

1. Santiam Molalla History, Culture, and Geography

The name “Molalla” has at least 27 historical spellings. It is said to be derived from the words “moolek” for elk and “olilla” for berries (Winkler 1984). This would seemingly be a good name for their land, which produced abundant elk and berries, as well as for the people, who were known to extensively trade specialty products from these plants and animals. Preserved huckleberries and blackberries, elk hides, jerked meat, and elkhorn spoons were all trade goods associated with Molallans. Beargrass and willow weaving materials were also important trade items, due to their universal value and general abundance in Molalla lands. The Santiam Molalla were known as good elk hunters, good berry pickers, accomplished traders, bitter and fierce enemies of the Cayuse to the east, and good friends, family, and business associates with the Klamath to the south. They were also said to be poor guides when more than 35 miles from their homes, indicating a relatively concentrated and productive Tribal territory of seasonal use and trade route patterns (Minto 1903).

Molallan Geography. Very little is known about the Molallan history or culture (Winkler 1984; Ruby and Brown 1986; Zenk and Rigsby 1998), but there is good agreement on early historical Molallan geography. During the 1750-1850 late precontact/early historical time period of this study, Molallans occupied nearly the entire western slope of the Oregon Cascades Range, from the Columbia River south, almost to California. The Molalla are believed to have been organized into three, or possibly four, major “bands,” or tribes. The Southern Molalla inhabited the western Cascades of the Umpqua River and Rogue River basins of the western Cascades. The Northern Molalla lived on the western slopes of Mt. Hood in the Clackamas River, Molalla River, and Pudding River headwaters, south to Silver Creek, east of present-day Salem, and the Santiam Molalla (named for an historical Kalapuyan leader who lived in a townsite near the confluence of his namesake river and the Willamette) lived on the western slopes of Mt. Jefferson and Three Sisters, on the headwaters of the North Santiam, Middle Santiam, South Santiam, Smith, Blue, McKenzie, Mohawk, and Middle Fork Willamette rivers. The Mohawk, Smith, and Blue rivers are northern tributaries of the McKenzie River, and all the named rivers are eastern tributaries of the Willamette River.

A fourth possible Molallan band is a division of the Santiam Molalla into two groups – one along the headwaters of the Santiam River, and the other along the headwaters of the Blue, Smith, McKenzie and Middle Fork Willamette rivers (Winkler 1984). This research provides some evidence for the likelihood of such a fourth band, and I occasionally reference these people in this report as “Blue River Molalla,” to differentiate them from the 1855 Treaty Band “Santiam Molallans” (Ruby and Brown 1986) who lived along the South Santiam River. Blue River headwaters and South Santiam River headwaters are separated by a

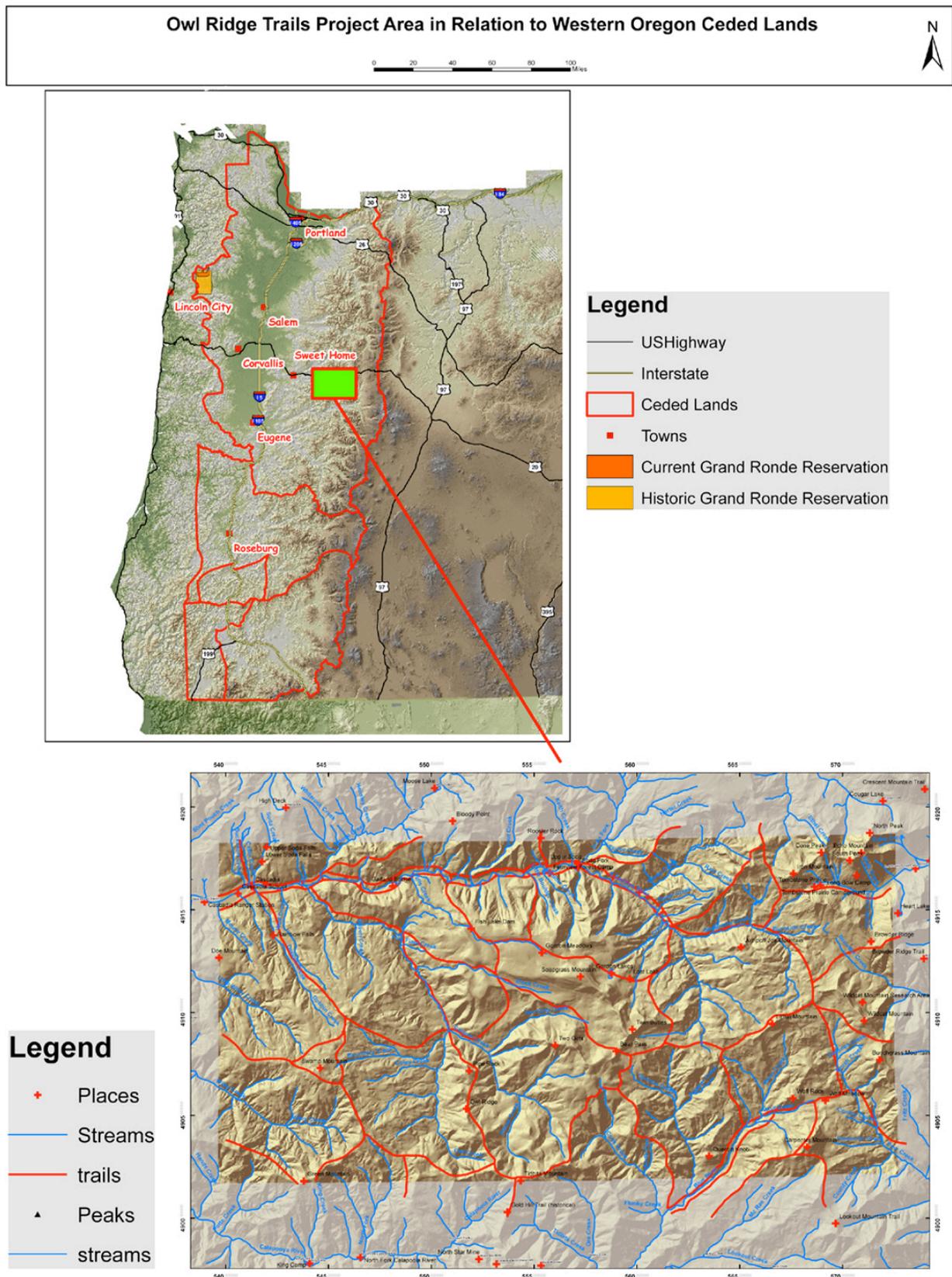
4,000 feet high, 25-mile long ridge that is covered with snow more than half the year, separating families and communities whose winter homes were within the two different (Santiam and McKenzie) river basins. Communities would have still been able to maintain contact via lower elevation Willamette Valley trails, but travel distances would have been much greater than taking the seasonal ridgeline trails, and the low elevation routes may have also been invasive of Santiam Kalapuya and Calapooia Kalapuya lands to the west.

