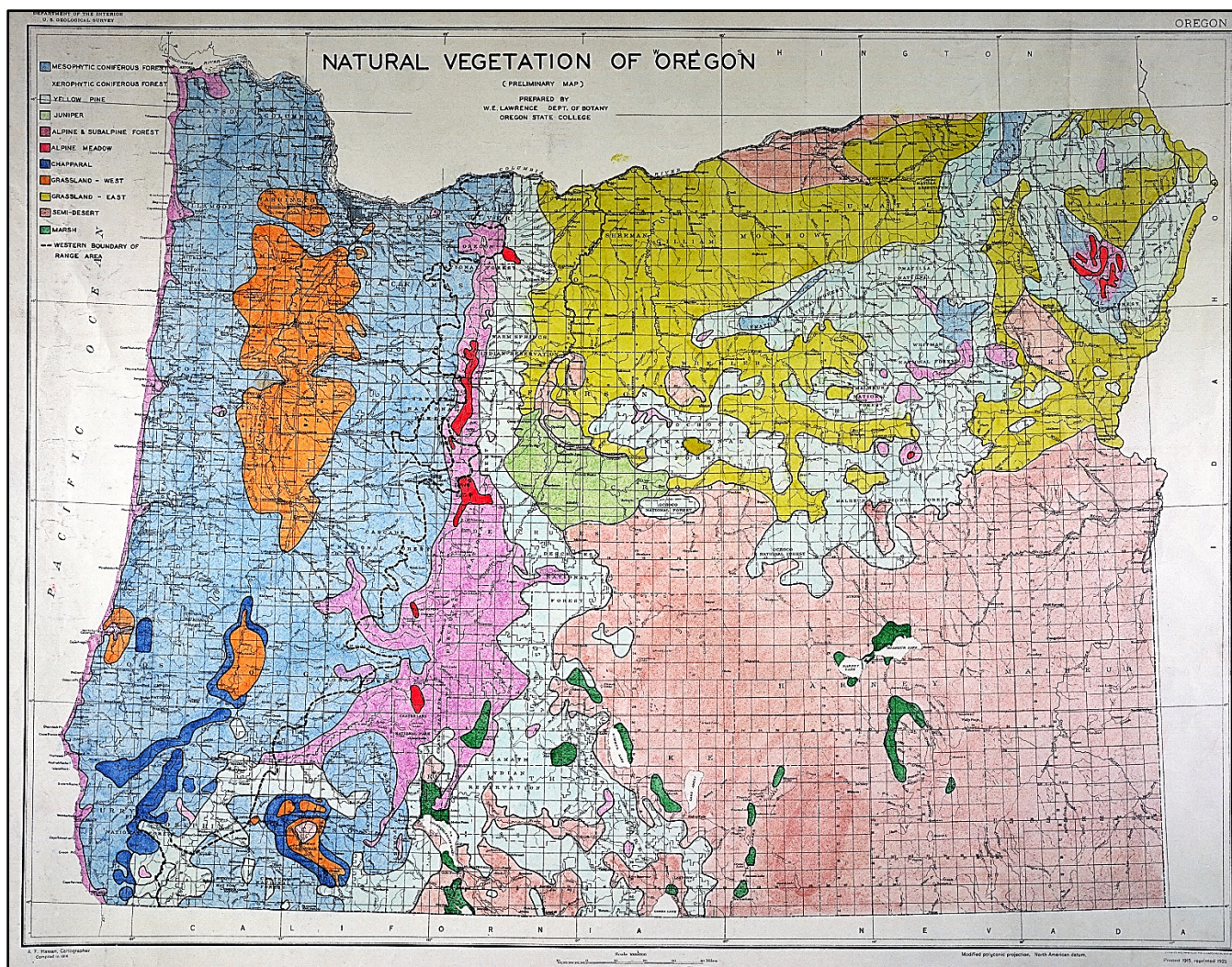


Extensive timberland classification – see item #8, and appendix E



Large-scale map of permanent Pw plot no. 1 – see item #9

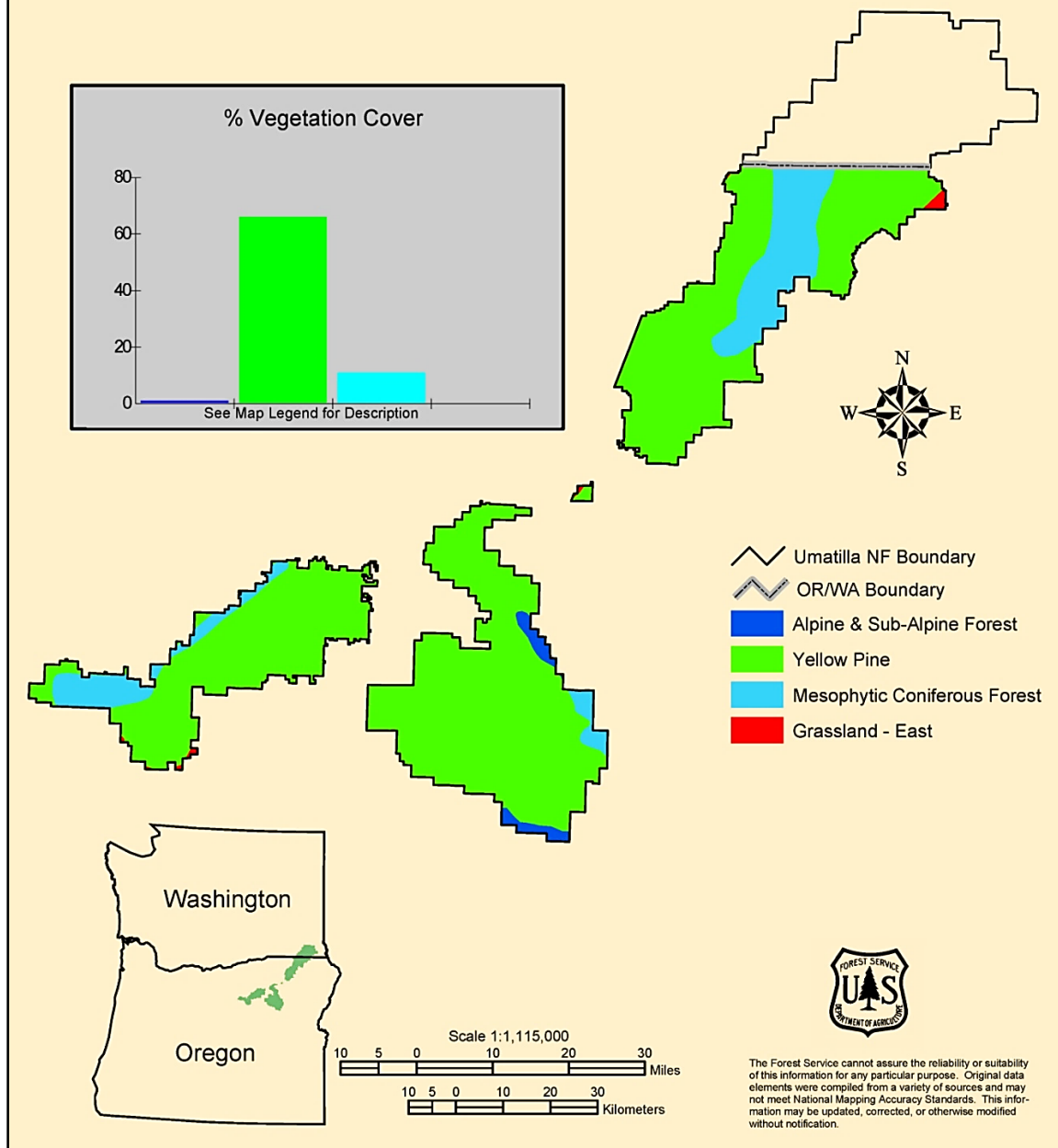




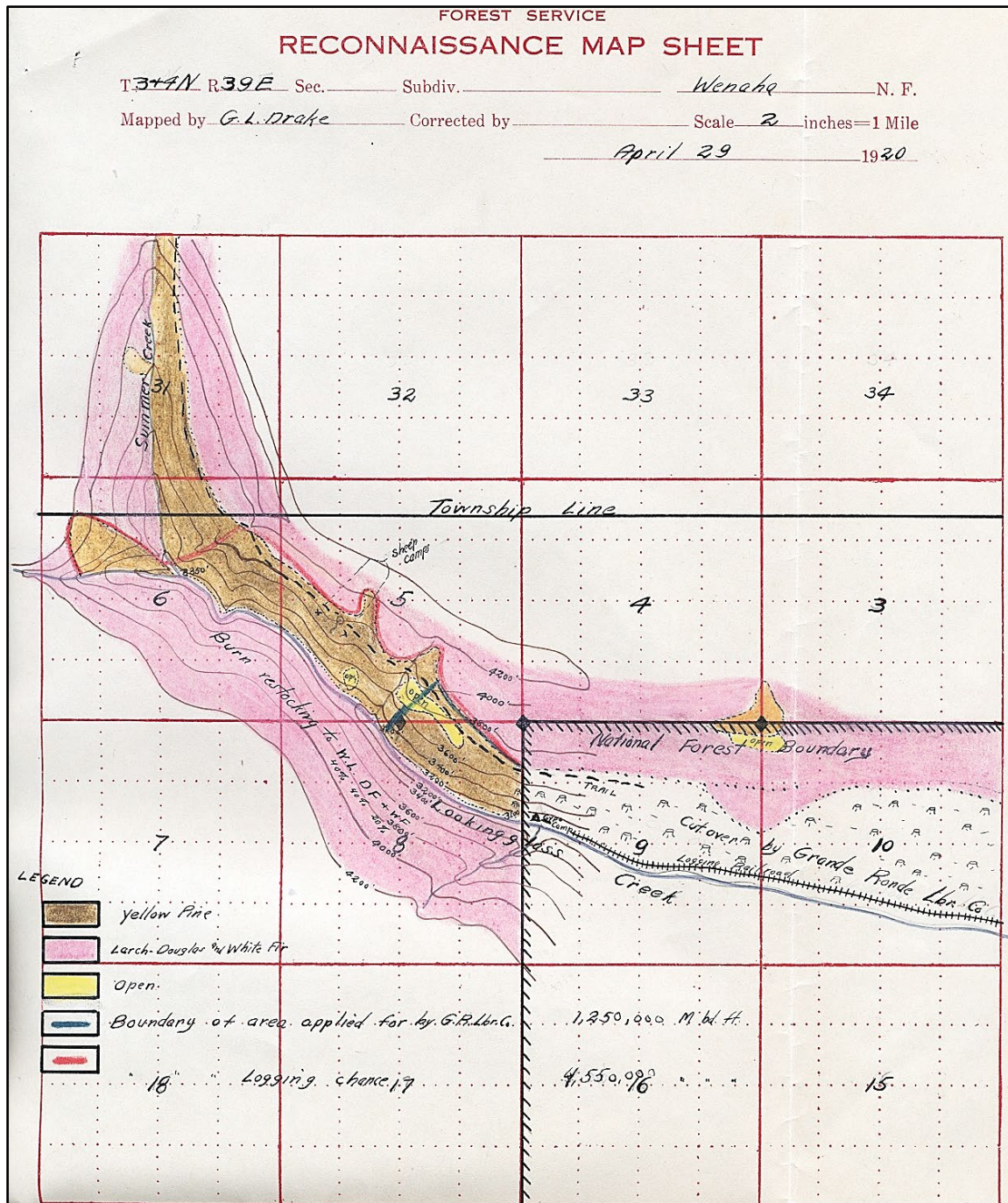
Natural Vegetation of Oregon map from 1915 – see item #10



# Umatilla National Forest 1915 Natural Vegetation of Oregon

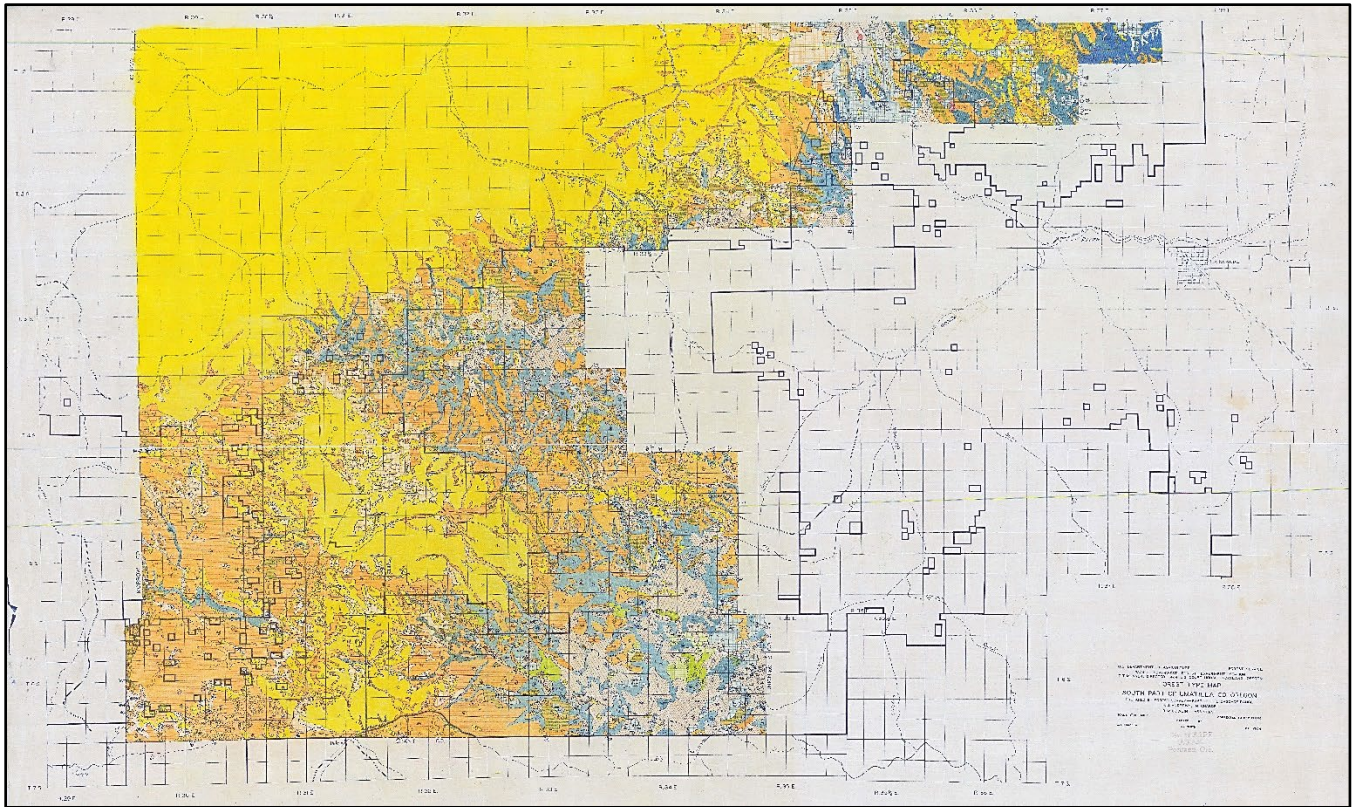


Natural vegetation of Oregon – see item #10



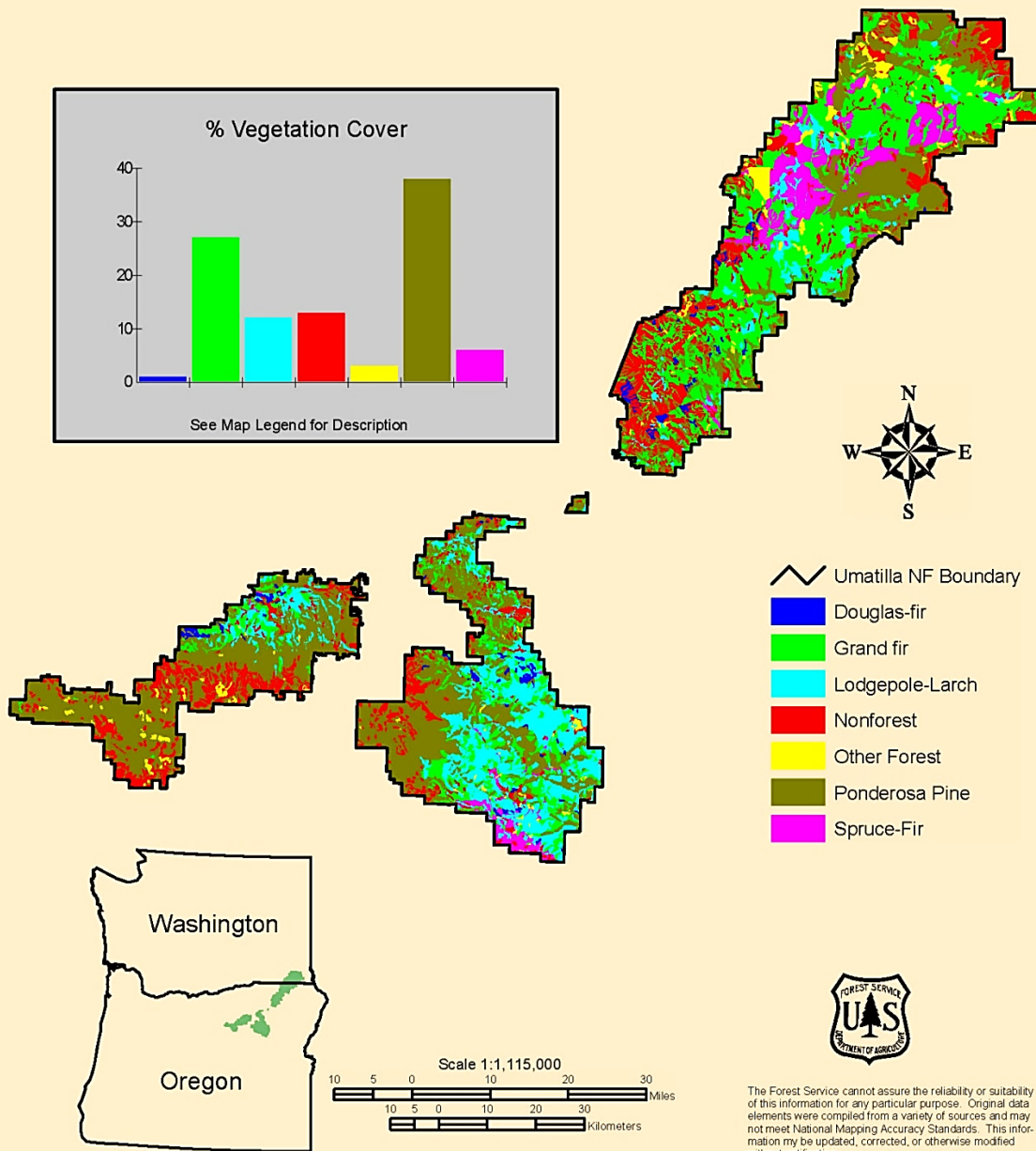
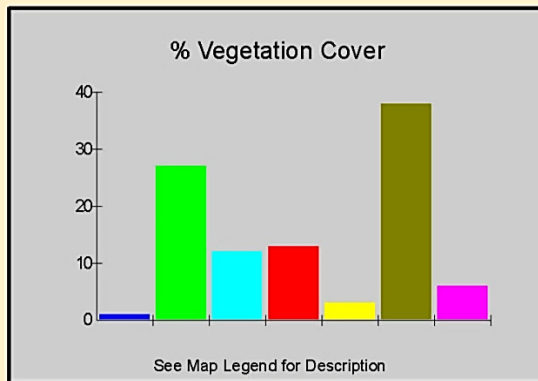
Reconnaissance map of Lookingglass Creek timber sale – see item #11





