

HISTORICAL VEGETATION MAPPING

Umatilla National Forest

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Background. With the advent of ecosystem management, 'ecosystem analysis at the watershed scale,' the 'historical range of variability' and other recent concepts, more and more emphasis is being placed on the use of historical information. In response to that emphasis, the Umatilla National Forest silviculture library added an archives section in 1993 to better manage historical accessions such as 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 the National Archives at its regional office in Seattle or from the national repository in College Park, Maryland.

Historical maps that show vegetation conditions are valuable for comparing the current or existing situation with a 'reference' condition. Many contemporary issues focus on changes in an ecosystem component through time (old growth, big trees, etc.), particularly when current conditions are believed to deviate substantially from conditions at the time of Euro-American settlement (e.g., presettlement conditions). As with any information source, use of historical maps may present limitations. An example is that some historical maps provide a relatively high amount of detail for forest types but little or no information for nonforest vegetation.

When there is a need to estimate how much vegetation change has occurred over time, historical maps are a valuable data source. *The objective of this document is to summarize historical vegetation maps available from the Supervisor's Office of the Umatilla National Forest.* Note that although these maps are stored at the Umatilla NF, many of them pertain to the entire Blue Mountains and are also useful for the Malheur and Wallowa-Whitman national forests.

This summary includes two types of maps: those characterizing vegetation conditions directly, and those portraying disturbance events that influence vegetation conditions (insect outbreaks, fires, windthrow events, etc.). Other historical maps, such as forest visitor's maps dating back to 1904, are not described here because they lack information about vegetation conditions. The following vegetation and disturbance maps are included in the historical archives of the Umatilla National Forest silviculture library, arranged chronologically from oldest to most recent:

1. Map of the state of Oregon showing the classification of lands and forests (Thompson and Johnson 1900).
 - a. **Source:** Included with a report called "The forests of Oregon" by Henry Gannett (1902).
 - b. **Description:** Shows forested areas within the state of Oregon, as classified using volume per acre, and also provides ancillary information such as the location of harvested areas, burns (forest fires) and the northern limit of redwood. The following items are included in the legend: 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.
 - d. **Status:** Map was photographically copied, and copies are hanging at several locations in the Supervisor's Office and in Ranger District offices. It is available in GIS (northeast Oregon portion only, including Malheur and Wallowa-Whitman national forests).
 - e. **GIS Pathname:**
2. Map of Washington showing classification of lands (Plummer and others 1902).
 - a. **Source:** Included with a report called "The forests of Washington, a revision of estimates" by Henry Gannett (1902).
 - b. **Description:** Shows forested areas within the state of Washington, as classified using volume per acre, and also provides ancillary information such as the location of cut (harvested) areas and burns (forest fires). The 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.
 - d. **Status:** Two portions of this map were copied in color (one 11" × 14" sheet shows the map title, authors, and legend; the other sheet shows southeastern Washington only). It is not available in GIS because the mapping is so coarse as to be unusable, and because the southeastern Washington information will not edge match with the greater detail provided by the northeastern Oregon map (item 1 above describes that map).
 3. Insect control project, northeastern Oregon, 1911 (U.S. Department of Agriculture, 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 the Whitman National Forest, although it is unknown which one because the map margins provide few annotations or notes.
 - b. **Description:** The map extends from the Burnt River on the south to the Powder River and Antone Creek on the north (township 6 south, ranges 37 and 38 east). The towns of Hereford, Bourne, Baker City and Sumpter, Oregon are shown on the map. The 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.
 - d. **Status:** Not available in GIS. Note: legibility of this map is poor because the original copy in the 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, which did not handle the blue background very well.
 4. The 1913 infestation of *Dendroctonus monticolae* (Pernot 1913).
 - a. **Source:** Accompanied a report called "The insect situation in 1913 on the Whitman National Forest" by J.F. Pernot.
 - b. **Description:** Base map shows the entire Whitman NF and was compiled from Supervisor's [Office] corrected atlas sheets in Portland, Oregon in April of 1912 by draftsman R.