Santiam Molalla Geography. On May 7, 1851 at Champoeg, Oregon, a Santiam Molalla man named “Coastnah” signed a treaty with the US government, on behalf of the 65 remaining men, women, and children of his Tribe, agreeing to sell a major portion of their ancestral lands and open them to white settlement and management. The treaty was never ratified by Congress, but provides a good idea as to known Santiam Molallan national boundaries, firmly in place at the time of the 1850 Oregon Donation Land Law (Carey 1972: 253). These boundaries were openly declared by the Santiam Molalla, and were formally confirmed by representatives of neighboring tribes of Santiam and Calapooia Kalapuyans to the west and south, and of Northern Molalla to the north. Paiute, Wasco, Warm Springs, and Cayuse to the east and Klamaths to the south also confirmed Molallan claims over western Cascade lands, at later times and under less formal circumstances.

The generally rectangular area of land owned and occupied by the Santiam Molalla in 1850 extended from the east-west mainstem of Silver Creek (east of present-day Salem) on the north; south along the western Cascade Range foothills; to the mainstem Middle Fork Willamette River; then east to a point along the Cascade crest due east of the Middle Fork headwaters; then north along the crest of the Cascades to a point due east of the headwaters of Silver Creek, and then west to the point of beginning along the Silver Creek mainstem (Gibbs and Starling 1851). These boundaries reflect millions of acres of prime timberlands, pasturage, berry fields, rivers, lakes, and streams that had apparently been used and occupied by much larger numbers of people in the decades and centuries preceding 1850.

The current study area is a significant but relatively small portion of the former Santiam Molalla lands. It is an area 21 miles long and ten miles wide (210 square miles), totaling about 130,000 acres (see Map 1). This area also includes the headwaters of South Santiam River and Blue River (tributary to McKenzie River). Fish Lake and Obsidian Cliffs to the immediate east of the study, are strategically located adjacent to a major Cascades Range pass (“Santiam Pass”) between eastern Oregon and western Oregon. This area also historically included primary trade routes between Klamath Indians to the south, Willamette Valley Kalapuyans to the west, Warm Springs Indians to the north, and Northern Paiutes to the east.

Map 1. Location of Owl Ridge Trails Project to western Oregon ceded lands.



Santiam Molalla History. During the course of this research, field surveyors (see Table 2) documented several relict old-growth groves, meadows, brakes, berry patches, balds, ridgeline grasslands and wetland prairies of the South Santiam River and Blue River mainstems and headwaters. These plants and fields have been measurably shaped and maintained by human hands for centuries and millennia (Boyd 1999b; Zybach 2002; Anderson 2005), yet numerous accounts claim that Molallans only arrived in the western Cascades a few generations, at most, before the arrival of whites.

In 1937, geographer and anthropologist Joel Berreman wrote that 1750 was the earliest possible date that Molallans could have moved into the Willamette Valley (Berreman 1937).

In 1972, anthropologist Harold Mackey wrote:

There is agreement that originally their [Molallan] hunting area included part of the present Warm Springs Reservation, the middle Deschutes, and a mountainous area between Mt. Hood and Mt. Scott. However, sometime around 1810-1820 they were driven out of the area by the more numerous Tenino. (Mackey 1972: 63)

In 1986, fifty years after Berreman, Ruby and Browns' "Guide to the Indian Tribes of the Pacific Northwest" stated:

[The Molalla] lived near the eastern slopes of the Cascade Mountains of central Oregon near the Warm Springs River . . . Less aggressive than the Cayuses, the Molalas were pushed westward sometime after 1780 by more aggressive tribes. (Ruby and Brown 1986: 137)

These relatively recent figures of 1750-1820 for perceived Molallan immigration into western Oregon are surprisingly consistent with a much earlier version given by an actual Molallan person in his native language. The following account is summarized from Mackey (1981: 63-65):

In December 1877, anthropologist Albert S. Gatchet interviewed Steven Savage, a native Molallan, at the Grand Ronde Indian Agency. Savage responded to Gatchet's questions in Molallan, and then helped him to translate the text line by line into literal English. These documents were added at some time to the Smithsonian Institute's Manuscript file No. 998, where they apparently remained unused until about 1980, when Mackey became aware of them.

