AN ABSTRACT OF THE THESIS OF

Lydia A. Kachadoorian for the degree of Master of Arts in Interdisciplinary Studies in Anthropology, Anthropology, and Geography presented on February 4, 2003.
Title: A Preliminary Archaeological Predictive Model For The US 30 Transportation Corridor, Portland, Oregon To Astoria, Oregon.

Abstract approved:

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David R. Brauner

This thesis is a preliminary archaeological predictive model and project-planning tool created for the Oregon Department of Transportation (ODOT) as part of a statewide planning effort to enhance the agency's ability to assess the potential impacts of highway projects on archaeological resources. This model addresses the archaeological sensitivity of the US 30 highway corridor from Portland, Oregon to Astoria, Oregon. The highway corridor is divided into 7 separate segments for management purposes and each segment is given a low, medium, or high probability rating for its potential to yield archaeological resources in this model. The ratings are accompanied by planning and maintenance recommendations to be integrated into a comprehensive planning document for the corridor.

Probability determinations are based on State Historic Preservation Office (SHPO) archaeological records, physiographic data, dominant vegetation zones, General Land Office maps, ethnographic accounts, and historical records. The precise utility of this model is unknown because cross-tabulations that compare actual and model assigned presence or absence of resources have not been made. Low probability ratings are assigned to 27% of the corridor. Medium probability segments comprise 15% of the corridor. High probability rating account for 58%

of the total length of the corridor. The segment with the highest site density is segment 2, averaging .63 archaeological sites per mile.

The archaeological probability ratings were initially omitted from the Draft Corridor Management Plan of 1998, but have been included in the Final Corridor Management Plan of 1999. The predictive model results were incorrectly added to the document and consequently create false impressions. In the Final Corridor Management Plan the number of sites listed for segment 2 is incorrect. It is indicated that seven archaeological sites are present within the corridor, but the actual number is fourteen. Furthermore, the percentage ratings of low, medium, and high archaeological probability are erroneously provided for segments 3, 4, and 7 in the final plan. Ultimately this report has proven useful to ODOT archaeological staff, however signs indicate that the data provided to planning personnel has had little impact on project planning and design.

A Preliminary Archaeological Predictive Model For The US 30 Transportation Corridor, Portland, Oregon To Astoria, Oregon

By

Lydia A. Kachadoorian

A THESIS

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APPROVED:

Redacted for privacy

Redacted for privacy

Committee Member, representing Anthropology

Redacted for privacy

Committee Member, representing Geography

Redacted for privacy

Chair of Department of Anthropology

Redacted for privacy

Dean of the Graduate School

I understand the my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Lydia A. Kachadoorian, Author

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DEDICATION

This thesis is dedicated to the memories of my father, George K. Kachadoorian, and his parents, Krikor and Varter Kachadoorian. If it were not for the fortitude of these strong souls I would not be here today to complete this thesis.

A PRELIMINARY ARCHAEOLOGICAL PREDICTIVE MODEL FOR THE US 30 TRANSPORTATION CORRIDOR, PORTLAND, OREGON TO ASTORIA, OREGON

CHAPTER 1:INTRODUCTION

This thesis presents a preliminary archaeological predictive model created for the Oregon Department of Transportation (ODOT) as part of a statewide planning effort to enhance the agency's ability to assess the potential impacts of highway projects on archaeological resources within the highway right-of-way (area under ODOT management). The long-term benefits of using models that emphasize archaeological sensitivity include better adherence to project timelines, reduced costs surrounding project clearance, and more efficient compliance with state and federal laws that regulate archaeological resources. When highway archaeologists have greater access to site location details and other data provided by predictive models it enables them to expedite archaeological review and better meet agency management goals.

BACKGROUND

In the spring of 1997 I was hired by the Environmental Services division of ODOT to complete a series of preliminary archaeological predictive models for highway transportation corridors. Before my employment, the University of Oregon had completed two small-scale preliminary archaeological predictive models for ODOT highway corridors (Losey 1996; Penton and Connolly 1996). I reviewed these reports and used some of the basic theories as a foundation for a more comprehensive plan for future models. I also corresponded with the Minnesota Department of Transportation (MN/DOT) which was in the process of developing their own archaeological predictive model for highway corridors. The MN/DOT contracted with several private firms to develop digital data, which could be manipulated using Geographic Information Systems (GIS). The data being collected and computerized for the MN/DOT was extensive. Unfortunately, ODOT did not have the resources necessary to create similar types of computerized information. I obtained the draft research design report supplied to MN/DOT by its contractors and incorporated some of the principles into my own work after discussing some of the applications with the Minnesota contractors (BRW 1996).

In addition, I investigated nationwide research reports completed on behalf of the Bureau of Land Management (BLM) and the United States Forest Service (USFS). A volume on predictive modeling theories published by the BLM in 1988 provided exposure to a vast array of complex and sometimes contradictory theories on how archaeological predictive models should be designed and implemented (Judge and Sebastian 1988). Most of the advanced theories promoted the use of elaborate and expensive technological tools and time consuming techniques that would require substantial funding and personnel not available to ODOT for this purpose. In addition, I posted queries to professional Internet newsgroups regarding similar ongoing efforts, but found that most of the information merely reiterated the vast body of theories postulated in the BLM volume.

In chapter two I will define the basic concepts that form the foundation of most archaeological predictive models and explain standard techniques used by archaeologists to create such models. I will also discuss the methods that I used to create a preliminary archaeological predictive model for the 99.34-mile long transportation corridor of US highway 30 from Portland to Astoria, OR. I refer to the model as "preliminary" because it is not completely comprehensive (does not incorporate every relevant variable) and did not incorporate advanced statistical analysis or GIS techniques, which in theory could have dramatically improved the precision and accuracy of the model.

Chapter three of this thesis, which is the original ODOT report, is the most extensive preliminary archaeological predictive model created for a highway corridor in the state of Oregon.

Lastly, in chapter four I will discuss some of the model's limitations and illustrate the life history of the document within the context of ODOT, a large state agency whose primary mission has little to do with the management of cultural resources. Supplemental documents, which trace the path of this preliminary archaeological predictive model within the agency, have been provided in the appendices.

CHAPTER 2: PREDICTIVE MODELS AND MY APPROACH

DEFINITIONS AND MODEL TYPES

Archaeological predictive models seek to define portions of a landscape that have the greatest potential to contain archaeological materials. The potential of an area or its sensitivity to contain cultural items can also be referred to its archaeological "probability". While "probability" can be formally extrapolated using inferential multivariate statistical techniques it can also be loosely used to refer to the deduced relative likelihood of an area to yield archaeological information. According to Timothy Kohler, a noted expert in the field of archaeological predicative modeling, a model can be defined as a:

> "simplified set of testable hypotheses, based on behavioral assumptions or on empirical correlations, which at minimum attempts to predict the loci of past human activities resulting in the deposition of artifacts or alteration of the landscape."
> (Kohler 1988:33)

Modeling approaches that focus on "behavioral assumptions" are typically referred to as "deductive models". Deductive models assume that general environmental processes can be applied to differing environments as long as behavioral choices are placed in their social, political, and religious contexts. Features of the environment that shape the adaptation of human culture are considered to be primarily economic in nature, therefore deductive models attempt to expand the concepts used when exploring human settlement patterns. Deductive models rely heavily on the use of ethnographic and ethnohistoric data when the impact of each biophysical component (a natural resource) is measured in the realm of the human decision making process. Deductive methods that placed each area in a cultural-historical context used to be the traditional approach employed when exploring the possible locations of archaeological material. But because most of the site location prediction work engaged in today must meet the management needs of different state and federal agencies it is often not feasible for expensive and time-consuming deductive models to be explored. The alternative approach most commonly used today involves various means of "empirical correlation".

"Empirical correlation" models are inductive in nature and seek to use various statistical techniques to extrapolate sample environmental data in order to understand the larger settlement dynamics of a region. Empiric based models seek to correlate quantifiable biophysical resources and the locations of known archaeological sites in order to reliably predict the location of undiscovered archaeological resources (Kvamme 1985). Social, political, and other factors that shape human behavior are not considered to the degree they are in deductive models. Sets and subsets of environmental variables are reduced and their significance and relevance to study areas mathematically determined. The mathematically techniques most frequently used in predictive or probability studies include multiple linear regression statistics, discriminant function analysis, and logistic regression analysis (Neter et.al. 1983; Carr 1985; Parker 1985; Warren 1990).

In a 1988 article on using models for resource location Kohler and Parker point out that empiric correlative models tend to belong to one of four categories: fatal flaw decision, hierarchical decision, unweighted linear additive, and weighted linear additive (Kohler and Parker 1986:422-425). Fatal flaw decision models rule out all site locations that do not meet every single criteria determined relevant for a given area. Hierarchical decisions considered all environmental variables separately or sequentially and employ Boolean logic in order to rule out geographic areas (Limp and Carr 1985). Unweighted linear additive models consider a number of given environmental variables for an area simultaneously and given even weight to each variable. These mathematically determined weights are added up for a geographic area to measure the probability of finding cultural materials (Keene 1985). Weighted linear additive models work along the same principles of their unweighted counterparts except for the fact that not all variables are given equal weight. For instance, distance to water may have more significance in an arid area then locations with southern exposure (areas warmed by morning sun).

Environmental variables are considered to be independent or explanatory in nature. A general knowledge of typically important independent environmental variables can be gleaned from previously tested models and settlement pattern studies (Jochim 1981; Ellen 1982; Kvamme 1982; Moe 1982; Cheatham 1988; Sekora 1989; Linebaugh 1992; Stafford and Hajic 1992). The environmental variables that are significant can vary by region and can be fundamentally different if one is seeking to locate only certain site types (Kvamme 1980; Sabo and Waddell 1983; Williams et.al. 1990) or those attributed to certain time periods (Galm et al. 1981; Hasenstab and Resnick 1990; Savage 1990). When environmental variables have a high weighted value of significance then they are considered to be compelling indicators of possible site location. Low weighted variables are also important elements to consider, but they may be deemed non-compelling indicators of human activities depending on the given context. Models that incorporate knowledge from ethnographic and ethnohistoric accounts can also have variables that are subjectively classified as compelling and non-compelling.

The dependant variable in predictive modeling is the presence or absence of archaeological materials. The dependant variable is the variable that is explained by independent data. The presence or absence of archaeological materials depends on a combination environmental factors and complex behavior patterns which are both rational and intuitive in their origins.

MY APPROACH

I combined aspects of both deductive and empiric correlative models in order to create a model that I could use given my limited financial means, lack of access to advanced technological software, and external time deadlines. The US 30 highway corridor had been designated into seven separate segments by ODOT planners and I classified those corridor segments by the archaeological probability ratings designations of low, medium, and high. While technically I did not determine formal probability through statistical means, I did use a simple algebraic weighted additive linear approach and deductive general principles (based on a cultural ecology approach) gleaned from ethnographic documents and previously conducted predictive models in similar environmental areas.

My predictive model probability ratings were based on the combination of dependant variables (i.e. the presence or absence of archaeological sites) and independent variables (i.e. biophysical components, such as access to water) which were specific to particular segments of corridor. I considered variables that spanned the landscape up to ¼ mile from each side of the highway (total width of corridor was ½ mile). Low probability ratings refer to areas within a corridor that lack positive indicators, have one or more negative indicators, or have one non-compelling indicator. Medium probability ratings refer to areas within a corridor that have two positive indicators or one compelling indicator. High probability zones have three or more positive indicators or two compelling indicators.

Positive indicators of archaeological resources included, but were not limited to the following: presence of archaeological sites, positive reconnaissance surveys, unverified site locations, ethnographic accounts describing the use of certain identifiable geographical features and ecotones, historical accounts of non-indigenous activities, site exposure and aspect, environmental transition zones, promising geomorphic features, montane areas with less than 20% slope, such as benches and saddles, areas within 1000 ft. of water sources, areas where two or more water sources come together, riparian zones, areas with favorable vegetation, and areas with large amounts of game and animal trails.

Negative indicators of archaeological resources included, but were not limited to the following: negative reconnaissance surveys, ethnographic and historical accounts that indicate a lack of use of a particular ecotone, slopes greater than 35% (except in cases of storage caves or rockshelters), unfavorable soil conditions, areas more than 1000 ft. from water sources, poorly drained floodplain areas, areas lacking fluvial terraces, an absence of flora and fauna when an ecotone is favorable to them, and land that has been heavily disturbed or significantly altered.

As previously mentioned, compelling environmental and cultural indicators are those variables to which the most weight is given. Not all variables in my model were weighted equally because it was assumed that not all variables were equally relevant. Some indicators were preferential indicators and were preferred over other less weighted, less compelling indicators.

DATA COLLECTION

I obtained archaeological site and survey data in a non-computerized format from the State Historic Preservation Office (SHPO) in Salem, OR. I gathered all of the available SHPO data for the US 30 highway corridor, which includes the land up to ¼ mile from each side of the actual highway. Copies of all relevant site forms and survey reports were made for in-depth analysis. State and federal agencies with land holdings within the corridor were contacted about possible archaeological work conducted in areas adjacent to the corridor. Sites per linear mile were calculated and archaeological survey coverage by segment was estimated. Site functions were considered and surveys reviewed for significance and relevance to the highway right-of-way. Sites and surveys were listed in table format and plotted onto both topographic and corridor specific maps. This was done by hand, without the use of GIS or mapping software.

Corridor geology, soils, landforms, vegetation, hydrology, and climate were researched and limited determinations were made as to their possible relationships to human settlement patterns. These natural components influence resource utilization, habitation choices, and population fluctuations and were therefore essential to understanding possible site location. These attributes, when present, were graphically illustrated and key transition zones noted.

Past ethnographic reports and studies were examined to understand the types of reported activities and activity areas that might be present within the highway corridor. Efforts were made to understand the different aspects of resource exploitation (food, shelter, crafts, clothing, etc.) for each separate tribal group within the corridor area. Knowledge of seasonal movements and resource procurement was deemed crucial in determining potential archaeological site types and functions. The relative boundaries of different tribal groups were discussed and graphically illustrated.

Historical records of non-tribal peoples were reviewed for activities that may have occurred within corridor boundaries. Attention was paid to the settlement patterns of different ethnic groups and placed within the temporal context of regional development. Themes such as the fur trade, exploration, immigration and settlement, conflict with tribal peoples, and community development were explored. Historical maps, for instance those from the 1850's-1880's created by the General Land Office, were obtained so that a bio-geographic records of vegetation, soils, and natural and cultural features could be incorporated into probability estimations. Historical maps and other documents were essential to the reconstruction of the corridor landscape during initial Euroamerican settlement.

DOCUMENT DISTRIBUTION

After the body of data was collected and analyzed probability assessments for each corridor segment were discussed by highway milepost, graphically illustrated, and distributed to planners and maintenance districts. General site locations were supplied to planning managers in table and map form, however this information was withheld from maintenance personnel due to its sensitive nature (knowledge of exact site location could result in greater site disturbance). General management recommendations sensitive to archaeological resources, were created as guidelines for work conducted within the corridor's low, medium and high probability zones.

Unfortunately, field truthing studies (survey and testing), which would verify the accuracy of the model, were not conducted by ODOT because funding was not appropriated for this purpose.

CHAPTER 3: THE REPORT

This predictive archaeological model for US 30 Highway has been designed to assist the Oregon Department of Transportation (ODOT) in project planning and development efforts. Areas of cultural resource concern have been identified for the 99.34 miles of US 30 Highway that extend from the vicinity of the Freemont Bridge in Portland, Oregon to the junction of US 30 and US 101 in Astoria, Oregon.

This predictive model has not been subjected to field testing, therefore probability determinations should be considered estimations. As new information and technology are developed the model will need to be refined. The US 30 highway corridor has been divided into seven separate segments for management purposes and each segment has been stratified according to low, medium, and high levels of archaeological probability. A low probability designation means that ODOT archaeologist will not need to be contacted in the cases of maintenance and overlay work. If substantial surface alterations are to occur within a low probability zone then ODOT archaeologist should be consulted before projects are undertaken. In medium probability zones ODOT archaeologist should be asked to participate in planning efforts and archaeological surveys and/or data recovery may be required. Planning efforts in high probability areas will need to be coordinated closely with Environmental Services before any ground disturbing activities occur. By definition, projects in high probability areas are the ones most likely to require financing for archaeological surveys and/or data recovery efforts.

Probability determinations for this corridor were based on the following types of information: State Historic Preservation Office (SHPO) records, physiographic data, vegetation zones, General Land Office maps, ethnographic accounts, and historical records. The SHPO records include the locations of officially recorded archaeological sites, the reported locations of unofficial archaeological sites that have not been recorded, and the scope of positive and negative cultural resource inventory surveys. It should be noted that the SHPO database is not necessarily complete, for it is solely based on information sent to the SHPO by numerous government agencies, private contractors, and universities. The Clatsop State Forest, which is the only large public land holding agency within the corridor, was also contacted to identify any archaeological work done within the corridor, which may have not been reported to the SHPO. The physiographic evidence employed incorporates geologic, geographic, and geomorphologic evidence within of the corridor areas. The vegetation information is organized by the vegetation zones currently recognized by contemporary field experts. General Land Office maps document the natural and cultural environment of the corridor area from 1852 to 1870. Ethnographic sources were used to identify which tribal peoples historically occupied the corridor area and where they were most likely to have established themselves based on lifestyle choices. Lastly, historical accounts of the settlement and development of the Lower Columbia region were reviewed in order to ascertain possible time periods of heavy use and occupation.

Details pertaining to the probability determinations for each segment can be found in the "Summary of Segments" section of this report. Low, medium, and high probability zones include the area ¼ mile wide on each side of the highway. In general, low probability areas lack positive indicators or have one non-compelling positive indicator. Medium probability designations are assigned to those areas with two positive indicators or one compelling indicator. A high probability designation is given to those zones that have three or more positive indicators or 2 compelling indicators. Probability determinations for the US 30 highway corridor are illustrated in Figures 28 through 33.

PHYSIOGRAPHIC ENVIRONMENT

The first segment of this corridor is located in the northern most portion of the Willamette Valley (Figure 1). This 9.66 miles stretches across a broad Quaternary alluvium that is surrounded by Eocene sedimentary hills capped by Miocene Age Columbia River basalt. This first segment is underlain by nonmarine sedimentary Plio-Pleistocene deposits. In segment 2 a transition from the Willamette Valley Province to the Coast Range Province begins to occur. The term 'Portland Basin' is used in this report to identify the vicinity, but the area has also been referred to as the Lower Columbia Valley, the Scappoose Plains, and the Wappato Valley. The Portland Basin is a mixture of both the Willamette Valley Province and the Coast Range Province. This physiographically diverse area contains islands (Sauvie, Bachelor, and Deer), sand and gravel bars, sloughs, high-water channels, levees, lakes, and marshes. Its origins are volcanic, marine, lacustrine, and alluvial in nature (Baldwin 1981:45-53; Franklin and Dyrness 1988:11-12, 15-16; Hibbs and Ellis 1988:25-37; Trimble 1963).

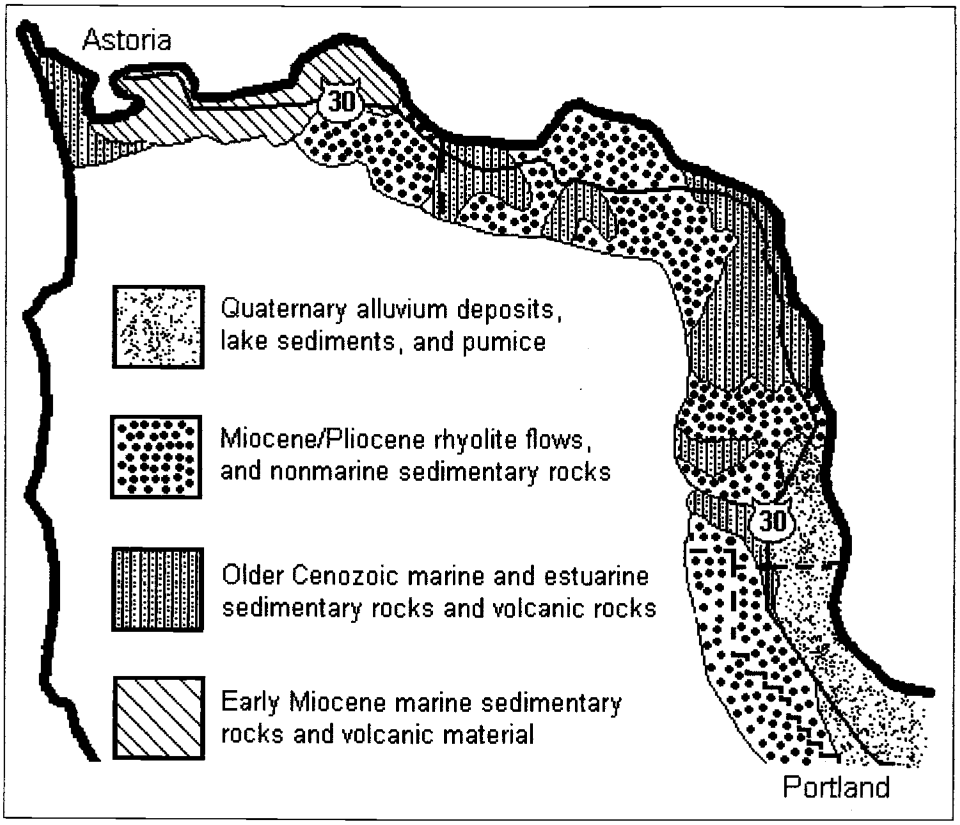

Figure 1. General geologic map of the US 30 highway corridor. Source data derived from Baldwin 1986:8.

Steep rugged mountains surround the silty alluvial terraces in segment 2. The higher terraces have not been subject to flooding since approximately 12,000 before present (BP), but the lower terraces have received considerable soil deposition. Within the last 150 years, much of the lower terrace areas surrounding local cities have been diked and drained for pastureland. These terraces represent deep alluvial silt deposits left by undulating ridge-and-swale actions of annual flooding. This transition zone contains numerous oxbow lakes, ponds, and marshes. Primary alluvial terraces with Ingram (mid-Holocene age) soils usually do not exceed 50 feet in mean sea level elevation. Terraces ranging from 50 to 100 feet in elevation are associated with Winkle (early Holocene age) geomorphic landforms (Hibbs and Ellis 1988:32-33). Alluvial terraces, consisting primarily of silt and unconsolidated sand/gravel, are generally underlain by Columbia River basalt, Stayton lava, and various non-marine sedimentary Miocene rocks.

Between 3,500 BP and 10,000 BP significant fluctuations in sea level occurred. This means that archaeological sites may be located at any elevation above the current surface to approximately ten feet below the surface (Hibbs and Ellis 1988:33). Special attention should be paid to Pilchuck and Rafton (late Holocene age) soils for they coincide with former lakes and marshes, which may be associated with archaeological sites (Ibid.). In this corridor those soils have been correlated to five GLO listed homesteads. Concerning older geomorphic surfaces such as Senecal and Champoeg (late Pleistocene age), archaeological sites should be on or near the present surface (Hibbs and Ellis 1988:31). To date, there has been little deposition on these surfaces.

The Portland Basin transition zone graduates into the Coast Range Province near milepost 25. The majority of the area is topographically mature, having moderately steep mountains with sharp ridges. Beginning in segment 3 and continuing into the mid-portion of segment 5 there are Cenozoic marine and estuarine sedimentary rocks. These high slopes with sandstone colluvial benches dominate the western side of the corridor in segment 3. Due to active flooding of the broad terraces to the east of the segment, the chances are greater that the oldest archaeological sites will be found on the shallow, stony loam terraces above the floodplain. Miocene/Pliocene rhyolitic flows and non-marine sedimentary rocks dominate segments 4 and 5. The remaining portion of the corridor consist of Miocene-age marine sedimentary deposits that have been uplifted, but are now rapidly eroding away (Baldwin 1981:5-24; Pettigrew and Lebow 1987:3-6; Franklin and Dyrness 1988:11-12; Alt and Hyndman 1996: 78-80).

VEGETATION ZONES

The first segment of this corridor passes through the northern most portion of the Willamette Valley Zone (Figure 2). This vegetation zone is a blend of grasslands and mixed oak (*Quercus garryana),* Douglas fir (*Pseudotsuga menzieii*), and bigleaf maple (*Acer macrophyllum*) forests. Valley lowlands tend to be covered in sedge (*Eleocharis* spp.), poison oak (*Rhus diversiloba*), and Oregon grape (*Berberis nervosa*). In the Portland area, western red cedar (*Thuja plicata*) dominates poorly drained ravine areas and streamsides. Scattered bushes and tall shrubs are abundantly distributed. Most of this valley was traditionally subjected to repeated burning by tribal peoples for the purpose of maintaining a prairie and oak Savannah that limited forest intrusion to foothill resources (Franklin and Dryness 1988:111-114, 116-118).

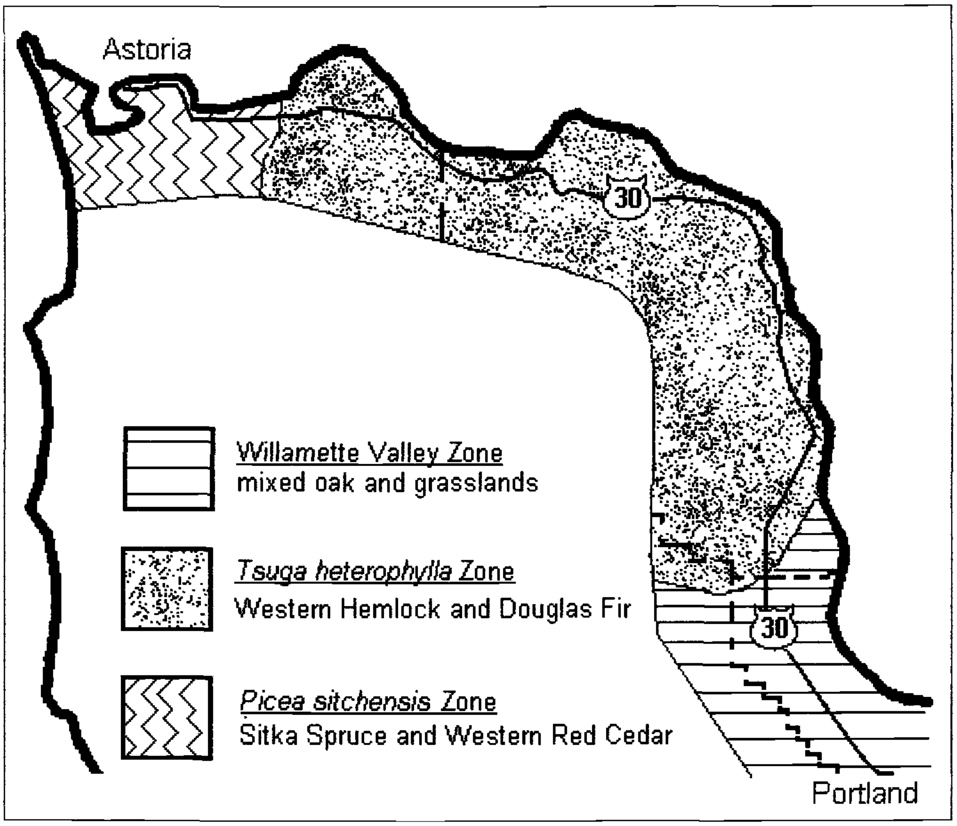

Figure 2. Major vegetation zones along the US 30 highway corridor. Source data derived from Franklin and Dryness 1988:45.

Segment 2 represents a transition area from the *Willamette Valley Zone* to the *Tsuga heterophylla Zone*. Traditionally this area was referred to as Wappato Valley, for it was exceptionally rich in wappato (*Sagittaria latifolia)*, a potato like plant heavily used by tribal peoples. Before Europeans diked and drained the broad fertile inter-connected wetlands and waterways, tribal peoples favored this locality for resource exploitation. Black cottonwood (*Populus trichocarpa*), Oregon ash *(Fraxinus oregona),* red alder (*Alnus rubra*), and willow varieties (*Salix* spp.) make up the riparian forests associated with creeks, rivers, channels, and bays. Dense understories of sedge (*Carex* spp.), cattail (*Typha latifola* L.), skunk cabbage

(*Lysichitum americanum*), and tall grasses occupy the meadow areas of riparian zones (Aikens 1993:176). The western portion of this second segment is mountainous and contains oak, Oregon ash, snowberry (*Symphoricarpos albus*), trailing blackberry (*Rubus spp.*), rose (*Rosa* spp.), grasses, and forbs. In general coniferous forests are located in the mountains above alluvial deposits, while deciduous tree species are associated with lower alluvial terraces (Pettigrew 1981:5; Pettigrew and Lebow 1987:3-6; Ellis 1991:21-27).

