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Post-Mazama aboriginal settlement/subsistence patterns : Upper Klamath Basin, Oregon

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A study was conducted in the Upper Klamath Basin, south-central Oregon, to test Luther S. Cressman's hypothesis characterizing prehistoric Klamath Basin culture as having, from an early date, a marsh/riverine subsistence focus with long-term stability and a slow rate of internal change emphasizing intensification of the existing marsh/riverine utilization pattern. A subsistence/settlement pattern model was developed to predict aboriginal site occurrence in the upper Klamath Basin.

Using the available ethnographic and archeological literature for the Klamath Basin, probability zones were defined for the study area based on the proposed likelihood of aboriginal sites occurring within the zone. High-, medium-, and low-probability zones for site occurrence were defined in terms of natural features, vegetation, water source type and location, and terrain. Field survey for cultural sites was conducted within all probability zones with all zones receiving greater than ten percent coverage. Survey unit selection was based on the location of U.S. Forest Service ground disturbing projects within the study area. In total, 139 aboriginal subsistence sites were identified.

The sites were broken out by probability zone to determine the appropriateness of the probability zone definitions. In all, 111 sites occurred in the high-probability zone, 16 sites occurred in the medium-probability zone, and 12 sites occurred in the low-probability zone. Further analysis revealed that 120 of the total 139 sites occurred within one mile of either Klamath Marsh or the Sprague, Williamson, or Sycan Rivers.

Conclusions based on the observed pattern of site occurrence support Cressman's hypothesis that aboriginal Klamath Basin human subsistence was marsh/riverine oriented essentially through the post-Mazama period and was highly stable and conservative regarding change in subsistence economics. A two-part settlement pattern model was developed for the study area to predict site occurrence in the uplands, which are defined as being land further than one mile from major water bodies, and to predict site occurrence in the land adjacent to major water bodies. The upland model is based on a land utilization pattern emphasizing hunting, infrequent and small-scale gathering, and occasional travel activities. The lowland model is based on heavy, continuous, and recurring occupation of land to acquire and utilize marsh and riverine plant and animal resources. Further study in the area will test and refine this two-part aboriginal land use model.

POST-MAZAMA ABORIGINAL SETTLEMENT/SUBSISTENCE PATTERNS: UPPER KLAMATH BASIN, OREGON

by

FRANCES MARIE PHILIPEK

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CHAPTER I

INTRODUCTION

Many questions have arisen in the field of archeology through time regarding cultural stability and change and prehistoric settlement and subsistence patterns. The collection and use of data obtained primarily through surface examination of sites, and the uses of cultural resource management inventories, studies, and projects, has been of great concern to archeologists more recently as federal laws and regulations have been enacted. These questions and concerns have grown more important with the growth of the field of cultural resource management, changes in the attitudes towards excavation by both the professional community and Indian tribes, and changes in the direction and interests of various archeologists in expanding the knowledge of American cultural history beyond temporal frameworks and artifact chronologies.

The Upper Klamath Basin of southern Oregon had been the focus of archeological studies in the 1940's and 1950's directed toward studying cultural change and adaptation. Since the 1950's, however, little additional work outside of archeological inventory was undertaken in the Upper Klamath Basin area, and work accomplished earlier, mainly by L. S. Cressman, was not extensively tested, re-examined, or expanded. The purpose of this study is to test Cressman's hypothesis concerning cultural stability/change in the Upper Klamath Basin, and to develop a model for predicting the occurrence of aboriginal subsistence sites in the Upper Klamath Basin.

Initially, it was believed that the field data collected for this study would show a large number of aboriginal sites occurring in upland environmental zones, away from the major rivers and the Klamath Forest Marsh. It was intended to fit the acquired site data into a temporal framework, using existing projectile point type chronologies. If upland site use clustered in a particular time period, or was heavy in all periods, a different picture of the Upper Klamath Basin aboriginal land use would have emerged than had previously been presented by Cressman and others. However, the new site data presented a different pattern than expected and few projectile points were located, so that placing the site data in a temporal framework became impossible.

The majority of inventory data from the study area came from cultural resource management activities conducted by the U.S. Forest Service, Winema National Forest, to comply with Executive Order 11593 and the National Historic Preservation Act of 1966 in regard to federal project impacts upon cultural resources. Very few data used in forming a probability model and in testing the model and the hypothesis regarding cultural continuity and stability for the the study area were derived from contexts that involved excavation of sites. The recent data from the field in the study area consists primarily of surface data collected through recording and mapping of sites. The most frequently occurring site type in the study area is the lithic scatter. The lithic scatters range widely in size and in degree of contextual integrity.

One process of scientific research is the examination or testing of existing theories and hypotheses using new or different data, or with new or different methods. For this thesis, information derived in the 1940's and 1950's was tested with new data collected from the field primarily in 1980 and 1981. Conclusions reached through manipulating and correlating the new data in various ways appear to support the conclusions derived for the study area by Cressman in the 1950's, although the earlier data was primarily collected from housepit sites and the recently collected material comes from a variety of upland and lowland site types, predominantly lithic scatters. A refined model for predicting subsistence site patterns and location of site occurrence has been designed from this combination of old and new data. From this model, a general view of the aboriginal subsistence/settlement adaptation pattern has emerged for the Upper Klamath Basin study area.

CHAPTER II

PREVIOUS ARCHEOLOGICAL WORK IN UPPER KLAMATH BASIN

While settlement pattern studies have been done in various portions of the Great Basin and surrounding areas, in the Upper Klamath Basin such studies have been limited primarily to discussions of the ethnographic data. The Sandal and the Cave (Cressman 1964) discusses the Klamath village patterns and house types known from the ethnographic period with supplemental archeological data demonstrating that the Klamath pithouse was well established by A.D. 1540. Cressman further suggests that the ethnographic settlement pattern, including permanent housepit villages, may have been customary by A.D. 200 to 300. Such villages appear to be situated along the Williamson and Sprague rivers, Upper Klamath Lake, and Klamath Forest Marsh. Summer villages are identified as containing summer houses constructed of saplings and mats. Cressman states that permanent winter villages were situated in locations suitable for winter fishing, waterfowling, and collecting of mussels, where drinking water was always available, and in a location protected from winter storms. Summer villages, according to Cressman's analysis, were located to take advantage of plant resource availability with the paramount consideration being "the nearness of a supply of drinking water" (1964:36). Cressman draws upon his earlier work in the Great Basin and in the Upper Klamath Basin at Medicine Rock Cave and several winter village sites published in Archeological Researches in the Northern Great Basin (1942) and in Klamath Prehistory (1956), as well as ethnographic sources to formulate this general settlement pattern.

While not as extensive or concentrated as Cressman's studies, additional archeological work has been conducted in the Upper Klamath Basin. In 1978 Aikens and Minor updated the projectile point chronology developed by Cressman from the Kamkaun Springs Midden site material through obsidian hydration analysis. Excavations at Night Fire Island on Lower Klamath Lake resulted in an analysis of prehistoric avian and faunal remains from a cultural context (Grayson 1973 and 1976) and the initial obsidian hydration rate being established for the Upper Klamath Basin (Johnson 1969). The majority of other work in the Upper Klamath Basin has been the result of cultural resource management projects going back to the 1950's conducted by federal agencies to comply with historic preservation legislation, directives, and federal regulations. Almost exclusively, the work has been inventory and site identification. Studies of this nature include Bryant et al. (1978a and 1978b) for the northeastern and southeastern edges of the Klamath Forest Marsh; Hopkins' (1979) Comprehensive Employment and Training Act (CETA) project survey report, covering various locations on the Winema National Forest; Bunten (1977) on Sycan Marsh; Philipek (1979a, 1979b, 1979c, 1980, and 1981) for various locations on the Winema National Forest; Kraft (1980 and 1981), Petersen (1980), Rager and Churchill (1981), Jenkins (1981), Pederson (1981), Wiggin (1981), and Jesperson-Zukosky (1981) for various Winema National Forest locations. This listing reflects the inventory and site identification work carried out on the Winema National Forest in relation to Forest Service timber sales, land exchanges, and other projects resulting in the identification of 450 cultural sites Forest-wide, with approximately 200 of those sites occurring within the study area. Despite a growing inventory of known sites, very little settlement analysis or overall data synthesis has been undertaken with this information. Knowledge of past land-resource utilization is limited primarily to one site type which is the permanent winter housepit village.

A number of special studies have also been conducted in the Upper Klamath Basin. These include Carlson's henwa and stone sculpture studies (1959), Swartz's petroglyph studies (1978), Cressman and Olien's Salt Caves Dam report (1963), and studies in the Lava Beds National Monument of California by Squier and Grosscup (1952) and Swartz (1961 and 1964). Amateur archeologists have also published books on Klamath prehistory, most notably Carroll B. Howe (1968 and 1979).

In the Great Basin immediately east of Upper Klamath Basin, numerous archeological studies have been conducted, most notably the work at Coffeepot Flat (Aikens and Minor 1977), Bedwell's 1973 Fort Rock Cave research, Weide's Warner Valley projects (1971 and 1974) and O'Connell's Surprise Valley prehistory (1975). To the west, Brauner conducted excavations in the Applegate Dam area from 1979-1981. In 1948 Cressman published a short description of the Paleo-Indian site at Odell Lake. Most recently, lithic and obsidian sourcing projects were conducted by Fleniken et al. (1980) and Sappington (1980) on the Fremont

National Forest, Lake County, Oregon.

A number of good ethnographic researches and anthropological studies have also been conducted in the Upper Klamath Basin with the Klamath Indians. The relevant data collected as a result of these studies will be outlined in the following chapter, but the ethnographic studies will be mentioned here to set the perspective for the archeological work.

In 1890 A. Gatschet produced The Klamath Indians of Southwest Oregon, providing an outline of Klamath lifeways and recording stories and incidents in the Klamath language. In 1897 Coville published his Notes on the Plants Used by the Klamath Indians of Oregon, compiling a thorough list of food, fiber, and medicinal, as well as miscellaneously used and unused plants familiar in Klamath culture at that time. The Material Culture of the Klamath Lake and Modoc Indians of Northeastern California and Southern Oregon (1910) by S. A. Barrett lists elements of Klamath material culture as well as some cultural practices as identified through questioning native informants regarding their knowledge of the items. Leslie Spier's 1930 Klamath Ethnography is the most thorough ethnographic study of the Klamath, including data on material culture, subsistence, social structure, religion, and other elements of Klamath life. A monograph by T. Stern (1966) examines Klamath life on the reservation from an historical perspective. Verne Ray's ethnography (1963) on the Modoc Indians, the Klamaths' southern neighbors and a people related to the Klamath, is also an important study for understanding Klamath culture. M. A. R. Barker collected ethnographic texts, myths, and place-names which were published in 1963. From this work conducted among the Klamath, Barker produced his Klamath Grammar (1964) and Klamath Dictionary (1963b). Many shorter papers have been published on the Klamath, including such topics as the Klamath ghost dance (Spier 1927), Klamath head deformation (Hrdlicka 1905), Klamath childhood and education (Pearsall 1950), gambling games (Dorsey 1901), Klamath myths (Spencer 1952; Barker 1963a), and the Klamath language (Barker 1963b and 1964; Aoki 1963). H. Zakoji, in 1953, wrote his Masters thesis on Klamath cultural change. Little settlement and subsistence data is available in these latter-described studies however, and Gatschet's, Spier's, Coville's, and Barrett's studies provide the best sources of data on Klamath economics.

Based upon the archeological and ethnographic studies, a general outline of Upper Klamath Basin prehistory was set forth by Cressman in Klamath Prehistory. From his work in winter village sites, Cressman suggests that Upper Klamath Basin culture had originated approximately 7000 B.P., after the environment stabilized from the Mazama eruption, and was characterized by cultural conservatism, continuity in prehistoric adaptation, and long-term stability. Excavations in the winter villages revealed slow, gradual change in tool and faunal remains and long-term environmental continuity. Known paleoenvironmental data also suggests long-term environmental stability, as the area has limited evidence of great changes in the marsh and lake shorelines. Surface soil consists of aeolian Mazama ash and pumice little changed from its original condition at deposition except by minor weathering from water and temperature. The pumice soils act as a sponge in storing water, and drainage patterns established in these soils after the Mazama eruption change relatively slowly and only slightly due to this soil moisture storage and slow water percolation.

Aikens and Minor (1978) divided the Upper Klamath Basin prehistoric cultural continuum into two temporal periods based on obsidian hydration dates and Cressman's relative chronology based on point typology and site stratigraphy. These periods are the Early Period, dating from 5000-2000 B.P., and the Late Period, dating from 2000-120 B.P. A third and earlier period, the pre-Mazama Period, has been identified for the Upper Klamath Basin with a pre-Mazama cultural layer occurring at Medicine Rock Cave, but this pre-Mazama period is poorly represented in the site record at this time and known data is extremely limited. Aikens and Minor (1978) dated the earliest level of occupation at the Kawumkan Springs site to 5000 B.P., 2,000 years later than Cressman originally dated the site and established the beginning of the Klamath cultural sequence.

The Early Period economy is characterized by a subsistence pattern that heavily utilized game animals. Large game animals made up the greater number of the animals taken for food, with fish bone occurring much less frequently than rodent bone. The presence of mortars, pestles, manos, and metates dating to this period attests to the use of plant foods in the diet, but specific plants have not been identified in the Early Period levels of sites. By 5500 B.P. fish became increasingly important, with a decrease in small game (rodent) utilization. By 2000 B.P. a heavy reliance on fish, with a concomitant de-emphasis on small game animals, had developed and would continue until the coming of Euro-Americans. The use of large game and shellfish appears to remain relatively stable over time. The beginning of the utilization of wocus, the major Klamath staple, is not known. However, the distinctive Klamath two-horned mano has traditionally been associated by archeologists with wocus processing and is reflected in ethnographic data. The two-horned mano is known from Late Period contexts but cannot be placed in the Early Period. The suggestion is that wocus, as a food, may have become increasingly important over time so that by the Late Period, a special and substantial body of material items, including grinding tools, basketry, special canoes and canoe poles, and social practices, including organization of labor and settlement location, had developed in conjunction with this seed plant's harvest, preparation, and storage.

House types appear to differ between the Early and Late Periods, with the Klamath pithouse seeming to occur within the Late Period. The earlier period house type is unknown, but stone platforms which may represent residential structures have been identified in Early Period site levels. However, work along the Klamath River (south of the study area) and in Surprise Valley (southeast of the study area) resulted in the dating of housepits at 5000-6000 B.P. (Cressman and Olien 1963; O'Connell 1975). Housepits occur very early just east of the study area at Lake Abert and possibly at other ancient Great Basin lakes. It is possible, therefore, that housepits predating 2000 B.P. may eventually be located in the Upper Klamath Basin as well.

Changes in point types correlate with the temporal periods, with the general trend being from larger leaf blades, side- and basal-notched points (such as Cascade, Northern Side Notch, Pinto Barbed, and Humboldt Concave Base points) to smaller triangular corner- and side-notched points (such as Rose Spring Corner Notched, Cottonwood Triangular, East Gate Expanding Stem and Desert Side-Notched points) known from numerous other sites in the Great Basin. Such a trend elsewhere is attributed to the gradual replacement of the atlatl and dart by the bow and arrow.

Other information regarding settlement, trade, social patterns, religion, and artistic styles are not identifiable by time period but have been extrapolated from the ethnographic data. Some notable differences between the protohistoric-historic period and the Late Period should be mentioned to demonstrate that direct correlation between the ethnographic lifeway and the late prehistoric one may be risky.

The ethnographers' native informants identified cremation as the means of disposing of all dead, of whatever age or rank, and denied the custom of burial which was imposed by the whites onto the Klamath people with the establishment of the reservation. However, burial of the dead is well attested by archeological evidence for the Early and Late prehistoric periods, with burials occurring in village middens excavated by Cressman and frequently being removed from village midden sites by looters and artifact hunters. In 1980-81 three skulls were removed by artifact hunters from a housepit site on private land and one skull was removed from a site along the Upper Klamath Lake on private land where it had eroded out onto the lakeshore. Numerous fragments of human bone have been observed in artifact hunters' holes in a housepit midden along the Klamath Forest Marsh, and a burial cave with skeletal components of at least two adults and one child has been located on the Winema National Forest. While archeological data for burial in the Late Period is plentiful, cremation is the only form of disposal of the dead ethnographically claimed.

Another example of late prehistoric archeological evidence and ethnographical accounts discordance concerns pictographs. Spier's informants disclaimed any knowledge of pictographs, stating that Klamaths did not make them although their shamans did repaint existing ones. While pictographs rarely occur in the Upper Klamath Basin, they are present and probably date to within the last 2,000 years as some are apparently related to permanent housepit sites and to cremation/burial sites. Therefore, though the ethnographic information on the protohistoric and postcontact Klamath Indians is both extensive and relatively thorough for an Oregon Indian tribe, it must be used cautiously when taken as an analogy for the precontact Klamaths. On the other hand, much of the ethnographic data can be verified prehistorically, and this valuable source of information should not be ignored. Both the ethnographic data on subsistence and settlement and known prehistoric data on the Upper Klamath Basin cultural economics were used in conjunction with physical data to stratify the study area into probability areas for site occurrence.

CHAPTER III

ETHNOGRAPHIC DATA ON KLAMATH SUBSISTENCE AND SETTLEMENT

As discussed in the last chapter, a larger body of ethnographic literature focusing on the protohistoric lifeways of the Klamath has been produced than for many other Oregon tribes. The data presented in this literature allows for the outlining of a Klamath resource utilization pattern by providing accounts of foods used and food gathering methods recorded for the postcontact Klamath. For the present study the ethnographic studies by Gatschet (1890), Spier (1930), Coville (1897), Barrett (1910), and Stern (1966) on the Klamath have been used for the discussion of Klamath subsistence practices, which follows. In some cases, predominantly for permanent housepit villages, cremation mounds, and mourner's sweat lodges, actual site locations and site names are given. With the exception of the Sycan's being identified as a summering area and of naming some fishing locations and a few religious areas and summering areas adjacent to the Upper Klamath Lake, no other site names or locations are given. Certainly, no upland sites were identified.

Settlement along the rivers, Upper Klamath Lake, and Klamath Forest Marsh was not uniform. The Klamath Marsh-Williamson River group of Klamath (a'ukckni) were identified by Spier's informants as being the most numerous Klamath group, and counted at least 29 winter villages along the southern margin of the Klamath Forest Marsh and on the middle and lower Williamson River. The Sprague River village inhabitants also apparently were considered as part of the a'ukckni people. The a'ukckni Klamath occupied a large territory with numerous well-watered riverine and marsh areas suitable for winter habitation. However, during the ethnographic period more lived at the Klamath Forest Marsh, even in winter, than on the Williamson or Sprague rivers. (See Figure 1--Spier's 1930 map of Klamath Forest Marsh, Sprague River, and Williamson River sites.) Village sites along the marsh contain numerous housepits with one site, du'ilkut, consisting of perhaps 100 housepits. This site, a favorite of artifact hunters, is on private land and has been totally destroyed within the past three years by timber sale harvest and slash disposal. Artifact hunters have severely damaged the entire midden by digging so that little data may be salvage-able from the site to determine period of occupation, settlement use, and social structure, as well as information on how much of the site was occupied at any one time. The settlements on the Williamson River are small and scattered according to Spier's informants, and Sprague River settlements are widely separated while extending some distance up the Sprague River to somewhat west of Gearhart Mountain. Some of the Sprague River sites are also very large. Klotcwa'ets is a large village site identified by Spier and excavated by Cressman on the south side of the Sprague River. On the north side of the river across from the named site another 40 housepits, unrecorded by Cressman or Spier, have been located during a Forest Service site inventory, bringing the total number of housepits at this site to perhaps 70. Spier believed that these Sprague River

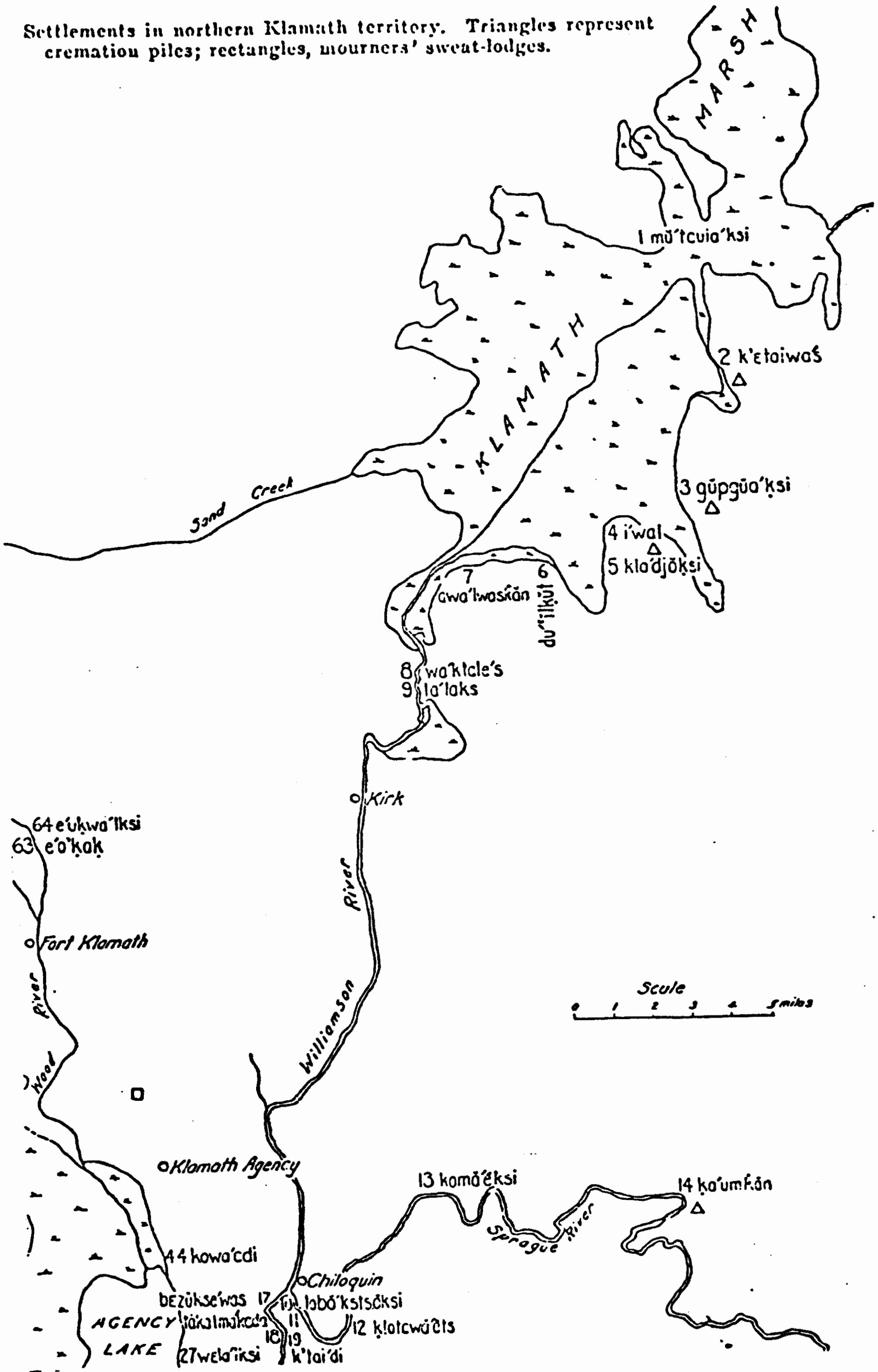

Figure 1. Map of Spier's Klamath Marsh, Sprague, and Williamson River sites. (From: L. Spier's Klamath Ethnography, 1930, Univ. of Calif. Publ. in Am. Arch. and Ethnography 30, pg. 12).

Klamath, who were part of the a'ukckni people, used the Sycan River and Klamath Forest Marsh during the summer.

Besides the Klamath Forest Marsh-Williamson-Sprague River group, four other divisions of the Klamath are documented. Divisions took their name and identity from the geographical location they inhabited. The Agency Lake Group, the Kowa'cdikni, wintered along Agency Lake while the Lower Williamson River people, the du'kwakni, had their winter settlements in the marshy lands constituting the mouth of the Williamson River at Upper Klamath Lake. The Pelican Bay group, the gu'mbotkni, had their winter villages on the west side and north side of Upper Klamath Lake, and the Klamath Falls people, the iu'lalonkni, resided predominantly in the region presently around Klamath Falls. The study area for this thesis lies within the identified home range of the a'ukckni as outlined by these ethnographically recorded divisions. (See Figure 2--Map showing the location of the study area.)

The diet of the Klamath included fish, game animals, fresh water shellfish, and a large variety of plants with wocus, the marsh and lake pond lily, seeds providing the bulk of winter plant food. The acquisition of these foods required the people to range over their home land from marsh and river shores to upland meadows and scabrock flats. Raw material for fashioning tools and weapons must also have been sought. Obsidian occurring as natural nodules is common over large tracts of the study area, but appears only rarely as a natural occurrence near winter village sites, and so required calculated effort for acquisition. More rarely cherts and other cryptocrystallines occur. Nonporous basalt rock

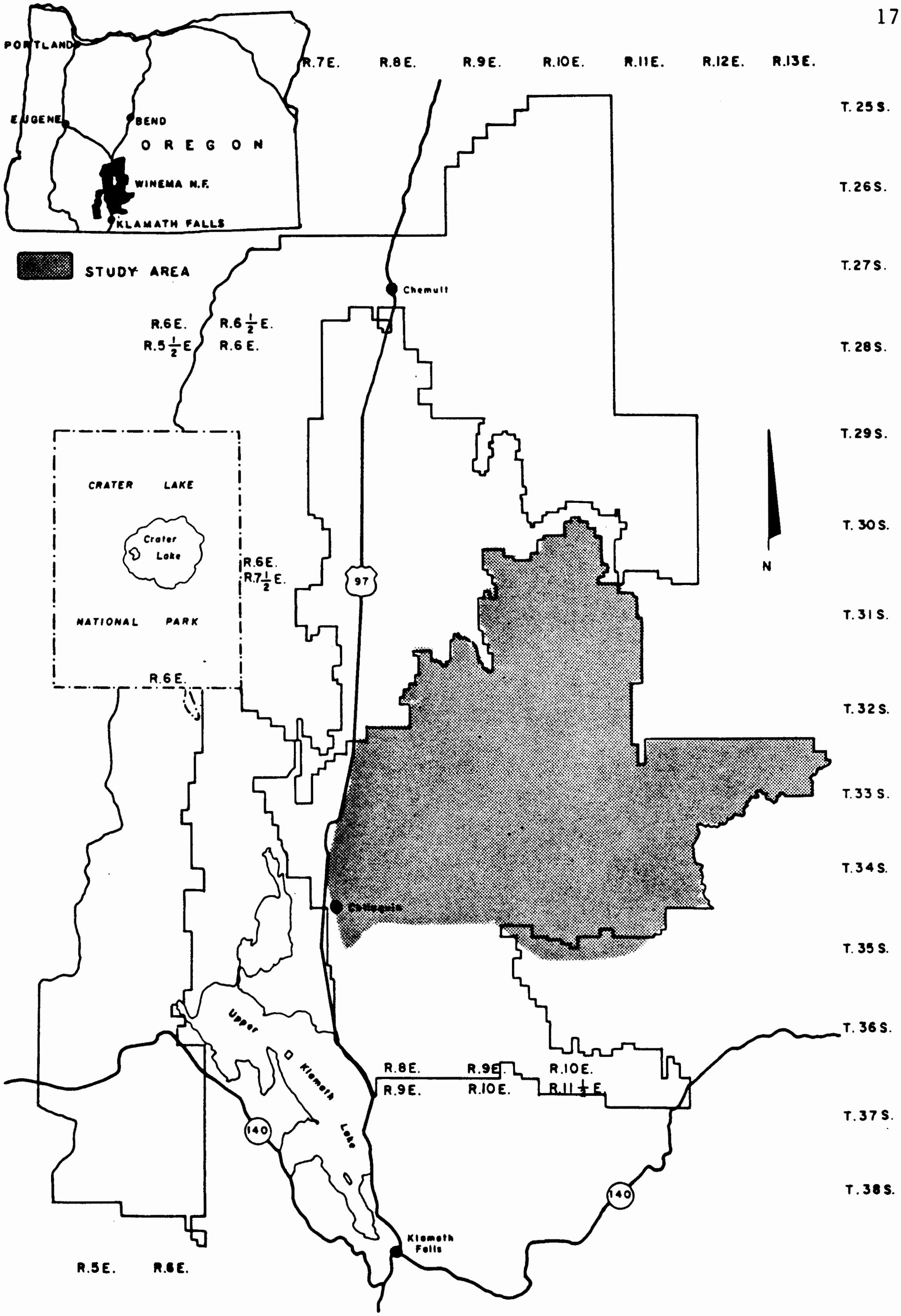

Figure 2. Map showing location of study area.

for manufacturing manos, metates, mullers, hammerstones, bowls, pestles, and other such tools also occurs widely through this area because of its volcanic past, but suitable basalt might need seeking. Porous basalt, which seems most suited for use in making tools for cutting and shaping stone--such as rock saws and rock sanders--may have had to be acquired at some distance from a winter site.

According to all of the published studies the ethnographic Klamaths' diet was based heavily on fish and wocus. Wocus seeds are ripe for only a short time--the last few weeks of August and the first few weeks of September--and fishing, though a year-round occupation for some, peaks in the spring with a greater number of fish and more numerous varieties of fish occurring in March and April. Some fish, such as salmon, ran both in spring and fall.

The ethnographic Klamath subsistence pattern can be classified as central based wandering, with the winter village site serving as the home base to be returned to year after year. Though fishing and gathering sites were also used recurrently, the families using them and the number of people present may have varied due to resource availability. Some plant gathering locations, hunting camps, and lithic quarry areas may have been used less frequently than on a yearly basis, while certain fishing stations and wocus camps may have been consistently occupied every year during the fish runs and wocus harvest.

The Klamath seasonal round of activities commenced with the arrival of early spring and the river fish runs. While the spring fish runs are at their height in March and April, the people living away from the rivers generally did not leave their winter villages until April or May, allowing for the low lying land to dry up and for vegetation to be well started in its growth cycle. Klamaths living along the major rivers did not need to leave the winter village for spring fishing but could take advantage of the early runs from the village location or locations nearby. Larry Keeley (1981) believes that the people from the marsh villages arrived at the river sites and stayed with relatives in the villages or camped near relatives' river settlements during the spring fish run. In return, the river villagers might stay with their kinspeople in the marsh villages for wocus harvest. The Williamson River contains fish year round, but this resource is especially plentiful during the spring fish runs. Some streams contain plentiful fish only during the spring runs. Spier names several fishing sites within the study area. His sites #10, #13, and #17, occurring along the Sprague River and at the Williamson River and Sprague River confluence, are identified as fishing locations as well as winter villages (see Figure 1--Spier's sites map for these locations). Site #13 is identified as the only site where first-fish rites were held by the Klamath. Such rites were held only for the sucker run. Site #17 is identified as a place where spring fish were caught at a dam. All of the winter village sites located along the Sprague and Williamson rivers probably were used as spring fishing sites by their inhabitants. However, which locations villagers from other wintering sites used is not documented and can only be surmised to have been based on suitability and efficiency of a location to harvesting fish, nearness to one's winter village--i.e., accessibility being both quick and easy--and, perhaps, by kinship and reciprocity obligations. While not listed by Spier or Gatschet in their identified fishing sites, other sites along the river may easily have served as fishing stations. Notably, a site on the Sprague River several miles upriver from Ka'umkan and not listed by Spier or Gatschet is called S'Ocholis, which means "Place of the Fish Racks" in Klamath, and would seem to represent a fishing station. Gatschet names some sites near Yainax on the Sprague River also as fishing sites. Such fishing sites are noticeably lacking along the Williamson River above the Klamath Forest Marsh in the ethnographic accounts. Barker's Klamath Texts (1963a) contains two maps and a list of location names, many from Gatschet and Spier, but generally does not identify these locations as sites unless they are villages. Other mapped and listed locations refer to the physical features of the area generally, and Barker notes the place-names or descriptive names of locations.

A wide variety of fish was taken by the Klamaths. These included suckers, trout, salmon, chub, blue minnows, thick skinned minnows, large white minnows, and numerous lake and marsh fish. Informants of Spier said seven kinds of fish ran in the spring, but only suckers, salmon and chub were specifically named. The spring sucker run was still a major event for the local Klamaths in 1981, and many suckers were caught and dried, especially along the Williamson River. Suckers were the only fish for which first-fish rites were held. Gatschet's informants named

March/April as the months for catching large suckers and April/May as the months for drying large suckers. Large fish were claimed to run in the fall. Crayfish and shellfish were taken apparently at any time of the year.

The spring and early summer were spent collecting roots on the marshes and prairies. Gatschet's enumeration of the months of the Klamath year provides information that the digging of ipos, a small plant related to yampa that produces edible roots, started in April/May and Coville (1897) places the commencement of ipo digging at about May 1st. Ipos commonly grow in dry meadows, on dry slopes of wet meadows, on scabrock flats, and in other open areas that are very wet in the spring during snow melt but which quickly dry out in the summer.

The gathering of camas also began in the spring, and Coville placed it around the beginning of April. The plant grows commonly in the open meadows of the ponderosa pine forests. Yampa has also been identified as a root gathered in early spring. In early summer a type of sedge was collected, its stems used for food. Through the summer a large number of plant foods in the form of roots, seeds, and stalks became available and a large number of these plants were gathered by the Klamath women. Roots gathered in the summer came from the arrowhead or wappatoo, a marsh plant, which the Klamaths reportedly collected as far away as the Chewaucan Marsh. Yanch, a plant similar to camas, and peucedanum, a plant with onion-like roots which grows well in dry, open areas, was also gathered. The shoots of the cow parsnip, growing in moist meadows, were used for food when they were about six inches high. Strawberries start appearing in mid-summer in moist, sunny areas of the ponderosa pine forest. Through the summer into early fall, women continued to collect plant foods and products. A list of principal plants collected during this period over a range of plant habitats includes:

Cat-tail: Of this plant, common to marsh, river and lake, the edible tuberous roots were collected.

Bur-reed: Also common to marsh and wetland, the rootstock tubers and stem base were eaten.

Gil-len-a: This plant grows in alkaline marsh soils and produces edible seed carpals.

Wild "Rye" grass: This river bottom plant was harvested for seeds.

Sugar grass: The seeds of the sugar grass (Panicularia) were a favorite seed plant common to marsh lands.

Polygonum: The seeds of the polygonum grasses were harvested at summer's end. These grasses tend to grow in dry, sandy soil near marshes.

Dock: Dock grows in low, open alkaline soils. The seeds of this plant were collected.

Chep-as: This plant also produces edible seeds which were collected. This forb grows in open, upland soils.

Rumex: The leaves, stems and seeds of rumex were collected.

Other seeds were harvested from amaranth, lamb's quarter, cane-grass, tule-grass, and no-tak. These plants occur in a variety of environments not limited to marsh or riparian zones. (See Appendix A for a list of plants, by common and scientific name, that occur in the study area.)

The primary seed plant, however, for the Klamath was wocus or yellow water lily. The wocus plant is plentiful in Upper Klamath and Agency lakes and in the Klamath Forest Marsh. In 1902, according to Spier, the Klamath Forest Marsh alone contained 10,000 acres of wocus. Gatschet's informant said that one woman, alone, could gather and process enough wocus during its season to produce between 350 and 500 pounds of ground seed. The wocus season lasts from mid- or late August to the end of September. The wocus, after harvesting, was prepared for storage and served as the major winter staple with fish.

While the women gathered summer plant crops, the men hunted. Both large and small game were hunted, as was waterfowl. However, deer, pronghorn, and elk hunting predominated in the late spring, summer, and fall. Waterfowl hunting centered around the spring and fall migrations. Deer and elk were hunted in the uplands, and hunting sometimes was carried out into the eastern deserts bordering Paiute country. Pronghorn occur in more open locations, also in the uplands and around the Klamath Forest Marsh. A variety of small game was also taken and among these smaller animals, raccoon, mink, beaver, marmot, porcupine, rabbit, and squirrel were eaten. Bear and mountain sheep, while not frequently hunted, were taken. The Klamath did not eat large carnivores other than bear. A wide variety of animals, including wolves and coyotes, were hunted for their skins. Most hunting was done with the bow and arrow for large game, though snares and traps were used for small animals.