Savage recounts the story of Cayuse horsemen, who had conducted a successful slave raid of Willamette Valley Kalapuyans and were returning to their home in eastern Oregon, when two of the Cayuse members chased down, murdered, and

dismembered a Molallan man named Phkaiosh. The Cayuse then raided the nearby Molallan homes, but the residents had fled. A Molallan man named Pshairsh tracked the Cayuse to the scene of the murder, gathered Phkaiosh's body parts and returned them to his home, as was customary treatment with Molallan dead.

Pshairsh was said to be still living at Grand Ronde in 1847, and Mackey places these events at 1820-1825 as partial result of that information. If Mackey's estimates are correct, then these events took place just a few years before the 1826-1828 establishment of Champoeg (near the Pudding River territory of the Northern Molalla), and only about ten years before the establishment of the 1834 Methodist Mission (near present-day Salem, and downstream from both the Northern Molalla and the Santiam Molalla).

A few days after Phkaiosh's murder, according to Savage, a Molallan-initiated vendetta battle took place near the western Cascade summit that resulted in the killing of nine Cayuse and only one Molalla. This event was said to have resulted in a permanent separation of the two tribes and an ending of Cayuse slave raids into the Willamette Valley.

Savage's battle account is corroborated in timeframe, combatants, and outcome by nearly the same story 25 years later in 1903, by John Minto, an early white resident, western Cascade mountaineer, and regional historian. Minto wrote of local 1830s-era Kalapuyan (or possibly Molallan) oral traditions as the basis for his discovery of Minto Pass in the 1870s:

There was a tradition among the Indians of the central portion of the Willamette Valley at the time when the missionaries of the Methodist Episcopal Church attempted christianization from 1834 to 1840, that a trail or thoroughfare through the natural [Santiam] pass had formerly been much used by their people and that its use was abandoned after, and as one of the results of, a bloody battle between the Mollalas (who claimed the western slopes of the Cascades from the Clackamas River south to the Calapooia Mountains,) and the Cayuses who were originally of the same tribe, but who had become alienated by family feuds, of which the battle or massacre of their tradition was the end. (Minto 1903: 241)

Probably the most thorough analysis of early historical and precontact archaeological sites in the historical territory of the Santiam Molalla was made by Carol Winkler (1984), a US Forest Service archaeologist who conducted a study of Molallan sites in the Middle Fork Willamette River basin to the south of this study area. Her research led to an entirely different conclusion, and she cites the authorities for her thinking:

According to the most recent historic and ethnographic research published (Farmer et al, 1973; Beckham 1976; Bryant et al. 1978; Beckham, Minor, and Toepel 1981, 1982; Rigsby n.d.), most of the Western Cascades had been inhabited by the Molala, who spoke a language isolate of the Penutium phylum, for perhaps 5000 or more years before Euro-American contact. Rigsby (1965, 1969) essentially disproved the existence of the “Waillaptuan” language family consisting of the Cayuse and Molala languages, proposed by Hale in 1846, and the concomitant hypothesized Molala intrusion into the Western Cascades. (Winkler 1984: 4)

Winkler’s conclusions are further supported by the more recent linguistic research of Zenk and Rigsby (1998). These two entirely different perspectives regarding the history of Molallan occupation of the western Cascades (recent immigration vs. ancient occupation) are addressed in the “Questions” and “Recommendations” sections of Part 8. For the purposes of this report, I have generally assumed the following to be true:

- 1) Santiam Molalla lived in the study area nearly year-round from 1750 to 1850 (Winkler 1984);
- 2) They were the dominant culture in the study area during that time (Zenk and Rigsby 1998); and
- 3) Their population was likely much greater in 1750 and in 1800 than in 1850 (Boyd 1999a).

2. Project Research Methods and Boundaries

The purpose of this project was to locate and document relict evidence of cultural plant and trail use by Santiam Molallans during the 1750-1850 time period of the study. The location of information -- whether in a library, through discussion, or in the woods -- required appropriate research methodology for value; while documentation required current technical formatting to be useful. Much of the resulting value of this information is to address the types of assumptions that conclude Part 1 of this report:

Were Molallans the dominant culture in the study area during late precontact time? Had they lived in the area for many generations, or were they more recent arrivals? Did they live in the area year-round, or just visit seasonally?

In order to complete this project to contract standards, it was necessary to develop an operational plan using formal research standards to acquire pertinent information, and to use current technical methods to digitally document, duplicate, analyze, distribute, and otherwise help organize and use the resulting data. This process has resulted in a series of useful products for the Confederated Tribes of Grand Ronde, of which this report provides a summary. Other completed products include several new GIS mapping layers (e.g., see Maps 1, 5, 6, and 7), an Excel file containing codified information on the 495 GPS points systematically arranged across the study area (see Appendix D), about 1500 documentary digital photographs tied directly to the GPS points (e.g., see Tables 2, 3, 5, 6, 7, 8), three ORWW educational websites containing historical photographs that had been assembled for this project (see Table of Contents for links), and a formal plan for addressing Recommendation #3: the restoration of Gordon Meadows (Zybach 2008).

Research for this project was conducted in four basic steps: archival research, predictive map construction, “ground-truthing” the predictive map (field research), and synthesis. These are not discrete steps in any sense, and usually two or three were being taken at the same time throughout the course of this project. There is a general order in which each step was initiated, however, and a similar order as to their relative completion dates. This report represents the most recent synthesis of research findings for this project, for example, and the final step of the four to be taken in order to complete contract agreements.