The *Tsuga heterophylla Zone* dominates segments 3, 4, and 5. This important timber zone has a Maritime climate with moisture and temperature extremes being greater than those in the neighboring *Picea sitchensis Zone.* The trees in this zone are primarily western hemlock (*Tsuga heterophylla)* and Douglas-fir *(Pseudotsuga menziesii)* but occasional oak and western redcedar trees are also present in the uplands. Extensive early logging of western hemlock stands opened the area up to a dense understory growth of tall grasses, rhododendron (*Rhododendron macrophyllum*), brakenfern (*Pteriduium aquilinum*), huckleberry (*Vaccinium* spp.), salal (*Gaultheria* spp.), vine maple (*Acer circinatum* Pursh), shrubs, and herbaceous vegetation. Today local vegetation attracts large numbers of black and whitetailed deer to the uplands while water based creatures inhabit the moist lowland terraces (Franklin and Dryness 1988:70-91).

Segments 6 and 7 are within the *Picea sitchensis Zone.* This fog saturated coastal variant of the *Tsuga heterophylla Zone* is usually only a few kilometers wide. Fine textured acidic forest soils host dense Sitka Spruce *(Picea sitchensis)*, Western hemlock, Western red cedar and Red alder stands. Lush forest understories are composed of epiphytes, shrubs, and ferns (*Polystichum* spp.). Headland areas and coastal plains are occupied by willows, grasses, various types of water loving plants and sporadic oak groves which cluster near forest/floodplain boundaries (Franklin and Dryness 1988:58-69).

ETHNOGRAPHIC INFORMATION

Native Americans who lived along the Columbia River shoreline gathered aquatic plants, harvested fish, and traded with other regional groups extensively. Historical and archaeological evidence indicates that the total population of the Lower Columbia region was over 22,000 (Aikens 1993:143). Investigations of fishing sites, upland hunting encampments, wooden plank houses, semi-subterranean mat lodges, and large villages indicate that most archaeological sites date between 100 BP and 3130 BP. Within this corridor archaeological sites that pre-date 3130 BP generally lie below current water levels. As the result of progressive sea level changes and rapid sediment deposition many of the older sites within the corridor may lie seven feet or more below current ground surfaces (Aikens 1993:170).

Approximately one third of the sites within the corridor that have been officially recorded are large village complexes. Another one third are seasonal camps and food processing sites, while the remaining one third are a combination of shell middens, individual housepits, human burials, and cache pits. Most of the sites were recorded between 1973 and 1979 by Pettigrew, Minor, Fagan, Thomas, Newman, and Hibbs (see Tables 6, 7, 8, and 9). Most sites recorded within the corridor in the mid to late 1980's were found by Ellis and Hibbs (see Tables 6, 7, 8, and 10). The area was most heavily surveyed for resources in the late 1970's, mid to late 1980's, and in the early 1990's (see Tables 2, 3, and 4). The greatest amount of excavation data stems from work conducted in the early 1980's by Pettigrew and Minor (Pettigrew 1981, Minor 1983;1989).

Tribal affiliations and boundaries can be difficult to delineate, but ethnographic records indicate that five of the six tribal groups that would have occupied corridor boundaries were related and spoke dialects of the Chinook language. Most local tribal peoples belonged to the following groups: the Clowewalla, Multnomah, Skilloot, Kathlamet, and Clatsop (Figure 3). The only non-Chinook speaking peoples, the Clatskanie, arrived somewhat later to the area and spoke an Athapascan based language. Approximately ten percent of this region's tribal population survived white contact and were eventually relocated to the Grand Rhonde and Siletz reservations.

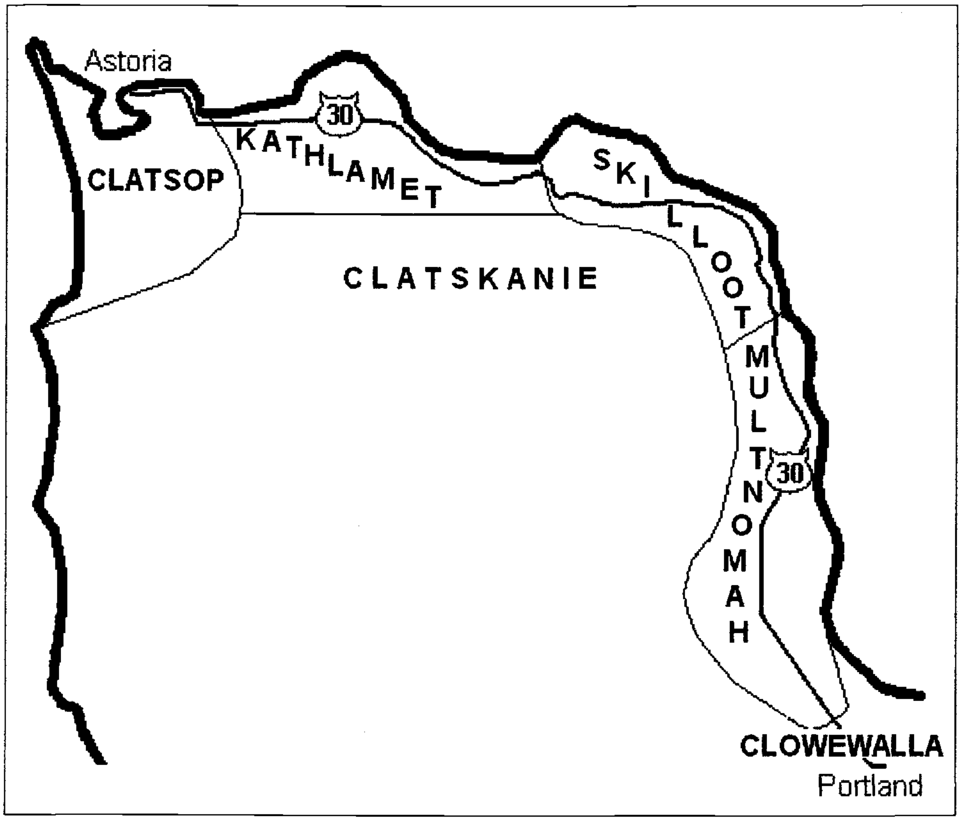

Figure 3. Tribal distribution along the US 30 highway corridor, ca. 1750. Source data derived from Berreman 1937:14.

The first half of segment 1 was inhabited by the Clowewalla, or Willamette Tumwater peoples. This group spoke an Upper Chinookan dialect and were closely related to the Clackamas. The Clowewalla lived in communal wooden structures in groups of 3-4 families per unit. Like most Chinookan speakers they established extensive canoe trade networks with other groups and lived primarily on fish caught at Willamette Falls. After suffering severe population loss induced by European diseases, the last few Clowewalla were relocated to the Grande Rhonde Reservation where soon after the remaining population became extinct (Swanton 1968:61; Woodward and Associates 1990:8-11; Ruby and Brown 1992:31).

The second half of segment 1, all of segment 2, and approximately ¼ of segment 3 were inhabited by the Upper Chinook Multnomah. There were ten different bands of Multnomah, or Wappato, who lived in large complex villages situated along Sauvie Island. These bands all shared a similar culture in which peoples traveled along water ways to collect fish, hunt water fowl, and harvest wappato and other aquatic plants. By the time Lewis and Clark met the Multnomah peoples their numbers had depreciated from 3,600 to 800. By 1907 there were only ten individuals members of the Multnomah bands who had survived the introduction of European populations. These tribal peoples became extinct shortly after Euroamerican settlement (Berreman 1937:16; Swanton 1968:70; Pettigrew 1981:6; Hibbs and Ellis 1988:51; Pettigrew 1990; Ellis 1991:59-63; Ruby and Brown 1992:142; Aikens 1993:174-176).

The last ¾ of segment 3 and all of segment 4 are associated with the Skilloot or Kon-naack (Cooniac) Band of the Chinooks. Although the Skilloot were renown river traders, they hunted more land mammals and utilized more non-aquatic plants than shoreline groups surrounding them. When Lewis and Clark traveled through the area they noted that there were approximately 2,500 Skilloot along the river (north and south sides) in 1805. It was only 5 years later that European disease and hostile contact with intruders reduced their numbers to 200. The only surviving Skilloot were relocated from a village at Oak Point to the Grand Rhonde Reservation in 1830 (Berreman 1937:16; Swanton 1968:45; Zucker et al. 1983:8-9;Burtchard 1990:10; Ruby and Brown 1992:208).

Segments 5 and 6 were once inhabited by the Kathlamet, who spoke an Upper Chinookan language but who maintained more of a Lower Chinookan culture (Silverstein 1990). In 1811 an early fur trader, Rox Cox, noted that the politically autonomous Kathlamet were the most "tranquil" of all the tribes who lived near Fort Astoria (Ruby and Brown 1992:12). In the tradition of their upstream Clatsop neighbors the aristocratic Kathlamet elite used head flattening to symbolize their command over valuable resources like deer, elk, harbor seal, salmon, and sturgeon. In 1806 Lewis and Clark noted one permanent Kathlamet village of 300 individuals. By 1849 the population had dwindled to 58 persons. This was partially due to population movements to Washington, but also was the result of introduced diseases. The remaining population was moved to the Grand Rhonde Reservation and is now believed extinct (Berreman 1937:15; Warner 1975:2-3; Zucker et. Al. 1983:8-9; Norman 1992:4-5; Ruby and Brown 1992:11-12).

The last segment of the corridor was originally inhabited by the Clatsop Indians. These Lower Chinook speakers were culturally like the Chinook people across the river in Washington, but they depended on land based resources more than the other Chinook Proper groups. When Lewis and Clark arrived in 1805 they wintered with the Clatsop. Soon after that the Clatsop began trading goods with soldiers at Fort Astoria. Originally women controlled trade in Clatsop aristocratic society, but as the demand for pelts increased women lost status to male counterparts and traditional society began to break down. Soon disease, alcohol, and infanticide decreased Clatsop numbers from 400 in 1805 to 26 in 1910. The few Clatsop that survived became integrated into the Nehalem band of the Tillamook (Berreman 1937:15; Zucker et. al. 1983:8-9; Connolly 1992:2; Norman 1992:4-5; Ruby and Brown 1992:30-3).

Shortly before 1775 the Clatskanie migrated to Oregon from the Athapasan speaking Kwalhioquas in Washington (Zucker et. al 1983:10). They settled near the Columbia River (segments 2, 3, 4 and 5) but were soon pushed inland by the

Skilloot. Very little is known of these people, but archaeological evidence indicates that they lived in the foothills near rivers and tributaries. The Clatskanie people relied primarily on hunting and gathering, unlike their Chinook speaking neighbors (Krauss 1990). It is believed that the 1200 person seasonal village of the "Clackstar Nation" (near present day Warren) described by Lewis and Clark was associated with the Clatskanie Indians (Green 1979:5; Hibbs and Ellis 1988:51; Ellis 1991:64). Eventually, these tribal peoples exhibited great hostility toward white intrusion. Small pox and conflicts with Euroamericans reduced the Clatskanie population down to only 8 individuals in 1851(Berreman 1937:24; Zucker et. al. 1983:10; Ruby and Brown 1992:29).

HISTORICAL BACKGROUND

The period of European exploration began in the Lower Columbia River region in 1792 when Lt. William Broughton from the British Navy first began exploring and mapping the area. Subsequent contact between early explorers and tribal groups was periodic until 1805-6 when Merriweather Lewis and William Clark explored the area on behalf of the US government. The goal of Lewis and Clark's voyage was to assess the potential for commerce in unclaimed lands. Lewis and Clark noted at that time that tribal peoples were already dying from small pox and venereal disease that early fur trappers had brought with them (Dicken and Dicken 1979:49-56).

This early exploration period was followed by a twenty-year boom in fur trading. John Jacob Astor established Fort Astoria, the home of the Pacific Fur Trading Company in 1811. This fort was taken over by the Northwest Company in 1814 and renamed Fort George. The Northwest Company merged with the Hudson Bay Company (HBC) in 1821 and closed down Fort George, four years later, upon the establishment of Fort Vancouver. Regular contact and frequent trading between tribal peoples and Euroamericans become commonplace along the Lower Columbia River. The fur trade began to decline during the 1830's due to over exploitation of beaver. Simultaneously, a widespread malaria epidemic decimated local tribal populations. The HBC took this opportunity to engage in other types of trade, including the trading of dairy products to Russians in modern day Alaska. Due to a reduced need for animal trappers the HBC granted some of their employee's early retirement. These former fur traders began to settle in the Willamette Valley by the early 1830's. The HBC actively encouraged other Euroamericans to settle in the area and raise dairy cows. New arrivals established dairy farms in the vicinity of the HBC's newly purchased trading post on Sauvie Island (formerly Nathaniel Wyeth's Fort William) (Follansbee 1980:26-33; Hibbs and Ellis 1988:56-88).

Some of the first people to arrive in the Willamette Valley after the explorers and fur traders were missionaries. Missionaries wrote to people in the east persuading then to journey west to the fertile lands "wasting away" in the Willamette Valley at the hands of non-agricultural tribal peoples. The economic depression of the late 1830's catapulted those seeking land and fortune out to the west. The first people to arrive settled around Sauvie Island's high grasslands. There was little settlement on river low lands at this time because annual spring flooding was still a potent force. Until the floodplain areas could be diked and wetlands drained, which would be some years later, settlers were limited in the types of crops that they could raise along the Columbia River and its tributaries (Ellis 1991:53-85).

Many people ventured into Oregon beginning in 1840 along the Oregon Trail. Between 1841 and 1843 the non-aboriginal population in the Lower Columbia River area more than quadrupled. This period of early settlement was encouraged by the US government for it wanted to claim the area. Finally in 1846 the HBC relinquished sovereignty of the area to the United States. The Donation Land Act, which was passed in 1850, determined the pattern of land distribution and settlement within this area. People began living in areas currently associated with the cities of Portland, Linnton, Scappoose, Warren, St. Helens, and Columbia City to become wealthy off of water based commerce activities. During this period tribal peoples were being forced onto reservations and the landscape was being devastated by deforestation and industrial development. The predominantly Scandinavian immigrants in St. Helens began a shipping industry that seriously rivaled Portland's hold on resource distribution. Canneries, logging mills, and manufacturing plants in and near Astoria encourage vast migration. When logging efforts provided greater access to pristine tracks of land in the uplands people began to diffuse into the higher elevations rather rapidly (Follansbee 1978:12-20; Ellis and Freed 1991:5-9).

During this period of expanding settlement and flourishing commerce new services and conveniences could be found in more remote areas. Technological innovations allowed people to dike marginal lands so that new agricultural and industrial undertakings could take place in formerly "non-productive" areas. Originally, most goods were shipped along the Columbia River, but with the gradual infiltration of railroad lines small shipping towns shut down and land was consolidated. Astoria was a bit of an anomaly in the area for it further expanded after 1898 when the railroad finally reached the city. In the early 1900's the construction of the US 30 highway connected Astoria to Portland via a convenient land route (Norman 1992:4-5). As a consequence of World War II (WWII) activities, both Portland and Astoria saw economic booms and dramatic population increases when the demand for ship building dramatically rose. Today these two cities are still the vital cultural and economic centers with the corridor.

SHPO INDEX MAPS ILLUSTRATING SURVEYED AREAS

The SHPO office maintains a collection of United States Geologic Survey (USGS) topographic maps on which the locations of archaeological sites and surveys are illustrated. Unofficial, unrecorded archaeological sites reported by landowners, archaeological enthusiasts, looters, and/or ethnographic/historic documents are also included on the topographic maps. These index maps contain both positive and negative archaeological survey coverage and findings. Survey reports are given SHPO numbers and are stored by county in a library at the SHPO. The majority of the cultural resource surveys within this state generally occur for the purposes of public land sales and/or alteration/development of publicly owned lands. Because most of the land within the corridor is not owned by the state or federal government there have been relatively few large surveys conducted within this area.

Table 1. Survey coverage of the US highway 30 corridor.

Segment Number	Segment Length	Length of Surveys	Percent Surveyed
1	9.66	~.6	~6.6 %
2	22.33	~14.6	~65.4 %
3	16.68	~16.3	~97.4 %
4	14.33	~.8	~5.2 %
5	19.01	~9.3	~48.9 %
6	10.53	~.3	~2.8 %
7	6.80	~.6	~8.0 %
Totals	**99.34mi**	**42.35mi**	**42.6 %**

Survey coverage within the corridor by segment is listed in Table 1. Numbers used for "Length of Surveys" are based upon the linear distance in each corridor segment that has been surveyed for cultural resources. Survey coverage varies tremendously and coverage does not necessarily imply the area directly along the highway right-of-way. Of the 99.34 miles of corridor 42.6 % of the area has been surveyed. Corridor specific surveys (within ¼ mile of each side of the road) are illustrated in Figures 4 through 9 and survey specifics are listed in Tables 2 through 4.

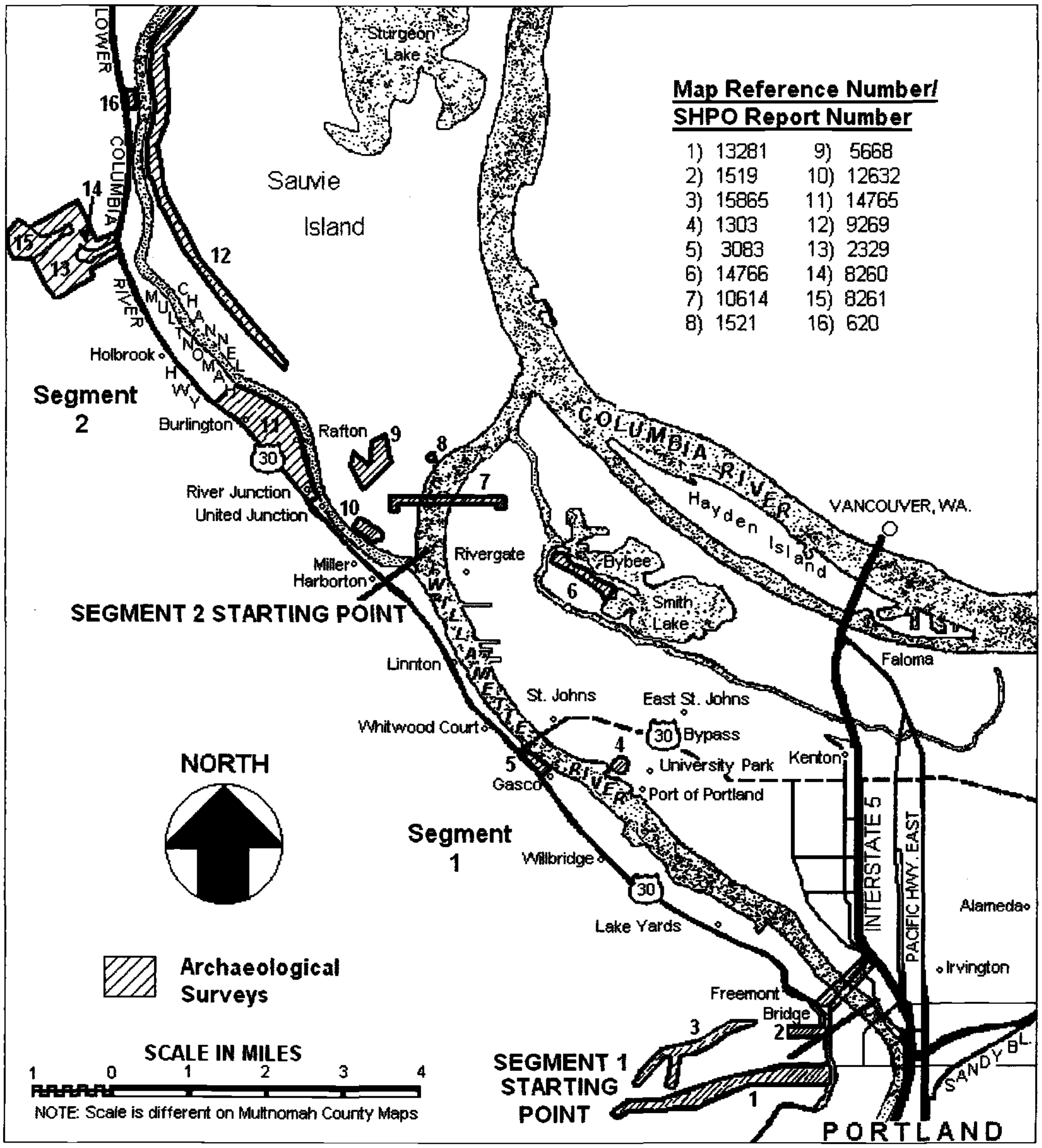

Figure 4. Surveyed areas within two miles of both sides of US 30. Segment 1 and 2 in Multnomah County.

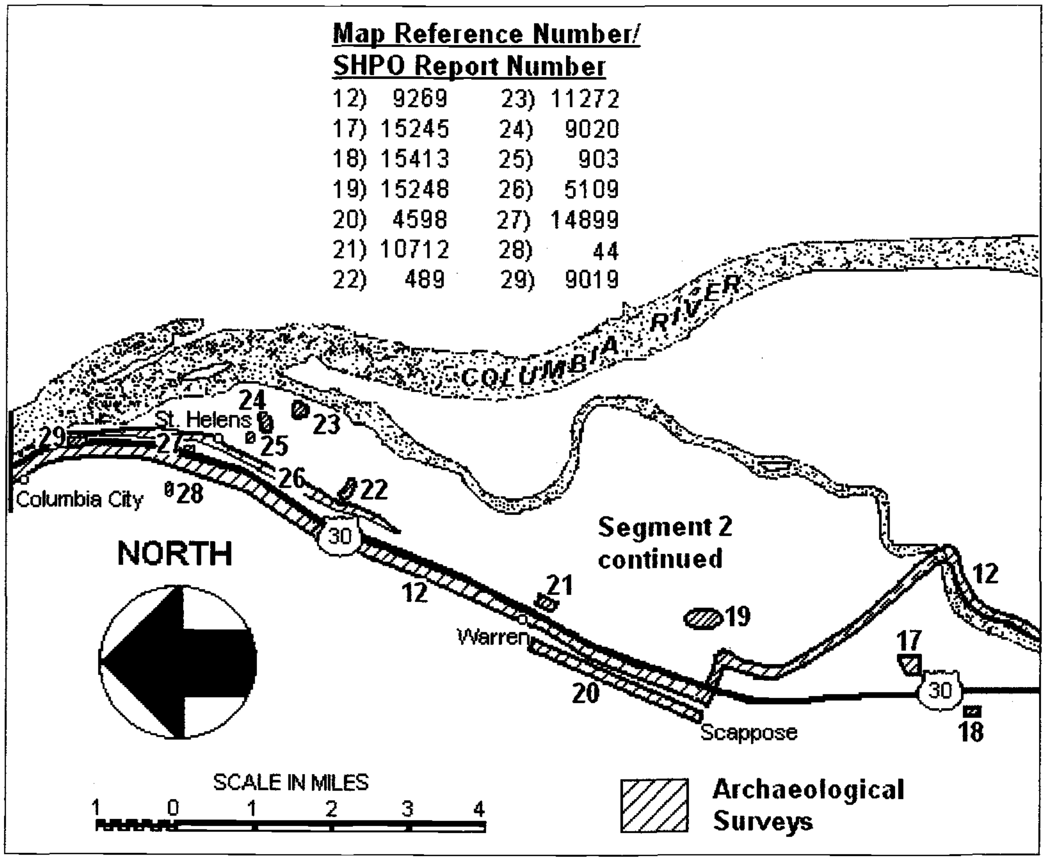

Figure 5. Surveyed areas within two miles of both sides of US 30. Segment 2 in Columbia County.

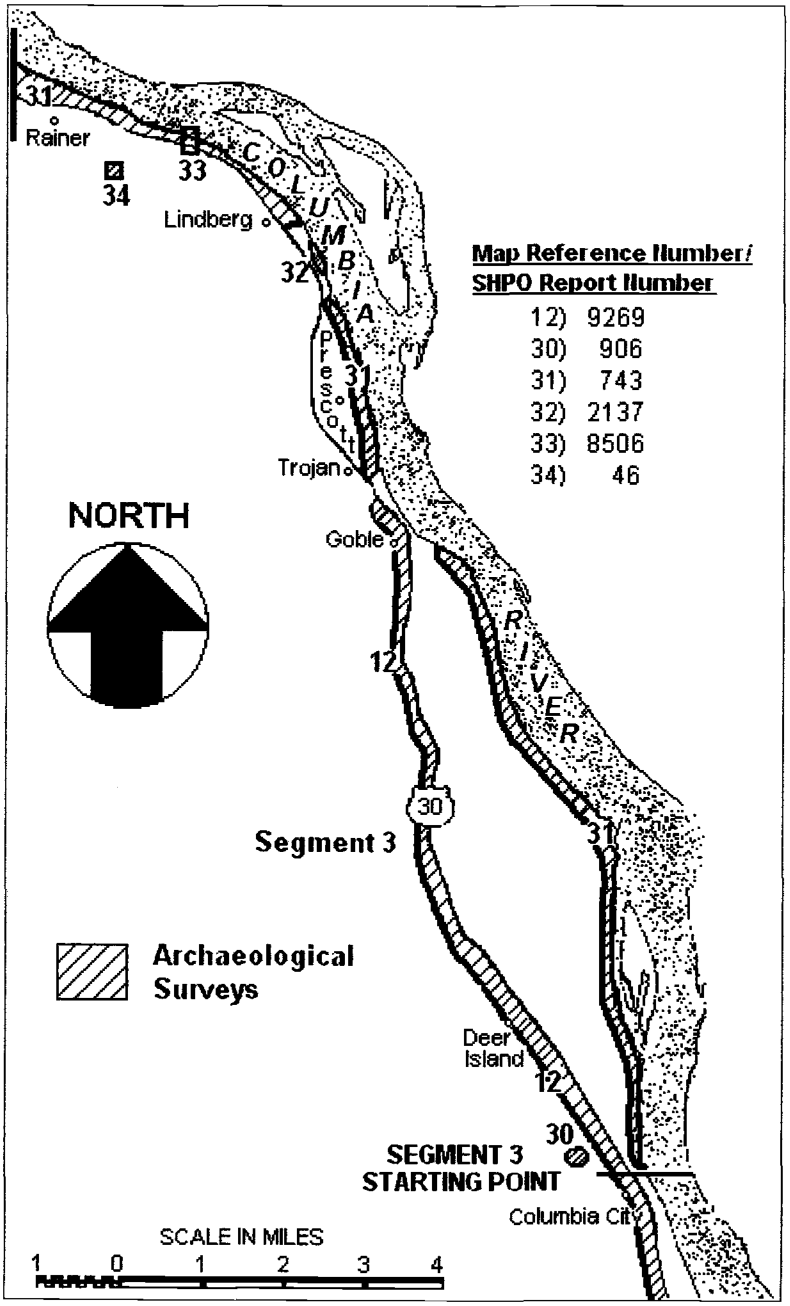

Figure 6. Surveyed areas within two miles of both sides of US 30. Segment 3 in Columbia County.

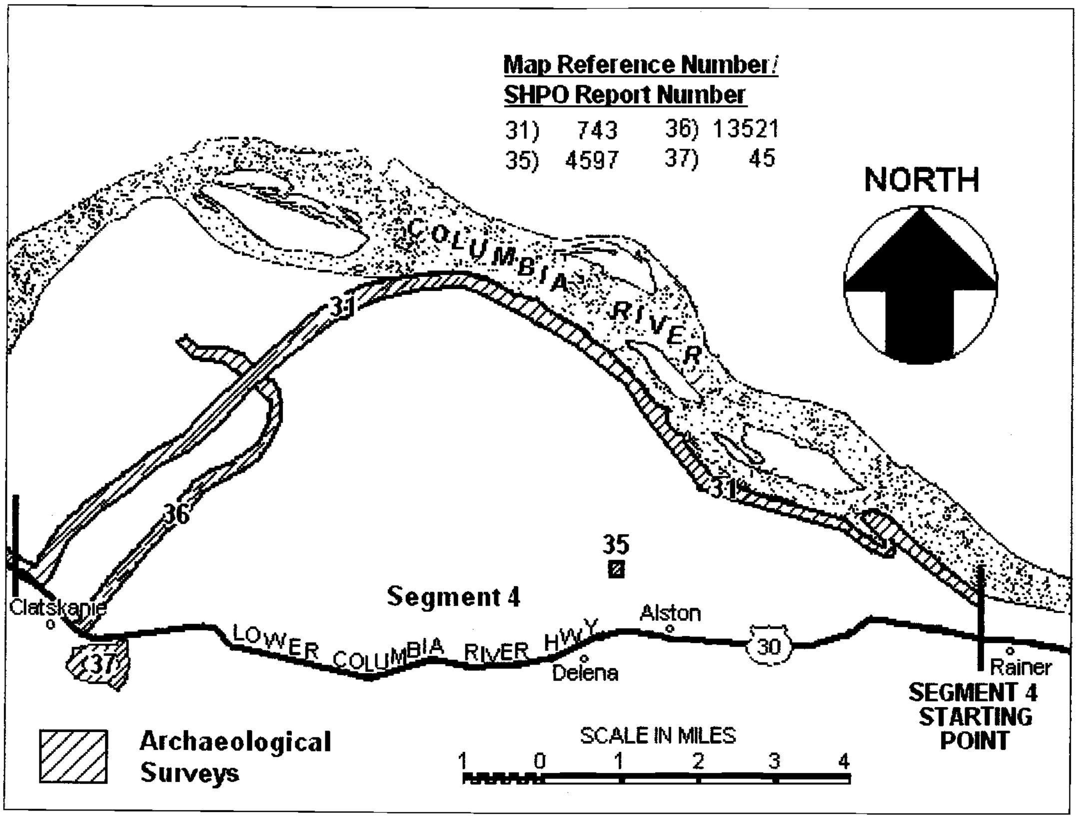

Figure 7. Surveyed areas within two miles of both sides of US 30. Segment 4 in Columbia County.