Waterfowl were major food animals hunted near the rivers, lakes and marshes. Waterfowl living in the Upper Klamath Basin included a wide variety of ducks, geese, and swans, as well as brant, pelicans, loons, and gulls. Upper Klamath Lake and Klamath Forest Marsh are along one of the major migratory bird flyways, and modern-day wildlife refuges are established on the east side of the Klamath Forest Marsh, the west side of Upper Klamath Lake, along the Link River, and at Tulelake, south of Klamath Falls. Waterfowl, then, were very plentiful in spring and fall, and the ethnographic Klamath hunted them with bows and arrows, trapped them in nets, and hunted them at night with a light. Night hunting with lights, according to Spier, occurred late in the year after the waters had begun to freeze and waterfowl congregated in the unfrozen spots in rivers and bays. The ducks, attracted by the light from fires set in the canoes, flew toward the canoes and were netted or clubbed.

Insects were also collected according to Gatschet. In late August women scraped up moth chrysalids from the ground and these were eaten after roasting.

In early fall, the women moved to the uplands to collect the ripening wild fruits, nuts, and remaining seeds. The wocus was either transported to the winter village for storage or cached until it could be transported later. Much of this transportation was accomplished by dugout canoe or, in the ethnographic period, by horseback. Prior to the introduction of horses, which occurred before 1825 (though horses were scarce until the late 1840's or early 1850's), wocus, dried fish, and game, as well as roots, berries, and seed, must have been moved to the winter village by footpacking where canoe transport was not possible.

The early and mid-fall plant crops included, among the fruits identified by Coville, elderberry, serviceberry (which was picked in great quantities in its habitat along streams, forest edges, and rocky slopes), chokecherry (which occurs in openings in the ponderosa pine forest and along streams where it was gathered in large quantities in late September), huckleberries (occurring from mid-August onwards in the forested uplands), wild plum (growing on rocky slopes and in openings in the ponderosa pine forest), gooseberry (common to moist bottom lands), yellow currant (growing along streams), red currant (an upland soil native plant whose berries were used as food and whose wood was used for arrow shafts), and less commonly collected blackberries, wild raspberries, and wild rose fruit. Nuts were occasionally collected from the chinquapin which grows in the higher mountain ecological zones. Fall seeds were sometimes gathered from the sugar pine, balsomarrhiza, lba, tarweed, and lo'las.

Besides food collection, fiber and tool material from plants, identified by Coville, was also a necessity well provided for in the Upper Klamath Basin environment. Rocky Mountain flax is a native species of the upper altitude sage plains and forest openings and was much used as cordage fiber for making mats, fish netting, and snowshoe mesh. Cane grass provided both light arrow shafts and weaving material. The principal weaving fiber was tule grass, though nettle and wire grass (alkaline soil plants) were also utilized. Wood was plentiful from pine, fir, cedar, willow, aspen, juniper, and other trees and woody shrubs. Salt is not mentioned as being traded for or acquired until after white men came, though salt occurs naturally in the Klamath River canyon.

In late October the Klamaths began construction of their winter pithouses, and the final transport and storage of cached food was accomplished. The winter village, generally returned to year after year, was occupied from late November to March or April with occasional fishing or hunting adding fresh food to the stored and dried food diet. As starvation food for a long winter, late spring or bad harvest year, the cambium layer under the bark of immature ponderosa and lodgepole pine was stripped from the trees, pounded and eaten. The black moss of the ponderosa pine forests was also collected and eaten under famine conditions.

Winter was spent in tool manufacture and repair, weaving, and socializing. With the reappearance of the ipos and the beginning of the fish runs, the seasonal rounds began again.

The Klamaths had two kinds of dwellings—a large semisubterranean winter pithouse, and a summer brush and sapling frame mat shelter. The pithouse consisted of a timber frame erected over a one- to six-foot pit, covered by stringers, mats and earth, and ranging up to 30 feet in diameter. Summer houses consisted of a mat-covered or brush and bark-covered sapling frame shaping a flat roofed structure with sharply sloping sides. Cooking was usually done outside the main structure in both summer and winter. A small wickiup structure was used as the winter cookhouse.

Great changes are believed to have occurred in Klamath culture in the protohistoric and white contact period. Horses lent greater mobility. Trade and warfare increased. A wide variety of different material goods became available. This changed culture is what is represented in the ethnographic accounts; and, the prehorse Klamath culture, while sharing basic elements with the ethnographic culture, may have had different subsistence emphases and different responses to the environment. However, Cressman (1964) believes that the Klamath subsistence pattern was established 3,500 years ago. Aikens and Minor, in a 1978 reassessment of Cressman's Kawumkan Springs data and material, also see a very early establishment of the ethnographic Klamath pattern. While revising dates on the Kawumkan levels, Aikens and Minor stress Cressman's theme of cultural conservatism and very gradual change in the cultural record throughout Klamath prehistory. With additional data from the Nightfire Island excavations on Lower Klamath Lake, from which only the obsidian hydration rate (Johnson 1969) and the avifauna

(Grayson 1976) have been reported, Aikens and Minor draw a picture of a gradual shift in subsistence emphasis in Klamath culture--from large game and rodent species forming the major food animals to a fish-based diet. Plant food use was represented in all levels at Kawumkan Springs by the presence of grinding stones. Specialized fishing gear occurs only in the upper levels. This data led Aikens and Minor to the conclusion that, "The principal evidence for cultural change was that showing a trend toward heavier emphasis on fishing at the expense of hunting" (1978:13). Aikens and Minor note from Spier's material, "...that the historic Klamath put surprisingly little emphasis on the game that was so abundant in their habitat, instead focusing their economic activity on fishing and plant gathering" (1978:13) and, of Cressman's conclusions, state that:

> ...Cressman's basic perception of an internal development from lesser to greater utilization of riverine and marsh resources, with no fundamental changes in the overall economic system, does not seem seriously threatened.

Of the Nightfire Island data, Aikens and Minor have concluded that:

> ...it is evident that the record broadly parallels and reinforces indications from Kawumkan Springs midden of an early and increasing emphasis on aquatic resources..., and taken together the two records show clearly that the foundations of the ethnographic Klamath culture pattern were firmly established by 5000-6000 B.P (1978:14).

One problem with the above conclusions is that they are based only on samples of data from two types of sites, both located only in aquatic--i.e., riverine, marsh, lacustrine--environments. These site types are housepit villages with middens and one cave site, Medicine

Rock Cave, directly adjacent to the Sprague River. While the conclusions drawn by Cressman and supported by Aikens and Minor may indeed be valid, an examination of other site types in other environments may shed new light on the proposed cultural history of the Upper Klamath Basin. A beginning of this examination must include a stratification of site types and ecozones followed by a discussion to correlate site types with their environment. With the addition of temporal data, upland environment usage can be analyzed to determine if changes occur over time. This study will attempt to undertake the first two steps, leaving the collection of temporal data to future studies.

A brief summary of the ethnographic Klamath seasonal round of subsistence activities, as discussed in this chapter, is displayed in Table I.

The ethnographic economic pattern previously discussed in this chapter may be outlined as follows: In the spring, from March to May, the Klamaths left their winter villages and gathered at the rivers for fishing, with the spring fish runs serving as the focal point of subsistence activities. A wide variety of fishing technologies were used. The gathering of ipos and camas occurred in the spring also, with some women focusing upon the meadow and prairie habitats. With early summer some men moved into the uplands to hunt large game such as deer and elk. The women continued to collect the edible and fiber plants as they matured from a variety of habitats ranging from marsh and streamside riparian to prairie and dry meadow, rocky slopes, and forest openings. By late summer the women and some men, especially elder men, clustered

TABLE I

MAJOR SUBSISTENCE ACTIVITIES OF MEN AND WOMEN BY SEASON

	Winter	Early & Mid-Spring	Late Spring & Early Summer	Mid- & Late Summer	Early Fall	Mid- & Late Fall
Rivers/Lakes	Fishing, tool manufacture, & maintainence	Men: Fishing, waterfowling (Spring fish run)	A little fishing Shell fish collecting	A little fishing	Men:Fishing, waterfowling (Fall fish runs)	Build winter house, fishing
Prairies/Meadows/Flats		Women: Camas & ipo digging	Women: Root collecting & seed gathering	Women: Seed and root collecting	Women: Late seed gathering	
Marshes	Fishing, tool manufacture & maintainence	Men: Waterfowling	Women: Tule and other marsh plant collecting	Women & some Men: Wocus harvest	Women: Finish with wocus. Men: Waterfowling	Build winter house, fishing
Uplands			Men: Hunting	Men: Hunting	Men: Hunting. Women: Collecting nuts and berries.	
Mountains			Men: Hunting	Men: Hunting	Men: Hunting. Women: Collecting nuts and berries.	

around the Klamath Forest Marsh and the lakes to collect and process wocus. In early fall fruit, nut, and late seed and root collecting was accomplished by the women. Berry-picking and other such activities took the women often into more upland environments; men may still have been hunting, either large game or waterfowl. Throughout the entire year, fishing, hunting, shellfish gathering, and waterfowling may have gone on, but the emphasis shifted based on the season and the availability of seasonal resources. Shellfishing apparently remained steady through all seasons except winter. The final gathering of plant crops, hunting, and fall fishing continued into mid-fall. By the end of October, families began to reestablish their winter villages with the reconstruction, frequently in the previous year's pit, of their pithouse. Through the winter, direct subsistence activities consisted only of minor fishing and hunting. Indirectly, subsistence activities were pursued through the manufacture, repair, and maintenance of the tools and materials necessary to sustaining the outlined subsistence pattern. In a famine year cambium and moss may have been collected and eaten in the late winter or early spring. The subsistence pattern was intertwined with trade, warfare, and religious and social activities that also occurred seasonally and regularly, concurrent with on-going economic activities. Two kinds of houses were used aboriginally in the Upper Klamath Basin--the winter pithouse and the summer mat house. Transportation prior to the introduction of the horse was by canoe and by foot. There is no record of dogs' being used for transport and, from ethnographic accounts, outright denials that dogs were ever eaten. While the Klamath reportedly kept many dogs, they were used in hunting, as guards, and as pets. Dog bones occur in prehistoric levels of the middens.

Cressman (1964) and Aikens and Minor (1978) place the establishment of this economic pattern early in Klamath prehistory, with the foundation of this subsistence strategy laid 5,000-6,000 years ago and the pattern firmly established by 3,500 years ago. The basis for their projected beginning and establishment of the ethnographic Klamath pattern rests on data from riverine-marsh environments and, with the exception of one Sprague River cave, from housepit/midden sites. Data from upland sites and from other types of sites is needed to understand fully Klamath cultural prehistory and the resultant ethnographic pattern.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

The area chosen for this study lies in the Upper Klamath Basin in the central portion of the old Klamath Indian Reservation of south central Oregon, Klamath County. The area is now part of the Chiloquin Ranger District of the Winema National Forest, U.S. Forest Service. This tract, with several tracts to the west, is called the North Chiloquin Block of the Chiloquin Ranger District. The area chosen for the study is bounded by major drainage systems on all sides. These boundaries include, to the southeast, the Sycan drainage from the point at which it leaves the Sycan Marsh flowing southwest to Coyote Bucket/Sprague River. The Sprague River, from Knot Table Land west to its confluence with the Williamson River, forms the southern boundary. The Williamson River, from its confluence with the Sprague River through Klamath Forest Marsh to its source in the springs at Head of the River, forms the western, northern, and northeastern boundary. The boundary between Head of the River and the Sycan River does not include a drainage but, rather, follows a more arbitrary and unnatural demarkation, the landline separating the Winema National Forest land from the private land of Weyerhaeuser Company's Long Bell tract. In the study area thus delin-eated (see Figure 2), the emphasis was placed on the federal land occurring therein, though data from the adjacent private land was used where available. Generally, little data is available from the privately owned lands, and no inventories per se have been undertaken on the private land.

The study area consists of approximately 468 square miles or approximately 300,000 acres distributed between Township 30 South and Township 35 South, Range 8 East and Range 13 East, Willamette Meridian. A wide range of ecological zones and topographic situations fall within this block.

Geomorphologic Characteristics

Carlson, in his soils study (1979), thoroughly describes Upper Klamath Basin's geologic and hydrologic character. Physiographically, the study area lies in the Basin and Range province. Narrow, north-south trending ridges are separated by valleys, and elevations may range from 4,000-5,000 feet on the valleys' floors and along the edge of the Klamath Forest Marsh, to nearly 7000 feet on butte and mountain tops. The highest points in the study area consist of Calimus Butte in the south central portion of the study area at 6,622 feet, Applegate Butte in the west central portion of the area at 6,079 feet, and Fuego Mountain in the southeastern portion at 6,391 feet. Immediately outside the northeast boundary stands Yamsay Mountain at 8,196 feet. This mountain figures prominently in the Klamath Indian vision quest ceremonies and in Klamath legend. To the west, across the Klamath Forest Marsh, lie the eastern flanks of the Cascades, most prominent of which are the foothills, slopes and jagged peaks of the ancient Mt. Mazama, now Crater Lake.

The relevant geologic history of the area dates back approximately to the early phases of the Pliocene Epoch, 10-15 million years ago. At that time rivers draining the area were blocked by flows of basalt and formed into large shallow lakes. During the continuous volcanic activity in the Cascade Range to the west, large quantities of volcanic material ejected from the mountains were deposited as tuff into the lakes. Local eruptive centers occurred in and around the study area creating additional andesite and basalt flows and outcrops as well.

Towards the end of the Pliocene, faulting began to take place, greatly altering the shallow lakes. The north-south trending ridges that characterize so much of the topography of the study area resulted from the development of uplifting systems. Such ridges form a sharp, steep face on one side (in the study area the west face generally is steep), with a gentler slope on the opposite side (in the study area, this face is generally to the east). Faulting continued into the Pleistocene Epoch.

The faulting action, with the uplifting of blocks of land, resulted in the formation of basins which, from drainage ways, became small lakes. These lakes continued to be filled with silts and pyroclastic material.

The Pleistocene Epoch in the Cascades was marked by volcanic activity, as well. Locally, eruptions of Mt. Shasta and Mt. Mazama caused additional ash and pumice deposits over the entire south-central portion of Oregon.

Glaciation occurred on the slopes of 12,000-foot Mt. Mazama but did not occur within the study area, and during this period of glaciation and the retreat of Mazama's glaciers, relatively little volcanic activity was occurring in the area. The drainage systems of the immediate pre-Mazama period were developing and stabilizing. The first human inhabitants of the study area entered the Upper Klamath Basin at this time. Some rivers such as the Sprague River and the Lost River, and lakes such as Upper Klamath Lake, had developed though these aquatic areas would be greatly altered before assuming their present shapes.

During the period of relative volcanic inactivity, gases, liquid, and crystal magma built up in the volcanic chamber under Mt. Mazama. The buildup and arrangement of these gases and magma material caused the violent and massive eruption approximately 7,000 years ago which created Crater Lake and altered the land around Mt. Mazama, in some instances, entirely. Mazama ash and pumice covered an area of more than 350,000 square miles, with more than 5,000 square miles covered with over six inches of pumice. All of eastern Oregon was blanketed, and the areas of present day Klamath Forest and Sycan marshes were buried in aeolian ash and pumice. This ash and pumice eruption may have lasted several months or several years and was followed by a lava and pumice flow. Avalanche pumice poured into upper Klamath Forest Marsh, traveling even uphill. At the end of this flow, Mt. Mazama's eruption came to an end with gradually weakening explosions. However, the deposited pumices, in some places 300 feet deep on the slopes of old Mazama, tapering to the shallow avalanche pumice and deep aeolian pumice and scorias,

"...continued to give off acid fumes for many years" (Williams 1956).

From the late Pleistocene into recent times, small, localized volcanic activity continued, and cinder cones attest to such activity in the study area. One example is the previously mentioned Applegate Butte.

After the Mazama eruptions, the area slowly adjusted and stabilized, with the present water courses developing. The water-absorptive property of pumice acted as a water storage system with springs developing and creating creeks and waterways where the stored water percolated to the surface. The general north-south ridge and valley systems channeled this water, and Klamath and Agency lakes began to take on their present shapes. The lakes, in the process of eutrophication, and due to drainage and water flow changes created by the pumice and ash soils, retreated from their older shorelines--several hundred feet above the present line and observable at Solomon Butte and around Bloody Point--to their historically recorded level. Klamath Forest Marsh was fed by the newly developed upper Williamson River. During the late historic period, portions of the lakes and marshes were drained for farming. Removal of water upstream for irrigation has increased the natural eutrophication of the Marsh and lakes.

Hydrologic Characteristics

The creation of the hydrology of the study area was briefly described in the geomorphology section. The present section will consist of a brief description of the drainages themselves.

The study area lies in the Klamath River drainage basin, and the spring-fed and river-fed marshes and lakes are the most distinctive water bodies present. Klamath Forest Marsh borders the study area to the northwest and north, with the Sycan Marsh touching on the study area on the east. Marshy conditions occur in the study area at Head of the River, Wilson Flat, Abraham Flat, Silver Dollar Flat, Hallet Spring, and portions of the Sprague and Williamson rivers.

Runoff from the forested lands eventually flows into Upper Klamath Lake, and the major courses for this water to leave the study area are the Sprague, Williamson, and Sycan rivers. Major, permanent creeks entering the Williamson River, upstream to downstream, include the Bull Pasture Creek, Haystack and Telephone creeks, Skellock Draw Creek, Yoss Creek, Hog Creek, and Spring Creek. The Sycan River is fed by numerous unnamed drainages, with Torrent Spring and numerous other springs adding water downstream from the Sycan Marsh. Sprague River drains much of the southern portion of the study area. Other major creeks in the study area consist of Clover Creek, Meadow Creek, and Wildhorse Creek in the northern reaches, Wildhorse Creek in the eastern portion, and the Calimus drainages to the south. Intermittent drainages occur throughout the study area. Springs are widely scattered and provide a year round water supply. The water from a spring may travel several miles or only a few hundred feet before being reabsorbed by the soil and evaporated by the dry air. Springs do occur commonly due to the absorptive nature of the ash and pumice soils. Major springs include, from north to south and west to east in the study area, Bluejay Spring, Corral Spring, Dice

Crane Spring, Buckhorn Springs, Whitehouse Springs, Slabhouse and Applegate Springs, Wildhorse and Bottle springs, Torrent Spring, North Calimus Spring, and Kamkaun Spring. The entire study area is well watered, and large dry stretches of landscape do not occur. Anywhere within the study area water is usually within less than a day's walk.

Arid and semiarid regions normally exhibit marked seasonal differences in stream flow and this fluctuation can be observed in the study area with the intermittent drainages and in meadows and flats. Major drainages in the Upper Klamath Basin are less subject to the extreme variation of the seasons because of their spring-fed nature. Rainfall and snowmelt stored in the uplands flow down through the pumice to the underlying basalt bedrock, and then flow laterally through the pumice until the water emerges on slopes. According to Carlson (1979), this downward infiltration and lateral seeping is slow in the pumice because of the limited number of contact points between soil particles and the water within the porous pumice and ash particles, and thus absorbed water continues to emerge at the surface in some places through the dry season at a steady rate. In the early to mid-autumn, some permanent spring and stream levels fall, just as rain and snow begin to replenish the surface water levels and underground water storage recommences. By mid-summer, intermittent drainages have dried up.

Soils

The soil of the study area is little changed from its parent material--i.e., the ejecta of Mt. Mazama deposited by the prevailing winds at the time of the mountain's eruption 7,000 years ago. Very little soil building has occurred in the original material.

The soils of the Winema National Forest have been classified by G. Carlson (1979) into pumice-and-ash soils and nonpumice-and-ash soils. Within the pumice-and-ash soils, six subdivisions are made by Carlson, and each subdivision is further divided by land type. Within the study area, Carlson's soil group A (Lapine-like) and soil group B (Shanahan and Shukash-like), both pumice and ash soils, make up the bulk of soils present. The B soils generally cover the southern and eastern portions of the study area (see Figure 3--Soils of the Study Area) and consist of air-laid pumice and ash in a 20- to 40-inch mantle over the original, now buried, soil. The B pumice soils are gravelly and coarse sandy in texture with underlying cobbly sandy loams in the older buried soils.

The A soils occur in the western and northwestern portions of the study area (see Figure 3) and consist of deep soils formed in the coarse air-laid pumice and ash mantle. The original, buried, soil surface lies at a greater than 40-inch depth below the present surface. Soil texture ranges from gravelly to coarse sandy, with a high gravel content.

For both soils, slope ranges from 0-70 percent, with most of the slopes less than 35 percent.

Around the edge of Klamath Forest Marsh, some soil group G (Wickiup-like and other unnamed soils) occurs. This soil is made of water reworked pumice and ash and lies on slopes ranging from 0-5 percent.

On the eastern margins of Klamath Forest Marsh, some soil group

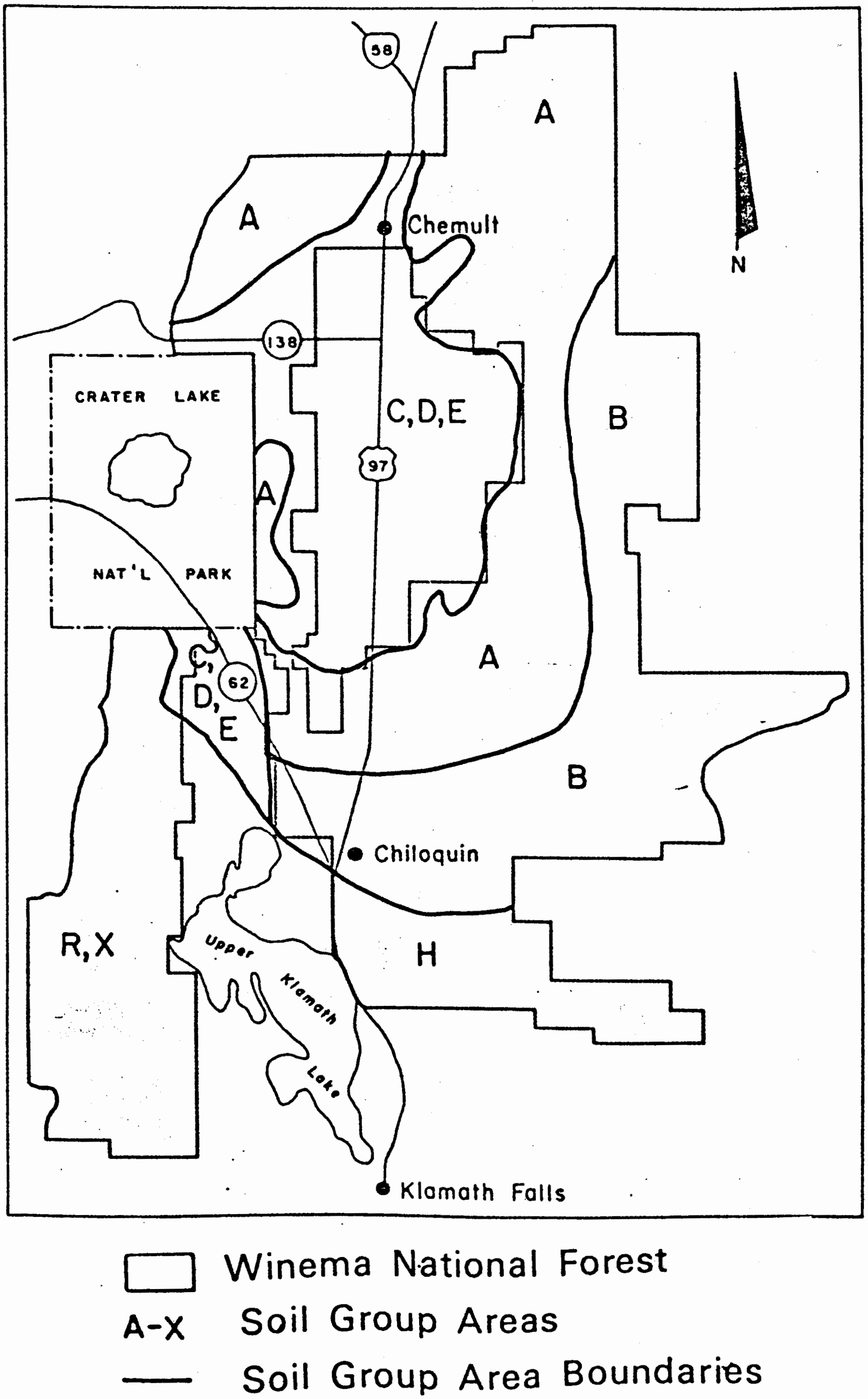

Figure 3. Soils of the study area (after Carlson 1979).

C--avalanche pumice soils and soil group D, soils formed of the fine ash formed on the outer, leading edge of the avalanche pumice--occur. The slopes associated with these soils range between 0 and 15 percent.

Along the Marsh and the Williamson and Sprague rivers, some alluvium/riparian shallow top soils have developed. The study area soils are all pumice and ash based and contain some special properties as a result. In addition to absorbing and storing large quantities of water and having a slow water movement rate, pumice soils have low heat absorption and storage, slow heat transfer, rapidly changing soil surface temperature in response to heat, and absence of heat radiation from soil at night. The thermal and hydrologic properties of the soil create extensive frost heave in freezing temperatures with four- to eight-inch ice crystal columns standing on the soil surface and affecting the top 8-10 inches of soil. When dry, pumice soils have little cohesion, and soil displacement, especially on slopes, is great. The soils' fertility is also low, and humus and organic matter tends to be restricted to the upper six inches of soil.

Climate

The climate of Upper Klamath Basin is characterized by generally dry summers with moderately high temperatures and wet winters with moderately low temperatures. Winter storms enter the area from the west and southwest, having originated in the north Pacific. Most precipitation comes in the winter in the form of snow, though summer storms occur as a result of convection. Between 15 and 30 inches of precipitation is received by the study area annually. The months of maximum precipitation/minimum temperature are December and January, while July, August, and September show the least precipitation and maximum temperature. Most precipitation occurs between October and March. Summer storms generally come from the north or northwest.

Temperatures of 32° F and lower, causing killing frosts, have been recorded in Upper Klamath Basin in every month of the year. Summer nights generally are cool. The year round temperature maximum and minimum averages, based on 17 years' recording, are 60.9° F and 28.1° F, respectively, for the general study area (recorded at Chiloquin Ranger Station). The average January temperature maximum and minimum for the same period are 38.6° F and 14.8° F, with an overall January average of 27.1° F. The average July maximum and minimum temperatures for the same period are 83.8° F and 41.1° F, with an overall July average of 61.5°F. While great swings may occur in the temperature between any two years, the temperature is generally moderate through the year. Humidity is low. The growing season in the Sprague and Williamson river valleys is about 90 days.

Prevailing winds in the Upper Klamath Basin are from the west and southwest with an average recorded wind velocity of six miles per hour over a long term. Localized wind patterns vary, and high velocities occur effected by the topography. Severe wind storms are not uncommon. Evapotranspiration rates are related to wind, temperature, topography and vegetation and vary over the study area.

Vegetation

Plant communities on the Winema National Forest were mapped in 1976 over the pumice zones by Leonard Volland. While the plant communities were mapped on a gross scale of one-half-inch-to-the-mile and concentrated on timber types, a large body of ecological data on the native plant communities was gathered and published by the Pacific Northwest Forest Service.

Volland (1976) separated the plant communities initially into forest and nonforest types. These types were then further divided into categories based on overstory, understory, and groundcover dominant species (see Figure 4), as follows:

The major forest-type communities occurring within the study area include, in the low to middle elevations, the Ponderosa Pine/Bitterbrush/Needlegrass community (CP-S2-12) and the Ponderosa/Bitterbrush-Manzanita/Needlegrass community (CP-S2-13). The former occurs on the flats and lower levels of slopes while the latter occurs on the middle and upper levels of slopes.

In the middle elevations, the Mixed Conifer/Snowbrush-Manzanita (CW-S1-12) community occurs with the Mixed Conifer/Manzanita (CR-S1-11) community and the Lodgepole/Bitterbrush/Needlegrass (CL-S2-11) community. The mixed conifer communities tend to take upper slope positions, while the lodgepole take lower slope positions as well as backside-of-slope positions.

In the upper elevations, the Lodgepole/Bitterbrush/Needlegrass

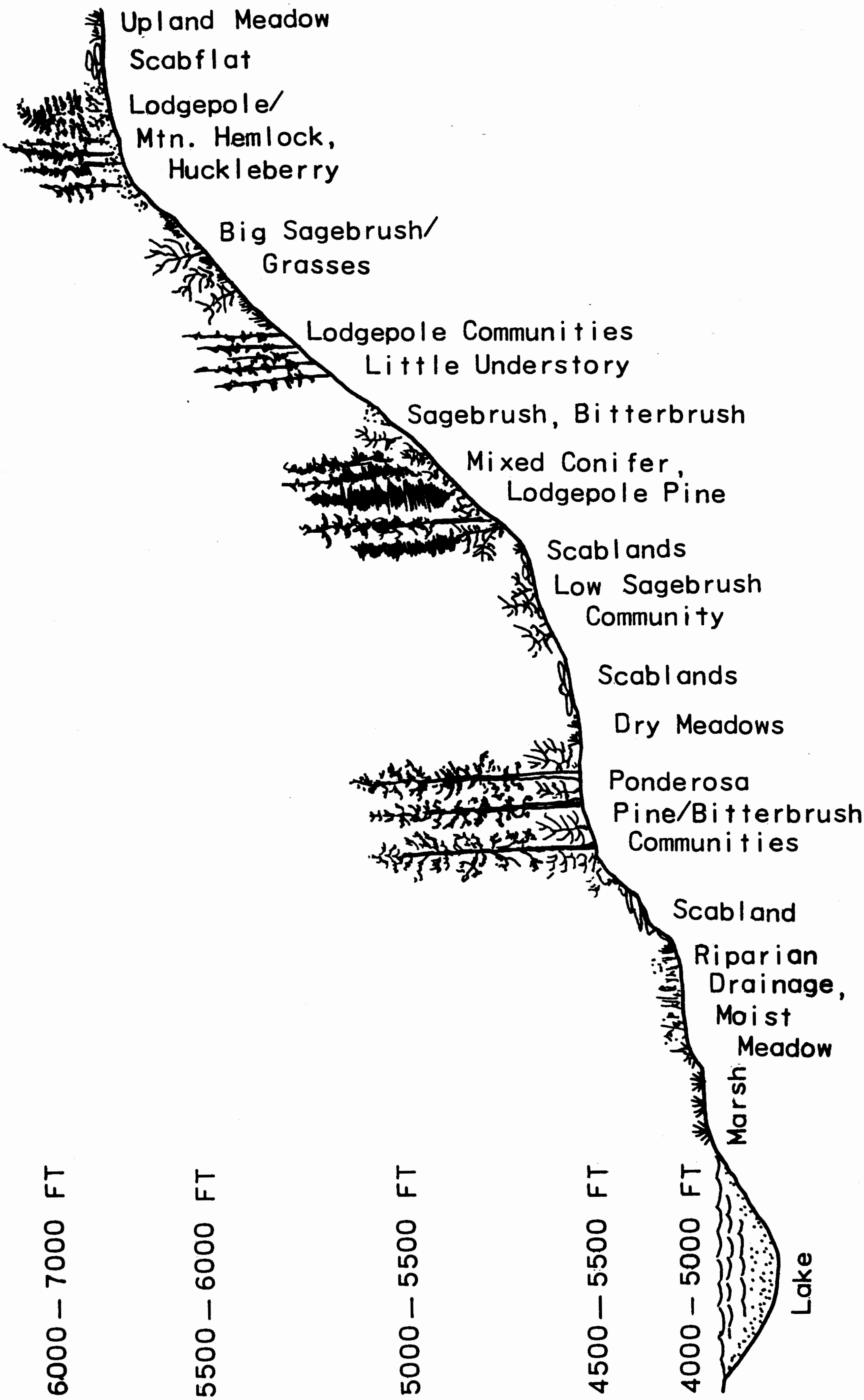

Figure 4. Plant communities in the study area.

(CL-G3-11) community utilizes the lower and bottom slope positions including frost pockets, while the Mountain Hemlock/Grouse Huckleberry (CM-S1-11) community is confined to upper slopes of mountain ridges and elevated plateaus. The Lodgepole/Manzanita community (CL-S3-11) utilizes mountain and ridge side slopes up to 7,000 feet.

In forested areas immediately adjacent to the Marsh, the forest plant communities tend to remain the same as in the forest interior, with some change in understory and ground cover types including bearberry, sedges, and other such forbs and shrubs. Many of the plant communities designated contain the same plant varieties with the overall percentage of dominant versus less common species being the indicator of community type.

The lower elevation communities are dominated by ponderosa pine in the timber overstory and bitterbrush in the understory. Yarrow, strawberry, lupine, rose, serviceberry, balsamroot, and snowberry occur in the ground vegetation of these communities.

In the middle elevation communities, mixed conifer stands consisting of red fir, white fir, western white pine, and lodgepole pine stands, dominate the timbered overstory. Strawberry, balsamroot, serviceberry, squawcarpet, sedges, rockcress, and needlegrass may be present in the ground vegetation.

The upper elevation communities are dominated by lodgepole pine and mountain hemlock. Ground vegetation consists of sedges, lupine, sulfur buckwheat, fireweed, and needlegrass under the lodgepole pine and aster, Nuttall violet, anise, and lupine occurring with the mountain hemlock.

Except for the occurrence of serviceberry, strawberry, rose, and isolated seed and root plants, the forest plant communities offer few of the aboriginally utilized plant foods and fibers. Sugar pine seeds and cambium came from the trees themselves, as did wood and bark, but other utilized plants, with the exception of the fruit producers (berries and rose), do not seem to occur densely enough in the forested zones to have justified systematic collection. Bitterbrush is a favored mule deer browse.

The nonforest plant communities offer a wide range of aboriginally utilized plant resources. These communities include, in the study area, Dry Meadow (MD-19-11), Moist Hairgrass Meadow (MM-19), Moist Bluegrass Meadow (MM-90), Bluegrass Scabland (GB-99), Bitterbrush/Needlegrass-Fescue (SD-33-11), Big Sagebrush-Bitterbrush/Bunchgrass (SD-20-13), and Low Sagebrush/Idaho Fescue. The determinants of these plant communities' occurrence are slope condition, depth of water table, and soil type and texture.

The meadow communities occur at the bottom and immediate margins of the slopes along drainages and around basins, flats, and depressions. The dry meadow type has a water table depth exceeding 45 inches in July, while moist meadows have a water table depth of 45 inches or less in July. Meadow vegetation includes ipos, camas, clover, sedges, and numerous other grasses and forb plants.

Scablands may occur on a flat or slight slope along ridges, benches, and escarpment heads. While scablands are wet in spring and early summer, they are dry for much of the remainder of the year. These lands are very stony with clusters and paving of basalt and andesite covering much of the ground surface. Soil development is minimal. Grasses and forbs grow in the available soil, especially early season plants and perennials when conditions are wet.

The bitterbrush and sagebrush communities grow on mid- and upper-slope positions. Low sagebrush favors the lower elevation rolling slopes and ridgelines with cobbly soils, while big sagebrush favors the higher elevation steep slopes with rocky, cobbly soils, and prevalent surface rock. Numerous grasses, particularly the annuals, are common as are some of the hardier bush species.

One additional nonforest plant community occurring in the study area is the marshland. Marshlands occur in well-watered areas where the water table is high, often remaining on the surface over large areas through the dry season with interspersed pools and channels. Numerous grasses and reeds live in these marshy habitats, as well as some flowering plants and forbs.

These nonforest plant communities occur between 2,600- and 6,100-foot elevations, generally wherever the specific conditions are met for their development and continuance. Lodgepole pine encroachment on meadows is common, but in the forests in the Upper Klamath Basin prior to Euro-American management, fire was the natural agent helping to produce and maintain forest openings. Peter Skene Ogden, John Fremont, and other early explorers in the Great Basin and Upper Klamath Basin reported that the Indian inhabitants deliberately set fires throughout the area. However, extensive information concerning the Native American practice of deliberately setting fires to control and manipulate vegetation is lacking for the Upper Klamath Basin at this time. Since such practices were common to the plateau peoples and the early Willamette Valley residents, the Klamath peoples' neighbors, it is quite likely that the Klamaths' ancestors may have used fire similarly to maintain prairies, meadows, and the Marsh itself as producers of desired plants.

Fauna

Having lived and worked in the Upper Klamath Basin for the past three years, the author has noted that wildlife is plentiful in the study area and consists of a wide variety of waterfowl, birds, mammals, and fish. (See Appendix A for a list of animals, by common and scientific name, that occur in the study area.) Seasonal changes affect the number, location, and behavior of these animals.

The marshes, streams, lakes, and rivers contain numerous varieties of fish as well as crayfish and shellfish. Suckers, mullets, minnows, trout, and salmon occur in the rivers, along with bass, chub, and other lake fish. Spring and fall fish runs in the rivers create periods of abundance for several varieties of fish including suckers, and salmon.

