AN ABSTRACT OF THE THESIS OF

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Title: The Lanceolate Projectile Point in Southwestern Oregon: A Perspective from the Applegate River.

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Archaeological investigations of the Applegate Lake project area were conducted by the Department of Anthropology, Oregon State University from 1977-1980. A cultural sequence believed to span over 8000 years was revealed from a series of six sites. Several of these sites contained lanceolate or leaf-shaped projectile points. A large serrated variety is similar in form and age to specimens referred to as "Cascade" points in the southern Columbia Plateau, considered by some to be the hallmark artifact of an expansive Old Cordilleran Culture. Smaller varieties of lanceolate projectile points are comparable to finds along the middle and upper Rogue River.

Comparisons of projectile point morphology and technology demonstrates considerable variation in southwestern Oregon for the large lanceolate projectile point type, while the smaller variety may exhibit somewhat less variability. Assemblage and projectile point comparisons do not indicate that the Old Cordilleran Culture concept is applicable to this part of the state. The archaeological and linguistic evidence is also not supportive of a movement of Old Cordilleran/Penutian speaking people through this part of the state and into California. Instead, only the idea of the lanceolate projectile and the larger weapon system it was a part of diffused throughout the Pacific Northwest at an early time level. In southwestern Oregon other aspects of culture were considerably diversified by as early as 6000 years ago.

THE LANCEOLATE PROJECTILE POINT IN SOUTHWESTERN OREGON: A PERSPECTIVE FROM THE APPLEGATE RIVER

by

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CHAPTER I

Introduction

Through a series of contractual agreements between the Portland District, U.S. Army Corps of Engineers, and the Department of Anthropology, Oregon State University, an evaluation of the cultural resources within the Applegate Lake project area was accomplished from 1977 to 1980. The program was directed by Dr. David Brauner, with Dr. John Fagan serving as liaison officer from the Army Corps of Engineers.

The Applegate Lake project area is located on the upper Applegate River approximately thirty-five miles southwest of Medford, Oregon (see Figure 1). The Applegate River flows through the Klamath Mountains physiographic province as defined by Dicken (1955) and adapted by Baldwin (1964). The river enters the project area at an elevation of 2100 feet above sea level and passes the Applegate Dam site at an elevation of 1800 feet. The relatively narrow Applegate Canyon is confined by mountains which rise to elevations of 4400 feet and are themselves deeply encised by lateral canyons. Geologically the mountains are composed of Triassic and Jurassic metavolcanic and metasedimentary deposits of the Applegate and Galice groups (Baldwin 1964:77-82). Soils are generally shallow and not well developed. Vegetation is classified within the Mixed Evergreen (Pseudotsuga-Sclerophyll) zone, with Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), Pacific madrone (*Arbutus menziesii*), live oak (*Quercus chrysolepis*), and tanoak (*Lithocarpus densiflorus* as major species (Franklin and Dyrness 1973:134).

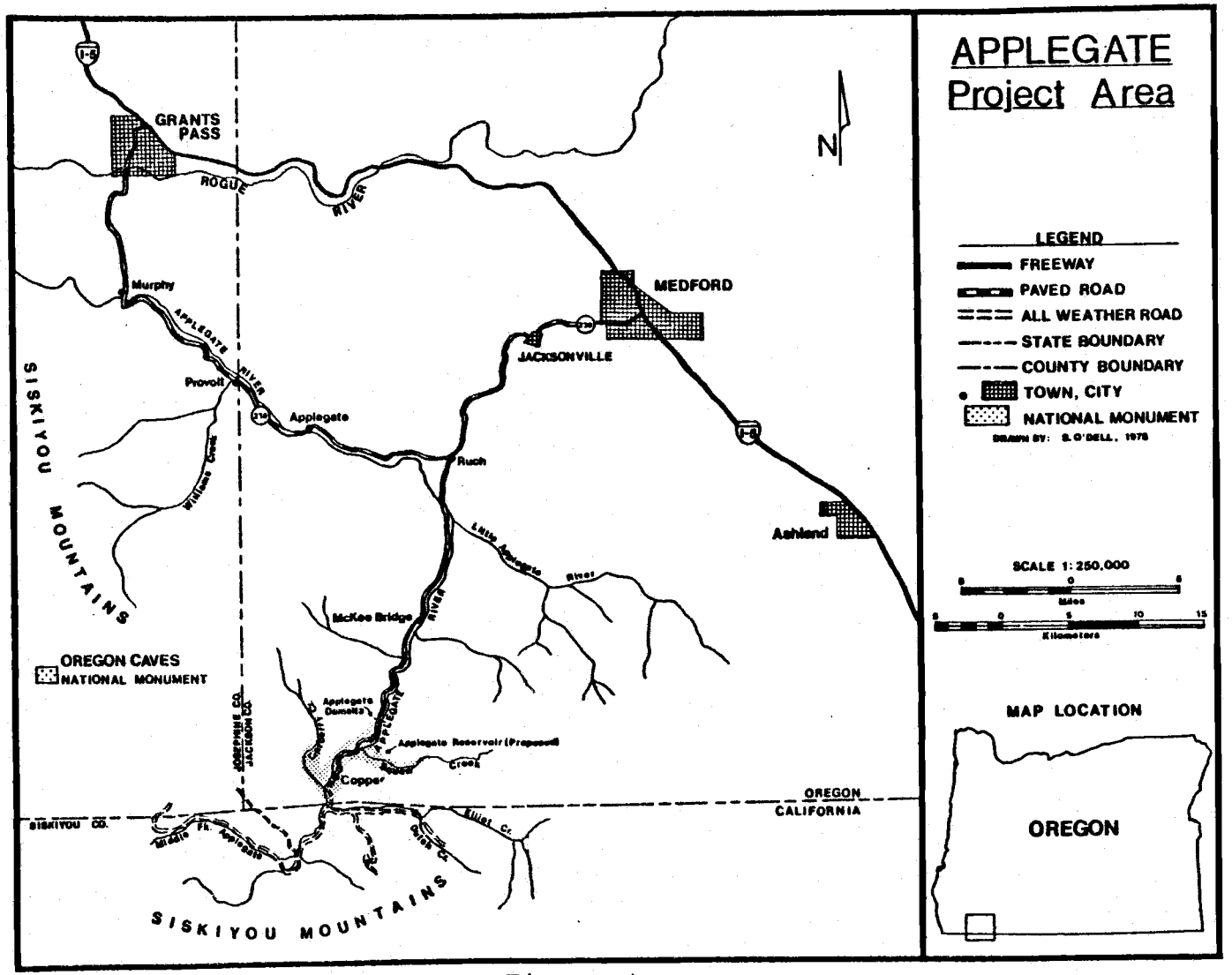

APPLEGATE
Project Area
LEGEND
FREEWAY
PAVED ROAD
ALL WEATHER ROAD
STATE BOUNDARY
COUNTY BOUNDARY
TOWN, CITY
NATIONAL MONUMENT
DRAWN BY: S. O'DELL, 1978
SCALE 1: 250,000
Miles
Kilometers
MAP LOCATION
OREGON
GRANTS PASS
ROGUE RIVER
MEDFORD
JACKSONVILLE
Ashland
Murphy
APPLEGATE RIVER
Provolt
Applegate
Ruch
William Creek
Little Applegate River
McKee Bridge
SISKIYOU MOUNTAINS
OREGON CAVES
NATIONAL MONUMENT
JOSEPHINE CO.
JACKSON CO.
Applegate Reservoir (Proposed)
Copper
Elliot Cr.
Deer Cr.
SISKIYOU CO.
OREGON
CALIFORNIA
SISKIYOU MOUNTAINS

Figure 1

While this study is generally concerned with a time removed from the historic period, the Native Americans living in or near the project area during the contact period should be noted. The River or Lowland Takelma claimed the middle stretch of the Rogue River and much of the Applegate drainage (Sapir 1907:1). They spoke a variety of Penutian called Takelman. Occupying an area near the confluence of the Little Applegate and Applegate Rivers and extending to present day Ruch was an Athapascan-speaking people known as the Dakubetede (Sapir 1907:2). Lastly, the Shasta, a Hokan-speaking people may have used the area seasonally with known use of areas to the south and east (Holt 1946:301). While these groups differed linguistically, they shared many cultural traits including the procurement system, socio-political system, and religion (Sapir 1907:257; Drucker 1936:284; Kroeber 1920:162).

Social grouping was confined to band organization with each band occupying a winter village along a major watercourse. Marriage was generally band exogamous (Sapir 1907:268).

Winter villages were abandoned in the early spring in favor of upland camp sites, a classic central-based wandering settlement pattern. Root crops such as camas (*Camassia spp.*) and Ipos (*Calochortus spp.*) were dug in the spring, and the various runs of salmon and steelhead exploited from the summer to late fall. In the fall camps were moved into the oak groves where the women would harvest acorns and the men would hunt deer either communally in drives or alone by stalking (Holt 1946:310). The onset of winter would bring movement back to the winter village where stored foods and hunting provided sustenance until the following spring.

Statement of Problem

Prior to the Applegate Lake archaeological project only one U.S. Forest Service report (Hopkins et al. 1976) describes archaeological sites within the Applegate Valley. Moreover, the understanding of prehistoric cultural relations and cultural chronology within the southwestern portion of the state remains poorly understood.

The Applegate Lake archaeological investigations located and evaluated a series of sites that appear to span 8000 years or more. From these sites a series of cultural phases were constructed which document the longest known cultural sequence in the region (Brauner 1981a, 1981b). The oldest site is dominated by varieties of wide stemmed projectile points and is followed chronologically by large serrated lanceolate and smaller non-serrated lanceolate projectile points. Taken together the series of sites show the evolution of the lanceolate projectile points used by the prehistoric inhabitants of the valley.