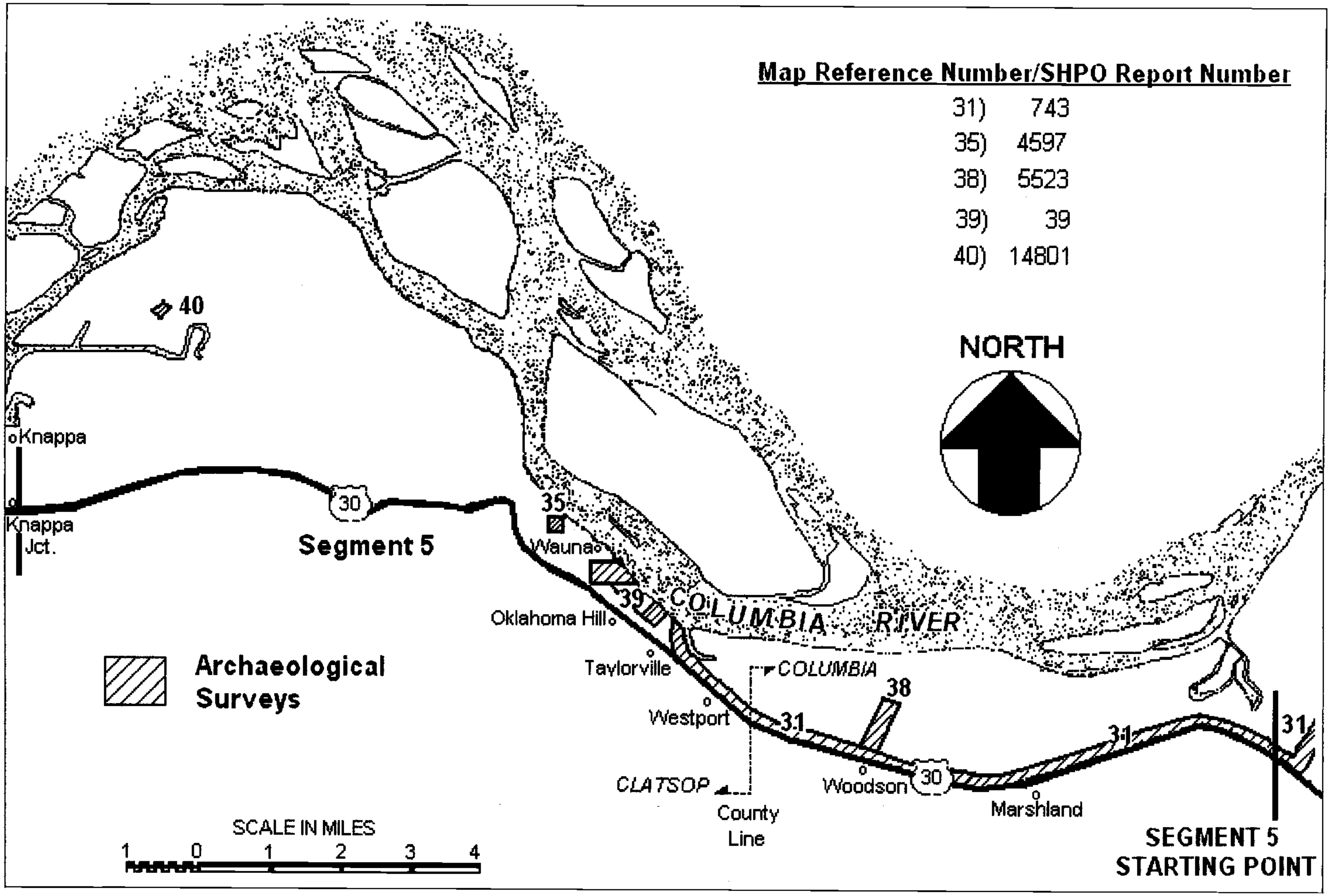

Figure 8. Surveyed areas within two miles of both sides of US 30. Segment 5 in Columbia and Clatsop Counties.

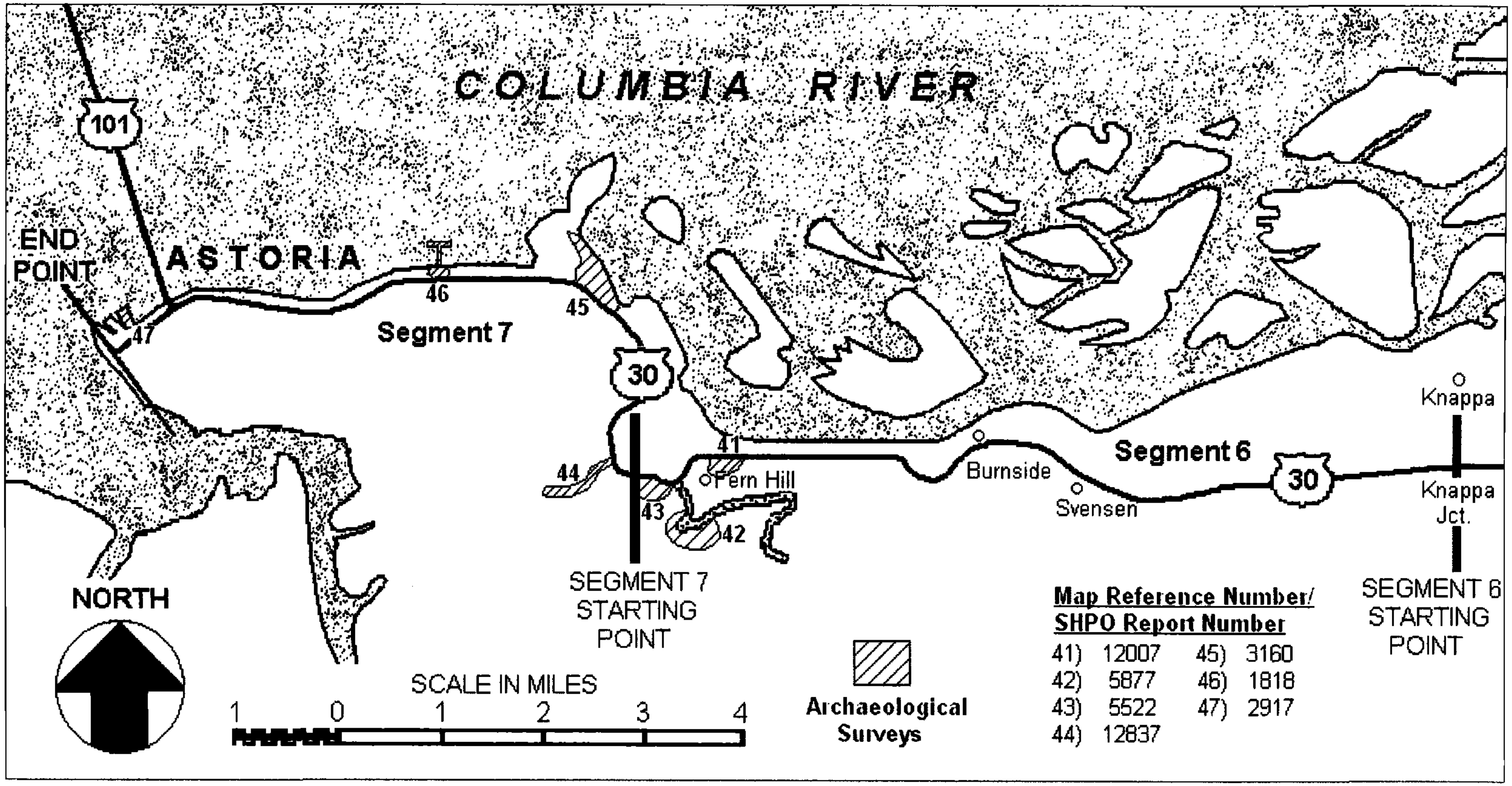

Figure 9. Surveyed areas within two miles of both sides of US 30. Segments 6 and 7 in Clatsop County.

Table 2. Cultural resource surveys conducted within the US 30 highway corridor. Survey range up to ~1/4 mile from each side of highway right-of-way.

Map Reference Number	SHPO Report Number	Author/s	Report Topic, Date	Survey Area or Distance
1	13281	Sanders & Harder	AT&T's Fiber Optic Route, '91	5.8 miles
2	1519	Dumond & Pettigrew	Banfield Transitway, '80	N.A.
3	15865	N.A.	Balch Creek Shed Survey	N.A
4	1303	N.A.	N.A.	3.75 acres
5	3083	N.A.	U.S. Government Moorings	N.A.
6	14766	Ellis	St. Johns/Ramsey Lake, '94	N.A.
7	10614	Fleming	OSM/Ash Pipeline Survey, '89	N.A.
8	1521	N.A.	N.A.	450 feet
9	5668	Lebow & Pettigrew	Sauvie Island Golf Course, '89	40 acres
10	12632	Ellis & Freed	Alder Creek Marina, '91	22 acres
11	14765	Thomas & Galm	Burlington Bottoms, '94	10 acres
12	9269	Hibbs & Ellis	North Coast Feeder Pipeline, '88	28 miles
13	2329	Follansbee & Frances	Wildwood Potential Landfill, '80	N.A.
14	8260	Lebow	Access Road to Wildwood	2 miles
15	8261	Pettigrew & Lebow	Wildwood Potential Landfill. '87	340 acres
16	620	Newman& McNassar	Happy Rock Moorage Bank, '79	20 feet
17	15245	Minor	Rolling Hills/Seven Oaks Subdiv.	19 acres
18	15413	Minor	Fred Meyer Development, '96	11 acres
19	15248	Ellis	Lone Star Northwest Mining, '91	423acres
20	4598	Pettigrew & Baxter	US 30-Warren to Scappoose,'79,'83	5 miles
21	10712	Thomas & Galm	Warren Substation-Tarbell , '89	2.7acres

Table 3. Cultural resource surveys conducted within the US 30 highway corridor. Survey range up to ~1/4 mile from each side of highway right-of-way.

Map Reference Number	SHPO Report Number	Author/s	Report Topic, Date	Survey Area or Distance
22	489	Fagan	Corps Disposal Site, '79	N.A.
23	11272	Fagan	Dredging & Disposal Areas, '74	N.A.
24	9020	Franchere & Netboy	Wappato Indians, '72	N.A.
25	903	Follansbee	City of St. Helens, '79	N.A.
26	5109	Follansbee	St. Helens-Columbia Sewers, '78	N.A.
27	14899	Gard	Dalton Lake Wetlands, '94	64 acres
28	44	Follansbee	St. Helens Sewers, '77	N.A.
29	9019	Connolly	U.S. 30, Warren to Scappoose, '88	10 miles
30	906	Dumond & Pettigrew	Deer Island Rest Area, '79	N.A.
31	734	Cox & Wenger	Columbia River Shoreline, '79	N.A.
32	2137	Freed & Minor	Proposed Disposal Site, '80	10 acres
33	8506	Heritage Research	Sprint Fiber Optic Cable, '87	1 acre
34	46	Follansbee	Roxy Park Sewer, '77	N.A.
35	4597	N.A	N.A.	N.A.
36	13521	Keeler	Hermo Road Survey, '93	3.5 miles
37	45	Follansbee	Clatskanie Sewer Lines, '77	N.A.
38	5523	Freed	Army Corps Project, '84	N.A.
39	39	N.A.	Driscoll Slough	N.A.
40	14801	N.A.	Lewis & Clark Wildlife Refuge	1 acre
41	12007	Connolly	Fern Hill-John Day Bridge, '91	N.A.
42	5877	N.A.	John Day River Bend Survey	30 acres

Table 4. Cultural resource surveys conducted within the US 30 highway corridor. Survey range up to ~1/4 mile from each side of highway right-of way.

Map Reference Number	SHPO Report Number	Author/s	Report Topic, Date	Survey Area or Distance
43	5522	Pettigrew	John Day River Bridge, '84	3200 feet
44	12837	Connolly	John Day Bridge-Youngs Bay, '92	N.A.
45	3160	Keeler	DSL Tongue Pt. Naval Base, '81	N.A.
46	1818	Freed	Corps Shoreline Storage, '79	N.A.
47	2917	Thomas	Astoria Westside Boat Basin	400 feet

SHPO ARCHAEOLOGICAL SITE FILES

SHPO maps list the location and Smithsonian number of recorded archaeological sites indexed in the state site files. Individual site records were studied in order to understand the nature of the archaeological sites within corridor boundaries. Site records not only list the type of archaeological sites found, but also artifact density, site size, and in some cases relationships to nearby highways.

Table 5. Archaeological sites per linear mile along the US highway 30 corridor.

Segment Number	**Segment Length**	**Number of sites**	**Sites per Linear Mile**
1	9.66	0	**0**
2	22.33	14	**.63**
3	16.68	1	**.06**
4	14.33	0	**0**
5	19.01	1	**.05**
6	10.53	1	**.09**
7	6.80	1	**.15**

A tabulation of the number of officially recorded archaeological sites per linear mile within the corridor can be found in Table 5. Figures such as those for segments 1, 4, 6, and 7 tend to be deceptive due to a lack of overall survey coverage in each of these segments. It is likely that site density within these particular segments is higher than what present figures indicate. Archaeological sites within the corridor are illustrated in Figures 10 through 15. The figures also contain the general locations of reported, but unverified archaeological sites. Site specifics for prehistoric sites are listed in Tables 6 through 9. Data on historic archaeological sites can be found in Table 10.

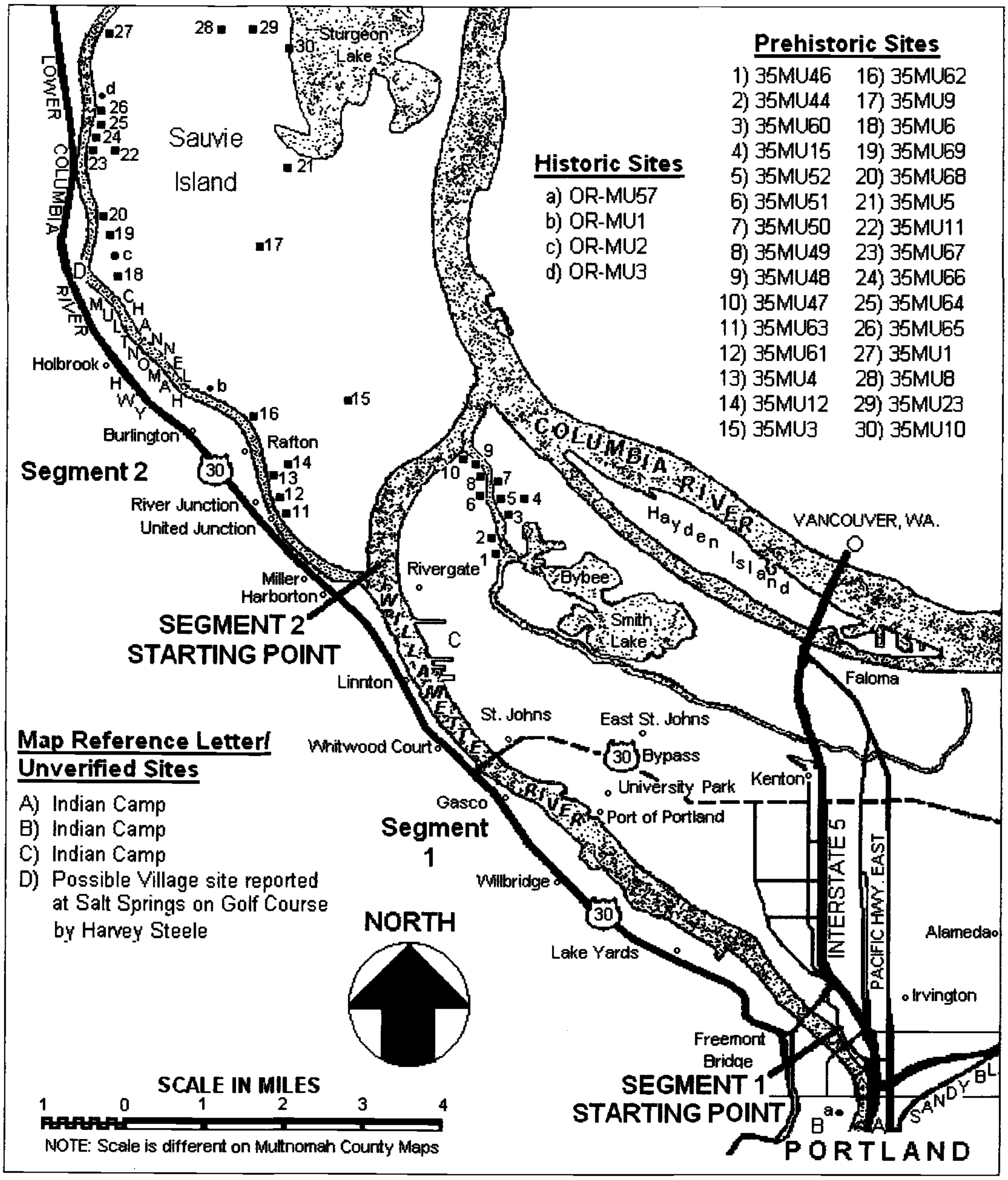

Figure 10. Officially recorded and unverified archaeological sites located within two miles of both sides of US 30. Segments 1 and 2 in Multnomah County.

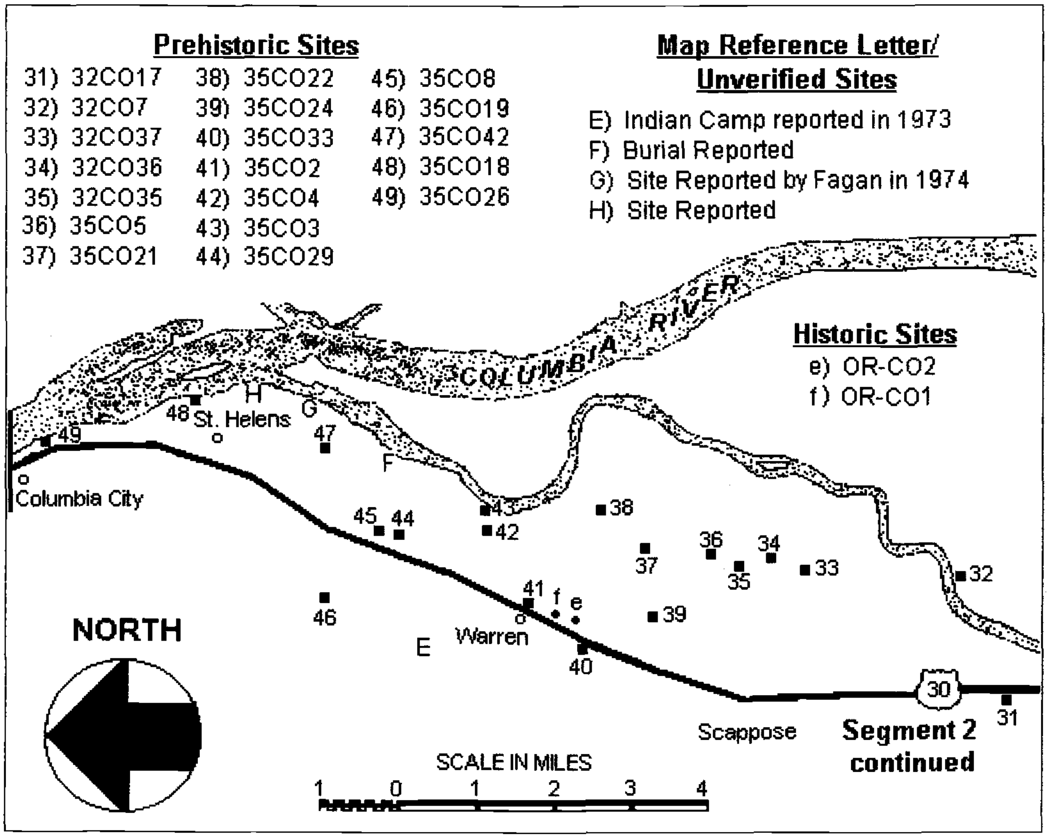

Figure 11. Officially recorded and unverified archaeological sites located within two miles of both sides of US 30. Segment 2 in Columbia County.

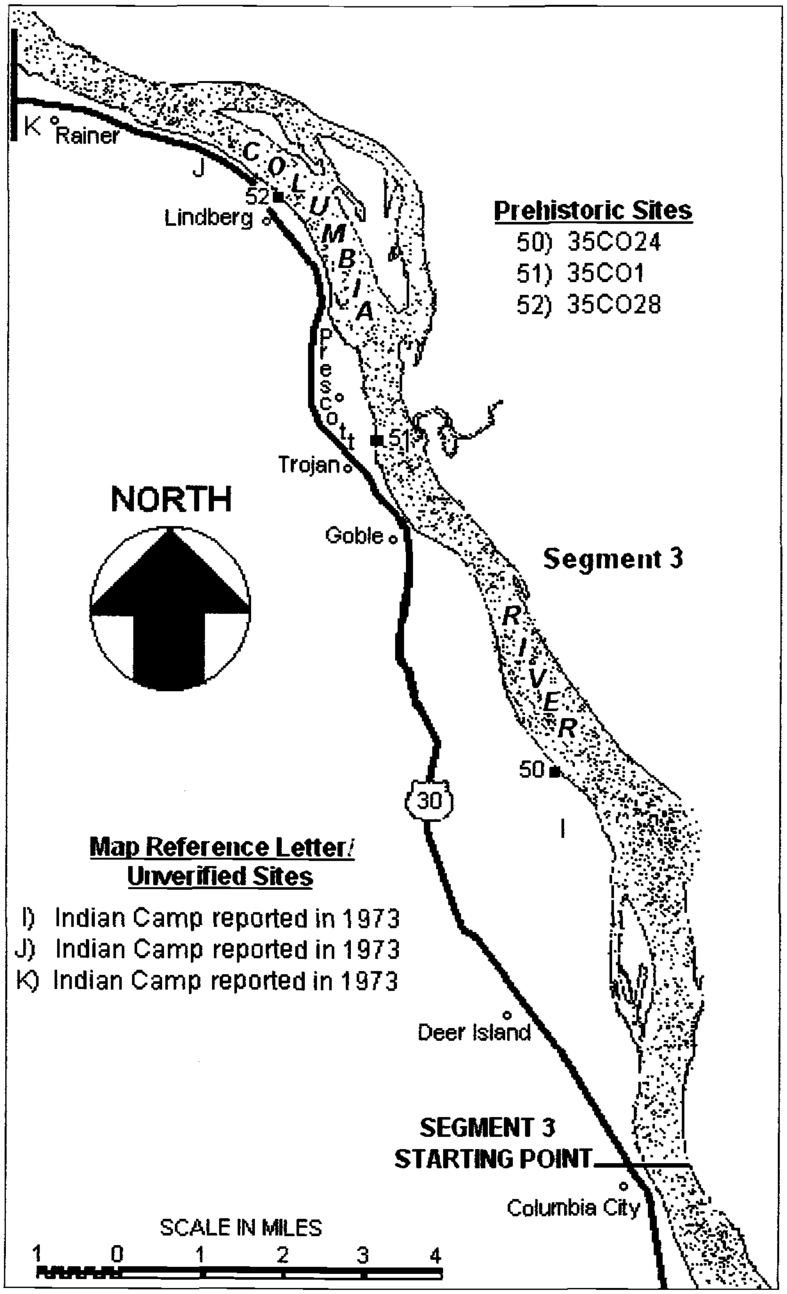

Figure 12. Officially recorded and unverified archaeological sites located within two miles of both sides of US 30. Segment 3 in Columbia County.

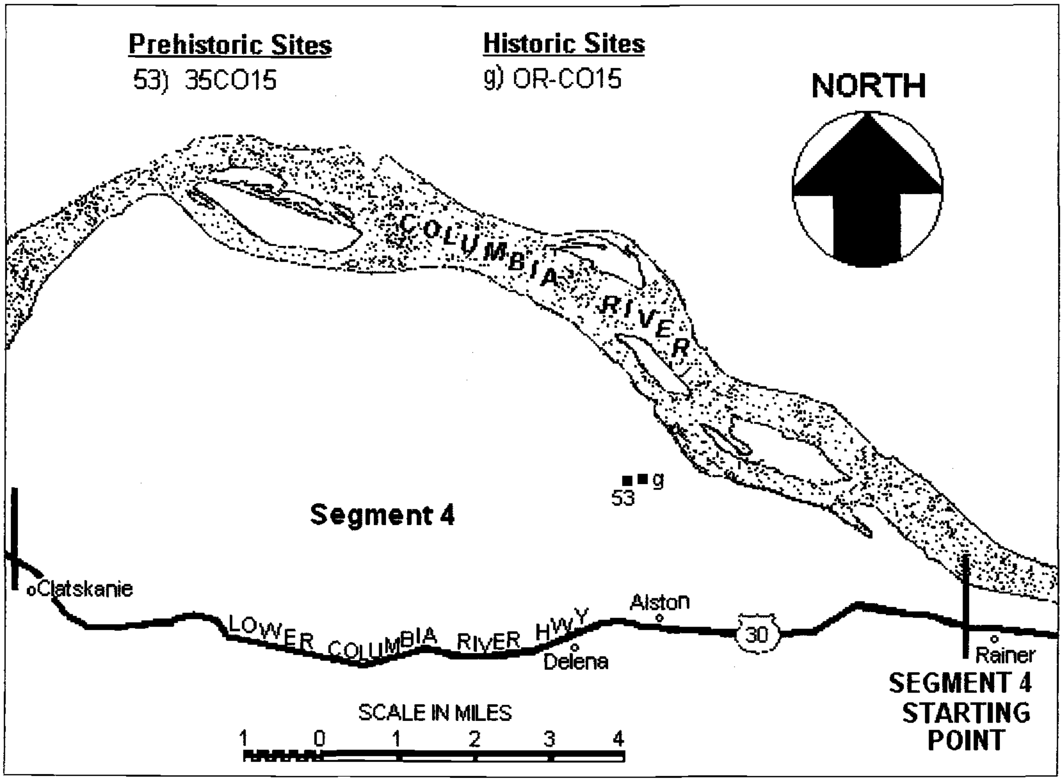

Figure 13. Officially recorded and unverified archaeological sites located within two miles of US 30. Segment 4 in Columbia County.