- H. Robertson. Legend for the 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 tool boxes. The legend for the 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.
- c. **Scale:** 1:126,720 (projection unknown); 33" × 38" thematic.
 - d. **Status:** Not available in GIS.
5. 1912 sketch map showing areas of mountain pine beetle infestation, and areas being treated to control the infestation, on the Whitman National Forest (Edmonston 1913).
 - a. **Source:** Accompanied a report called "1912 report on northeastern Oregon project no. 38" by W.D. Edmonston.
 - b. **Description:** A mountain pine beetle outbreak occurred in ponderosa and lodgepole pines in the northern Blue Mountains and Wallowa Mountains in the early 1900s (beginning no later than 1905). This map provides a rough approximation of the infestation area as of 1912, and 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 the western United States. The 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 the Elkhorn Range. The Whitman National Forest map (dated 1912) shows treatment and infestation areas in color. The map has two legends: the first one shows five different treated and inspected areas (differentiated by color) and the area of lodgepole and whitebark pines; the other 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.
 - c. **Scale:** 1:253,440 (projection unknown); 8, 8½" × 11" sheets; colored thematic.
 - d. **Status:** Not available in GIS, and not available on a Kodak Photo-CD. The map was copied on a series of 8½" × 11" sheets since the National Archives does not have large-format color copying capability.
 6. Extensive timberland classification for the Wenaha, Umatilla, and part of the Whitman national forests (Kellogg 1916, Kendall 1914).
 - a. **Source:** This accession consists of a set of 27 map sheets that provide a timber volume classification for the Wenaha, Umatilla, and Whitman (portion) national forests.
 - b. **Description:** These maps were probably part of an early timber atlas. The legend for the thematic information includes the following items: voided (private) lands; timberland – 2,000 to 5,000 board feet per acre; timberland – 5,000 to 10,000 board feet per acre; timberland – 10,000 to 25,000 board feet per acre; woodland, cordwood, poles, etc.; grassland, parks, meadows, etc.; sagebrush; brushland; land rejected on application under the Homestead Act of June 11, 1906; land applied for and classified by the Secretary of Agriculture under the acts of June 11, 1906 and August 10, 1912 as chiefly valuable for for-

estry; unclassified land held for intensive classification; and several unknown items. The base map includes points of elevation (indicated by numbers), the names and approximate locations of old Ranger Stations, locations of homesteads (including homesteader names in some instances), names of watercourses, range (livestock) driveways, and certain other annotations.

- c. **Scale:** 1:63,360 (projection unknown); 27, 18" × 21" sheets; colored thematic.
 - d. **Status:** Since the National Archives lacks on-site equipment for large-format color copying, a vendor was used to photograph each sheet – the color negatives were then scanned onto a Kodak Photo-CD. In September 2001, a contract was awarded to Titan Systems Corporation (Portland, Oregon) to digitize these maps and merge them into a single coverage. The coverage is now available in GIS.
 - e. **GIS Pathname:**
7. Large-scale map of permanent Pw plot no. 1 (Smith 1914).
 - a. **Source:** Accompanied a report describing the extent and impact of windfall associated with cut-over areas on the Whitman National Forest (Smith and Weitknecht 1915).
 - 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 (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 absolute way of knowing 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.
 - c. **Scale:** 1:600 (projection unknown); 28" × 29" thematic.
 - d. **Status:** Not available in GIS.
 8. Natural vegetation of Oregon (Lawrence 1915).
 - a. **Source:** Prepared by W. E. Lawrence, Department of Botany, Oregon State College.
 - b. **Description:** The thematic layer provides the following items: mesophytic coniferous forest, xerophytic coniferous forest, yellow pine, juniper, alpine and subalpine forest, alpine meadow, chapparal, grassland – west, grassland – east, semi-desert, and marsh. The western boundary of range area was also shown on the base map.
 - c. **Scale:** 1:1,000,000 (polyconic); 26" × 20" colored thematic.
 - d. **Status:** Since the National Archives lacks on-site equipment for large-format color copying, a vendor was used to photograph this map – the color negative was then scanned onto a Kodak Photo-CD. In September 2001, a contract was awarded to Titan Systems Corporation (Portland, Oregon) to digitize this map and it is now available in GIS.
 - e. **GIS Pathname:**

9. Reconnaissance map for proposed Grande Ronde Lumber Company timber sale in Lookingglass Creek (Drake 1920).
 - a. **Source:** Included with a reconnaissance/examination report for a proposed timber sale area applied for by the Grande Ronde Lumber Company of Perry, Oregon.
 - b. **Description:** This is a multi-color reconnaissance map showing the boundary of the area applied for, and some general vegetation types (yellow pine, larch-Douglas-fir-white fir, and open areas). It also includes some disturbance information: "burn restocking 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 the location of both creeks.
 - c. **Scale:** 1:31,680 (projection unknown); 8½" × 11" colored thematic.
 - d. **Status:** Available in GIS.
 - e. **GIS Pathname:**