Several of these lanceolate forms are found elsewhere in southwestern Oregon and the Pacific Northwest, and a problem exists in relating these new finds to the larger theoretical and chronological frameworks already developed. The large serrated lanceolate points from 35JA52 and 35JA53B are similar to projectile points referred to as "Cascade points" in the southern Columbia Plateau. B. Robert Butler first coined the term Cascade point to refer to the hallmark artifact of his Old Cordilleran Culture concept (Butler 1961:29). This culture, as Butler described it, represented the earliest occupation of prehistoric peoples in the Pacific Northwest. Since Butler's original statement, older components have been found, as well as numerous components containing Cascade-like materials. Several authors consider the Old Cordilleran Culture to represent evidence of the spread of Penutian-speaking people throughout the Northwest at an early time level (Pettigrew 1974; Haun 1977; Bryant 1979).

The smaller lanceolate projectile points from 35JA47 are similar to points first described by Luther Cressman at the Gold Hill site on the Rogue River (Cressman 1933a, 1933b). Wilbur Davis found similar lanceolate or leaf-shaped points in the Elk and Lost Creek drainages of the upper Rogue River. He coined the name "Gold Hill" for the type, and noted the similarity with Cascade specimens (Davis 1968b, 1974).

The main objectives of this work are to:

1) define and describe the series of lanceolate projectile point types occurring within the Applegate Lake project area and,

2) relate the occurrence of these projectiles to the broader area of southwestern Oregon and the Pacific Northwest.

This will include morphological and technological comparison to the Cascade type point, and to similar specimens from other southwestern Oregon localities such as the Klamath Basin, the upper Rogue River, the Gold Hill site, and several coastal sites. A determination of whether or not the Old Cordilleran Culture concept is applicable to the upper Applegate River and in southwestern Oregon will also be attempted. The corrolary hypothesis of the spread of Penutian speakers with the Cascade point will also be reviewed in light of the Applegate materials.

CHAPTER II

The Old Cordilleran Culture

The first theoretical construct focusing on lanceolate or leaf-shaped points in the Pacific Northwest was the Old Cordilleran Culture concept proposed by B. Robert Butler. First presented as a paper in 1958 and developed in stages through 1965, the construct was designed to explain cultural materials Butler believed represented the earliest occupation of the Pacific Northwest. Butler's hypothesis resulted from data collected along the Lower Columbia River, specifically at the Five-Mile-Rapids and Indian Well sites. As Butler perceived it, the Old Cordilleran Culture was

> ...a cultural tradition which is represented by one of the early components or series of components at sites along the Pacific Ranges of the cordilleras of the New World as far south as southern California, and in northeastern Mexico and on down into South America, as far north as the Columbia Valley and perhaps further north into the Frazer Valley.... It is a tradition characterized by a leaf-shaped point and blade complex, along with a generalized assortment of cutting, chopping, and scraping implements ...its carriers pursued a generalized hunting-fishing-gathering economy...during the Altithermal, the outward pushing Desert Culture tradition soon modified and eventually dominated this tradition; but in those areas far removed from Desert Culture influence, the tradition developed along independent lines, becoming a maritime tradition in the Northwest Coast area.... In its earliest arrival in the Pacific Northwest, the tradition occurs in sites more to the interior than the coast, but that it rapidly penetrated to the fall line of the major rivers draining the interior and subsequently spread out from there...it arrived in the Pacific Northwest probably no earlier than 12,000 years ago, or near the end of the Pleistocene and was established in South American by at least 8000 years ago. And finally,...it was contemporaneous with such Early Lithic traditions as Clovis, Folsom, Scottsbluff, etc. (Butler 1958:11).

Three years later Butler's monograph on "The Old Cordilleran Culture in the Pacific Northwest" was published (Butler 1961). In this review Butler noted that leaf-shaped projectile points were known to occur at early time levels in five geographical subareas of the Northwest, including 1) the northern Great Basin of south-central Oregon

(Fort Rock and Cougar Mountain Caves), 2) the Upper Klamath Lake Region (Kawumkan Springs Midden), 3) the Dalles Region of the Lower Columbia Valley (Five-Mile-Rapids and Indian Wells), 4) the Columbia Basin of eastern Washington and Oregon (Ash Cave, Hat Creek, and Cold Springs), and 5) the Puget Lowland of northern Washington. Other areas given brief consideration included southern Idaho and California (see Figure 2).

The identifying or index artifact for the Old Cordilleran Culture was the leaf-shaped or Cascade projectile point, with the Indian Well specimens forming the type collection (Butler 1961:29). The Cascade point was described as

> ...generally long, narrow leaf-shaped or bipointed items which tend to be quite thick in proportion to their width and are usually thickest above the butt end; none shows evidence of basal thinning. A number have a fairly predominant bulb of percussion at or near the butt end, which may indicate that these had been made from a flake struck from a prepared core. Most of the points are diamond-shaped in cross section... (Butler 1961:28).

Along with the points which he again described as apparently made on prismatic blades struck from a conical core (Butler 1961:64), a basic assemblage of chopping, cutting, and scraping implements of chipped stone characterized the lithic assemblage.

The basic ecnomy was quite flexible and oriented towards the hunting of land mammals, particularly deer. Riverine resources such as fish and mussels were utilized but to a lesser extent. Edible roots, berries, and other vegetable foods were presumed to complete the subsistence requirement.

In 1962 Butler published his findings on two sites with components fitting into his Old Cordilleran model. He modified the Old Cordilleran assemblage and adaptive strategy to include

> ...a well developed bone and antler industry; blade implements, including the finely made "willow leaf" Cascade points and end of blade scrapers; the edge-ground cobble complex; hunting of such large mammals as deer and elk, and apparently large numbers of birds; and intensive, probably seasonal exploitation of such riverine resources as fish (Butler 1962:77-78).

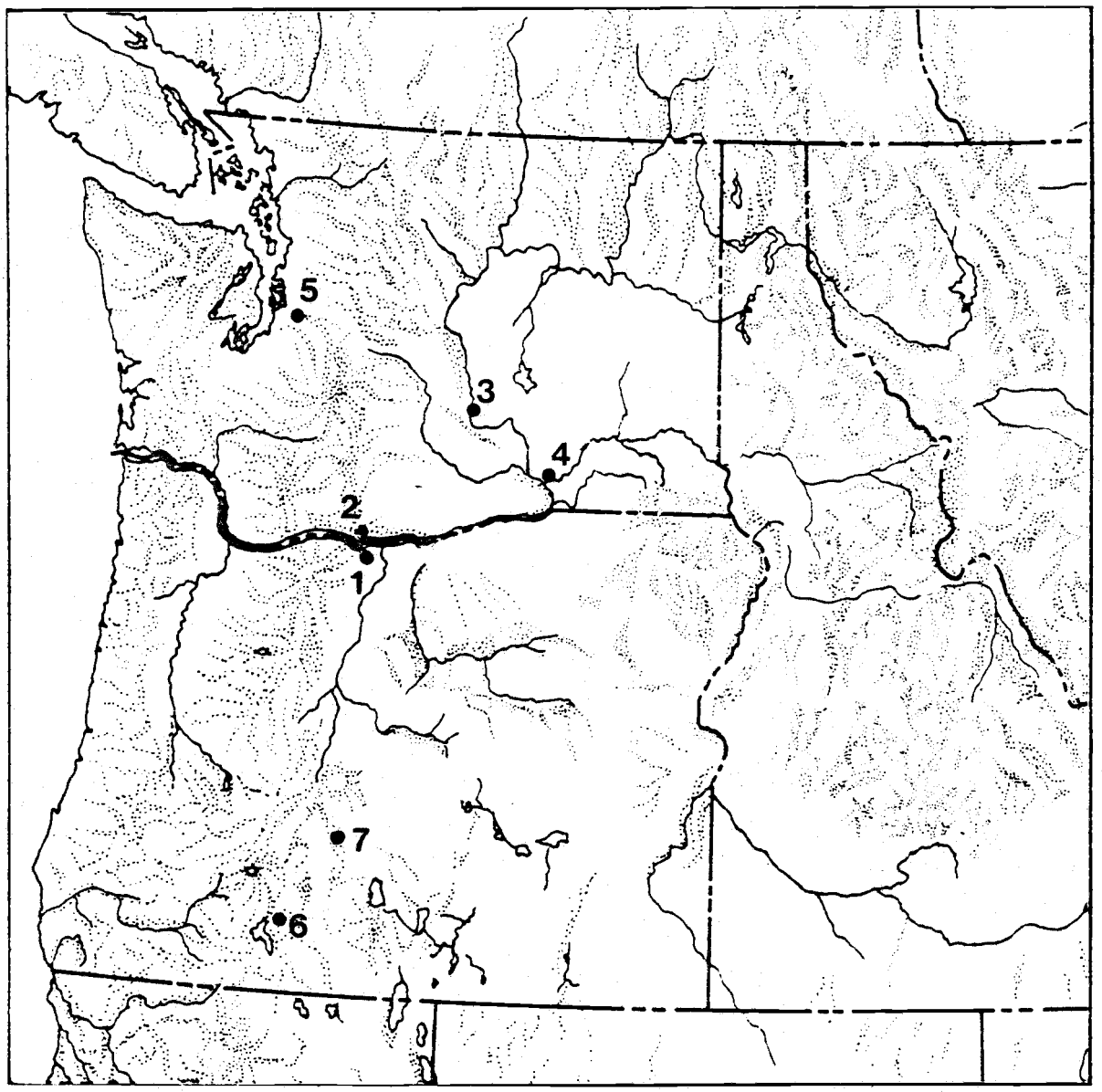


Figure 2
Old Cordilleran Culture sites (Butler 1961).

1. Five-Mile-Rapids
2. Indian Well
3. Vantage
4. Hat Creek, Ash Cave, Cold Spring sites
5. Puget Lowlands
6. Kawumkan Springs Midden
7. Fort Rock and Cougar Mountain Cave

His last treatise on the concept came in 1965. Butler chided his fellow archaeologists for too often proceeding into fieldwork without any theoretical framework with which to view the materials recovered. His own concept he viewed as a heuristic device to guide future excavations within the Northwest, "a set of expectations to be tested by new observations" (Butler 1965:1126). The artifacts distinguishing the Old Cordilleran Culture were further refined to include a variety of oval knives and unifacially beveled antler wedges in addition to the previously defined traits. He suggested use of the edge-ground cobble as a root processing tool and posited an environmental context within which the Old Cordilleran Culture resided which he called the Pacific Northwest climatovegetational complex (Butler 1965:1128).