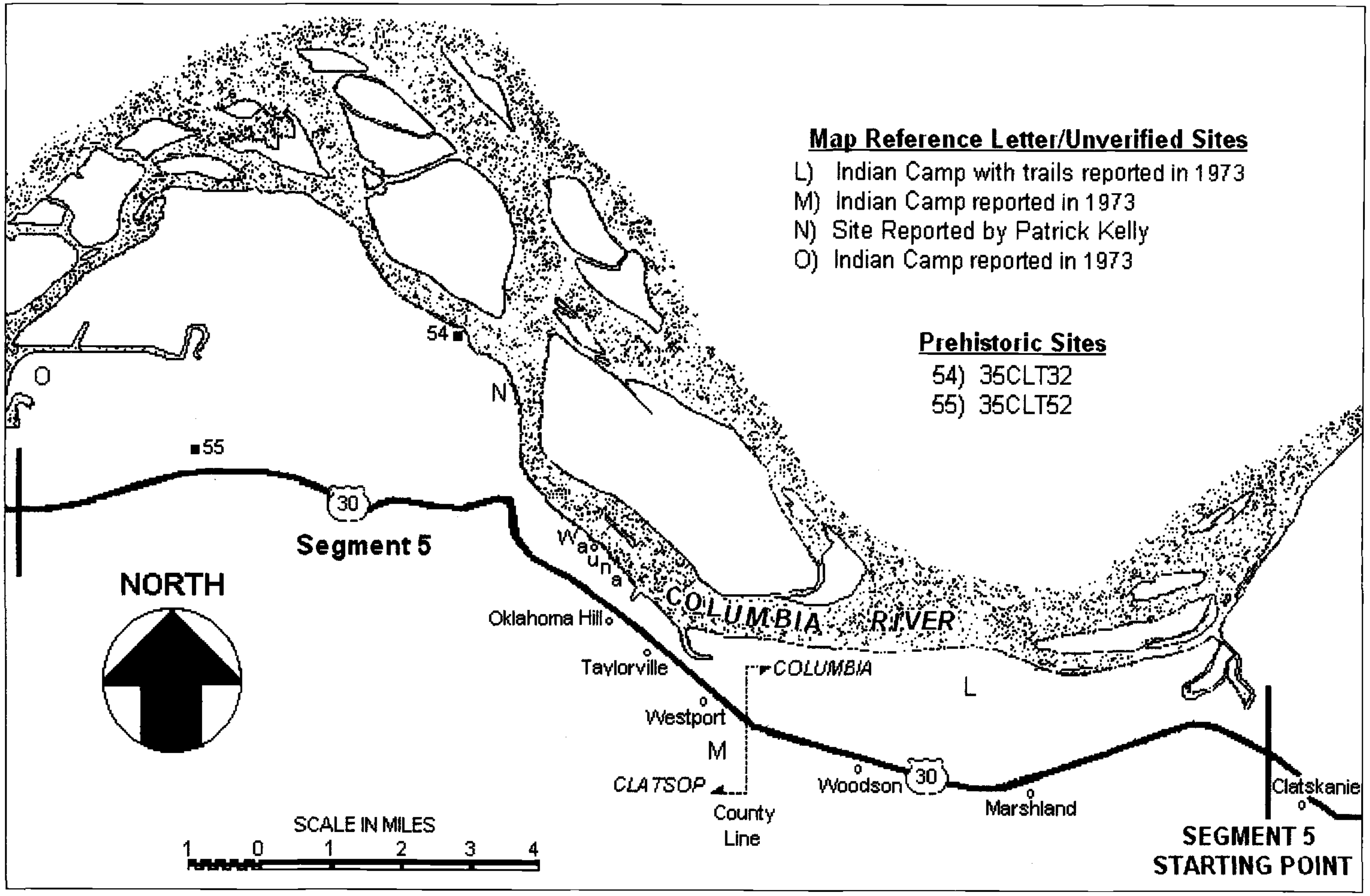

Figure 14. Officially recorded and unverified archaeological sites located within two miles of both sides of US 30. Segment 5 in Columbia and Clatsop Counties.

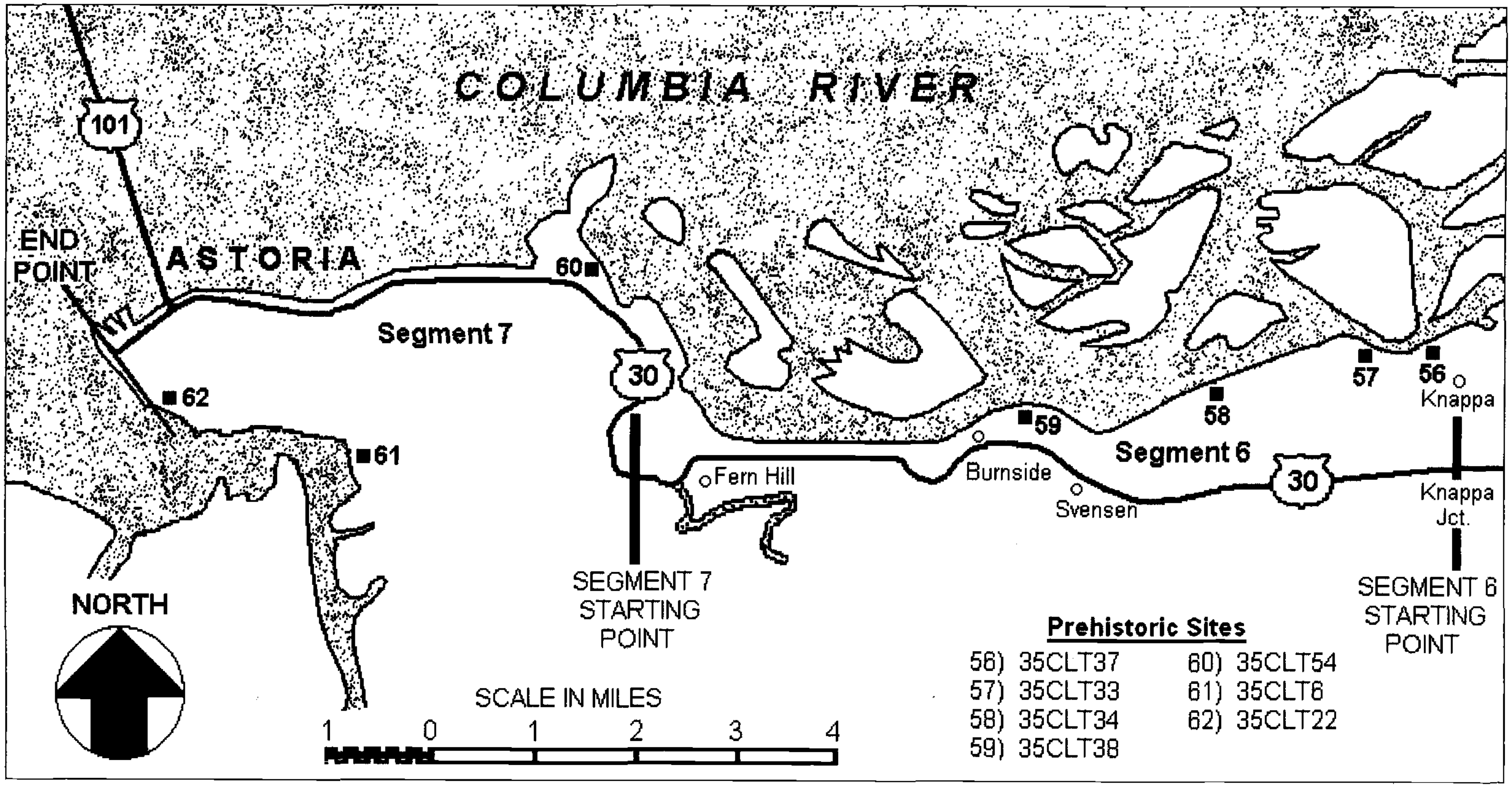

Figure 15. Officially recorded and unverified archaeological sites located within two miles of both sides of US 30. Segments 6 and 7 in Clatsop County.

Table 6. Officially recorded prehistoric archaeological sites within the US 30 highway corridor.

Map Reference Number	Archaeological Site Number	Site Location	Site Type	Site Recorder and Date
1	35MU46	T2N, R1W, Sec. 36	Village with historic materials	S.& T. Thomas, 1979
2	35MU44	T2N, R1W, Sec. 36	Village with historic materials	S.& T. Thomas, 1979
3	35MU60	T2N, R1W, Sec. 36	Food processing	Scott, 1987
4	35MU15	T2N, R1W, Sec. 44	Seasonal camp on slough	Unknown
5	35MU52	T2N, R1W, Sec. 44	Seasonal camp on slough	Unknown
6	35MU51	T2N, R1W, Sec. 44	Seasonal camp on slough	Unknown
7	35MU50	T2N, R1W, Sec. 24	Food processing area connected to sites 35MU49 and 35MU48	Unknown
8	35MU49	T2N, R1W, Sec. 24	Food processing area connected to sites 35MU50 and 35MU48	Unknown
9	35MU48	T2N, R1W, Sec. 24	Food processing area connected to sites 35MU50 and 35MU49	Unknown
10	35MU47	T2N, R1W, Sec. 23	Seasonal village with midden	Unknown
11	35MU63	T2N, R1W, Sec.28	Lithic & historic materials	Charles Hibbs & Ass., 1987
12	35MU61	T2N, R1W, Sec.45;	Fishing camp with lithic material	Charles Hibbs & Ass., 1987
13	35MU4	T2N, R1W, Sec.46	Sunken village, National Landmark	Newman, 1977
14	35MU12	T2N, R1W, Sec.46	Occupation area	Pettigrew, 1977
15	35MU3	T2N, R1W, Sec.41	Unknown	Unknown

Table 7. Officially recorded prehistoric archaeological sites within the US 30 highway corridor.

Map Reference Number	Archaeological Site Number	Site Location	Site Type	Site Recorder and Date
16	35MU62	T2N, R1W, Sec.21	Campsite	Charles Hibbs & Ass., 1987
17	35MU9	T2N, R1W, Sec.9	Merrybell village	Pettigrew, 1973
18	35MU6	T2N, R1W, Sec.49	Village	Pettigrew, 1973
19	35MU69	T2N, R1W, Sec.6	Occupation area	Charles Hibbs & Ass., 1987
20	35MU68	T2N, R1W, Sec.6	Occupation area	Charles Hibbs & Ass., 1987
21	35MU5	T3N, R1W, Sec.33	Unknown	Unknown
22	35MU11	T3N, R1W, Sec.31	Sunken village	Unknown
23	35MU67	T3N, R1W, Sec. 31	Possible village	Charles Hibbs & Ass., 1987
24	35MU66	T2N, R1W, Sec. 6	Occupation area/lithic materials	Charles Hibbs & Ass., 1987
25	35MU64	T3N, R1W, Sec. 31	Possible housepit	Charles Hibbs & Ass., 1987
26	35MU65	T3N, R1W, Sec. 31	Possible housepit	Charles Hibbs & Ass., 1987
27	35MU1	T3N, R1W, Sec. 30	Large village with midden	Pettigrew, 1973
28	35MU8	T3N, R1W, Sec. 29	Unknown	Unknown

Table 8. Officially recorded prehistoric archaeological sites within the US 30 highway corridor.

Map Reference Number	Archaeological Site Number	Site Location	Site Type	Site Recorder and Date
29	35MU23	T3N, R1W, Sec. 28	Large village	Unknown
30	35MU10	T3N, R1W, Sec. 28	Village	Unknown
31	35CO17	T3N, R2W, Sec. 24	Lithic scatter	Pettigrew, 1974
32	35CO7	T3N, R1W, Sec. 20	Major village (Pumphouse)	Pettigrew, 1973
33	35CO37	T3N, R1W, Sec.7	Food gathering	Charles Hibbs & Ass., 1987
34	35CO36	T3N, R1W, Sec. 5	Lithic scatter	Ellis, 1985
35	35CO35	T3N, R1W, Sec. 5	Campsite with historic materials	Ellis, 1985
36	35CO5	T4N, R1W, Sec. 45	Plank houses & middens	Pettigrew, 1973
37	35CO21	T4N, R1W, Sec. 46	Campsite	Newman, 1976
38	35CO22	T4N, R1W, Sec. 29	Campsite	Newman, 1976
39	35CO24	T4N, R1W, Sec. 47	Human burial	Pope, Starkey, & Newman, 1977
40	35CO33	T4N, R1W, Sec. 42	Campsite	Spear, 1981
41	35CO2	T4N, R1W, Sec. 48	Possible Clackstar Village	Pettigrew, 1973
42	35CO4	T4N, R1W, Sec. 20	Lithic scatter	Pettigrew, 1973
43	35CO3	T4N, R1W, Sec. 20	Cathlacumup Village	Pettigrew, 1973
44	35CO29	T4N, R1W, Sec. 57	Food Processing	Follansbee, 1978
45	35CO8	T4N, R1W, Sec. 56	Lithic materials and trade beads	Pettigrew, 1973
46	35CO19	T4N, R1W, Sec. 7	Projectile point cache	Pettigrew & Fagan, 1974
47	35CO42	T4N, R1W, Sec. 9	Powell fishing site	Connolly, 1988
48	35CO18	T4N, R1W, Sec. 39	Cliff side occupation	Pettigrew & Fagan, 1974

Table 9. Officially recorded prehistoric archaeological sites within the US 30 highway corridor.

Map Reference Number	Archaeological Site Number	Site Location	Site Type	Site Recorder and Date
49	35CO26	T5N, R1W, Sec. 42	Possible village	Cox & Wenger, 1978
50	35CO24	T4N, R1W, Sec. 47	Trade beads/projectile points	Pope, 1977
51	35CO1	T6N, R2W, Sec. 1	Trojan III human burials/village	Unknown
52	35CO28	T7N, R2W, Sec. 22	Shoreline lithic scatter	Cox & Wenger, 1978
53	35CO15	T7N, R3W, Sec.4	Aboriginal & historic	Fagan, 1974
54	35CLT32	T8N, R6W, Sec. 15	Shoreline camp	Cox & Wenger, 1978
55	35CLT52	T8N, R7W, Sec. 14	Campsite	Minor, 1977
56	35CLT37	T8N, R7W, Sec. 8	Knappa Docks midden	Minor, 1977
57	35CLT33	T8N, R7W, Sec. 7	Eddy Point midden	Minor , 1977
58	35CLT34	T8N, R8W, Sec.13	Ivy Station midden	Minor, 1977
59	35CLT48	T8N, R8W, Sec. 16	Midden	Minor, 1978
60	35CLT54	T8N, R9W, Sec. 11	Mill Creek campsite	Minor, 1977
61	35CLT6	T8N, R9W, Sec. 21	Possible midden	Collins, 1951
62	35CLT22	T8N, R9W, Sec. 18	Aboriginal & historic	Minor, 1977

Table 10. Officially recorded historic archaeological sites within the US 30 highway corridor.

Map Reference Letter	Archaeological Site Number	Site Location	Site Type	Site Recorder and Date
a	OR-MU57	T1S, R1E, Sec. 66	Chinese urban occupation	Unknown
b	OR-MU1	T2N, R1W, Sec. 17	Possible dwelling	Charles Hibbs & Ass., 1987
c	OR-MU2	T2N, R1W, Sec. 7	HBC Logie Dairy	Charles Hibbs & Ass., 1987
d	OR-MU3	T3N, R1w, Sec. 31	House with dump	Charles Hibbs & Ass., 1987
e	OR-CO2	T4N, R1W, Sec. 30	Pre-1853 route from the Tualatin Plains to St. Helens	Charles Hibbs & Ass., 1987
f	OR-CO1	T4N, R1W, Sec. 30	Early homestead	Charles Hibbs & Ass., 1987
g	OR-CO15	T7N, R3W, Sec. 4	Historic portion of multi-component site	Fagan 1974

GENERAL LAND OFFICE MAPS

Copies of General Land Office Maps (GLO) from 1852 through 1870 were obtained from the University of Oregon Map Library for analysis purposes. Government land surveyors created these maps in order to establish the township, range, and section boundaries. These maps provide an insight into the vegetation, topography, soils, and human settlement patterns of early Oregon.

Environmental features recorded on GLO maps include soil types and qualities, levels of forest undergrowth, plant species, timber varieties, and marshy and/or steep areas unfit for settlement purposes. This information can be used to reconstruct the nature of the landscape at the time of white-Indian contact to further evaluate early settlement patterns. This type of information can be combined with current knowledge of archaeological sites and ethnographic/historical information in order to predict the potential presence of archaeological sites in currently unexplored areas.

Common cultural features noted on GLO maps include homesteads, cultivated fields, pack trails, wagon roads, ferry crossings, saw mills, schools, and aboriginal villages. This type of information can potentially be used to identify the possible locations of historic and sometimes prehistoric archaeological sites. GLO data was taken into account when probability determinations were designated. Figures 16 through 21 illustrate and list the extent of the natural and cultural features listed on GLO maps for the corridor area.

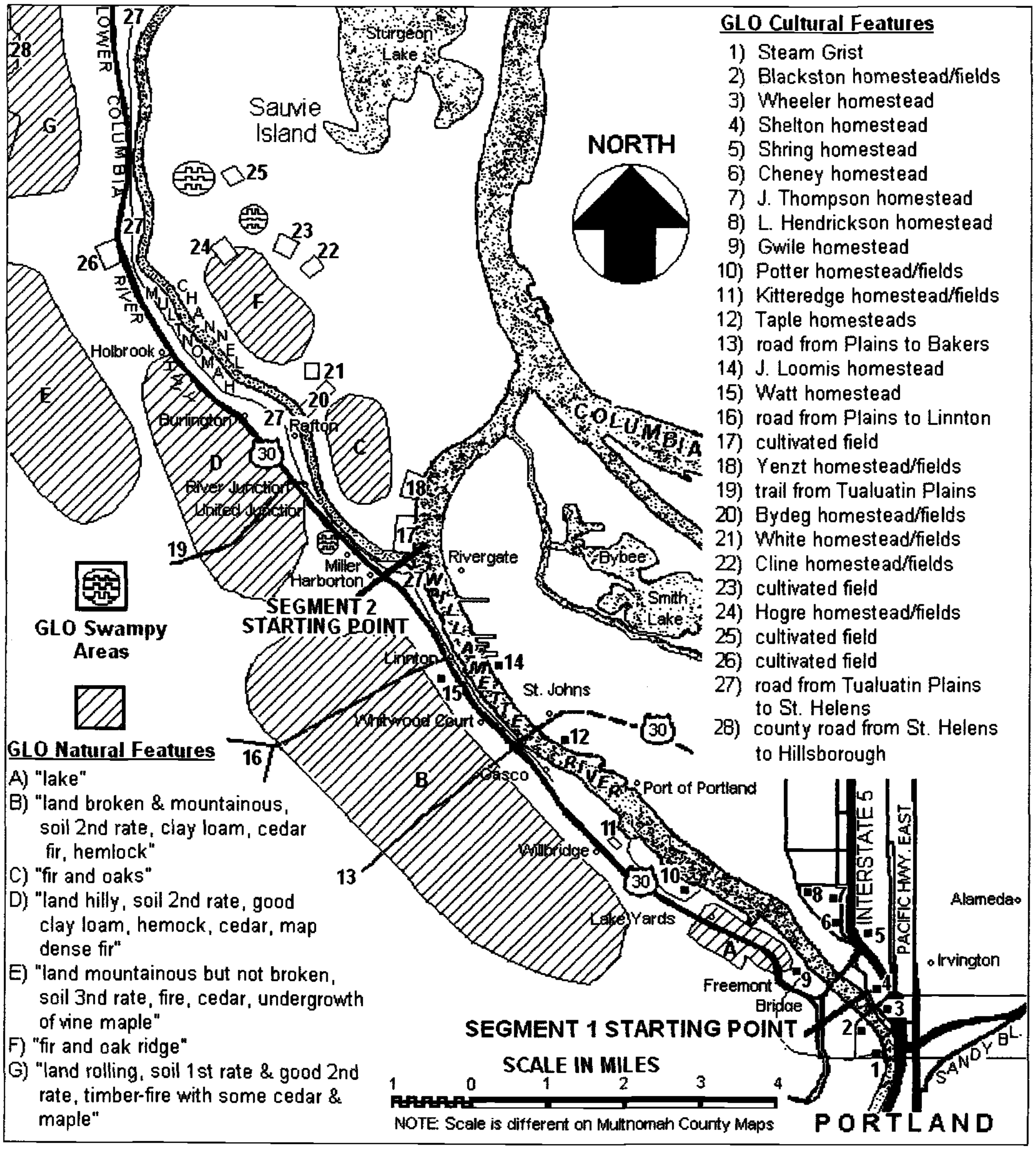

Figure 16. Natural and cultural features from General Land Office Maps, 1852 through 1870. Segments 1 and 2 in Multnomah County.

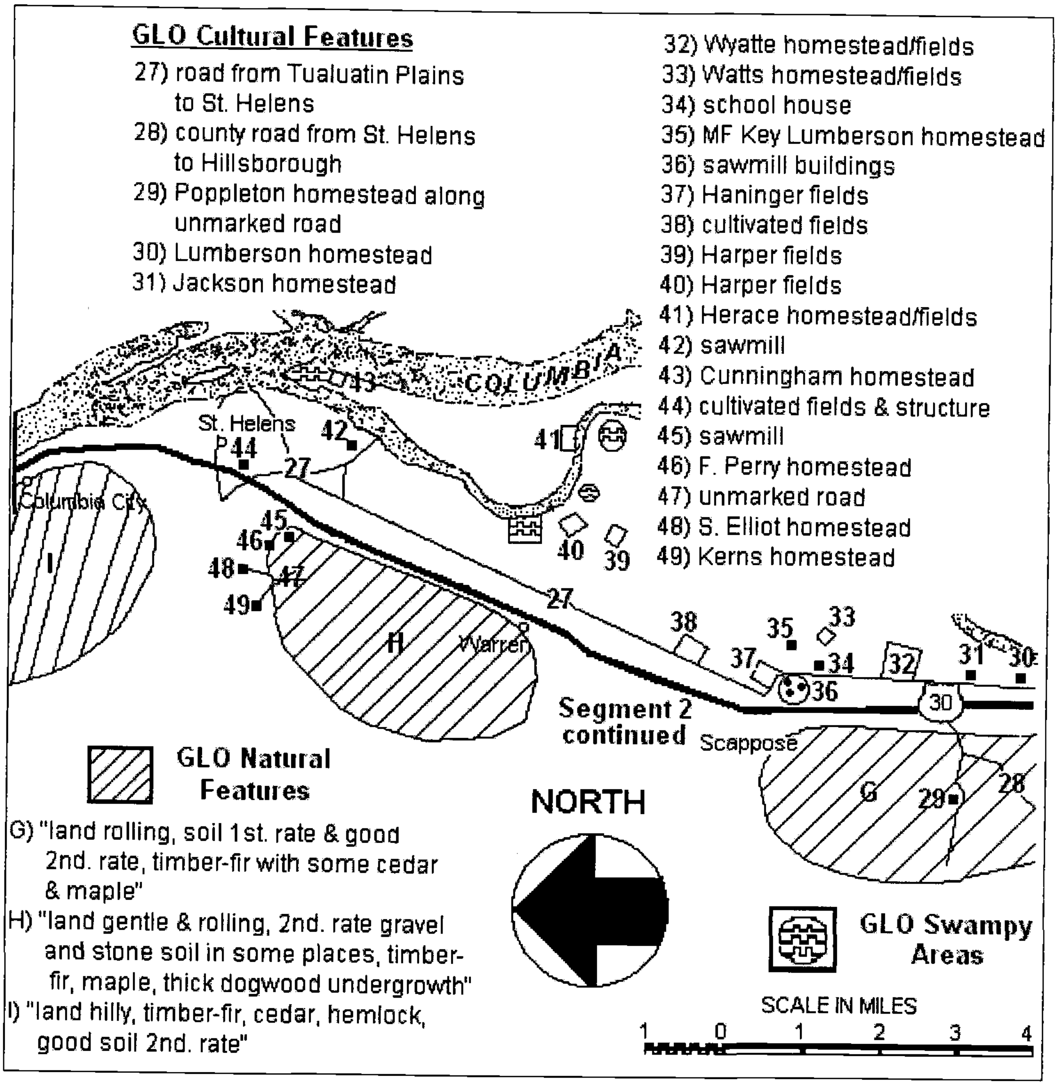

Figure 17. Natural and cultural features from General Land Office Maps, 1852 through 1870. Segment 2 in Columbia County.

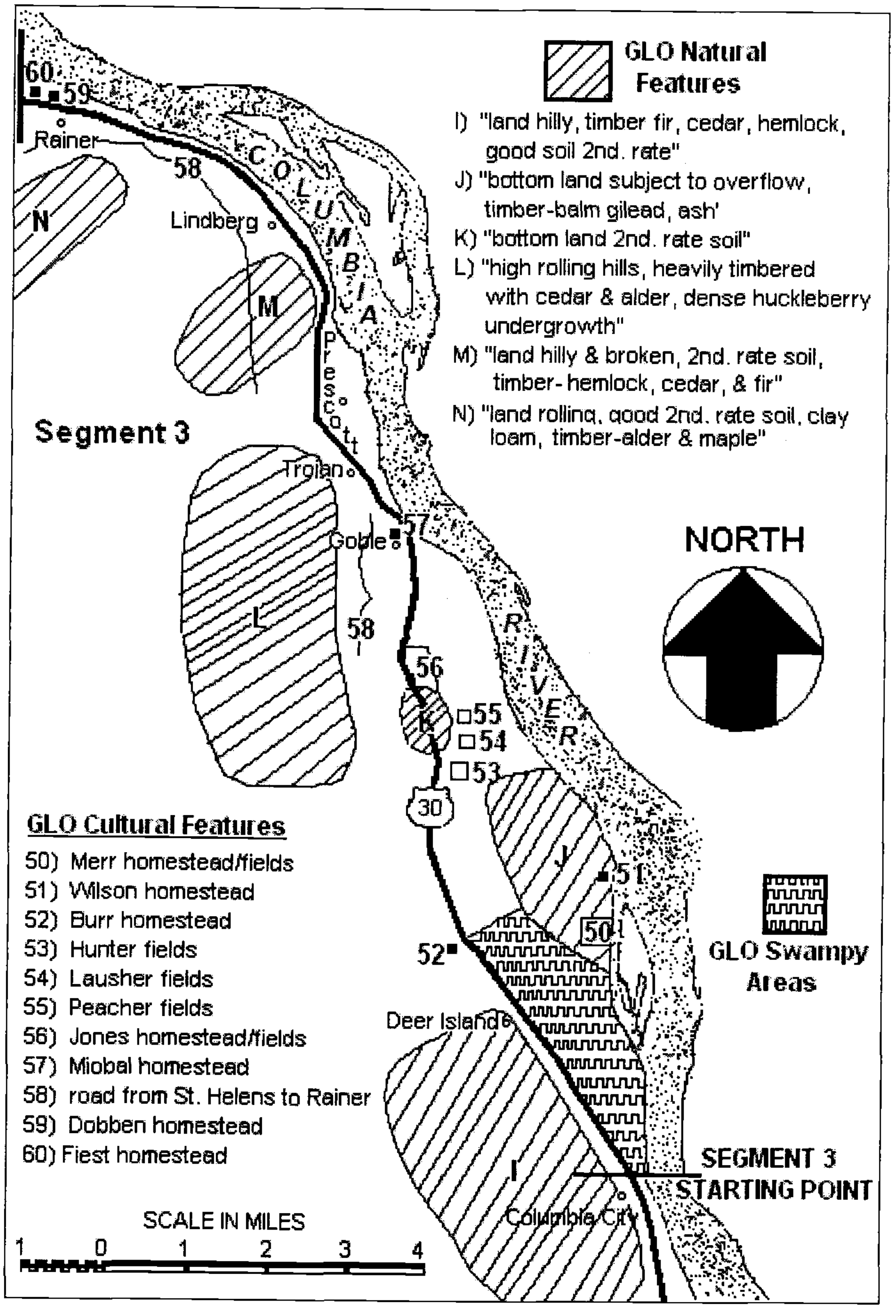

Figure 18. Natural and cultural features from General Land Office Maps, 1852 through 1870. Segment 3 in Columbia County.