10. Forest type maps for Asotin, Columbia, Garfield, and Walla Walla counties in southeastern Washington, 1935 (Kemp and others 1935a, 1935b; Taylor and others 1935).
 - a. **Source:** Published by the Pacific Northwest Forest Experiment Station, Forest Survey unit for east of the Cascade Range.
 - b. **Description:** These blue-line sheets came from an early mapping effort that provided 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 using an alphanumeric code, sometimes in conjunction with cross-hatching or other annotations. The numbers of Castell or Dixon colored pencils were provided with the legend so that map users, if they so desired, could hand color the maps using an official color scheme.
 - c. **Scale:** 1:63,360 (projection unknown); 36" × 40" (Asotin County), 36" × 41" (Columbia County), 35" × 40" (Garfield County); thematic.
 - d. **Status:** Original copies of these maps (except Walla Walla County) are located at the University of Washington Libraries in Seattle. The Regional Office Geometrics Unit digitized all four of them in 1993 (using a contract with Infotec in Portland) (Holt 1993). In September 2002, a contract was awarded to Titan Systems Corporation (Portland, Oregon) to edge match these four maps and then merge them with seven similar maps for northeastern Oregon (item 11 describes the Oregon maps). The end result was a single GIS coverage compiled from 11 individual maps. Appendix A provides a detailed description of the legend for this coverage.
 - e. **GIS Pathname:**

11. Forest type map, state of Washington, southeast quarter (Andrews and Cowlin 1936).
 - a. **Source:** A generalized forest type map for the southeastern quarter of the state of Washington. It was derived from detailed county-level mapping published the previous year.

- b. **Description:** Unlike the county-level type maps described above, detailed information about stand characteristics was not portrayed on this map, such as stocking, age, seral species, or identification of timber harvest areas. The legend for this map includes two non-forest types, three non-commercial types and twenty timberland types.
 - c. **Scale:** 1:253,440 (Lambert projection); 36" × 61" colored thematic.
 - d. **Status:** This map is available in GIS. Refer to appendix B for a detailed description of its legend.
 - e. **GIS Pathname:**
12. Forest type maps for Grant, Morrow, Umatilla, Union, and Wallowa counties in northeastern Oregon, 1936-1937 (Buell and others 1936a, 1936b; Pelto and others 1936; Sankela and Lynch 1936a, 1936b; Sankela and others 1936, Wolfe and others 1936).
- a. **Source:** Published by the Pacific Northwest Forest Experiment Station, Forest Survey unit for east of the Cascade Range.
 - b. **Description:** These blue-line sheets came from an early mapping effort that provided 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 using an alphanumeric code, sometimes in conjunction with cross-hatching or other annotations. The numbers of Castell or Dixon colored pencils were provided with the legend so that map users, if they so desired, could hand color the maps using an official color scheme.
 - c. **Scale:** 1:63,360 (projection unknown); 36" × 92" (Grant County north), 40" × 105" (Grant County south), 40" × 79" (Morrow County); 39" × 84" (Umatilla County north), 35" × 39" (Union County north), 36" × 82" (Wallowa County north), 42" × 84" (Wallowa County south); thematic.
 - d. **Status:** Original copies of these maps are located at the University of Washington Libraries in Seattle. They were sent to Olympic Reprographics Company in Seattle, scanned, and then saved in a multi-layer format as Autocad files (annotations/attributes stored as one layer, base map (roads, section lines, etc.) stored as another layer, thematic data as another layer, etc.). The Autocad files were supplied to us on a CD and then converted into a format compatible with the ArcGIS system. In September 2002, a contract was awarded to Titan Systems Corporation (Portland, Oregon) to edge match these seven maps and then merge them with four similar maps for southeastern Washington (item 9 describes the Washington maps). The end result was a single GIS coverage compiled from 11 individual maps. Appendix A provides a detailed description of the legend for this coverage.
 - e. **GIS Pathname:**
13. Land exchange – First National Bank of Heppner (Wakeman 1936).
- a. **Source:** Accompanied “Report and accompanying appraisal of First National Bank of Heppner lands in Morrow County, Oregon” by William J. Wakeman (1936).