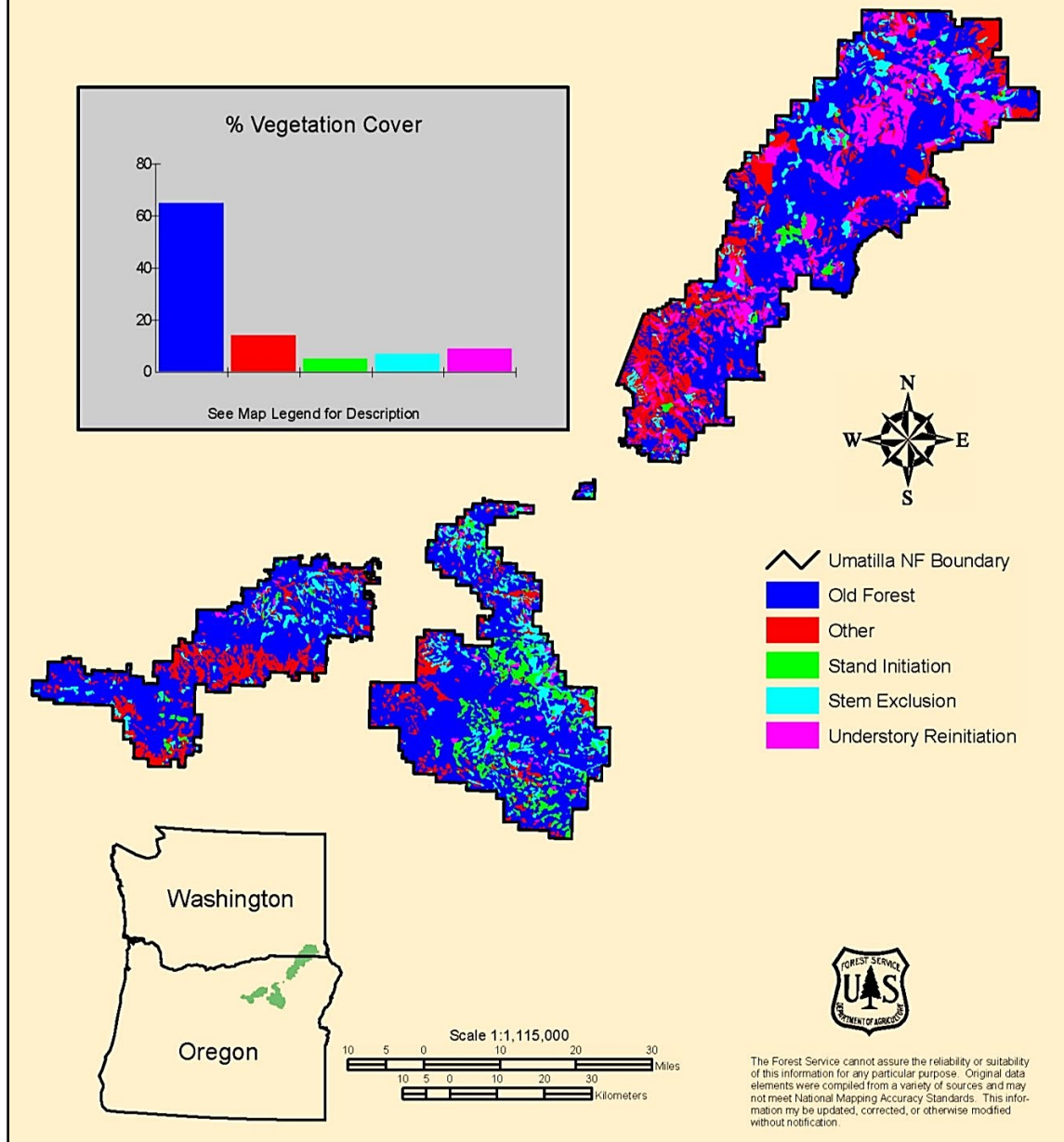
County-level forest type mapping for 1935-1936 (south half of Umatilla County) – see item #12

# Umatilla National Forest 1935-1936 Forest Types



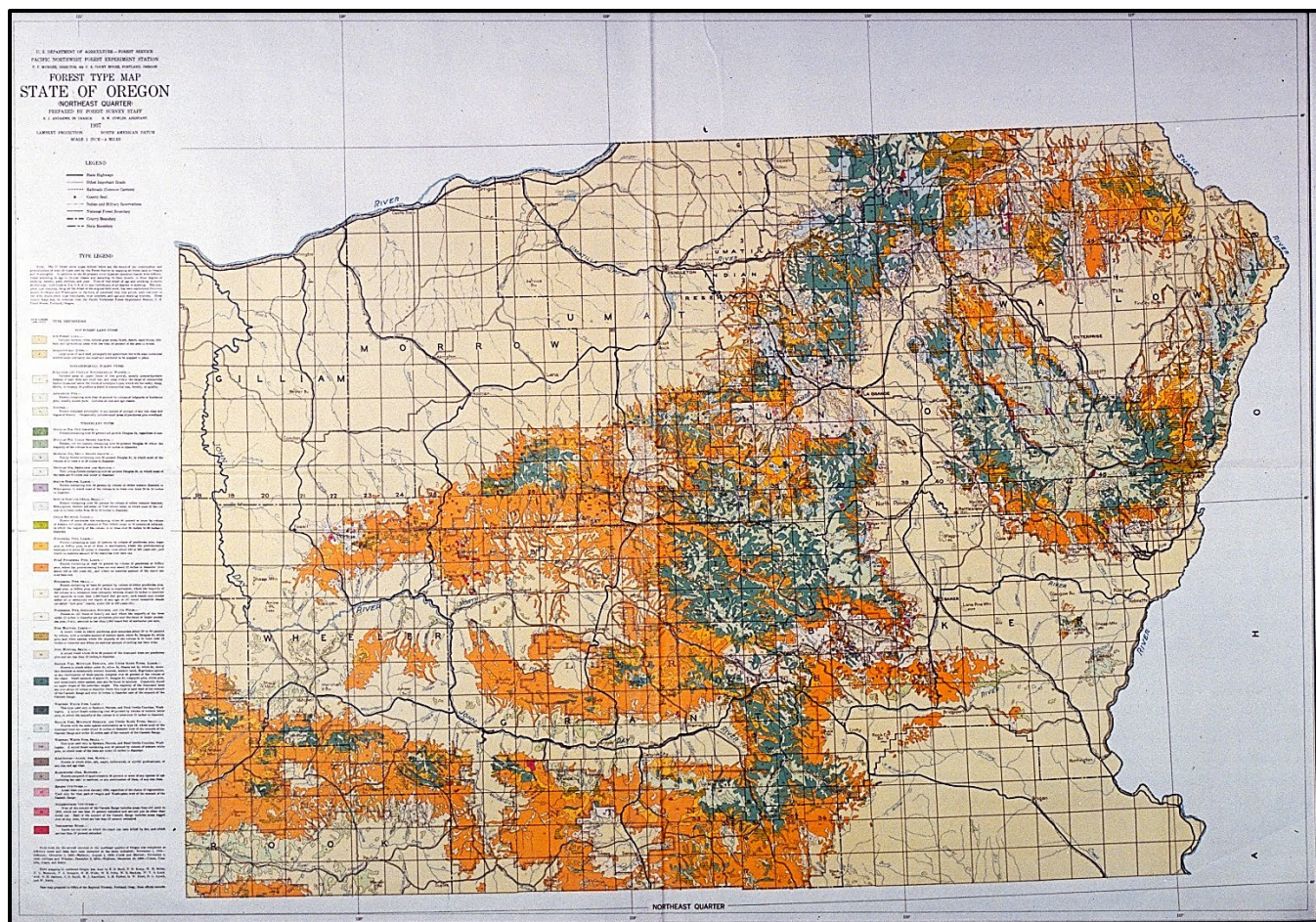
County-level forest type mapping for 1935-1936 – see item #12

# Umatilla National Forest 1935-1936 Structure Class

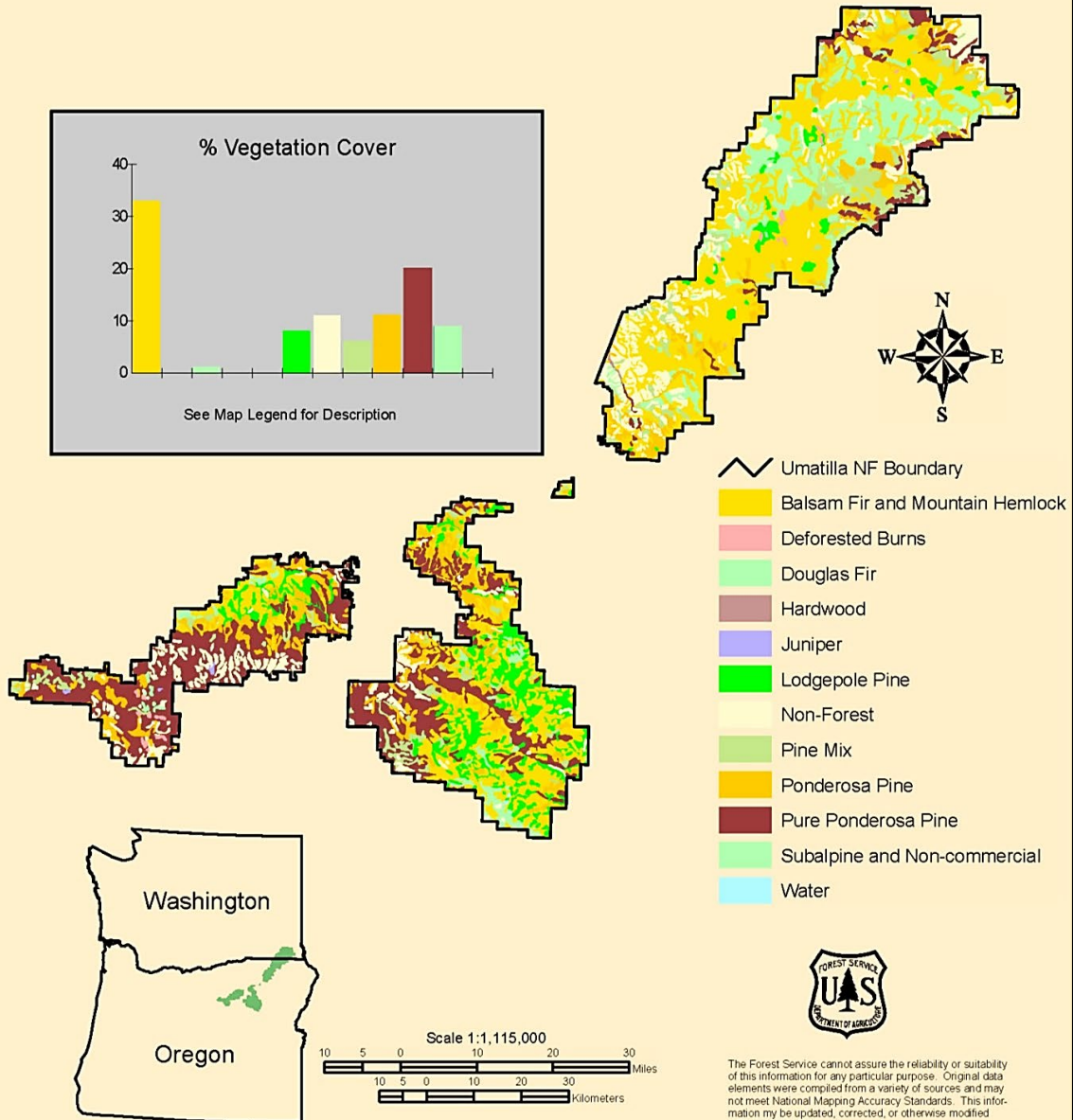
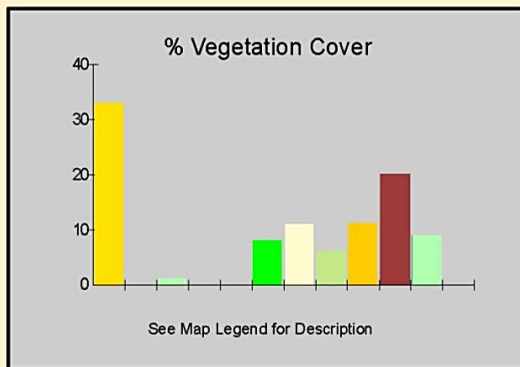


County-level forest structural stage mapping for 1935-1936 – see item #12





# Umatilla National Forest 1936-1937 Forest Types



Quarter-state forest type mapping for 1936-1937 – see item #13





# The Forests of Washington and Oregon in the 1930s

Constance A. Harrington, Pacific Northwest Research Station and David C. Powell, Umatilla National Forest



## INTRODUCTION

In the 1930s the Pacific Northwest Experiment Station:

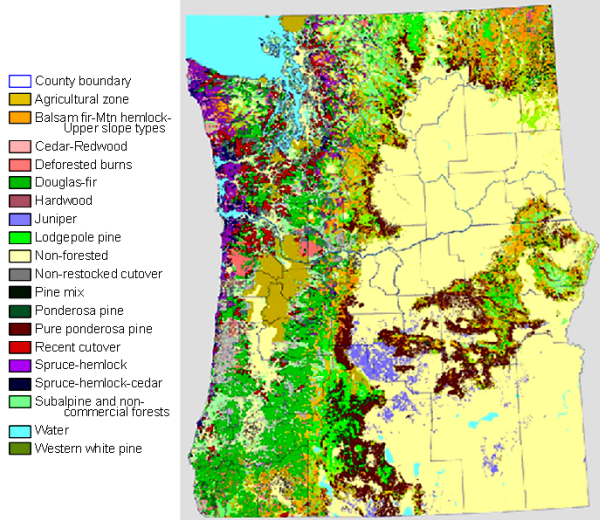
- Surveyed all forests in Washington and Oregon,
- Prepared maps of forest species composition and tree size

These maps have been digitized and are now available. The maps can be used to obtain an overview of what the forest cover was at that time and to compare current forest cover with that which existed 70 years ago.

## BACKGROUND

The 1930s forest survey of Washington and Oregon was the largest, most complete survey to date. The survey used a combination of on-the-ground surveys, aerial photography, and existing surveys (adjusted after field checks to ensure consistency) to cover all forest lands in both states.

The Douglas-fir region (western Washington and Oregon) was surveyed first, and the ponderosa pine region (eastern Washington and Oregon) was surveyed 2 years later. County maps were prepared as each county survey was completed, then "quarter-state" maps (one map for each quarter of the 2 states) were issued. The quarter-state maps (1:253,440) provide information on forest species composition and tree size as well as identifying areas that had been recently burned or cutover.



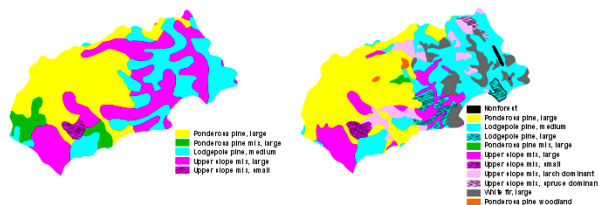
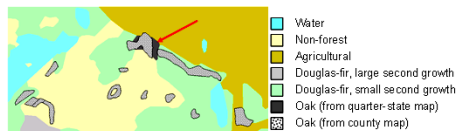
Digital version of the original quarter-state maps showing forest cover types in the 1930s. The original maps also showed tree size classes and that information is preserved in the digital version.

## COUNTY MAPPING

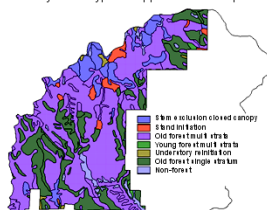
County-level maps were produced at a scale of 1:63,360. This map scale allowed more detail to be included.

The county-level maps are especially valuable for fine-scale analyses because the tree species and size information is mapped at a finer scale and these maps also include more detailed information about certain disturbance factors such as fire.

This portion of the **quarter-state** map for Pierce County, Washington shows the mapped polygons with solid colors. Only one area (see arrow) was mapped as Oregon white oak. Ten additional areas (shown as speckled) were mapped as oak on the **county** map for Pierce County.



Forest cover maps of the Kelsay Creek watershed on the Umatilla National Forest in eastern Oregon – the view on the left is based on the quarter-state map, the view on the right is based on the county map. Both maps indicate the watershed was dominated by stands of large ponderosa pine and medium lodgepole pine, but the county map has twice as many forest types mapped as well as providing finer detail on the outline of the forest cover polygons.

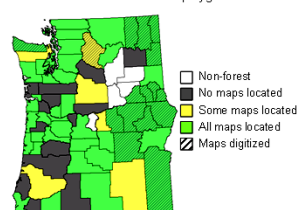


## Use of forest cover and size class information

The quarter-state maps divided forest cover for the major species into 2 to 4 size classes. The county maps also provided information on 10-year age classes (for stands < 20 – 24') and 3 stocking classes. This information can be used to determine the historical (1930) distribution of stand structure classes.

## AVAILABLE PRODUCTS

A history of the survey, along with reprinted copies of the original publications reporting results from the survey is being printed. A companion CD includes GIS and graphics files showing the composite map developed from the 8 quarter-state maps as well as PDF files of the history and original publications.

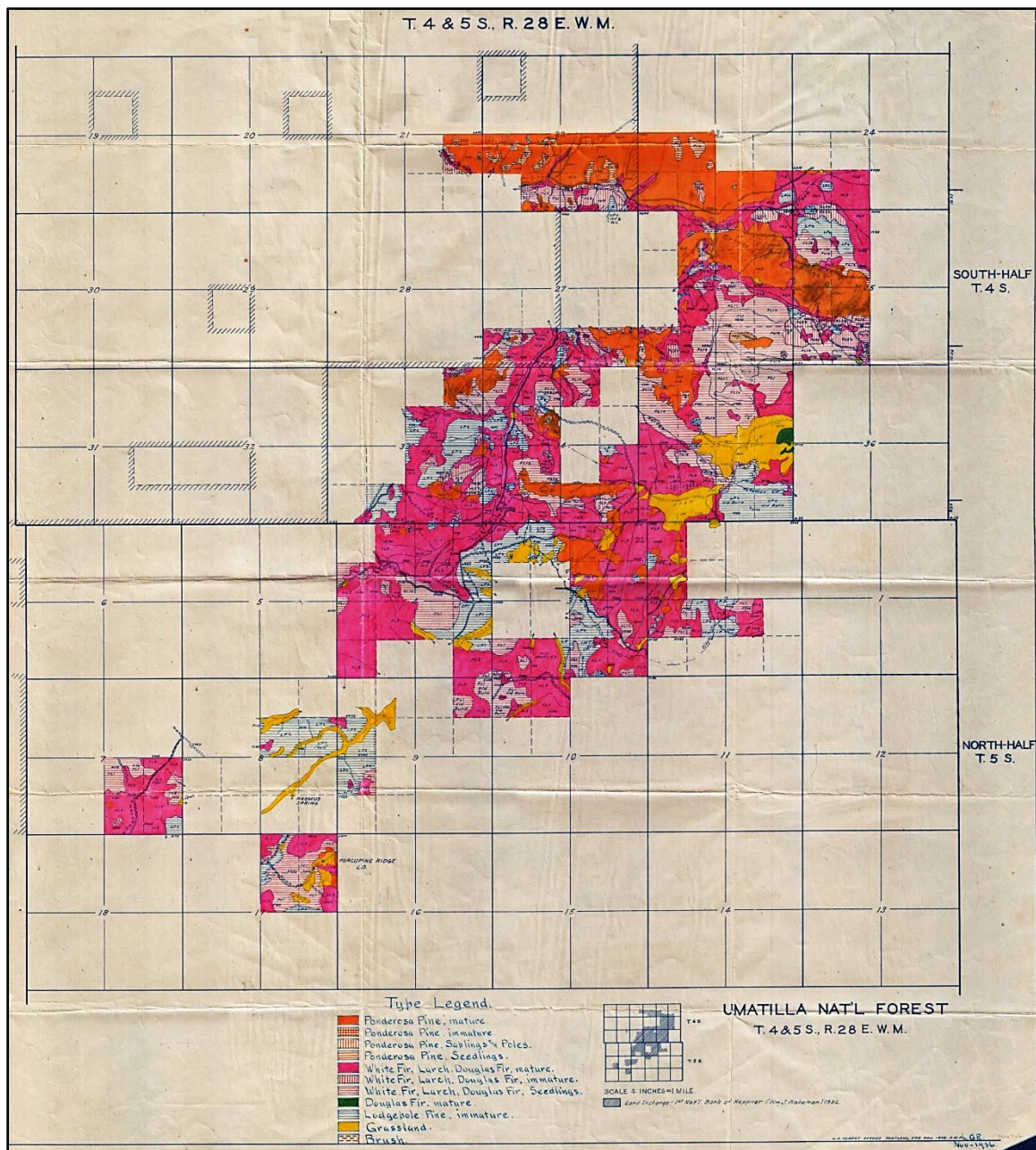


## Status of county maps

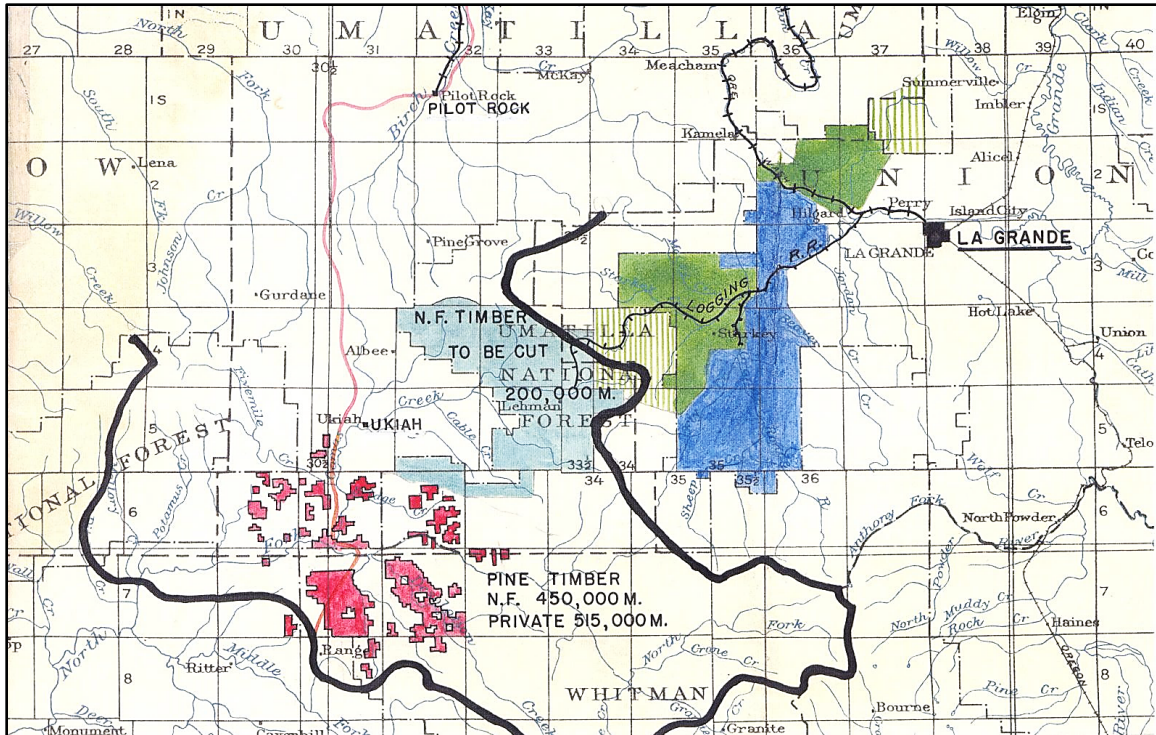
County maps have been located for almost 2/3 of the counties and several are available digitally. Please contact [charrington@fs.fed.us](mailto:charrington@fs.fed.us) or [dweyer@fs.fed.us](mailto:dweyer@fs.fed.us) if you have information on any of the missing maps or digital versions of county maps you would be willing to share.