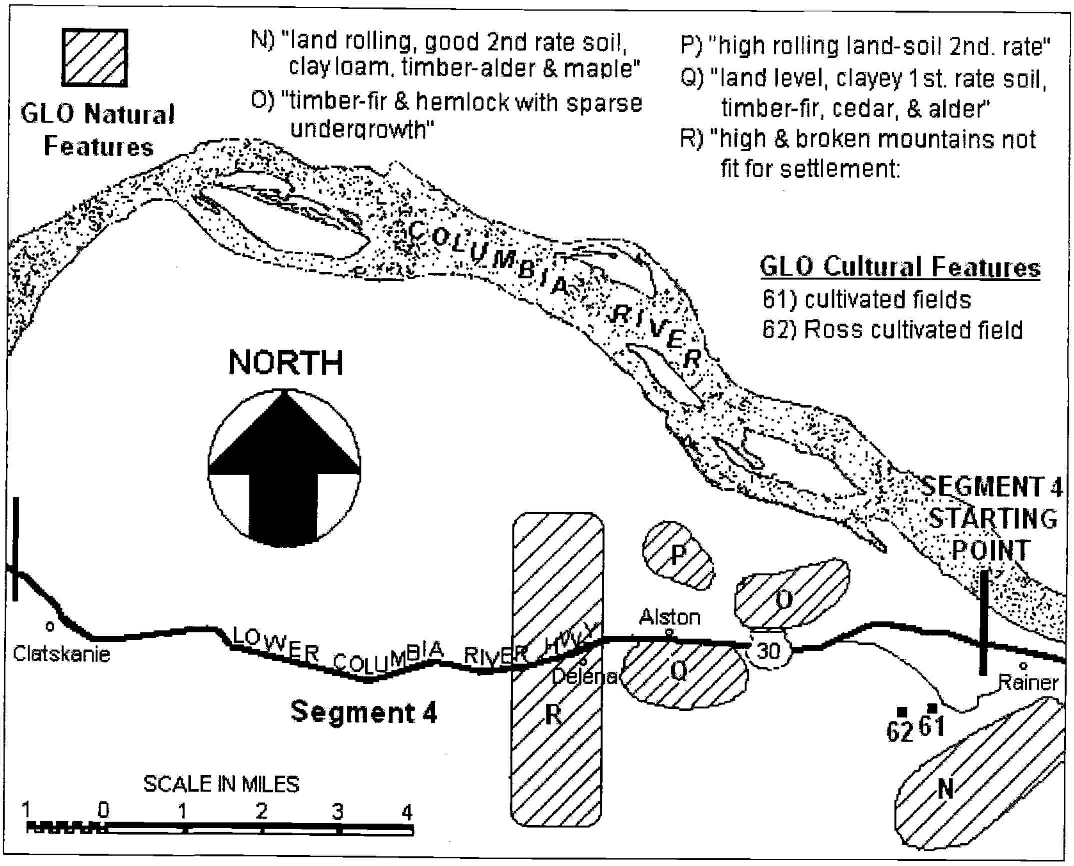

Figure 19. Natural and cultural features from General Land Office Maps, 1852 through 1870. Segment 4 in Columbia County.

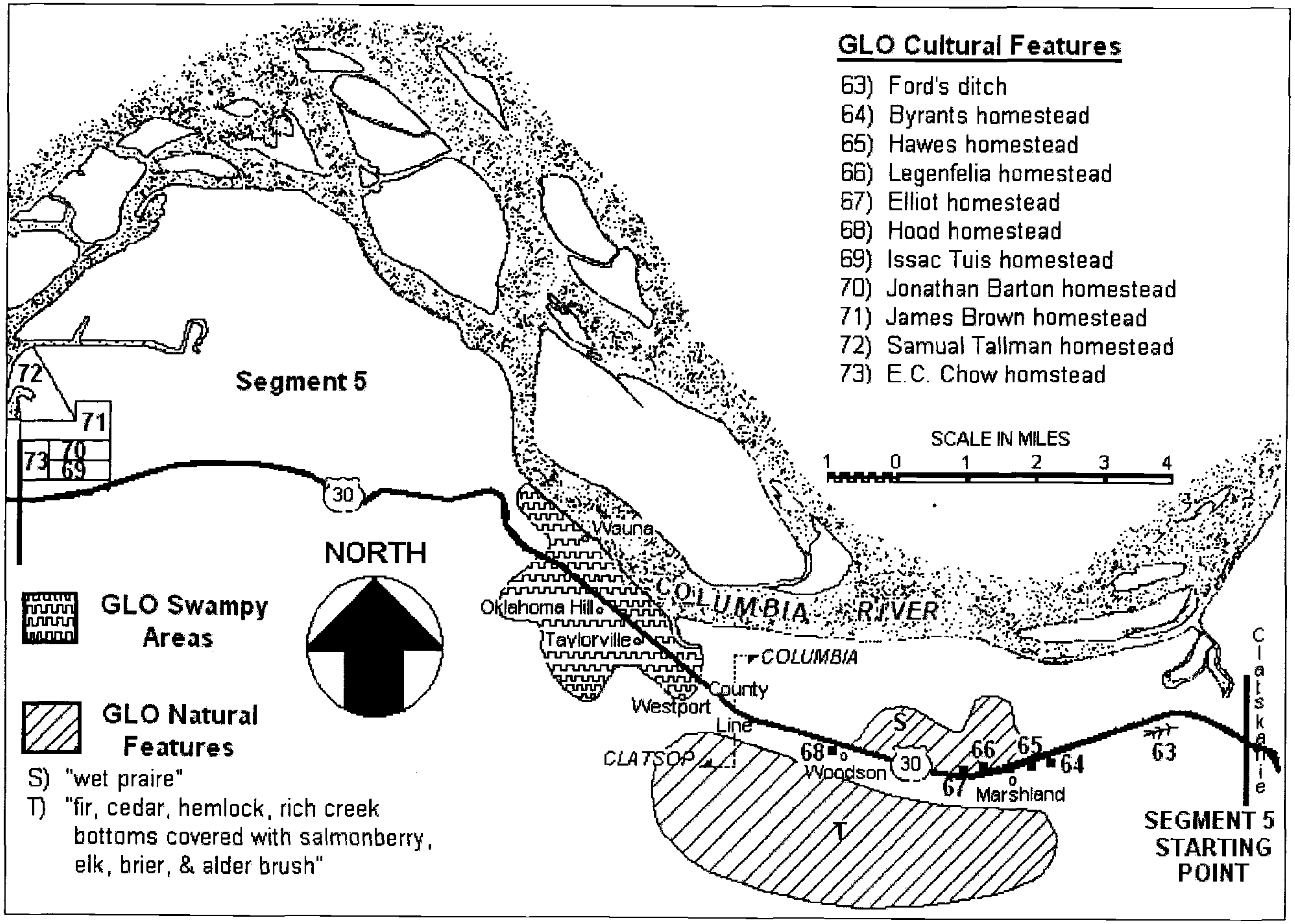

Figure 20. Natural and cultural features from General Land Office Maps, 1852-1870.
Segment 5 in Columbia and Clatsop Countries.

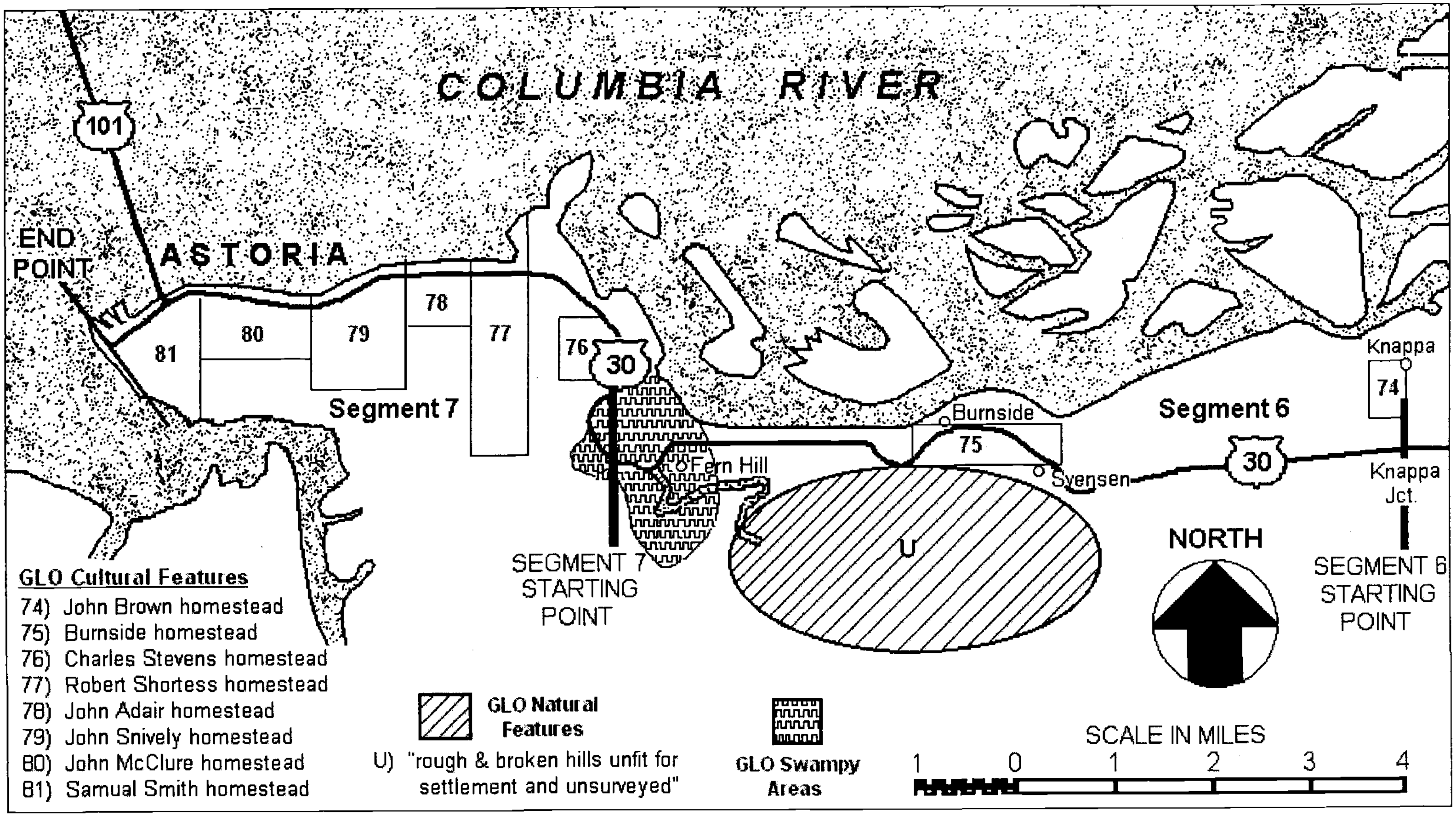

Figure 21. Natural and cultural features from General Land Office Maps, 1852-1870. Segments 6 and 7 in Clatsop County.

SOIL SURVEYS AND GEOMORPHOLOGY

Previous research suggests that there is a positive correlation between Holocene (later epoch of the Quaternary Period) age geomorphic landforms, such as Ingram and Winkle (early-mid Holocene) surfaces, and prehistoric archaeological sites (Reckendorf and Parsons 1966; Balster and Parsons 1968). Holocene landforms are associated with rapid material deposition in low relief alluvial terraces, stream channels, abandoned meanders, tidal flats, and beaches. Archaeological sites incorporated into Holocene age landforms are likely to be deeply buried beneath the surface (Minor and Grant 1996). Pleistocene (earlier epoch of the Quaternary Period) surfaces are generally associated with stream level terraces and moderate slopes in broad gently rolling hilly areas. Archaeological sites located on elevated Pleistocene surfaces tend to be primarily surface manifestations. The Holocene age Ingram and Winkle geomorphic landforms are associated with moderate floodplains, stable sand dunes, natural levees, old lake beds, and contemporary bar and channel typography. These types of surfaces are more likely to contain prehistoric archaeological sites than the steeper Pleistocene surfaces. Approximately 45% of the corridor contains Holocene geomorphic surfaces that have a propensity to contain intact archaeological resources.

Historic archaeological sites in this area are primarily timber and fishing centered in nature. Soils with the corridor are not prime agricultural soils, but in some cases they can be used for pasture and/or hay production. Based on land capability and woodland production tables (from county soil surveys), there does not appear to be a correlation between geomorphic surfaces and historic Euroamerican land use areas.

The Soil Conservation Surveys for Clatsop, Columbia, and Multnomah Counties were used to analyze the distribution of geomorphic surfaces within the highway corridor (Parsons 1983, 1986, 1988). Only a geomorphic map for Multnomah County currently exists. Because of this I created geomorphic maps for Clatsop and Columbia counties after geomorphology research for each county was completed. This process involved associating specific corridor soil types with local geomorphic landforms (Tables 11). Figures 22 through 27 illustrate the relationships between Holocene and Pleistocene landforms within the corridor.

Table 11. Holocene and Pleistocene geomorphic surfaces and assoicated soil series by county.

Geomorphic Surface	**Multnomah County**	**Columbia County**	**Clatsop County**
HOLOCENE EPOCH (present day-10,000 BP)			
Horseshoe (<300 BP, late Holocene)	Pilchuck Rafton	Locoda Rafton	Clatsop Locoda
Ingram (500-3,000 BP, mid-Holocene)	Sauvie	McBee Sauvie Wauna	Brallier Brenner Coquille Nehalem Wauna
Winkle (5,000-10,000BP, early Holocene)	Burlington Quafeno	Eilertsen Sifton Quafeno	Mues
PLEISTOCENE EPOCH (10,000 BP to 1.8 million BP)			
Champoeg (late Pleistocene)	none	Multnomah	none
Senecal (late Pleistocene)	Quatama	Latourell	Walluski Hebo Chitwood
Dolph (mid-Pleistocene)	none	none	Grindbrook Knappa
Eola (early Pleistocene)	none	Mayger	Templeton Svenson

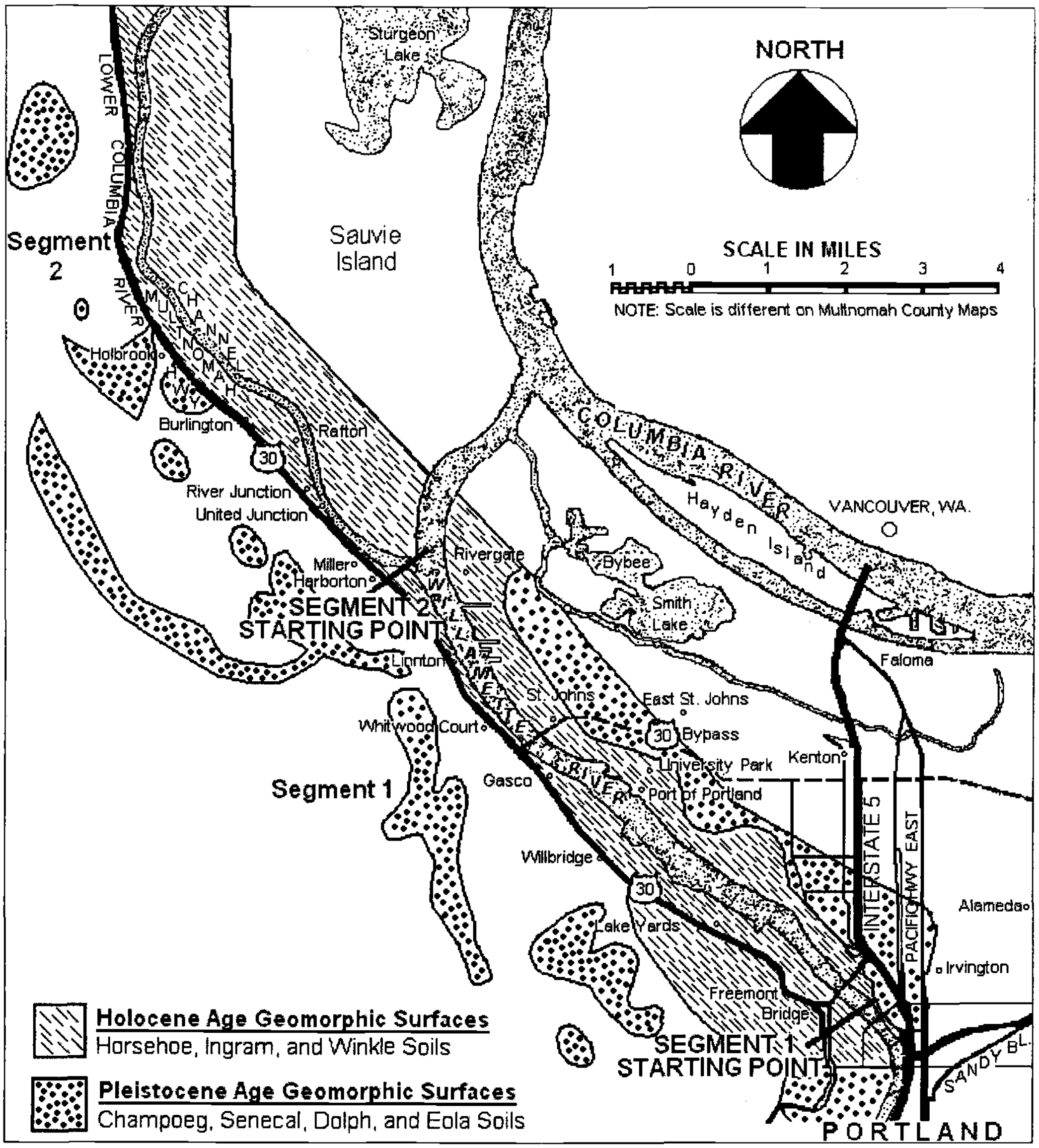

Figure 22. Geomorphic landforms based on soil survey data. Segments 1 and 2 in Multnomah County.

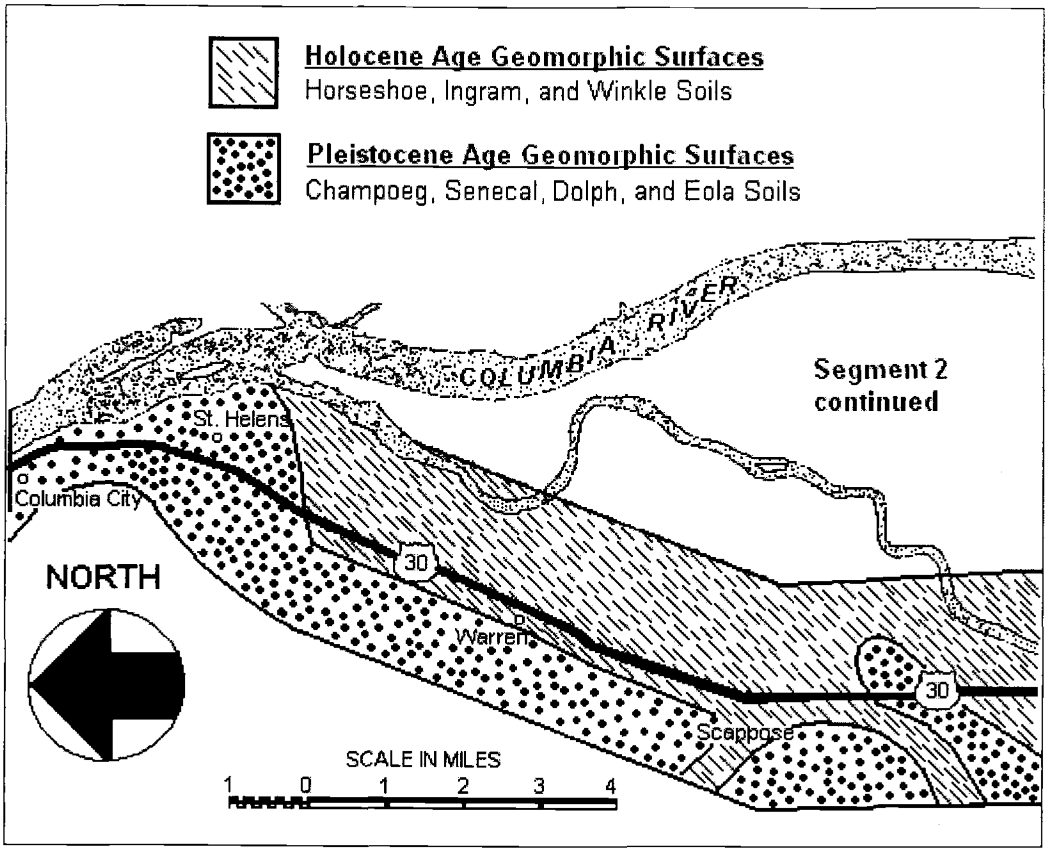

Figure 23. Geomorphic landforms based on soil survey data. Segment 2 in Columbia County.

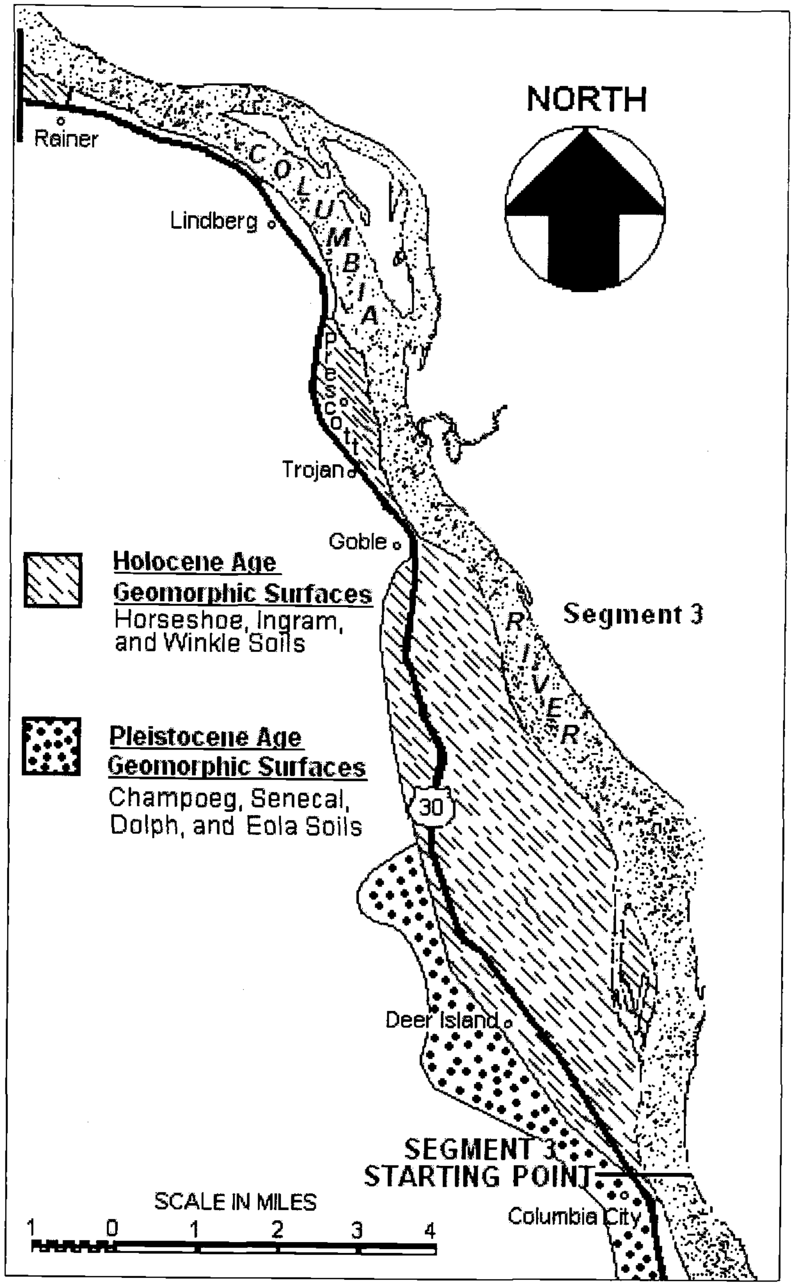

Figure 24. Geomorphic landforms based on soil survey data. Segment 3 in Columbia County.

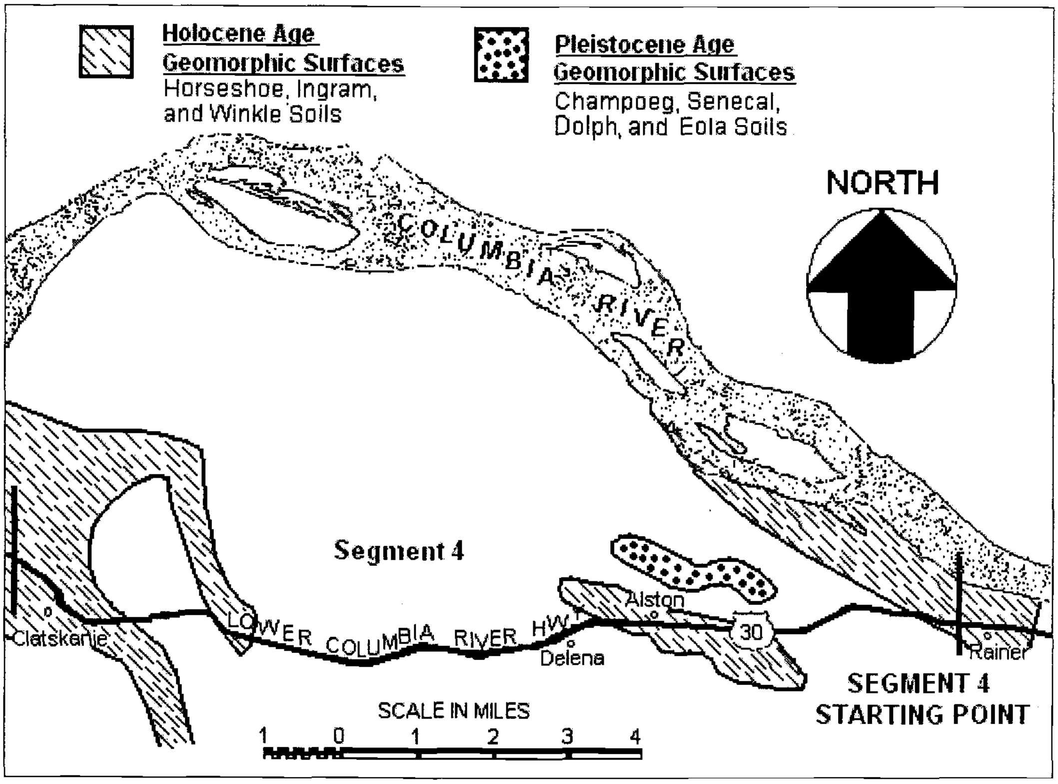

Figure 25. Geomorphic landforms based on soil survey data. Segment 4 in Columbia County.

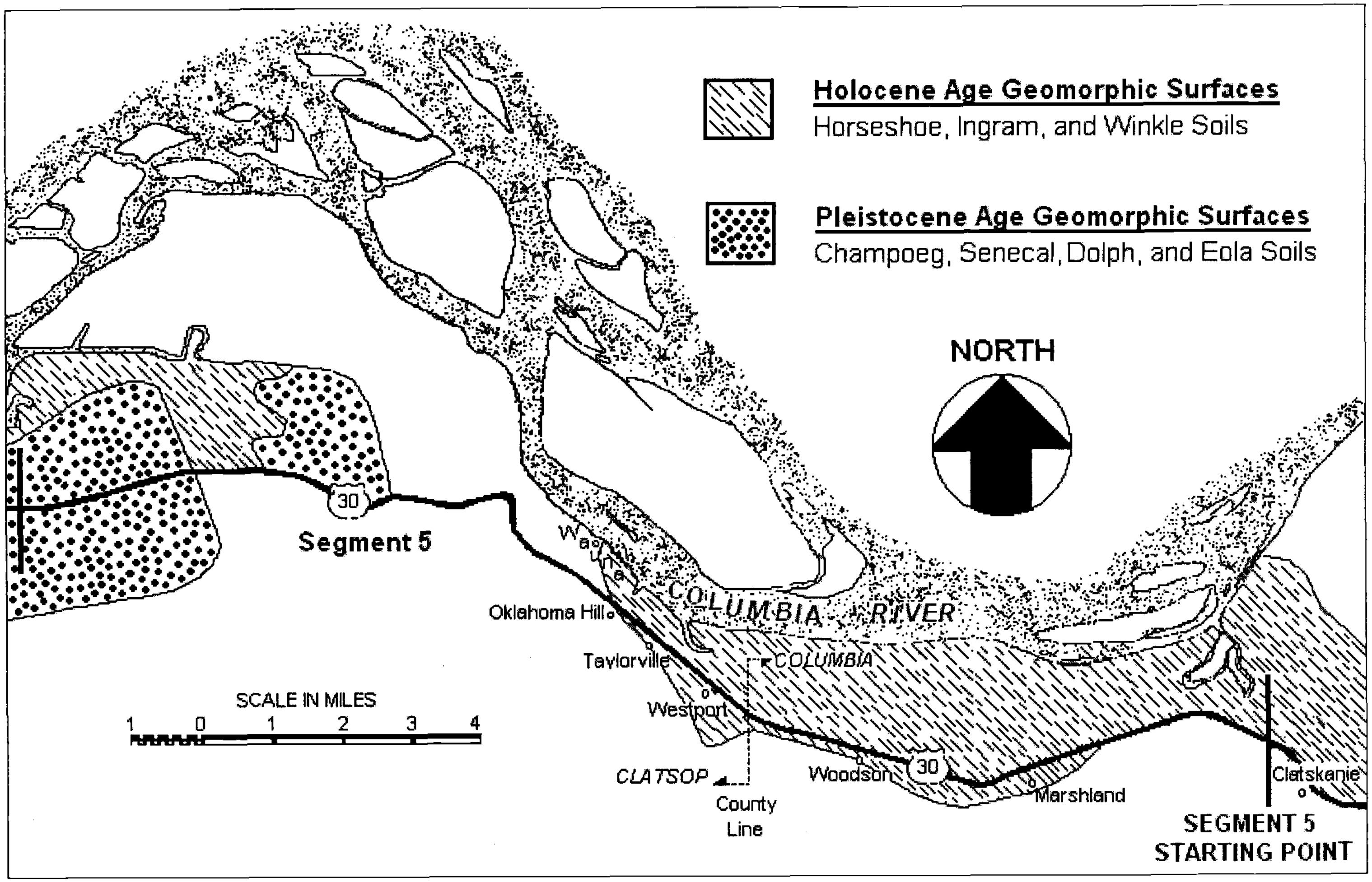

Figure 26. Geomorphic landforms based on soil survey data. Segment 5 in Columbia and Clatsop Counties.