The Old Cordilleran Culture concept has met with criticism and controversy since its inception. Many critics believe that less than total comparisons were used, on the assemblages and in analysis of the projectile points. Carlson (1962) and Osborne (1963) dismiss the concept due to incomplete comparison of assemblages and call the point tradition of "moderately even quality" (Osborne 1963:1398). They assert that without a careful examination of the morphology and technology used in the manufacture of the points no support is possible for the archaeological culture. Lack of criteria for defining the points and assemblages is also echoed by Gruhn (1962) and by Jensen (1976).

Another point of contention was the amount of environmental diversity seemingly covered by the proposed culture. Osborne describes the culture as "at home in too many environmental situations" (Osborne 1963: 1398), and Gruhn notes that the projectile point tradition "was probably held in common by a number of distinctive cultural groups inhabiting the various regions of this vast and ecologically diverse area..." (Gruhn 1962:184). Butler tried to answer this criticism with the proposed climatovegetational zone, but it is doubtful that this general model would satisfy his critics who view the Pacific Northwest more in terms of its environmental diversity rather than homogeneity.

Charles Nelson (1969) provides the most comprehensive review of the Old Cordilleran Culture concept, and the elements described by Butler in 1962 and 1965. Nelson analyzed the artifacts from the Sunset Creek site, a multicomponent site along the Columbia River in central Washington. The earliest defined phase, the Vantage phase, contained the leaf-shaped points, and in relating those materials to the Old Cordilleran Culture Nelson reevaluated the evidence for the concept. Nelson systematically reviews the evidence for twelve criteria including 1) the Cascade projectile point, 2) a variety of oval knives, 3) non-distinctive cutting, chopping, and scraping implements, 4) blade tools such as end of blade scrapers, 5) unifacially beveled antler wedges, 6) unspecified bone and antler tools, 7) edge-ground cobbles, 8) hunting of deer, elk, antelope, and mountain sheep, 9) snaring or trapping of birds, 10) use of root crops such as camas or kous, 11) fishing and, 12) use of fresh water mussels and snails. Nelson considered most of these traits either too speculative or so general as to apply to all phases of Plateau prehistory. Only the Cascade projectile point, a specific type of blade with a faceted platform, and edge-ground cobbles were left as identifying traits.

Nelson then described a series of attributes of the Cascade projectile point in an effort to tighten the definition for the type. He describes the points as made on blades with faceted striking platforms, finely pressure flaked, and often exhibiting edge serration. Metric data is also included (see Appendix A). He views his trait as "embracing a highly distinctive set of morphological and technological practices" (Nelson 1969:12). Nelson groups the Indian Well points as typologically identical with those from the southern Columbia Plateau, noting however that some early lanceolate points from Lind Coulee and the Dalles are too broad, short, and with flaking patterns dissimilar to the type as a whole. He sees little similarity with projectile points from the northern Great Basin, the Klamath Basin, or western Washington other than a generalized outline. He would confine the Cascade point to the southern Columbia Plateau and adjacent portions of Idaho. As for Cascade-like projectile points reported outside the southern Plateau subarea Nelson proposed that

> ...the only reasonable hypothesis which can be constructed is that the idea of making projectile points which had a leaf-shaped outline diffused through adjacent portions of the Great Basin, Columbia Plateau, and Cascade cordillera at an early date. And that is the broader significance of the distribution of leaf-shaped projectile points in the Pacific Northwest (Nelson 1969:23).

Nelson also proposed a revision in chronology. Discounting earlier data from the Dalles (Five-Mile-Rapids site) Nelson assigns Cascade components to between 8000 and 6500 years ago. After that time they co-occur with the Cold Springs side-notched projectile point to about 4000 years ago (Nelson 1969:22). This chronological ordering of Cascade points was also made by Newman (1965). Combined with new evidence for older components with stemmed projectiles dating from 9000 to 11,000 years ago on the Lower Snake River it became evident that the lanceolate point did not represent the earliest cultural stratum in the southern Plateau. This effectively eliminated a portion of the concept focusing on the initial occupation of the Northwest. Nelson did observe a continuity in lithic technology between the earlier components and Cascade components suggesting internal development for the later Cascade materials.

Peter Jensen (1976) used a numerical taxonomy, specifically cluster analysis, to look at the similarity and differences between leaf-shaped points in the Northwest and in the New World. He used a series of twenty-two mostly morphological attributes to score the lanceolate points. A comparison of 106 projectiles from Weis Rockshelter, Ash Cave, Cougar Mountain Cave, Indian Well, and Cascadia Cave found that the group labeled "Cascade" from sites described by Butler was in fact homogeneous. Jensen interprets this as supporting transmission of ideas and not enough evidence to infer a greater similarity in culture as the Old Cordilleran Culture (Jensen 1976:174).

On a scale including the Plateau, Central and South America only the Plateau specimens represented a unique population, thus refuting the Pan-Cordilleran theory (Jensen 1976:182). On the whole, the Plateau lanceolate projectile points had a greater width to thickness ratio and

were shorter. Using these and other attributes Jensen constructed a key as an additional test in classification of the Plateau or Cascade type (Plateau vs. non-Plateau) (Jensen 1976:203). As useful as the key may be in distinguishing the two groups, it was not designed to look at variation within the Plateau or adjacent subareas.

In a little known study, Grace Miller (1969) conducted a statistical analysis of leaf-shaped projectile points along the Lower Snake River in an effort to determine whether a single projectile point tradition was represented through time and space. Three subtypes were isolated by significant association of lithic material, blade shape, width-to-length ratio and serration from several open sites along the river. These continue in the same proportions through time. Specimens from Windust Cave however do not fit into the three subtypes defined at the open sites, a difference Miller interprets as evidence for a distinct point making tradition (Miller 1969:75). She also alludes to the possibility of a functional difference in the points which would correspond with a difference in site function.

The Cascade Assemblage

Butler's Old Cordilleran Culture concept as formulated in 1961 was based primarily on the early occurrence of leaf-shaped projectile points, and not an assemblage of traits. Because of this he could include places from the Frazer River to southern California within the realm of the culture. Later he began to introduce more traits into an assemblage configuration with more diagnostic attributes.

This approach was taken by Warren, Bryan and Tuohy (1963) when they proposed the Border Columbia Complex defined during their analysis of the Goldendale site. The authors constructed a trait list composed of the edge-ground cobble, hand stone, Cascade point, Lind Coulee style I point, oval knives, and blade tools which occurred as a complex in many components compared within the southern Plateau. Warren later broke up this complex into the Old Cordilleran and Lind Coulee Pattern both of which could only be found in the southern Plateau (Warren 1968:84-85).

Leonhardy and Rice (1970) formalized phase designations for the Lower Snake River Region. They proposed a series of six cultural phases, the earliest of which, the Windust Phase, dated between 10,500 and 8000 years B.P. The subsequent Cascade Phase dated from 8000 to around 4500 B.P. (slightly revised dates from Leonhardy and Rice 1980). Leonhardy and Rice refer to the Windust and Cascade Phases as linked by similar technologies forming an evolutionary continuum (Leonhardy and Rice 1970:24).

The Cascade Phase is defined on evidence from ten archaeological sites, and is divided into two subphases on the basis of the Cold Springs Side-Notched projectile point horizon marker. A second hallmark artifact, the edge-ground cobble was also identified. Other common artifacts include lanceolate and triangular knives, tabular and keeled end scrapers, and a variety of utilized flakes. The lithic technology was adapted to basalt, and to an extent to cryptocrystalline silicates. Both large tabular, and prismatic blades were manufactured. A variety of bone tools including awls, needles, atlatl spurs, and shafts were also noted.

Fauna taken during the phase include deer, elk, pronghorn antelope, as well as small mammals such as rabbit and beaver. The large salmonoids including salmon and steelhead are first believed to be of economic importance during the phase (Leonhardy and Rice 1970:9).

Judith Bense reviewed the Cascade Phase in 1972 (Bense 1972). She identified four artifact types specific to the phase: the lanceolate Cascade point, large side-notched Cold Springs points, edge-ground cobbles, and distinctive but unnamed types of knives (Bense 1972:50). She demonstrated assemblage homogeneity through the warm and dry climatic period referred to as the Altithermal, which closely corresponded to the dates for the phase itself. A distinctive stone tool technology first reported by Leonhardy and Muto (1972) was also noted. This Levallois-like technique was adapted for blade and blade-like flake manufacture and was the dominant lithic reduction system during the Cascade Phase.

Bense was particularly harsh in reviewing the Old Cordilleran concept in light of the Cascade Phase. She notes the new chronological

placement and technological information as evidence discrediting the theory. At the same time she recognizes similarity between projectile points, stone tool technology, other tools such as edge-ground cobbles, and total lifeway within an area of the southern Plateau. She states that the Cascade Phase, Vantage Phase, Indian Well Phase, and Olcott Phase of the Puget Lowlands are similar enough to combine these synchronic phases as part of an areal cultural horizon (Bense 1972:90).

Swanson and Leonhardy (1972) also acknowledge an early cultural pattern or tradition in the southeastern Plateau. They state that the tradition commenced with the first occupation of the area and by 8000 years ago developed into a remarkably uniform archaeological manifestation known as the Old Cordilleran Culture (Swanson and Leonhardy 1972: 1). They report that separate phases for areas within the southeastern Plateau are indistinguishable archaeologically, all containing Cascade points, edge-ground cobbles, blades, antler hafts and wedges, choppers, scrapers, and para-Levallois cores (Swanson and Leonhardy 1972:10, 12).