Poster describing mid-1930s forest type mapping completed by the Pacific Northwest Forest Experiment Station. This mapping is described as items 12 and 13 in the Map Descriptions section. Additional information about the work described on this poster is provided in a general technical report authored by Connie Harrington (2003).



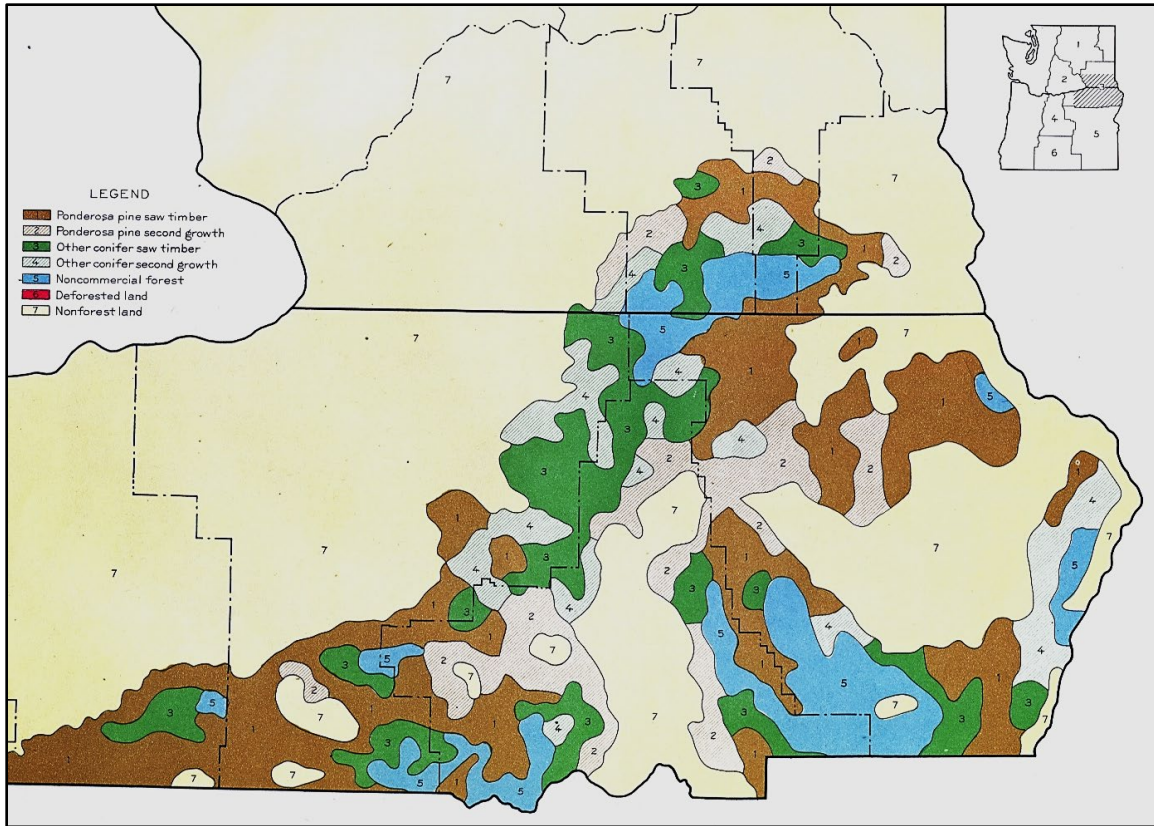


Land Exchange Area on Heppner Ranger District (1936) – see item #14

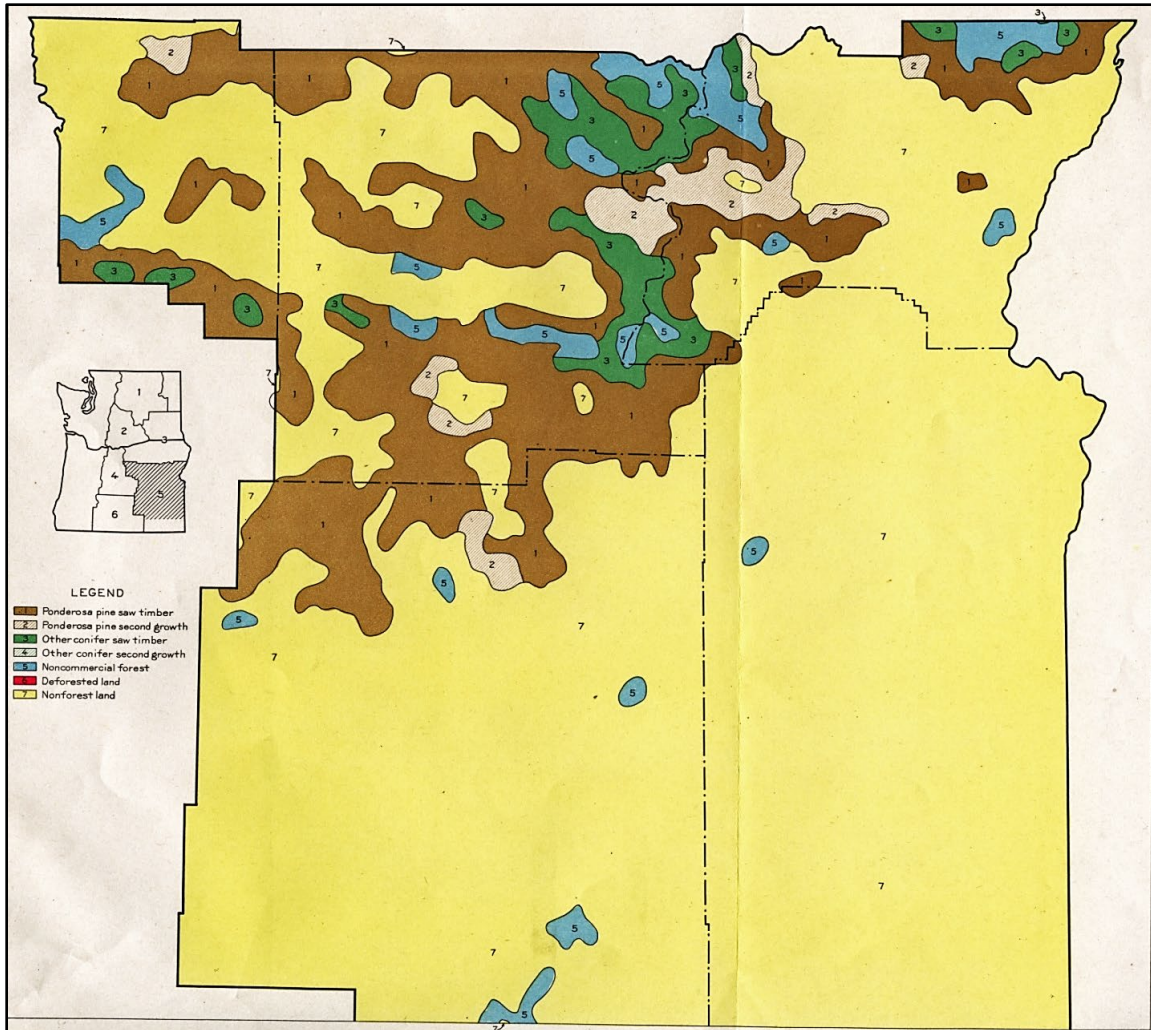


Camas Creek timber sale unit map – see item #15



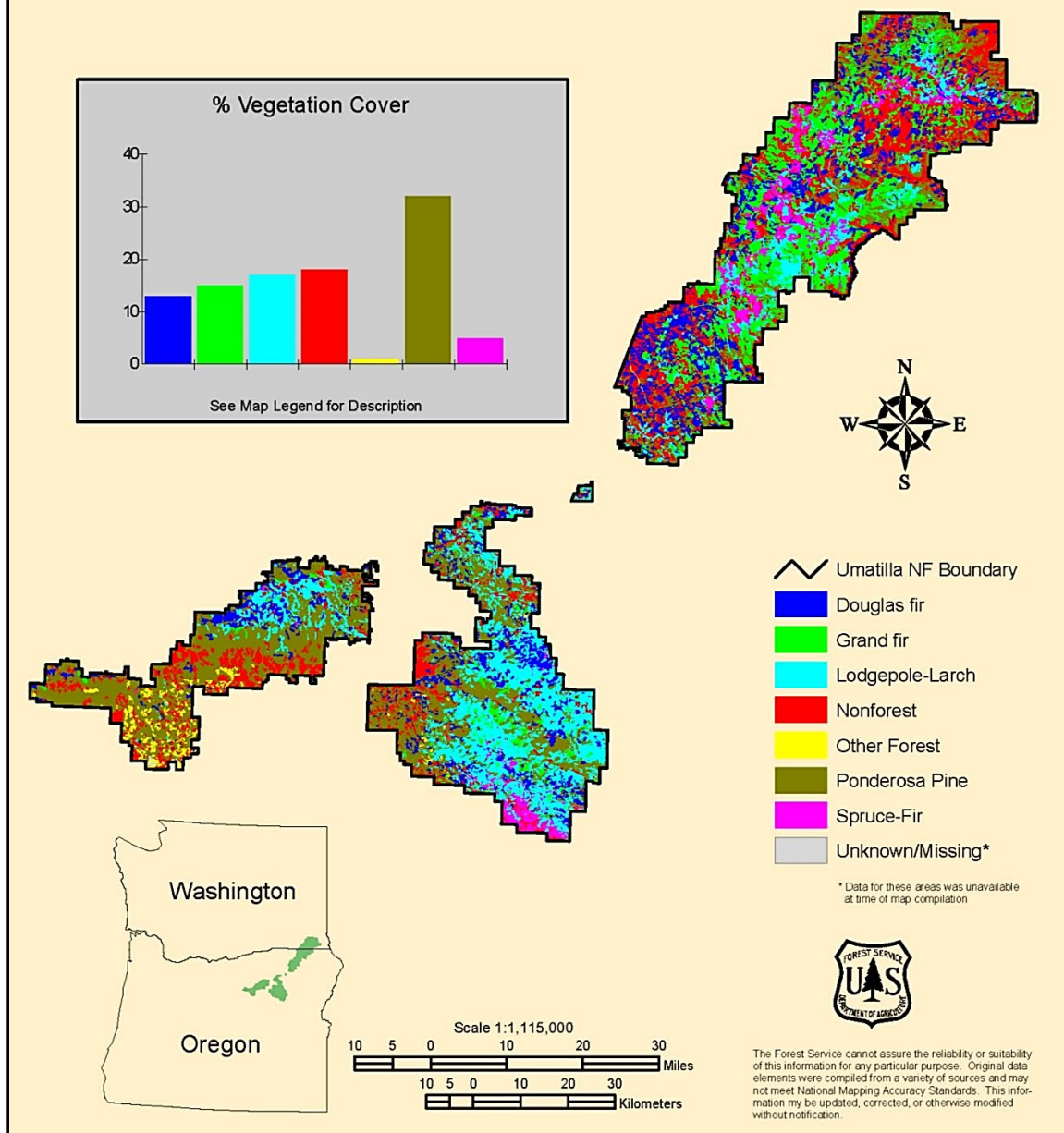


Survey unit #3 – north Blue Mountain unit – see item #18



Survey unit #5 – south Blue Mountain unit – see item #18

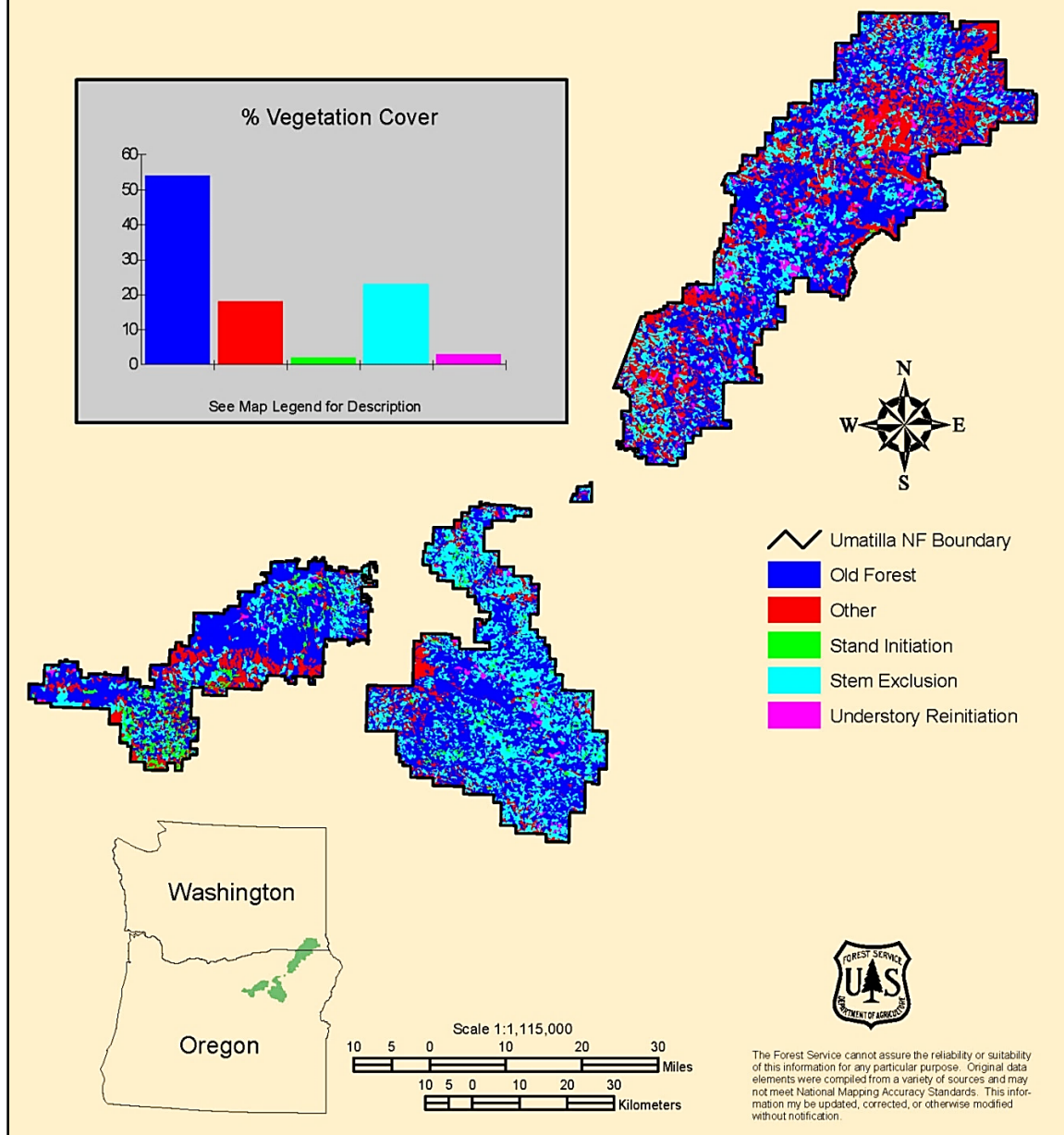
# Umatilla National Forest 1953-1960 Forest Types



County forest type mapping for 1950s – see item #21



# Umatilla National Forest 1953-1960 Structure Class



County forest structural stage mapping for 1950s – see item #21

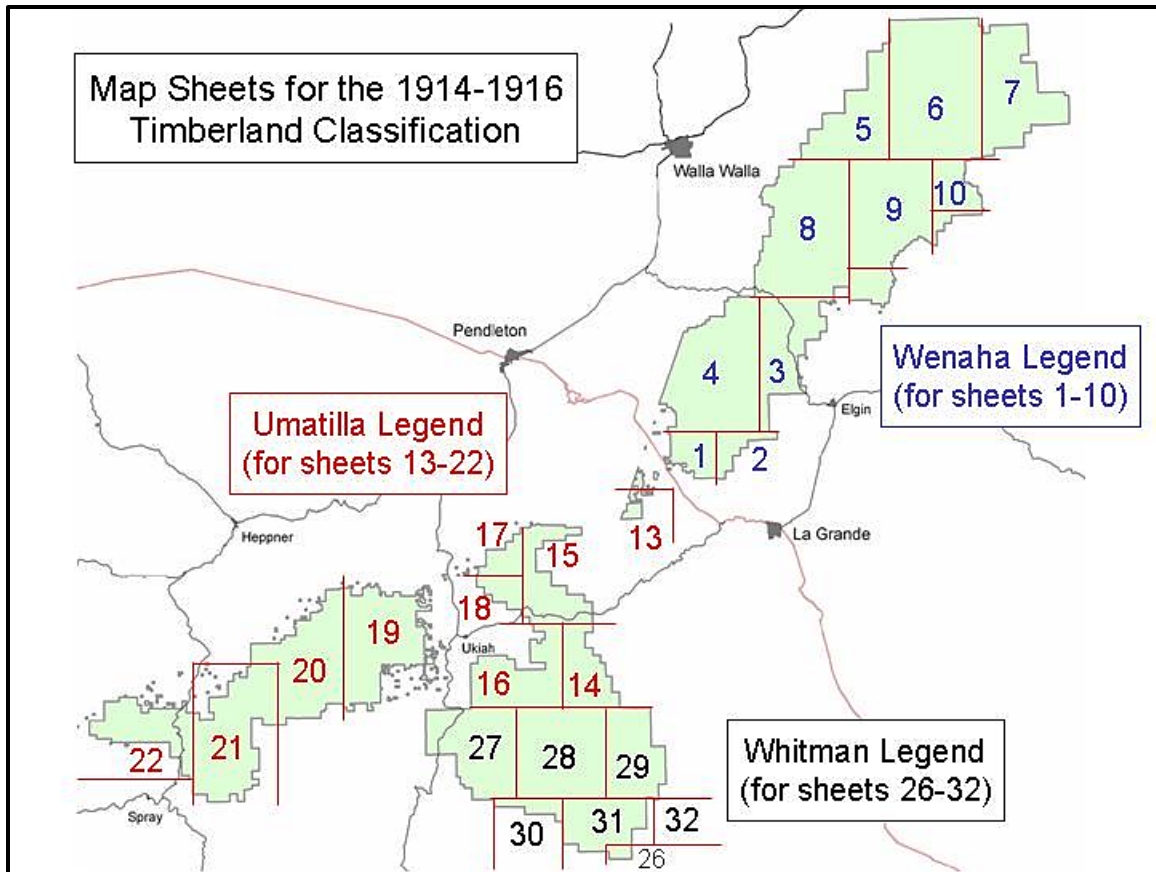
## APPENDIX E: 1914-16 TIMBERLAND CLASSIFICATION IMAGES

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This appendix provides image files for item #8 of the Map Descriptions section: “Extensive timberland classification for Wenaha, Umatilla, and part of Whitman National Forests” (Kellogg 1916, Kendall 1914, Smith 1915).