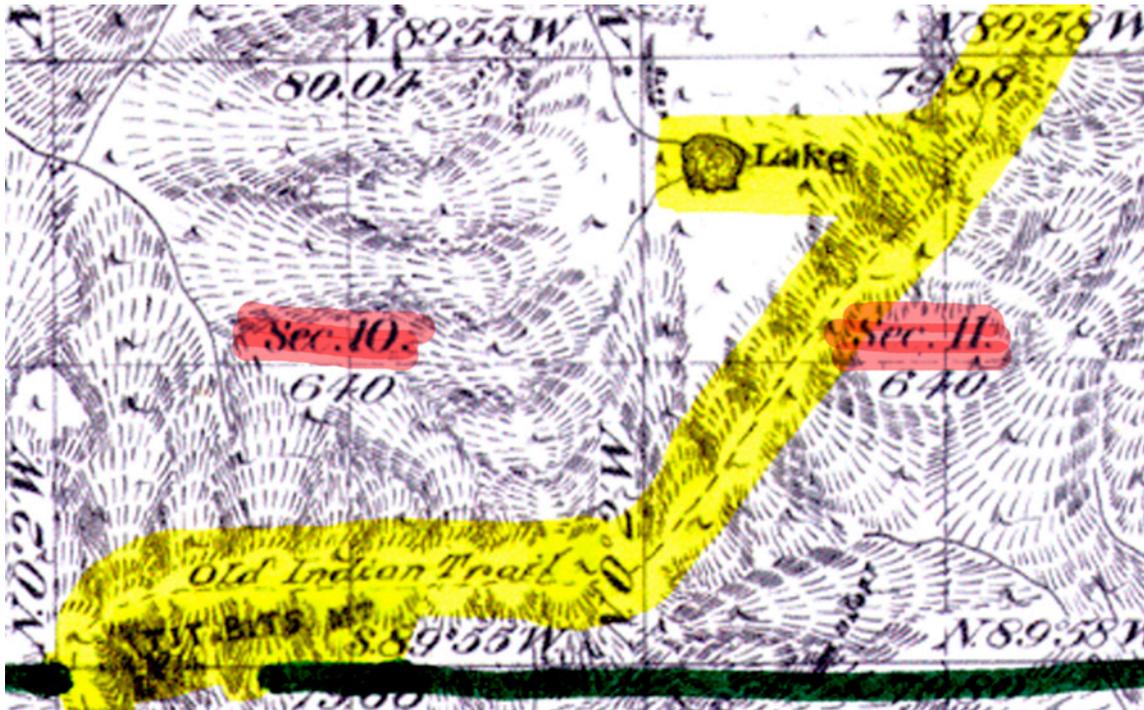
This part of the report briefly describes basic research methods and provides examples of the types of technology used to develop the predictive map, field test the results, and document the findings needed to complete this project. References and Internet links are provided for more detailed and comprehensive descriptions of these methods and types of documentation for purposes of further review, replication, or additional formal (constructive) criticism.

Temporal Boundaries: Archival Research. The beginning date of this research, 1750, was partly chosen because it was the earliest date given by Berreman (1937) for the migration of Molallans into the Willamette Valley and the west slope of the Cascades. This date also precedes the first western Oregon contacts with white and black traders and explorers, beginning in the 1770s and 1780s (Carey 1971). These contacts were followed immediately by plagues of smallpox, malaria and other diseases from Europe and Africa, and brought devastating results to local people with no immunities to those diseases (Boyd 1999a). It is likely these introduced diseases were transmitted to the Santiam Molalla on several occasions between the 1770s and 1850, and decimated their populations during those decades. It is impossible to comprehend the despair, fear, and confusion the survivors must have felt. 1850 was selected as a terminus because it is the year the Oregon Donation Land Law was enacted, and when Santiam Molalla lands were legally opened to white settlement and to federal control by the US Government (Carey 1981).

Coastnah's spring 1851 negotiations with the US Bureau of Indian Affairs to accommodate the growing flood of white settlers into his country and to care for his remaining citizens (Part 1) may, in fact, be the earliest historical record of the Santiam Molalla. Molallans first enter the historical record in the journals of Willamette Valley missionaries and Hudson Bay Company beaver-trappers in the 1830s and 1840s, and possibly earlier, but these were almost entirely Northern Molalla and Southern Molalla, whenever their homelands were identified. There seems to be no direct historical record of the Santiam Molalla, or of any member of that Band, during the 1750 to 1850 time period of this study -- which time also represents only the last 100 years of native Oregon Indian ownership, management, and residency of the western Cascades in a history of more than 10,000 years. This research is to find the trails these people walked, the foods they ate, and the sights they saw during those last 100 years.

Geographic Boundaries: Predictive Map. Map 1 shows the research boundaries determined for this project. These boundaries were selected on the basis of several criteria: they closely conformed to land forms that implied complete trail loops and links, rather than segmented bits and pieces of trail; they included several known features and plants of specific interest (e.g., Gordon Meadows, Cascadia Caves, huckleberries, camas, etc.); and they conform closely to both original General Land Office (GLO) surveys (see Maps 2 and 3) and to current USGS 7 1/2 quadrangle map boundaries. The GLO surveys are most important for historical research purposes, while the USGS maps (e.g., see Map 4) are the State and federal standard for recording cultural resources. These two map series (GLO and USGS) were used in combination with a 1938 Linn County map atlas (Metsker 1938) to create the principal predictive maps for this project. This process of GLO predictive trail map creation is shown in greater detail in an

Map 2. Annotated fragment of 1907 GLO map of Tsp. 15 S., Rng. 4 E.