If the phases discussed by Bense, Swanson, and Leonhardy are combined they form a much more feasible and compact Old Cordilleran Culture concept. Since the concept was postulated over such a wide area of the Northwest it is appropriate to test Butler's hypothesis with comparisons of the leaf-shaped projectile points, stone tool technology, and other assemblage traits as new data becomes available.

Penutian and the Old Cordilleran Culture

The idea that the Old Cordilleran Culture represents Penutian-speaking peoples has been suggested in the archaeological literature for some time. When Butler stated that the Old Cordilleran Culture was the likely ancestor of the Nez Perce the implication was that the linguistic affiliation also held true. Earl Swanson was the first to articular the possible relationship saying

> It is also of interest that some linguistic correspondences have been suggested by the archaeology, and one cannot help but note the correspondence between the Old Cordilleran Culture and Penutian (Swanson 1962:157).

The ideas surfaced again in 1974 with the publication "On the Early Prehistory of the Northwest Coast" by Richard Pettigrew. Pettigrew postulated that as the Pleistocene glaciers retreated, several separate language groups moved into the new territory. These included Penutian speakers moving northward from south of the Puget Lowlands to the Prince Rupert-Queen Charlotte Islands region having a stone tool technology related to the Old Cordilleran Culture and Border Columbia Complex.

Pettigrew reviewed the evidence from the Old Cordilleran Culture and Border Columbia Complex and cited additional evidence of similar leaf-shaped points, knives, etc. in Oregon, Washington, the Frazer River Valley, and in the Straits of Georgia. While admitting that many of these early sites were either incompletely reported or had small artifact samples, he nonetheless suggested an early cultural manifestation on the southern Northwest coast related to the Old Cordilleran Culture and Border Columbia Complex dating between 10,000 and 7000 years ago (Pettigrew 1974:42).

The Cascade point assemblage is linked with the Penutian language family based on the ethnographic distribution of Penutian languages, which he stated covers all of the Border Columbia Complex and most of the Old Cordilleran Culture area. Pettigrew also cited linguistic evidence that California Penutian speakers and the Tsimshian of the Prince Rupert area were possibly descended from migrants from Oregon, although the existing glottochronological work does not support the later belief (Pettigrew 1974:44).

Opposing Butler, Pettigrew hypothesized that the people represented by the Border Columbia Complex expanded from the southeastern Plateau west and north, down the Colubmia River and north along the coast in the pursuit of plentiful salmon fisheries. The limits of cultural expansion was controlled by the availability and high productivity of the salmon runs (Pettigrew 1974:47).

Alan Haun (1977) also concluded that a correspondence between Penutian and the Old Cordilleran Culture existed. Following Sapir (1929), Swadesh (1956), and Hymes (1957), Haun noted that Penutian was

a viable genetic unit, and outlined the various stocks of the language family in Oregon. Citing the lexicostatistical divergence values of Swadesh (1956), Haun concurs with Swadesh that Oregon represents the ancient center of the Penutian phylum. Within Oregon Haun states that Plateau Penutian (Lepitan stock) of the central and eastern parts of the state is the stock of greatest antiquity based on its extensive geographic distribution, long time of internal divergence, and degree of internal differentiation. This stock then becomes the likely center for dispersion of Penutian in Oregon and into adjacent regions to the north and south (Haun 1977:10).

With regard to the archaeological evidence, Haun agrees with Butler as he tried to establish a series of similar assemblages with the Cascade point as the diagnostic artifact. He postulated that early sites west of the Cascades containing these materials are only seasonal occupations of a people based east of the Cascades. He believed that a year round settelment pattern was established in western Oregon only by 3000-5000 years ago, and that this prompted the divergence of the Takelman language stock. He also notes a correspondence in the movement of Penutians with the Cascade point into western Oregon with data from California which indicates that a Penutian intrusion happened at about the same time (Haun 1977:28).

Other archaeologists working in southwestern Oregon and California have picked up on these ideas. In a report to the Rogue River National Forest, Bryant states

> Penutian speakers between 8000 and 4000 years ago appear to have carried an archaeologically detectable assemblage with them wherever they settled. This assemblage contains as its prime marker leaf-shaped points called Cascade points or knives... (Bryant 1979:23).

California archaeologists Ragir (1972) and Jensen (1976) accept the Northwest origins of Penutian in California noting the value of the hypothesis to explain artifactual similarities with the Windmiller

Culture dated 3000-4000 B.P. An alternate hypothesis of Farber (1980: 16) states that the Martis Complex of the Sierra Nevada (1500-3000 B.P.) is indicative of a Penutian-speaking culture that first arrived in the central California Valley from the southern Plateau, and then spread into the Sierra. A critique of the above postulates will be presented in the concluding chapter of this thesis.

CHAPTER III

The Manufacture of Cascade Tools

B. Robert Butler first noted that Cascade points were made on prismatic blades struck from a large, conical core (Butler 1961:64). The following year a colleague, Earl Swanson, commented on evidence that tortoise cores and large parallel sided flakes formed a base for the Old Cordilleran Culture (Swanson 1962:156).

In that same year Don Dumond (1962) published an article on blades and cores. In his report he described a blade/core industry from the early period at the Five-Mile-Rapids site at the Dalles. In the original report of investigation Cressman (1960) mentioned the presence of blade-like (lamellar) flakes and suggested further analysis on the collection. Dumond examined two classes of unifacially flaked artifacts and concluded that over one hundred were recognizable as prismatic blades (flakes over twice as long as wide, with roughly parallel sides, having a triangular to trapezoidal cross section, and ridged by longitudinal scars on the dorsal surface from previous flake removals). Two kinds of cores, the conical and the disc core were observed with both varieties deemed capable of providing blade-like flakes. Dumond states

> It seems reasonable to conclude that a percussion blade-core technique, in which cores prepared with flattened striking platforms were utilized in producing rough blades was known at Five-Mile-Rapids on the Columbia River by at least 7800 years ago (or 5800 B.C.) and likely a millennium or two earlier, and that this technique declined in importance by about 6000 years ago (or 4000 B.C.) (Dumond 1962:423).

In a report on the Goldendale site which bears a resemblace to Old Cordilleran assemblages, Warren et al. (1963) noted that cores with striking platforms and preparatory flaking were manufactured, and that flakes from these cores were then finished into blade tools (Warren, Bryan, and Tuohy 1963:3, 4).

New evidence for blade production in the southern Columbia Plateau came to light in 1965. Charles Nelson (1965) reported on the recovery of seventy-five well prepared blades and one probable core from a site

near Central Ferry, Washington (45Fa3). Many of these blades were struck from cores with ground striking platforms. It was inferred from a number of characteristics that these cores were either large conical or biconical cores (Nelson 1965:1). The remnant striking platforms on the blades were evidence that the striking platforms on the cores were often secondarily retouched, crushed, and ground so as to produce a uniform striking platform for the manufacture of true blades (Nelson 1965:6). Nelson's table of gross measurements for eighty-nine flakes and blades with unifacially retouched striking platforms is included in Appendix A. Few blade tools were found at the site, but included a side scraper, two end scrapers, a fragmentary leaf-shaped knife, three utilized flakes, a leaf-shaped Cascade point. By comparing the projectile point forms from the site to other sites of known chronology, Nelson dated the blade industry to between 7500 and 5000 years ago (Nelson 1969:8, 9).

Crabtree and Swanson (1968) describe their experiments in blade manufacture using edge-ground cobbles as hammerstones. The cobble edge blades as they call them, have small to non-existent striking platforms (1 mm or less wide) and exhibit a large amount of hinge fracturing below a heavily ground dorsal platform edge (Crabtree and Swanson 1968:52). While they demonstrated this possible method of manufacture, the technique is yet to be demonstrated in archaeological sites.

The problem of the blade and core technology was again addressed with the excavation of Wexpusnime (45Ga61) on the Lower Snake River (Leonhardy et al. 1971). Top struck cores typical of a Levallois-like stone tool technology were reported. Enough debitage to fully describe the core and blade technology was recovered (Leonhardy et al. 1971:30). The reductive technique, similar to the Old World Levallois technique, was presented by Frank Leonhardy and Guy Muto at the 1972 Northwest Anthropological Conference.

The reductive process began with the decortification of a nodule and the removal of a wide, flat flake from the face of the core. Platforms could then be prepared and blade-like flakes removed along the ridges left by the removal of the large Levallois-like flake. A series

of blades could then be struck and the core reshaped. Flakes and blades from each stage of manufacturing were considered diagnostic of the technique, as was the core itself (Bense 1972:57-60).

This Levallois-like technique as fully described by Muto (1976) appears to represent a tradition lasting from 12,000 to 4500 years ago on the Lower Snake River. The Cascade Technique, as Muto named it, produces end products which are typologically identical to end products of the Old World Levallois system. It differs from the Old World Levallois in that Old World cores were prepared with a specific purpose in mind, blade cores for blades, point cores for points, and flake cores for flakes. On the Snake River these same products were produced from a single core through variation in the system (Muto 1976:32).

Muto used the data from Wexpusnime (45Fa61) and Granite Point (45WT41). The entire lithic assemblage from each of the control components were used in the analysis. The reductive technique was generally exemplified in basalt, but cryptocrystalline silicate nodules were also reduced using the system. The technique is described in eight stages (see Figure 2 and Muto 1976:38-55).

1) *First Core Trimming*

   This involves removal of cortex from the nodule and establishing the rough outline in cross and longitudinal section so that the core is a workable size and shape.

2) *Core Shaping*

   The rough core is further shaped and prepared to the artisans specification for removal of flakes and blades.

3) *Primary Flake Removal*

   In this stage the primary Levallois-like flake is removed, this flake carrying the scar pattern from the core shaping on its dorsal surface.

4) *Secondary or Distal Ridge Truncation Flake Removal*

   At this point the flintknapper could remove a secondary flake behind the primary flake, carrying all the portion of the primary flake scar on its dorsal surface, or detach the distal ridge truncation flake, which truncates the distal portions of the converging ridges left from the primary flake. This flake is viewed as a trajectory maintenance flake facilitating the production of blades.