Waterfowl are especially plentiful in the spring and fall in the lake and marsh environments where ducks, geese, swans, and other water fowl rest and feed during their seasonal migrations. Some waterfowl are year-round residents of Upper Klamath Basin. Numerous duck varieties as well as brant, cranes, pelicans, loons, and gulls are recorded as occurring in the Upper Klamath Basin. Other birds such as woodpeckers, blackbirds, jays, magpies, owls, and raptors also live in the forest. Upper Klamath Basin is a major wintering area for bald eagles.

Large game has consisted of black-tailed deer, red deer, mule deer, elk, pronghorn, and mountain sheep. The abundance and availability of these animals shift between summer and winter range and fawning areas. Small animals consist of beaver, rabbit, mink, otter, raccoon, badger, and a wide variety of rodents. Carnivores such as wolves, coyotes, grizzly and black bears, cougars and bobcats, foxes, and smaller carnivores such as martens and weasels were also present, although wolves and grizzlies presently do not live in the area.

Rattlesnakes do not occur in the study area, but the reptilian animals are represented by other snakes and by lizards. Tree toads, marsh frogs, and a wide range of insects are present. Mosquitos are especially prevalent around the marsh and drainages and in the late summer, wasp swarms appear throughout the area.

Environmental Continuity

Once the soils, hydrology, flora, and fauna stabilized after the Mazama eruption, it seems from the limited amount of paleoenvironmental data available for the Upper Klamath Basin, that little overall change has occurred. Faunal analysis of mammalian and waterfowl remains from Nightfire Island brought Grayson (1973 and 1978) to conclude that no significant environmental changes were reflected in mammalian remains and that, except for minor relative proportion changes, waterfowl use of the area has remained comparably stable.

Cressman's site excavations in the 1940's also reflected similar faunal species present from 5000 B.P. onwards with incidence of human use of the fauna showing proportional change only. It seems possible that the Upper Klamath Basin has had little natural environmental change since the Mazama event. However, shorelines marked by Mazama pumice chunks occur along Solomon Butte and dunes occur in the Bloody Point area, indicating higher lake levels. One quarry site on a bench along Klamath Forest Marsh contains water smoothed flakes of obsidian, indicating the site was submerged at some time after the Mazama event and after humans had occupied the lakeshore. Such evidence for variation in Upper Klamath Lake's water level is contradictory to the evidence demonstrating little environmental change.

CHAPTER V

PREFIELD ASSUMPTIONS AND FIELD METHODOLOGY

Identification of Probability Zones

For the purpose of this study, probability zones were designed in an effort to predict aboriginal site locations on the basis of existing ethnographic and prehistoric subsistence and settlement data. The ethnographic data outlined a subsistence economy based on a heavy utilization of fish and plant foods, with hunting taking on secondary importance. Plant foods were collected from marsh, prairie, and upland shrub-bush environments. Settlement patterns consisted of a central-based wandering system characterized by very large winter villages containing substantial permanent structures reconstructed and reused each year. Men and women pursued generally different subsistence activities throughout the year, and summer mat houses may have been constructed at summer camps. Nonwinter living sites were spatially related to rivers for fishing, to marshes, meadows, and prairies for plant gathering, and to upland zones for hunting and berry-picking. Cressman, Aikens, and Minor believe that this ethnographic pattern may have been established and operating for several thousand years.

The land in the study area was divided into three categories of probability zones on the basis of the relative likelihood of prehistoric-protohistoric sites occurring in a particular area. These zones are the "high-probability", "medium-probability", and "low-probability" zones, and their defining criteria include the features outlined in Table II. The zones were defined to predict occurrence of all types of aboriginal sites, not subsistence sites exclusively. The high-probability zones were expected to contain the largest number of sites and the greatest number of site acres relative to the medium- and low-probability areas. A more detailed description of the criteria used to define the probability areas occurs later in this chapter.

After the zones were defined, they were marked on U.S.G.S. topographic quadrangles, usually of the 15-minute series. In the field, aerial photos were frequently used with topographic quadrangles and Forest Service Fire and Transportation maps to define the designated probability areas more precisely. The aerial photos, typically on the 1:24,000 scale, were also used in prefield areal reconnaissance to locate and define the terrain, vegetation, and water source data upon which probability areas generally were designed.

Probability zones for site occurrence were determined, prior to entering the field, on the basis of several environmental elements. The proximity and type of water available, the types of topographic features present (such as buttes, rocky outcrops, ridges), general terrain considerations (such as how steep were slopes and how hilly was the tract), type and distribution of vegetation, and presence or absence of known prehistoric quarries or lithic material sources, together, were the major criteria used for determining probability levels of specific areas.

Also considered in designing probability zones was the presence or

TABLE II

PROBABILITY ZONE CORRELATED TO FEATURES

	Water	Vegetation	Terrain	Other
High Probability Zone	Shores and banks of permanent water sources manifested as: streams creeks rivers marshy areas lakes springs	Wet Meadows Dry Meadows Natural Forest openings	Scabrock Flats Saddles between high probability areas Flats immediately above and adjacent to canyons with permanent water bodies	Ethnographically defined use areas Known natural cryptocrystalline sources
Medium Probability Zone	Temporary but recurring water supply manifested as: intermittent drainages small forest basins temporary springs		Major Ridges Butte Tops Drainage Divides Rock Outcroppings Heads of Drainages	Areas immediately adjacent to high probability zones along major water ways and water bodies. Apparent natural travel routes between high and medium probability zones
Low Probability Zone	No water source within a range of from one mile to 300 feet	Heavily timbered land	Steep Slopes Stone, barren openings Minor Ridges Low, timbered butte	

absence of passes and natural travel routes between known site areas and areas suspected of having had heavy prehistoric utilization. While game movement patterns and game use areas were occasionally considered, it was decided that these areas generally occur in relation to the other factors already being considered such as water sources, terrain and vegetation, so that game habitats and trails were not specifically mapped. Further, it is not possible to determine to what extent present big game habits, affected by logging, livestock grazing, dense road networks, and year-round hunting by the present-day Indian residents using guns and trucks, reflect pre-Euro-American contact big game habits in this area.

High-probability areas were initially defined for the entire Winema National Forest in 1979 by Thompson, Wilke, and Lindeman. This original probability mapping was established on a one-half-inch-to-the-mile scale and was very general and undiscriminating. Only one element was considered at that time--i.e., the presence of a major, permanent water supply. The immediate zones around and along major rivers and drainages, the marshes and lakes, and the major springs contributing to perennial streams and bodies of water were defined as high-probability areas. Upland areas, major intermittent drainages, dry meadows and scabland, rocky outcroppings, and other such environmental features were not included in the original mapping and the mapping scale was too gross to provide specificity even for those water features being identified and plotted.

From the winter of 1980 through the fall of 1981, more specific probability zone mapping (using additional elements discussed in detail below and shown in Table II) drawn from known ethnographic, prehistoric, and physical data were developed, first on a forest-wide basis, and then on a project area and survey area basis. The mapping scale for the forest-wide maps is based on the U.S.G.S. 15-minute and 7-1/2-minute topographic map series, which give one-inch-to-the-mile and 2.64-inches-to-the-mile mapping scales, respectively. Project specific mapping involved a variety of maps including Forest Timber Sale maps, Forest Transportation Plan and Fire Plan maps, aerial photos on a 1:24,000 scale (equivalent to the topographic 7-1/2-minute scale), topographic quadrangles, and other maps as available. Scale on these maps range from four-inches-to-the-mile to one-inch-to-the-mile. Probability zone data, survey transects, and cultural data were then converted to, and recorded permanently on, two-inches-to-the-mile topographic maps with 40-foot contours. The use of these mapping scales lent greater specificity to probability zone designations on the ground.

For the purpose of the present study, high-probability areas were defined as the banks and shores of permanent flowing and stable bodies of water, meadows, scabrock flats, saddles between high-probability areas, flats adjacent to canyons with permanent water, natural cryptocrystalline sources, and ethnographically identified use areas (see Table II). The high-probability zone along major water bodies such as rivers, lakes, and marshes, generally extended to one-third of a mile on each side of the water resources. The confluence of two water features, where either feature was a permanent water body, was given a wider zone of high-probability including approximately one-half mile along the drainages with the concomitant land between the features included. An area of approximately 200 feet in width was included in the high-probabilty zones along streams and creeks and around springs. Small forested peninsulas and islands in wet and dry meadows and in scabrock flats were included in the high-probability zone designated for the meadow or flat. The forested margins around meadows, flats and natural openings were included in the high-probability zone to a width of approximately 200 feet. The flat and adjacent slopes of saddles lying between known site areas or high-probability areas were placed in the high-probability zone. These features present the easiest travel routes for humans and game, especially where the terrain is rough and steep. Ethnographically identified use areas such as berrying grounds or wild plum orchards, when specifically named, were designated high-probability zones. The junction of two or more high- or medium-probability features was seen to indicate an increase in the likelihood of a cultural site occurrence, and the boundaries of the high-probability zone surrounding the intersect features was extended, as appropriate.

The known natural cryptocrystalline sources in the study area, specifically obsidian and ignimbrite, frequently occur in relationship to scablands, meadows, and water sources. No identified quarry sites occur on ridges or forested slopes. High-probability features of this type occur both in the uplands and the lowlands.

Medium-probability areas were defined as the banks and shores of temporary but recurring water sources, ridges, buttes, drainage divides and heads of drainages, rock outcroppings, the land immediately adjacent to the high-probability zones along rivers, lakes, and marshes, and natural travel routes between medium-probability areas.

Intermittent drainages, temporary springs, and small forest basins usually contain water from late October/early November until late May/early June. Game animals return to these areas when water is available, and various annual plants, particularly early season plants, are supported by these temporary water supplies. Because these types of water sources have a limited season and are often small in areal extent, they do not provide a large quantity of subsistence resources. Hunting and gathering activities conducted by an individual or a small group may have resulted in the utilization of these less productive areas to great advantage during the spring and fall. Sites related to hunting and plant gathering were predicted to occur in association with these features although the sites were expected to be small and to occur at a much lower frequency than around permanent water features.

The land within one mile of the major rivers, lakes, and marshes provided opportunities for late fall berrying, winter hunting and early spring root-gathering to inhabitants of permanent and temporary settlements along the major water features. Because these areas could be exploited immediately and easily relative to the settlements, a medium-probability zone was mapped immediately adjacent to the high-probability zones running along the rivers, lakes, and marshes, to include approximately one mile of land on each side of the major water feature, where appropriate.

Medium-probability zones were not mapped around high-probability zones at meadows, scabflats, saddles or other such features. For this study, it was assumed that aboriginal activities in these zones concentrated on the high-probability feature itself and the adjacent high-probability margins.

Terrain features designated as medium-probability features were believed to offer good hunting opportunities since game utilize ridges, drainage divides, drainage heads, and other such features for shelter and as travel routes. Butte tops provide good vantage points for observing game movements, and ridges and buttes in Upper Klamath Basin frequently contain rocky outcrops that are the habitat of marmots, ground squirrels and other small creatures.

Low-probability zones consisted of timbered areas with neither a permanent nor temporary water source occurring within a range of one mile, steep slopes whether open or timbered and stony, and barren openings if cryptocrystallines were not reportedly present. Minor ridges, small timbered buttes, and other general terrain features that do not represent significantly different plant and animal niches or use variations, were mapped in the low-probability zone.

While it was recognized that areas in the low-probability zone received aboriginal human use, it was assumed that this use was much less frequent and much more random in character than in the other zones and that such use would less frequently result in the creation of a site. Single-kill sites, individual berry-picking sites, travel routes, overnight campsites, and other such locations could witness human activity with no visible trace being left by the individual or group involved. An assumption of either small scale use (often resulting in no visible impact to the land) or no use was the basis for defining the low probability areas.

Probability areas were initially designed from maps and aerial photos and occasional mapping errors occurred. However, upon entering the field and viewing the actual landscape, corrections were made as necessary to define the actual nature and size of the physical features. The final probability maps were designed to guide the inventory and to test hypotheses regarding aboriginal land use in the Upper Klamath Basin.

In summary, probability areas, divided into low, medium, and high zones, were defined on the basis of assumptions formed of aboriginal use patterns represented in the ethnographic literature and outlined by the small number of previous archeological research projects dealing with subsistence economics in the Upper Klamath Basin. Low-probability zones included areas of low density, infrequent, and small scale utilization, and remains of this type of use were predicted to be minimal. Medium-probability zones were defined as areas of more frequent, recurring, small scale and occasional larger scale utilization. High-probability areas were defined as areas where large scale exploitation of available subsistence resources could take place repeatedly because a high density of useable and recurring resources were present. Probability maps, at a scale of one-inch-to-the-mile, are included in Appendix B.

Survey Strategy and Inventory Methods

Selection of inventory units was based on the legal requirement that all federal undertakings resulting in ground disturbance have a cultural resources survey performed by qualified personnel prior to the commencement of the undertaking. The majority of the survey data for the study area comes from Forest Service project cultural resource inventories conducted by summer temporary archeologists (working singly, in pairs, and in crews of three and four), certified cultural resource technicians (working in combination with the archeologists), and the Winema National Forest Archeologist and Winema Student Trainee Archeologist. A few inventories were conducted outside project-level work for Forest planning and other purposes.

The Forest Service project inventories conducted within the study area were primarily cultural site surveys conducted for large timber sales and large timber-vegetation management projects. Projects of this type frequently involve between 2,000 and 4,000 acres of land. These acres are usually divided into smaller work units ranging from 20-1,000 acres in size. Units may be adjacent to each other or may be widely spread over the designated project area. The designated project area lies within a larger timber planning unit, called a Total Resource Inventory (TRI) compartment, of approximately 10,000-15,000 acres. While timber sales inventories dominate the large acreage survey units, other large acreage timber-vegetation management project surveys include timber stand improvement projects (thinning), site preparation projects (plowing prior to tree planting in some locations), and reforestation projects (tree planting). Cultural resource inventory was conducted only in the actual impact units of these large projects, not over an entire TRI compartment. The impacted units are initially selected and designed from a present day silvicultural priority and vegetation management-manipulation basis. Such selection should be random from the standpoint of aboriginal human economics. Thus, large scale survey units, clustered through the study area in TRI compartments, should provide a random sampling device for archeological purposes. High-, medium-, and low-probability zones occurred in the impact units, which occurred throughout the study area.

A number of smaller scale project inventories were also conducted for the numerous undertakings of the Forest Service. These projects range in size from a few hundred acres to as little as one acre in areal extent and, while these surveys make up proportionally much less of the total inventoried acres within the study area, they are relatively numerous and widely spread, and frequently focus on single features such as springs or saddles. Such projects include small timber sales, firewood sales, house log sales, individual thinning units, slash disposal projects and prescribed burns, spring and water developments, wildlife cistern construction (creation of a water source for wildlife in an unwatered area by constructing a rainfall-snowmelt holding tank and basin), land exchanges, and a variety of linear impact projects such as road construction, road obliteration, fence line construction, and powerline/pipeline right-of-way grants. These projects contained zones of low, medium, and high probability. All of the small scale projects were designed to meet timber needs, to benefit and control wildlife and livestock, to provide access to the Forest for modern-day Forest users, or to meet other modern-day human needs for energy and fiber. Some of these projects were designed to increase federal administrative efficiency. These various purposes were all assumed to occur randomly in relation to the aboriginal culture's land utilization practices and, thus, added additional acreage to the random sample coverage of the study area.

One cultural survey occurred within the study area outside of the direct impact project context. In the summer of 1979, a survey of the Sycan River, between Sycan Marsh and Coyote Bucket, was completed in association with the Winema-Fremont National Forest Sycan Management Plan. This plan was undertaken to analyze recreation use and impact on all resources in the Sycan River Planning Unit in response to proposed designation of the Sycan River as a "Wild and Scenic River." Data from this cultural inventory was also used in the sample data for the study area. The majority of the survey area lies within the high-probability zone. No low-probability tracts occur within the Sycan planning unit.

Intensity of survey coverage varied by probability zone and feature type. While methods and coverage were designed generally for each probability zone, actual transects were not identified until the inventory crews reached the inventory unit. The field conditions on the unit, predominantly surface visibility, dictated the routes of transects as long as the required coverage for that probability zone was obtained. The required coverage for high-probability zones was visual coverage of

100 percent of the area within a unit. However, surface visibility was frequently poor due to grass cover, pine needle matting, duff cover, brush and plant growth, and downed trees. Surface visibility commonly was estimated at 50 percent of a total high-probability zone. Duff or other surface debris was occasionally cleared over small areas at regular intervals to allow viewing of the ground surface. With a general 50 percent visibility, most larger or denser lithic scatters should be visible in the clear patches and then traceable into vegetated or obscured areas. Sites with pits or other below surface level features, and cambium-stripped trees and other above surface level features, were noticeable despite surface visibility limitations. Vegetation changes were examined for possible cultural causes. Rodent burrows, tree tip-ups, stream banks, and road cuts were examined for subsurface deposits as well as to increase the amount of actual ground surface viewed. Special efforts were made at all times to increase actual surface visibility and site identification and to obtain as close to 100 percent visual coverage of high-probability zones in the survey units as possible.

The desired coverage for medium-probability zones ranged between 50 and 70 percent estimated visual coverage. As in high-probability zones, actual surface visibility varied and transects designed to provide 50 percent coverage of medium-probability zones within inventory units did not necessarily guarantee obtaining true 50 percent surface examination. While efforts were constantly made to see the actual ground surface, and the same survey methodology applied as in examining the high-probability zones, the ground surface actually viewed often fell short of the desired 50 to 70 percent, although the full 50 to 70 percent of the area was walked.

The desired coverage for low-probability areas was an estimated 20 percent inventory conducted in random transects through the zone.

Total desired coverage on any single inventory unit, regardless of the percentage makeup of probability zones, was to be no less than an estimated 30 percent. Occasionally, inventory was conducted outside designated units when the survey crew walked from one unit to the next unit, or from the road to a unit.

Prior to entering the field, a search of the literature and of the site files was conducted to locate known sites. However, as the project inventory was usually the first cultural resource survey to be conducted over most of the units, knowledge of sites in a unit prior to the field inventory was rare. Occasionally possible sites, previously observed and reported by Forest Service employees, were in the site files, or data gleaned from ethnographic reports provided information on possible or actual sites. Such information was field checked during the field inventory.

Additional prefield work consisted of familiarization with the soil, terrain, and vegetation of an inventory unit by examining soil and vegetation maps, topographic quadrangles, and aerial photos. Probability maps were also examined prior to entering the field, and preliminary decisions regarding the placement of transects were made.

Final decisions were made in the field.

All inventory transects were mapped on project unit maps to record as closely as possible where the actual transects had been placed. An example of these maps is in Appendix C. Inventory units already surveyed were frequently returned to for closer examination if features or conditions warranted. Returning to units occurred more often when high-probability zones failed to yield sites, when previously reported sites were not located, or to examine isolated find locations more closely. Some areas were resurveyed under different lighting angle conditions or after moisture changes in the soil had taken place (both wetting and drying). Significantly, such return visits did not often result in the identification of additional new sites, though occasionally more information on size, nature, and limits of known sites could be gathered.

In summary, a literature search aimed at locating site data and at understanding the natural features of inventory units was conducted prior to entering the field. Probability areas divided into high, medium and low zones were defined for the entire study area, and inventory strategy was based on both knowledge of natural features in an inventory unit and on the types of probability zones contained in a unit. The probability zones were defined using ethnographic and known prehistoric data on aboriginal human subsistence. While low-probability areas were assumed to include small scale, infrequent, and randomized utilization, medium- and high-probabilty areas were assumed to represent those environmental zones more heavily exploited. Medium-probability zones were defined as areas receiving recurring, though short-term seasonal, use by small groups of humans. Such use, though repeated at the same and similar locations in the study area, may have been less frequent than yearly. However, the use would be predictable and not random. High-probability areas were those assumed to receive frequent and recurring long-term utilization, utilization by a large number of people, multiple subsistence resource exploitation, and predictable utilization. Inventory units were selected based on present day silvicultural, vegetation management, wildlife and livestock habitat management, and recreational and engineering needs and priorities, with the federal projects for National Forest land management being designed for these priorities. The prehistoric human subsistence needs and priorities in the Upper Klamath Basin differ from present-day human needs which focus on managing trees for large scale lumber production, managing forage and water for beef cattle production, and managing the visual environment for recreational pursuits. Land use by the prehistoric and historic inhabitants of the Upper Klamath Basin varies along these different foci, so that present-day human land use patterns may or may not overlap with prehistoric human land use patterns in different areas. Because these land use-resource use patterns appear to operate independently of one another, inventory unit selection based on present-day land use priorities appears to provide an unbiased sampling device relative to prehistoric land use priorities. Field survey was conducted on foot by trained personnel and was aimed at achieving different levels of coverage for each probability type, with overall total coverage of any unit to be at least 30 percent. Surface visibility presented a problem, but measures were undertaken to increase such visibility whenever possible. Inventory transects were mapped upon completion of a unit survey.

Recording and Classification of Sites

The term "site" will be used in the present study to refer to both individual sites and site areas. Sites were recorded initially in the field in rough draft form, with final site reports completed in the office. For the purpose of this study, only those sites believed to be directly related to prehistoric-protohistoric subsistence and economic activities will be included. Numerous noneconomic sites were located. These consist of rock cairn/alignment sites traditionally associated with the Klamath vision quest practice in Upper Klamath Basin, rock art sites, and burial/cremation sites. Numerous historic sites reflecting logging, ranching and other activities were also identified.

Sites considered to be directly related to aboriginal subsistence activites consist of housepit village sites, middens, lithic scatters, quarries, cambium stripped trees, cache pits, caves with evidence of prehistoric use, and isolated finds of both artifacts and flakes. Frequently, sites combine the various features that also may occur as individual site types--e.g., a housepit site having a midden, cambium-stripped trees, and lithic debris.

Housepit village sites were identified as locations where large, circular, and semi-circular pits occur. Earth berms often occur around these pits. Such a site might consist of a single pit or numerous pits. Other cultural features might also be present on the site, and were generally expected.

Middens were identified as locations with a heavy humus composition derived from shell, bone, charcoal, decayed plant material, broken and fire cracked stone debris, and/or other similar materials occurring such that the deposits cannot be explained as a natural occurrence.

Lithic scatters were identified as locations consisting of chipped stone debris scattered upon the ground surface, with few or no natural cryptocrystalline nodules occurring and with secondary flakes predominating over primary flake debris. Lithic scatter areas were broken into three size categories: large lithic scatters (LLS), medium lithic scatters (MLS), and small lithic scatters (SLS). This division was based on determining the average lithic scatter size for the Winema National Forest and looking at all lithic scatter sizes for size clustering. Three size clusters appeared to occur, though the size divisions were established arbitrarily, while including the apparent clusters. These size groupings are large lithic sites (LLS) ranging from 9 acres to 30 acres, medium lithic sites (MLS) of 1 to 6 acres, and small lithic sites (SLS) of one-half acre or less. A few very large lithic scatter sites, over 50 acres, were recorded in Upper Klamath Basin, and these sites were not categorized into the three lithic scatter size clusters. (See Appendix D for a listing of lithic scatter sizes by acres.) Lithic scatter sites were not designated as campsites, hunting sites, or other use type sites during initial recording. Division into large, medium, and small scatters occurred after data on lithic scatter sites from the 1979, 1980, and 1981 field seasons was examined.

Quarry sites were identified as locations where natural chipping material (in the study area this being obsidian, ignimbrite, and fine grained basalt) occurred in conjunction with evidence of past human utilization. This utilization was assumed to be represented in the form of flaking debris (with primary flakes predominating over secondary and maintenance flakes in the debris) and artifacts.

Cambium-barked trees were assumed to be represented by trees over 140 years of age with bark stripping scars well healed on one side of the tree. Such scars vary in size but should be oblong, running vertically, and are above the present ground level of the trunk. The scar often leans or points to the right or left on the bottom and is ragged on top, though squared and rounded scars appear, usually after extensive healing has occurred on the tree. Dead and downed trees may show evidence of stripping even with rotting of the bark and wood. Stripped trees may occur singly or in groups.

Cache pits are difficult or impossible to identify when empty, and verification of a pit's identity by means of associated artifacts was necessary. Some isolated pits resembling housepits were located at a distance from water and they were tentatively identified as food cache pits. Verification by excavation is required. One previously unopened, filled cache pit, located accidently during a road construction project, was easy to identify, as it contained 268 obsidian blanks and knives.

Caves and rockshelters were identified as prehistoric sites if lithic debris, rock art, or other cultural material was present. If no such material was located, the site was recorded as a possible cultural site and verification of cultural use must be acquired through oral tradition, excavation, and other such means. Since cave sites have contained human burials in the Upper Klamath Basin, automatic association of such sites with occupation and subsistence activities cannot be made. If lithic material in the form of flaking debitage occurred in the cave, it was assumed that economic activities occurred at the cave. Excavation will be necessary to understand fully cave and rockshelter use by the Klamaths. There are very few caves on the Winema National Forest and only two of these features, Medicine Rock Cave and Sycan Canyon Rockshelter, are identified in the study area.

Isolated finds were assumed to be represented as singly occurring flakes or singly occurring artifacts. This site type was divided into two categories, flakes and artifacts, respectively.

In addition, other possible economic site types were sought. A tentative category of chipping station sites was defined as sites with primary flakes predominating, or heavily represented in relation to secondary flakes, with few whole or naturally broken cryptocrystalline nodules present. Except for broken or incomplete specimens, finished artifacts were presumed to be rare on such sites. Cores should be present on such sites. However, no such chipping station site, as defined, was identified in the study area. This may suggest that in the Upper Klamath Basin most working of stone material for chipped stone tools took place either at the quarry location or in the campsite. Tools may have been roughed out at the actual quarry and finished later when time or need permitted at camp, at the hunter's blind or butcher site, or tools may actually have been finished at the quarrying location. Few broken or incomplete artifacts are present at the known quarries, suggesting the former practice, but artifact collecting may have significantly biased the artifact samples on site surfaces.

All sites were recorded on standard Forest Service Pacific Northwest Region site forms. Data on elevation, terrain, vegetation, soils, water type and access, and other pertinent environmental observations were included on the forms. Site size and description of material present and features observed were required. In addition, sites were usually mapped on portions of U.S.G.S. topographic quadrangles to show exact site location, size, and shape in relation to terrain, water, and vegetation. The appropriate portion of the quadrangle was attached to each site form. Whenever possible, site maps showing greater detail were hand-drawn in the field. Artifacts were drawn, photographed, and left on the sites. The size, number, and density per square meter of flakes, with a description of the lithic material present, was recorded on some sites with lithic debitage. Cultural features such as pits, bedrock mortars, barked trees, cairns, shell concentrations, and other such items were counted and described, and sketch maps of features were frequently made. Ground stone artifacts were also drawn and photographed. Site tables showing some of the data collected for economic sites within the study area are contained in Appendix D. An example of site forms used is contained at the end of Appendix D.

After recording on site forms, locational data (by site type, with site size and site extent information) was transferred to a two-inches-to-the-mile, 40-foot contour-lined, topographic mylar map. The relationship of a particular type of site to water sources, terrain features and other sites, was then visually displayed. Overlays of inventory transects and probability zones, also on a two-inches-to-the-mile scale, could be combined with the sites' map to ascertain correlations. A record of site type occurence by probability feature was made during the transfer of site data to the mylar map.

In summary, site recording commenced in the field, with each final site report being completed out of the field. Data collected included information on natural and cultural features present on a site. Sites were divided into categories generally based on the presence of various physical representations of cultural features, though some speculated use categories were included. The site categories identified as representing at least some aboriginal economic activities include housepit sites, middens, lithic scatters, cambium-barked trees, quarries, caches, caves, and isolated finds. Lithic scatter sites were divided into three additional subcategories based on apparent size clusters for all lithic scatter sites on the Winema National Forest. These subcategories are LLS sites (9-30 acres), MLS sites (1-6 acres), and SLS sites, (one half acre or less). A few very large sites (over 50 acres) were also identified. Other subsistence activity site categories did not emerge from the field data. Site type and locational data were transferred to a topographic mylar map scaled two-inches-to-the-mile. A record showing occurrence of site type by probability feature was kept to ascertain correlations of certain features to particular categories of sites.

CHAPTER VI

RESULTS OF THE FIELD INVENTORY

Field surveys conducted during the seasons of 1979, 1980, and 1981 provided the majority of the numerical data used for discussing inventory in this study, since inventory work undertaken prior to those field seasons was poorly documented. However, sites located in any year by any inventory were included in the site numerical data. All acreage data for inventory were based on National Forest lands.

There are 316,575 acres of National Forest land in the study area. Of these acres 28,707 were classified as having a high probability for locating archeological sites, 20,004 acres were classified as having a medium probability for locating such sites, and the remaining 267,864 acres were placed in the low-probability category. While the majority of high-probability acres occur along the Klamath Forest Marsh and the Sprague, Williamson, and Sycan rivers, high-probability acres do occur throughout the study area (see Appendices B and C for a breakdown of probability acreage occurrence).

Of the National Forest acres within the study area, 31,470 acres were inventoried during the last three field seasons and have been thoroughly documented and mapped. In 1977 a survey of the southeast and northeast margins of the Klamath Forest Marsh was contracted by the Winema National Forest. While this survey provided several thousand acres of survey in predominantly high-probability areas, much of the numerical data from this survey was never recorded, and the actual acreage covered is not known. In 1978 a survey crew consisting of CETA workers under Victoria Sounart conducted an inventory of cultural sites along several one mile sections of the Williamson and Sycan rivers, Klamath Forest Marsh, and on some private and county land tracts. While this survey resulted in the inventory of some 2,000-3,000 acres, documentation and accuracy of the survey was poor and, though site data is available from this survey, numerical information is lacking. Therefore, though approximately 36,000 acres have been surveyed within the study area, the documented surveyed acreage is lower.

The 31,470 documented survey acres provided approximately 9.9-percent inventory coverage of the study area. With site data from the poorly documented inventories included, approximately 11.4 percent of the study area has been inventoried. Additional site data was available from ethnographic accounts and from sites identified by some means other than systematic survey.

Of the systematic, well documented inventories, 1,925 acres or 6.7 percent of the high-probability area was covered. Additionally, the pre-1979 inventories provide a possible 2,000 more acres, giving about 13.6 percent coverage of the identified high-probability acres. Within the entire high-probability areas, 104 subsistence activity sites and seven isolated finds were located.

Medium-probability acres inventoried from 1979 on make up approximately 7.9 percent of the entire study area medium-probability zones with survey on 1,593 acres. If pre-1979 inventory is included, approximately 2,593 medium-probability acres have been examined, providing approximately 12.9 percent inventory of the medium-probability zone. Within the entire medium-probability area, 13 subsistence sites and three isolated finds were identified.

The low-probability areas inventoried in the 1979 and later inventories consist of 27,952 acres or 10.4 percent coverage of the low-probability zone. With the addition of an estimated 1,500 acres from pre-1979 inventories, approximately 29,452 acres, or 10.9 percent of low-probability areas have been inventoried. Within the low-probability zones, six subsistence sites and six isolated finds were identified. (See Table VII and Appendix C for these totals.)

A breakdown of sites by type and probability area is provided in Tables III through VII.

TABLE III

SITE TOTALS -
NORTH CHILOQUIN DISTRICT
LITHIC SCATTERS

A. Total Lithic Scatter Sites

Probability Areas	No. of L. S. Sites	No. of Acres
High Probability	77	339.5
Medium Probability	12	26.14
Low Probability	4	.075
Total	93	365.715

B. Small Lithic Scatters by Probability Area (less than one acre in size)

Probability Areas	No. of Sites
High Probability	25
Medium Probability	8
Low Probability	4
Total	37

C. Medium Lithic Scatters by Probability Area (between 1 and 5 acres in size)

Probability Areas	No. of Sites
High Probability	40
Medium Probability	3
Low Probability	0
Total	43

D. Large Lithic Scatters by Probability Area (greater than 5 acres in size)

Probability Areas	No. of Sites
High Probability	12
Medium Probability	1
Low Probability	0
Total	13

E. Lithic Scatter Sites further than one mile from the Sprague, Williamson, and Sycan rivers and Klamath Forest Marsh

Probability Areas	No. of Sites	No. of Acres
High Probability	3	2.754
Medium Probability	8	20.64
Low Probability	1	.004
Total	12	23.398

F. Lithic Scatters by Type further than one mile from the major rivers and Klamath Marsh

Probability Areas	LLS	MLS	SLS
High	0	0	3
Medium	1	0	7
Low	0	0	1
Total	1	0	11

TABLE IV

NORTH CHILOQUIN DISTRICT HOUSEPIT SITES

A. Total Housepit Sites by Probability Area - National Forest

Probability Areas	No. of Sites
High Probability	18
Medium Probability	0
Low Probability	0
Total	18

B. Total Housepit Sites in the Study Area - Outside the National Forest

Probability Areas	No. of Sites
High Probability	6
Medium Probability	0
Low Probability	0
Total	6

C. Housepit Sites by Water Body Location

Water Feature	No. of Sites
Klamath Forest Marsh	13
Williamson River	8
Sprague River	2
Other	1
Total	24

Total Housepit Sites in North Chiloquin District Study Area - 24

TABLE V

NORTH CHILOQUIN DISTRICT
ISOLATED FINDS

A. Total Isolated Flakes by Probability Area

Probability Areas	No. of Finds
High Probability	4
Medium Probability	1
Low Probability	3
Total	8

B. Total Isolated Artifacts by Probability Area

Probability Areas	No. of Finds
High Probability	3
Medium Probability	2
Low Probability	3
Total	8

C. Total Isolated Finds by Probability Area

Probability Areas	No. of Finds
High Probability	7
Medium Probability	3
Low Probability	6
Total	16

D. Isolated Artifacts by Type

Projectile Points	7
Grinding Stones	1
Total	8

E. Isolated Find (IF) Sites Further than One Mile from Klamath Forest Marsh, and the Williamson, Sprague and Sycan rivers

Probability Areas	IF Artifacts	IF Flakes	Total IF Sites
High Probability	1	0	1
Medium Probability	0	0	0
Low Probability	2	3	5
Total	3	3	6

TABLE VI

NORTH CHILOQUIN DISTRICT
BARKED TREE SITES

A. Total Barked Tree Sites by Probability Area

Probability Areas	No. of Sites
High Probability	3
Medium Probability	1
Low Probability	2
Total	6

B. Number of Barked Trees by Probability Area

Probability Areas	No. of Trees
High Probability	12
Medium Probability	1
Low Probability	4
Total	17

C. Barked Tree Sites Further than One Mile from Klamath Forest Marsh, and the Williamson, Sprague and Sycan rivers

Probability Areas	No. of Sites
High Probabilty	0
Medium Probability	0
Low Probability	1
Total	1

TABLE VII

TOTAL - ALL SUBSISTENCE SITES BY
PROBABILITY AREA

	Including Isolated Finds	Excluding Isolated Finds
High Probability	111	104
Medium Probability	16	13
Low Probability	12	6
Total	139	123

It is important here to highlight some of the data contained in these tables.

The majority of all types of lithic scatters occur in the high-probability zone. All lithic scatters, regardless of size (with the exception of two small ones) occur in conjunction with some water feature--springs, wet meadows, intermittent drainages, major rivers, and Klamath Forest Marsh. Only 12 lithic scatters of the study areas' 93 total occur further than one mile from a major river or Klamath Forest Marsh. Of these 12, 11 are small lithic scatters (SLS). When compared with the fact that 37 small lithic scatters in all are recorded in the study area, the fact that 11 of these SLS, or 29.7 percent, occur at a distance of greater than one mile from major water features may be significant.

All large lithic scatters (LLS), with the exception of one, and all medium lithic scatters (MLS) occur within one mile of the major water bodies. In total, there are 56 LLS and MLS recorded. Further, no MLS or SLS occurred in low-probability areas and only four such sites occur in the medium-probability zone.

The housepit village sites occur, without exception, in high-probability areas along the Klamath Forest Marsh or the Williamson or Sprague rivers.

The six cambium-barked tree sites are spread through all three probability zones, but only one site, consisting of one tree, occurs further than one mile from a major water body.

The Isolated Finds, divided into categories of Isolated Find (flakes) and Isolated Find (artifacts), also occur in all probability zones, and six of these Isolated Finds (37.5 percent of the total 16) occur further than one mile from the major rivers and Klamath Forest Marsh. This pattern may be a significant occurrence. All isolated finds, except one for which the exact location within its section is unknown, occur in conjunction with a water feature, ranging from major water bodies and their immediate environs to wet meadows with creeks and intermittent drainages.