These image files are available from a website ([Timberland Classification](#)), but I decided to also include them in this appendix because websites have not been particularly stable through time, so it is not assured that web access will always be available. The following image files are provided in this appendix:

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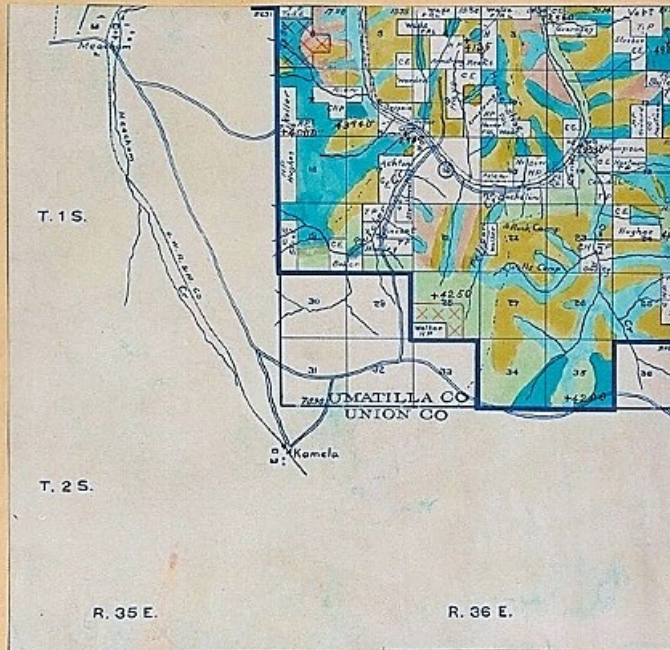
Map Sheet Key for 1914-16 Timberland Classification for Umatilla, Wenaha, and Whitman NFs



9

R. 36 E.

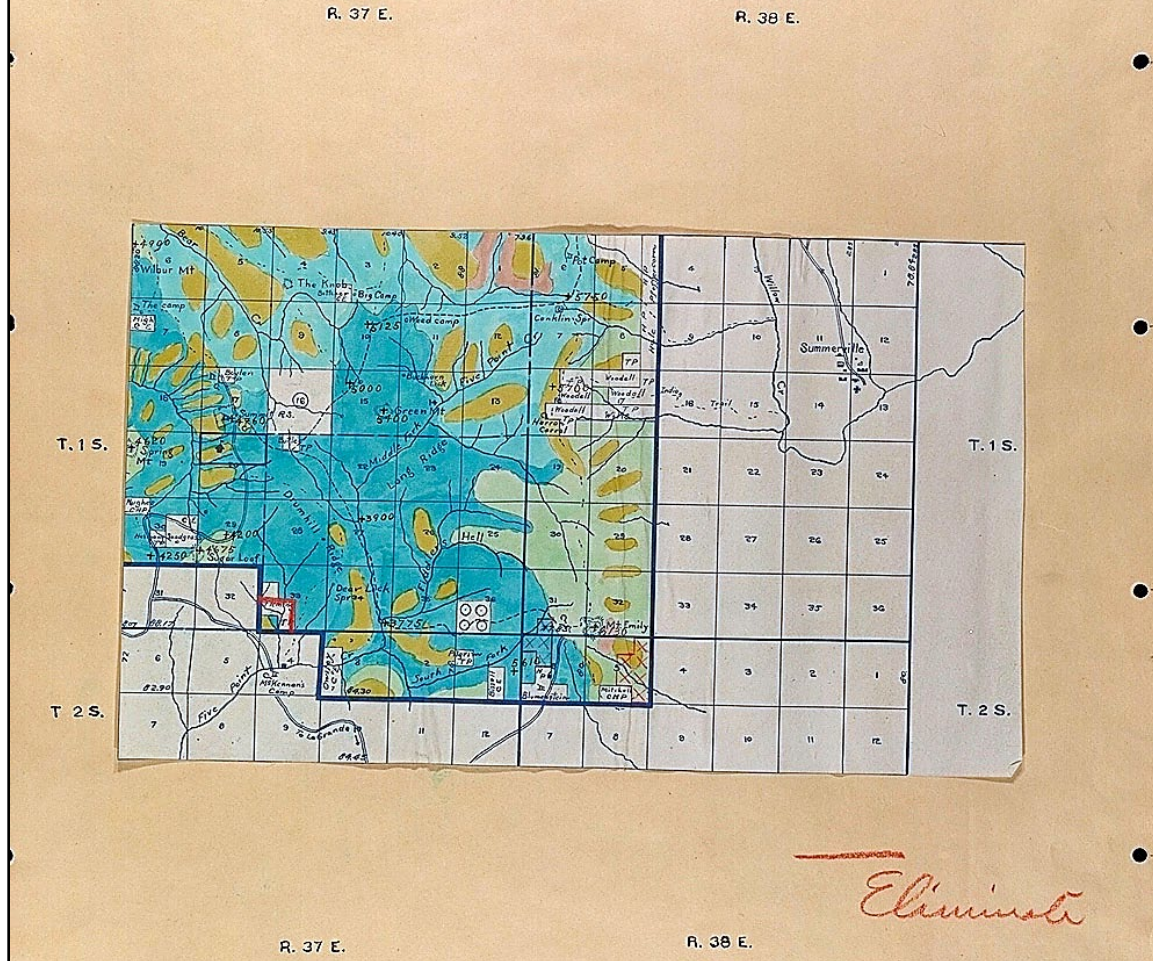
*Wenaha Clearing  
Estimate 1944  
By T. H. Hunsaker*



Map Sheet #1 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest

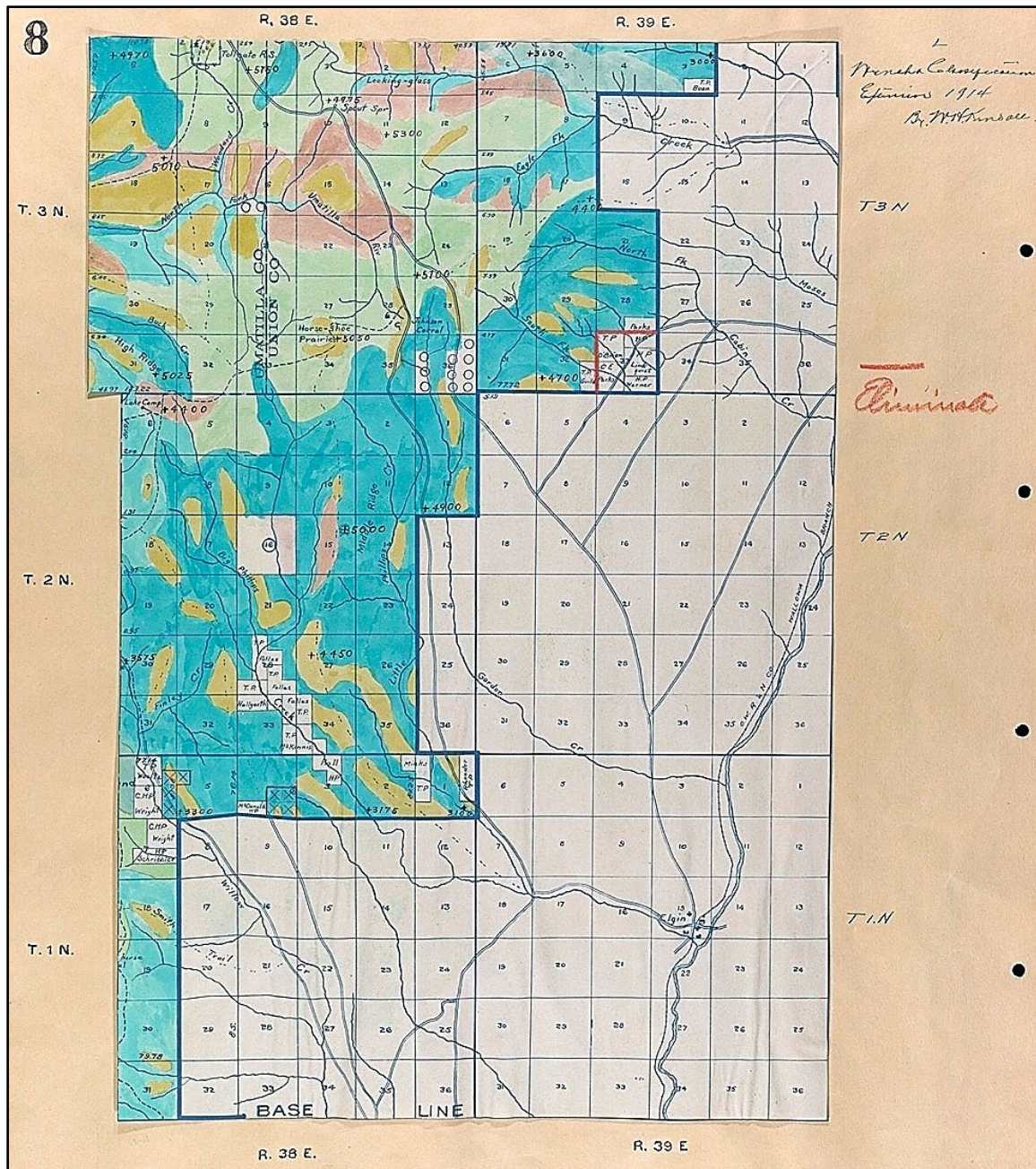
10

Wenaha Classification  
Expenditures 1914  
By T.H. Kinsale



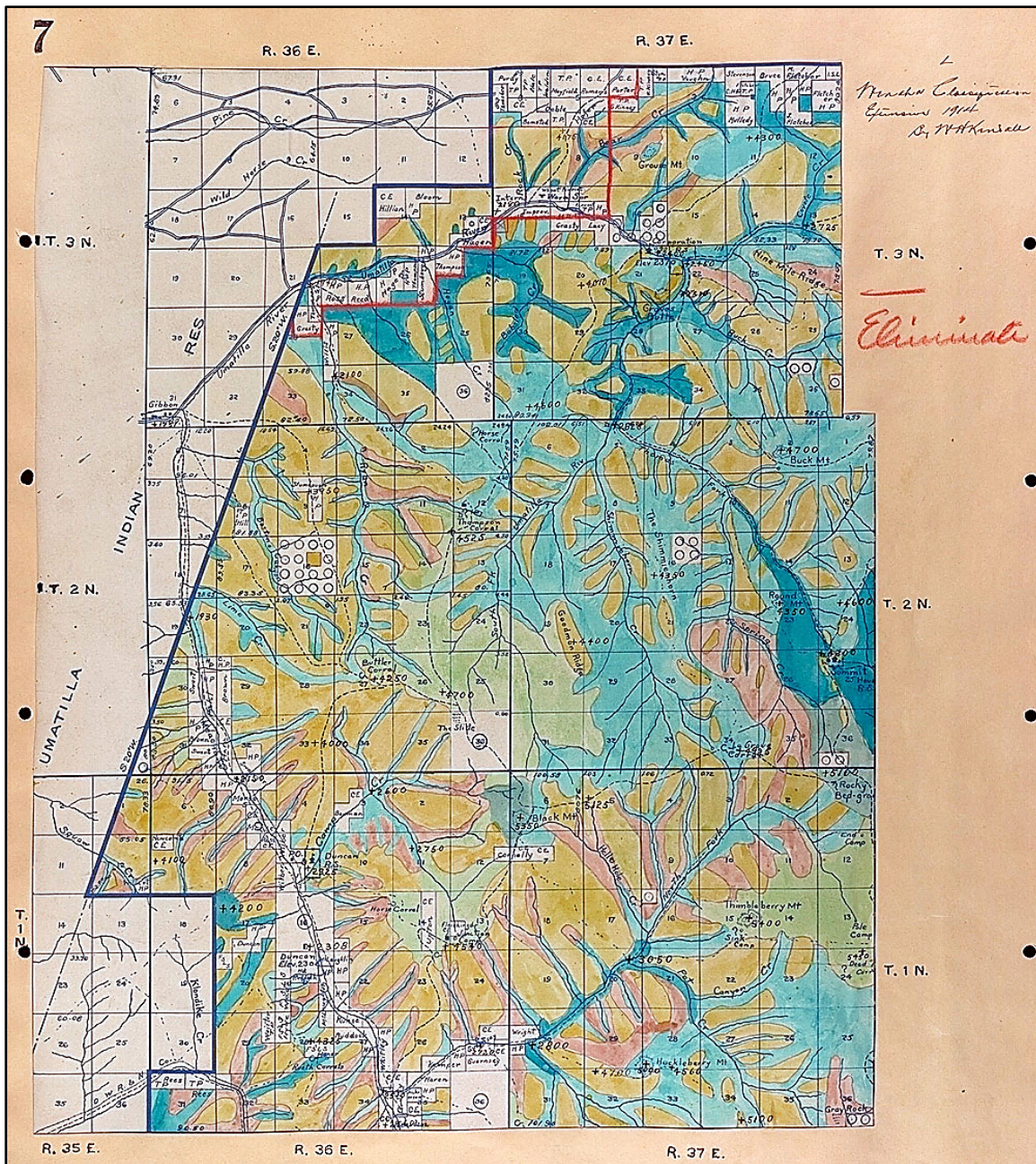
Map Sheet #2 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest





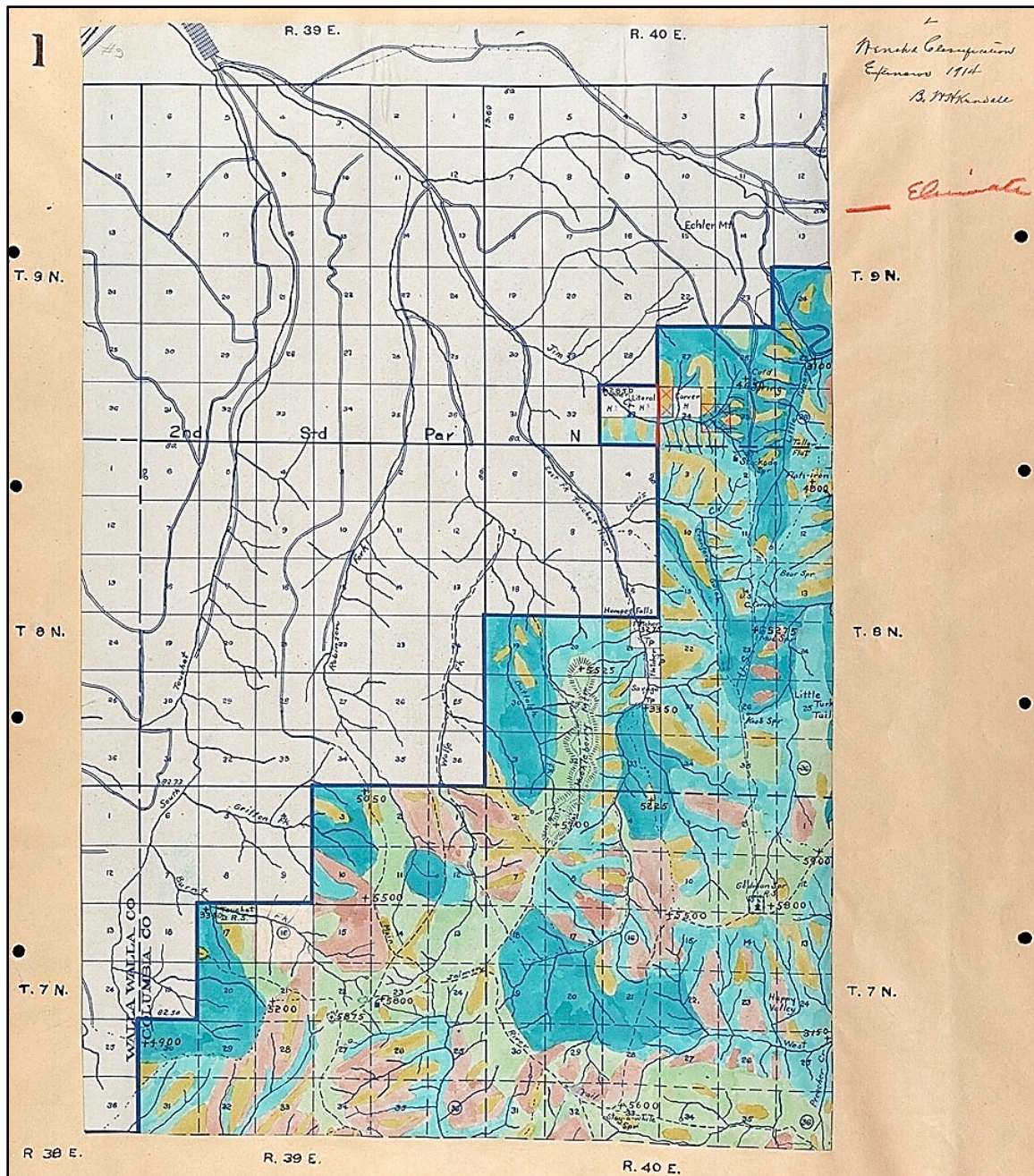
Map Sheet #3 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest





Map Sheet #4 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest









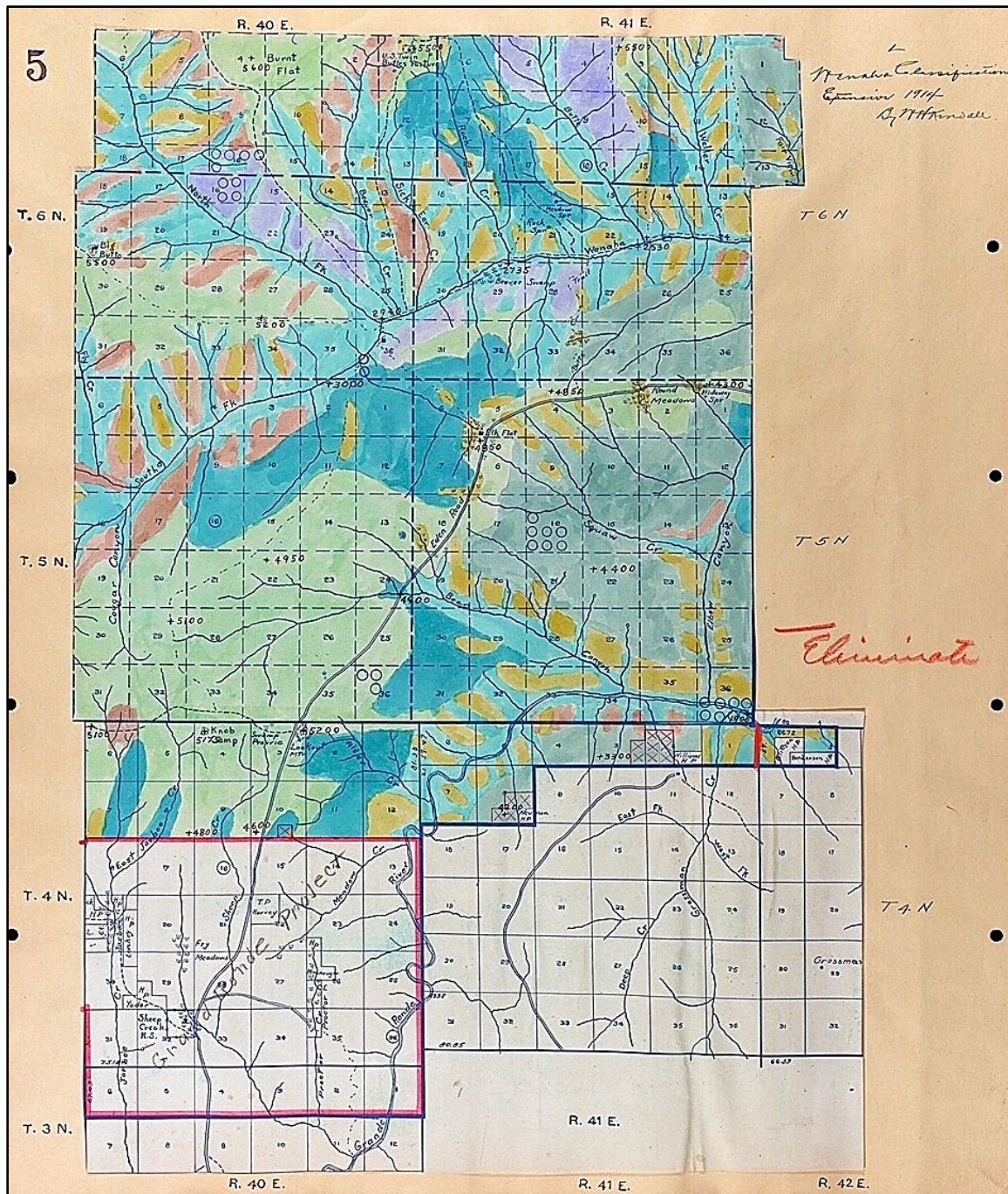






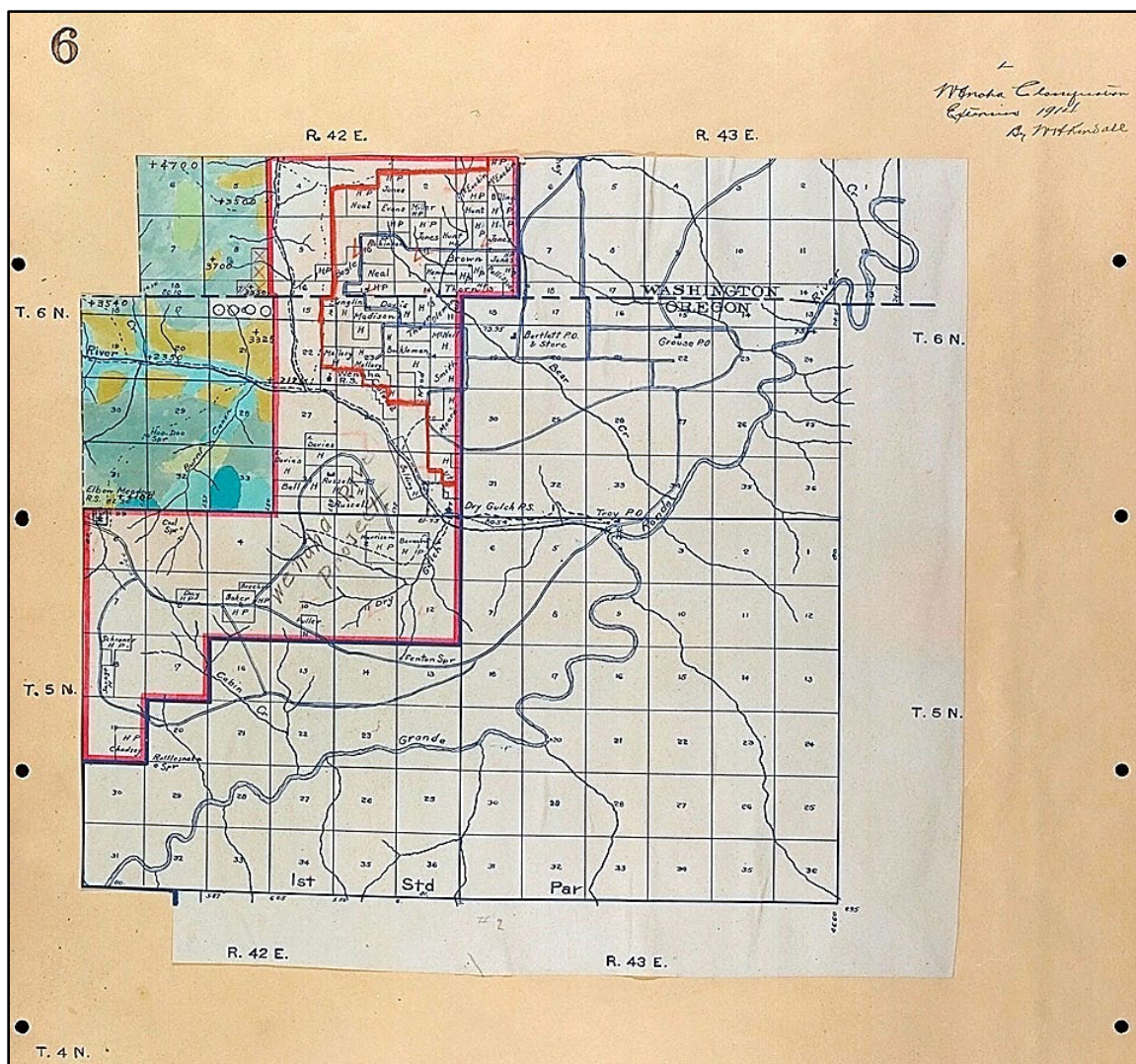






Map Sheet #9 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest




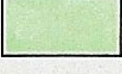


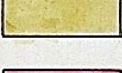
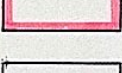
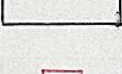






Map Sheet #10 (see Map Sheet Key at beginning of this appendix), Wenaha National Forest



# LEGEND

	Timber land - 2,000 to 5,000 Bd. ft. per acre.
	Timber land - 5,000 to 10,000 Bd. ft. per acre.
	Timber land - 10,000 to 25,000 Bd. ft. per acre.
	Woodland - cordwood, poles, etc.
	Intermixture - scrubby timber, brush, and grass.
	Brush land or chaparral.
	Grass land - parks, meadows, open, etc.
	Covered by previous intensive classification.
	Alienated lands.
	Rejected applications under Act of June 11, 1906.
	Points of elevation ( indicated by numbers )

wood  
land

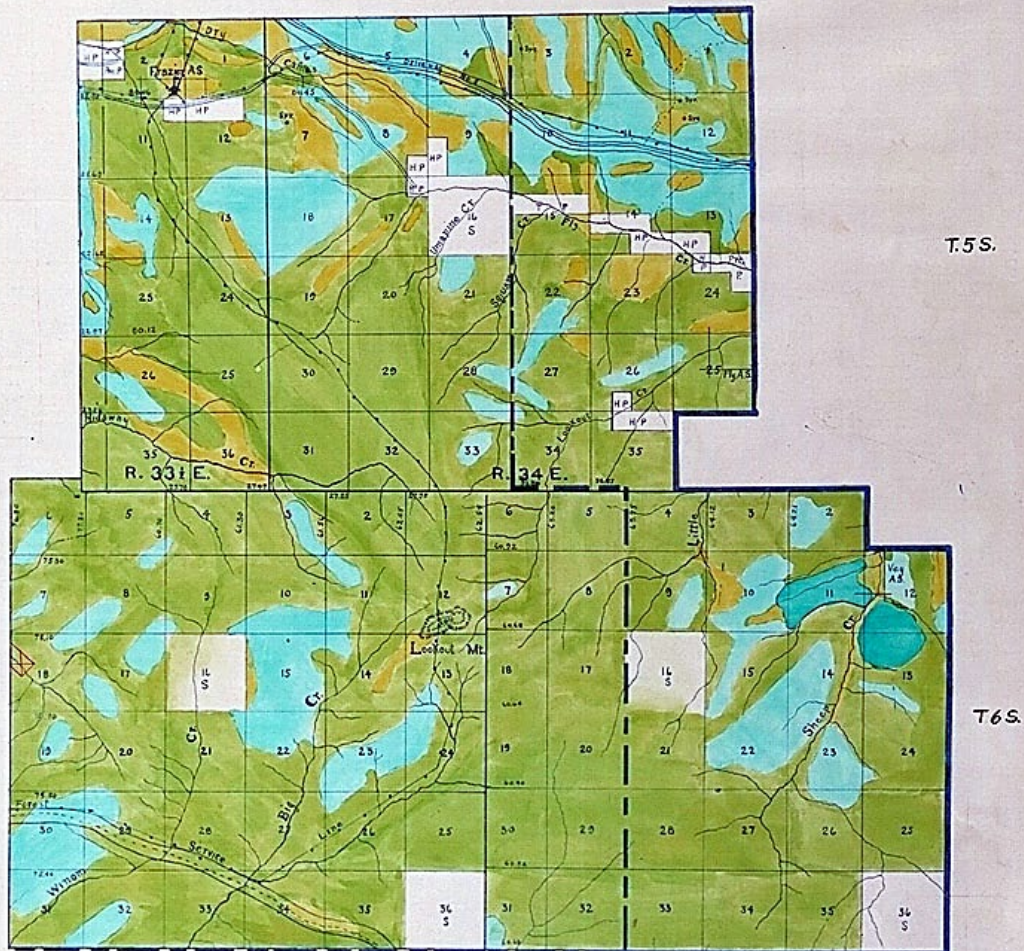
Map Sheet #11, Wenaha National Forest, Map Legend



Map Sheet #13 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest



Umatilla  
CLASSIFICATION.  
EXTENSIVE  
1916  
By *McKinnon*

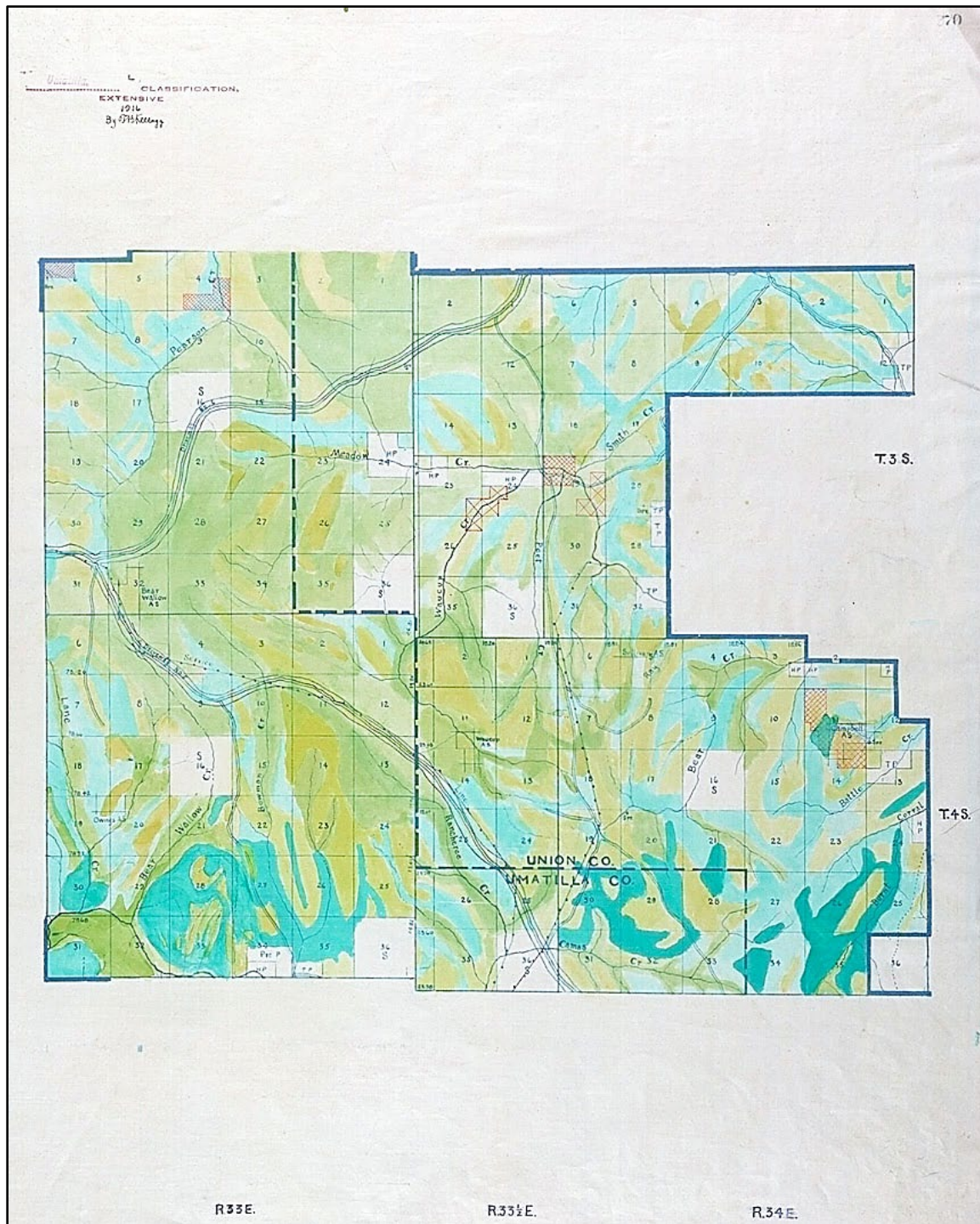


R.34E.

R.35E.

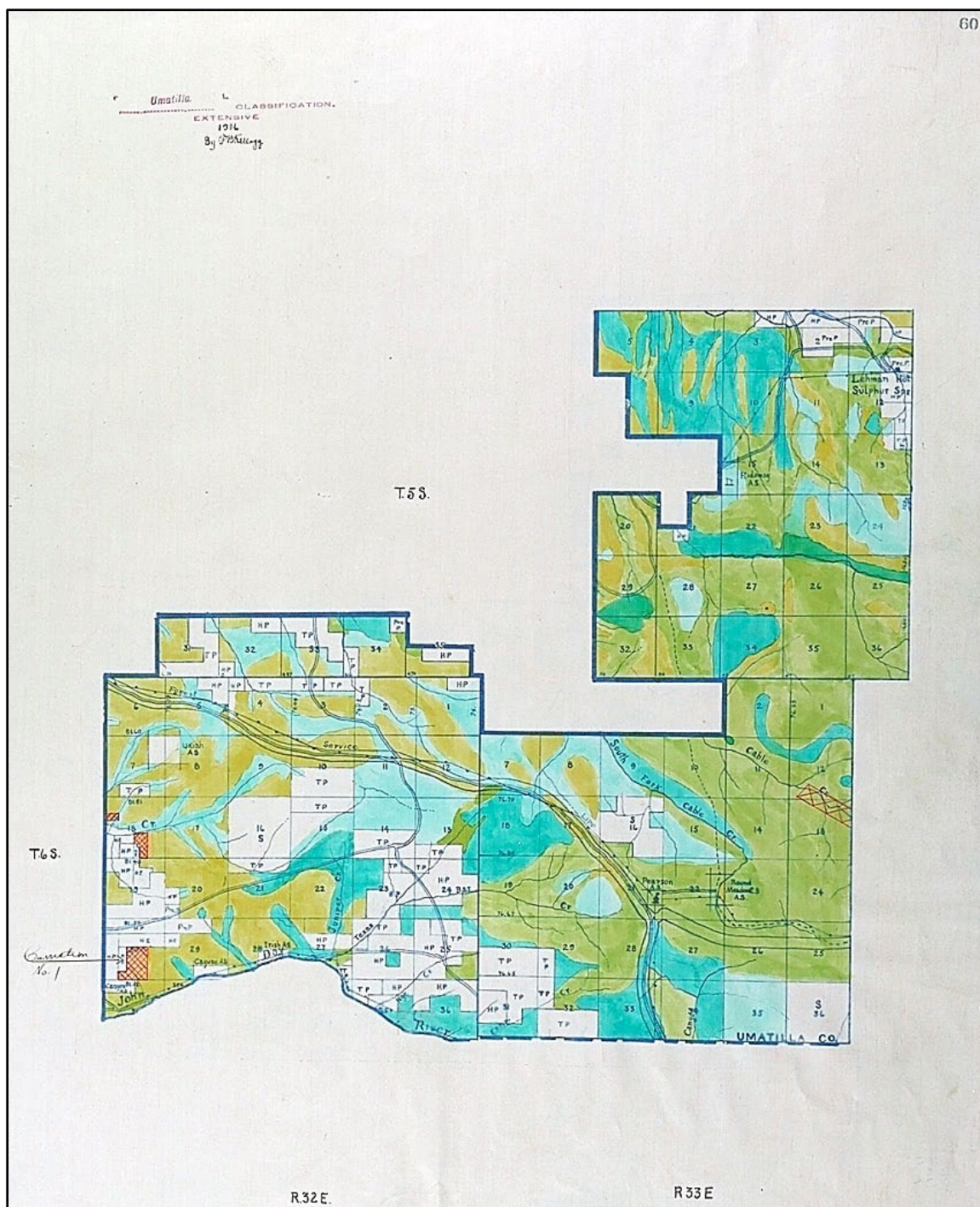
Map Sheet #14 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest





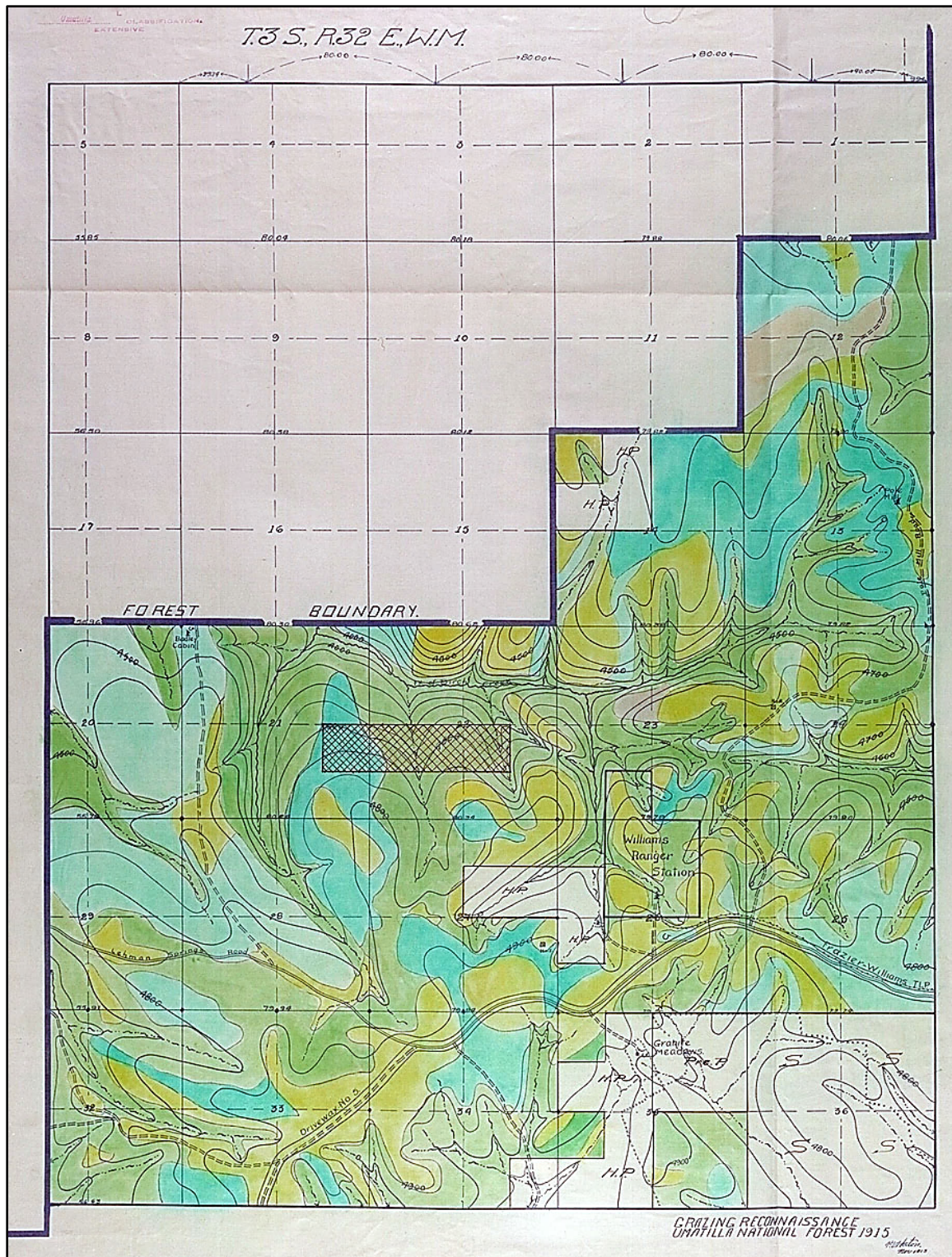
Map Sheet #15 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest