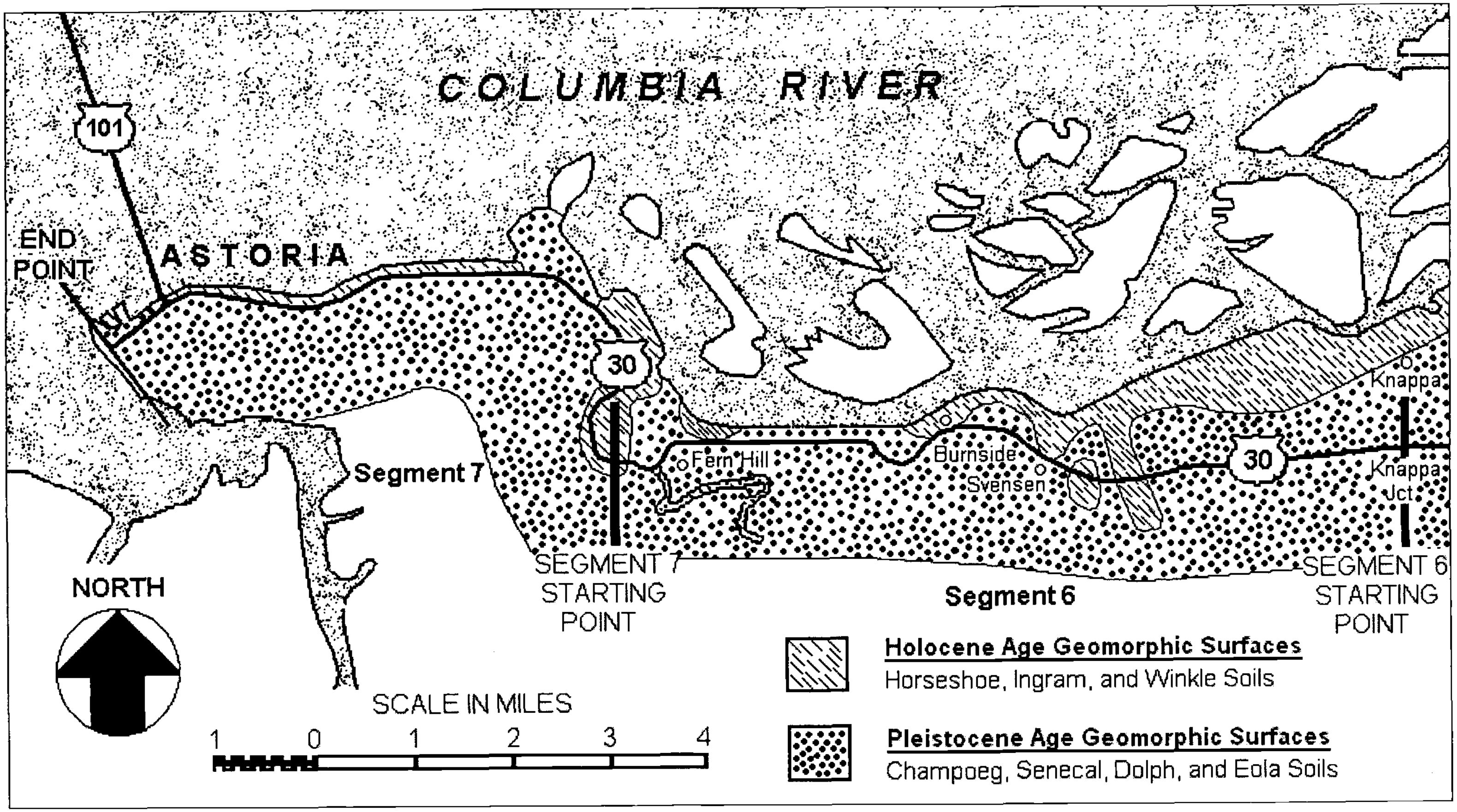

Figure 27. Geomorphic landforms based on soil survey data. Segments 6 and 7 in Clatsop County.

PREDICTIVE MODEL LIMITATIONS

One of the accuracy limitations imposed upon this predictive model is the nature of the data surrounding soil distribution and geomorphology. No formally approved geomorphic maps for Columbia or Clatsop counties exist. For this report the distribution of certain soil types was used as the basis for determining geomorphic landform distribution. Soil types are generally associated with certain slope gradients and composition elements, but often soil boundaries cannot be clearly defined and archaeological sites may be associated with more than one soil type.

Additionally, the amount, quality, and relevance of ethnographic and historic information becomes an issue when these sources are utilized. Many areas have no documented ethnographic information associated with them. Furthermore, features originally identified in literature, such as waterways, may be hard to locate due to human modification of the landscape over time.

Archaeological survey coverage within the corridor may represent exaggerated figures. The vast majority of the surveys were not conducted for ODOT and/or were not conducted directly along the highway. Some of the most extensive surveys were conducted in the late 1970's and early 1980's. This is important because in past decades research questions and values assigned to cultural items, including what sites should be recorded, may have been markedly different than those of contemporary archaeologists. Many of the surveys were conducted during times of heavy vegetation cover and involved no sub-surface testing, such as shovel probing or excavation units. Four of the seven segments have less than 10% survey coverage. Furthermore, archaeological sites are not uniformly spread across even the most desirable of landscapes. In principle it is difficult to locate and recognize short term, and sometimes even long term, occupation patterns unless purposive and opportunistic sampling methods are practiced (Connolly and Baxter 1983).

SUMMARY OF SEGMENTS

To facilitate the usefulness of this predictive model the original US 30 corridor segments (1 through 7) have been further divided into sub-segments where necessary. These segments and sub-segments have been assigned archaeological probabilities (low, medium, and high) based on physiographic, vegetative, and cultural knowledge of the corridor area.

Segment 1

This segment begins in Portland at milepost 0.00 and ends near Harborton at milepost 9.66. At this point US 30 stretches across the large alluvial terraces of the *Willamette Valley Zone.* The steep slopes of the Tualatin Mountains contain numerous small waterways that flow into the Willamette River to the east. Archaeological sites are likely to be associated with the Holocene landforms that stretch the length of this portion of US 30. 6.2% of this segment has been surveyed for archaeological resources. There are no known archaeological sites within this segment, but an Indian village was reportedly located on the other side of the Willamette River across from Linnton in 1973. GLO maps indicate that in this portion of Portland there were 5 homesteads (Blackston, Gwile, Potter, Kitteredge, and Watt) and three roads (Tualatin Plains-St. Helens, Plains-Baker, and Plains-Linnton) within the corridor. A small lake formerly near milepost 3 may have attracted waterfowl to the area, which would have been exploited by both aboriginal and Euroamerican groups. Even though this portion of the corridor has been disturbed by intensive industrial development, this segment receives a medium probability designation for its potential to contain archaeological resources (Figure 28).

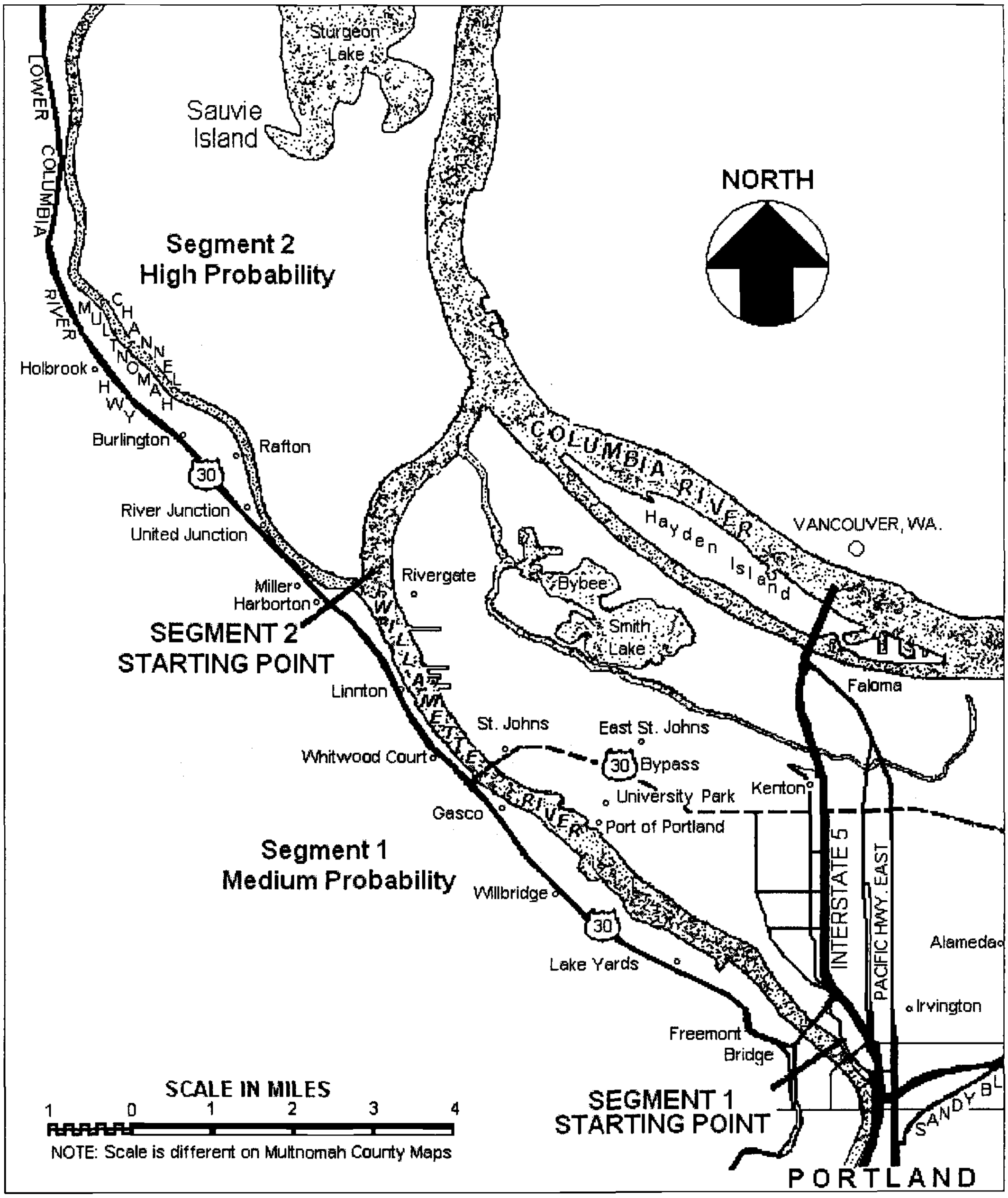

Figure 28. Archaeological probability for Segments 1 and 2 in Multnomah County.

Segment 2

Segment 2 begins at milepost 9.66 and ends 22.33 miles later at milepost 31.99 near Columbia City. This area, which is referred to as the Portland or Wappato Basin, is a transition zone from the *Willamette Valley* vegetation zone to a *Tsuga heterophylla Zone*. High steep mountains on the western side of the corridor taper off at near milepost 17.4. The majority of the segment is associated with Holocene landforms. The floodplains to the east are rich in plants traditionally exploited by the Multnomah Indians. Approximately 66% of the corridor has been surveyed for archaeological resources. Statistically there are .63 sites per mile, but the actual probability exceeds that number. There are numerous archaeological sites within the general vicinity of Sauvie Island. Archaeological sites, both prehistoric and historic tend to occur in high density on dry elevated ground near waterways and wetlands. Within the corridor boundaries alone there are twelve prehistoric archaeological sites (35MU61, 35MU63, 35MU64, 35MU65, 35MU66, 35MU67, 35CO2, 35CO8, 35CO17, 35CO26, 35CO29, and 35CO33), two historic archaeological sites (OR-CO1 and OR-CO2), and one reported possible "Indian village" (letter D in Figure 10). GLO records contend that the soils and natural environs were very favorable to settlers and indigenous groups alike. Three homesteads (Lumberson, Jackson, and Haninger), one cultivated field, and two sawmill complexes are listed within ¼ mile of the highway. There are many other homesteads and structures just outside corridor boundaries. Two roads (Tualatin Plains-St. Helens and St. Helens-Hillsbourough) and two trails (Logie Trail and a Trail from Tualatin Plains) are located within the corridor. Historically St. Helens and Columbia City were social and economic activity centers for settlers. The number of historic archaeological sites associated with early homesteading, dairying, and logging within this corridor is potentially high. Based on favorable indicators this corridor segment has received a high probability rating (Figures 28 and 29).

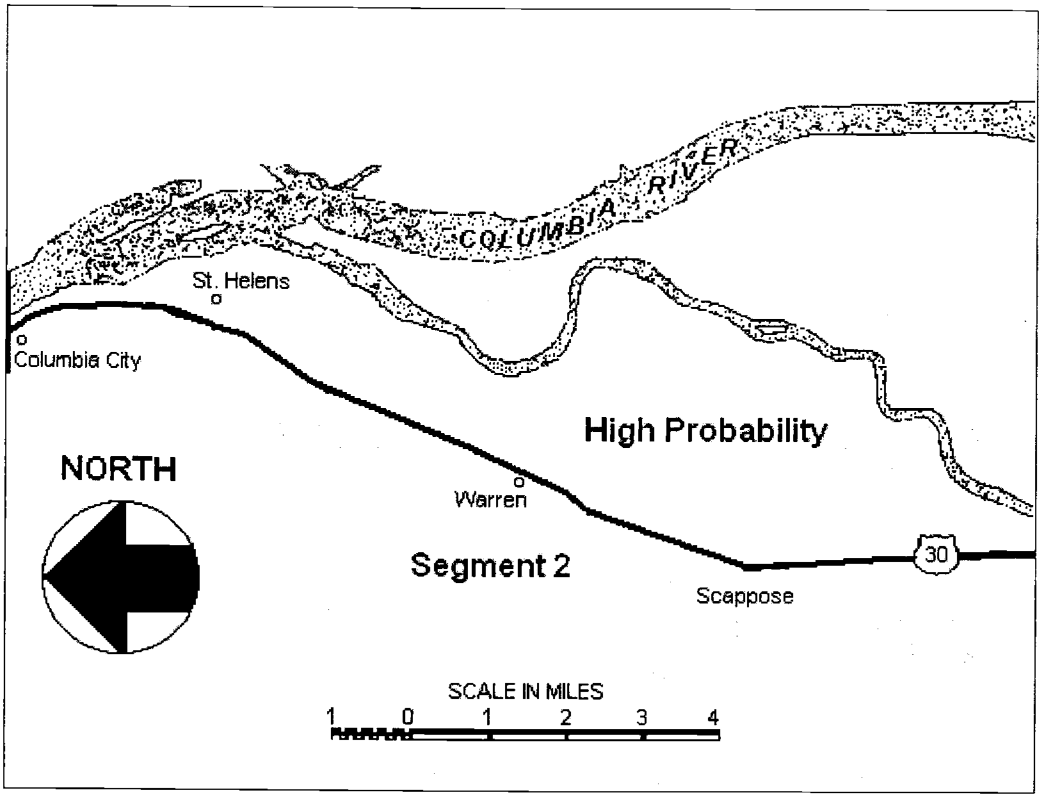

Figure 29. Archaeological probability for segment 2 in Columbia County.

Segment 3

Sub-segment 3A begins at milepost 31.99 and ends at milepost 39.50. This segment marks the beginning of the _Tsuga heterophylla Zone_. This 7.51 mile stretch occupies lower elevations to the east of the highway which are prone to seasonal flooding. Any archaeological sites that might be located on the Holocene surfaces in sub-segment 3A would likely be deflated or deeply buried under rapidly deposited sediment. Surveyed areas within the corridor have revealed no archaeological sites. GLO documentation suggests that at least two homesteads (Burr and Jones) and one road (from St. Helens to Rainer) were located within the corridor, but these were not found during field investigations. GLO records indicate that marshy areas had good but second-rate soil. Much of the area within the corridor has been disturbed through railroad and levee building, in addition to gravel mining (milepost ~34.5). Based on a lack of positive indicators this sub-segment has received a low probability rating (Figure 30).

Sub-segment 3B begins at milepost 39.50 and ends milepost 41.70. The topography along the Holocene surfaces in this portion of the corridor is relatively stable. Goble Creek provides a year round source of fresh water. Portions of the corridor have been surveyed, but the 1979 shoreline survey did not focus on the area along the highway. There is one official tribal burial (35CO1) within the corridor, and a natural formation named "Elder Rock" (milepost 40.2). GLO maps list at least one early homestead in present day Goble. A portion of the road from Rainer to St. Helens and an early cemetery also occupy area within the corridor. This sub-segment has received a high probability designation for cultural materials (Figure 30).

Sub-segment 3C, which begins at milepost 41.70 and ends at milepost 44.00, contains Holocene surfaces but no known archaeological sites. There is no indication of GLO environmental favorability, but a portion of the old road from St. Helens to Rainier is within the corridor boundaries. The shoreline survey previously mentioned technically would not have located archaeological sites within the majority of the corridor. The two positive indicators for this sub-segment and the lack of relevant survey data indicate that this sub-segment has a medium probability for containing archaeological sites (Figure 30).

Sub-segment 3D stretches from milepost 44.00 to milepost 48.67 in the city of Rainier. There are many small fresh water streams in the corridor and the topography is relatively level. Although the amount of Holocene surfaces within this sub-segment is small, there is one known archaeological site (35CO28) and two historically reported prehistoric villages (letters J and K in Figure 12) within this sub-segment. GLO maps indicate that there were at least two early homesteads

(Dobben and Fiest) and a portion of the old road from St. Helens to Rainier cut into this sub-segments good but 2nd rate soil. In 1979 when the Columbia County shoreline survey was conducted, most historic archaeological sites, which would have been associated with Lindberg and Rainier, were only casually mentioned but not recorded. Based on current information regarding this area sub-segment 3D has received a high probability designation for cultural resources (Figure 30).

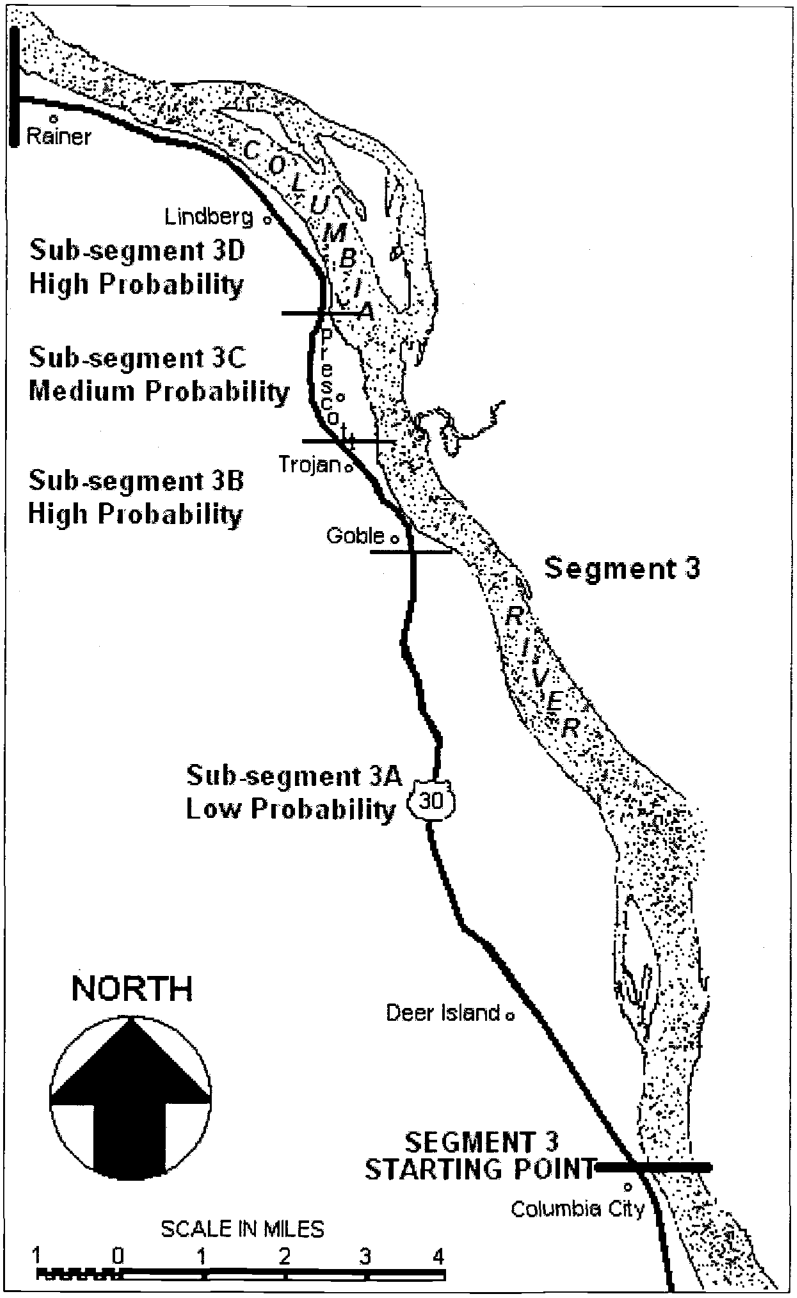

Figure 30. Archaeological probability for segment 3 in Columbia County.

Segment 4

Sub-segment 4A begins at milepost 48.67 and ends 1.53 miles later at milepost 50.20. The topography in this sub-segment is quite steep and Holocene associated soils only occupy a small portion of the corridor area. There are no known sites and no surveys within this sub-segment. GLO maps state that the area was originally sparse in undergrowth and dense in fir and hemlock. A small bit of the St. Helens to Rainer road may still exist near the Hudson Cemetery (milepost ~50.2). Due to a lack of positive indicators this sub-segment has been given a low probability rating for archaeological materials (Figure 31).

Sub-segment 4B stretches from milepost 50.20 to milepost 56.40. Within this portion of US 30 two fresh water creeks (Palmer and Beaver) run throughout this sub-segment into the Columbia River. Even though surveys of Holocene associated landforms have revealed no archaeological sites within the corridor, there is one prehistoric archaeological site (35CO15) and one historic archaeological site (OR-CO15) located within one mile of the northern portion of this sub-segment. GLO sources indicate that the area was very favorable for human occupation. The soil was rated highly and timber stands were dense while undergrowth was sparse. This sub-segment has been given a high probability rating based on these indicators (Figure 31).

Sub-segment 4C runs from milepost 56.40 to milepost 60.60. There are no major water sources within this sub-segment and only 5% of the area is associated with Holocene landforms. There have been no surveys and there are no known sites within this steep and mountainous terrain. This area received a "not suitable for settlement" designation in GLO records. Based on the lack of positive indicators this sub-segment has been given a low probability rating (Figure 31).

Sub-segment 4D begins at milepost 60.60 and ends 2.40 miles later at milepost 63.00. Holocene landforms in this corridor are associated with the Clatskanie River. There are no known archaeological sites within this sub-segment, but only approximately 5% of this area has been surveyed for cultural resources. There are no GLO comments regarding this area, but there is potential for historic archaeological sites associated with the town of Clatskanie to lie within the corridor boundaries. This sub-segment has been given a medium probability rating for the presence of archaeological resources (Figure 31).

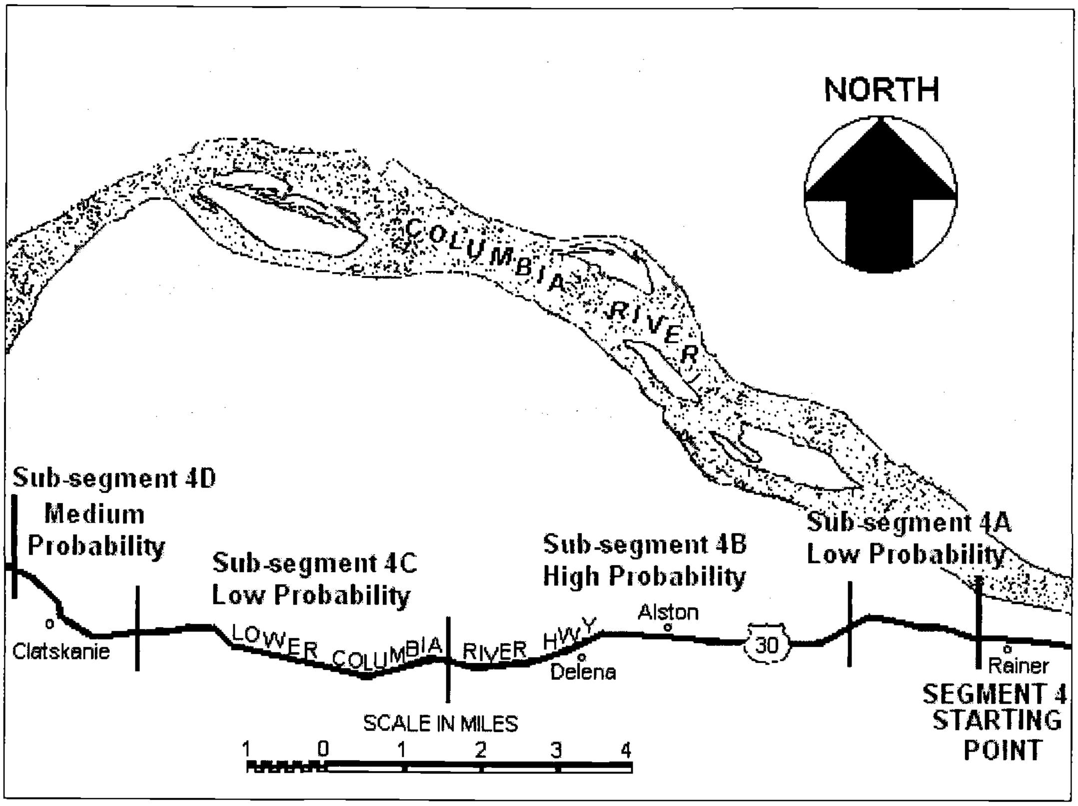

Figure 31. Archaeological probability for segment 4 in Columbia County.

Segment 5

Sub-segment 5A begins near Clatskanie at milepost 63.00 and ends between Westport and Taylorville at milepost 71.00. There are various small creeks that flow into the Westport Slough which subsequently create marshy areas that attract wildlife. The area is dominated by Holocene landforms. SHPO records indicate that the 1979 Columbia County shoreline survey entered the corridor boundaries, but that is questionable when the relationship between the shoreline and US 30 is examined. There are no known archaeological sites within the corridor area, but two aboriginal villages with associated trails (L and M in Figure 14) are supposedly located near corridor boundaries. GLO maps indicate that the conditions for human occupation are favorable and that five homesteads (Byrants, Hawes, Legenfelia, Elliot, and Hood) were once originally within corridor limits. There was also an irrigation ditch known as Ford's ditch adjacent to the westbound lane of the highway. Even though railroad and levee building have disturbed the area to the north of the corridor there is a high probability that archaeological resources are located within sub-segment 5A (Figure 32).

Sub-segment 5B begins at milepost 71.00 and terminates at milepost 77.10. This sub-segment begins in marshland but then graduates to steep and mountainous terrain (mileposts 73.60-75.70). Only 25% of this corridor can be associated with Holocene landforms. There are some small negative surveys in the area, but generally they are not directly within corridor boundaries. There are no known archaeological sites within this corridor. Based on this information sub-segment 5B has been given a low probability rating (Figure 32).

Sub-segment 5C commences at milepost 77.10 and extends to Knappa Junction (milepost 82.01). Numerous small streams, including Gnat Creek, run throughout the corridor area. Thirty percent of this sub-segment is associated with Holocene age landforms. There is one official archaeological site (35CLT52) within a flat saddle, which is situated along a stream. Additionally, GLO maps indicated the presence of homesteads (Tuis and Chow) encircling the town of Knappa and the Knappa Junction area. Based on positive indicators this sub-segment has been given a high probability rating (Figure 32).