5) *"A" Blade Removal*

"A" blades are removed along the ridges left by the primary flake removal. These come in left and right hand varieties, and their removal provides additional ridges on the core for blade making.

6) *"B" Blade Removal*

This blade is struck from the same platform as the primary flake, and is removed along the ridges formed by "A" blade removal. It carries the remnant scar of the primary flake, scars from "A" blades, and the remnant of the distal ridge truncation flake scar on its dorsal surface.

7) *Corner Blade Removal*

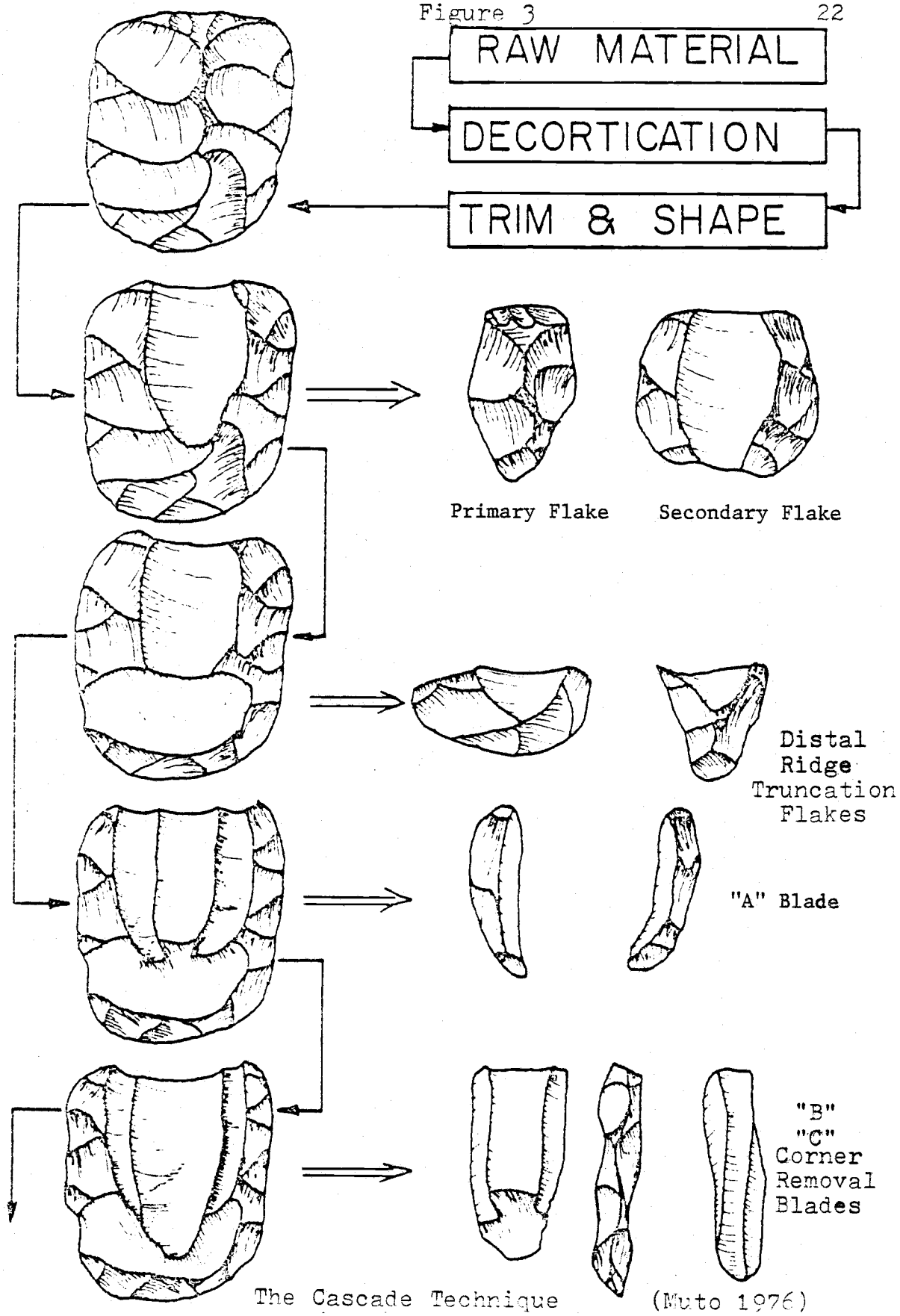
The corners of the core are removed producing blades with a long sinuous ridge down its midline. Their removal facilitates further reduction of the core.

8) *"C" Blade Removal*

This stage, as well as stage seven are later stages in the manufacturing trajectory and are not always reached prior to rejection of the core. These blades are removed from the sides of the remaining core.

At this point several possibilities existed for the partially exhausted core. The core could be utilized as an implement, modified into a thick biface and used for heavy chopping and scraping, or bifacially thinned for the production of flakes which could be subsequently utilized. This last option apparently took place more often during the Cascade Phase than during the earlier Windust Phase. The transition from the Windust Phase to Cascade Phase was marked by a shift from blade utilization to blade modification. During the Cascade Phase a long and thin projectile point was the desired end product. As a consequence blades were primarily used to manufacture Cascade projectile points and knives. Unmodified blades are a rare archaeological find (Muto 1976:130).

Muto states that the technique is found throughout the Columbia Plateau, from the Puget Lowland to the Snake River Plain and from the Okanogan Highlands to the northern Great Basin. He also cites evidence for similar techniques in the plains and in the southeast (Muto 1976: 3-4). Leonhardy viewed materials recovered by David Munsell from the San Juan Islands off Puget Sound, and confirmed that all elements



The Cascade Technique (Muto 1976)

of the Cascade Technique are represented (Leonhardy, personal communication).

The Cascade Technique is not restricted to any one material. If large flat flakes and blades were the desired end products the technique could be applied to obsidian, for instance. It does appear than when working poor quality basalt or other less than ideal material it offers an efficient method of removing blades or blade-like flakes. This advantage in the technique may be lost with higher quality materials where more freedom can be exercised in the production of such end products. For this reason evidence for the technique may be obscured or absent in assemblages predominately of high quality cryptocrystalline or obsidian (Muto, personal communication).

Evidence for the manufacture of projectile points on blades may be difficult or impossible to find given the projectile points alone, without cores and manufacturing debris. While platform remnants and a triangular to planoconvex cross section may suggest manufacture of lanceolate points on blades, there is no negative line of evidence which would indicate that they were not. Points with biconvex or diamond-shaped cross sections can also be made on blades if more material is removed from the ventral surface. Platform remnants can also be removed in manufacture. As Max Pavesic noted

> If the blade curvature is straightened, the striking platform removed, and the original flake scars on the ventral and dorsal faces are eliminated through chipping, it is impossible to determine if a specimen was manufactured on a blade (Pavesic 1971:149).

Platform remnants may serve a functional purpose. Without having to retouch the basal area of the point, a strong butt is available to absorb the shock of impact. These platforms could be retained on a variety of preforms and finished projectiles for this reason.

The investigation of the Stockhoff basalt quarry in northeastern Oregon offered yet another insight into "Cascade" Phase lithic reduction systems, although the site lies outside the Lower Snake River Region where the Cascade Phase was defined. Of 671 artifacts recovered from the site, 520 or 77% were bifaces or biface fragments. Bruce Womack

(1977) divided the bifaces into a sequence of four stages of manufacture based on the amount of cross sectional and longitudinal thinning, the securing of final outline and section, and edge finish. Citing Muto (1971) Womack noted that many unfinished bifaces have been erroneously classified as finished implements such as knives. Conversely, Womack examined knives with a high degree of edge polish indicating use from Marmes Rockshelter and Wexpusnime and concluded that they would be classified as stage III (unfinished) bifaces by his own categorization. Differentiation between unfinished bifaces and completed tools is particularly difficult with basalt tools where use wear is slow to accumulate. Through experimentation Womack observed that low bulk procurement such as the butchering of a single animal did not produce noticeable edge wear (Womack, personal communication).

Approximately forty-five Levallois-like cores, flakes, and blades or two percent of the total lithic sample represent evidence of the Cascade Technique at the quarry site. Womack accounts for this small percentage by noting that the technique is well suited to the reduction of poor quality talus blocks or river cobbles where careful planning is needed to remove large flakes. At the Stockhoff site, no special core preparation was needed to obtain these same flakes from the much finer grained basalt present at the quarry. This would appear to support the idea that the technique is more likely to be found when working with poorer quality material. Womack suggests that the Cascade Technique was redirected at the quarry for the manufacture of large bifaces (Womack 1977:128). These bifaces could then be taken from the site for further reduction into knives, projectile points, or a variety of other chipped stone tools.

Descriptive and metric data pertaining to Cascade tools is presented in Appendix A.

CHAPTER IV

The Applegate Lake Locality

The setting of the Applegate Lake project area was described in the introductory chapter. A review of the archaeological investigations in the valley as well as geomorphological factors important to relative dating of the sites is presented here.

The earliest professional archaeological reconnaissance of the locality was carried out by Cole and Johnson in February, 1966. Hampered by recent alluvial deposits and thick vegetation, no definable archaeological sites were located (Cole 1966). In 1976 a cultural resource inventory of thirty-seven recreation sites surrounding the proposed Applegate Lake was conducted. A variety of historic and four prehistoric sites were located (Hopkins et al. 1976).

A reevaluation of the cultural resources within the proposed project area was awarded to the Department of Anthropology, Oregon State University in 1977. Some twenty-seven archaeological and historic sites were identified, fifteen of which were selected for further evaluation. Of these, four archaeological and no Euro-American sites were determined eligible to the National Register (Brauner 1978:78). Because of adverse impacts associated with dam and pool construction three of these sites, 35JA47, 35JA52, 35JA53, and the remnant portion of 35JA49 were selected for extensive excavation. One other site important to this discussion, 35JA53B, was located adjacent to a barrow pit and was tested in 1980 (Brauner 1981c). Based on geological position and typological cross dating the sites are from oldest to youngest; 35JA53, 35JA52, 35JA53B, 35JA47, and 35JA49 (see Figure 4 for map).