article in which the principal Alsi, Yakona, Siuslawan, and Kalapuyan trails in the Alsea River headwaters of Benton County are used as an example (Zybach 2002):

www.NWMapsCo.com/ZybachB/Articles/Alseya_Valley_2002.pdf

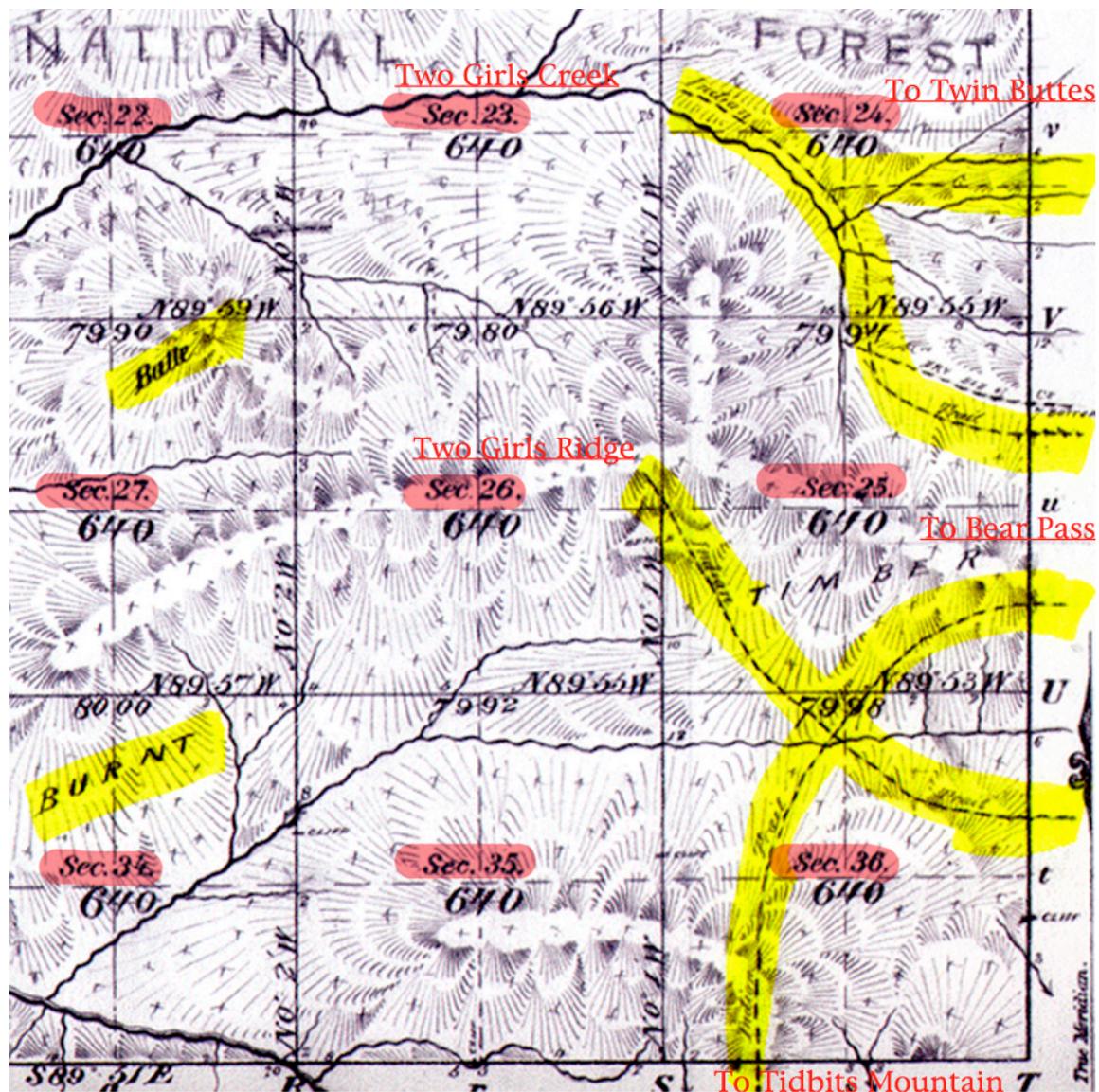
The theoretical ridgeline trail network model used to produce the project's predictive map proved to be highly accurate and vital to the success of this project. This demonstrates that such maps (and their hypothetical basis) can likely be used with confidence in other forested areas with similar topographies. A "predictive map," for purposes of this project, then, has two basic functions: 1) to assemble available documentary and theoretical information into a map format designed to predict locations with the greatest likelihood of containing physical evidence of interest, and 2) to serve as a basis to inventory field results, findings, locations and condition of valued cultural resources. The original predictive maps used for this project, roughly sketched on the eight 7 1/2-minute USGS quadrangle maps, can be found here:

www.ORWW.org/DRAFT/Owl_Ridge_Project/Maps/

The black and red dotted lines on this map represent possible trail locations, the solid red lines represent (usually) final trail locations (see Map 5), and the small circles represent the first grid of GPS points that needed to be evaluated and

documented in the field (see Appendix D). These data were subsequently gathered and entered into the Grand Ronde computer system by Volker Mell, the Tribal GIS technician, and can now be used for a variety of map products, including a much improved and updated digital predictive map for the area.

Map 3. Annotated fragment of 1895 GLO map of Tsp. 14 S., Rng. 4 E.



Predictive maps are largely a theoretical construct, guided by available information. They are tested and improved by two basic processes: “ground-truthing” the map in the field (including on-site examinations and local and expert interviews), and by archival research. These processes were carried on simultaneously for this project, and are illustrated in these pages with historical map fragments, tables, and figures.

Map 4. Annotated fragment of 1901 USDI map of central Oregon Cascades.