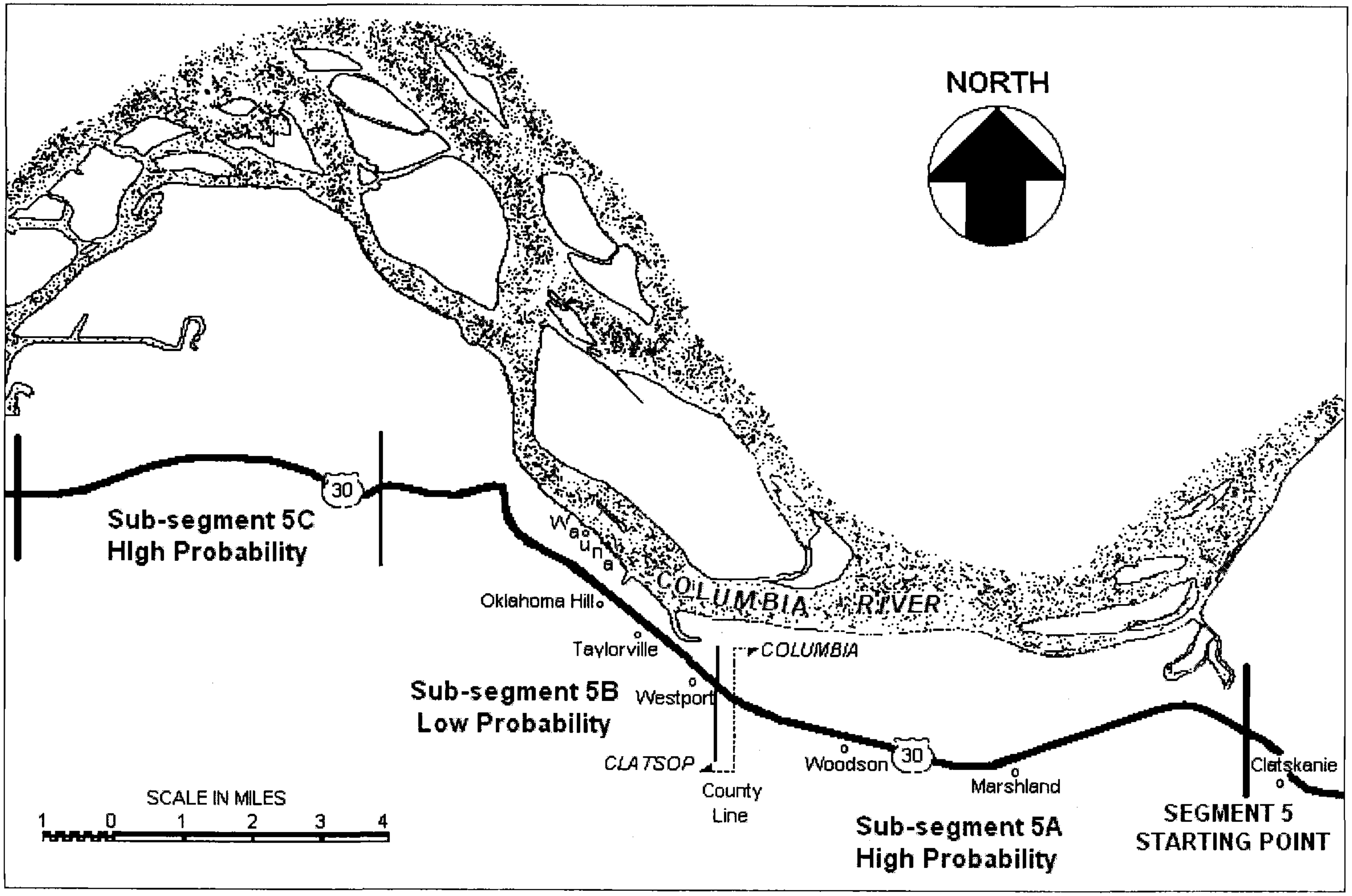

Figure 32. Archaeological probability for segment 5 in Columbia and Clatsop Counties.

Segment 6

Sub-segment 6A, which marks the transition from the *Tsuga heterophylla Zone* to the *Picea sitchensis Zone*, begins at Knappa Junction (milepost 82.01) and ends shortly after Little and Big Creeks (milepost 83.00). No surveys have been conducted within this corridor and there are no known archaeological sites within ¼ mile of either side of the road. There are however two recorded archaeological sites (35CLT37 and 35CLT33) within 1 mile of corridor boundaries and GLO records indicate homesteads (Brown, Tallman, and Chow) nearby. Based on positive indicators this sub-segment has been given a high probability rating (Figure 33).

Sub-segment 6B begins at milepost 83.00 and ends at milepost 85.20. There are no major water sources within this corridor and no Holocene associated landforms. No surveys have been conducted and no sites have been located within corridor limits. There is one archaeological site (35CLT34) situated approximately one mile away on the bank of the Columbia River. GLO records do no provide any pertinent information on this area. Based on this evidence this sub-segment has received a low probability designation (Figure 33).

Sub-segment 6C (mileposts 85.20-87.70) contains three active creeks (Ferris, Bear, and Mary) which drain into the Columbia River. There is a combination of both Holocene and Pleistocene surfaces within this sub-segment. No surveys have been conducted within the corridor, but one archaeological site (35CLT38) has been located within corridor limits. GLO maps indicate the presence of one homestead (Burnside). This sub-segment has been given a high probability rating for archaeological resources (Figure 33).

Sub-segment 6D's hilly topography stretches from milepost 87.70 to milepost 92.54 near the John Day River. Only 15% of the corridor area can be associated with Holocene aged features. This area is prone to seasonal inundation and rapid sediment deposition. GLO records indicate that this marshy area was considered unfavorable for settlement. Two small highway surveys were conducted within this sub-segment, but no archaeological resources were located. The ground surface in this area has been heavily disturbed by logging activities and previous road work. Due to a lack of positive indicators this sub-segment has been given a low probability rating for archaeological resources (Figure 33).

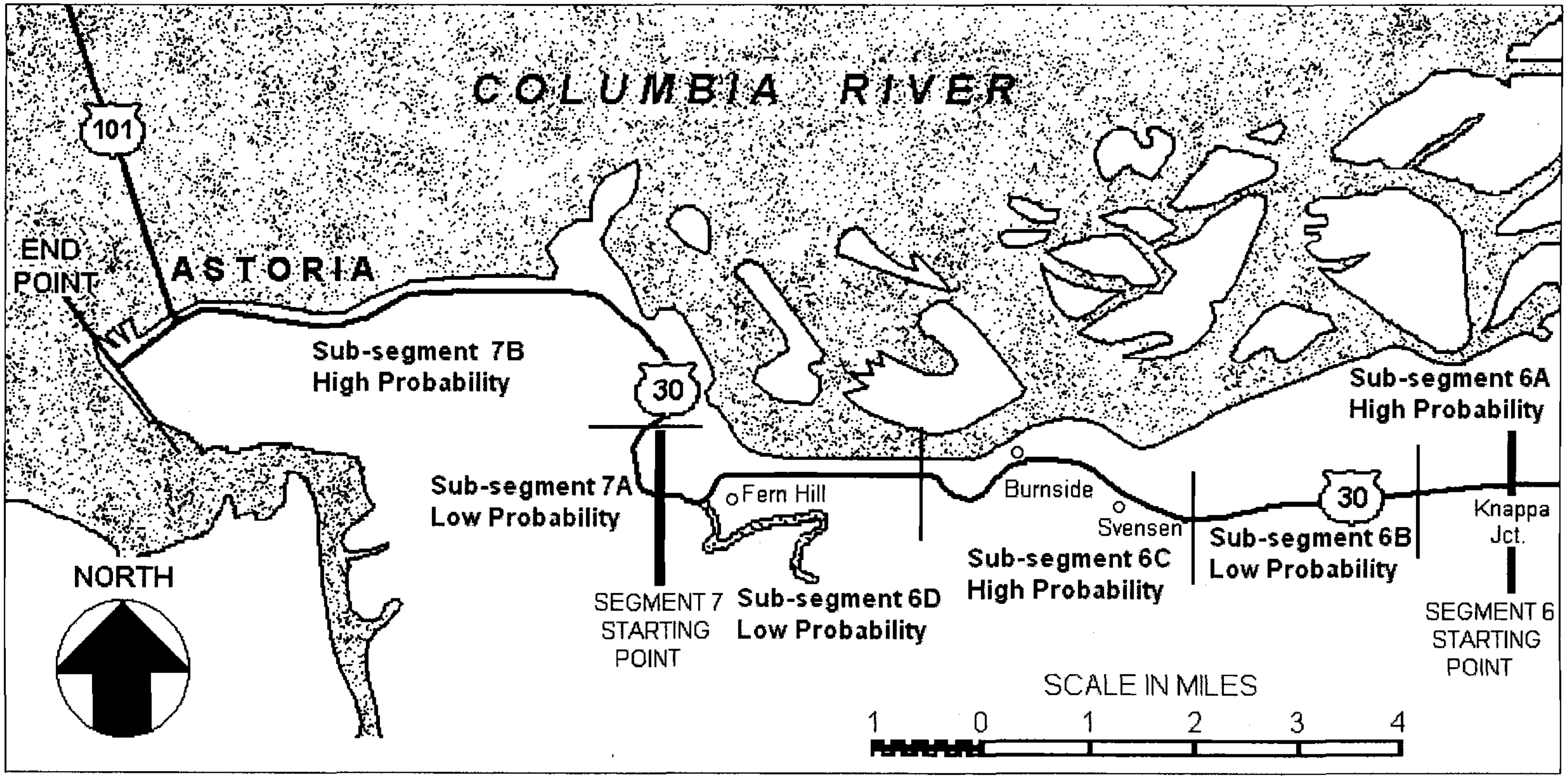

Figure 33. Archaeological probability for segments 6 and 7 in Clatsop County.

Segment 7

Sub-segment 7A (milepost 92.54-93.10) is similar in nature to sub-segment 6D, in terms of its marshy situation and annual inundation. There are Holocene age surfaces with this ½ mile sub-segment, but a highway survey revealed no archaeological sites. Without compelling positive indicators this sub-segment receives a low probability (Figure 33).

Sub-segment 7B begins at milepost 93.10 and terminates at milepost 99.34 where US 30 intersects US 101. This portion of US 30 is in close association with the Columbia River and Holocene age landforms. Ethnographic records indicate that the Kathlamet and Clatsop tribal peoples utilized the resources in this area. There is one prehistoric archaeological site (35CLT54) near Mill Creek. Historical accounts of Euroamerican settlers also indicate that a mill may have been placed at the mouth of Mill Creek in 1849. It may have been located on the Charles Stevens homestead. GLO records indicate that there were five other homesteads (Shortess, Adair, Snively, McClure, and Smith) that buffered land within the present day highway corridor. There have only been three small archaeological surveys within this corridor and none of them were conducted for ODOT. While this area is heavily developed there is still a high probability of finding archaeological resources associated with tribal peoples and early Euroamerican settlers (Figure 33).

CONCLUSIONS AND RECOMMENDATIONS

Twenty seven percent of this corridor is considered to be low probability in nature. If archaeological surveys previously conducted in low probability areas failed to reveal archaeological materials, it is unlikely that ODOT will require additional surveys. In general, the archaeologist from ODOT's Environmental

Services will not need to be contacted when routine work, such as maintenance and overlays, begins in these areas. If cultural materials over 50 years old are encountered during routine activities, those activities should cease until a qualified archaeologist may assess the potential impact upon the resources. In the event that major roadway changes are proposed for low probability zones, the ODOT archaeologist should be consulted and invited to participate in the initial planning process.

Fifteen percent of the corridor has been designated as a medium probability zone for archaeological materials. The ODOT archaeologist should review plans concerning undertakings in these areas. In the event that archaeological surveys and/or data recovery are required it will be necessary to include these activities in initial project budgets. In addition, tribal groups may need to be consulted and given the opportunity to comment on projects affecting traditional cultural resources.

Fifty eight percent of this corridor is composed of high probability zones. For theses segments it is critical that planning efforts be coordinated with Environmental Services staff before any ground altering activities occur. Usually, archaeological surveys and/or data recovery will need to be conducted and tribal groups will need to be consulted. Frequently, projects in high probability areas will require financial and temporal commitments on behalf of ODOT.

These initial probability determinations have been based on a limited amount of natural and cultural oriented knowledge about the corridor areas. The determinations discussed in this report are subject to change in the event that new data is introduced. Ideally this model, which is a project-planning tool, should be field tested to determine its range of accuracy.

CHAPTER 4: ANALYSIS AND CONCLUSIONS

PREDICTIVE MODEL LIMITATIONS

There are several limitations of the US 30 preliminary predictive model. The data on soil distribution and geomorphology is lacking because professional maps were not available for Columbia or Clatsop counties. Geomorphic surface distribution maps for both counties were manually created and the boundaries of Holocene and Pleistocene surfaces were transferred to maps of a different scale.

Computations surrounding archaeological survey coverage within the corridor are undoubtedly exaggerated because acres and miles could only be roughly estimated. Furthermore, the majority of archaeological surveys were not conducted within highway right-of-way and focused on areas owned by other state agencies. Survey quality varied greatly and some surveys were conducted during seasons when vegetation hindered visibility and made site discovery improbable.

The paucity of ethnographic and historic data allows for the credible assumption that archaeological sites may be present in areas not previously mentioned in records. Furthermore, archaeological sites are not uniformly distributed and short-term occupation sites, along with older deeply buried sites, are often more difficult to locate. The model itself is biased towards late prehistoric sites attributed to ethnographic records and cannot adequately determine settlement patterning of both older prehistoric and historic archaeological sites. Even though archaeological sites are nonrandomly distributed within the corridor it should be understood that this corridor study combines favorable factors for different occupation periods and different ethnic groups. Complex factors were simplified for this model and as a consequence its effectiveness is compromised. Because no model can be a perfect predictor, misassignments of probability ratings to portions of highway corridors may have occurred.

This preliminary archaeological predictive model was tailored to the situation at ODOT. It was not possible to engage in more expensive and time-consuming methods given the lack of funding and true interest in archaeological predictive models. If money, time, and access to technology were not limiting factors during my employment I would have elected to computerize the entire project. The use of GIS technology would have allowed for more precise manipulation of the data, easy reproduction of more accurate maps, and timely updates of pertinent databases to continuously improve the effectiveness of the model. The practical and efficient application of scientific data and modeling theory was limited by my ability to manually measure map variables. The utility of this model is unknown because cross-tabulations that compare actual and model assigned presence or absence of resources have not been made. Although this project-planning tool has not been field tested, it still provides valuable information to ODOT staff archaeologists who review proposed projects within the corridor.

The original plan to incorporate the archaeological sensitivity ratings generated by this model into a draft corridor-planning document did not meet fruition due to a coordination failure between the regional project development team and the Environmental Services branch. Project planning and development are too often separated by large lapses in time and as a result pertinent information, such as important environmental data, can fall by the wayside. The archaeological probability ratings were incorporated into the Final Corridor Management Plan, which will be discussed in the last section of this chapter.

Shortly after the completion of my preliminary archaeological predictive model the Environmental Services branch decided that the technical data from archaeological reports might better be integrated if it could be generated more quickly and presented in a less cumbersome format.

DEVOLUTION OF ODOT ARCHAEOLOGICAL MODELS

The US 30 preliminary archaeological predictive model was completed in approximately five months. ODOT personnel considered five months, for 100 miles of corridor, too lengthy. As a result, I was asked to create similar, but less involved reports for future highway corridors. I termed my second approach to highway corridor probabilities a "preliminary archaeological assessment report".

A preliminary archaeological assessment of a highway corridor became a scaled down version of a preliminary predictive model. This process involved an examination of SHPO site files and survey records similar to that of a predictive model. Sites per linear mile were calculated and archaeological survey coverage was estimated by corridor segment. Sites and surveys were listed in table format and plotted onto topographic maps for ODOT archaeologists. General site locations were supplied to planning managers in table and map form, but this information was withheld from maintenance personnel due to its sensitive nature. Rudimentary information on the geology and vegetation of the corridor was defined and combined with basic knowledge of tribal and Euroamerican settlement of the area. The data was analyzed and probability assessments for each corridor segment were briefly discussed, graphically illustrated, and distributed to planners and maintenance districts. Standard recommendations associated with low, medium and high probability designations were also provided. This approach resulted in a two to three month timeline, depending on corridor length.

Two to three months was still considered unacceptable for highway corridor reports and I was instructed to further pare down the product. My approach was deemed to be a "streamlined product". This report did not contain any map work, specific ethnographic or historical data, geologic or geomorphic information, or vegetation analysis. Only SHPO records were reviewed for site location data and survey coverage information. The number of sites and their locations according to township, range and section were documented in table format. Exact site locations were provided only to the archaeologists. Archaeological survey coverage along the highway corridor was estimated. Site density per segment was tabulated, but no formal probability determinations were made due to a lack of relevant data. This document was accompanied by a boilerplate narrative that any ground altering activities would require coordination with ODOT archaeologists. It was distributed to regional planners, but not maintenance personnel. The total length of time to complete a "streamlined product" ranged from one to three weeks.

CORRIDOR MANAGEMENT PLANS

I submitted the preliminary archaeological predictive model to ODOT planners in November 1997 and was asked to review the Draft Corridor Management Plan for US Highway 30 in November 1998. Within this draft document corridor strategies were outlined and specific proposed projects addressed. I paid close attention to the section on Social and Land Use Impacts, which was supposed to incorporate cultural resource issues into guidelines for each corridor segment. Both the built environment and archaeological resources were to be discussed and integrated with other relevant data so that the regional planners could meet requirements to "preserve the livability of the communities within the corridor and to avoid, minimize or mitigate impacts to sensitive cultural resources and other community resources." (ODOT 1998:G-8). Preservation of sections of Old Highway 30 was briefly discussed and consultation with tribal governments regarding significant cultural resources was mentioned.

Resources by segment were discussed, although very little mention was made of built historic features and none was made regarding archaeological resources or the potential to find those resources in each segment. None of the data from the preliminary archaeological predictive model was utilized in the draft document, even though it was submitted to planners one year before. No mention was made of any archaeological research that had been conducted for the report. Segment 2, the segment with the greatest archaeological site density, was reported as having a significant number of built historic sites but no indication was made that twelve archaeological sites were within the highway corridor (Appendix A). Most of the proposed projects were classified as having little impact on cultural resources, although justification was not provided. The following statement from the draft document had no foundation because the majority of the cultural resource data available to the planning team was omitted:

> "Protection of sensitive cultural (historic and archaeological) resources and effects on community livability must be considered with any proposed improvements to the transportation system. Therefore, the corridor strategy objectives are designed to forestall adverse impacts to livability and cultural resources."
>
> (ODOT 1998:G-10)

Shortly after reviewing the draft document I crafted a memo highlighting all of the archaeological data by segment and detailed document deficiencies in project examination and legislative compliance (Appendix B). Little response was given to the memo and my inquiries into the final corridor plan continued until I left ODOT in January 1999. In January 2003 connected with the regional planner that I had addressed the original memo to (Frederick Eberle) and learned that the data from the model was used in Final Corridor Management Plan. This corridor plan was adopted in November 1999 and distributed to local governments, ODOT district offices, area managers, and those developing funding requests for proposed projects in the corridor. When the final plan was adopted, it was acknowledged that the environmental section was incomplete and would need to be updated periodically. Environmental data was to be mapped out as a guide for maintenance activities and project development, but that portion of the corridor plan remains incomplete to this day.

Upon review of the final corridor plan I discovered that the number of sites listed in segment 2 was incorrect. It was indicated that seven archaeological sites were present within the corridor, but the actual number is fourteen. Further more, the percentage ratings of low, medium, and high archaeological probability were erroneously listed. Correct and incorrect percentage ratings are listing in Table 12.

Table 12. Side-by-side comparison of actual probability percentages and those listed incorrectly in the final corridor plan.

Segment Number	Predictive Model Percentages (Correct)	Final Corridor Report Percentages (Incorrect)
Segment 3	45% low probability 14% medium probability 41% high probability	50% low probability 2% medium probability 49% high probability
Segment 4	40% low probability 17% medium probability 43% high probability	17% low probability 64% medium probability 29% high probability (also listed as 43%)
Segment 7	8% low probability 92% high probability	19% low probability 13% medium probability 68% high probability

It is not known how the probability ratings clearly provided in the memo were misentered into the Final Corridor Management Plan. I alerted the regional planner that I was working with to the errors in the final document and suggested that users be notified of the inaccuracies. The only proposed project listed in the final corridor plan that planners deem a possible concern is an upgrade of historic drainages from Portland to the St. Johns Bridge. This project would occur in segment 1 and no errors of archaeological concern were made in that portion of the final document. Planning personnel believe that their errors will only need to be evaluated if new projects are proposed for segments 3, 4, and 7. My request to have a proposed bike lane project in the Scappose area (segment 2) listed as a project that could have potential cultural resource impact was denied. This is a concern because this portion of the corridor has a confirmed high site density and projects occurring with highway right-of-way in this segment have a high potential to impact cultural resources.

Ultimately this report has proven useful to ODOT technical staff, however signs indicate that the data provided to planning personnel has had little impact on project planning or design. The archaeological probability ratings included in the final document will most likely only be of use to project planners if more funding dollars are allocated to new potential projects not previously addressed in the Final Corridor Management Plan.

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APPENDICES

APPENDIX A

ODOT Draft Corridor Plan
Portland-Astoria (US 30) Corridor
August 6, 1998

Chapter IV. Corridor Management
Sub-Chapter G. Social and Land Use Impacts

G. Social and Land Use Impacts

1.0 Introduction

Transportation projects impact the built environment and the population of communities within the corridor. Corridor planning must strive to balance the expansion of transportation facilities with the protection of social and cultural resources.

2.0 Existing Conditions

The following paragraphs describe existing (1995) land use conditions and cultural features along the corridor by segment. Figure G- I shows the existing zoning and land uses in the corridor.

2.1 Land Use Patterns and Cultural Features

Segment I - MP 0. 00 - 9.66
Sub-segment A is located in the City of Portland and is the most urbanized portion of US 30. This portion of US 30 functions as the center for import/export activities, with major port facilities, which accommodate air, rail, and water transportation links. Heavy industrial, including rail yard activities are located on the northeast side of the highway, while newer light industrial uses occur on both sides of the highway. Approximately 25 percent of the land area extending 2,000 ft. on both sides of the highway in sub-segment A is currently in industrial uses, while 30 percent is used for commercial operations. Four percent is vacant, developable land in this sub-segment, all of which is zoned for industrial uses.

Although still within the city limits of Portland, Sub-segment B bisects the neighborhood of Linnton at approximately milepost 8. Residential development has tended to cluster on the southwest side while commercial development has typically located on the northeast side. A similar development pattern has also occurred in the vicinity of Saltzman Avenue at milepost 5.23. The land uses in subsegment B are currently 18 percent industrial, 5 percent residential and 59 percent park land, with 10 percent vacant, developable land remaining. Of the 10 percent that is vacant developable land, 28 percent is zoned residential and 70 percent is zoned industrial.

Segment 2 - MP 9.66 - 31.99
The highway passes through the unincorporated communities of United Junction at milepost 11.40, Burlington at milepost 12.59, and Warren at milepost 25.25. Scappoose, St. Helens, and Columbia City are incorporated urban areas in this segment. The City of Scappoose has a population of 4,650 and acts as the activity

center for this segment. Scappoose has designated a significant number of historical sites, which are listed in the comprehensive plan. The City of St. Helens is the largest city along this segment, with a population of 8,555, and acts as the activity center for the area. A major part of the town is located on the east side of US 30. Columbia City has a population of 1,550 and contains the Caples House Museum.

Land uses outside of these cities is primarily forest and farm land, with isolated rural-residential uses. Adjacent to the city limits of the City of Scappoose, several areas are used for industrial and commercial use, but the primary land uses between the incorporated areas are farm and forest, with isolated rural residential. Strip developments, including commercial and industrial uses, line the roadway in the City of St. Helens.

There are several cemeteries in this segment, including Fairview Cemetery at milepost 19.40, Columbia Memorial Gardens at milepost 23.00, Bayview Memorial Cemetery at milepost 26.00, and McNulty Cemetery and the Masonic Cemetery, both inside the city limits of St. Helens.

The Multnomah/Columbia County line is located at milepost 18.37. A public golf course is located at mile 15.

Segment 3 - MP 31.99 - 48.67

This segment begins at the northern UGB of Columbia City, passes through the City of Rainier (population 1,780), ending at the interchange to the Longview Bridge west of the city' Apart from the City of Rainier, Segment 3 contains mostly forest and farm lands. Isolated rural residential zones are scattered throughout the segment including the rural centers of Deer Island at milepost 35.00, Goble at milepost 40.02, and Lindberg at milepost 45.12. US 30 also provides access to the City of Prescott (population 60) at milepost 43.00.

The decommissioned Trojan Nuclear Plant is located at milepost 42.00. Adjacent to the Trojan Nuclear Plant site are three small lakes; Recreation Lake, Reflection Lake and Swan Lake. The Welter Family Cemetery is located at approximately milepost 42.00.

Segment 4 - MP 48.67 - 63. 00

This segment is primarily forest lands, apart from a few isolated rural residential areas, and the City of Clatskanie (population 1,880) at the west end of the segment. There are several designated viewpoints along the highway overlooking the Columbia River. Access to several county parks and cemeteries is located at milepost 50.00. There are a number of rural residences in this segment. The two prominent rural centers are Alston Comer, located at milepost 52.34, and Delena at milepost 54.97.

A turn-of-the-century lumber mill owner, T.J. Flippin, built his house in Clatskanie to resemble a castle. This historical facility is known as the "Flippin Castle" and is now the Clatskanie Senior Citizens home.

Segment 5 - MP 63.00 - 82. 01
This segment contains a combination of rural uses, including farm, forest and pasture lands as well as unincorporated rural residential areas and two main industrial sites. The James River Corporation's Wauna Pulp and Paper mill is located about I 0 miles west of Clatskanie and is the area's largest employer. Portland General Electric's Beaver turbine generating plant is located at Port Westward industrial site. Access to the Columbia River Toll Ferry is provided at Westport, at milepost 70.66. A fish hatchery is located north of Wauna.

Bradley Wayside, a state park, is located on the top of Clatsop Summit (elevation 654.84 feet), west of Wauna at milepost 74.75. This 18 acre wayside is a day use area and picnic area. Nearly 200,000 visitors were recorded using this area in 1992-93 (ODFW, 1996). There is a small unincorporated community at Knappa Junction. Woodson Jones Beach is located at milepost 68.00. The Columbia/Clatsop County line is located at milepost 69.95.

Clatsop State Forest lands, managed by the Oregon Department of Forestry, are located on both sides of the highway between milepost 76-79 and scattered along the highway from milepost 70 to Knappa Junction. The Oregon Department of Forestry is currently developing a long-range forest plan for all lands in northwest Oregon including this area (ODFW, 1996).

Two cemeteries are located along this segment, one at Westport and the other at Knappa Junction.

Segment 6 - MP 82.01 - 92.54
The Knappa Junction area has commercial development on both sides of the roadway. There are rural residences located at the intersection of Swenson Road and US 30. The rural community of Fem Hill is located at milepost 91.34. This segment borders the Lewis and Clark Wildlife Refuge on the north side of US 30 and the Clatsop State Forest on the south. A bald eagle refuge, known as the Twilight Creek Sanctuary, was established in 1990 as a roosting and loafing site for bald eagles. The area is located at MP 87.5 immediately north of the highway. The other main land use is forest.

Segment 7 - MP 92.54 - 99.34

The segment is primarily an urban area containing the Astoria town center and urban residential, commercial and industrial areas. The population of Astoria is IO, II 0. It is the center of economic activity for the northern Oregon Pacific coast. Astoria has a large port facility And many designated historical sites and tourist attractions, including the Columbia River Maritime Museum, the Flavel House Museum, and the Astoria Column. There is a public boat landing at milepost 93.45. Tongue Point Job Corp and the Coast Guard Station are located at milepost 95.00. The Port of Astoria is located towards the end of the segment.

Land ownership outside the urban area includes Oregon Department of Forestry south of the highway and US Department of Interior (Lewis and Clark National Wildlife Refuge) both north and south of the highway (ODFW, 1996).

3.0 Future Conditions and Vision

3.1 Future Conditions

City and county comprehensive plans generally identify areas for future growth. Development within the corridor is projected to be concentrated within urban areas, in conformance with adopted comprehensive plans. Review of these plans indicates that there is significant growth projected for the communities closer to the Portland metropolitan area, less growth in rural areas outside urban growth boundaries, and relatively less growth in the western end of the corridor than in the eastern end. This overall trend reflects population growth pressures in the Portland area.