Site 35JA53 was located on the only portion of a high terrace left in the project area. Cultural materials included numerous medium size shouldered points with a long stem and short triangular blade. Also represented in less numbers were asymmetrical lanceolate knives, edge-ground cobbles some with small holes pecked in their faces, manos,

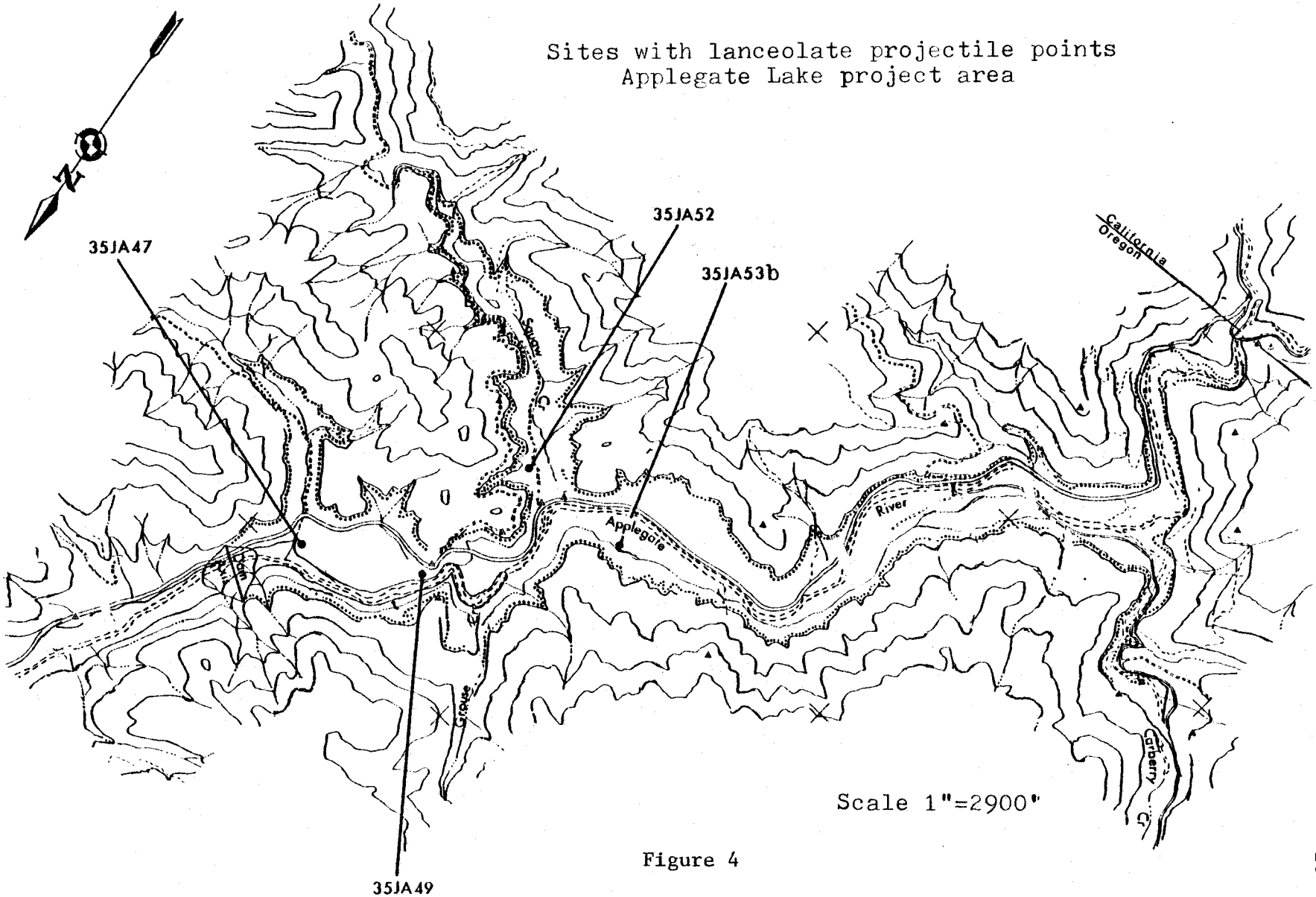

Sites with lanceolate projectile points
Applegate Lake project area
35JA47
35JA52
35JA53b
35JA49
California
Oregon
Applegate
River
Scale 1"=2900'

Figure 4

pestle-like implements, and quartzite cobbles with faceted edges. Experimentation with local stone such as schist, andesite, and quartz was considerable. The assemblage indicates use of the site as a seasonal hunting camp where some plant food processing and hide working also took place. The site is estimated to be 8000 or more years in age (Brauner 1981b).

Site 35JA52 was located downriver from 35JA53 on a hogback ridge north of Squaw Creek, a third order stream. Much of the upper levels of the site had been bulldozed off to replace soil washed away from agricultural fields by high episodes of Squaw Creek. Preliminary investigation suggested that the site was located on a terrace above the active floodplain. Testing revealed that the remaining portion of the site was intact, and stream channel deposits indicated occupation was on the active floodplain some thirty meters higher than the present regime. A slightly lower position from 35JA53 indicated that only minor downcutting during the period between occupation of the two sites.

Excavation entailed the opening of three rectangular blocks, and a long L-shaped unit. As with 35JA53 the site represents a single component. The assemblage includes projectile points, scraping tools, manos, metates, edge-ground cobbles some with pecked depressions in their faces, two bowl fragments, and numerous worked and utilized flakes. The edge-ground cobbles reach their apex at 35JA52 and are not similar technologically to the edge-ground cobbles of the southern Plateau. The edges are ground around the entire perimeter, and the pecked depressions are not characteristic of Plateau specimens. They do however show a technological continuity between 35JA53, 35JA52, 35JA53B, and the lower levels of 35JA47.

Most numerous among the variety of projectile point forms are large serrated lanceolate specimens referred to as type 01-06A (see Figure 5 and Appendix B). Next common are thick, stubby side-notched points, with small numbers of smaller lanceolate, stemmed, pentagonal and other forms also represented (Figure 6). The 01-06A type includes seven complete and 18 fragmentary specimens with greater than one half the point remaining. In addition some 59 basal fragments, 27 midsections,

Figure 5

Type 01-06A and 01-06B Projectile Points

A-D	01-06A Complete, D from 35JA53B
E,H,I,J	01-06A Resharpened
F,G	01-06A Fragments
K,L	01-06A Resharpened with serration