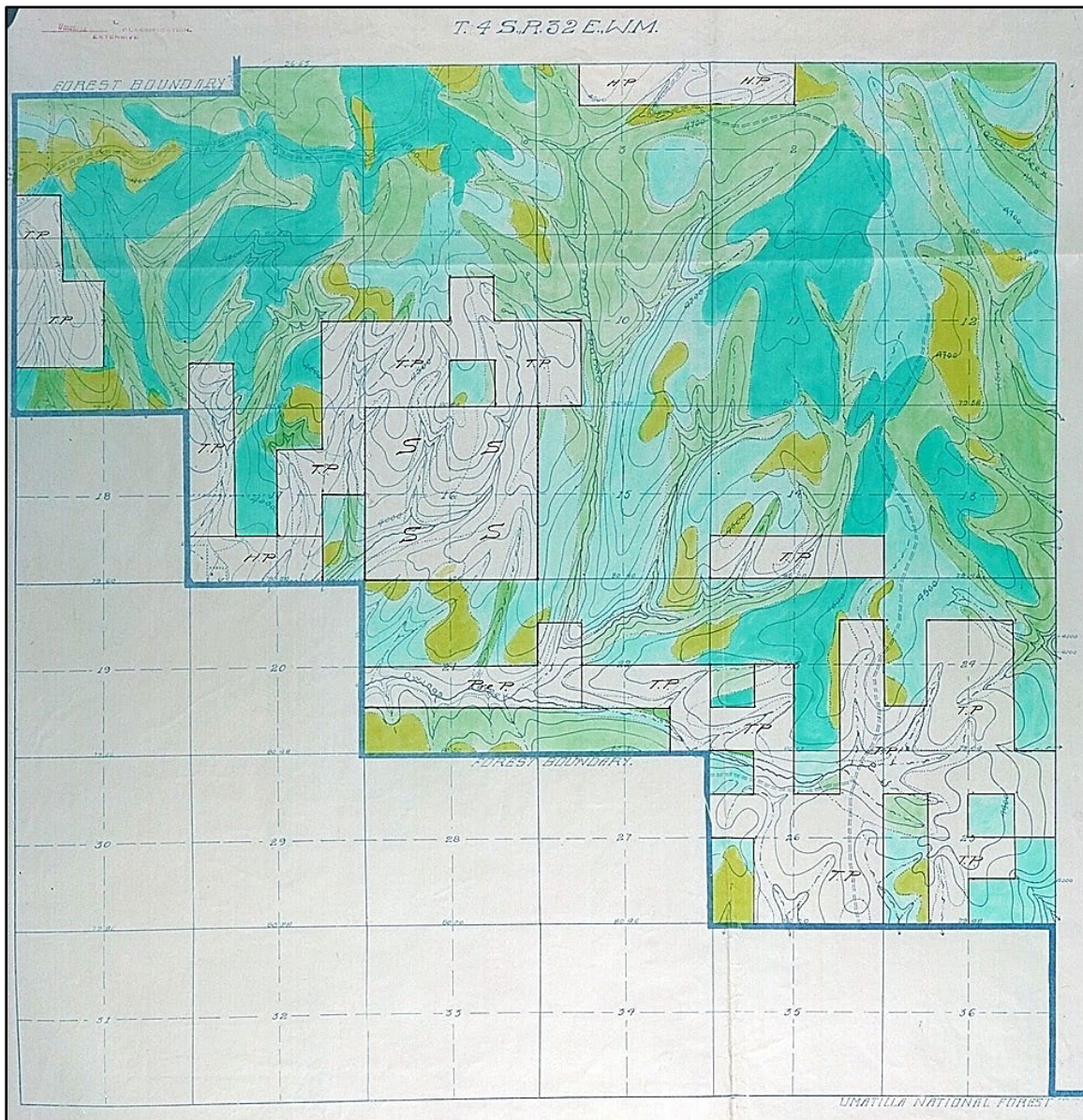
Map Sheet #16 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest





Map Sheet #17 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest



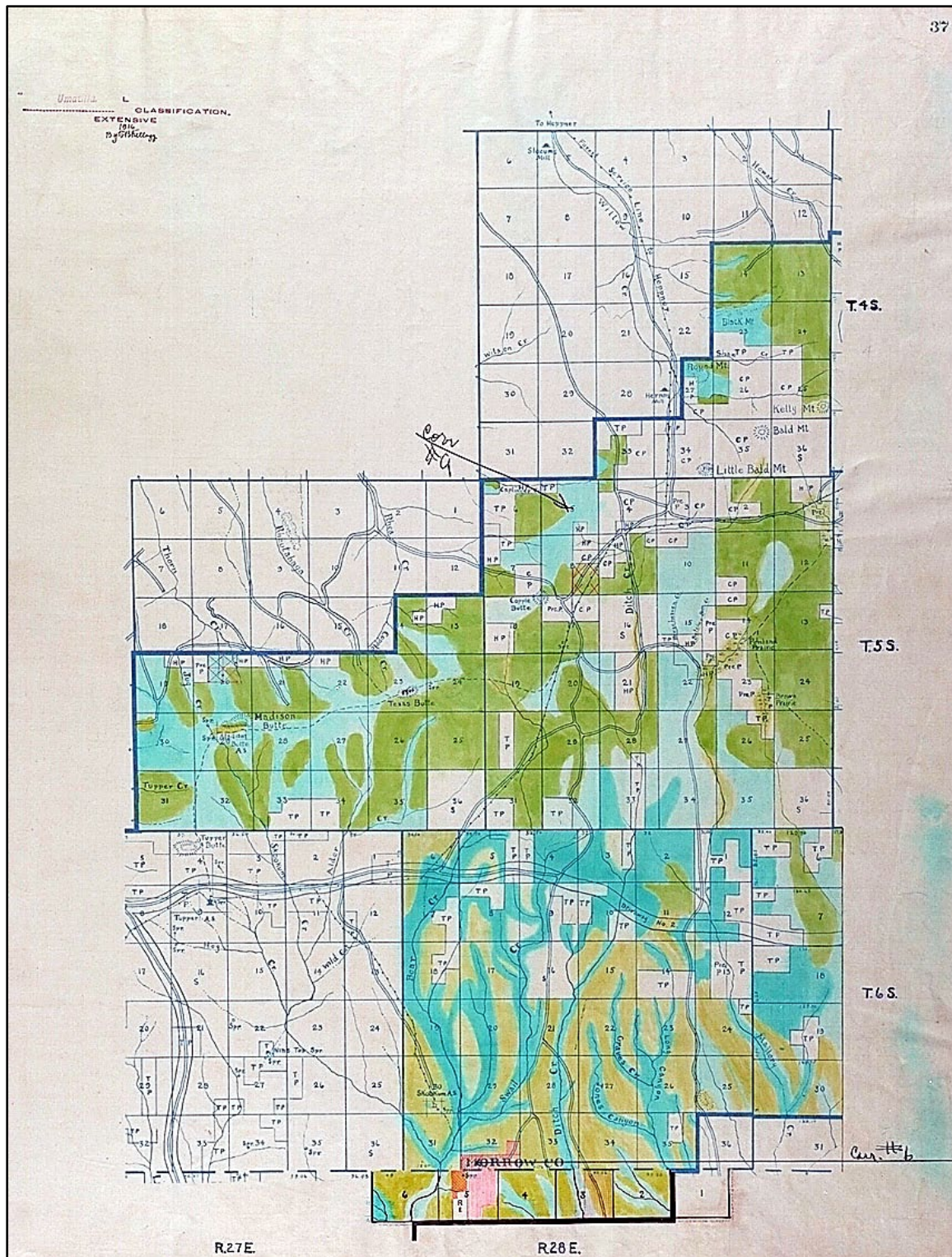


Map Sheet #18 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest



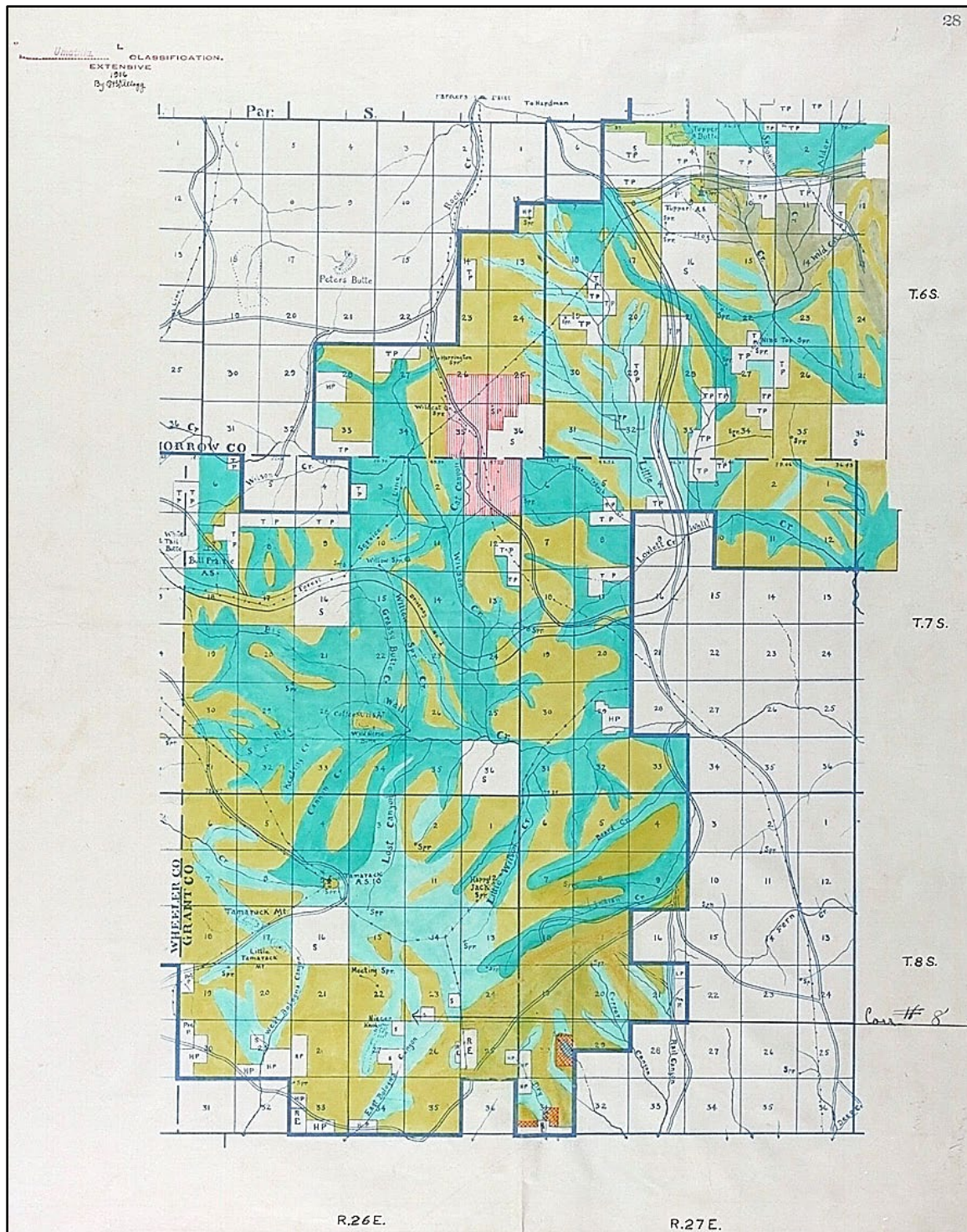
Map Sheet #19 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest



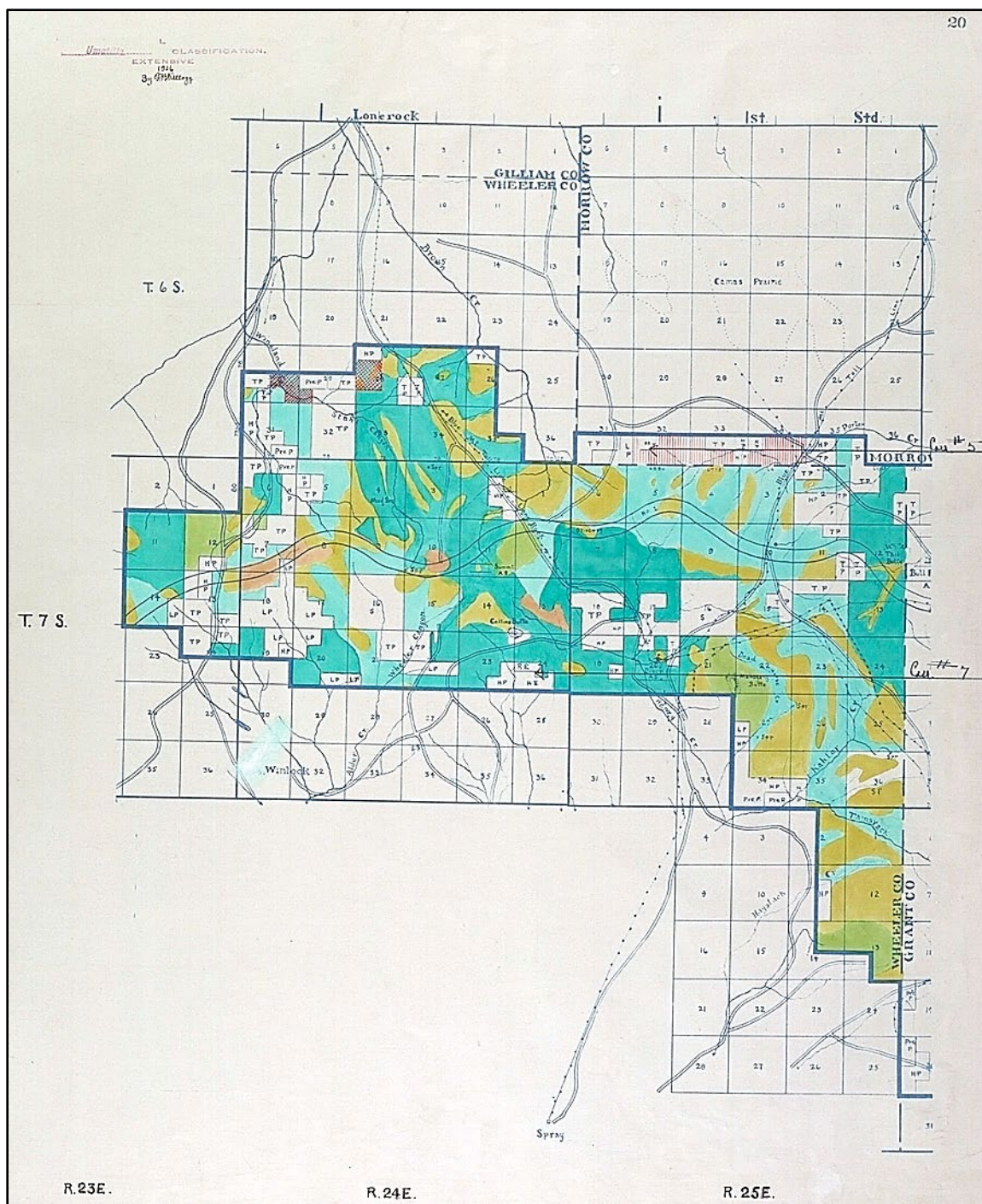


Map Sheet #20 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest









Map Sheet #22 (see Map Sheet Key at beginning of this appendix), Umatilla National Forest













LAND CLASSIFICATION OF THE UMATILLA NATIONAL FOREST, OREGON.

BY

F. E. KOLLBERG

1916

L E C E E R















Cover Classification		Letter Symbol Status	
1		2 - 5 M. feet per acre.	11 AS - Administrative Site.
2		5 - 10 M. feet per acre.	12 CP - Coal Patent.
3		10 - 25 M. feet per acre.	13 HA - Homestead Application (CLO)
4		Woodland, cordwood, poles, etc.	14 HE - Homestead Entry original.
5		Grasslands, parks, meadows, open.	15 HP - Homestead Entry patented.
6		Sagebrush.	16 LP - Forest Lien Selection patented.
7		Brushland.	17 Pro. P - Pre-emption Patent.
8		Land rejected on application under the Homestead Act of June 11, 1906.	18 RE - Rejected to Entry (under June 11, 1906) but not entered.
9		Land applied for and classified by the Secretary of Agriculture under the Act of June 11, 1906 and August 10, 1912 as chiefly valuable for forestry.	19 S - State land (school)
10		Unclassified land held for intensive classification.	20 SS - State Selection pending.
			21 SP - School Selection (used as) base of approved indemnity.
			22 TP - Timber & Stone patent.

Map Sheet #23, Umatilla National Forest, Map Legend









# WHITMAN NATIONAL FOREST. OREGON. DISTRICT 6.

## WILLAMETTE BASE and MERIDIAN. Land Classification Report. 1915. LEGEND.

### FOREST COVER TYPES.

	Timber land less than 2 M. B. F. per acre.
	Timber land 2 to 5 M. B. F. per acre.
	Timber land 5 to 10 M. B. F. per acre.
	Timber land 10 to 25 M. B. F. per acre.
	Timber land over 25 M. B. F. per acre.
	Woodland, cordwood, poles, etc.
	Chaparral or brush land.
	Sagebrush.
	Grass land, parks, meadows, open.
	Barren above timber line.
	Burn.
	Chiefly valuable for water control. (Show forest cover also.)
	Unclassified land held for intensive classification. (Do not show forest cover.)
	Land listed after intensive classification. (This legend is included for use when the area left for intensive classification is covered, and the final classification determined.)

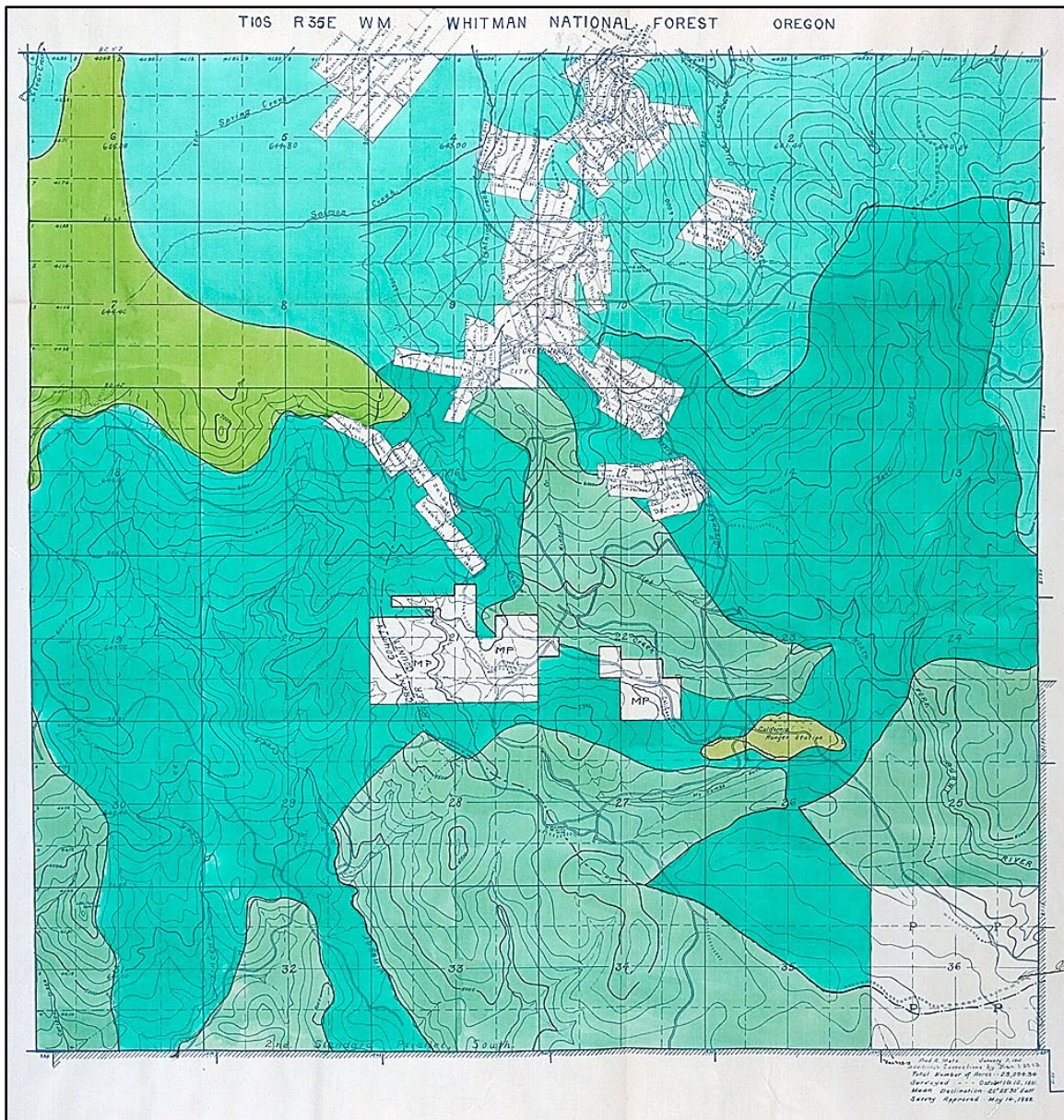
### ALIENATIONS.