3.2 Urban Areas

Development within the Portland metropolitan UGB will follow the direction set by Metro's *Regional Framework Plan* and the *Urban Growth Management Functional Plan.* This would result in continued industrial uses in northwest Portland, near to US 30. The Linnton Neighborhood Plan envisions significant redevelopment and infill within the neighborhood as part of a revitalized downtown center. The Plan encourages more transit and pedestrian amenities to promote alternative modes. In addition, Metro has designated the land around US 30 between the UGBs of Portland and Scappoose as a green corridor. The green corridor designation seeks to protect the adjacent rural areas from urban levels of development.

The population of Scappoose is expected to increase by 82% between 1995 and 2015, with development focused in the southern and eastern sections of Scappoose (Segment 2). Additional industrial and commercial development will occur around the Scappoose Industrial Airpark and the west side of US 30, respectively.

Significant interest has been expressed in industrial development of land at the intersection of the Scappoose-Vernonia Highway and US 30. Based on the assumptions for future employment and population, a significant proportion of residents (approximately 70 percent) work outside of Scappoose, many commuting to Portland. For this reason, the growth would have a continuing impact on the US 30 traffic volumes.

Over the next twenty years, St. Helens is expected to change from a relatively autonomous community of residents working within the town to a "bedroom-type" community with a higher percentage of residents commuting to Portland for work and other reasons. The 1995 population is forecasted to nearly double by 2016 to 15,600. Most new industrial development is expected to occur in the southeast portion of the city. New commercial activity will likely locate on the west side of US 30, creating substantial linear development along the length of the highway.

The population of Columbia City is estimated to double between 1995 and 2016, from 1,350 to 2,'700. As the city is primarily a residential community, employment growth is not expected to be significant, compared to projected growth in nearby St. Helens. However, because most residents work outside the city, residential growth will impact traffic volumes on US 30.

No population projections had been obtained for Prescott as of August 1998, but as the population is relatively small, no significant impacts were expected to result from future population growth.

Clatskanie's population is also estimated to nearly double between 1995 and 2016, from 1,780 to 3,154.

The City of Rainier's comprehensive plan predicts population growth of over 2,300 by 2015, more than twice the population of 1,720 in 1995. Many residents work outside the city limits, particularly in Longview, Washington. Employment within Rainier is expected to increase with development of the waterfront for industrial and commercial uses.

Contrary to other cities in the corridor, Astoria is predicted to experience slower growth as a percentage of total population, increasing from 11,926 in 1996 to 13,201 by 2016. Another difference from the other communities is the relatively strong employment base within the community.

3.3 Rural Areas

Multnomah County regulations are designed to preserve existing, predominantly agricultural and forest, land uses in the western part of the county, and development will be relatively low. However, the Metro 2040 Growth Concept includes a potential expansion of the Urban Growth Boundary in west Multnomah County, and potential designation of new urban reserve lands. The area closest to the corridor would be near Saltzman Road and Skyline Boulevard. Burlington, an unincorporated rural center, is not planned to be expanded.

In 1995, Columbia County had about 17,400 residents living in rural areas outside the Urban Growth Boundaries. By 2016, the County TSP expects this rural population to increase to 31,970. However, this number is about 7,600 higher than that forecasted by state agencies, and may represent full-buildout.

Clatsop County forecasts an overall decrease in residential population.

3.4 Future Vision

As part of the corridor planning process, the CSC developed the following future vision for social and land use impacts in the corridor:

Management of and improvements to the transportation system are fully integrated with regional and local government land use planning, resulting in transportation efficient land use patterns intended to reduce vehicle trips and miles traveled and promote a live-work balance, particularly within the corridor's eastern portion. A number of communities within the corridor are designated as Special Transportation Areas in an effort to balance through travel needs with the role of US 30 as a Main Street in these communities. A "Green Corridor" is maintained between the Portland urban growth boundary and Scappoose.

4. Policy Direction

4.1 Statewide Direction

Statewide policy direction regarding social and land use impacts is provided in Oregon Statewide Planning Goal 12, the Transportation Planning Rule (TPR), the Oregon Benchmarks, the Oregon Transportation Plan (OTP), and the Oregon Highway Plan (OHP). The statewide plans focus on protecting "livability" by maintaining air quality, accessibility, and efficiency, and by supporting appropriate land use development.

The Transportation Planning Rule is the implementing legislation for Goal 12. It mandates coordinated land use and transportation planning in order to *"avoid the air pollution, traffic and livability problems faced by other areas of the country."*

The OTP policy calls for the development of *"a multimodal transportation system that provides access to the entire state, supports acknowledged comprehensive land use plans, is sensitive to regional differences, and supports livability in urban and rural areas.* " The OTP also requires consideration of economic, social, energy, and environmental (including scenic values) impacts in corridor planning, improvements, and maintenance. Both the OTP and the OHP call for the creation of transportation systems which support compact development in urban areas and limit access as appropriate in rural areas. Land Use Policy 2A of the OTP calls for transportation plans and policies that implement Oregon's Statewide Planning Goals. Action 2A.1 calls for TSPs to support local land use plans and to be sufficient to accommodate planned development in the jurisdiction.

4.2 Corridor Strategy Objectives

Interim Corridor Strategy Objectives for the Portland-Astoria Corridor were developed in 1997 by the Corridor Steering Committee. The objectives for social and land use impacts are as follows:

Effects on Community Livability.

G. 1 Design transportation system improvements to preserve the livability of the communities within the corridor and to avoid, minimize or mitigate impacts to sensitive cultural resources and other community resources.

G.2 Preserve those sections of Old Highway 30 with historic values.

G.3 Consult with Tribal and local governments concerning the presence of ignificant cultural resources/uses.

Land Use Impacts

G-5 Encourage transportation-efficient land use patterns that reduce vehicle miles traveled and promote a live/work balance, e.g. clustered development, mixed uses, maximum parking ratios, and circulation systems that reduce out-of-direction travel. Take advantage of the multi-modal capabilities/ capacities of the corridor to promote development that is not solely auto/truck dependent.

G.6 Accommodate continued growth by constructing alternative local transportation routes.

G.7 Utilize access management to limit the impacts of new development on highway congestion.

G.8 As identified in Metro's Region 2040 Growth Concept, work with Metro, Multnomah and Columbia Counties, and the City of Scappoose to identify appropriate "green corridor" planning and transportation strategies to preserve natural areas between the Metro Urban Growth Boundary and Scappoose.

G.9 Ensure that city and county comprehensive plans, zoning ordinances and local and regional transportation system plans achieve Corridor Strategy objectives.

G.10 Preserve the rural character of that portion of the corridor outside UGBS.

G.11 Limit additional commercial and residential land use designations along the corridor outside UGBs to designated rural community centers.

G.12 Design highway improvements to limit adverse land use impacts, consistent with the TPR and local land use regulations.

4.3 Transportation System Plans (TSPS)

Support for access management, alternative travel modes, and local transportation routes as alternatives to the use of US 30 are expressed by all of the TSPs to some extent. Few, however, identify whether the projects proposed for future development are likely to have land use or community resource Impacts and with the exception of the Metro plans, none discuss compact land use patterns as a way to enhance livability. However, discussion of land use patterns may be found in the various comprehensive plans and Metro's Region 2040 Plan. Review of these plans indicates that there is significant vacant developable land within the corridor to accommodate projected growth, particularly between Scappoose and Rainier.

4.4 Other

Objective 2.22 in Metro's Regional Framework Plan calls for minimizing the impact of urban travel on rural land uses, including the use of green corridor designations of urban connectors that link neighboring towns.

<u>Noise Study for the Highway 30 Corridor - Draft</u>

The purpose of this study is to comply with the FHWA Noise Standard. The study examines traffic noise levels and impacts to adjacent land uses. One proposed mitigation measure encourages local jurisdictions to use land use controls to prevent uses that would be negatively impacted by noise (residences and schools) from locating along the corridor.

<u>Regional Strategies in the Counties of Clatsop, Columbia, and Tillamook</u>

The Regional Strategies Initiative was started by Oregon's governor and legislature in 1987. Under this program, the Oregon Economic Development Department provides state lottery moneys to each of 12 economic regions to support strategies for strong economic futures. The Northwest Oregon Economic Alliance Board, which administers the region's program, has recently completed a six-year economic plan based on three key industries: Environmental Services, Forest

Products, and Tourism. The regional strategies for Clatsop, Columbia, and Tillamook counties encourage industries that will not have a negative impact on the region's high quality of life. The vision statement is "People living and working in harmony with nature," and the Northwest Oregon Economic Alliance Board places a major emphasis on "sustainability" when evaluating projects for funding. The Board has approved 20 projects for Regional Strategies funding, five of which will be funded through low-interest loans.

5. Implementation Program

Protection of sensitive cultural (historic and archaeological) resources and effects on community livability must be considered with any proposed improvements to the transportation system. Therefore, the corridor strategy objectives are designed to forestall adverse impacts to livability and cultural resources.

Effects on Community Livability

G.1 Design transportation system improvements to preserve the livability of the communities within the corridor and to avoid, minimize or mitigate impacts to sensitive cultural resources and other community resources.

City and County TSPs have considered potential impacts to cultural and other community resources in the evaluation and selection of projects to be included in the plans. More detailed study of potential impacts will be conducted as projects move through planning and implementation. Two projects in Portland were identified for improving livability in Linnton and the St. Johns Bridge area.

Project #	Category	Description
45	Strategic	Portland, Visually narrow US 30 through Linnton to calm traffic, making a safer pedestrian environment
75	Constrained	Portland, Historic drainage features from St. Johns Bridge WB upgrade.

G.2 Preserve those sections of Old Highway 30 with historic values.

G-3 Consult with Tribal and local governments concerning the presence of significant cultural resources/uses.

ODOT will consult with Tribal and local governments concerning the presence of significant cultural resources/uses. Several projects were identified that would preserve and enhance the use of the old Highway 30 for bicycle routes:

Project #	Category	Description
55	Preferred	St. Helens, Improve shoulders to provide bike route along Old Portland Road.
56	Preferred	Scappoose, Improve/widen Old Portland Road from US 30 to Scappoose to add bike lanes.
57	Preferred	Rainier, Columbia County, Create bike path along old Highway 30, Rainier to Alston.

Land Use Impacts

G-5 Encourage transportation-efficient land use patterns that reduce vehicle miles traveled and promote a live/work balance, e.g. clustered development, mixed uses, maximum parking ratios, and circulation systems that reduce out-of-direction travel. Take advantage of the multi-modal capabilities/ capacities of the corridor to promote development that is not solely auto/truck dependent.

G.6 Accommodate continued growth by constructing alternative local transportation routes.

G-7 Utilize access management to limit the impacts of new development on highway congestion.

G-8 As identified in Metro's Region 2040 Growth Concept, work with Metro, Multnomah and Columbia Counties, and the City of Scappoose to identify appropriate "green corridor" planning and transportation strategies to preserve natural areas between the Metro Urban Growth Boundary and Scappoose.

G-9 Ensure that city and county comprehensive plans, zoning ordinances and local and regional transportation system plans achieve Corridor Strategy objectives.

G.10 Preserve the rural character of that portion of the corridor outside UGBS.

G.11 Limit additional commercial and residential land use designations along the corridor outside UGBs to designated rural community centers.

G.12 Design highway improvements to limit adverse land use impacts, consistent with the TPR and local land use regulations.

The cooperative and coordinated land use and transportation planning called for in the above objectives have been integrated into the development of local TSPs and this Corridor Plan. City and county comprehensive plans and Metro's Region 2040 Plan have identified areas for future growth. Review of these plans indicates that there is significant vacant developable land within the corridor to accommodate projected growth, particularly between Scappoose and Rainier. The planning process has addressed all modes of transportation (see Sections IV.A through IV.D for specific road, bicycle, pedestrian, transit, freight, air, and rail projects) while developing modal plans that support existing and planned land uses. Access management standards have been established to provide for development consistent with adopted land use plans and functional requirements of the adjacent roads and highways. Coordination with local planning efforts has been accomplished through the integration and concurrent development of local TSPs and this Corridor Plan, ensuring that local plans are consistent with Corridor Plan objectives. Local growth and development is encouraged through a number of off-system projects, including those listed below.

To further address the above strategies, ODOT will continue to work with each local agency to ensure that policies and ordinances implementing the TSPs and Corridor Plan are adopted. An example of such ordinances could be setback requirements for parcels adjacent to state highways.

The Metro 2040 Growth Concept Plan Map designates the area along US 30 from the Metro UGB to Scappoose as a Green Corridor. The intent is to maintain urban accessibility to encourage employment growth, but also limit impacts to the non-urban uses of the rural reserve area. Green Corridor requirements include protection and preservation of an open space with no development. Metro will need to secure a cooperative agreement with the affected jurisdictions and ODOT to impose the Green Corridor requirements along this section of US 30.

Improving local road networks will attract more local trips and accommodate continued growth, as directed by Objective G.6, above. This will also reduce the use of US 30 for intra-city travel. The following projects were identified primarily to implement this objective:

Project #	Category	Description
6	Constrained	Reconstruction of West Gable Road to city arterial standards.
7	Preferred	Minor arterial improvements (pavement, storm drainage) along Bachelor Flat Road
8	Constrained	Improve Sykes Rd. to city arterial standards.
12	Constrained	Replace existing one-lane C Street bridge with two-lane bridge/sidewalks
68	Constrained	Upgrade roadway; new curb, gutters-and sidewalk along C Street-E 5th to Rockcrest.
86	Preferred	Millard - Sykes city street.
92	Preferred	Columbia Blvd. - Pittsburg Road city street.
112	Preferred	Swedetown County Rd, change bridge height.

APPENDIX B

US 30 MEMO
November 12, 1998
Lydia Kachadoorian

TECHNICAL SERVICES BRANCH
ENVIRONMENTAL SERVICES
Office Phone: (503) 986-3477
Fax Phone: (503) 986-3524

INTEROFFICE MEMO

November 12, 1998

TO: Michael Ray, Region 1 Planner
Frederick Eberle, Region 1 Planner

CC: Hal Gard, Archaeologist
Jason Neil, Project Manager

FROM: Lydia Kachadoorian, Archaeologist

SUBJECT: US 30 Draft Corridor Management Plan, Archaeological Component

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This memo acknowledges the receipt of the *US 30 Draft Corridor Management Plan* and requests content changes.

The discussion of cultural resources included within subsection *2.1 "Land Use Patterns and Cultural Features"* of chapter *G-1 "Social and Land Use Impacts"* is incomplete. The majority of the text describes current land use patterns within the corridor, not cultural resources. In addition, the primary cultural resources mentioned in the plan are cemeteries and an occasional historic building. Other types of historic resources and archaeological resources have been omitted from the text. Corridor reports for both the built environment and the archaeological component were completed and sent to the Region 1 office in 1997. Information compiled for ODOT on cultural resources within the US 30 corridor should be incorporated into the corridor management plan. A separate section addressing the historical and archaeological concerns is necessary. Also, archaeological sites can be "historic" in nature, meaning that early non-indigenous settlement and expansion sites need to be considered in addition to Native American sites. Information on both the ethnographic context (Native American) and non-Native historical land use patterns can be found in the November 1997 archaeological predictive model report.

The information in the archaeological predictive model for the US 30 corridor is arranged by segment and addresses known archaeological resources, as well as, the potential of each corridor segment to yield archaeological materials. Probability determinations for the corridor were based State Historic Preservation Office (SHPO) records, physiographic evidence, vegetation zones, General Land Office (GLO) maps, ethnographic accounts, and historical records. It is important to have general archaeological site information incorporated into the descriptions of the segment resources. The specific locations of archaeological sites should be withheld from public documents, because location information is exempt from the disclosure provisions of the Freedom of Information Act. In addition, sensitive archaeological site details, like the presence of human remains, should not be included in publicly available management plans, because archaeological sites are sensitive non-renewable resources susceptible to human impact. It is, however, important to indicate the presence of archaeological sites within this management plan so that their presence may be taken into consideration during project development.

For instance, Segment 1 (*MP 0.00-9.66*) received a medium probability rating for archaeological resources partly based on the presence of five early homesteads and three wagon roads on GLO maps. Favorable environmental conditions and reported nearby prehistoric village sites also effected the probability rating of Segment 1.

Segment 2 (*MP 9.66-31.99*) is a high archaeological probability segment containing twelve prehistoric archaeological sites, two historic archaeological sites, a reported "Indian village", three GLO homesteads, two historic saw mill complexes, two wagon roads, and historic trails.

Segment 3 (*MP 31.99-48.67*) received a low archaeological probability rating for 45% of the corridor segment, a medium probability rating for 14% of the corridor segment, and a high probability rating for 41% of the corridor segment. There are two recorded prehistoric archaeological sites, two unrecorded Native American villages, two GLO homesteads, a wagon road, and an early cemetery within Segment 3.

Segment 4 (*MP 48.67-63.00*) received a low archaeological probability rating for 40% of the corridor segment, a medium probability rating for 17% of the corridor segment, and a high probability rating for 43% of the corridor segment. Historically, plant and animal resources were readily available in portions of the corridor. One prehistoric archaeological site is located within the corridor and several more sites are beyond the boundaries of the highway corridor. A wagon road was also noted on the GLO maps.

Segment 5 (*MP 63.00-82.10*) received a low archaeological probability rating for 32% of the corridor segment and a high probability rating for 68% of the corridor segment. There is one recorded archaeological site and two unrecorded Native American villages within Segment 5. More than ten Euroamerican homesteads were noted on the GLO maps for this segment. The Holocene landforms and multiple fresh water sources indicate that people would have favored this portion of the corridor in both prehistoric and historic times.

Segment 6 (*MP 82.01-92.54*) received a low archaeological probability rating for 67% of the corridor segment and a high probability rating for 33% of the corridor segment. One prehistoric site and several GLO homesteads are located within the corridor. There are three archaeological sites and multiple GLO homesteads slightly beyond the boundaries of the highway corridor. The area surrounding this segment is referred to as an ecological transition zone. Environmental transition zones attract large game animals, such as deer and elk, which were typically hunted by Native American groups.

Segment 7 (*MP 92.54-99.34*) received a low archaeological probability rating for 8% of the corridor segment and a high probability rating for 92% of the corridor segment. Ethnographic records indicate that this area was strongly favored by the Clatsop Indians who utilized the resources of the Columbia River intensively. One archaeological site is located with this portion of the corridor and the presence of six early homesteads and a sawmill was indicated on GLO maps. Regardless of current development patterns, this segment has a high potential to yield archaeological resources associated with tribal peoples and Euroamerican settlers.

Most of the archaeological sites within the US 30 corridor have not been evaluated for significance. These sites could potentially be significant and it is important that the management plan indicate that formal site evaluation will need to occur if these sites are to be impacted by ODOT construction projects. It is ODOT policy to preserve, when possible, cultural resources within the corridor, therefore projects such as the improvements proposed for US 30 from Old Portland Road to Scappose (project #56, page G-10) will have to undergo cultural resource review. ODOT prefers to avoid cultural resources or minimize the impact to them, because mitigation can be temporally and financially costly. Mitigation should be viewed as the last resort and resource avoidance should be stressed as the most preferable option within the management plan. ODOT policy on cultural resources can be found under the heading *00170.50 Protection of Cultural Resources* in the "*Oregon Department of Transportation Standard Specifications for Highway Construction*".

Concerning state goals and statues that effect the protection of cultural resources, Goal 5 of Oregon's Statewide Planning Goals, was not mentioned in the context of cultural and archaeological resources. A discussion of Goal 5 should be included within the "Policy", "Implementation", and "Effects on Community" sections of this management plan. Goal 5 emphasizes the protection of open spaces, scenic and historic areas, and natural resources on the local government level. In addition, the preservation and protection of archaeological and cultural resources within this state is covered under the following Oregon Revised Statutes: *Indian Graves and Protected Objects* (97.740 *et seq.*), *Archaeological Objects and Sites* (358.905 *et seq.*), and *Archaeological Sites and Historical Material* (390.235 *et seq.*).

On the federal level, there are 15 federal legislative acts and 3 executive mandates that effect the treatment and preservation of archaeological and/or cultural resources. The 15 federal acts are: the Antiquities Act (1906), the Historic Sites Act (1935), the National Trust Act (1949), the National Historic Preservation Act (1966 amended 1992), the Federal Collections Act (1966), the Department of Transportation Act (1966), the Federal-Aid Highway Act (1968), the National Environmental Policy Act (1969), the Archaeological and Historic Preservation Act (1974), the Housing and Community Development Act (1974), the Federal Land Policy and Management Act (1976), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), the Surface Transportation and Uniform Relocation Assistance Act (1987), and the Native American Graves Protection and Repatriation Act (1990). The three Executive Orders are: Executive Order 11593 (1971), Executive Order 13007 (1996), and Executive Order 13084 (1998). In addition, the Advisory Council on Historic Preservation (ACHP) and the Council on Environmental Quality have created procedural guidelines for compliance with federal archaeological laws. Of the federal laws, the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), and the Department of Transportation Act (DOTA) (section 4f) have had the most significant impact on ODOT's archaeology program.

I would like to thank the Region 1 planners for the opportunity to comment on the draft of the *US 30 Corridor Management Plan.* A copy of the November 1997 archaeological assessment report has been attached to this memo.

Please contact me (503) 986-3504 if you have any questions regarding this memo. You may also contact Hal Gard (Archaeologist) at (503) 986-3508, or Jason Neil (Environmental Project Manager) at (503) 986-3502. .

Attachment: US 30 Predictive Archaeological Model Report, black and white copy (original color copy provided to Region 1 in November 1997)

APPENDIX C

ODOT Corridor Plan
Portland-Astoria (US 30) Corridor
November 9, 1999

Chapter II. Corridor Overviews
Sub-Chapter C: Existing Conditions
Section 8. Social and Land Use Impacts
and
Sub-Chapter D: Key Management Assumptions and Themes
Section 4: Approach to Key Issues

Chapter III. Corridor Management
Sub-Chapter B. Corridor Plan Objectives
Section 6.4: Corridor Plan Objectives

Chapter IV. Corridor Decisions
Sub-Chapter B: Matrix of Objectives and Solutions
Section G: Social and Land Use Impacts

8.0 Social and Land Use Impacts

Land uses in the Corridor generally consist of undeveloped rural areas between incorporated towns or unincorporated rural centers. There are several incorporated and unincorporated residential areas along US 30, interspersed with forested hills and low-lying areas. An archaeological predictive model (1997) addresses known archaeological resources, as well as the potential of each segment to yield archaeological materials. The segment descriptions below include the probability rating that resulted from the archeological investigation.

Land uses are summarized below by segment:

- Segment I in the Portland metropolitan area and Multnomah County is the most urbanized portion of US 30, including residential, commercial and heavy industrial uses. Within the first half of this segment, uses are split approximately half residential, one-quarter industrial, and the remaining commercial. The segment begins in the heavy industrial area of northwest Portland, and passes through the small neighborhood of Linnton at approximately milepost 8. Residential development in Linnton has tended to cluster on the southwest side while commercial development is located on the northeast side. A separate transportation study for Linnton looked at existing conditions for pedestrian, transit and bicycle circulation and how it was affected by the use of US 30 for through-highway and industrial traffic. The study concluded that improved amenities for these modes were needed, in addition to improvements for industrial traffic. The predictive model indicated a medium probability rating for this segment.

- In Segment 2, the highway passes through the unincorporated communities of United Junction, Burlington, and Warren. Scappoose, St. Helens, and Columbia City are incorporated cities in this segment. Land uses outside of these cities are primarily forest and farm land, with some isolated rural residential areas. One exception is just outside of Scappoose where there are several industrial and commercial areas. The cities of Scappoose and St. Helens are the activity centers for this segment, having the largest populations. The Port of St. Helens provides access to shipping on the Columbia River. Segment 2 contains seven prehistoric archaeological sites, several historic sites and trails, and several cemeteries, and received a high probability rating.

- Apart from the cities of Prescott and Rainier, and the unincorporated rural communities of Goble, Deer Island, and Lindberg, Segment 3 contains mostly forest and farmlands. The Lewis and Clark Bridge provides access to Washington State 'ust west of Rainier. The Trojan Nuclear Plant, at milepost 42, has been decommissioned. Forty-one percent of this segment received a high probability rating for finding cultural or historical sites, one-half received a low probability rating and two received a medium rating.

- Segment 4 of the Corridor consists mostly of farm, pasture, and forest land, apart from a few isolated rural centers (Alston Comer and Delena) and the city of Clatskanie. Forty-three percent of the segment received a high probability rating for cultural or historical sites. The historical "Flippin Castle" in Clatskanie is now a home for seniors. This segment contains the steepest slopes in the Corridor, and has corresponding expansive views of the Columbia River from US 30. This segment had a high probability rating for 29 percent of the segment, medium probability for 64 percent, and low for 17 percent.

- Segment 5 contains a combination of rural uses, including farm, forest and pasture lands as well as unincorporated rural residential areas, such as Westport and Knappa Junction (where the segment ends). There are two major industrial sites outside urban areas, a pulp and paper mill at Wauna, west of Clatskanie and the Portland General Electric Beaver turbine generating plant at Port Westward. The Columbia River Toll Ferry at Westport provides access to the river and to Cathlamet, in Washington State. The Julia Butler Hanson National Wildlife Refuge encompasses 4,757 acres on islands in the Columbia River. Segment 5 received a high probability rating for 68 percent of the corridor segment, and a low probability rating for the rest. Two cemeteries are found in this segment.

- The Knappa Junction area at the beginning of Segment 6 has commercial development on both sides of the roadway. Other unincorporated areas with residences include Svenson and Fem Hill. However, the main land use is forest land, with the Lewis and Clark Wildlife Refuge on the north side of US 30 and the Clatsop State Forest on the south. Segment 6 received a high probability rating for 33 percent of the segment, and low rating for the remainder.

- Segment 7 is primarily an urban area containing Astoria's city center and urban residential, commercial and industrial areas. Astoria is the center of economic activity for the northern Oregon Pacific coast. The Astoria-Megler Toll Bridge links Astoria with the Washington State southern coastal areas. Cultural attractions in Astoria include the Columbia River Maritime Museum, the Heritage Museum, Flavel House, the Uppertown Fire Fighters Museum, and the

Astoria Column. Segment 7 received a high probability rating for 68 percent of its length, a medium rating for 13 percent, and a low rating for 19 percent.

Portland-Astoria (US 30) Corridor Plan II.35
Volume I
Adopted November 1999

II. Corridor Overview
D. Key Management Assumptions and Themes

4.0 Approach to Key Issues

Environmental Impacts
All projects undertaken in the implementation of this Plan must consider impacts to wetlands, other water bodies, farmlands, forestlands, threatened or endangered species and other protected resources, including cultural and archaeological resources. The overall approach is to seek to protect the environment from vehicle emissions, pollutant runoff and interruption of migration routes. The Oregon Plan (Oregon Coastal Salmon Restoration Initiative Conservation Plan) provides the primary means of addressing impacted anadromous fish runs in the rivers and streams in the Corridor. Priorities for culvert repairs were assigned by the Department of Fish and Wildlife based upon the severity of potential biological impact if the culverts were left unrepaired.

Portland-Astoria (US 30) Corridor Plan III.31
Volume 1
Adopted November 1999

III. Corridor Management
B. Corridor Plan Objectives

6.4 Corridor Plan Objectives

Corridor Plan Objectives for social and land use impacts are as follows:

Effects on Communiiy Livability
G. I Design transportation system improvements to preserve the livability of the communities within the Corridor and to avoid, minimize or mitigate impacts to sensitive cultural resources and other community resources.
G.2 Preserve those sections of Old Highway 30 with historic values.
G.3 Consult with Tribal and local governments concerning the presence of significant cultural resources/uses.

G. Social and Land Use Impacts

Implementation Solutions for Social and Land Use Impacts

Corridor Plan Objectives	Service Improvements	Maintenance & Operations Management	Modernization	Refinement Planning Needs	Implementing Jurisdiction	Comments
Effects on Community Livability						
G.1 Design transportation system improvements to preserve the livability of the communities within the corridor and to avoid, minimize or mitigate impacts to sensitive cultural resources and other community resources.		**Project #75 (Portland Historic drainage features from St. Johns Bridge. WB upgrade with constrained funding)**			ODOT, local jurisdictions	TSPs have considered potential impacts to cultural and other community resources in the evaluation and selection of projects to be included in the plans. More detailed study will be conducted as projects move through planning and implementation.
G.2 Preserve those sections of Old Highway 30 with historic values.					ODOT, local jurisdictions	Opportunities to preserve highway sections and to use such for bicycle and pedestrian uses will be explored.
G. 3 Consult with Tribal and local governments concerning the presence of significant cultural resources/uses.					ODOT, local jurisdictions, Tribal governments	