- b. **Description:** Shows vegetation types within 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 is on the Heppner Ranger District. The following items are included in the thematic legend: ponderosa pine, mature; ponderosa pine, immature; ponderosa pine, saplings and poles; ponderosa pine, seedlings; white fir, larch, Douglas fir, mature; white fir, larch, Douglas fir, immature; white fir, larch, Douglas fir, seedlings; Douglas fir, mature; lodgepole pine, immature; grassland; and brush. The base map also includes annotations showing roads, ridges, elevations, section lines, landmark names, and the presence of old burns.
 - c. **Scale:** 1:15,840 (projection unknown); 26" × 30" colored thematic.
 - d. **Status:** In September 2001, a contract was awarded to Titan Systems Corporation (Portland, Oregon) to digitize this map. The coverage is now available in GIS.
 - e. **GIS Pathname:**
14. Forest type map, state of Oregon, northeast quarter (Andrews and Cowlin 1937).
- a. **Source:** A generalized forest type map for the northeastern quarter of the state of Oregon. It was derived from detailed county-level mapping published the previous year.
 - b. **Description:** Unlike the county-level type maps described above, detailed information about stand characteristics was not portrayed on this map, such as stocking, age, seral species, or identification of timber harvest areas. The legend for this map includes two non-forest types, three non-commercial types and twenty timberland types.
 - c. **Scale:** 1:253,440 originally (Lambert projection); 35" × 50" colored thematic.
 - d. **Status:** An original copy of this map, located in the forestry library of the University of Washington in Seattle, was photographed and the resulting negative sent to Photocraft (Portland, Oregon) to produce a paper print. The paper print was digitized and is now available in GIS. Refer to appendix B for a detailed description of its legend.
 - e. **GIS Pathname:**
15. Location of the Camas Creek timber sale unit (Stevenson 1937).
- a. **Source:** Accompanied a report called "Sale prospectus and timber appraisal report; Camas Creek unit" by George E. Stevenson (1937).
 - b. **Description:** The Camas Creek unit was a timber sale containing 221,308,000 board feet of national forest timber located in the 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 the watersheds of Camas and Meadow Creeks, with the western boundary of the unit being about 10 miles east of Ukiah, Oregon. This color map shows the 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 the Mt. Emily logging railroad; Mt. Emily Lumber Company timberland, and lands logged by the Mt. Emily Lumber Company.
 - c. **Scale:** Scale and projection unknown; 1, 8½" × 11" color sheet; 3, 8½" × 11" non-color sheets.
 - d. **Status:** Not entered into GIS.