Of all subsistence/settlement sites, including isolated finds, 111 occur in high-probability zones, with 16 sites and 12 sites recorded, respectively, for medium- and low-probability zones, and with 139 subsistence sites identified in total. Subsistence/settlement sites occurring within one mile of Klamath Forest Marsh, and the Williamson, Sprague, and Sycan rivers total 114, with only 19 cultural occurrences related to subsistence being recorded further than one mile from these major water features. These 19 sites make up only 13.7 percent of the total number of subsistence/settlement sites. Of these 19 cultural occurrences, 11 are small lithic scatters and six are isolated finds. Table VIII contains these totals identified by site type and probability zone.

Within the lithic scatter sites, 31 sites, ranging from LLS to SLS, occur along the Sycan River. No other subsistence/settlement site types are recorded along the Sycan River. A total of 12 quarry sites are recorded among the lithic scatter sites. Of these quarry sites, 11 occur along the Sycan River, with only one quarry site being recorded along the Klamath Forest Marsh. While obsidian sources are reputedly present in the Sprague River canyon, and naturally occurring nodules of obsidian have been observed and collected there, no quarry sites have yet been identified or recorded along the Sprague River. This does not mean they will not be identified in the future. An obsidian outcropping is also reputed to occur in cliffs bordering the lower Williamson River, but this possible quarrying source has not been located. Nonobsidian cryptocrystallines are rare in the study area and only obsidian quarries were identified. Some of the lower quality obsidian (containing less silicate material) blends into ignimbrite and a continuum of obsidian quality ranging from low grade ignimbrite to high grade clear glassy obsidian can be observed among the quarry sites and in flakes and artifacts from sites throughout the study area.

TABLE VIII

TOTAL SUBSISTENCE SITES BY DISTANCE FROM KLAMATH FOREST MARSH AND THE SYCAN, WILLIAMSON & SPRAGUE RIVERS

Total Subsistence Sites on or Within One Mile of Klamath Forest Marsh, and Sycan, Sprague, and Williamson rivers.

	Lithic Scatters			Isolated Finds		Housepits	B-Trees	Total
	SLS	MLS	LLS	IF(A)	IF(F)			
High	22	40	12	2	4	24	3	107
Medium	1	3	0	2	1	0	1	8
Low	3	0	0	1	0	0	1	5
Sub-Total	26	43	12	5	5	24	5	120
Type-Total	81			10		24	5	

120 Total

Total Subsistence Sites Further Than One Mile from Klamath Forest Marsh, and Sycan, Sprague, and Williamson rivers.

	Lithic Scatters			Isolated Finds		Housepits	B-Trees	Total
	SLS	MLS	LLS	IF(A)	IF(F)			
High	3	0	0	1	0	0	0	4
Medium	7	0	1	0	0	0	0	8
Low	1	0	0	2	3	0	1	7
Total	11	0	1	3	3	0	1	19
Type-Total	12			6		0	1	

19 Total

CHAPTER VII

CORRELATIONS AND CONCULSIONS

One goal of scientific research is that of developing and defining hypotheses regarding a certain body of data and related to specific problems, questions, and processes. One purpose of this study, as stated in the Introduction, was to develop a model for predicting the occurrence of aboriginal subsistence sites in the Upper Klamath Basin. Another general goal of scientific research is that of examining existing hypotheses from different perspectives and testing them with different bodies of data or using different approaches. The second purpose of the present study has been to reexamine Cressman's hypothesis concerning the long term stability and slow rate of change in the aboriginal culture of the Upper Klamath Basin. Hypotheses that best explain a wide variety of data collected and assembled in different ways are given additional strength, while hypotheses that appear to be contradicted by other data generally lose credibility and may eventually be discounted and replaced with theories that better explain and correspond with known facts and accumulated data.

More specifically defined, the purposes of the present study have been to introduce a body of data regarding settlement and subsistence sites in a portion of the Upper Klamath Basin, using data derived from surface inventory only, and to test a hypothesis set up in this study for describing aboriginal resource use in the study area. The data was then used to test the hypothesis set forth by Cressman concerning long-term cultural continuity and slow change for this area. It was believed that these two hypotheses would differ in their explanation of cultural change in the area and that a pattern of resource utilization with a greater emphasis on upland resources would emerge than that implied by Cressman's theory. These hypotheses will now be examined in light of the newly accumulated inventory data.

The first hypothesis was designed to establish a possible settlement pattern model, by outlining probability areas where sites would occur, with an explanation of why sites were expected in these locations. Probability areas were defined on the basis of ethnographic data, archeological data, and settlement/site pattern data known for other Great Basin areas. High- and medium-probability zones occurred over a large portion of the study area, including appropriate upland areas where gathering activities were proposed to center around meadows, scablands, open slopes, and forest fringe areas. Upland hunting was proposed to explain spring, ridge, drainage divide, and butte top site locations. During the actual inventory for field data, inventories occurred throughout the lowlands along the Sprague, Williamson, and Sycan rivers, and Klamath Forest Marsh, as well as in the uplands immediately adjacent to these features and many miles away from these features. A large amount of low-probability land was inventoried, and it may be said that while relatively few sites were found in the low-probability zones, this fact is not the result of a lack of inventory but, rather, a true paucity of sites as predicted. In contrast, 111 sites were located in the high-probability zones, though acres assigned to high-probability zones made up barely nine percent of the study area in all. Low-probability acres made up 74 percent of the study area. Subsistence sites found in high-probability areas make up nearly 80 percent of all subsistence sites recorded in the total study area while subsistence sites found in the low-probability areas make up less than nine percent of the total recorded. Without looking more closely, the high- and low- probability zones designed for the study area in this thesis appear to fit the suggested model.

Medium-probability area sites make up approximately 11.5 percent of all sites in a zone that is defined for approximately six percent of the study area. This zone makes up, by number of acres included in the zone, the smallest zone in the study area though it produced, numerically, and by percentage, more sites than the low-probability area. The medium-probability zone had far fewer sites than the high-probability area, and it, too, seems to fit the suggested model.

An examination relating site type to probability area lends support to the model. While the majority of all lithic scatters occur within the high-probability zone, all large lithic scatters except one occur in the high-probability zone, and 40 of the 43 medium lithic scatters occur within the high-probability area. Small lithic scatters are somewhat more diverse in probability zone occurrence, but even with the SLS, 25 of the 37 sites, or better than two-thirds, occur in the high-probability zone. All of the housepit sites occur within the high-probability zone while cambium-barked tree sites occur more randomly.

Isolated find sites also occur more randomly.

The pattern that emerges from the site type-probability correlations fit the assumptions behind the proposed probability model. With a heavy density of larger sites and containing numerous complex sites and most of the smaller sites, as well, the high-probability areas represent acreage where large scale and/or repeated exploitation of readily available resources took place. With notably fewer sites (though containing some larger, moderately complex sites such as one large lithic scatter of 20 acres and three medium lithic scatter sites, as well as some of the smaller sites), the medium-probability zone seems to represent less frequent, recurring, small scale and occasionally larger scale utilization. The low-probability zone, containing only small lithic scatters, isolated finds, and barked tree sites, numbering only 12 sites in all (of which one half are isolated finds), represents low density, infrequent, small scale utilization. Site predictability occurs variously between the zones, with sites in the low-probability area seeming to occur randomly while sites in the high-probability areas occur in predictable locations.

A third factor must now be considered that refines this proposed settlement pattern significantly and leads into an examination of Cressman's hypothesis dealing with continuity and cultural conservatism in the Upper Klamath Basin. As discussed in the chapter on previous archeological work in the area, Cressman set forth a general outline for the Upper Klamath Basin in his <u>Klamath Prehistory</u> (1956). Cressman reiterated this outline in <u>The Sandal and the Cave</u> (1964), and portions of his theories regarding the Upper Klamath Basin's cultural history were supported by Aikens and Minor (1978) and by Grayson's Night Fire Island publications (1973 and 1976). The hypothesis emerging from this work and stated by Cressman regarded the long continuity and conservatism of the Upper Klamath Basin aboriginal culture. Cressman characterized the culture as one of long-term stability, continuity of adaptation, and cultural conservatism over its 5,000-6,000 year development. The ethnographic pattern observed by Gatschet, Spier, and others was proposed to have been formed 3,500 years ago. This ethnographic pattern was characterized by a heavy utilization of marsh and riverine resources and concentrated settlements and subsistence activities on the Klamath Forest Marsh and along the Sprague and Williamson rivers. The Upper Williamson and the Sycan rivers were also heavily utilized in the summer.

The hypothesis developed by Cressman and supported by Aikens and Minor depended upon a body of data drawn from only one type of site--the housepit village--located in a limited number of areas adjacent to the Sprague and Williamson rivers and Klamath Forest Marsh. Some additional data for this hypothesis were drawn from the Night Fire Island excavations, also housepit-winter village oriented, on Lower Klamath Lake. An attempt was made in the present study to approach this hypothesis from a different angle and to test it against data from sites other than winter villages and data collected in zones other than those along the major rivers and Klamath Forest Marsh. As stated previously in this chapter, it was believed that data from the Upper Klamath Basin uplands and from nonwintering sites might be obtained that would cause questioning of the hypotheses for early establishment and long continuity of the Upper Klamath Basin aboriginal cultural pattern.

After sites located in the present survey were correlated to probability zones, a correlation was made between site types, probability zones, and site occurrence in uplands versus major riverine-Klamath Forest Marsh locations. Sites by type and by probability area were divided into two additional categories: 1) sites within one mile of Klamath Forest Marsh or the Sprague, Williamson, and Sycan rivers, and 2) sites further than one mile from these major water features. For the 139 recorded sites within the study area, 120 sites fall into the first category--i.e., within one mile of Klamath Forest Marsh or the Sprague, Williamson, and Sycan Rivers. Only 19 sites occur at a distance of greater than one mile from the major water features. Of these 19, 11 are small lithic scatters and six are isolated finds (see Table VIII). When compared to all sites, the sites in category two make up only 13.7 percent of total sites found and, if isolated finds are excluded from the data, only 10.6 percent of the total study area sites. Of the sites greater than one mile from the major water bodies, only one is a large lithic scatter (the same large lithic scatter that is the only exception to the correlation of large lithic scatters and the high-probability zone). Since this large scatter occurs just below Knot's Tableland, it is proposed that quarrying material was available on the Tableland though the natural source has not been identified.

These correlations appear to support a theory of long, stable, and heavy reliance upon and utilization of riverine and marsh resources. Upland resources are used infrequently and are of minor importance to total subsistence resources collected throughout the post-Mazama aboriginal period. The evidence for upland subsistence utilization presents, perhaps, a picture of occasional upland hunting which the small lithic scatter sites and isolated finds may represent as kill sites, butchering sites, waiting areas, and lost projectile points from the chase. The settlement and subsistence pattern derived from this body of data on upland sites and nonhousepit sites does not contradict Cressman's model of slow, gradual change with increasing adaptation to marsh and riverine resources and little utilization of areas away from these water zones. This economic model is the ethnographic pattern, and nothing from this upland site data would seem to contradict the hypothesis that the ethnographic subsistence pattern was of long standing.

Initially, it was planned to date the upland sites utilizing the point type chronology developed by Cressman (1956) and refined by Aikens and Minor (1978). Through the identification of point types on the sites, correlations of site occupation to general time periods would have been drawn and any temporal clustering of upland sites would have been noted. However, very few upland or lowland sites contained projectile points, and dating by this method was not possible to the extent required to establish temporal clustering.

Sites in the uplands dating from any post-Mazama time periods are located on top of the Mazama ash soils which date to the Mazama event. The upland cambium-barked tree site is only a few hundred years old, the isolated projectile points represent different temporal styles, and the few lithic scatters that have been dated by their points vary in temporal period. No temporal clustering appears in this sparse data. However, with only 19 upland sites to consider, adding a temporal framework to the data would accomplish little. Dating would not change the fact that few upland sites have been located, and the pattern they present is one of low utilization of the uplands apparently for hunting.

Cressman's hypothesis regarding the cultural stability and long continuity of the Klamath economic system does best fit the body of data analyzed here. A riverine-marsh orientation for aboriginal settlement and subsistence originated early in the reoccupation of the study area after the Mazama event. This initial pattern of aboriginal land and resource use became firmly established by 3500 B.P. Through slow change the aboriginal subsistence economy continued to be adapted to the riverine-marsh focus through expansion and intensification of the utilization of the wide variety of riverine and marsh plant and animal resources--until white contact disrupted the pattern. This subsistence pattern was then recorded by ethnographers. The pattern was characterized by stability of adaptation and environment, cultural conservatism, and adaptive continuity. Intensive and extensive utilization of marsh-riverine resources, with variation through time represented by changes in the percentages of the resources utilized but not in overall actual resources used, may be proposed. Gradual inclusion or exclusion of some resources and some gradual changes in technology as the culture adapted more and more to the resources being exploited and the environment occupied, can be seen in the archeological record.

The strong correlation of sites and riverine-marsh zones significantly affects the probability zones as they are defined in this thesis. The probability zones for the model presented here were designed to include high and medium zones throughout the study area, including the uplands. High-probability zones were defined for permanent springs, flowing creeks, wet meadows, dry meadows, scab flats, forest openings and some saddles where these features occurred in upland zones. However, of the 111 sites occurring in the high-probability zone of the study area, only four occurred in the uplands. Medium-probability zones in the uplands consisted of intermittent drainages, ridgelines, temporary springs, butte tops, and drainage divides and accounted for eight of the 16 medium probability sites recorded in the study area. Of these eight, seven are small lithic scatters and the sites' locations being such features as drainage divides, ridgelines, and intermittent drainages may indicate that these sites are hunting related, since game animals are the most prominent exploitable resource identified for the locations. In some instances berrying might also be proposed. Of the 12 low-probability area sites, seven occur in the upland zone and, of these, five are isolated finds also perhaps indicative of hunting activities.

For the proposed settlement pattern, therefore, some refinement of the initial hypothesis has been made, and a somewhat different model emerges. A two-part model, with probability zones defined differently for the lowlands and the uplands, seems appropriate. High-, medium-, and low-probability zones, as defined for the land lying within one mile of the Klamath Forest Marsh and the Williamson, Sprague, and Sycan rivers, appear to be well designated when correlated to site occurrence. However, in the uplands, defined as those areas greater than one mile from the named major water features, a probability model needs to be designed to locate sites related to hunting, berrying, and other more randomized, less areal-intensive and less recurrent activities. This refined upland model defines butte tops, springs, wet and dry meadows, drainage divides, intermittent and permanent drainages, and ridgelines as the features most likely to be associated with sites reflective of the hunting and other activities being carried out. These areas would be defined as upland high-probability zones. An upland medium-probability zone does not seem appropriate or necessary as the originally designated medium-probability features have been included in the high-probability category. In the uplands, eight sites of the total 19 occur in the medium-probability zone, indicating that this zone should be redefined as high probability and combined with the previously identified upland high-probability zone. The remaining land is defined as a low-probability zone though some archeological materials, primarily in the form of isolated finds, would still be expected to occur. Overall, site density in the uplands will be much lower than in the lowland major water body zones, and the sites reflect very different activities.

Future inventory work can be undertaken to test the validity of this settlement/subsistence model as refined for the uplands. Also, future inventory work and excavation work may clarify the model as defined and maintained for the lowlands--i.e., the land within one mile of the Klamath Forest Marsh and the Sprague, Williamson, and Sycan rivers. Excavation of upland sites may permit identification of specific activities such as hunting or berrying and may provide data on hunting technology, seasonality, and other such information.

Inventory conducted in other portions of the Upper Klamath Basin may also contribute data for comparison. The described probability model in this thesis, and the subsistence/settlement pattern and cultural continuity it implies, may be more suitably representative of the a'ukckni Klamath people and their ancestors and predecessors. It may be possible to define different patterns in different portions of the Upper Klamath Basin representing some variation in cultural emphasis, cultural adaptations, and cultural contacts among the other Klamath groups. Also, it should be possible to compare this model to those defined for other aboriginal peoples residing in the Great Basin, including those peripheral to the Upper Klamath Basin and occasionally overlapping the Upper Klamath Basin uplands. A clear understanding of the Upper Klamath Basin settlement/subsistence pattern may shed much light, as Cressman originally believed and undertook to determine, on the early Pleistocene Lake cultures of the Great Basin.

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APPENDIX A

LIST OF PLANTS IN THE STUDY AREA BY INDIAN NAME, COMMON NAME AND SCIENTIFIC NAME

Indian Name	Common English Name	Scientific Name
Ba	White Fir	Abies concolor
Ba-bak"-bak-lha'•nam		Erigonum stellatum
Ba-ba'-o-sam	Oregon Grape	Berberis repeus
Ba-lo'-och		Amarautus blitoides
Ba'-nam	White Fir	Abies concolor
Bha'-ne	Tall sedge	Carex
Bol'-whe	Sagebrush	Artemisia tridentata
Chak'-am	Service Berry	Amelanchier aluifoloa
Chak'-lo		Kunzia tridentata
Chap'-to	Slew Grass	Beckmannia
Chep'-as		Sisymbrium incisum
Chmar'-lak	Currant Berry	Ribes cereum
Cho-a'	Wappatoo	Sagittaria arifolia
Cho-it'-i-am	Wild Rose	Rosa fendleri
Chom'-chak	Yellow Flowered Currant	Ribes aureum
Choms'-kam	Yellow Flowered Currant	Ribes aureum
De-wich'-kash	Chokecherry	Prunus demissa

Indian Name	Common English Name	Scientific Name
De-wich'-ksam	Chokecherry	Prunus demissa
E' pa	Ipos	Carnum oreganum
E'-wam	Tall huckleberry	Vaccinium membranaceum
Ga-ga'-e-sam sa'-wals		Ceanthus prostratus
Ga'-o ga'-O'sam	Oregon Grape	Berberis repens
Gha'-gum lak'-o	Iris	Iris missouriensis
Ghat	Sagebrush	Artemisa tridentata
Gil-len'-a		Triglochin maritima
Gla'-i-pi	Grass	Elymus condensatus
Gla'-i-pi-am	Grass	Elymus condensatus
Go-e-wha	Tarweed	Madia glomerata
Go'-klas	Dock	Ruems salicifolius
Jo'-i-jiks	Wild strawberry	Fragaria virginiana
Ka'-a-lum-kes		Eriogonum elatum
Kach'-kul	Wild tobacco	Nicotiana attenuata
Kam'-cho-da"-lis	Sugar grass	Panicularia fluitans
Ka-ma'-mi	Bearberry	Aretostaphylos nevadensis
Kap'-i-onks		Polygonum douglasii
Kap'-ka	Ponderosa pine (sapling)	Pinus Ponderosa
Kat Kat'-sam		Tetradymia canescens
Ken-a'-wat		Rumex geyeri

Indian Name	Common English Name	Scientific Name
Kha-als'		Carex sp.
K-ol'		Valeriana edulis
Kol'-a-kams	Rocky mountain flax	Linum lewisii
Ko-osh'	Balm of Gilead poplar	Populus balsamifera
Kots-ou'iks	Lamb's quarters (goosefoot)	Chenopodium fremonti
Kta'-lo	Sugar pine	Pinus lambertiana
Kwe'-ya		Valeriana edulis
Lal-wal'-sam	Yarrow	Achillea millefoliom
Lba		Balsamorrhiza sagittata
Lho-lo'-e lo'-e-sam	Gooseberry	Ribes exyacan-thoides saxo-sum
Lo'-las		Mentzelia albicaulis
Mach-as'-sant	Mint	Mentha canadensis
Ma'-em la'--wals	Tule (seeds)	Scirpus lacustria occidentalis
Ma'-i	Tule (stems)	Scirpus lacustria occidentalis
Mas'-la	Wild raspberry	Rubus lencodermis
Ndalk	Yampa	Carum gairdneri
Nkos	Ponderosa Pine (adult)	Pinus ponderosa
Not		Apocynum cannabinum
No'-tak		Agrostic perennans
Ohl'-sam bon'-was		Gilia aggregata

Indian Name	Common English Name	Scientific Name
O'-tam	Bush honeysuckle	Lonicera conjugialis
Paks	Camas	Quamasia quamash
Pod'-cho	Cow parsnip	Heracleum lanatum
Po'-pas	Cat-tail	Typha latifola
Sa-hwet'	Yampa	Carum gairdneri
Sar'-um-bak-ish	Cascara	Rhamnus purshiana
Sca'-o	Death camas or lobelia	Zygadenus venenosus
Scou	Death camas or lobelia	Zygadenus venenosus
Shal	Cane Grass	Phragmites phragmites
Shwa'-wi-sam	Yellow Moss	Evernia vulpina
Ska'-wanks	Water Hemlock	Circuta maculata
Sleds	Nettle	Urtica breweri
Slo'-los	Elder Berry	Sambucus glauca
Slo'-lo-sam	Elder Berry	Sambucus glauca
Sta'-mak		Wyethia mollis
Stop'-alch	Ponderosa pine (cambium layer)	Pinus ponderosa
Tkop	Cane grass	Phragmites phragmites
To-mo'-lo	Wild red plum	Prunus subocrdata
To-tank'-sam	Blackberry	Rubus vitifolius
Tsal	Cane grass	Phragmites phragmites
Tsin-a'-o	Wire grass	Juncus balticus
Tso-pink'-sham	Yew	Taxus brevifolia

Indian Name	Common English Name	Scientific Name
Vo'-lal	Aspen	Populus tremuloides
Wa-chak'-wis	Scouring rush	Equisetm hyemale
Wa'-kam		Sium cicutaefolium
Wa'-ko	Lodgepole pine	Pinus murrayana
Wol'-wal	Rabbit Brush	Chondrophora nauseosa
Wa'-wi		Chrysothamnus bloomeri
Wa'-sam chon'-was	Evening Primrose	Oenothera hookeri
Wich'-pi	Tall Sedge	Carex
Wip'-lam	Alder	Alnus tenuifolia
Wit-am'-mam e'-wam	Wild Bitter Cherry	Prunus emarginata
Wo-do-phto'-sam	Wild Bitter Cherry	Prunus emarginata
Wo-kas	Yellow Water Lily	Nymphaea pdysepala
Wol'-wansh	Cedar	Libocedrus decurrens
Wol'-wan'-sham	Cedar	Libocedrus decurrens
Yam'-pa		Carum gairdneri
Yanch		Calochortus macrocarpus
Yas	Willow	Salix
Ya'-yak	Willow	Salix

LIST OF ANIMALS IN THE STUDY AREA BY

COMMON AND SCIENTIFIC NAME

	Common Name	Scientific Name
Amphibians:	Bullfrog	_Rana catesbeiana_
	Cascade's frog	_Rana cascadae_
	Ensatina	_Ensatina eschscholtzii_
	Great basin spadefoot	_Scaphiopus inermontanus_
	Long-toed salamander	_Ambystoma macrodactylum_
	Pacific treefrog	_Hyla regilla_
	Rough-skinned newt	_Taricha granulosa_
	Tailed frog	_Ascaphus truei_
	Tiger salamander	_Ambystoma tigrinum_
	Western spotted frog	_Rana pretiosa_
	Western toad	_Bufo boreus_
Birds:	American avocet	_Recurvirostra americana_
	American bittern	_Botarus lentiginosus_
	American coot	_Fulica americana_
	American goldfinch	_Carduelis tristis_
	American kestrel	_Falco sparverius_
	American robin	_Turdus migratorius_
	American wigeon	_Anas americana_
	Anna's hummingbird	_Calypte anna_
	Arctic loon	_Gavia arctica_

Common Name	Scientific Name
Ash-throated flycatcher	Myiarchus cinerascens
Bald eagle	Haliaeetus leucocephalus
Band-tailed pigeon	Columba fisciata
Bank swallow	Riparia riparia
Barn owl	Tyto alba
Barn swallow	Hirundo rustica
Barred owl	Strix varia
Barrow's goldeneye	Bucephala islandica
Belted kingfisher	Megaceryle alcyon
Bewick's wren	Thryomanes bewickii
Black swift	Cypseloides niger
Black tern	Chilodonias niger
Black-backed 3-toed woodpecker	Picoides arcticus
Black-billed magpie	Pica pica
Black-capped chickadee	Parus atricapillus
Black-chinned hummingbird	Archilochus alexandri
Black-crowned night heron	Nycticorax nycticorax
Black-headed grosbeak	Pheucticus melanocephalus
Black-necked stilt	Himantopus mexicanus
Black-throated gray warbler	Dendroica nigrescens
Black-throated sparrow	Amphispiza bilineata
Blue grouse	Dendragapus obscurus
Blue-winged teal	Anas discors
Bohemian waxwing	Bombycilla garrulus

Common Name	Scientific Name
Bonaparte's gull	*Larus philadelphia*
Brewer's blackbird	*Euphagus cyanocephalus*
Brewer's sparrow	*Spizella breweri*
Brown creeper	*Certhia familiaris*
Brown towhee	*Pipilo fuscus*
Brown-headed cowbird	*Molothrus ater*
Bufflehead	*Bucephala albeola*
Burrowing owl	*Athene cunicularia*
Bushtit	*Psaltriparus minimus*
California gull	*Larus californicus*
California (valley) quail	*Lophortyx californicus*
Calliope hummingbird	*Stellula calliope*
Canada goose	*Branta canadensis*
Canvasback	*Aythya vaslisineria*
Canyon wren	*Catherpes mexicanus*
Caspian tern	*Sterna caspia*
Cassin's finch	*Carpodacus cassinii*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-backed chickadee	*Parus rufescens*
Chipping sparrow	*Spizella passerina*
Cinnamon teal	*Anas cyanoptera*
Clark's nutcracker	*Nucifraga columbiana*
Cliff swallow	*Petrochelidon pyrrhonota*
Common flicker	*Colaptes auratus*

Common Name	Scientific Name
Common crow	*Corvas brachyrhychos*
Common goldeneye	*Bucephala Clangula*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Common nighthawk	*Chordeiles minor*
Common raven	*Corvus corax*
Common snipe	*Capella gallinago*
Common (great) egret	*Casmerodius albus*
Cooper's hawk	*Accipiter cooperi*
Dark-eyed junco	*Junco hyemalis*
Dipper	*Cinclus mexicanus*
Double-crested cormorant	*Phalacrocorax auritis*
Downy woodpecker	*Picoides pubescens*
Dunlin	*Calidris alpina*
Dusky flycatcher	*Empidonax oberholseri*
Eared grebe	*Podiceps nigricollis*
Eastern kingbird	*Tyrannus tyrannus*
Evening grosbeak	*Hesperiphona vespertina*
Ferruginous hawk	*Buteo regalis*
Flammulated owl	*Otus flammeolus*
Forster's tern	*Sterna forsteri*
Fox sparrow	*Passerella iliaca*
Gadwall	*Anas strepers*
Golden eagle	*Aquila chrysaetos*

Common Name	Scientific Name
Golden-crowned kinglet	Regulus satrapa
Golden-crowned sparrow	Zonotrichia atricapilla
Goshawk	Accipiter gentilis
Grasshopper sparrow	Ammodramus savannarum
Gray flycatcher	Empidonax wrightii
Gray jay	Perisoreus canadensis
Gray-crowned rosy finch	Leucosticte tephrocotis
Great blue heron	Ardea herodia
Great gray owl	Strix nebulosa
Great horned owl	Bubo virginianus
Greater scaup	Aythya marila
Green heron	Butorides striatus
Green-tailed towhee	Pipio chlorurus
Green-winged teal	Anas crecca
Hairy woodpecker	Picoides villosus
Hammond's flycatcher	Empidonax hammondii
Hermit thrush	Catharus guttatus
Hermit warbler	Dendroica occidentalis
Herring gull	Larus argentatus
Hooded merganser	Lophodytes cucullatus
Horned grebe	Podiceps auritus
Horned lark	Eremophila alpestris
House finch	Carpodacus mexicanus
House sparrow	Passer domesticus

Common Name	Scientific Name
House wren	Troglodytes aedon
Killdeer	Charadrius vociferous
Lapland longspur	Calcarius lapponicus
Lark sparrow	Chondestes grammacus
Lazuli bunting	Passerina amoena
Least bittern	Ixobrychus exilis
Least sandpiper	Calidris minutilla
Lesser goldfinch	Carduelis psaltria
Lesser scaup	Aythya affinis
Lewis' woodpecker	Melanerpes lewis
Lincoln's sparrow	Melospiza lincolnii
Loggerhead shrike	Lanius ludovicianus
Long-billed dowitcher	Limodromus scolopaceus
Long-billed marsh wren	Telmatodytes palustris
Long-eared owl	Asio otus
MacGillivray's warabler	Oporornis tolmiei
Mallard	Anas platyrhynchos
Marbled godwit	Limosa fedoa
Marsh hawk	Circus cyaneus
Mountain bluebird	Sialia currucoides
Mountain chickadee	Parus gambeli
Mountain quail	Oreortyx pictus
Mourning dove	Zenaida macroura
Nashville warbler	Vermivora ruficapilla

Common Name	Scientific Name
Northern oriole	*Icterus galbula*
Northern phalarope	*Lobipes lobatus*
Northern shrike	*Lanius excubitor*
Northern spotted owl	*Strix occidentalis caurina*
Northern three-toed woodpecker	*Picoides tridactylus*
Olive-sided flycatcher	*Nuttalornis borealis*
Orange-crowned warbler	*Vermivora celata*
Osprey	*Pandion haliatus*
Pectoral sandpiper	*Calidris melanotos*
Pied-billed grebe	*Podilymbus podiceps*
Pileated woodpecker	*Dryocopus pileatus*
Pine grosbeak	*Pinicola enucleator*
Pine siskin	*Carduelis pinus*
Pinon jay	*Gymnorhinus cyanocephalus*
Pintail	*Anas acuta*
Plain titmouse	*Parus inornatus*
Poor-will	*Phalaenoptilus nuttallii*
Prairie falcon	*Falco mexicanus*
Purple finch	*Carpodacus purpureus*
Purple martin	*Progne subis*
Pygmy nuthatch	*Sitta pygmea*
Pygmy owl	*Glaucidium gnoma*
Red crossbill	*Loxia curvirostra*
Red phalorope	*Phalaropus fulicarius*

Common Name	Scientific Name
Redhead	Aythya americana
Red-breasted merganser	Mergus serrator
Red-breasted nuthatch	Sitta canadensis
Red-necked grebe	Podiceps grisegena
Red-tailed hawk	Buteo jamaicensis
Red-winged blackbird	Agelaius phoeniceus
Ring-billed gull	Larus delawarensis
Ring-necked duck	Aythya collaris
Rock dove	Columba livia
Rock wren	Salpinctes obsoletus
Ross' goose	Chen rossii
Rough-legged hawk	Buteo lagopus
Rough-winged swallow	Stelgidopteryx ruficollis
Ruby-crowned kinglet	Regulus calendula
Ruddy duck	Oxyura jamaicensis
Ruffed grouse	Bonasa umbellus
Rufous hummingbird	Selasphorus rufus
Rufus-sided towee	Pipilo erythrophthalamus
Sage grouse	Centrocercus urophasianus
Sage sparrow	Amphispiza belli
Sage thrasher	Oreoscoptes montanus
Sanderling	Calidris alba
Sandhill crane	Grus canadensis
Savannah sparrow	Passerculus sandwichensis

Common Name	Scientific Name
Saw-whet owl	Aegolius acadicus
Say's phoebe	Sayornis says
Screech owl	Otus asio
Scrud jay	Aphelocoma coerulescens
Sharp-shinned hawk	Accipiter striatus
Short-eared owl	Asio flammeus
Shoveler	Anas clypeata
Snow bunting	Plectrophenax nivalis
Snow goose	Chen caerulescens
Snowy egret	Egretta thula
Solitary vireo	Vireo solitarius
Song sparrow	Melospiza melodia
Sora	Porzana carolina
Spotted sandpiper	Actitis macularia
Starling	Sturnus vulgaris
Steller's jay	Cyanocitta stelleri
Stilt sandpiper	Micropalama himantopus
Swainson's hawk	Buteo swainsoni
Swainson's thrush	Catharus ustulatus
Townsend's solitaire	Myadestes townsendi
Townsend's warbler	Dendroica townsendi
Tree swallow	Iridoprocne bicolor
Tri-colored blackbird	Agelaius tricolor
Turkey vulture	Cathartes aura

Common Name	Scientific Name
Varied thrush	Ixoreus naevius
Vaux's swift	Chaetura vauxi
Vesper sparrow	Pooecetes gramineus
Violet-green swallow	Tachycineta thalassina
Virginia rail	Rallus limicola
Warbling vireo	Vireo gilvus
Water pipit	Anthus spinoletta
Western bluebird	Sialia mexicana
Western flycatcher	Empidonax difficilis
Western grebe	Aechmophorus occidentalis
Western kingbird	Tyrannus verticalis
Western meadowlark	Sturnella neglecta
Western sandpiper	Calidris mauri
Western snowy plover	Charadrius alexandrinus nivosus
Western tanager	Piranga ludoviciana
Western wood peewee	Contopus sordidulus
Whistling swan	Olor columbianus
White pelican	Pelecanus erythrorhynchos
White-breasted nuthatch	Sitta carolinensis
White-crowned sparrow	Zonotrichia leucophrys
White-faced ibis	Plegadis chihi
White-fronted goose	Anser albifrons
White-headed woodpecker	Picoides albolarvatus
White-winged scoter	Melanitta deglandi

	Common Name	Scientific Name
	Williamson's sapsucker	*Sphyrapicus throideus*
	Willow flycatcher	*Empidonax trailii*
	Wilson's phalarope	*Steganopus tricolor*
	Wilson's warbler	*Wilsonia pusilla*
	Winter wren	*Troglodytes troglodytes*
	Wood duck	*Aix sponsa*
	Wrentit	*Chamaea fasciata*
	Yellow warbler	*Dendroica petechia*
	Yellowthroat	*Geothlypis trichas*
	Yellow-bellied sapsucker	*Sphyrapicus varius*
	Yellow-breasted chat	*Icteria virens*
	Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
	Yellow-rumped warbler	*Dendroica coronata*
Fish	Blue chub	*Gila coerulea*
	Bluegill	*Lepomis macrochirus*
	Brook trout	*Salvelinus fontinalis*
	Brown bullhead	*Ictalurus nebulosus*
	Brown trout	*Salmo trutta*
	Carp	*Cyprinus carpio*
	Dolly varden	*Salvelinus malma*
	Klamath Lake sculpin	*Cottus princeps*
	Klamath largescale sucker	*Catostomus snyderi*
	Largemouth bass	*Micropterus salmoides*
	Lost River sucker	*Catostomus luxatus*

	Common Name	Scientific Name
	Marbled sculpin	*Cottus klamathensis*
	Pacific lamprey	*Entosphenus tridentatus*
	Rainbow trout (steelhead)	*Salmo gairdneri*
	Shortnose sucker	*Chasmistes brevirostris*
	Slender sculpin	*Cottus tenuis*
	Sockeye salmon (kokanee)	*Oncorhynchus nerka*
	Speckled dace	*Rhinichthys osculus*
	Tui chub	*Gila bicolor*
	White sturgeon	*Acipenser transmontanus*
	Yellow perch	*Perca flavescens*
Mammals	Badger	*Taxidea taxus*
	Beaver	*Castor canadensis*
	Belding's ground squirrel	*Spermophilus beldingi*
	Big brown bat	*Eptesicus fuscus*
	Black bear	*Ursus americanus*
	Black-tailed jackrabbit	*Lepus californicus*
	Bobcat	*Lynx rufus*
	Broad-footed mole	*Scapanus latimanus*
	Bushy-tailed woodrat	*Neotoma cinerea*
	California ground squirrel	*Spermophilus beecheyi*
	California myotis	*Myotis californicus*
	Canyon mouse	*Peromyscus crinitis*
	Coast mole	*Scapanus orarius*
	Columbian black-tailed deer	*Odocoileus hemionus columbianus*