Scale 1:1

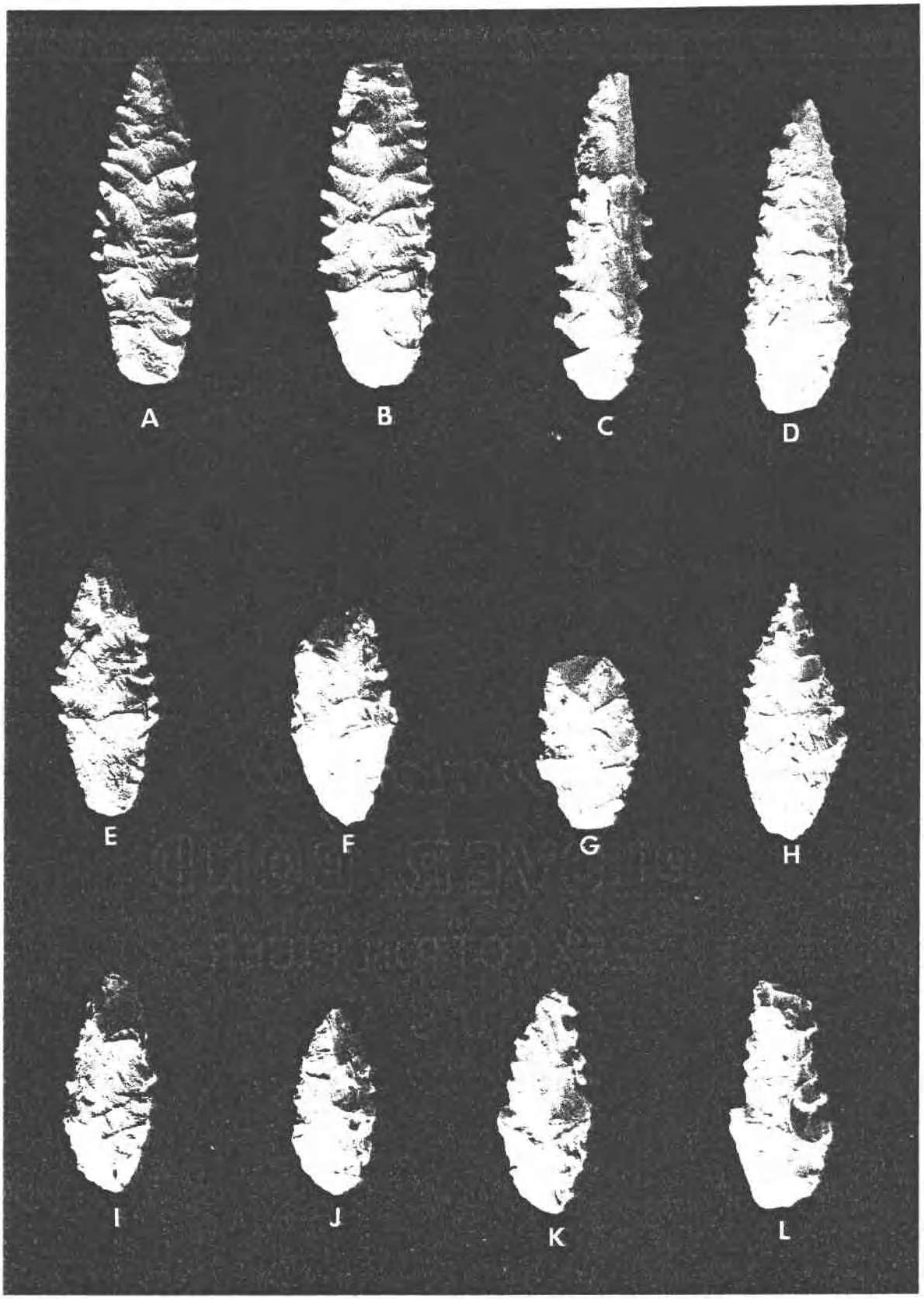
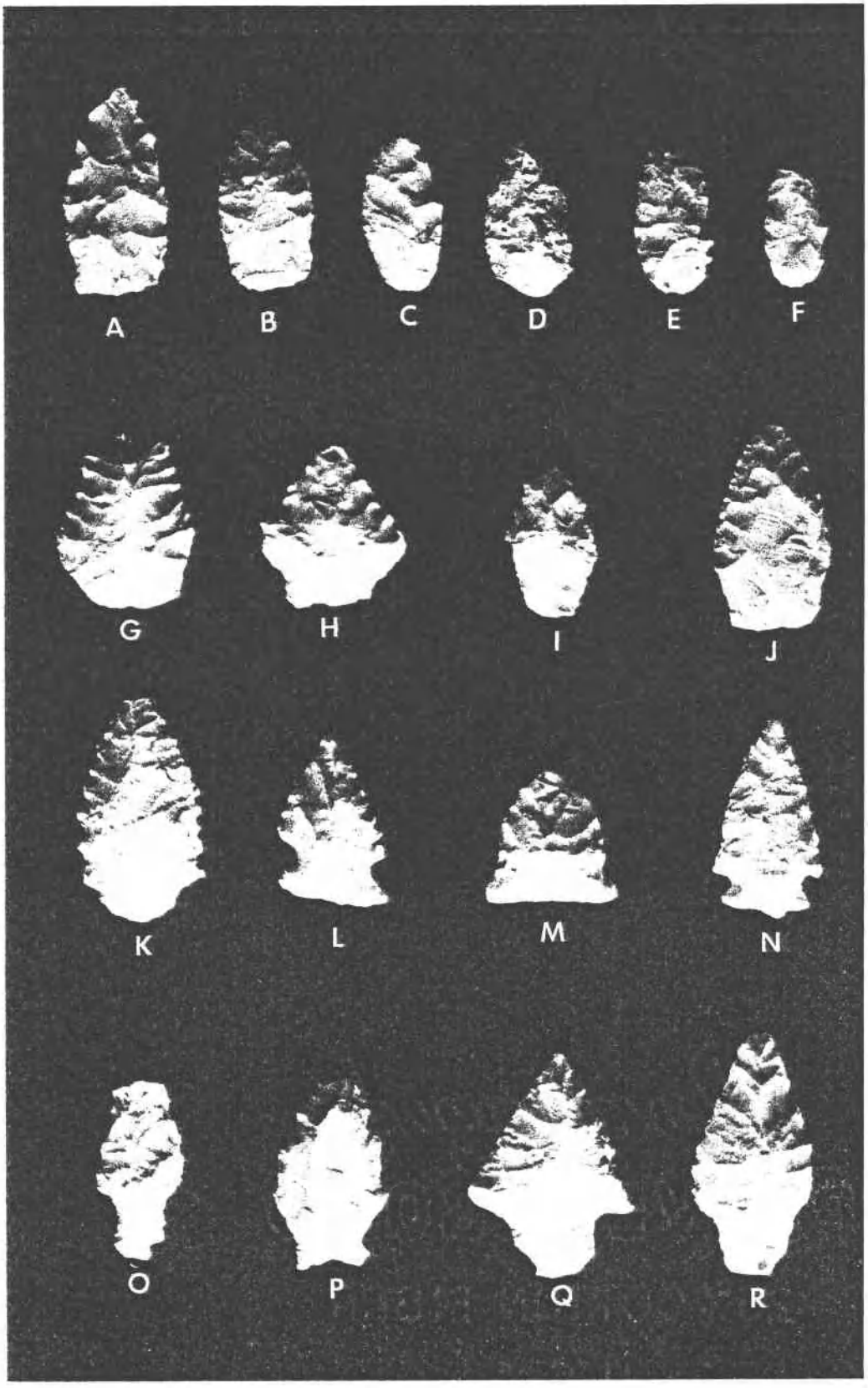

A
B
C
D
E
F
G
H
I
J
K
L

Figure 6

Assorted 35JA52 Projectile Point Types

A-F	01-06C
G	01-07A
H	01-07B
I	01-07C
J	01-07D
K	01-08A
L	01-01B
M	01-01F
N	01-03D
O	01-04I
P	01-04J
Q	01-04K
R	01-04L

Scale 1:1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R

and 26 tip fragments were recovered. The type is characterized by heavy edge serration and a high degree of resharpening. It is estimated that the mean length of the projectiles before resharpening was close to 55 mm compared to 43 mm for this group of whole and resharpened specimens.

A site containing a similar assemblage is 35JA53B which lies thirty meters southwest of 35JA53 on a slight terrace remnant ten meters below the older site. A period of downcutting is suggested prior to a period of stability and formation of the terrace. Materials recovered from a series of test pits included serrated lanceolate projectile points and edge-ground/face pecked cobbles identical to those from 35JA52.

A replicative experiment was conducted by John Fagan and the author to gain insight into the manufacturing process involved in making the lanceolate projectile points. Biggs, Oregon chert from along the Columbia River was the most similar material available for the replicative experiment. Amorphous flakes averages 80 x 60 x 15 mm were first worked into a small biface blank by percussion flaking. Both hammerstones and antler batons were used as percussors. The biface blank was then reduced using pressure flaking into a finished serrated lanceolate projectile point (see Figure 7). All debitage was recovered and sifted through a one quarter inch mesh screen for comparison with the 35JA52 flake collection. Only five pressure flakes from the manufacture of four lanceolate points were recovered (see Appendix D for data). About sixty percent of the percussion debitage by weight was recovered. In comparing the size of the debitage recovered with that in 35JA52 it became evident that the biface blanks brought to the site were not often larger than the average piece used in the experiment.

In conjunction with the experiment, Fagan produced a series of obsidian blades which were subsequently shaped and the edges thickened into a preform. He noticed particularly long, thin flakes with longitudinal ridges were removed while shaping the base of the blades (see Figure 8). It was thought that these flakes could be diagnostic of blade shaping. It is however improbable that these delicate flakes would remain intact within a frequented camp.

Figure 7

Replicative Experiment Stages

A	Initial Flake
B	Biface Blank (percussion flaked from A
C	Finished Projectile Point (pressure flaked from B)