16. Vegetation classification of the Desolation watershed as based on 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. in 1996 during the Desolation watershed analysis effort.
 - b. **Description:** Aerial photographs covering the Desolation watershed on North Fork John Day Ranger District (approximately 70,000 acres) were provided to the contractor, who then delineated polygons and classified vegetation conditions within each polygon. All delineation was completed on acetate overlays, not on the photos themselves. 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 the polygon delineations, and a digital database file containing the classification data. The digital data is available as a dbf file for use with ArcGIS.
 - e. **GIS Pathname:**
17. Location of aerial photograph centers for photography acquired between 1937 and 1981.
 - a. **Source:** Contract awarded to BAF, Inc. in September 2001 to determine the center for more than 15,000 aerial photographs acquired between 1937 and 1981. This includes all historical flights of aerial photography providing coverage for the Umatilla National Forest (1930s, 1950s, 1960s, 1970s).
 - b. **Description:** One print of each aerial photograph was supplied to the contractor, who registered an acetate overlay to the print using its fiducial marks as registration points, determined the photo center and marked it on the overlay, and then digitized each center using 1994 digital orthophoto quadrangles for geographical reference.
 - c. **Scale:** 1:20,000 or 1:15,840 depending upon year or flight.
 - d. **Status:** The process described above resulted in a GIS coverage depicting the center (as point data) of each aerial photograph acquired between 1937 and 1981. This coverage will readily allow analysts to determine which historical photos occur within a watershed or other planning area. Note that the late-1980s flight (1987-1988) is already available in GIS.
 - e. **GIS Pathname:**
18. Survey units no. 3 and 5: north and south Blue Mountain units of the ponderosa pine region (Cowlin, Briegleb, and Moravets 1942).
 - a. **Source:** This source came from a publication synthesizing the results of forest surveys completed during the 1930s for eastern Oregon and eastern Washington (Cowlin and others 1942).
 - b. **Description:** When combined, these two maps depict generalized forest conditions for the entire Blue Mountains province, as they existed in the 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 provided; two irregular-sized sheets; colored thematic.
 - 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.
 - e. **GIS Pathname:**
19. Interpretation of Government Land Office survey notes (1852 to 1930s).
- a. **Source:** Survey notes collected during land surveys by the Government Land Office. For the Umatilla National Forest, townships were surveyed between the mid 1800s and the early 1930s.
 - b. **Description:** Between November 1995 and May 2001, Martha King interpreted GLO survey notes for all 120 townships located within or adjoining the Umatilla National Forest. Bearing or witness tree information and much other data were entered into a Paradox database, with each database record linked to its respective section corner or section line.
 - 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 where each section line and section corner was assigned a unique identification number is available in GIS. The unique ID allows the spatial location of each section line or corner to be linked with its corresponding database information.
 - e. **GIS Pathname:**
20. Areas defoliated by Douglas-fir tussock moth or western spruce budworm, and sprayed areas to control tussock moth, for season of 1947.
- a. **Source:** 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, a portion of northern Blue Mountains 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 the Blue Mountain region, and this map and its accompanying report summarizes the results of 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 conducted every year since then. Buckhorn’s report included several maps (Blue Mountains, northern Washington, southern Oregon) but not all of them were copied. A color map showing the Blue Mountains situation (tussock moth – sprayed, tussock moth – unsprayed, spruce budworm) was copied. With respect to western spruce budworm, the most severe defoliation anywhere in the region was on parts of the Umatilla NF near Dale in the Meadow Creek-Desolation Creek drainages. Another large area of budworm infestation was a 160,000-acre center near Wall Creek, ranging from Swale Creek on the east to the Spray-Heppner highway on the west. A small infestation center near Battle Mountain State Park caused considerable public reaction. On the north half of the Umatilla NF, a large outbreak embraced some 67,000 acres near the headwaters of Phillips Creek, Umatilla River, and Willow Creek.

- c. **Scale:** 1:126,720 (projection unknown); 6, 8½" × 11" sheets; colored thematic.
 - d. **Status:** The map was copied on a series of 8½" × 11" sheets since the National Archives did not have large-format color copying capability. Budworm defoliation has not been entered into GIS. The Douglas-fir tussock moth area, all of which occurred on the Umatilla NF near Troy, was digitized during the Grande Ronde-Rondowa watershed analysis effort in 2000. That map shows two attributes: tussock moth – sprayed, and tussock moth – unsprayed.
 - e. **GIS Pathname:**
21. Areas of spruce budworm defoliation in 1948 (Furniss, Buckhorn, and Wright 1948).
- a. **Source:** 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:** The map accompanied a report based on five years of observations, intensive surveys in 1947 and 1948, and an experimental control project and detailed biological studies in 1948. Maps show the extent and intensity of budworm defoliation. Two maps (Blue Mountains area; Oregon Cascades area) were present at the end of the report, although map 1, Blue Mountains area, was the only one copied since both maps were in color and oversized. During August and September of 1948, an intensive survey of budworm defoliation was made by aerial and ground methods; the results of that survey are generally summarized by national forest as the reporting unit. For the 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 the Umatilla NF comprised 392,000 acres of the total.
 - c. **Scale:** 1 inch = 12 miles (projection unknown); colored thematic.
 - d. **Status:** Not entered in GIS. The Blue Mountains map was copied on 4, 8½" × 11" sheets since the National Archives does not have large-format color copying capability.
22. Forest type maps for Grant, Morrow, Umatilla, Union, Wallowa, and Wheeler counties in northeastern Oregon, 1953-1957 (Spada and others 1954; and others).
- a. **Source:** County-level forest type maps published by the Pacific Northwest Forest and Range Experiment Station.
 - b. **Description:** These maps provide an impressive amount of detail. Not only were cover type codes provided, but information about stand size (based on diameter classes), stocking/density (non-stocked; poor, medium, well stocking), age (10-year classes), associated species (western larch, Engelmann spruce, white pine) and evidence of past disturbance (partial cutting, fire, insects, windthrow, clearcutting) was also included.
 - c. **Scale:** 1:63,360; polyconic projection; thematic.
 - d. **Status:** These maps are available in GIS. The Regional Office Geometrics Unit digitized them in 1993 (using a contract with Infotec in Portland) (Holt 1993). They were edge matched and then merged into a single coverage. Appendix C provides a detailed description of their legend.
 - e. **GIS Pathname:**