CE	Cash Entry-Commuted Homestead.
H	Homestead Entry.
HP	Homestead Patented.
P	Any patented entry.
MC	Mineral classification.
MP	Mineral patent.
DMR	Dalles Military Road Grant Patent.
(16)	State School land.
T	Timber & Stone Patent.
TE	Townsite entry.
L	Lands examined, listed and opened to entry.
	Lands examined on application and rejected.
	Examined, rejected and permanently segregated nonlistable.
	Still maintained as a home.
	H. E. Cancelled or abandoned as a home.
	Ranger Station.
	Ranger Station, improved.
	N. F. Boundary, Atlas Sheets.
	N. F. Boundary, 4" scale maps.

*Man Smith*  
Ken 11-25-15

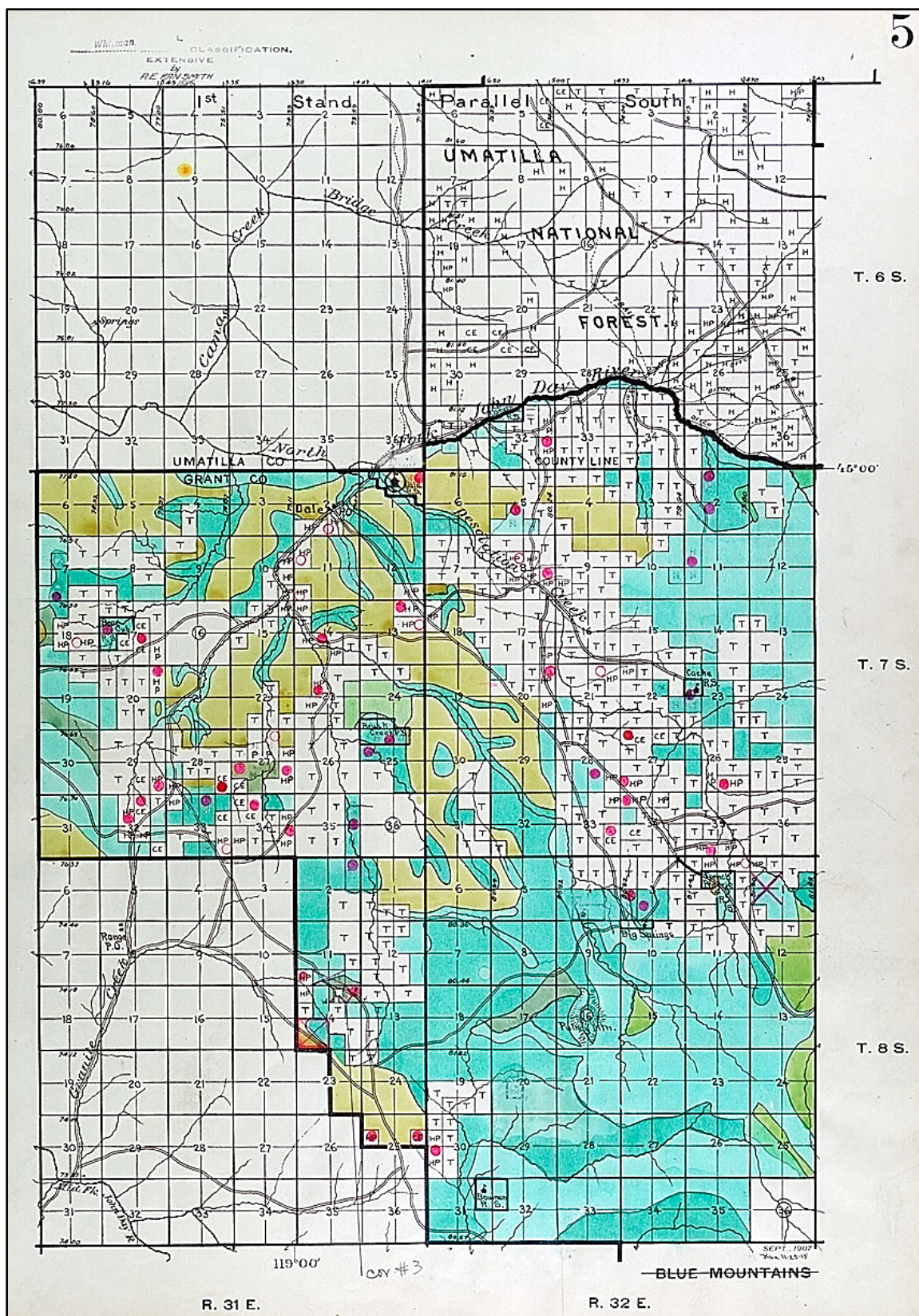
Map Sheet #25, Whitman National Forest, Map Legend





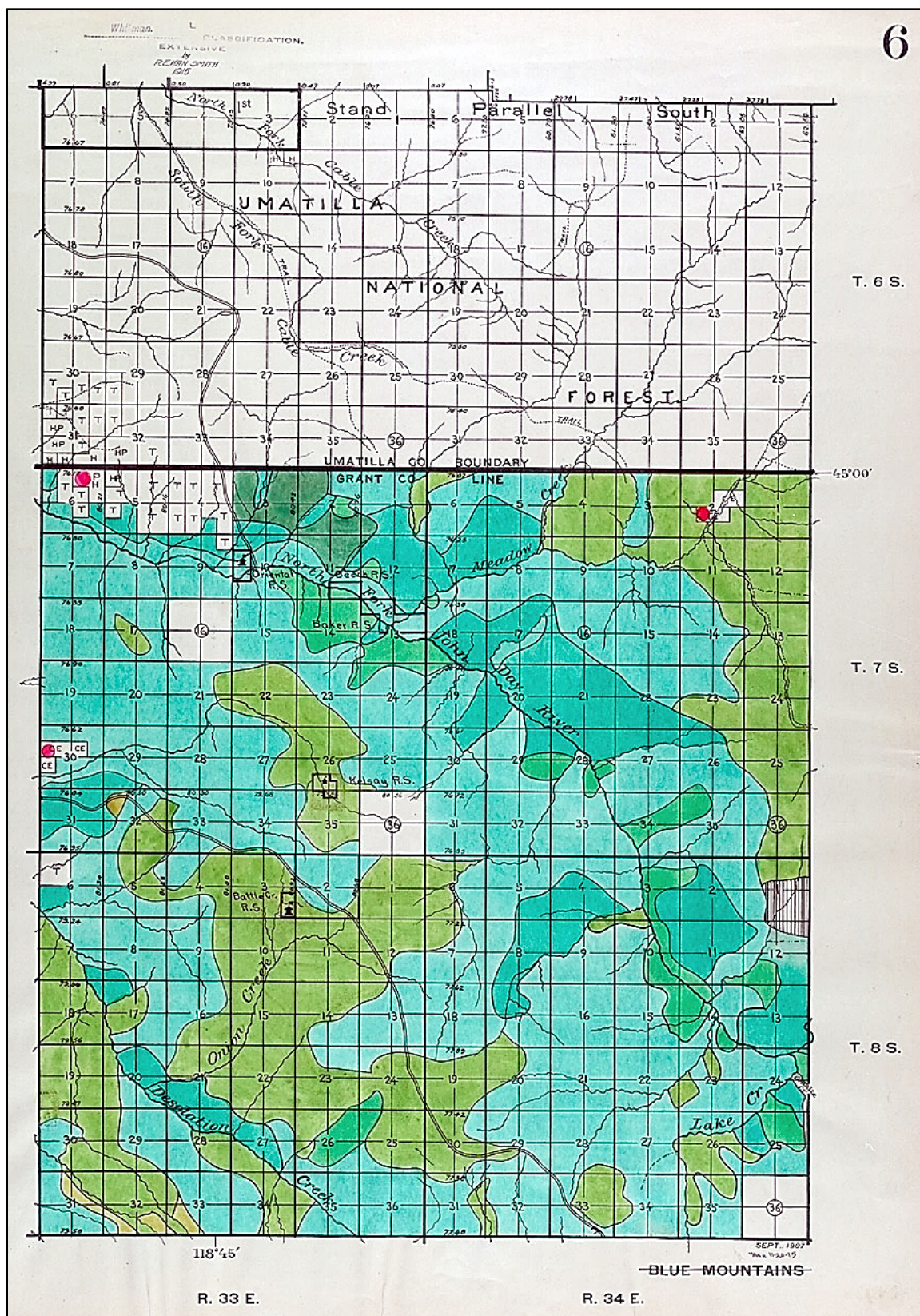
Map Sheet #26 (see Map Sheet Key at beginning of this appendix), Whitman National Forest





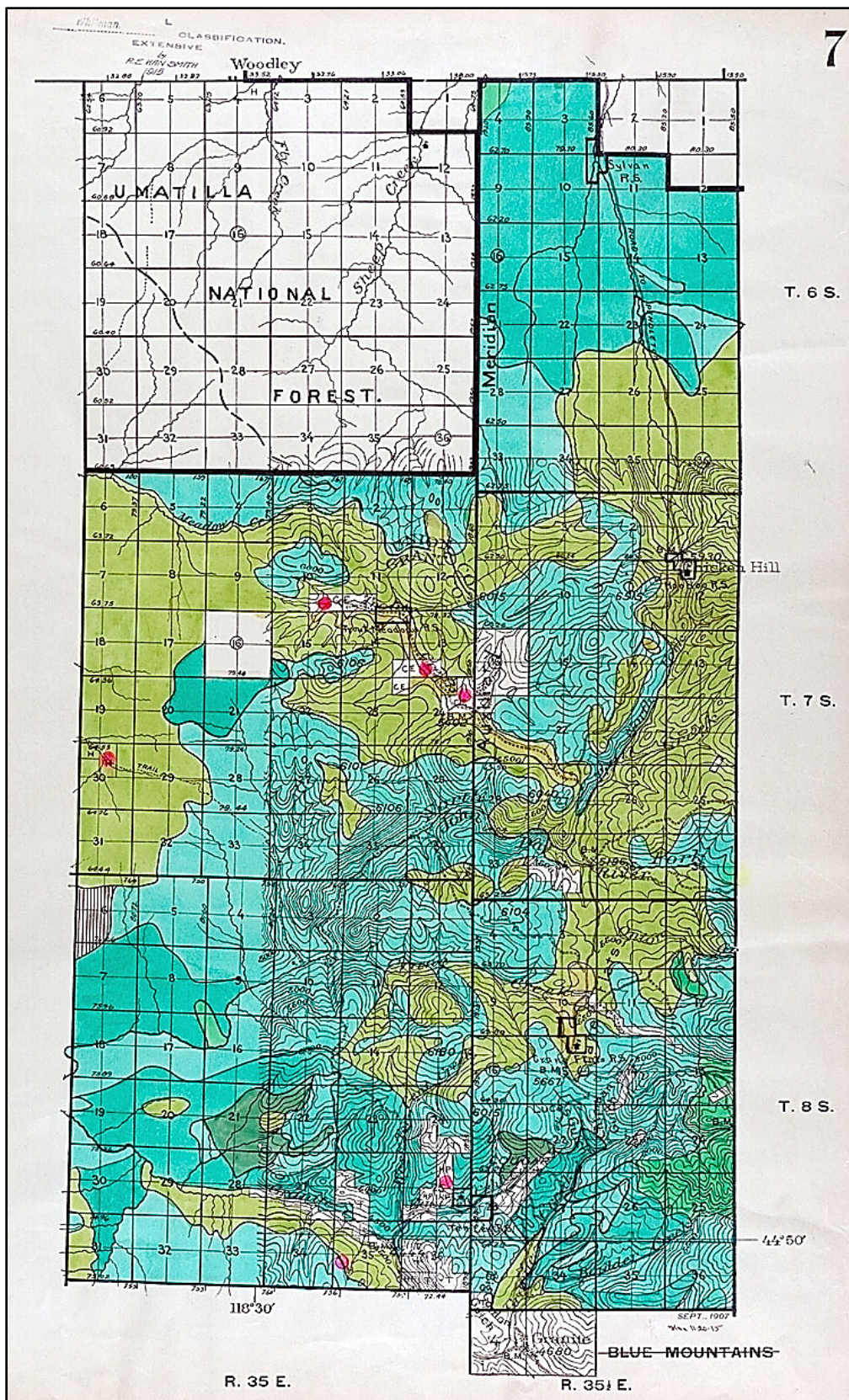
Map Sheet #27 (see Map Sheet Key at beginning of this appendix), Whitman National Forest





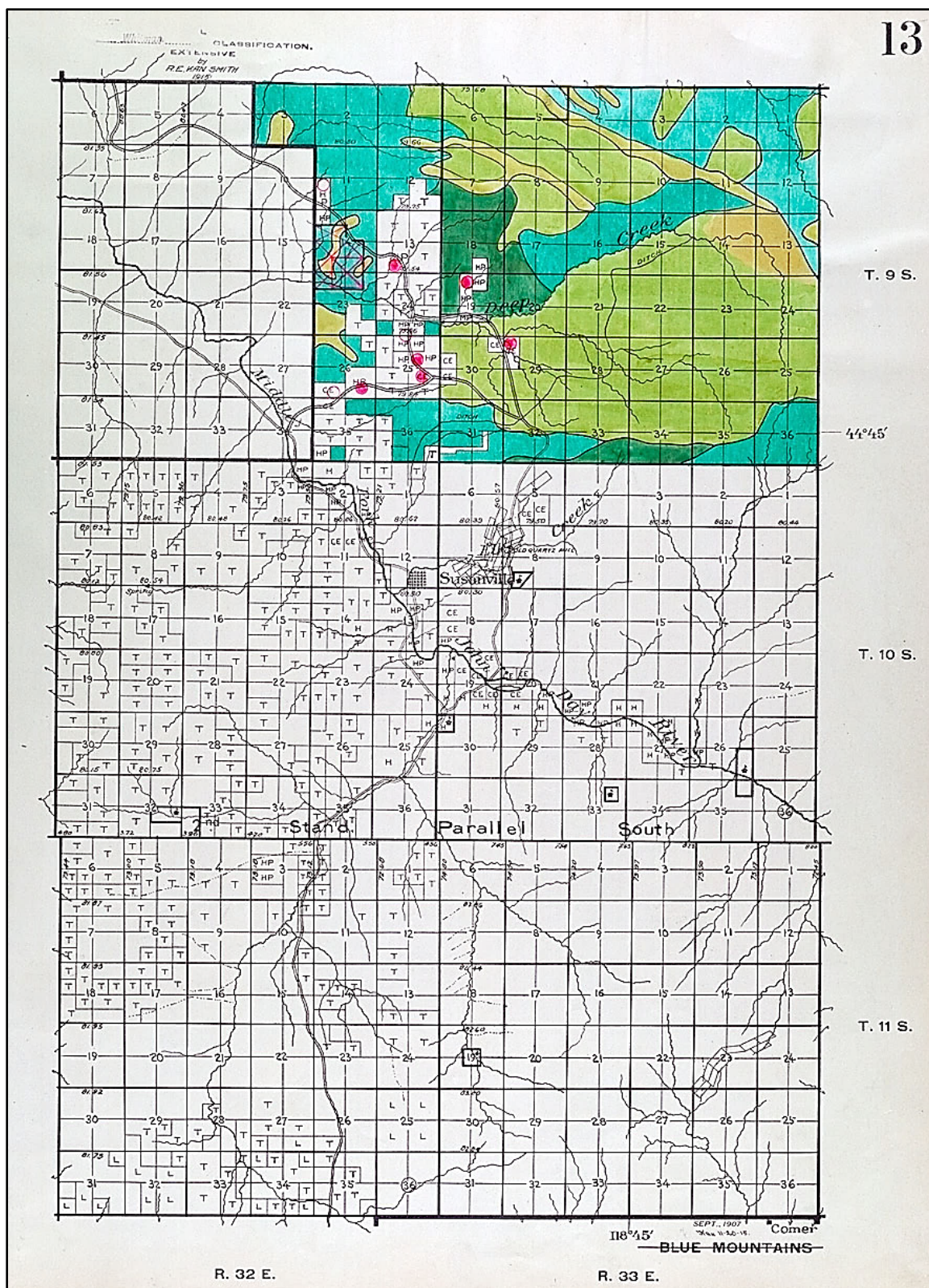
Map Sheet #28 (see Map Sheet Key at beginning of this appendix), Whitman National Forest





Map Sheet #29 (see Map Sheet Key at beginning of this appendix), Whitman National Forest





Map Sheet #30 (see Map Sheet Key at beginning of this appendix), Whitman National Forest



Map Sheet #31 (see Map Sheet Key at beginning of this appendix), Whitman National Forest







## REFERENCES

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- Adams, T.C.; Twerdal, M.P.; Tyler, C.E.; Sandor, J.A.; Doty, O.H. 1953.** Forest type map of Wheeler County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Andrews, H.J.; Cowlin, R.W. 1936.** Forest type map, state of Washington, southeast quarter. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey Staff. 1:253,440; Lambert projection; colored thematic map.
- Andrews, H.J.; Cowlin, R.W. 1937.** Forest type map, state of Oregon, northeast quarter. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey Staff. 1:253,440; Lambert projection; colored thematic map.
- Bones, J.; Hightree, P.; Harden, C.; Nelson, F.; Hazard, J.; Geiger, P.; Kennedy, J.; MacLean, C.; Hall, H. 1958a.** Forest type map of Union County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Bones, J.; Hightree, P.; Harden, C.; Nelson, F.; Minore, D.; Perkins, J.; Hazard, J.; Plank, M. 1958b.** Forest type map of Umatilla County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Bright, G.A.; Powell, D.C., editor. 2008.** An extensive reconnaissance of the Wenaha National Forest in 1913. Tech. Pub. F14-SO-06-08. Pendleton, OR: USDA Forest Service, Pacific Northwest Region, Umatilla National Forest. 65 p.  
[https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015522.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015522.pdf)
- Buckhorn, W.J. 1948.** Defoliator situation in the fir stands of eastern Oregon and Washington. Unpub. Typescript Rep. Portland, OR: USDA Forest Insect Laboratory. 21 p.  
[http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015607.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015607.pdf)
- Buell, E.D.; Kemp, P.D.; Jackson, G.H. 1936a.** Forest type map; north part of Wallowa County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Buell, E.D.; Kemp, P.D.; Jackson, G.H.; Smith, C.S. 1936b.** Forest type map; south part of Wallowa County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Burke, H.E.; Wickman, B.E. (editor). 1990.** Northeastern Oregon bark beetle control project 1910-11. Gen. Tech. Rep. PNW-GTR-249. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 46 p. <http://www.treesearch.fs.fed.us/pubs/26285>
- Churchill, D.J.; Carnwath, G.C.; Larson, A.J.; Jeronimo, S.A. 2017.** Historical forest structure, composition, and spatial pattern in dry conifer forests of the western Blue Mountains, Oregon. Gen. Tech. Rep. PNW-GTR-956. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 93 p. <https://www.fs.usda.gov/treesearch/pubs/55418>

- Cowlin, R.W.; Briegleb, P.A.; Moravets, F.L. 1942.** Forest resources of the ponderosa pine region of Washington and Oregon. Misc. Pub. No. 490. Washington, DC: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 99 p.  
<https://archive.org/download/forestresourceso490cowl/forestresourceso490cowl.pdf>
- Dillon, G.K.; Knight, D.H.; Meyer, C.B. 2005.** Historic range of variability for upland vegetation in the Medicine Bow National Forest, Wyoming. Gen. Tech. Rep. RMRS-GTR-139. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 85 p.  
<https://www.fs.usda.gov/treearch/pubs/20739>
- Drake, G.L. 1920.** Timber sale report: Looking-glass Creek area. Unpub. Typescript Rep. [Place of publication unknown]: [USDA Forest Service]. 6 p.  
[https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015542.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015542.pdf)
- Edmonston, W.D. 1913.** 1912 report on northeastern Oregon project no. 38. Unpub. Typescript Rep. [Place of publication unknown]: USDA Bureau of Entomology, Branch of Forest Insects. 29 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5416222.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5416222.pdf)
- Egan, T. 2010.** The big burn: Teddy Roosevelt and the fire that saved America. Boston, MA: Mariner Books. 324 p. isbn:978-0-547-39460-2
- Egan, D.; Howell, E.A., eds. 2001.** The historical ecology handbook: A restorationist's guide to reference ecosystems. Washington, DC: Island Press. 457 p. isbn:1-55963-746-3
- Furniss, R.L.; Buckhorn, W.J.; Wright, K.H. 1948.** The spruce budworm in Oregon and Washington; season of 1948. Unpub. Typescript Rep. Portland, OR: USDA Forest Insect Lab. 19 p.  
[https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015605.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015605.pdf)
- Gannett, H. 1902a.** The forests of Oregon. Professional Paper No. 4, Series H, Forestry, 1. Washington, DC: USDI Geological Survey. 36 p. <https://pubs.usgs.gov/pp/0004/report.pdf>  
<https://pubs.usgs.gov/pp/0004/plate-1.pdf>
- Gannett, H. 1902b.** The forests of Washington: a revision of estimates. Professional Paper No. 5, Series H, Forestry, 2. Washington, DC: USDI Geological Survey. 38 p.  
<https://pubs.usgs.gov/pp/0005/report.pdf> <https://pubs.usgs.gov/pp/0005/plate-1.pdf>
- Hagmann, R.K.; Franklin, J.F.; Johnson, K.N. 2013.** Historical structure and composition of ponderosa pine and mixed-conifer forests in south-central Oregon. Forest Ecology and Management. 304: 492-504. doi:10.1016/j.foreco.2013.04.005
- Harrington, C.A., compiler. 2003.** The 1930s survey of forest resources in Washington and Oregon. Gen. Tech. Rep. PNW-GTR-584. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 123 p [plus CD-ROM]. <http://www.treearch.fs.fed.us/pubs/6230>
- Heyerdahl, E.K. 1997.** Spatial and temporal variation in historical fire regimes of the Blue Mountains, Oregon and Washington: the influence of climate. Ph.D. dissertation. Seattle, WA: University of Washington. 224 p. <http://hdl.handle.net/1773/5575>
- Holt, J.R. 1993 (3 December).** Letter to Forest Supervisors, Directors, GIS Coordinators, and Inventory Coordinators. Historical county timber type maps. Portland, OR: USDA Forest Service, Pacific Northwest Region, Regional Office. 4 p.  
On file with: Umatilla National Forest, 2517 SW Hailey Avenue, Pendleton, OR 97801.