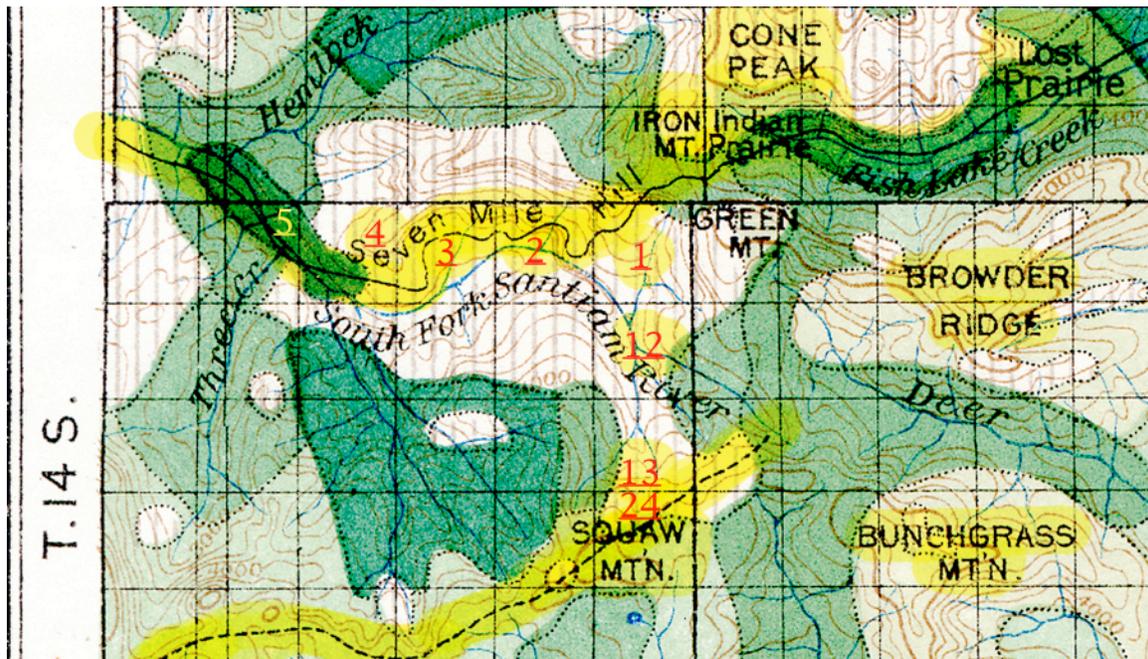


Figure 1. Excerpt from 1903 USDI Plummer report re: Tsp. 14 S., Rng. 5 E.

About 35 per cent of the total area is burned. The burn in sections 13 and 24 is very old and was an Indian hunting ground. The burn in section 12 and part of section 13 occurred in 1896. That in sections 1, 2, 3, and 4 occurred in 1885, and again in 1897.

The heavy timber in section 5 is old growth but not first class, being sometimes limby and windshaken. The proportion of poor timber is about 10 per cent. Although the timbered areas were saved from the big burn, the trunks were scorched to a height of 20 feet or more, showing that fire ran through the underbrush but failed to ignite the timber.

Project maps, and locations within the maps (see Appendix A), use standard legal descriptions and abbreviations that were adopted with the original GLO public land surveys in 1853, and that continue to be used on private property descriptions and other legal documents to the present time (Zybach 2002). GLO maps were created by surveying parallel east-west lines every six miles across the landscape ("Townships," abbreviated "Tsp."), and intersecting these lines with surveyed parallel north-south lines, also at six-mile intervals ("Ranges," or "Rng."). This process created a number of 36-square mile areas also called "Townships" and also abbreviated "Tsp.," to add a little confusion. Each resulting Township was then labeled with its unique Tsp. and Rng. numbers and subdivided into 36 individual square-mile parcels, named "Sections," and abbreviated "Sec." Map 2, for example, shows two square miles (numbered

sections 10 and 11) of GLO Tsp. 15 S., Rng. 4 E., and Map 4 (above) shows portions of four different Townships, of which sections 1-5, 12-13, and 24 are labeled in Tsp. 14 S., Rng. 5 E. Abbreviations for “south” and east” in these descriptions refer to the original 1853 starting point for these surveys, the Willamette Stone, near Portland, Oregon.

Archival Research. Figure 1 is an excerpt from the USDI report (Plummer 1903: 134) that was issued in conjunction with Map 4 and illustrates how written materials can help corroborate theoretical conjecture. In this example, the Latiwi (“Squaw”) Mountain Trail leads directly to a “very old” burn that “was part of an Indian hunting ground.” Further research identifies the trail as “Wylie’s Trail” (Hammond 1895), which had been blazed for stock in the late 1850s by Andrew Wylie, by following an “old Indian trail” (Minto 1903: 241-242; McArthur 1982: 653). Field research documented modern roads and trails in the same location, including numerous springs and relict huckleberry patches, beargrass meadows and thimbleberry fields. Archaeological evidence also confirms this is a major trail route (Farque, personal communication, September 18, 2007).

The maps, tables, and figures in this part of the report have been arranged to better illustrate the process of archival research and predictive map construction, followed by field research and documentation, and synthesis. Map 2 is an annotated fragment of 1907 GLO map Tsp. 15 S., Rng 4 E., showing a two-mile segment of an “Old Indian Trail” that travels northeasterly from “Tit Bits” (Tidbits) Mountain. The principal surveyor on this map was Ernest P. Rands, who was an experienced surveyor and very familiar with the local terrain. Eleven years earlier, in 1895, Rands had also participated in the subdivisional GLO survey of Tsp. 14 S., Rng. 4 E., in partnership with H. H. Johnson. At that time the two men mapped several more “Indian Trail” segments that directly connected to the “Old Indian Trail” to the south (see Map 3), but these trails crossed and had intersections; i.e., they couldn’t all be “primary” trail routes. In addition, none of the segments is more than a mile in length. One seems to end along Two Girls Creek, and another seems to end along Two Girls Ridge, and four segments seem to be heading toward Bear Pass (and Latiwi Mountain) to the east.