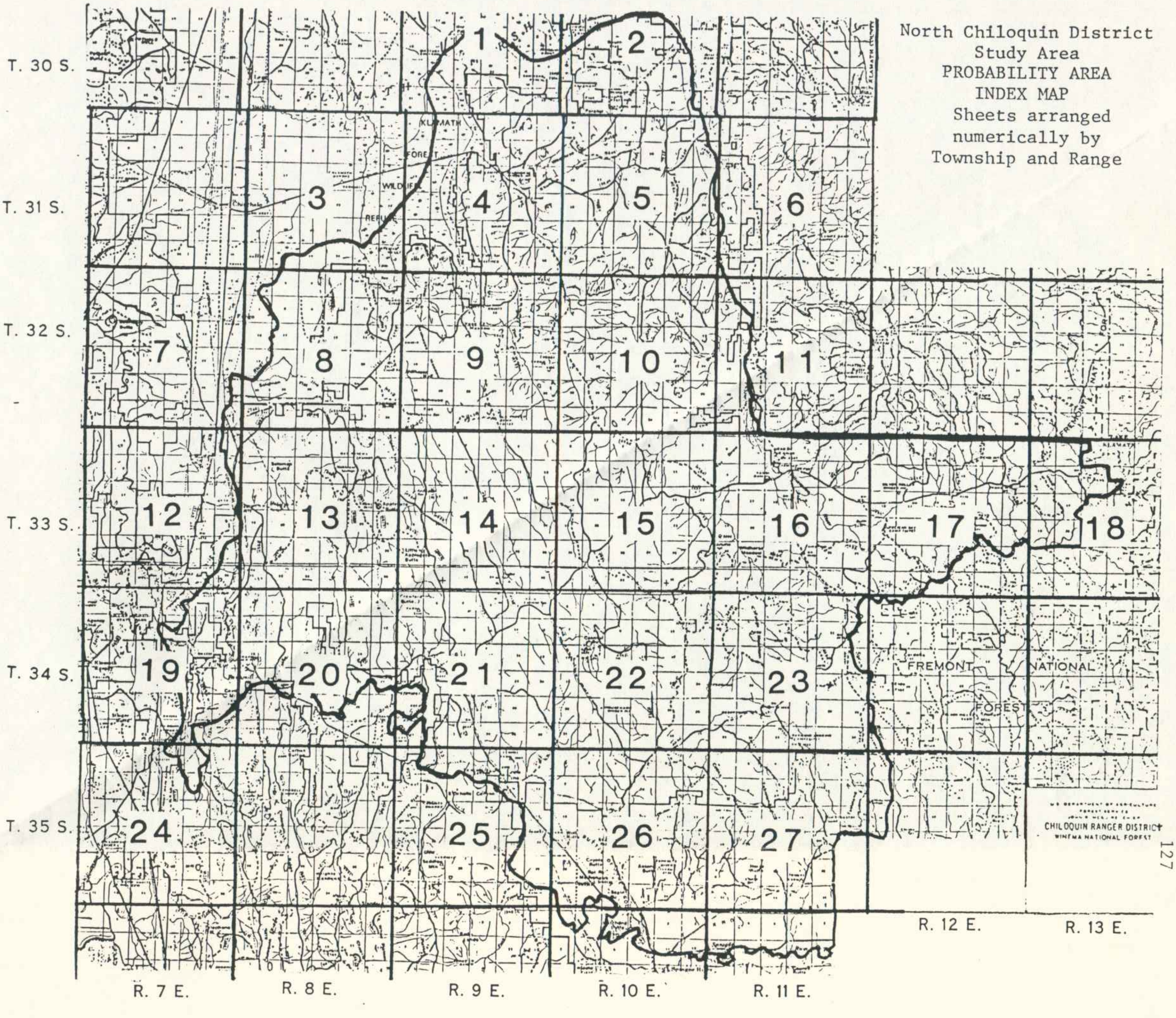
Common Name	Scientific Name
Coyote	Canis latrans
Creeping vole	Microtus oregoni
Deer mouse	Peromyscus maniculatus
Douglas squirrel	Tamiasciurus douglasii
Dusky shrew	Sorex obscurus
Dusky-footed woodrat	Neotoma fuscipes
Ermine (short-tailed weasel)	Mustela erminea
Fisher	Martes pennanti
Fringed myotis	Myotis thysanodes
Golden-mantled ground squirrel	Spermophilus lateralis
Gray fox	Urocyon cinereoargenteus
Great basin pocket mouse	Perognathus parvus
Heather vole	Phenacomys intermedius
Heermann's kangaroo rat	Didolomys heermanni
Hoary bat	Lasiurus cinereus
House mouse	Mus musculus
Least chipmunk	Eutamias minimus
Little brown myotis	Myotis lucifugus
Longtail weasel	Mustela frenata
Long-eared myotis	Myotis evotis
Long-legged myotis	Myotis valans
Long-tailed vole	Microtus longicaudus
Marten	Martes americana
Merriam's shrew	Sorex merriami

Common Name	Scientific Name
Mink	Mustela vison
Montane vole	Microtus montanus
Mountain beaver	Aplodonitia rufa
Mountain lion (puma)	Felis concolor
Mule deer	Odocoileus hemionus hemionus
Muskrat	Ondrata zibethicus
Northern flying squirrel	Glaucomys sabrinus
Northern grasshopper mouse	Onychomys leucogaster
Northern pocket gopher	Thomomys talpoides
Norway rat	Rattus norvegicus
Nuttalls's (mountain) cottontail	Sylvilagus nuttallii
Ord's kangaroo rat	Dipodomys ordii
Pallid bat	Antrozous pallidus
Pika	Ochotona princeps
Pinon mouse	Peromyscus truei
Porcupine	Erethizon dorsatum
Pronghorn	Antilocapra americana
Raccoon	Procyon lotor
Red fox	Vulpes vulpes
River otter	Lutra canadensis
Rocky mountain elk	Cervus elaphus nelsoni
Sagebrush vole	Lacurus curtatus
Silver-haired bat	Lasionycteris noctivagans

	Common Name	Scientific Name
	Small-footed myotis	*Myotis leibii*
	Snowshoe hare	*Lepus americanus*
	Striped skunk	*Mephitis mephitis*
	Townsend's big-eared bat	*Plecotus townsendii*
	Townsend's chipmunk	*Eutamias townsendii*
	Townsend's vole	*Microtus townsendii*
	Trowbridge's shrew	*Sorex trowbridgii*
	Vagrant shrew	*Sorex vagrans*
	Water shrew	*Sorex palustris*
	Water vole	*Arvicola richardsoni*
	Western gray squirrel	*Sciurus griseus*
	Western harvest mouse	*Reithrodontomys megalotis*
	Western jumping mouse	*Zapus princeps*
	Western pocket gopher	*Thomomys mazama*
	Western red-backed vole	*Clethrionomys occidentali*
	Western spotted skunk	*Spilogale gracilis*
	Wolverine	*Gulo gulo*
	Yellow-bellied marmot	*Marmota flaviventris*
	Yellow-pine chipmunk	*Eutamias amoenus*
	Yuma myotis	*Myotis yumanensis*
Reptiles	Common gartersnake	*Thamnophus sirtalis*
	Night snake	*Hypsiglena torquata*
	Northern alligator lizard	*Gerrhonotus coeruleus*
	Pine (gopher) snake	*Pituiphis melanoleucus*

Common Name	Scientific Name
Racer	*Coluber constrictor*
Rubber boa	*Charina bottae*
Sagebrush lizard	*Sceloporus graciosus*
Short-horned lizard	*Phrynosoma douglassii*
Side-blotched lizard	*Uta stansburiana*
Striped whipsnake	*Masticophis taeniatus*
Western fence lizard	*Sceloporus occidentalis*
Western gartersnake	*Thamnophus elegans*
Western pond turtle	*Clemmys marmorata*
Western rattlesnake	*Crotalus viridis*
Western skink	*Eumeces skiltonianus*

APPENDIX B


North Chiloquin District
Study Area
PROBABILITY AREA
INDEX MAP
Sheets arranged
numerically by
Township and Range
T. 30 S.
T. 31 S.
T. 32 S.
T. 33 S.
T. 34 S.
T. 35 S.
R. 7 E.
R. 8 E.
R. 9 E.
R. 10 E.
R. 11 E.
R. 12 E.
R. 13 E.
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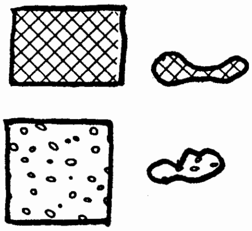
27
KLAMATH
FOREST
WILDLIFE
REFUGE
FREMONT
NATIONAL
FOREST
CHILOQUIN RANGER DISTRICT
WINEMA NATIONAL FOREST

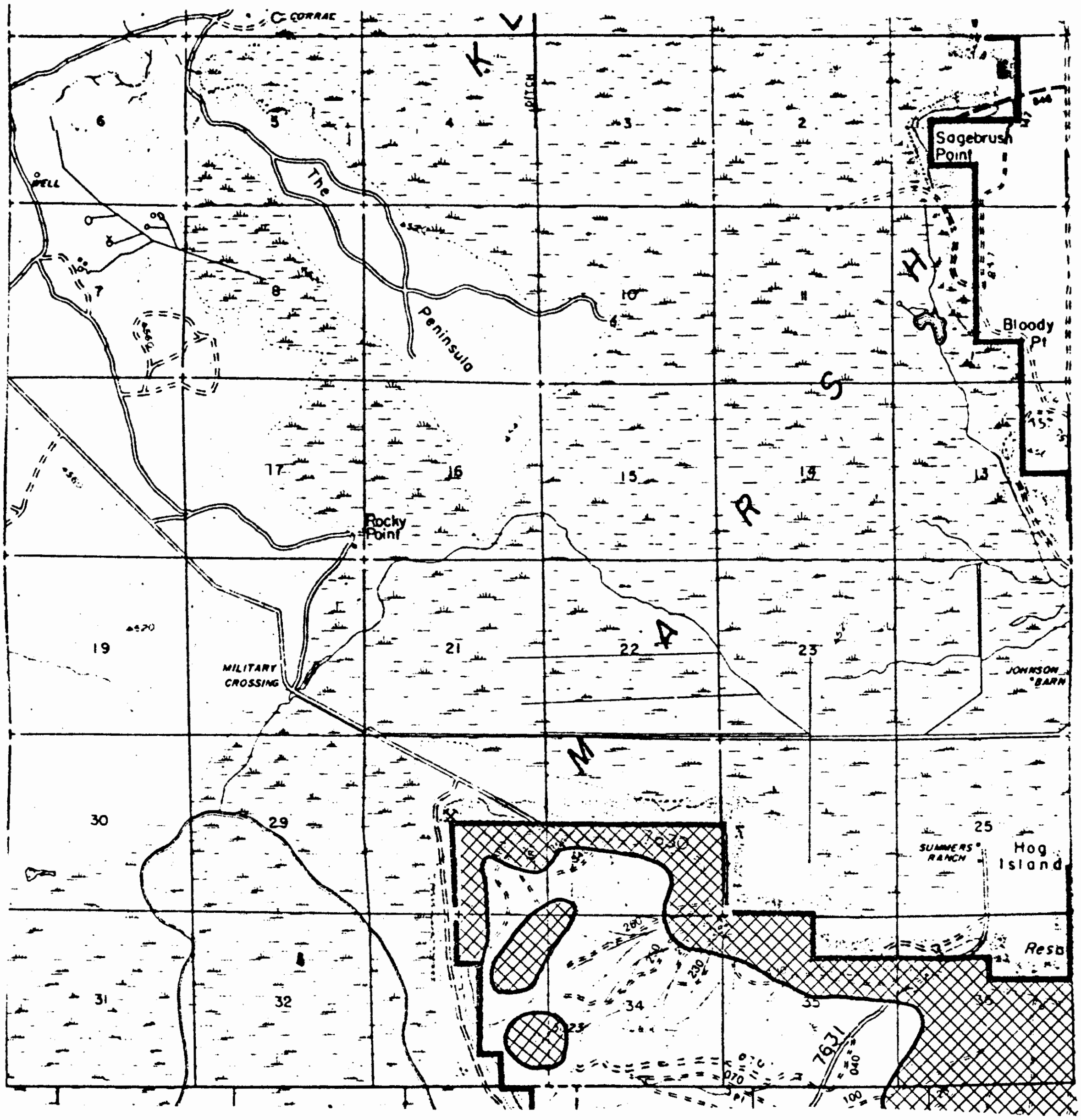
PROBABILITY MAPS KEY



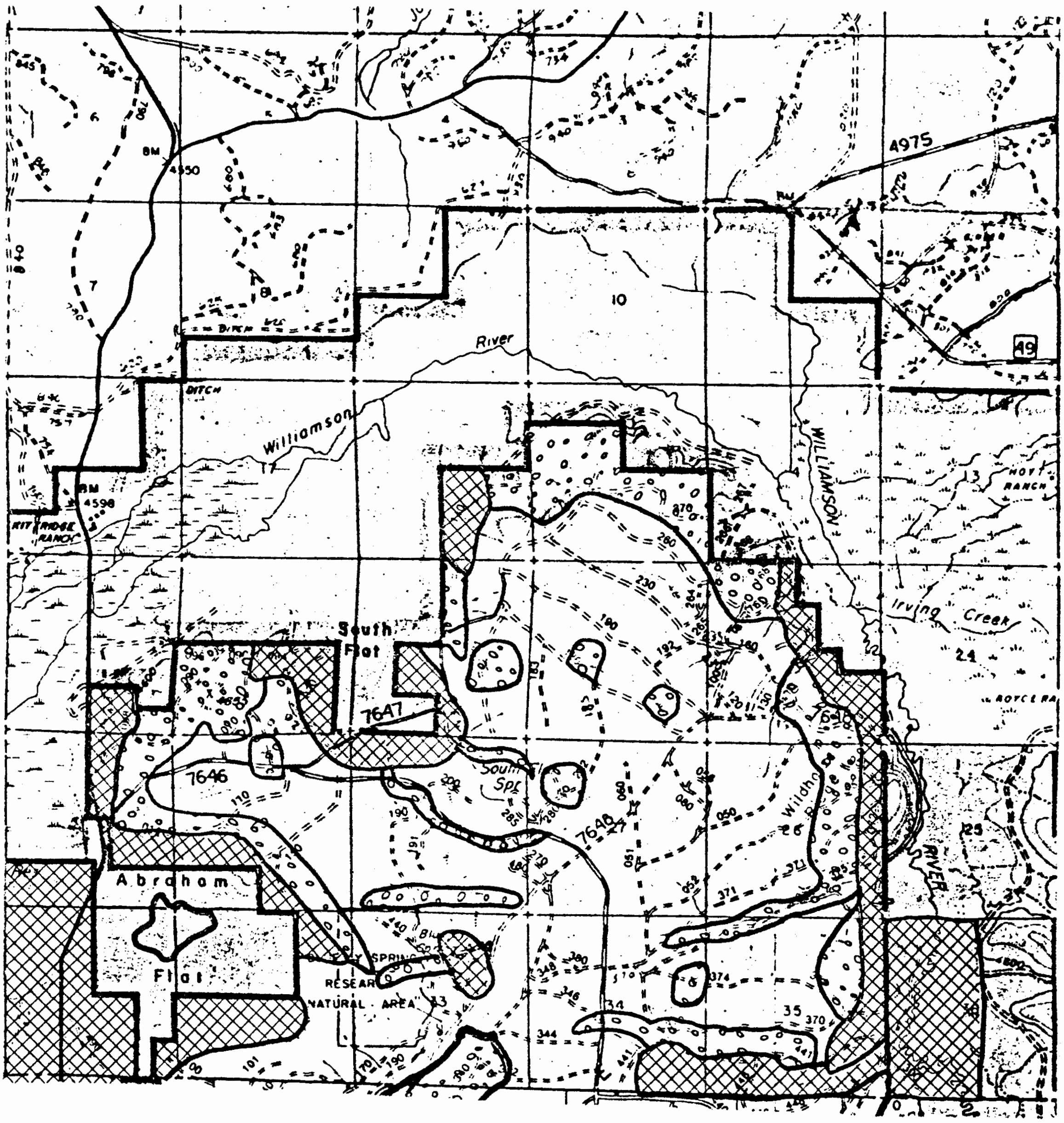
High Probability Areas

Medium Probability Areas

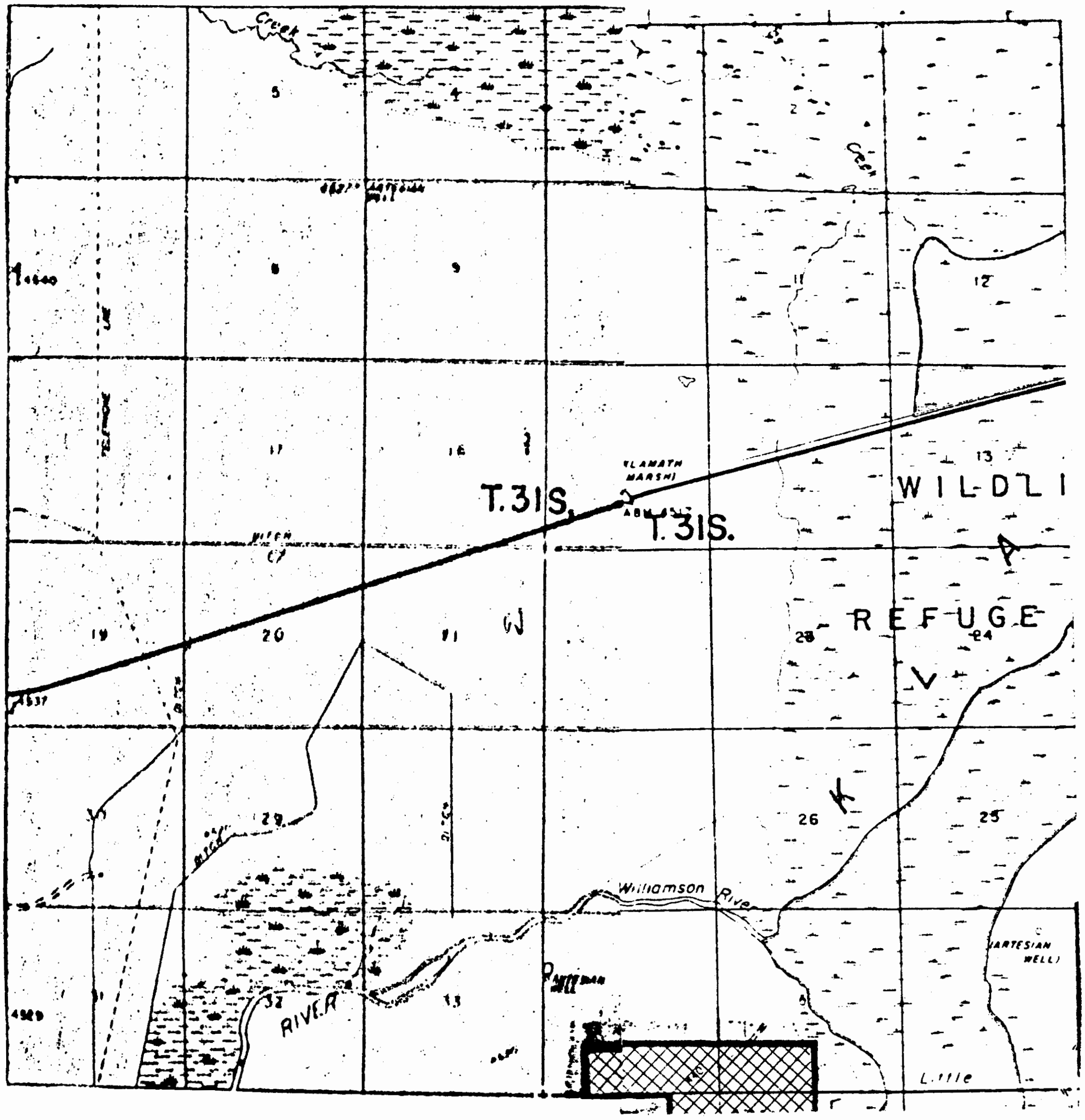
SHEET 1 - Township 30 South
Range 9 East



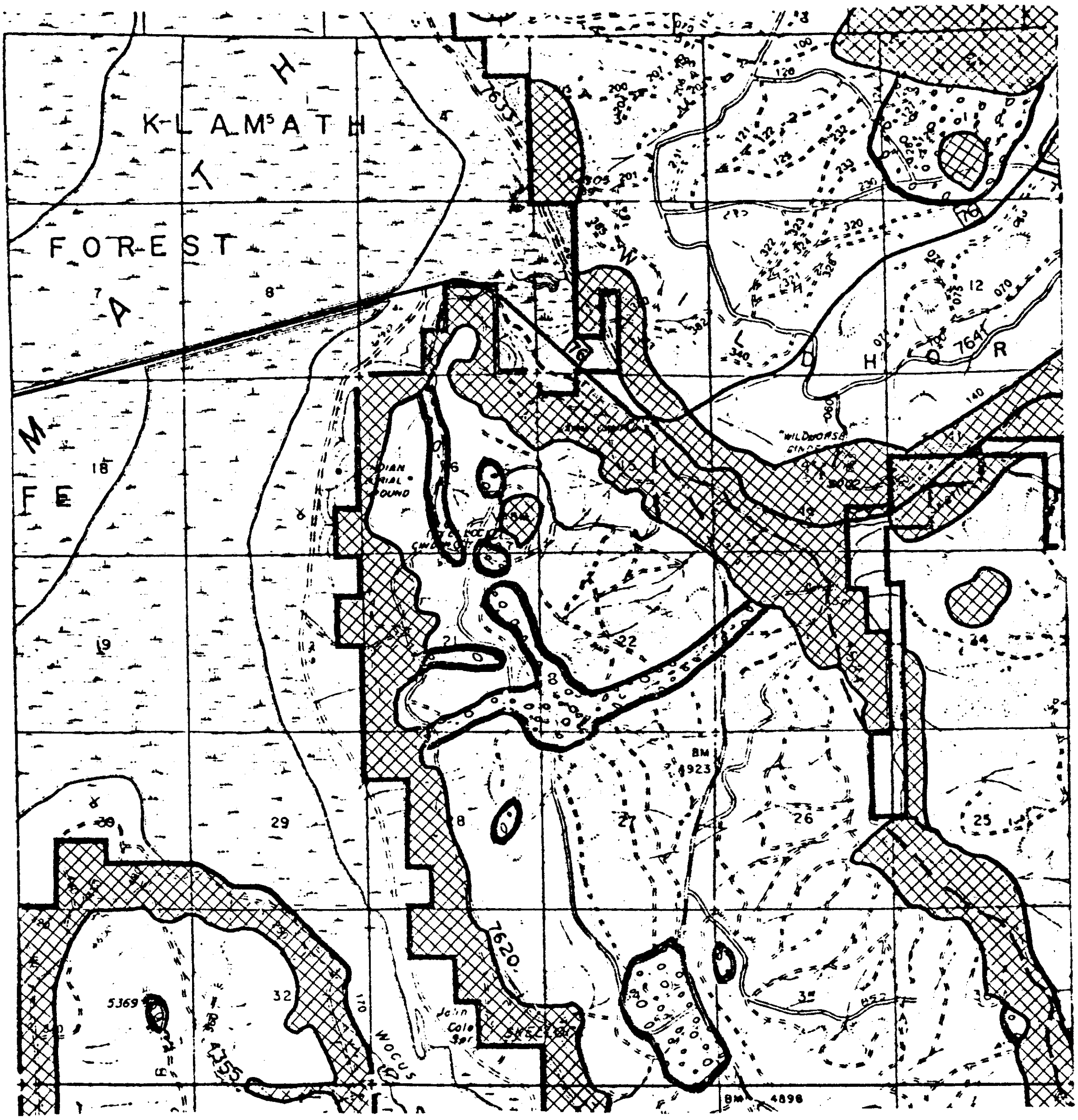
SHEET 2 - Township 30 South
Range 10 East



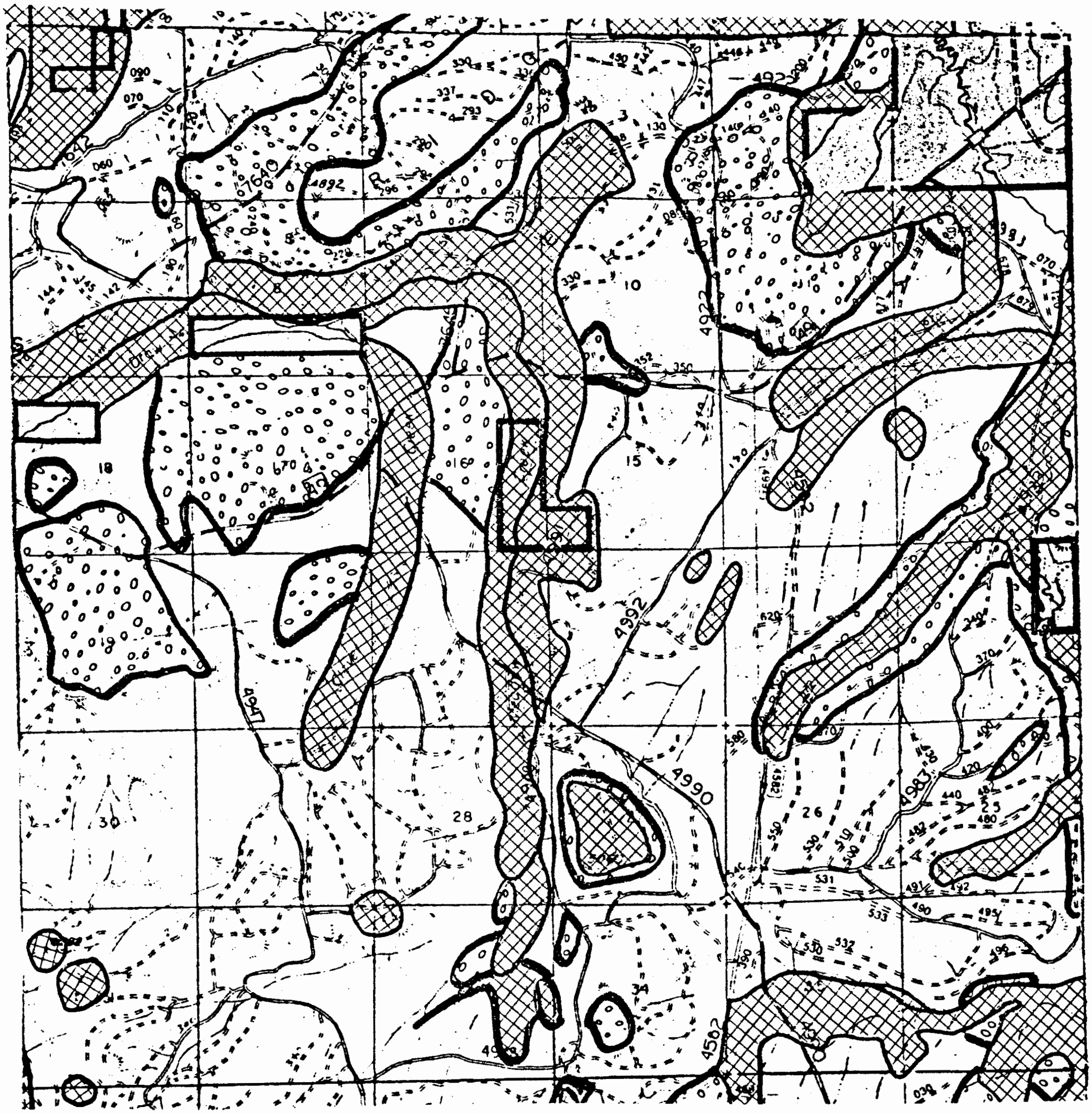
SHEET 3 - Township 31 South
Range 8 East



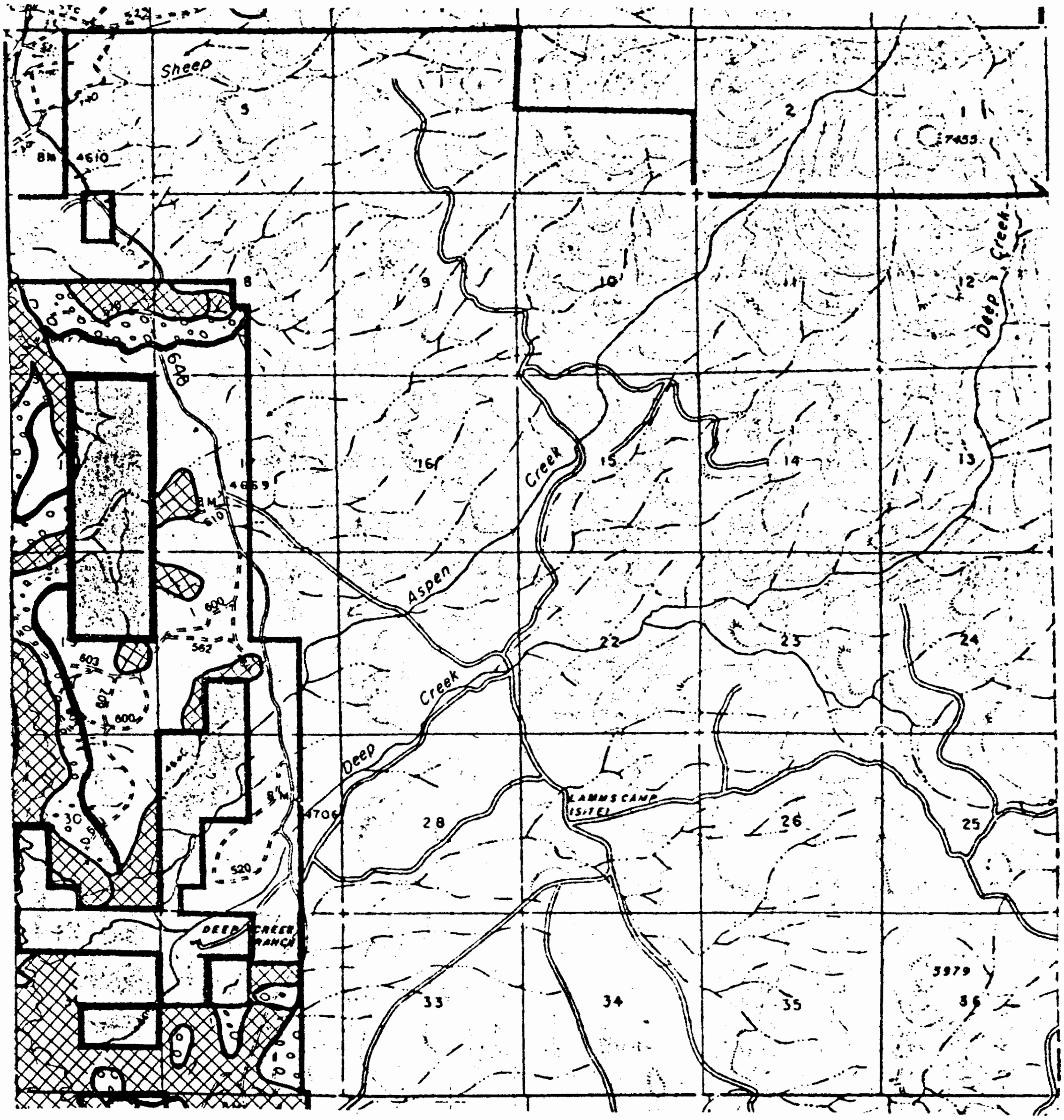
SHEET 4 - Township 31 South
Range 9 East



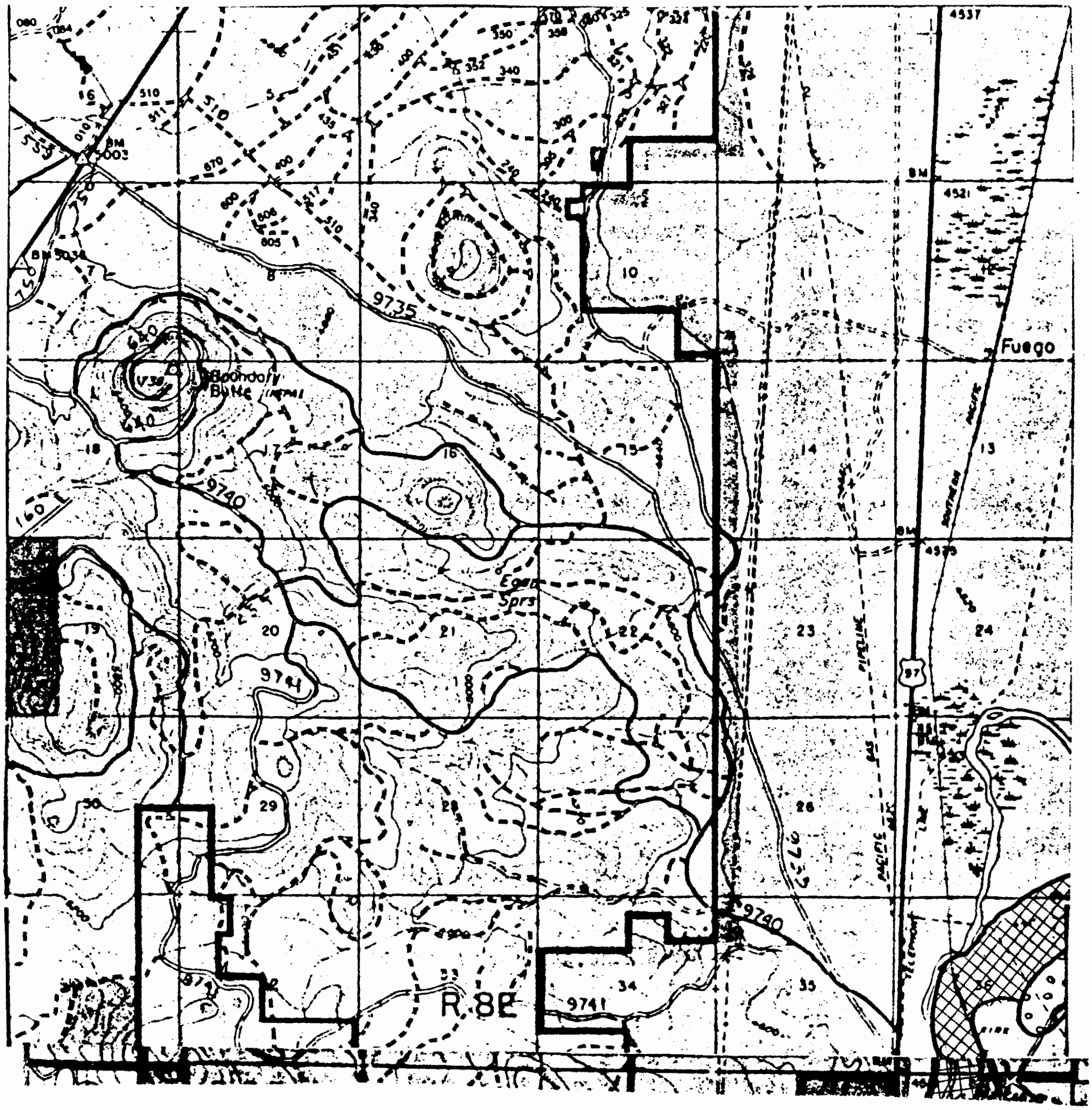
SHEET 5 - Township 31 South
Range 10 East



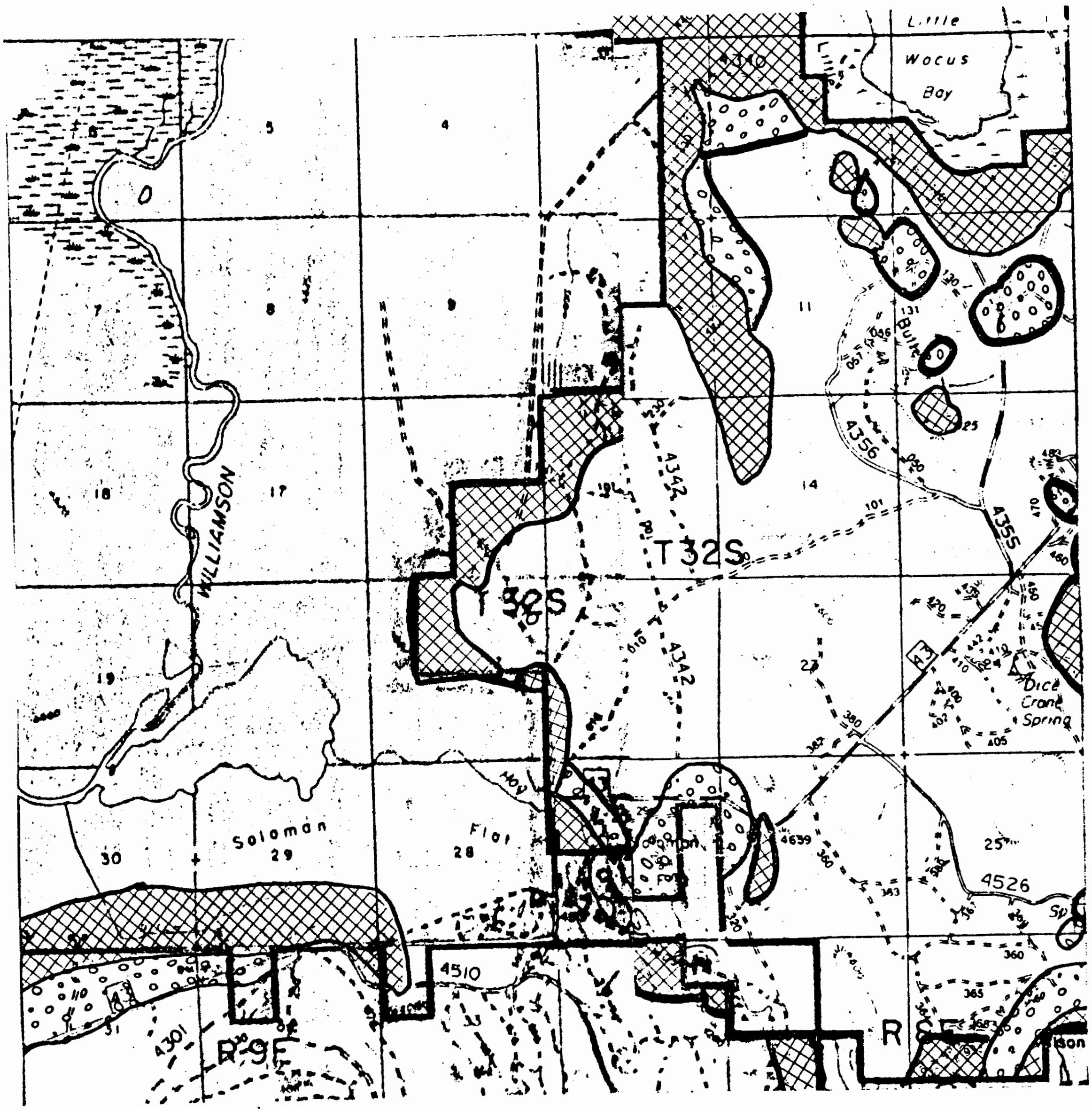
SHEET 6 - Township 31 South
Range 11 East