23. Area sprayed with a chemical insecticide (DDT) to control Douglas-fir tussock moth populations (1974).
 - a. **Source:** An unpublished map dated July 31, 1974 available in the silviculture section of the Supervisor's Office, Umatilla National Forest.
 - b. **Description:** A widespread outbreak of Douglas-fir tussock moth affected the northern Blue Mountains and the northern Rocky Mountains in the early 1970s. By 1974, over 350,000 acres had been defoliated on the 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.
 - d. **Status:** Don Justice digitized many, if not all, of the Umatilla NF treatment areas during the Grande Ronde-Rondowa watershed analysis effort in 2000.
 - e. **GIS Pathname:**

Literature Cited

- Andrews, H. J.; Cowlin, R. W. 1936.** Forest type map, state of Washington, southeast quarter. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey Staff. 1:253,440; Lambert projection; 36" × 61"; colored thematic.
- Andrews, H. J.; Cowlin, R. W. 1937.** Forest type map, state of Oregon, northeast quarter. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest Experiment Station, Forest Survey Staff. 1:253,440; Lambert projection; 35" × 50"; colored thematic.
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APPENDIX A: LEGEND AND TYPE DEFINITIONS
 1935-1936 County-Level Forest Cover Type Maps¹

<u>TYPE</u>	<u>DEFINITIONS</u>
1	BARRENS: Areas too rocky, exposed, or soil-less to support a real vegetative cover.
2	OTHER NON-FOREST LAND: Cultivated, pasture, grass, grass swamp, sagebrush, and brush lands.
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.
5 1/2	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.
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.

¹ Legend descriptions derived from USDA Forest Service (1935, 1936).

<u>TYPE</u>	<u>DEFINITIONS</u>
20	PONDEROSA PINE, LARGE: A forest containing 50-80% ponderosa pine, over 22" DBH.
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	LOGGED POLE PINE, LARGE: A forest containing over 50% lodgepole pine, over 12" DBH.
26	LOGGED POLE PINE, MEDIUM: A forest containing over 50% lodgepole pine, 6-12" DBH.
26A	LOGGED POLE 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.

<u>TYPE</u>	<u>DEFINITIONS</u>
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.
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. Or, 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.
37	DEFORESTED BURNS: Any non-restocked burn, not cut over.
37A	Drought killed,
37B	Insect killed,
37W	Wind thrown.

<u>TYPE</u>	<u>DEFINITIONS</u>
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

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).

"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 B: LEGEND AND TYPE DEFINITIONS
1936-1937 State-Level Forest Cover Type Maps

NUMBER TYPE DEFINITION

NONFOREST LAND TYPES

- 01 NON-FOREST LAND.
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.
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.
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 LODGEPOLE PINE.
Forests containing more than 50 percent by volume of lodgepole or knobcone pine, usually almost pure. Includes all size and age classes.
- 05 JUNIPER.
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.
Forests containing over 60 percent old growth Douglas-fir regardless of size.
- 07 DOUGLAS-FIR, LARGE SECOND GROWTH.
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.
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.
Very young forests containing over 60 percent Douglas-fir, in which most of the trees are 6 inches and under in diameter.

<u>NUMBER</u>	<u>TYPE DEFINITION</u>
10	<p>SPRUCE-HEMLOCK, LARGE.</p> <p>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.</p>
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	BALSAM FIRS, MOUNTAIN HEMLOCK, AND UPPER SLOPE TYPES, LARGE. 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.
20	BALSAM FIRS, MOUNTAIN HEMLOCK, AND UPPER SLOPE TYPES, SMALL. 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.
21	HARDWOODS--ALDER, ASH, MAPLE. Forests in which alder, ash, maple, cottonwood, or myrtle predominate, of any size and age class.
22	HARDWOOD--OAK, MADRONE. 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.
23	RECENT CUT-OVERS. 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.
24	NONRESTOCKED CUT-OVERS. 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.
25	DEFORESTED BURNS. Lands not cut over on which the stand has been killed by fire, and which are less than 10 percent restocked.

APPENDIX C: Legend for County-Level Forest Type Mapping

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 the 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 non-stocked.

- blank Non-stocked; 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.

- 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
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 underbars (_). 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 1954-1958 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.”