Map 4 helps resolve this conflict by identifying a single ridgeline route from Tidbits Mountain to Bear Pass and to Latiwi Mountain and beyond (see Part 4), but it doesn’t resolve the other “dead end” trail fragments surveyed by Johnson and Rands in 1895 (Map 3). Other GLO surveys were completed in the study area between 1870 and 1895 by Warner (1870), Barr (1879), and Pershin (1895), but these surveys were highly unusual in that they do not record a single trail or other evidence of human presence -- and such trails were certainly known in the area at that time, and were regularly used. In addition, these men only named three or four creeks and landmarks for the entire 36-square mile

area they surveyed, including “Elephant Mountain” (which name cannot be found in any other source), and yet they are otherwise highly accurate and detailed regarding drainage patterns, bearing trees, shrubs, slopes, and springs.

In addition to historical maps, survey notes, interviews and government reports, other sources of archival information were also used to test and refine the predictive map and other theoretical constructs used in this project. Historical photographs were used extensively for this purpose. Cone Peak is in the northeast corner of this study area, as shown on Map 4. Figures 2 (Plummer 1903: 132) and 3 (ibid.: 146) were photographed from Cone Peak in early July 1902, and clearly show well-developed ridgeline trails, and the last traces of snow for the summer. The view south also shows a significant portion of the research area. This is a good method to connect dangling trail segments, or to help determine primary travel routes, but historical photos of this age and quality are usually difficult to locate for most areas, including the entire remainder of the study area.

Beginning in the 1930s, however, most of Oregon’s forestlands were systematically photographed in great detail through the widespread use of two new inventions: the airplane, and the Osborne camera. Figure 4 is an Osborne photo (or “Osborne”) taken in 1933 showing the same Cone Peak eastern ridgeline on the left, as shown in 1902 in Figure 2. Note the man in the foreground and the strip of numbers across the top. Osborne negatives were curved in such a way as to avoid distortion at the edges of the photographs. They were also panoramic-scaled negatives that covered 1/3, or 120-degrees, of the horizon. In Figure 4, and all Osbornes, the numbers represent the points of the compass; e.g., 0/360 = due north, 90 = east, 180 = south, etc. The Osborne camera was used to take a complete 360-degree panoramic photograph series from every USFS fire lookout tower in the Pacific Northwest, and then posted those photos at each tower so fires could be telephoned in, and located by using compass points. These photographs were, in essence, highly detailed maps of the area they documented for the point of time in which they were made.

Figure 5 is an Osborne taken in 1933 from Twin Buttes Fire Lookout, north of Bear Pass. The perpendicular ridgeline is Two Girls Ridge, with the trail intersection to Tidbits Mountain clearly visible at 215-degrees (see link below for larger image). At the base of Two Girls Ridge is a pond or small lake, near the headwaters of Two Girls Creek. The Two Girls ridgeline trail and the pond are the apparent destinations of two 1896 “Indian Trail” segments, as shown on Map 3. Farque suggests archaeological evidence may be found in the area. The presence of relict patches of huckleberries and beargrass add credence to this suggestion. The trail segments are “dead ends” because they have led to destinations, not ended in blockades. All trails lead straight to Bear Pass, to the



Figure 2. View east from Cone Peak, July 1902. F. Plummer



Figure 3. View south from Cone Peak, July 1902. F. Plummer



Figure 4. View from Iron Mountain, northeast to south, September 1933. Snyder.



Figure 5. View from Twin Buttes, south to northwest, September 1933. Moe & Sorlin.

campgrounds in that area, and all directions of the compass from there. The six series of Osbornes (18 total) located within the Owl Ridge Trails Project study area can be found here:

www.ORWW.org/Osbornes_Project/

Table 1. Repeat aerial photography of Latiwi Mountain Trail, 1946-1981.

<p>Bear Pass 1946</p>	<p>Bear Pass 1981</p>
<p>Latiwi Mountain 1946</p>	<p>Latiwi Mountain 1981</p>

Aerial photographs from the 1930s are available for much of western Oregon, but the earliest sets that could be located for the study area were a spotty set (missing several photos) from 1944 at the University of Oregon, and a nearly complete private set from 1946, kindly lent to me for several weeks by Cascade Timber Consulting, Inc. Repeat photography is the process of comparing two photographs taken from the same perspective, but at different points in time. Aerial photographs are well suited for this purpose. Table 1 (above), for example, compares two segments of the Latiwi Mountain/Wylie Trail 1) before logging (from the general time of the Osbornes) to 2) after logging, precipitated by national post-WW II housing and paper product needs. The direct impact of clearcutting on old trail evidence, berry patches, and surface artifacts is obvious; and well documented. Just as obvious are the well-documented undisturbed areas in which it may still be possible to find undisturbed evidence. These photos, and select others of the study area obtained from University of Oregon and Cascade Timber Consulting, Inc. files, can be found in enlarged format with labeled landmarks here:

www.ORWW.org/Rivers/Santiam/South/Aerial_Photos/Headwaters/

Other types of archival information used during the course of this project included local histories (e.g., Carey and Hainline 1979; Olsen, et al. 1982), oral histories (Williamson and Milligan 1982), books (e.g., Stewart 2002, Anderson 2005), newspaper articles (e.g., Braman 1987; McClary 2007), and academic research (e.g., Anderson 1993; Zybach 2003). Museum collections, particularly those of photographs and local artifacts, could be an additional reference source, given time and resources to investigate.