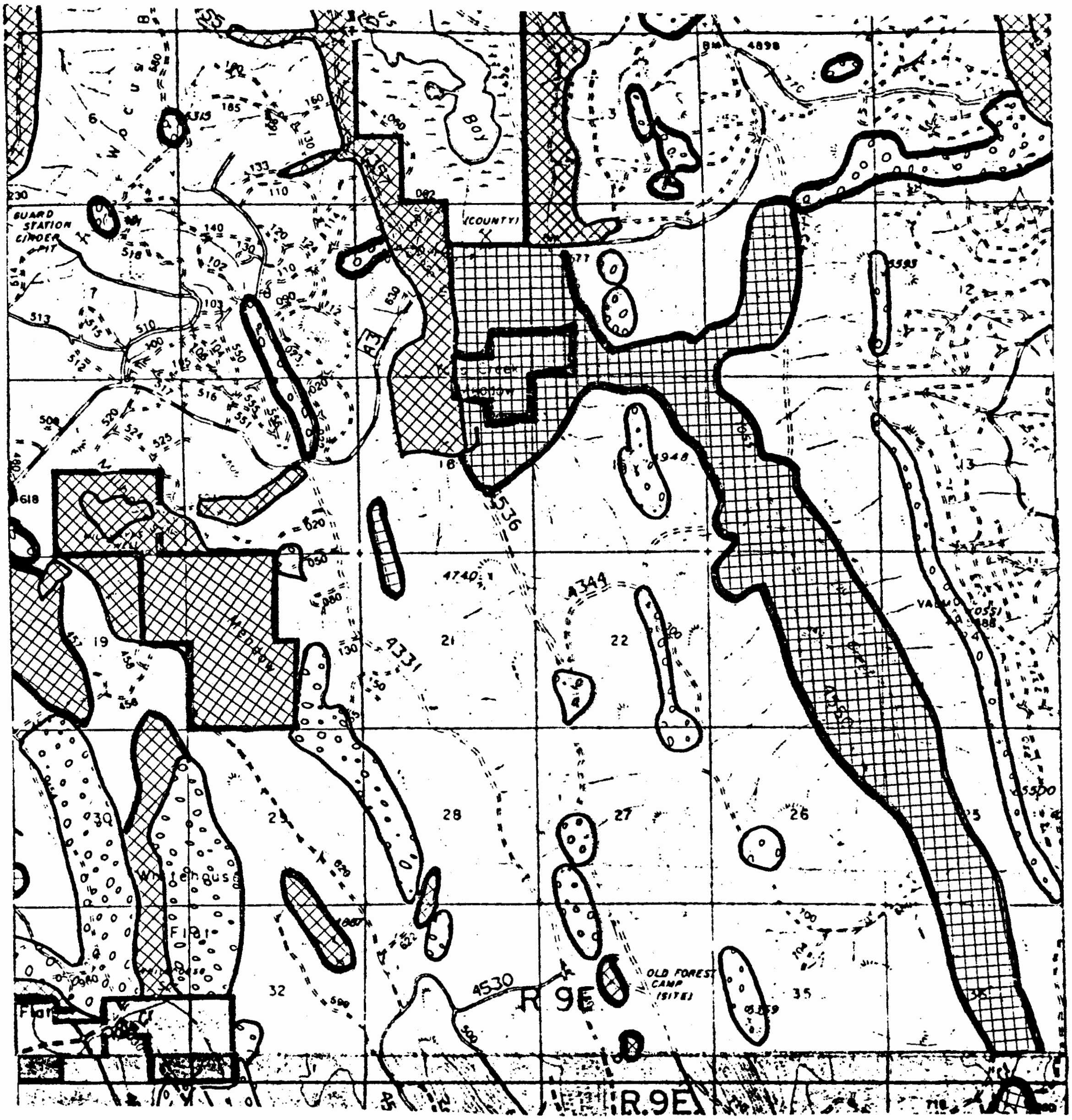
SHEET 7 - Township 32 South
Range 7 East



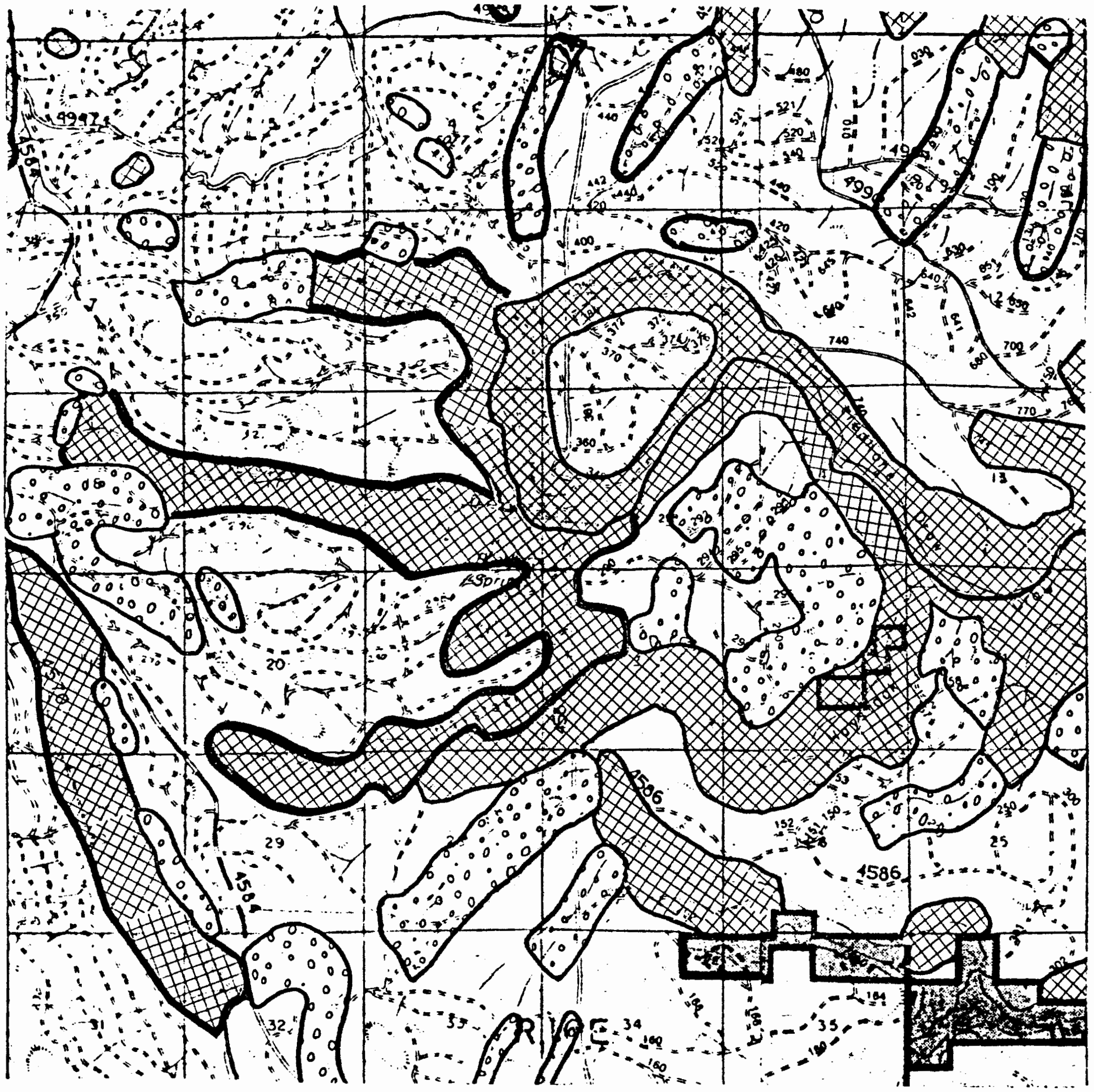
SHEET 8 - Township 32 South
Range 8 East



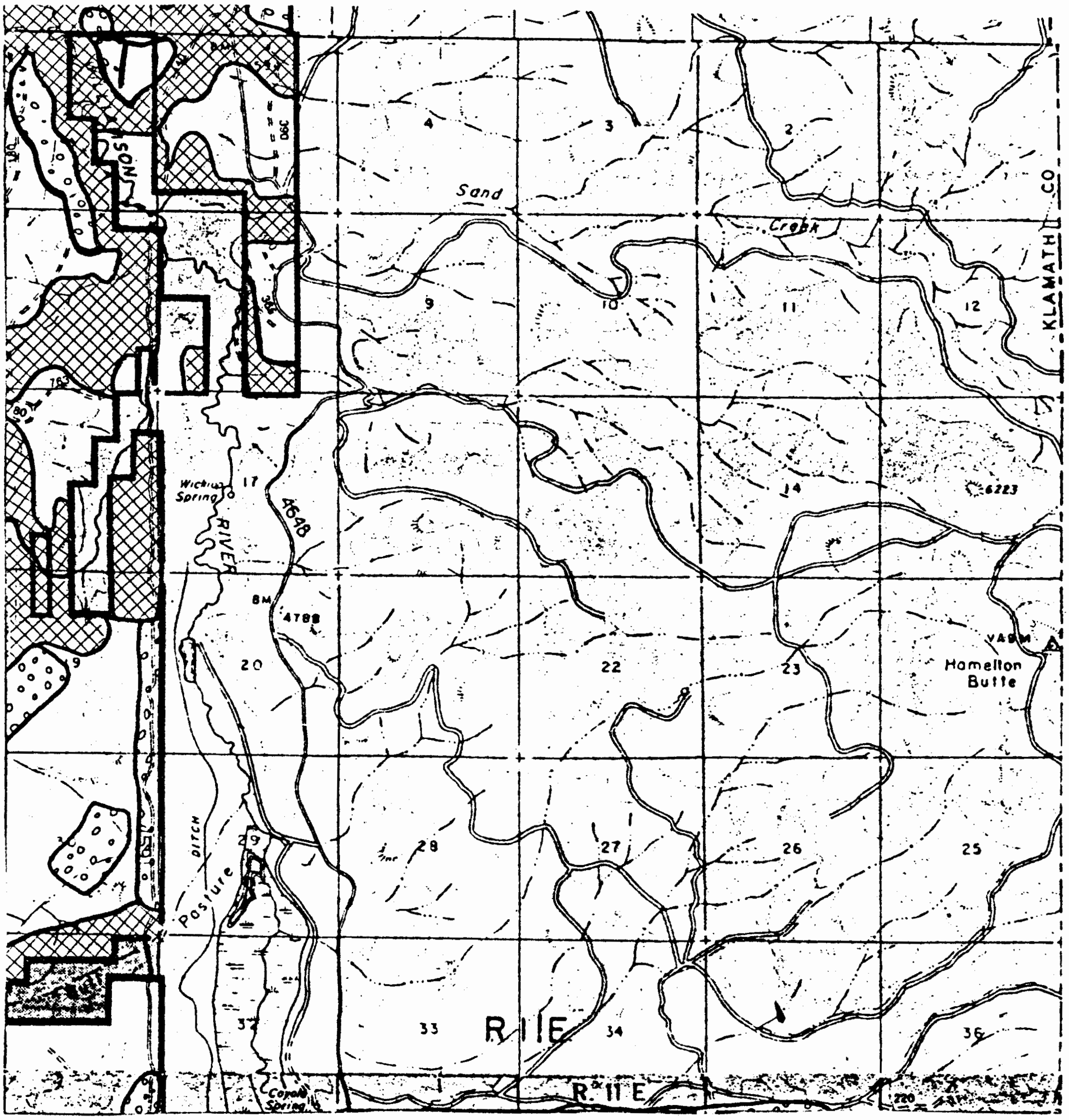
SHEET 9 - Township 32 South
Range 9 East



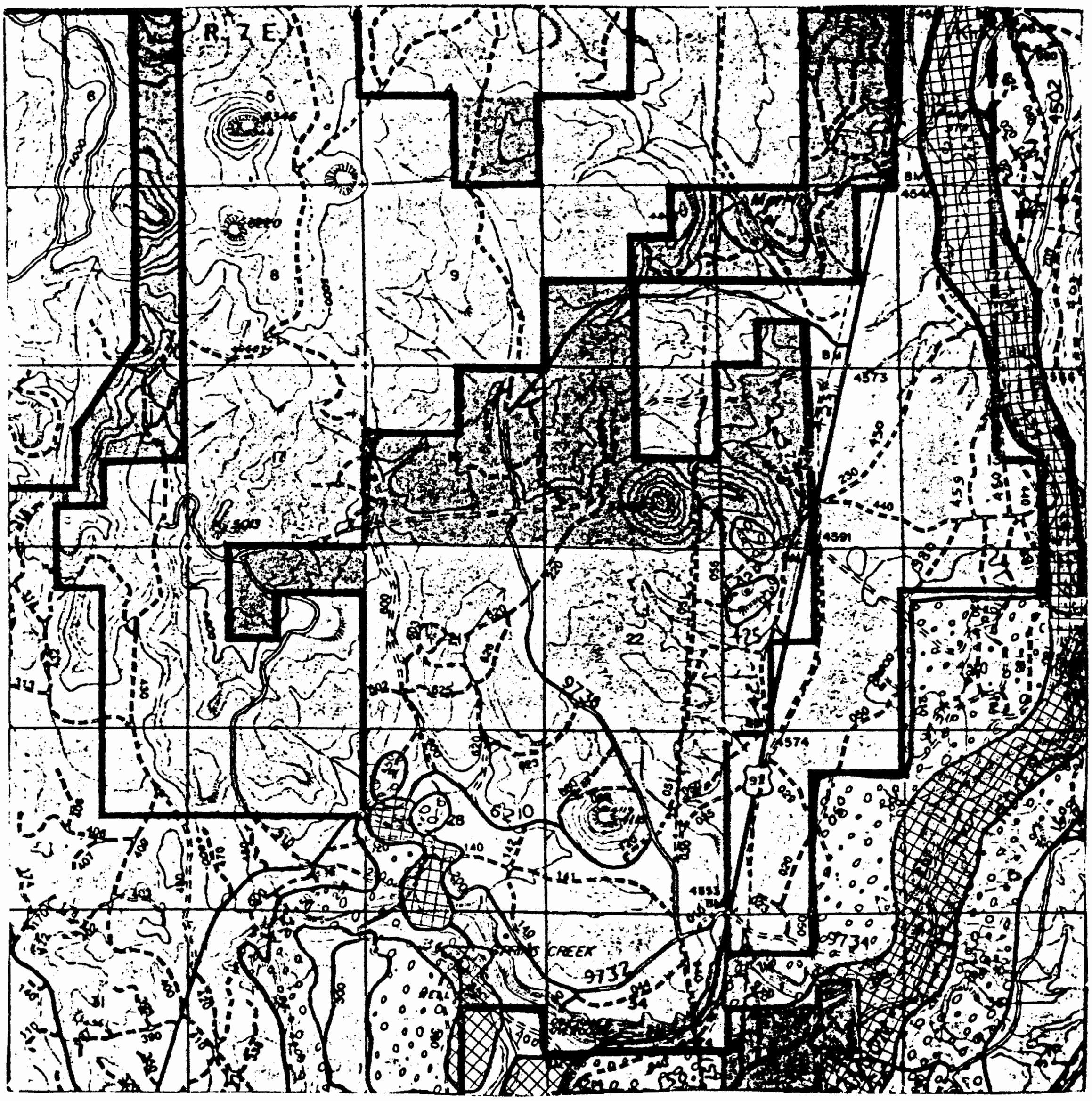
SHEET 10 - Township 32 South
Range 10 East



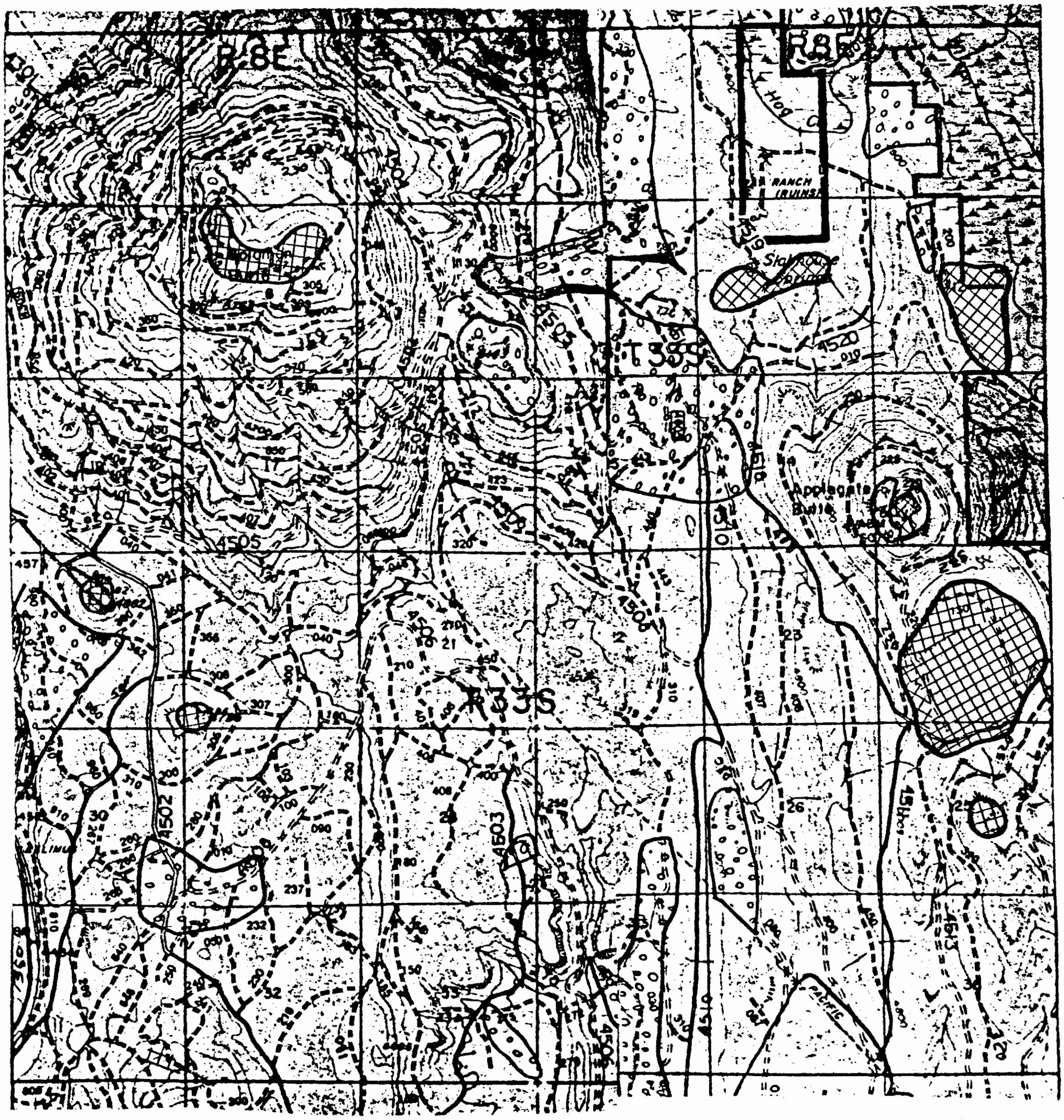
SHEET 11 - Township 32 South
Range 11 East



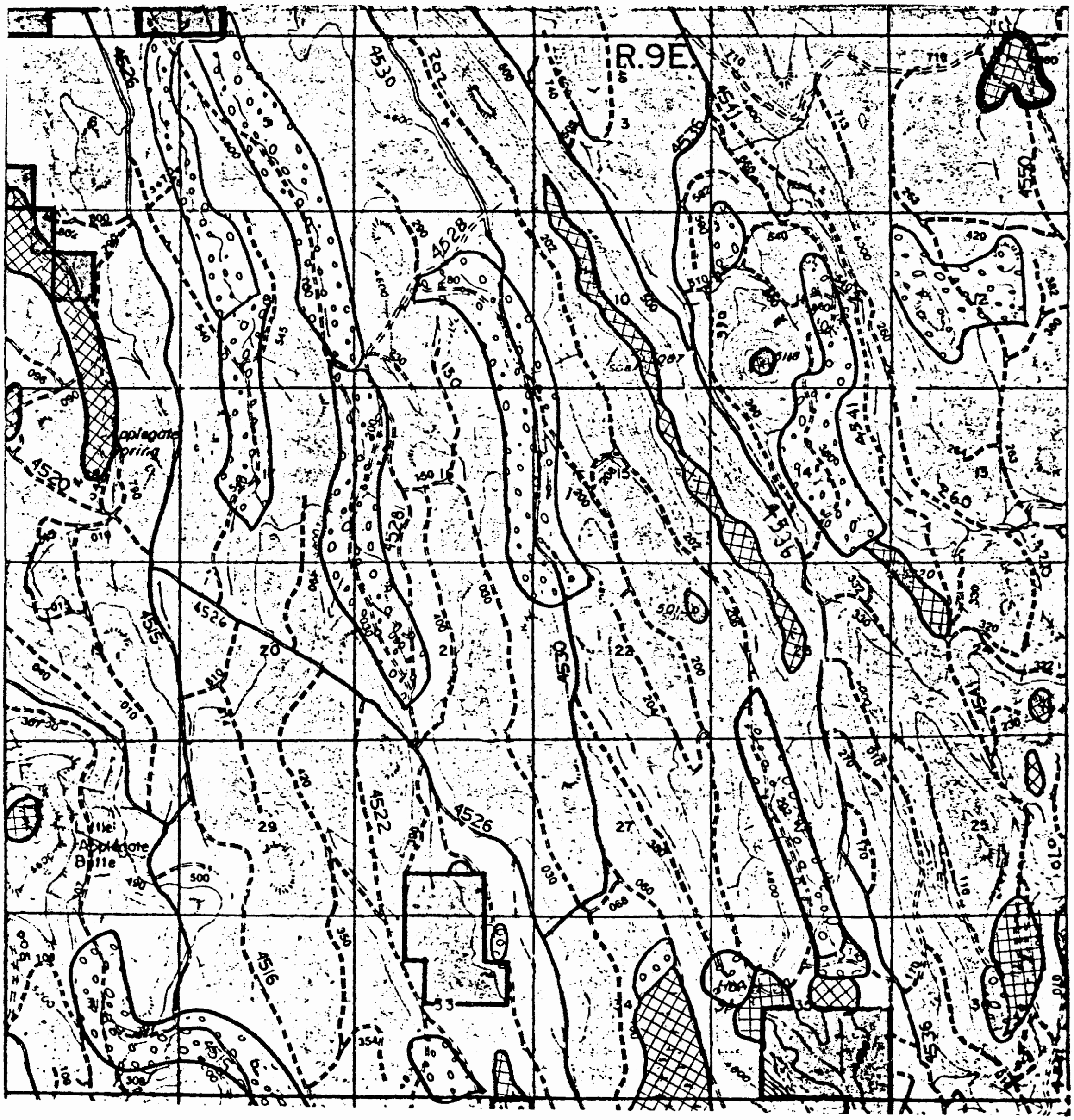
SHEET 12 - Township 33 South
Range 7 East



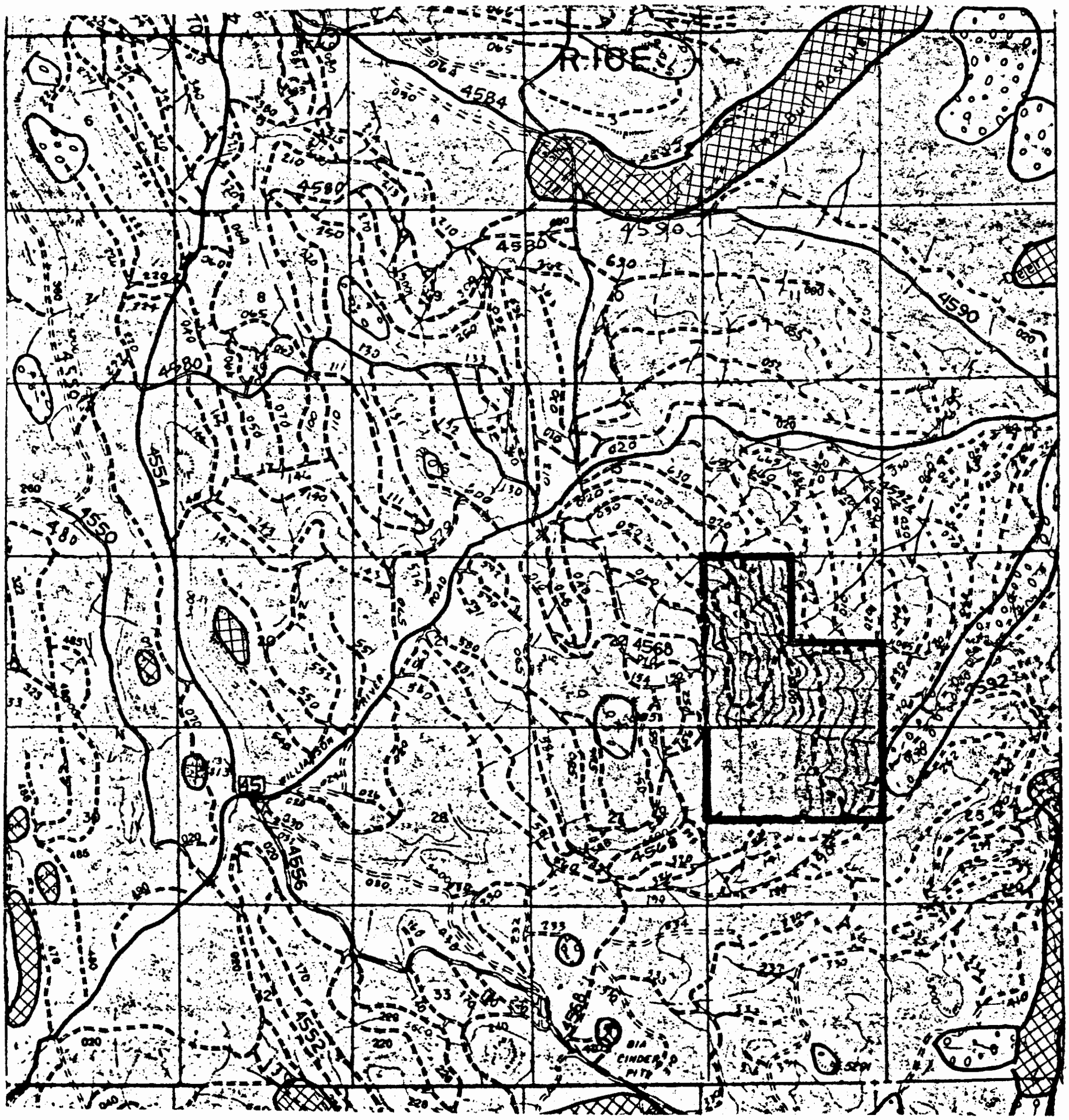
SHEET 13 - Township 33 South
Range 8 East



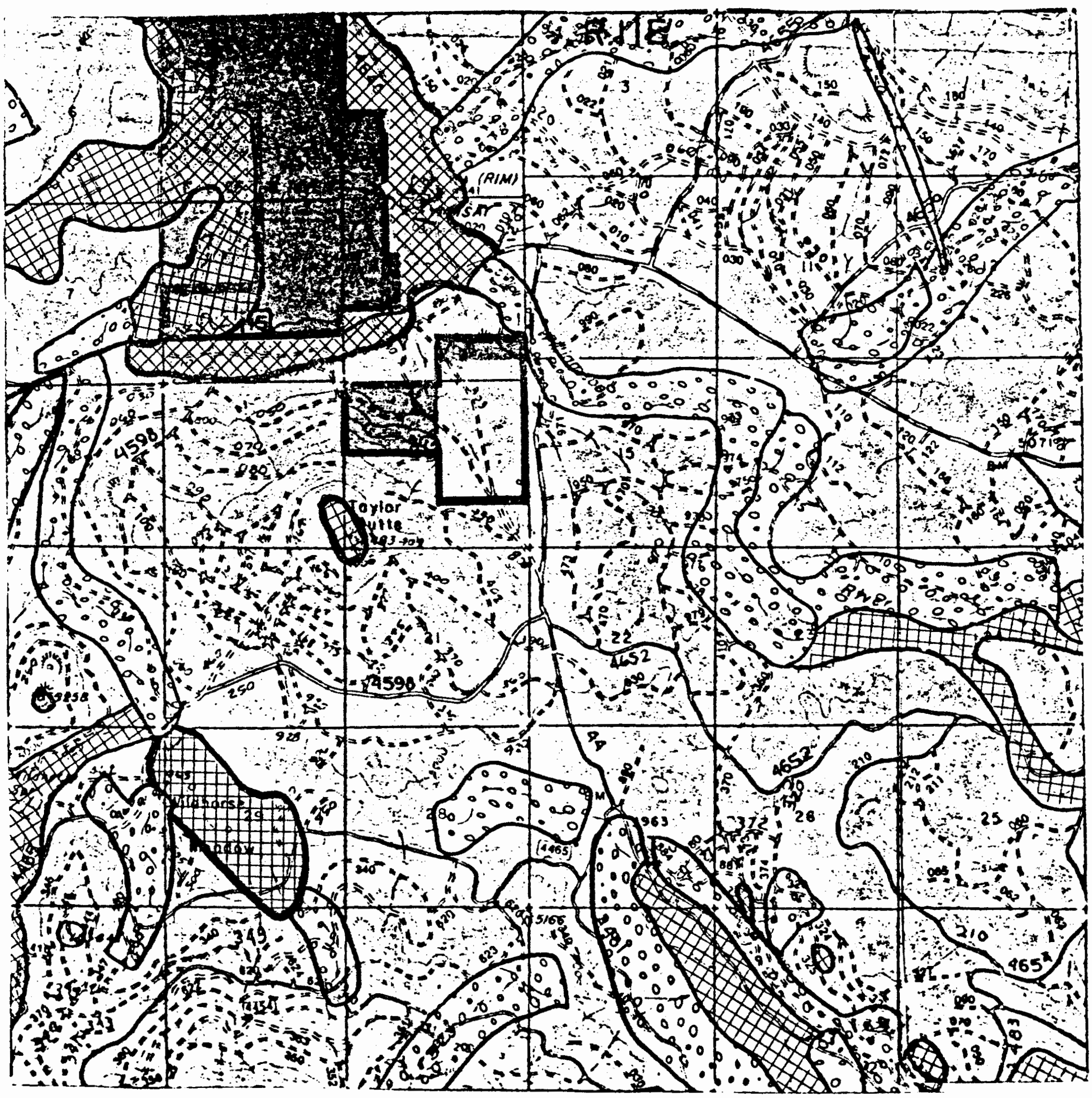
SHEET 14 - Township 33 South
Range 9 East



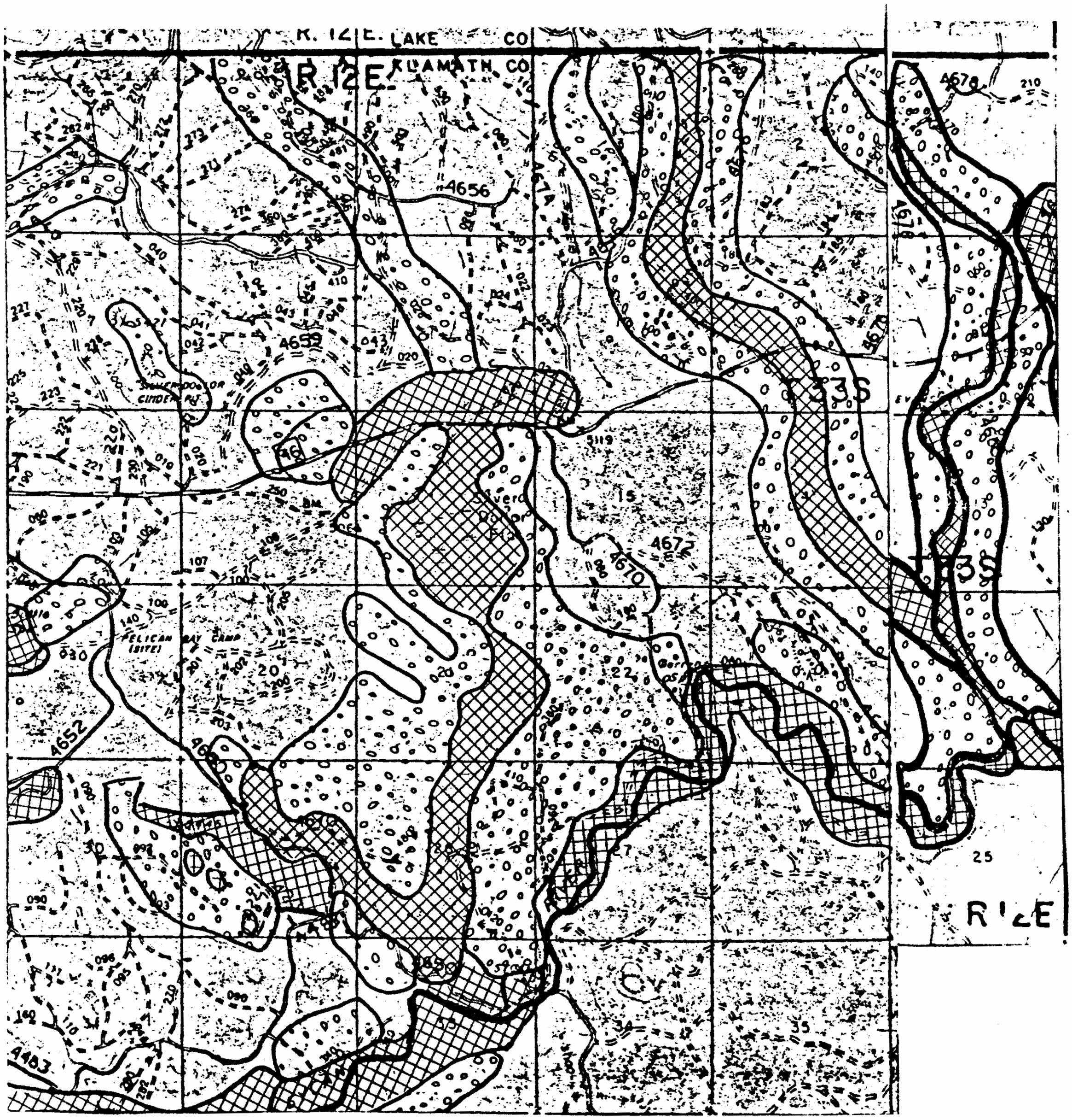
SHEET 15 - Township 33 South
Range 10 East