- Johnston, J.D.; Dunn, C.J.; Vernon, M.J.; Bailey, J.D.; Morrisette, B.A.; Morici, K.E. 2018.** Restoring historical forest conditions in a diverse inland Pacific Northwest landscape. *Ecosphere*. 9(8): e02400 (23 p). doi:10.1002/ecs2.2400
- Kaufmann, M.R.; Huckaby, L.S.; Regan, C.M.; Popp, J. 1998.** Forest reference conditions for ecosystem management in the Sacramento Mountains, New Mexico. Gen. Tech. Rep. RMRS-GTR-19. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 87 p.  
<https://www.fs.usda.gov/treearch/pubs/42394>
- Kellogg, F.B. 1916.** Land classification of the Umatilla National Forest, Oregon. [Place of publication unknown]: [USDA Forest Service, Umatilla National Forest]. 1:63,360; projection unknown; colored thematic; 10 colored thematic map sheets.
- Kemp, P.D.; Taylor, R.W.; Jackson, G.; Tucker, L.E. 1935a.** Forest type map; Columbia County Washington. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Crest. 1:63,360; projection unknown; thematic map.
- Kemp, P.D.; Taylor, R.W.; Jackson, G.; Tucker, L. E.; Wood, J. 1935b.** Forest type map; Garfield County Washington. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Crest. 1:63,360; projection unknown; thematic map.
- Kendall, W.H. 1914.** Wenaha classification, extensive. [Place of publication unknown]: [USDA Forest Service, Wenaha National Forest]. 1:63,360; projection unknown; colored thematic; 10 colored thematic map sheets.
- Lawrence, W.E. 1915.** Natural vegetation of Oregon. [Place of publication unknown]: USDI Geological Survey. 1:1,000,000; polyconic projection; colored thematic map.
- Litchfield, W.V.S.; Frost, G.; Jackson, G.H.; Kemp, P.D.; Buell, E.D.; Smith, C.S.; Pelto, W.E.; Sankela, W.E.; Lynch, D.L.; Tucker, L.E. 1936.** Forest type map; south part of Union County Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Crest. 1:63,360; projection unknown; thematic map.
- Lydersen, J.M.; North, M.P.; Knapp, E.E.; Collins, B.M. 2013.** Quantifying spatial patterns of tree groups and gaps in mixed-conifer forests: Reference conditions and long-term changes following fire suppression and logging. *Forest Ecology and Management*. 304: 370-382.  
doi:10.1016/j.foreco.2013.05.023
- MacLean, C.D.; Orr, W. 1960.** Forest statistics for Umatilla and Union Counties, Oregon. Forest Survey Report 135. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 43 p.
- Meyer, C.B.; Knight, D.H.; Dillon, G.K. 2005.** Historic range of variability for upland vegetation in the Bighorn National Forest, Wyoming. Gen. Tech. Rep. RMRS-GTR-140. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 94 p.  
<https://www.fs.usda.gov/treearch/pubs/20740>
- Moravets, F.L.; Briegleb, P.A.; Wolfe, H.M.; Tucker, L.E.; Smith, C.S.; Irwin, W. 1936.** Forest type map; forested part of Wheeler County Oregon. Portland, OR: USDA Forest Service,



- Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Pelto, W.E.; Lauridsen, M.J.; Jackson, G.H.; Wolfe, H.M.; Briegleb, P.A.; Irwin, W. 1936.** Forest type map; north part of Grant County Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Pernot, J.F. 1913a.** The 1913 infestation of *Dendroctonus monticolae*. [Place of publication unknown]: USDA Forest Service, Whitman National Forest. 1:126,720; projection unknown; thematic map.
- Pernot, J.F. 1913b.** The insect situation in 1913 on the Whitman National Forest. Unpub. Type-script Rep. [Place of publication unknown]: USDA Forest Service, Whitman National Forest. 13 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5414671.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5414671.pdf)
- Plummer, F.G. 1912.** Forest fires: their causes, extent and effects, with a summary of recorded destruction and loss. Bull. 117. Washington, DC: USDA Forest Service. 39 p. <https://archive.org/download/forestfirestheir11plum/forestfirestheir11plum.pdf>
- Plummer, G.H.; Plummer, F.G.; Rankine, J.H. 1902.** Map of Washington showing classification of lands. Washington, DC: USDI Geological Survey. 1:1,000,000; projection unknown; colored thematic map. <https://pubs.usgs.gov/pp/0005/plate-1.pdf>
- Powell, D.C. 1999.** Historical references about vegetation conditions: a bibliography with abstracts. Tech. Pub. F14-SO-TP-05-99. Pendleton, OR: USDA Forest Service, Pacific Northwest Region, Umatilla National Forest. 310 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3798058.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3798058.pdf)
- Powell, D.C. 2011.** Using General Land Office survey notes to characterize historical vegetation conditions for the Umatilla National Forest. White Pap. F14-SO-WP-Silv-41. Pendleton, OR: USDA Forest Service, Pacific Northwest Region, Umatilla National Forest. 54 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5413735.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5413735.pdf)
- Pyne, S.J. 2001.** Year of the fires: the story of the great fires of 1910. New York: Penguin Books. 322 p. isbn:0-14-200117-1
- Sankela, W.E.; Lynch, D.L. 1936a.** Forest type map; forested part of Morrow County Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Sankela, W.E.; Lynch, D.L. 1936b.** Forest type map; north part of Umatilla County Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Sankela, W.E.; Smith, C.S.; Lynch, D.L. 1936a.** Forest type map; south part of Umatilla County Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Sankela, W.E.; Smith, C.S.; Lynch, D.L.; Litchfield, W.V.S.; Frost, G.; Buell, E.D.; Kemp, P.D.; Jackson, G.H. 1936b.** Forest type map; north part of Union County Oregon. Portland, OR:

- USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.
- Smith, K. 1914.** Large-scale map of permanent Pw plot no. 1. [Place of publication unknown]: [USDA Forest Service]. 1:600; projection unknown; thematic map.
- Smith, R.E.K. 1915.** Land classification of the Whitman National Forest, Oregon. [Place of publication unknown]: USDA Forest Service, District 6, Whitman National Forest. 1:63,360; projection unknown; 7 colored thematic map sheets.
- Smith, K.; Weitknecht, R.H. 1915a.** Windfall damage in selection cuttings in Oregon. Proceedings of the Society of American Foresters. 10(3): 263-265.  
<https://archive.org/download/vol10proceedings00soci/vol10proceedings00soci.pdf>
- Smith, K.; Weitknecht, R.H. 1915b.** Windfall damage on cut-over areas, Whitman National Forest. Unpub. Typescript Rep. [Place of publication unknown]: [USDA Forest Service]. 85 p.  
[https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015529.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015529.pdf)
- Spada, B.; Berger, J.; Schimmel, R. 1957a.** Forest type map of southeast Washington: portions of Walla Walla, Columbia, Garfield, and Asotin counties; Umatilla National Forest. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Ponderosa-Pine Subregion. 1:63,360; polyconic projection; thematic map.
- Spada, B.; Bones, J.T.; Hightree, P.E. 1957b.** Forest type map of Baker County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Spada, B.; Bones, J.T.; Hightree, P.E.; Hazard, J.; Kennedy, J.; Geiger, P.H.; Orr, W.; Harden, C. 1957c.** Forest type map of Wallowa County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Spada, B.; Bones, J.T.; Hightree, P.E.; O'Neill, P.G.; Schimel, R.D.; Berger, J.M.; King, J.P.; Ekstrom, J.R.; Schwietert, W.W.; Spolar, T.J.; Fields, B.L.; Orr, W.E.; Iliinsky, N.P.; Simonson, J.E.; Ericksen, W.L.; Plank, M.E.; Harden, C.H.; Perkins, J.B.; Kennedy, J.P.; Minore, D.; MacLean, C.D.; Hall, H.H.; Fulkerson, I.E. 1960.** Forest type map of Grant County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 1:63,360; polyconic projection; thematic map.
- Spada, B.; Minore, D.; Collins, J.G. 1954.** Forest type map of Morrow County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Forest Survey. 1:63,360; polyconic projection; thematic map.
- Stevenson, G.E. 1937.** Sale prospectus and timber appraisal report; Camas Creek unit. Unpub. Typescript Rep. [Place of publication unknown]: USDA Forest Service, Umatilla National Forest. 23 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015566.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015566.pdf)
- Taylor, R.W.; Jackson, G.; Tucker, L.E.; Wood, J. 1935.** Forest type map; Asotin County Washington. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Crest. 1:63,360; projection unknown; thematic map.

- Thompson, G.; Johnson, A.J. 1900.** Map of the state of Oregon showing the classification of lands and forests. Washington, DC: USDI Geological Survey. 1:1,000,000; projection unknown; colored thematic map.
- USDA Forest Service. 1911?** Insect control project, northeastern Oregon, 1911. [Place of publication unknown]: [USDA Forest Service]. 1:63,360; projection unknown; thematic map.
- USDA Forest Service. 1935.** Forest survey – Oregon and Washington; description and status of detailed one-inch-to-mile type maps. Unnumbered Typescript Rep. Portland, OR: U.S. Dept. of Agriculture, Forest Service, Pacific Northwest Forest Experiment Station. 16 p.
- USDA Forest Service. 1936.** The forest survey of eastern Oregon and eastern Washington: explanatory text to accompany forest statistics for each county. Unnumbered Rep. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station. 8 p.
- USDA Forest Service. 1957.** Plot procedures and forest type classification. Unnumbered Rep. Portland, OR: USDA Forest Service, Pacific Northwest Forest and Range Experiment Station. 37 p.
- USDA Forest Service. 2010.** When the mountains roared: stories of the 1910 fires. Missoula, MT: USDA Forest Service, Northern Region. 122 p.  
[http://www.foresthistory.org/ASPNET/Publications/region/1/1910\\_fires/sec1.htm](http://www.foresthistory.org/ASPNET/Publications/region/1/1910_fires/sec1.htm)
- USDA Forest Service. Date Unknown.** Maps showing location of 1958 forest inventory plots. Pendleton, OR: USDA Forest Service, Umatilla National Forest. 1:63,360; projection unknown; thematic maps; one page per township (more than 100 pages in all).
- Wakeman, W.J. 1936a.** Land exchange – First National Bank of Heppner. Portland, OR: USDA Forest Service, Umatilla National Forest. 1:15,840; projection unknown; colored thematic map.
- Wakeman, W.J. 1936b.** Report and accompanying appraisal of First National Bank of Heppner lands in Morrow County, Oregon. Unpub. Typescript Rep. Portland, OR: USDA Forest Service. 14 p. [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fsbdev7\\_015565.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev7_015565.pdf)
- Wolfe, H.M.; Pelto, W.E.; Lauridsen, M.J.; Jackson, G.H.; Kemp, P.D.; Moravets, E.L. 1936.** Forest type map; south part of Grant County, Oregon. Portland, OR: USDA Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey – East of the Cascade Range. 1:63,360; projection unknown; thematic map.



## APPENDIX F: SILVICULTURE WHITE PAPERS

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White papers are internal reports, and they are produced with a consistent formatting and numbering scheme – all papers dealing with Silviculture, for example, are placed in a silviculture series (Silv) and numbered sequentially. Generally, white papers receive only limited review and, in some instances pertaining to highly technical or narrowly focused topics, the papers may receive no technical peer review at all. For papers that receive no review, the viewpoints and perspectives expressed in the paper are those of the author only, and do not necessarily represent agency positions of the Umatilla National Forest or the USDA Forest Service.

Large or important papers, such as two papers discussing active management considerations for dry and moist forests (white papers Silv-4 and Silv-7, respectively), receive extensive review comparable to what would occur for a research station general technical report (but they don't receive blind peer review, a process often used for journal articles).

White papers are designed to address a variety of objectives:

- (1) They guide how a methodology, model, or procedure is used by practitioners on the Umatilla National Forest (to ensure consistency from one unit, or project, to another).
- (2) Papers are often prepared to address ongoing and recurring needs; some papers have existed for more than 20 years and still receive high use, indicating that the need (or issue) has long standing – an example is white paper #1 describing the Forest's big-tree program, which has operated continuously for 25 years.
- (3) Papers are sometimes prepared to address emerging or controversial issues, such as management of moist forests, elk thermal cover, or aspen forest in the Blue Mountains. These papers help establish a foundation of relevant literature, concepts, and principles that continuously evolve as an issue matures, and hence they may experience many iterations through time. [But also note that some papers have not changed since their initial development, in which case they reflect historical concepts or procedures.]
- (4) Papers synthesize science viewed as particularly relevant to geographical and management contexts for the Umatilla National Forest. This is considered to be the Forest's self-selected 'best available science' (BAS), realizing that non-agency commenters would generally have a different conception of what constitutes BAS – like beauty, BAS is in the eye of the beholder.
- (5) The objective of some papers is to locate and summarize the science germane to a particular topic or issue, including obscure sources such as master's theses or Ph.D. dissertations. In other instances, a paper may be designed to wade through an overwhelming amount of published science (dry-forest management), and then synthesize sources viewed as being most relevant to a local context.
- (6) White papers function as a citable literature source for methodologies, models, and procedures used during environmental analysis – by citing a white paper, specialist reports can include less verbiage describing analytical databases,

techniques, and so forth, some of which change little (if at all) from one planning effort to another.

- (7) White papers are often used to describe how a map, database, or other product was developed. In this situation, the white paper functions as a 'user's guide' for the new product. Examples include papers dealing with historical products: (a) historical fire extents for the Tucannon watershed (WP Silv-21); (b) an 1880s map developed from General Land Office survey notes (WP Silv-41); and (c) a description of historical mapping sources (24 separate items) available from the Forest's history website (WP Silv-23).

The following papers are available from the Forest's website: [Silviculture White Papers](#)

<b>Paper #</b>	<b>Title</b>
1	Big tree program
2	Description of composite vegetation database
3	Range of variation recommendations for dry, moist, and cold forests
4	Active management of Blue Mountains dry forests: Silvicultural considerations
5	Site productivity estimates for upland forest plant associations of Blue and Ochoco Mountains
6	Blue Mountains fire regimes
7	Active management of Blue Mountains moist forests: Silvicultural considerations
8	Keys for identifying forest series and plant associations of Blue and Ochoco Mountains
9	Is elk thermal cover ecologically sustainable?
10	A stage is a stage is a stage...or is it? Successional stages, structural stages, seral stages
11	Blue Mountains vegetation chronology
12	Calculated values of basal area and board-foot timber volume for existing (known) values of canopy cover
13	Created opening, minimum stocking, and reforestation standards from Umatilla National Forest Land and Resource Management Plan
14	Description of EVG-PI database
15	Determining green-tree replacements for snags: A process paper
16	Douglas-fir tussock moth: A briefing paper
17	Fact sheet: Forest Service trust funds
18	Fire regime condition class queries
19	Forest health notes for an Interior Columbia Basin Ecosystem Management Project field trip on July 30, 1998 (handout)
20	Height-diameter equations for tree species of Blue and Wallowa Mountains
21	Historical fires in headwaters portion of Tucannon River watershed
22	Range of variation recommendations for insect and disease susceptibility
23	Historical vegetation mapping
24	How to measure a big tree
25	Important Blue Mountains insects and diseases

<b>Paper #</b>	<b>Title</b>
26	Is this stand overstocked? An environmental education activity
27	Mechanized timber harvest: Some ecosystem management considerations
28	Common plants of south-central Blue Mountains (Malheur National Forest)
29	Potential natural vegetation of Umatilla National Forest
30	Potential vegetation mapping chronology
31	Probability of tree mortality as related to fire-caused crown scorch
32	Review of "Integrated scientific assessment for ecosystem management in the interior Columbia basin, and portions of the Klamath and Great basins" – Forest vegetation
33	Silviculture facts
34	Silvicultural activities: Description and terminology
35	Site potential tree height estimates for Pomeroy and Walla Walla Ranger Districts
36	Stand density protocol for mid-scale assessments
37	Stand density thresholds as related to crown-fire susceptibility
38	Umatilla National Forest Land and Resource Management Plan: Forestry direction
39	Updates of maximum stand density index and site index for Blue Mountains variant of Forest Vegetation Simulator
40	Competing vegetation analysis for southern portion of Tower Fire area
41	Using General Land Office survey notes to characterize historical vegetation conditions for Umatilla National Forest
42	Life history traits for common Blue Mountains conifer trees
43	Timber volume reductions associated with green-tree snag replacements
44	Density management field exercise
45	Climate change and carbon sequestration: Vegetation management considerations
46	Knutson-Vandenberg (K-V) program
47	Active management of quaking aspen plant communities in northern Blue Mountains: Regeneration ecology and silvicultural considerations
48	Tower Fire...then and now. Using camera points to monitor postfire recovery
49	How to prepare a silvicultural prescription for uneven-aged management
50	Stand density conditions for Umatilla National Forest: A range of variation analysis
51	Restoration opportunities for upland forest environments of Umatilla National Forest
52	New perspectives in riparian management: Why might we want to consider active management for certain portions of riparian habitat conservation areas?
53	Eastside Screens chronology
54	Using mathematics in forestry: An environmental education activity
55	Silviculture certification: Tips, tools, and trip-ups
56	Vegetation polygon mapping and classification standards: Malheur, Umatilla, and Wallowa-Whitman National Forests



<b>Paper #</b>	<b>Title</b>
57	State of vegetation databases for Malheur, Umatilla, and Wallowa-Whitman National Forests
58	Seral status for tree species of Blue and Ochoco Mountains

## **REVISION HISTORY**

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**November 2012:** formatting and editing changes were made throughout the document; a scanned version of a Wakeman (1936) map item was added to appendix D; an appendix (F) was added describing a silviculture white paper system, including a list of available white papers.

**December 2019:** an appendix (E) was added providing image files for individual map sheets comprising a 1914-16 timberland classification for Umatilla National Forest.