“Ground-truthing”: **Field Research.** Ground-truthing is a principal method of testing theory, such as used to construct predictive maps. The specific theories of precontact land use patterns in western Oregon that were used to construct these maps are described and demonstrated in some detail in much of my earlier work (e.g., Zybach 2002; 2003). More general theories of plant use and land management that are consistent with this project can be found in Boyd (1999b), Stewart (2002), and Anderson (2005). The basic methodology of ground-truthing precontact and early historical Indian trails in western Oregon is described by Braman (1987), regarding the mapping of an 1840-1849 Klickitat horse trail from Kings Valley in Benton County, to Toledo in Lincoln County.

Ground-truthing for this project was performed by members of Phoenix Reforestation, Inc. (see Table 2). The method used was consistent with the documentation process ORWW developed on the B&B Complex project: using digital cameras, GPS receivers, maps, transportation, and clear weather to systematically photograph multiple-scale patterns of native plants across the landscape. A more detailed description of the process can be found here:

ORWW/CTGR 2008 Owl Ridge Trails Report

www.ORWW.org/B&B_Complex/Repeat_Photos_Grid/index.html

Daily Inventory Forms here:

www.ORWW.org/DRAFT/Owl_Ridge_Project/

Initial field research began with several informal trips to the project area by members of ORWW, the Grand Ronde Tribe, and Phoenix Reforestation, Inc. (see Report Cover, Tables 2 and 8). On the basis of these excursions, and the observations and opinions of those who participated, it was determined that further research was warranted, and led directly to the performance of this project. A partial record of a few of these field trips can be found here:

www.ORWW.org/Rivers/Santiam/South/Canyon_Creek/

Formal ground-truthing began with establishing a systematic grid across the predictive map, focusing on key locations such as creek crossings, peaks, springs, and mountain passes. Many of these were on private property, or located behind locked gates, landslides, or downed trees. Other areas had been heavily logged (see Table 1). Beginning with these selections, it was decided to have field researchers avoid posted or locked private lands, or dangerous situations, keep most trail hiking (except critical locations) to a minimum, and use their own best judgment when selecting other areas to document. The focus was on road and trail intersections, open vistas for documenting landscape-scale forest patterns, and areas of cultural vegetation, such as camas, huckleberries, beargrass, and willow.

Researchers generally worked in teams of two, taking GPS readings and photographs at select locations, recording their findings in the daily log (see previous link), and trying to determine a relative ranking for cultural plants and for the likelihood of Molallan trail use at each location. These efforts resulted in the establishment of 495 GPS points documented by 1500 photographs within the study area, in which nearly 1000 untested rankings were determined by eight different people in isolated circumstances from one another (see Appendix D). The rankings are intended to be dynamic and consistently refined and improved as new information is made available. The color-coded display of ranked points across the study area represents the next progression of the project predictive map, should it remain in use over time. GPS points, photograph identification, and cultural plant and trail use rankings are listed in Appendix D. Additional information regarding these points is included in the project Excel spreadsheet, which has been entered into the Grand Ronde computer system.

Table 2. Owl Ridge Trail Project 2007 field surveyors.

	
<p>Eric Esselstyn & Rocky Polries, Fishing Rock, August 2, 2007. R. Slattum</p>	<p>Keri Cribbs, Gordon Meadows, August 22, 2007. E. Esselstyn</p>
	
<p>Nana Lapham, Dobbins Creek crossing, September 17, 2007. B. Zybach</p>	<p>Bob Zybach, Swamp Mountain meadow, September 20, 2007. N. Lapham</p>
	
<p>Scott Brown on unnamed rock, September 8, 2007. N. Lapham</p>	<p>Greg Archuleta and Lifeways members at Gordon Meadows, July 26, 2007. D. Lewis</p>

In addition to basic documentation of each GPS location (road signs, road intersections, spring, etc.), an effort was made to photograph fruits, nuts and seeds, flowers in bloom, and identifying foliage of key cultural plants (see Appendix C). Panoramic photos were also planned for large prairies and meadows, or key vistas, with QTVR-style sequences favored. Finally, an attempt at a “Beauty Shot” was made in locations such as waterfalls, lakes and ponds, peaks, old-growth, rock outcrops, caves, and other locations that may have had significant cultural value to Santiam Molalla.

GIS. A general technical description of how to transform late precontact/early historical western Oregon political data to GIS can be found here:

www.NWMapsCo.com/ZybachB/Articles/DEF_Indians_1995.htm

Field data from this project has already been gathered and transformed into discrete GIS layers by the Grand Ronde GIS Mapping Department. Essentially, two new GIS map layers have been created: a map of the primary Santiam Molalla trail system in 1750-1850 (see Map 5), and the 1500 GPS-referenced digital photographs. This data can be used immediately for a number of useful GIS mapping products, as recommended in Part 8 “GIS Mapping” of this report. One of the listed suggestions, “an increasingly detailed and accurate archaeological predictive map and cultural resource inventory can be further developed and refined from the base model created for this project,” has been more completely described in this section of the report.

Maps 1, 5, 6 and 7 in this report, and the two maps used in the Gordon Meadows Restoration Plan (Zybach 2008), presented to the Grand Ronde Tribal Council on June 19, 2008, are products of these new GIS layers. Volker Mell, Grand Ronde Tribal GIS specialist, created these maps, and others used for this project. The Tribal GIS files also contain the 1500 photographs taken during this project, and all are georeferenced to the new maps as well. Ethnobotanists, foresters, archaeologists, and others can now use a combination of these products to conduct informal field inventories in an office environment.