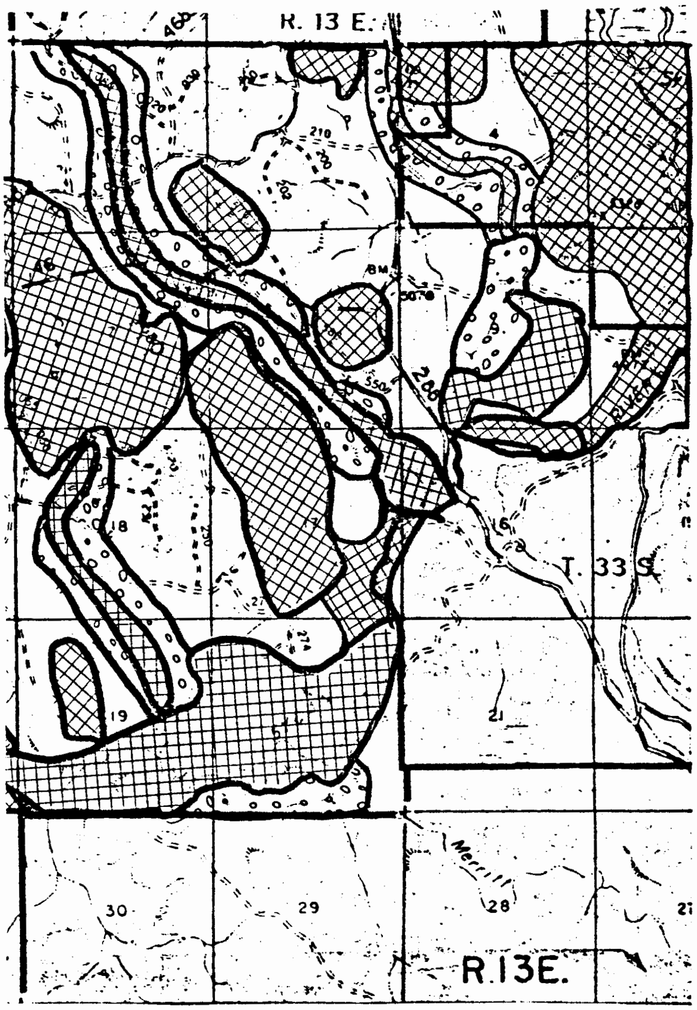
SHEET 16 - Township 33 South
Range 11 East



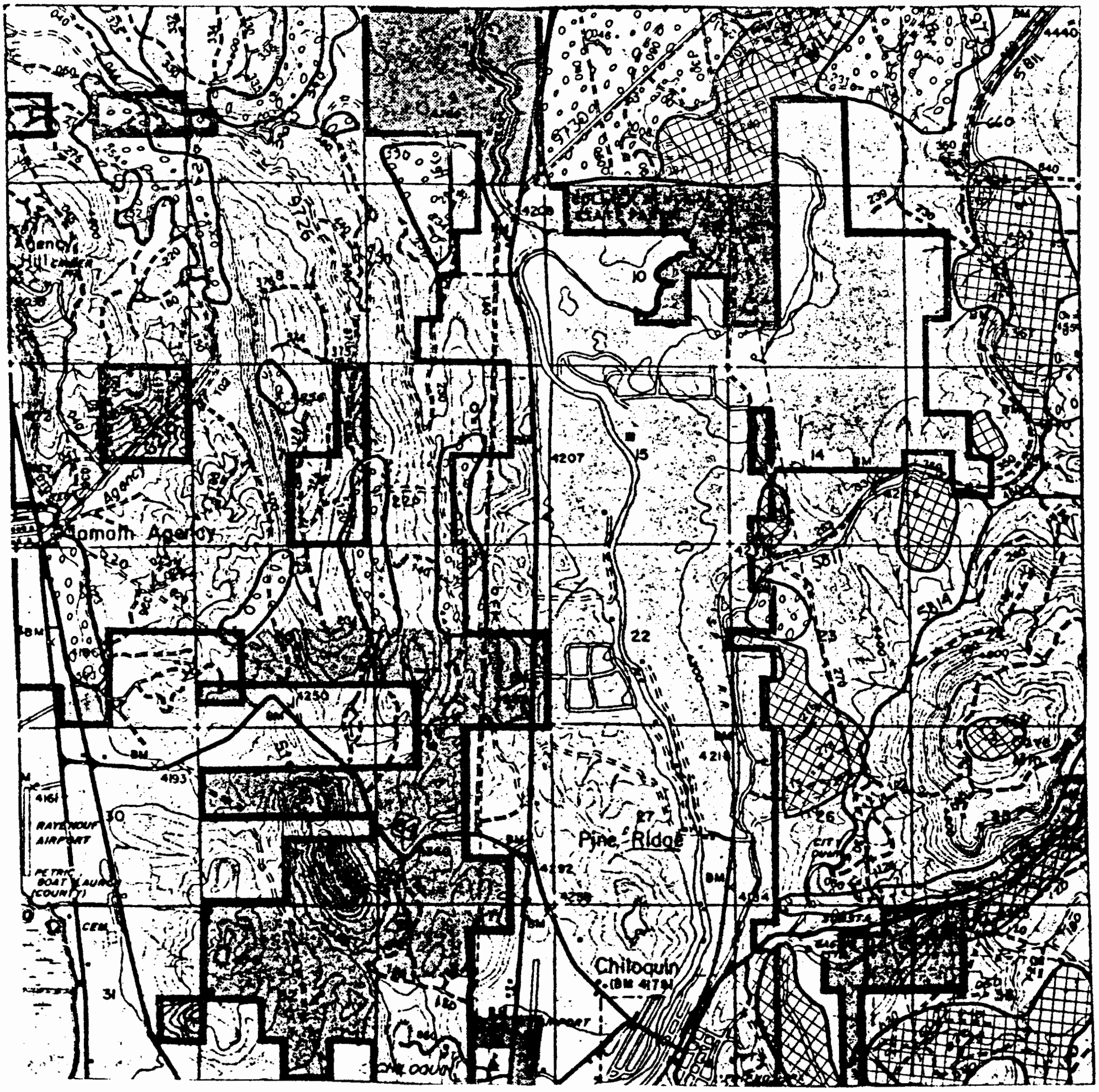
SHEET 17 - Township 33 South
Range 12 East



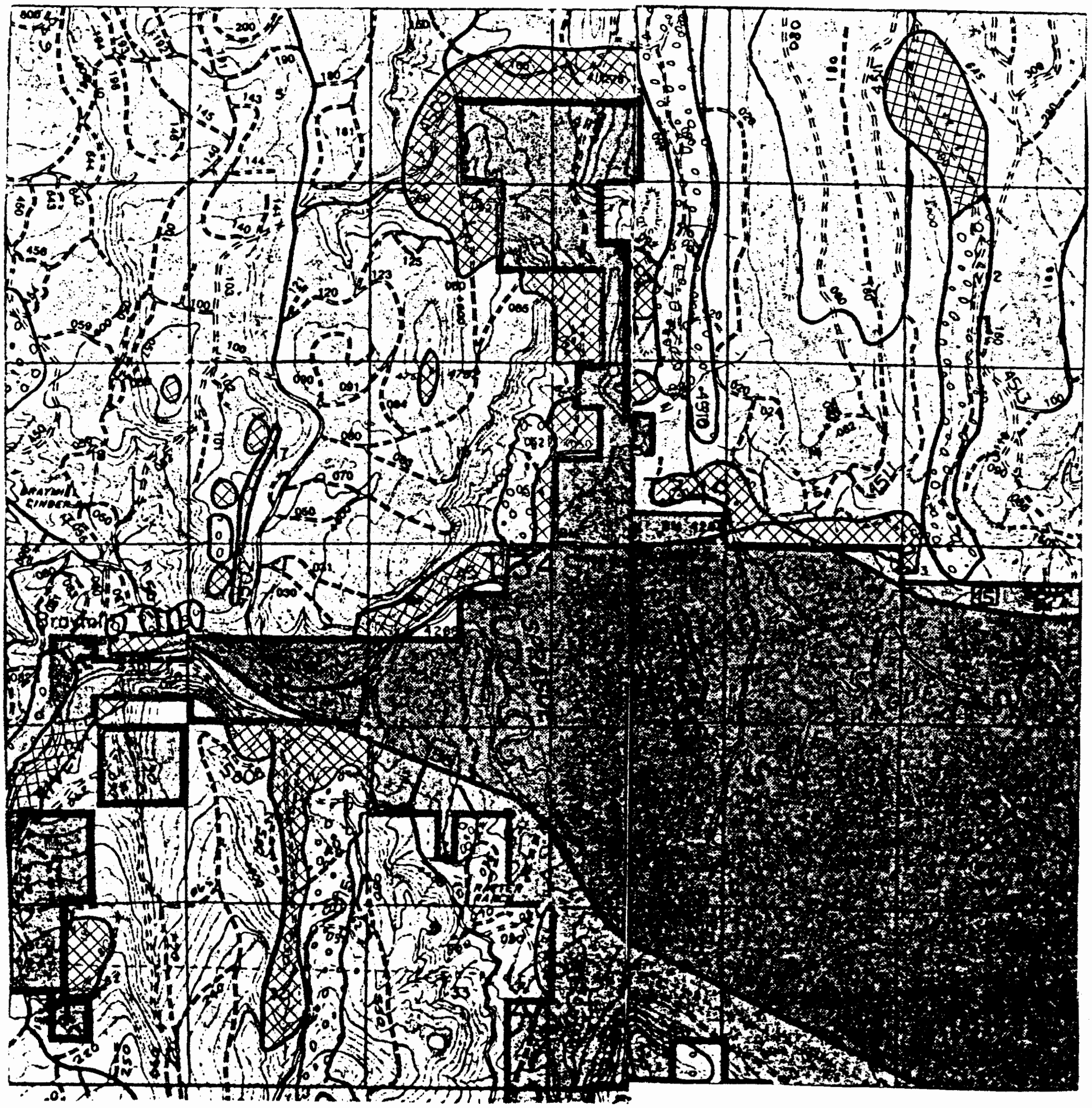
SHEET 18 - Township 33 South
Range 13 East



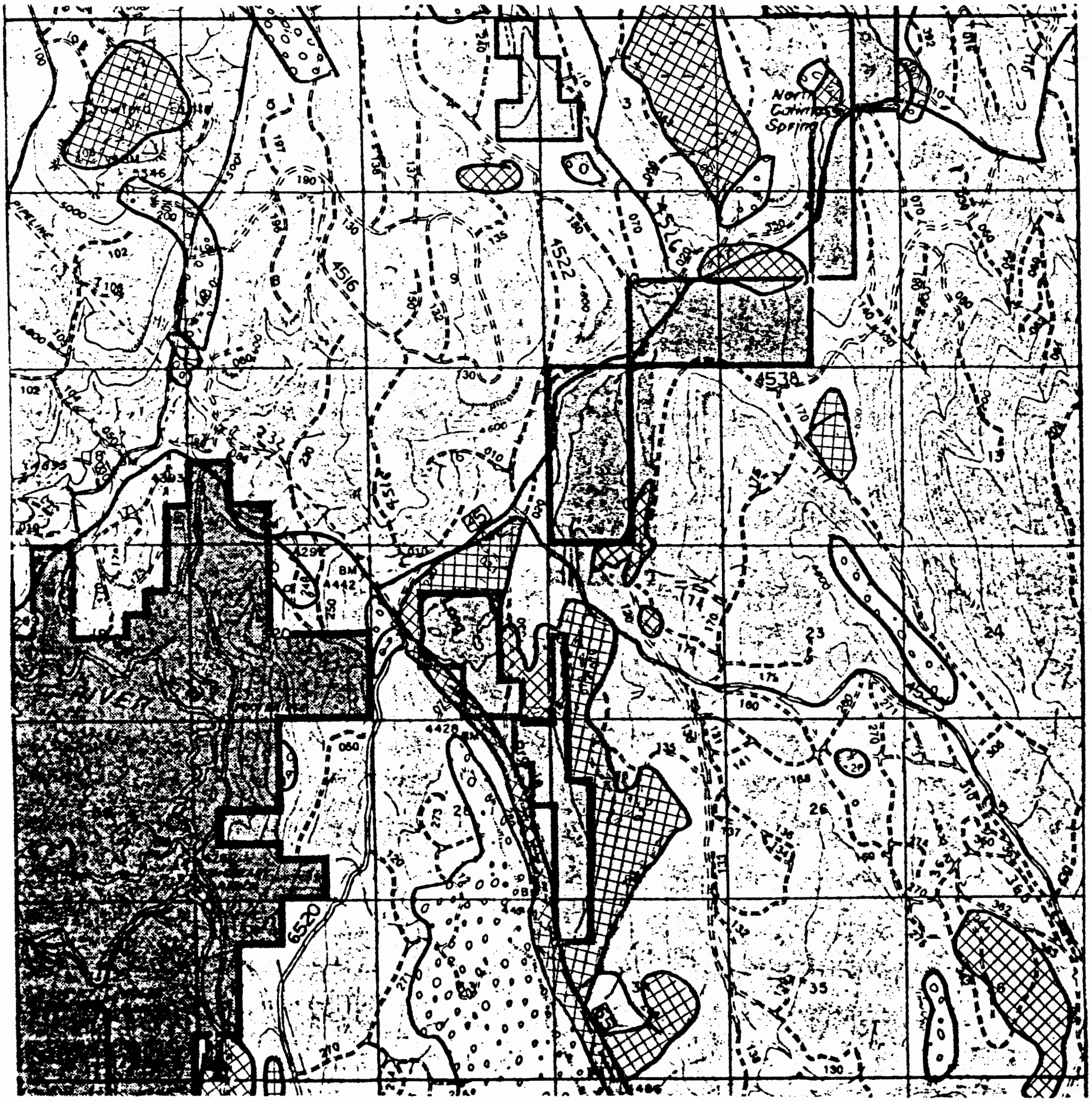
SHEET 19 - Township 34 South
Range 7 East



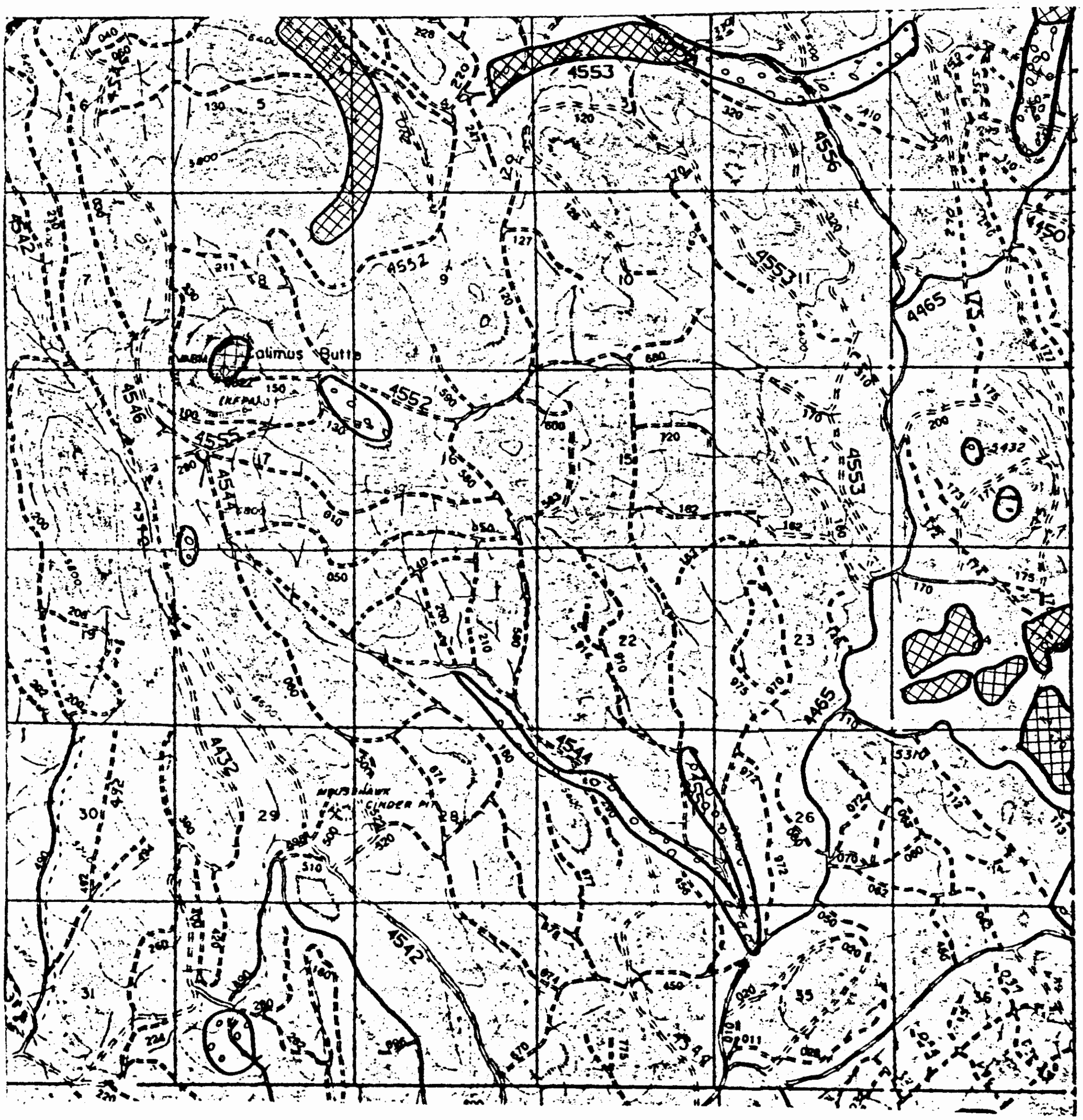
SHEET 20 - Township 34 South
Range 8 East



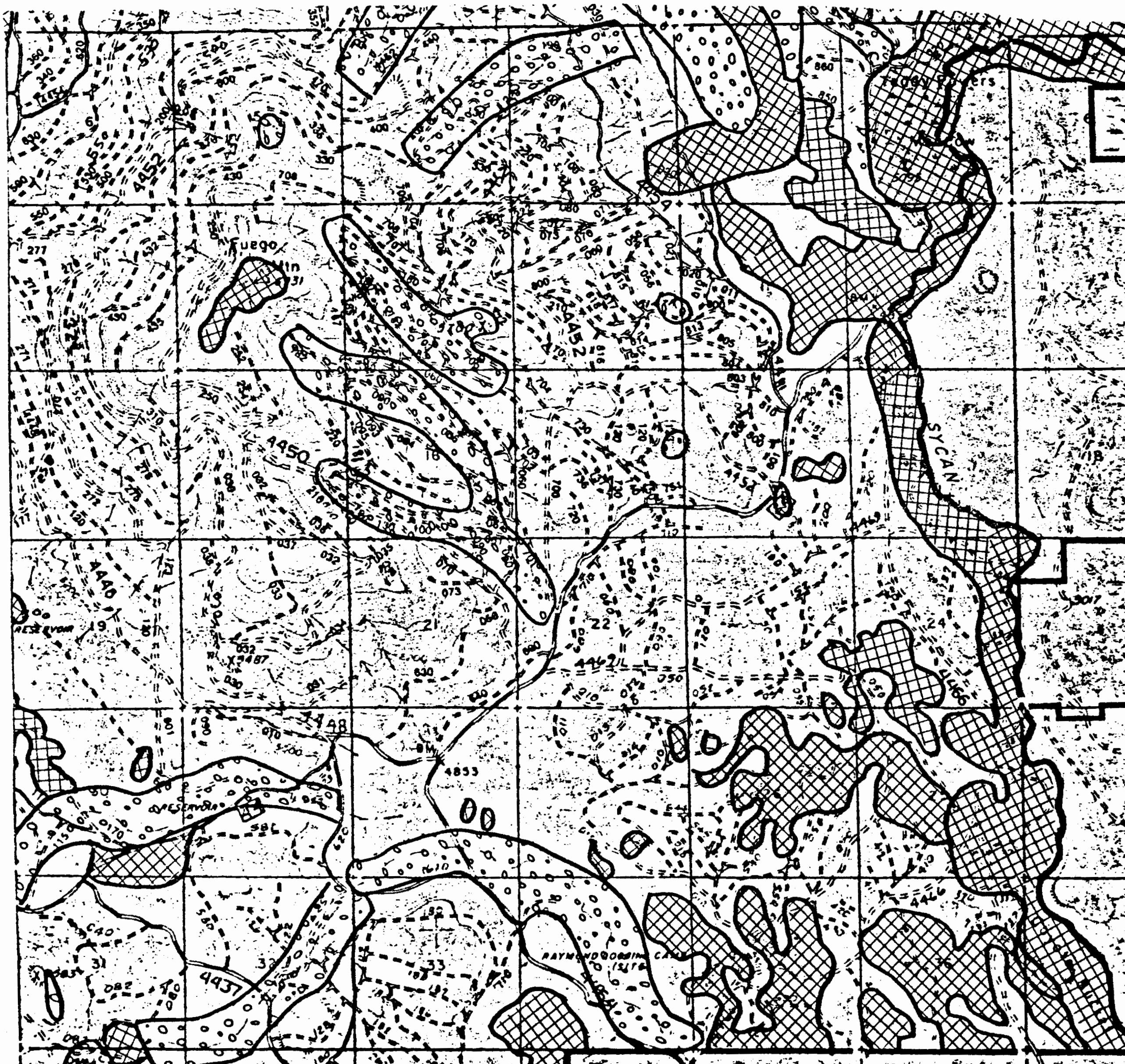
SHEET 21 - Township 34 South
Range 9 East



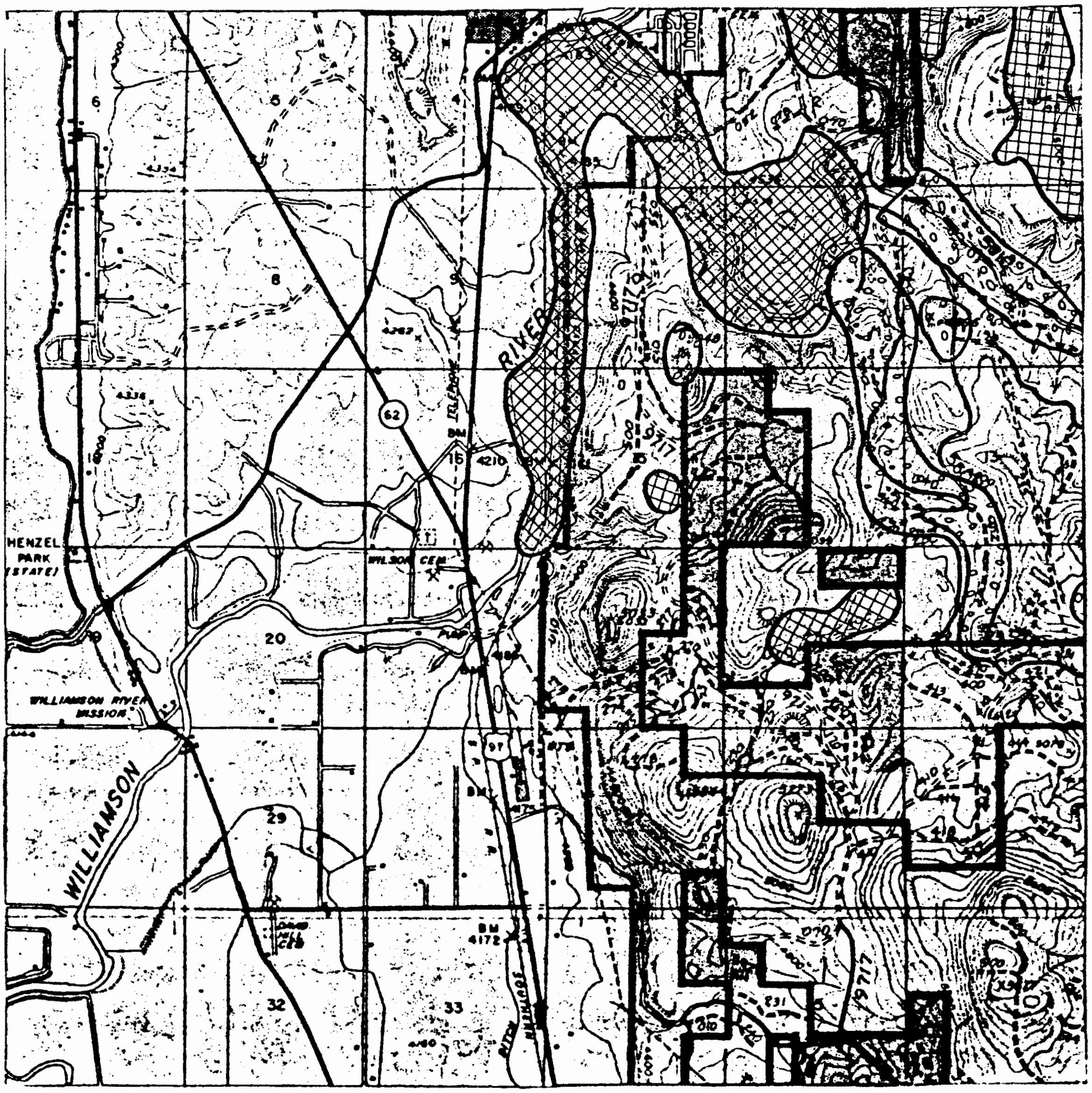
SHEET 22 - Township 34 South
Range 10 East



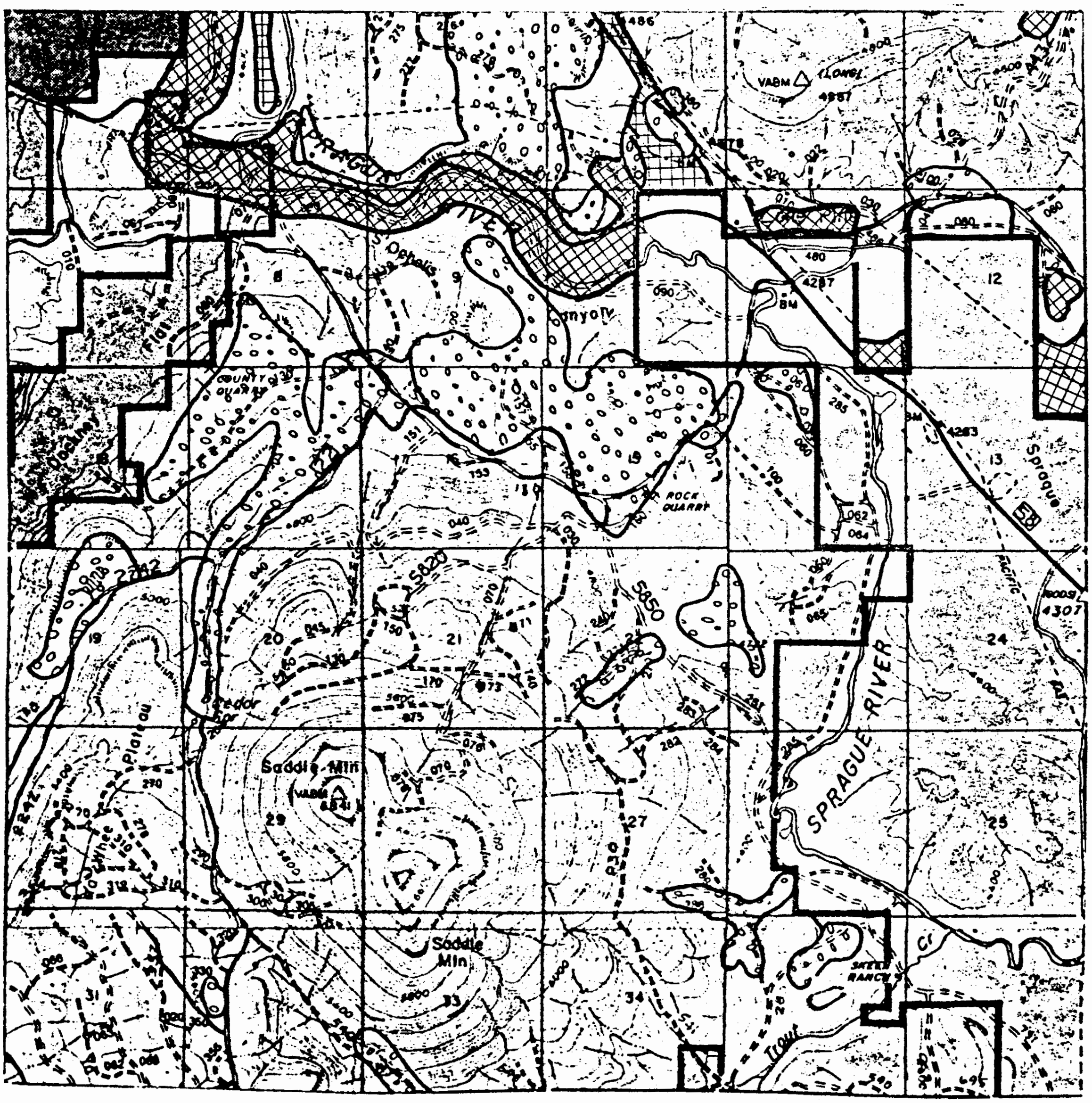
SHEET 23 - Township 34 South
Range 11 East



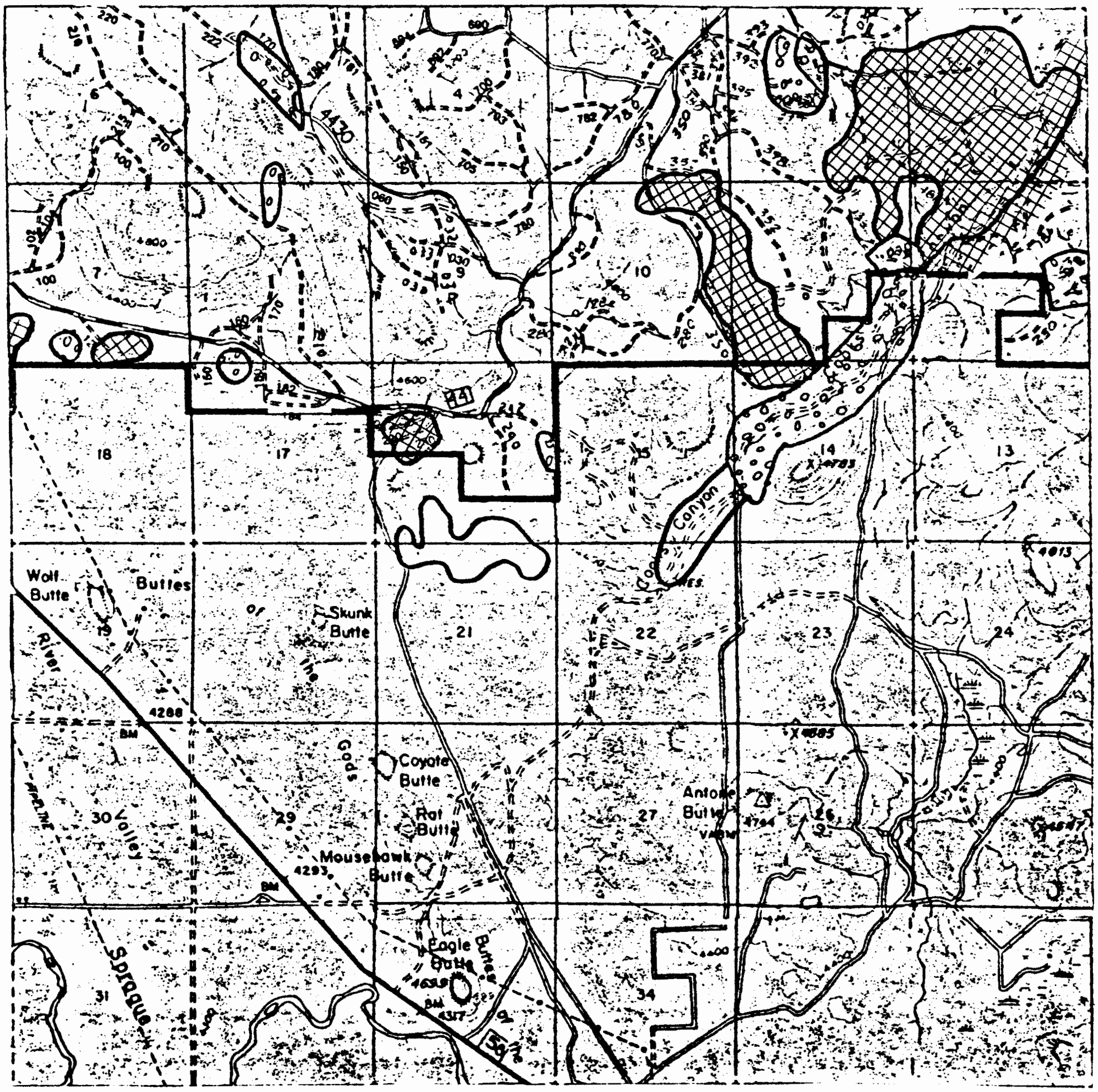
SHEET 24 - Township 35 South
Range 7 East



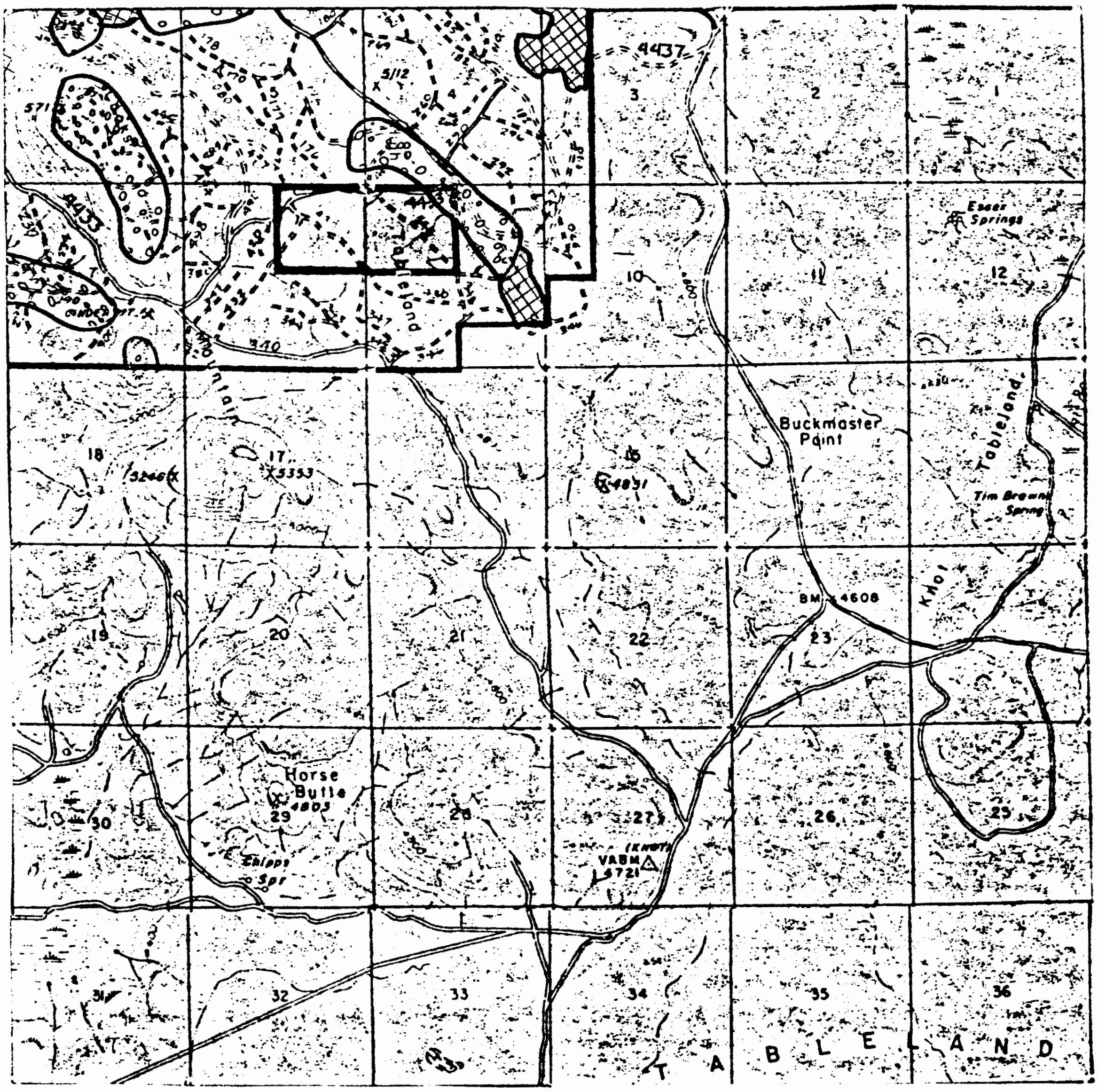
SHEET 25 - Township 35 South
Range 9 East



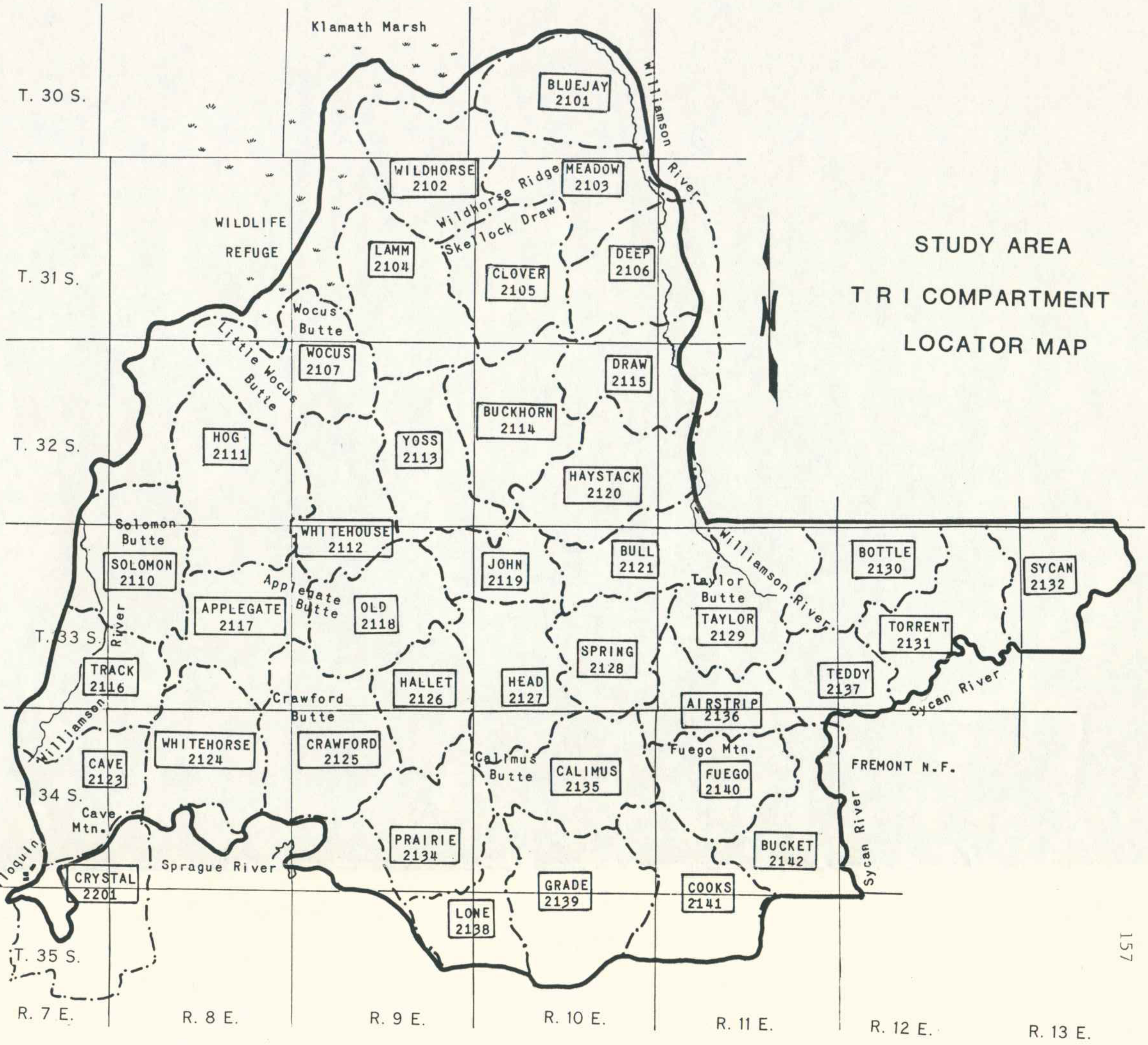
SHEET 26 - Township 35 South
Range 10 East



SHEET 27 - Township 35 South
Range 11 East



APPENDIX C



STUDY AREA

T R I COMPARTMENT

LOCATOR MAP

KEY TO INVENTORY TABLE CATEGORIES

Category

A. Compartment Name and Total National Forest Acres

B. Total High-probability Acres

C. Total Medium-probability Acres

D. Total Low-probability Acres

E. Total Inventoried Acres

F. Total High-probability Acres Inventoried

G. Total Medium-probability Acres Inventoried

H. Total Low-probability Acres Inventoried

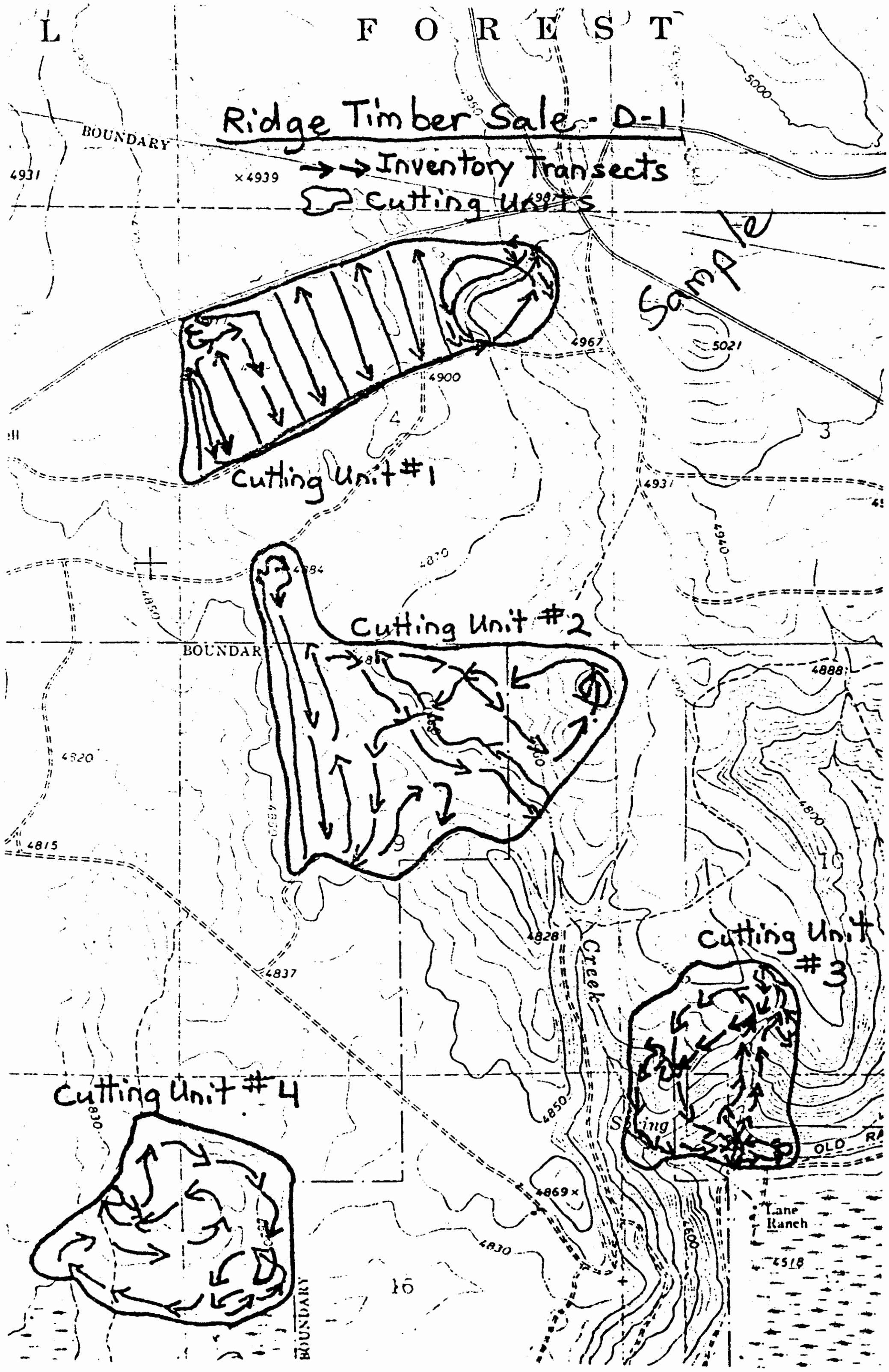
INVENTORY AND PROBABILITY ACRES TABLE
BY COMPARTMENT

A Comp. & T. N.F. Acres	B T. Hi Prob. Acres	C T. Med Prob. Acres	D T. Low Prob. Acres	E T. In. Acres	F T. Hi Prob. In. Acres	G T. Med. Prob. In. Ac.	H T. Low Prob. In. Acres
Bluejay 6,642 Ac.	2,800	2,000	1,842	3,831	90	280	3,461
Wildhorse 6,181 Ac.	1,020	150	5,011	2,010	20	0	1,990
Meadow 7,268 Ac.	360	340	6,568	379	0	0	379
Lamm 9,042	500	200	8,342	961	10	40	911
Clover 9,451 Ac.	620	1,500	7,331	1,760	40	195	1,525
Deep 8,292 Ac.	450	375	7,467	286	20	30	236
Wocus 8,118 Ac.	1,290	190	6,638	180	0	30	150
Hog 9,283 Ac.	2,720	1,520	5,043	1,753	610	70	1,073
White house 8,946 Ac.	900	430	7,616	0	0	0	0

A Comp. & T. N.F. Acres	B T. Hi Prob. Acres	C T. Med Prob. Acres	D T. Low Prob. Acres	E T. In. Acres	F T. Hi Prob. In. Acres	G T. Med. Prob. In. Ac.	H T. Low Prob. In. Acres
Yoss 8,494 Ac.	440	280	7,774	992	0	55	937
Buckhorn 10,525 Ac.	660	335	9,530	0	0	0	0
Draw 8,096 Ac.	1,250	350	9,530	468	50	40	378
Haystack 9,205 Ac.	260	525	8,420	548	10	60	478
Solomon 8,066 Ac.	320	40	7,706	1,945	60	30	1,755
Applegate 8,671 Ac.	660	600	7,411	0	0	0	0
Old 8,534 Ac.	320	190	8,024	2,105	150	40	1,915
John 7,075 Ac.	50	170	6,855	0	0	0	0
Bull 6,016 Ac.	520	130	5,366	946	0	0	946
Taylor 9,376 Ac.	640	300	8,436	1,349	0	20	1,329

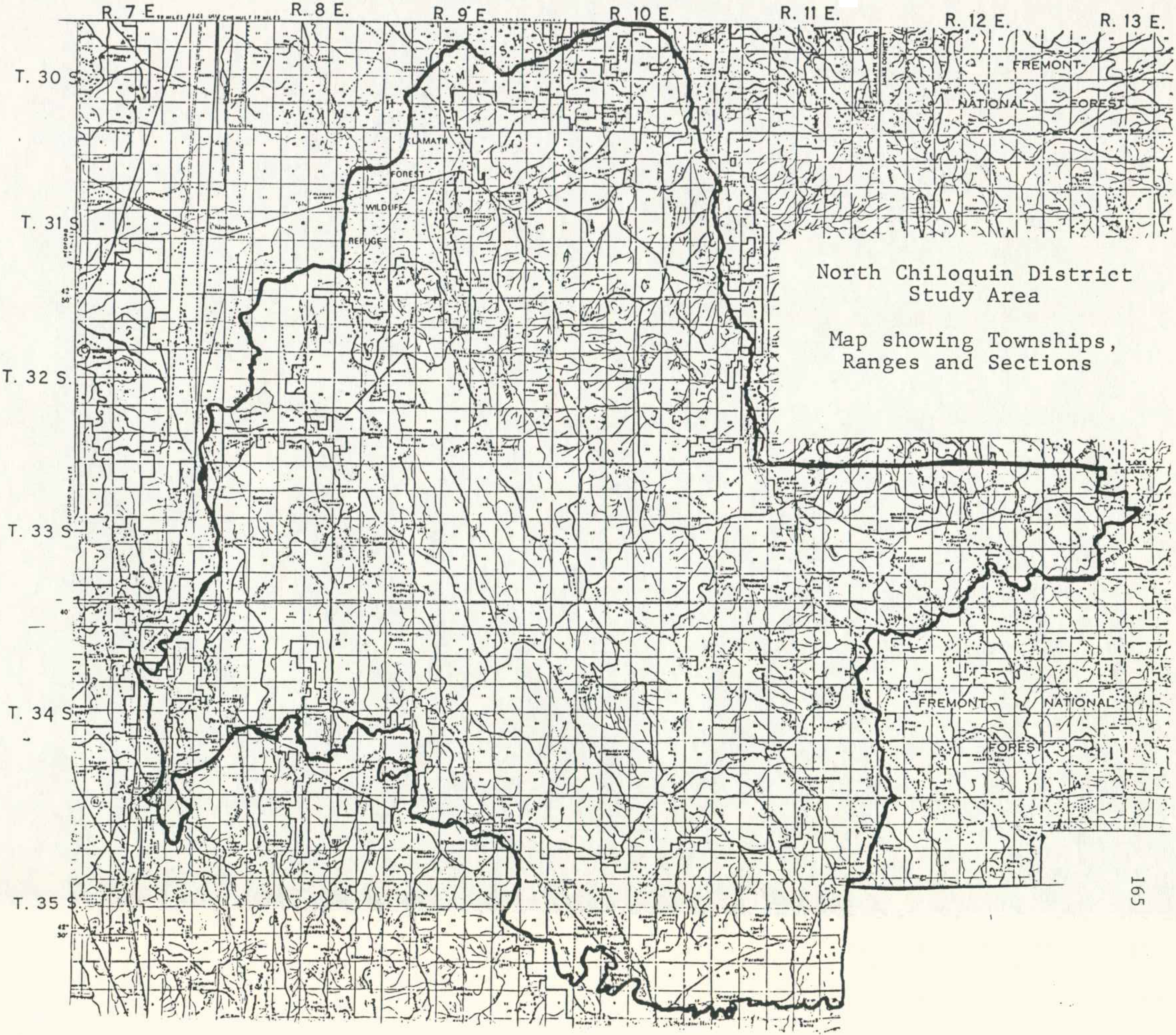
A Comp. & T. N.F. Acres	B T. Hi Prob. Acres	C T. Med Prob. Acres	D T. Low Prob. Acres	E T. In. Acres	F T. Hi Prob. In. Acres	G T. Med. Prob. In. Ac.	H T. Low Prob. In. Acres
Bottle 7,866 Ac.	240	390	7,236	1,955	30	20	1,905
Torrent 9,675 Ac.	780	1,880	7,015	160	160	0	0
Sycan 7,575 Ac.	1,450	380	5,745	300	300	0	0
Track 8,347 Ac.	200	1,870	6,277	166	0	68	98
White horse 8,551 Ac.	280	160	8,111	7	2	0	5
Crawford 11,330 Ac.	70	105	11,155	0	0	0	0
Hallet 5,702 Ac.	750	120	4,832	0	0	0	0
Head 10,500 Ac.	20	100	10,380	0	0	0	0
Spring 7,012 Ac.	0	180	6,832	0	0	0	0
Airstrip 7,282 Ac.	360	400	6,522	1,636	0	10	1,626

A Comp. & T. N.F. Acres	B T. Hi Prob. Acres	C T. Med Prob. Acres	D T. Low Prob. Acres	E T. In. Acres	F T. Hi Prob. In. Acres	G T. Med. Prob. In. Ac.	H T. Low Prob. In. Acres
Teddy 5,970 Ac.	500	300	5,170	120	120	0	0
Cave 5,643	122	42	5,479	0	0	0	0
Long 4,187 Ac.	330	700	3,157	10	10	0	0
Prairie 8,766 Ac.	100	32	8,634	5	5	0	0
Calimus 9,782 Ac.	5	80	9,697	2,324	0	40	2,284
Fuego 8,098 Ac.	160	550	7,388	2,579	0	305	2,274
Bucket 8,122 Ac.	3,060	1,000	4,062	240	240	0	0
Lone 5,038 Ac.	800	240	3,998	0	0	0	0
Grade 11,156 Ac.	1,900	850	8,406	2,210	0	20	2,190
Cooks 8,692 Ac.	1,800	1,000	5,892	347	0	240	107
TOTALS 316,575	28,707	20,004	267,864	31,470	1,925	1,593	27,952



Example of inventory transect maps.

APPENDIX D



North Chiloquin District
Study Area

Map showing Townships,
Ranges and Sections

TABULATED SITE DATA

1. LITHIC SCATTERS BY COMPARTMENT

COMPARTMENT	SITE NO.	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	QUARRY
Bluejay	35-KL-270	1.3 Ac	Klamath Marsh		H	X
	30-10-30-1	2 Ac	Klamath Marsh	Knoll	H	
	35-KL-112	5 Ac	Williamson River	Knoll	H	
	35-KL-114	100 Ft^2	Williamson River	Meadow	H	
	CH-80-43	6,000 Ft^2	Williamson River	Spring/Creek	H	
Wildhorse	35-KL-148	2 Ac	Klamath Marsh	Wet Meadow	H	
	30-9-35-1	2,152 Ft^2	Within 1 mile Klamath Marsh	Intermittent Drainage/ Wet Meadow	L	
	CH-80-66	450 Ft^2	Within 1 mile Klamath Marsh	Intermittent Drainage	L	
	35-KL-144	4,304 Ft^2	Klamath Marsh		H	
	30-9-35-2	100 Ft^2	Klamath Marsh		H	
	35-KL-249	225 Ft^2	Klamath Marsh	Slope	H	
	30-9-34-1	600 Ft^2	Within 1 mile Klamath Marsh		L	
Meadow	35-KL-164	12 Ac	Williamson River		H	
	35-KL-110	.25 Ac	Williamson River	Intermittent Drainage	H	
	35-KL-264	17 Ac	Williamson River	Intermittent Drainage	H	
	35-KL-271	2,152 Ft^2	Within 1 mile Williamson River	Intermittent Drainage	H	
Lamm	31-9-16-1	2 Ac	Within 1 mile Williamson River	Intermittent Drainage	M	
	31-9-23-1	.25 Ac		Spring	H	
	31-9-33-1	5 Ac	Klamath Marsh		H	
Clover	CH-80-100	2 Ac	Creek	Meadow	H	
	31-10-29-1	1,020 Ft^2		Intermittent Drainage	M	
	31-10-29-2	4,842 Ft^2		Intermittent Drainage	M	

LITHIC SCATTERS BY COMPARTMENT

COMPARTMENT	SITE NO.	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	QUARRY
Deep	35-KL-261	4 Ac	Williamson River	Intermittent Drainage	H	
	35-KL-163	100 Ft^2	Williamson River		H	
	CH-80-57	2 Ac	Within 1 mile Williamson River	Knoll	M	
	35-KL-165	5 Ac	Williamson River	Intermittent Drainage	H	
	35-KL-111	1 Ac	Williamson River	Slope	H	
Wocus	CH-80-37	100 Ft^2	Wocus Butte (top)		H	
	35-KL-142	5 Ac	Klamath Marsh		H	
	32-8-1-1	5 Ac	Klamath Marsh		H	
	35-KL-138	9 Ac	Klamath Marsh	Spring		
Hog	35-KL-238	5 Ac	Solomon Flat	Ridge	H	
Draw	35-KL-44	100 Ft^2	Williamson River		H	
	35-KL-236	10 Ac	Williamson River	Slope	H	
	35-KL-109	5 Ac	Williamson River		H	
	32-11-8-1	1 Ac	Williamson River		M	
	35-KL-45	20 Ac	Williamson River	Slope	H	
Solomon	35-KL-136	4,960 Ft^2	Solomon Flat	Butte	H	
	35-KL-101	30 Ac	Williamson River		H	
	35-KL-103	100 Ft^2	Williamson River	Upland	M	
	35-KL-99	3 Ac	Williamson River		H	
	33-7-12-1	2 Ac	Williamson River		H	
	33-7-12-2	2 Ac	Williamson River		H	
Applegate	CH-80-84	100 Ft^2	Spring	Meadow/Intermittent Drainage	M	
Old	CH-80-34	100 Ft^2	Ridge	Slope	L	
Taylor	35-KL-105	11 Ac	Williamson River		H	
	35-KL-107	100 Ft^2	Williamson River		H	
	35-KL-106	400 Ft^2	Williamson River		H	
	35-KL-243	.25 Ac	Meadow	Intermittent Drainage	M	
Bottle	33-12-17-1	.25 Ac	Flat	Dry Meadow	M	

LITHIC SCATTERS BY COMPARTMENT

COMPARTMENT	SITE NO.	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	QUARRY
Torrent	33-12-22-1	.50 Ac	Sycan River	Slope	H	
	SR-26	2 Ac	Sycan River		H	
	SR-27	1 Ac	Sycan River		H	
	SR-24	1 Ac	Sycan River		H	
	SR-25	1 Ac	Sycan River		H	
Sycan	SR-16	30 Ac	Sycan River	Scab Flat	H	X
	SR-7	1 Ac	Sycan River	Slope	H	X
	SR-2	30 Ac	Sycan River	Scab Flat	H	X
	SR-8	20 Ac	Sycan River	Scab Flat	H	X
	SR-17	3 Ac	Sycan River	Meadow	H	
	SR-20	3 Ac	Sycan River		H	
	SR-18	2 Ac	Sycan River		H	
	SR-14	2 Ac	Sycan River		H	X
	SR-15	2 Ac	Sycan River		H	X
	SR-12	1,076 Ft^2	Sycan River		H	
	SR-13	2 Ac	Sycan River		H	
	SR-19	20 Ac	Sycan River	Scabrock Flat	H	X
	SR-9	1,076 Ft^2	Sycan River		H	
	SR-10	269 Ft^2	Sycan River	Intermittent Drainage	H	
	SR-11	10 Ac	Sycan River		H	X
	SR-22	2 Ac	Sycan River		H	
	SR-21	1,076 Ft^2	Sycan River	Meadow	H	
	SR-23	5 Ac	Sycan River	Scabrock/Meadow	H	X
Track	35-KL-235	1,076 Ft^2	Williamson River	Ridge	H	
	33-7-25-1	.25 Ac	Williamson River	Spring	H	
Whitehorse	34-8-21-1	1 Ac	Sprague River	Slope	H	
Airstrip	34-11-2-1	.75 Ac		Intermittent Stream/ Wet Meadow	H	
Teddy	SR-28	5 Ac	Sycan River	Meadow	H	X
	34-11-1-1	2 Ac	Sycan River	Meadow	H	
Cave	35-KL-8	5 Ac	Sprague River		H	

LITHIC SCATTERS BY COMPARTMENT

COMPARTMENT	SITE NO.	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	QUARRY
Long	35-9-5-1	1 Ac	Sprague River		H	
	35-9-10-1	3 Ac	Sprague River	Rim	H	
Bucket	35-KL-115	5 Ac	Sycan River		H	
	35-KL-116	.25 Ac	Sycan River		H	
	SR-31	5 Ac	Sycan River	Knoll	H	
	SR-29	2 Ac	Sycan River	Butte	H	
	34-11-12-1	.25 Ac	Sycan River		H	X
	34-11-28-1	.50 Ac		Intermittent Drainage/ Meadow	M	
	34-11-1-2	500 Ft^2	Sycan River	Butte	H	
Cooks	34-11-30-1	100 Ft^2		Intermittent Drainage	M	
	35-11-9-1	20 Ac		Intermittent Drainage	M	

2. NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE	SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
100 ft^2	35-KL-114	Williamson River	Meadow	H	Bluejay
100 ft^2	30-9-35-2	Klamath Marsh		H	Wildhorse
100 ft^2	35-KL-163	Williamson River		H	Deep
100 ft^2	CH-80-37	Wocus Butte (top)		H	Wocus
100 ft^2	35-KL-44	Williamson River		H	Draw
100 ft^2	35-KL-103	Williamson River	Upland	M	Solomon
100 ft^2	CH-80-84	Spring	Meadow/Intermittent Drainage	M	Applegate
100 ft^2	CH-80-34	Ridge	Slope	L	Old
100 ft^2	34-KL-107	Williamson River		H	Taylor
100 ft^2	34-11-30-1		Intermittent Drainage	M	Cooks
225 ft^2	35-KL-249	Klamath Marsh	Slope	H	Wildhorse
269 ft^2	SR 10	Sycan River	Intermittent Drainage	H	Sycan
400 ft^2	35-KL-106	Williamson River		H	Taylor
450 ft^2	CH-80-66	Within 1 Mile Klamath Marsh	Intermittent Drainage	L	Wildhorse
500 ft^2	34-11-1-2	Sycan River	Butte	H	Bucket

NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE	SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
600 ft^2	30-9-34-1	Within 1 Mile Klamath Marsh		L	Wildhorse
1020 ft^2	31-10-29-1		Intermittent Drainage	M	Clover
1076 ft^2	SR-12	Sycan River		H	Sycan
1076 ft^2	SR-9	Sycan River		H	Sycan
1076 ft^2	SR-21	Sycan River	Meadow	H	Sycan
1076 ft^2	35-KL-235	Williamson River	Ridge	H	Track
2152 ft^2	35-KL-271	Within 1 Mile Williamson River	Intermittent Drainage	H	Meadow
2152 ft^2	30-9-35-1	Within 1 Mile Klamath Marsh	Intermittent Drainage/ Wet Meadow	L	Wildhorse
4304 ft^2	35-KL-144	Klamath Marsh		H	Wildhorse
4842 ft^2	31-10-29-2		Intermittent Drainage	M	Clover
4960 ft^2	35-KL-136	Klamath Marsh/ Solomon Flat	Butte	H	Solomon
6000 ft^2	CH-80-43	Williamson River	Spring/Creek	H	Bluejay
1/4 AC	35-KL-110	Williamson River	Intermittent Drainage	H	Meadow
1/4 AC	31-9-23-1		Spring	H	Lamm
1/4 AC	33-12-17-1	Flat	Dry Meadow	M	Bottle

NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE		SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
1/4	AC	33-7-25-1	Williamson River	Spring	H	Track
1/4	AC	35-KL-116	Sycan River		H	Bucket
1/4	AC	35-KL-243	Meadow	Intermittent Drainage	M	Taylor
1/4	AC	34-11-12-1	Sycan River		H	Bucket
1/2	AC	33-12-22-1	Sycan River	Slope	H	Torrent
1/2	AC	34-11-28-1		Intermittent Drainage/ Meadow	M	Bucket
1	AC	35-KL-1-11	Williamson River	Slope	H	Deep
1	AC	32-11-8-7	Williamson River		M	Draw
1	AC	SR-27	Sycan River		H	Torrent
1	AC	SR-24	Sycan River		H	Torrent
1	AC	SR-25	Sycan River		H	Torrent
1	AC	SR-7	Sycan River	Slope	H	Sycan
1	AC	34-8-21-1	Sprague River	Slope	H	Whitehorse
1	AC	35-9-5-1	Sprague River		H	Long
1.3	AC	35-KL-270	Klamath Marsh		H	Bluejay
2	AC	30-10-30-1	Klamath Marsh	Knoll	H	Bluejay

NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE		SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
2	AC	35-KL-148	Klamath Marsh	Wet Meadow	H	Wildhorse
2	AC	35-KL-260	Williamson River	Intermittent Drainage	H	Meadow
2	AC	31-9-16-1	Within 1 Mile Klamath Marsh	Intermittent Drainage	M	Lamm
2	AC	CH-80-100	Creek	Meadow	H	Clover
2	AC	CH-80-57	Within 1 Mile Williamson River	Knoll	M	Deep
2	AC	33-7-12-1	Williamson River		H	Solomon
2	AC	33-7-12-2	Williamson River		H	Solomon
2	AC	SR-26	Sycan River		H	Torrent
2	AC	SR-18	Sycan River		H	Sycan
2	AC	SR-14	Sycan River		H	Sycan
2	AC	SR-15	Sycan River		H	Sycan
2	AC	SR-13	Sycan River		H	Sycan
2	AC	SR-22	Sycan River		H	Sycan
2	AC	34-11-1-1	Sycan River	Meadow	H	Teddy
2	AC	SR-29	Sycan River	Butte	H	Bucket

NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE		SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
3	AC	35-KL-99	Williamson River		H	Solomon
3	AC	SR-17	Sycan River	Meadow	H	Sycan
3	AC	SR-20	Sycan River		H	Sycan
3	AC	35-9-10-1	Sprague River	Rim	H	Long
4	AC	35-K1-261	Williamson River	Intermittent Drainage	H	Deep
5	AC	35-KL-112	Williamson River	Knoll	H	Bluejay
5	AC	31-9-33-1	Klamath Marsh		H	Lamm
5	AC	35-KL-165	Williamson River	Intermittent Drainage	H	Deep
5	AC	35-KL-142	Klamath Marsh		H	Wocus
5	AC	22-8-1-1	Klamath Marsh		H	Wocus
5	AC	35-KL-140	Klamath Marsh	Spring	H	Wocus
5	AC	35-KL-238	Klamath Marsh/ Solomon Flat	Ridge	H	Hog
5	AC	35-KL-109	Williamson River		H	Draw
5	AC	SR-23	Sycan River	Scab Rock Flat/Meadow	H	Sycan
5	AC	SR-28	Sycan River	Meadow	H	Teddy
5	AC	35-KL-8	Sprague River		H	Cave

NORTH CHILOQUIN DISTRICT LITHIC SCATTERS BY SIZE

SITE SIZE		SITE #	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB. AREA	COMPARTMENT
5	AC	35-KL-115	Sycan River		H	Bucket
5	AC	SR-31	Sycan River	Knoll	H	Bucket
9	AC	35-KL-138	Klamath Marsh		H	Wocus
10	AC	SR-11	Williamson River	Slope	H	Draw
10	AC	SR-11	Sycan River		H	Sycan
11	AC	35-KL-105	Williamson River		H	Taylor
12	AC	35-KL-164	Williamson River		H	Meadow
17	AC	35-KL-264	Williamson River	Intermittent Drainage	H	Meadow
20	AC	35-KL-45	Williamson River	Slope	H	Draw
20	AC	SR-8	Sycan River	Scab Flat	H	Sycan
20	AC	SR-19	Sycan River	Scab Flat	H	Sycan
20	AC	35-11-9-1		Intermittent Drainage	M	Cooks
30	AC	35-KL-10-1	Williamson River		H	Solomon
30	AC	SR-16	Sycan River	Scab Flat	H	Sycan
30	AC	SR-2	Sycan River	Scab Flat	H	Sycan

3. NORTH CHILOQUIN DISTRICT ISOLATED FINDS: ARTIFACTS

COMPARTMENT	SITE #	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB AREA	TYPE & NO. OF ARTIFACTS
Meadow	31-10-12-3		Williamson River	Slope	H	Obsidian Projectile Pt.
Lamm	31-9-16-4		Klamath Marsh	Intermittent Drainage	M	Grinding Stone
Deep	31-10-36-2		Williamson River		H	Obsidian Projectile Pt.
	31-10-12-5		Williamson River	Intermittent Drainage	M	Obsidian Projectile Pt.
	31-10-12-6		Williamson River		L	Obsidian Projectile Pt.
Hog	32-8-35-1			Creek/Wet Meadow	H	Obsidian Projectile Pt.
Solomon	33-8-6-1			Intermittent Drainage	L	Obsidian Projectile Pt.
Bottle	33-12-8-1			Intermittent Drainage	L	Obsidian Projectile Pt.

4. NORTH CHILOQUIN DISTRICT ISOLATED FINDS: FLAKES

COMPARTMENT	SITE #	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB AREA	TYPE & NO. OF ARTIFACTS
Bluejay	30-10-15-2		.2 miles Williamson River	Intermittent Drainage	M	1 Obsidian Flake
Wildhorse	30-9-33-1		Klamath Marsh	Slope/Butte	H	1 Ignimbrite Lg. Flake
Meadow	31-10-2-1			Intermittent Drainage	L	1 Obsidian Flake
Clover	31-9-13-2				L	Obsidian Core
Deep	31-10-13-2		Williamson River	Intermittent Drainage	H	6 Obsidian Flakes
Solomon	35-KL-104		Williamson River	Uplands	H	1 Obsidian Flake
Track	33-7-25-2		Within 1 mile west Williamson River	Intermittent Drainage	H	1 Obsidian Flake
Cooks	35-11-3-1			Intermittent Drainage	L	1 Obsidian Flake

5. NORTH CHILOQUIN DISTRICT BARKED TREE SITES

COMPARTMENT	SITE #	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB AREA	NO. OF TREES
Wocus	32-8-2-4		Klamath Marsh		H	1
Hog	32-8-27-1		Solomon Flat/ Klamath Marsh	Creek	M	1
	32-8-22-1		Within 1 mile Solomon Flat/Klamath Marsh	Uplands	L	3
Track	CH-80-65		Williamson River		H	1
Grade	34-10-26-1			Slope	L	1
Crystal	CH-1		Sprague River	Ridge	H	10

6. NORTH CHILOQUIN DISTRICT HOUSEPITS

COMPARTMENT	SITE #	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB AREA
Wildhorse	35-KL-143	1076 ft^2	Klamath Marsh		H
	31-9-3-1	5 AC	Klamath Marsh		H
Lamm	35-KL-136	4304 ft^2	Klamath Marsh	Spring	H
	31-9-16-2	20 AC	Klamath Marsh		H
	31-9-17-1	50 AC	Klamath Marsh		H
Wocus	35-KL-141	1/2 AC	Klamath Marsh		H
	35-KL-140	1/2 AC	Klamath Marsh	Spring	H
	35-KL-137	65 AC	Klamath Marsh		H
	35-KL-142	1 AC	Klamath Marsh		H
	31-8-36-1	1 AC	Klamath Marsh		H
	31-8-35-1	7 1/2 AC	Klamath Marsh		H
	35-KL-138	9 AC	Klamath Marsh		H
Hog	35-KL-238	5 AC	Klamath Marsh		H

NORTH CHILOQUIN DISTRICT HOUSEPITS

COMPARTMENT	SITE #	SIZE IN ACRES	MAJOR ENVI. FEATURE	SECONDARY ENVI. FEATURE	PROB AREA
Track	CH-80-65	1 1/2 AC	Williamson River		H
	35-KL-233	1 1/2 AC	Williamson River	Spring	H
Prairie	35-KL-11/12			Wet Prairie	H
Draw	35-KL-236	40 AC	Williamson River	Ridge/Slope	H
Crystal	CH-1	48 AC	Sprague River	Ridge	H
Private Land: Spier #7	Awalwaskan	2 AC	Williamson River		H
Spier #8	Waktales	10 AC	Williamson River		H
Spier #9	LaLaks	10 AC	Williamson River		H
Spier #10	Lobokstsoksi	2 AC	Sprague River/ Williamson River		H
Spier #17	Bezuksewas	10 AC	Sprague River/ Williamson River		H
Spier #14	Kaumkan	20 AC	Sprague River		H

SAMPLE

FOREST SERVICE - Region Six
CULTURAL RESOURCE INVENTORY
Record Form

SITE NO. (Temp.) 02-35-A
(Perm.) 38-FR-324

Type: Historic (Archaeological) District ☐ Yes ☒ No

1 LOCATION

Forest Smokey County O'Neil District Woodsey State
U.S.G.S. Quad. North Place 15', 1964
Legal: NE¼ of NW¼, Sec. 36 T. 2N R. 35E, W. M.
TRI: Compartment name Normal
Compartment no. 35
Cell no. 2476
Elevation: 750 m.
UTM: Zone 17
Easting 279660
Northing 435 1360
Lat. Long.

2 SETTING

Plant Community: Douglas fir gallery with Ceonothus
Terrain: Steep and undercut slopes, rugged.
Soils/Sediments: shallow litter over basalt
Water Source: Kikapoo stream 100m. S.
Environmental Features (see instructions): game trail to Creek 30 m. E of site; rocky mtn sheep sited; burnt snags on site;

3 DESCRIPTION

Site Name Smokey site
Size 300 x 200 m Date of Use unknown
Function/use seasonal camp
How determ.? no permanent dwelling pits

Present Condition: ☐ Excellent ☒ Fair ☐ Deteriorated/disturbed ☐ Hazardous ☐ Useable ☒ Vandalized ☐ Altered

Physical data (see instructions)
pictograph on rock face upslope from area; see sketch map for details. Chipping debris (obsidian) limited to 3 clusters, both primary and secondary reduction flakes present; 2 grinding slicks on granite erratics near site; main site area defined by concentrations > 5 flakes / meter²; at least 4 fragments of obsidian preforms noted (see photos); no bone, shell, charcoal, or other organic material present. Vandalism noted on pictograph (part of a panel destroyed by gunshots). Tire marks in mud leading away from road suggests ease of access leads to such vandalism.

4 OTHER

Expected impacts: ☐ yes ☐ no ☒ maybe
Source continued vandalism
Mitigation recommendations: prevent access / inform visitor - develop mitigation plan

Recorded by [redacted] Date 13 Ap 77
Inventory type: ☐ Tickler (verified? ☐ yes ☐ no)
☐ Overview ☐ Recon. ☐ Survey ☒ Incidental
Reference: Memo to D.R. 15 Mar 77
Attachments: ☒ Sketch map ☒ Photos ☒ U.S.G.S. ☐ Catalog ☐ Report ☐

Example of site forms used.