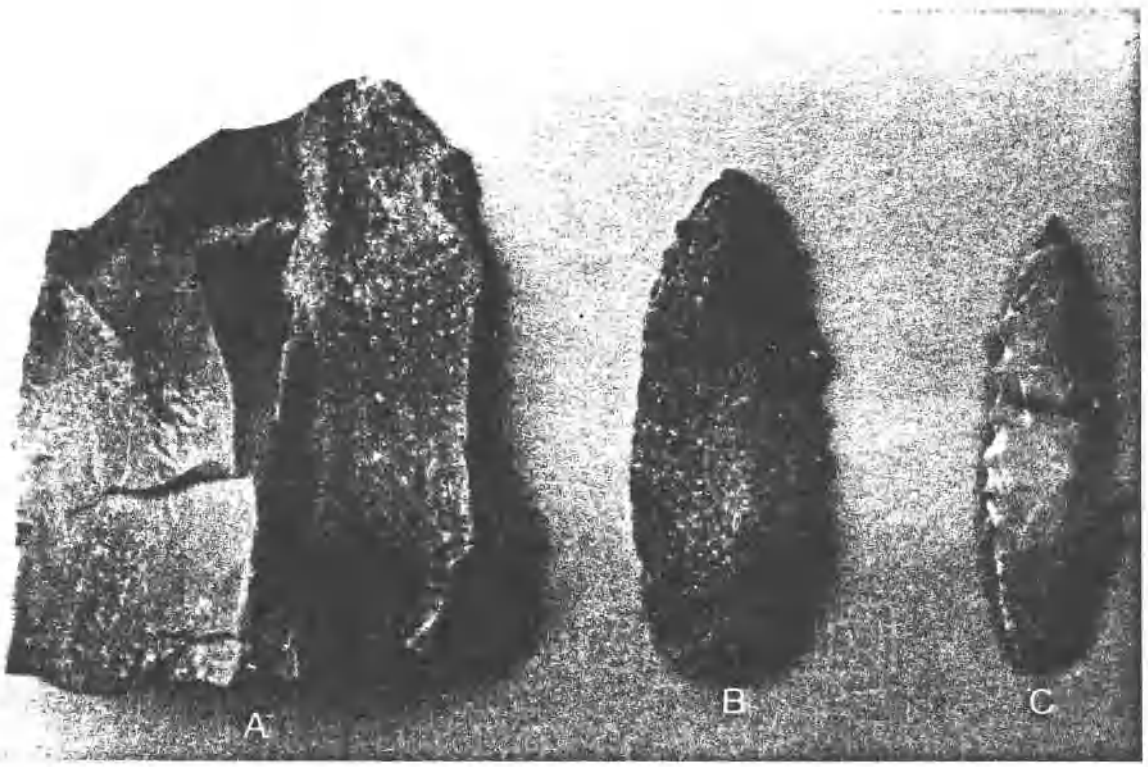
Scale 1:1

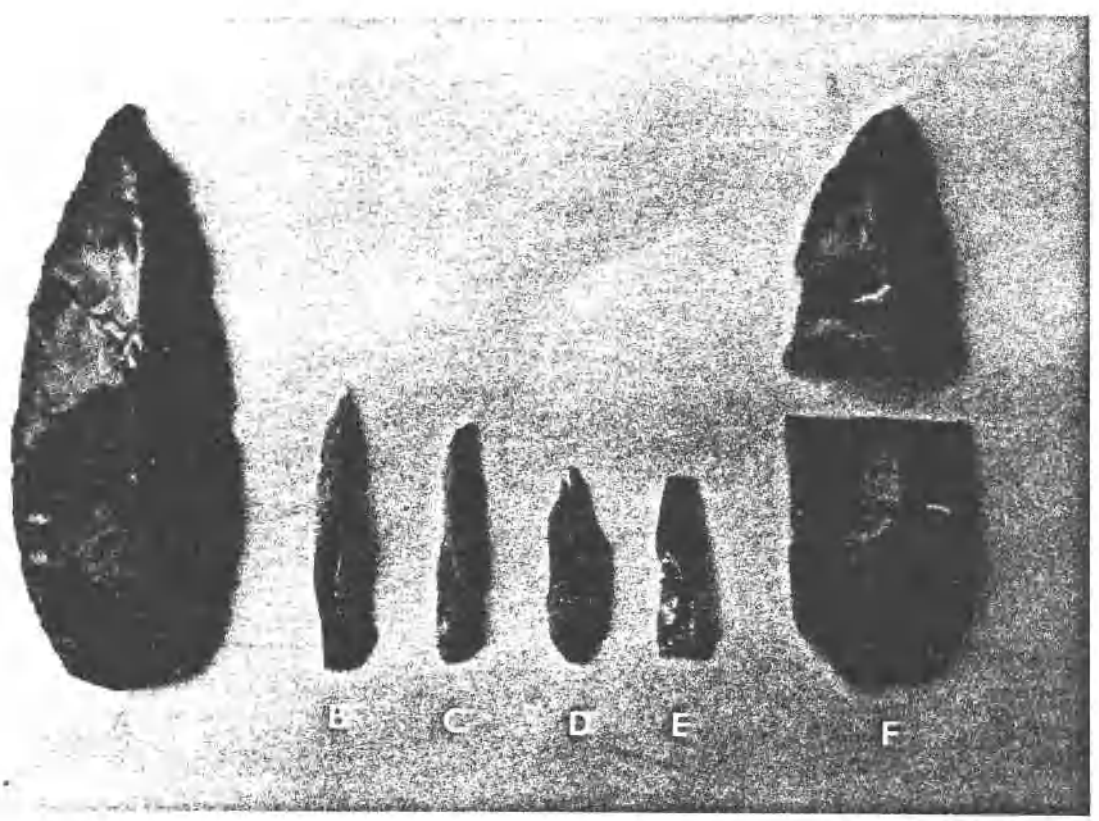
Figure 8

Blade Shaping

A	Obsidian blade shaped into blank
B-E	Long thin flakes removed from blade in process of shaping into blank
F	Broken blade blank

Scale 1:1


A
B
C


B
C
D
E
F

Evidence for blade production or utilization is almost non-existent at the site. Lithic industries are represented in andesite, cryptocrystalline silicates, and obsidian. The andesite is confined to a group of large, heavy, cores, choppers, and flake scrapers. The cores are amorphous to discoidal with multi-platforms, and other than general shape do not exhibit close ties to the Cascade Technique system (see Figure 9). The cryptocrystalline silicate cores are small conical and discoidal cores with multi-platforms. Both the andesite and cryptocrystalline cores show a regularity of form suggesting they were prepared. Only three blade-like flakes of this material were found at the site, and these are too small and thin to manufacture lanceolate points. They are probably a product of bifacial thinning. In addition no rejected blade or blade tool fragments were recovered. This evidence suggests that blade manufacture was not practiced at the site.

A more likely sequence involves the breaking of jasper nodules or agate pebbles into a group of thick flakes somewhere in the foothills of the western Cascades or in slightly downstream gravel deposits. Site 35JA29 within the Elk Creek drainage is such a resource area (Brauner and Honey 1980:89-90). These pieces would then be heat treated, a dominant characteristic of the large lanceolate projectiles from 35JA52. Small bifaces could then be manufactured and brought to the site for further percussion and pressure flaking. Two types of antler pressure flakers were probably necessary for finishing the projectiles, a strong dull pointed flaker for achieving the final outline of the point, and a sharply pointed flaker for notching the serrations. As the Native Americans broke their weapon tips through use they were subsequently resharpened or discarded.

There are many unfinished biface fragments of cryptocrystalline at the site which may be broken blanks brought to the site for further work. Obsidian was also brought to the site in biface form from some distance in northern California or eastern Oregon.

One observation necessitates an alternate hypothesis. Most of the resharpened projectile points do not retain edge serration, with this characteristic and a truncated blade the determining attributes of

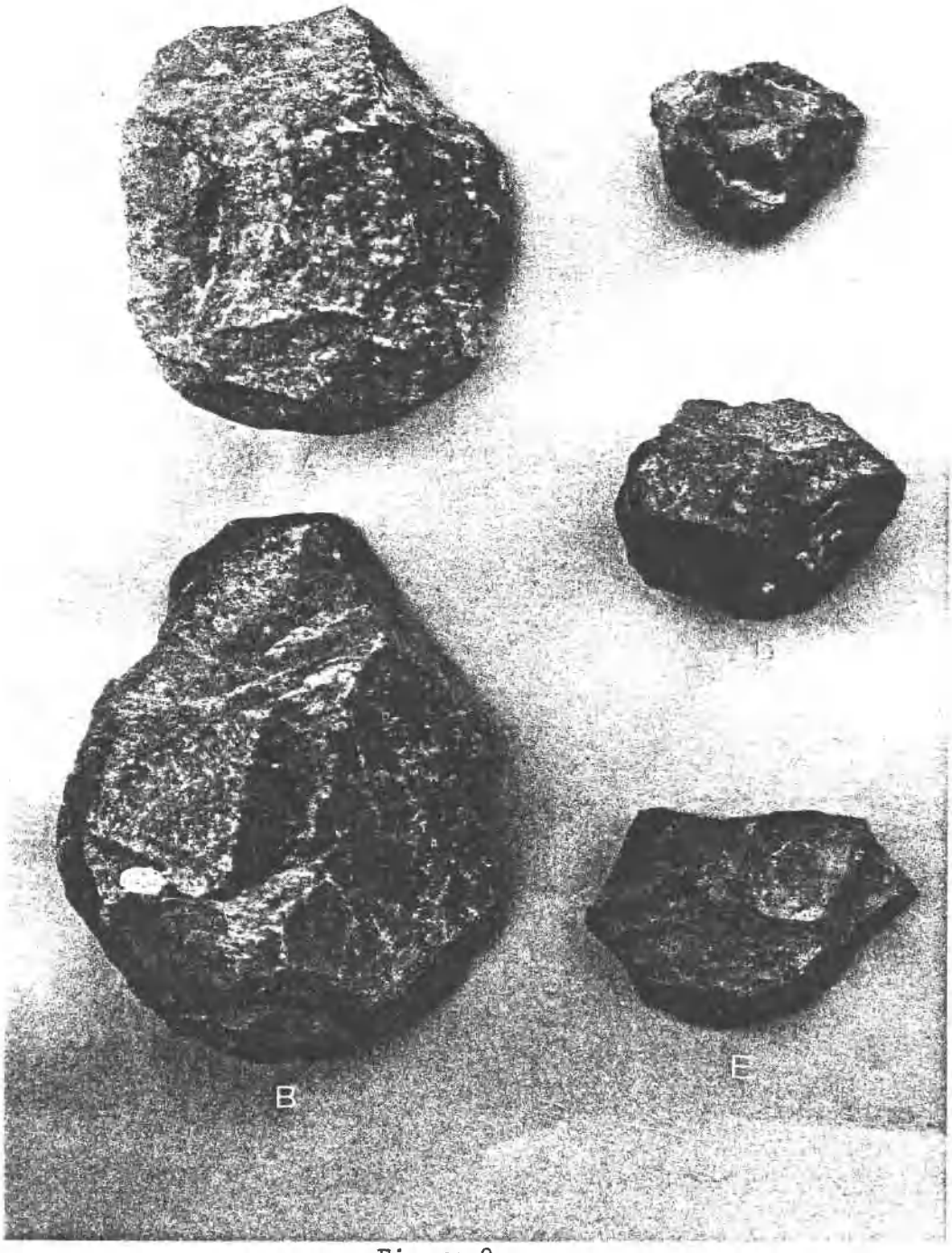


Figure 9

Cores from 35JA52

A,B Andesite cores
C-E Cryptocrystalline cores

3/4 actual size

projectile resharpening (Figure 6; e,g,h,i,j). While it is possible that a serrated point was no longer a desirable attribute at this stage it could also be true that the people at 35JA52 did not make the lanceolate projectile points or know how to resharpen them with edge serration. The lanceolate projectile points could have been traded into the valley from peoples to the east with the technology and raw materials close at hand. The two 01-06B specimens retaining serration (Figure 6;k,l) could have been resharpened prior to trade and transport into the Applegate Valley. Trade for the entire weapon system cannot be ruled out.

Site 35JA47 is geologically more recent than 35JA52 and is located approximately one mile downstream from the mouth of Squaw Creek (see Figure 4). The geomorphological evidence indicates a period of substantial downcutting between occupation of 35JA52, 35JA53B, and 35JA47, with the Applegate River cutting down some twenty meters during the interlude of occupation between 35JA52 and 35JA47, and ten meters from the occupation of 35JA53B until the occupation of 35JA47. The site is located on an old channel of the Applegate River which had slowly filled in to a depth of three meters with fine grained sediments. These sediments form an older geologic stratum of yellow silty to sandy clay.

Test excavation found cultural material as deep as 2.4 meters below the surface, where a serrated lanceolate point of the 01-06B type was found (Figure 10,E; Brauner 1978:22). Two large block excavations were undertaken. Block 0, an eight by eight meter square encountered the yellow clay soil immediately below the plow zone, with large-stemmed, triangular blade points (type 01-04D, Figure 12,M), a 01-06A lanceolate point (Figure 10,A) and a variety of other projectile forms occurring. An intrusive rock filled hole, possibly a sweat lodge or earth oven was located near the center of the block and held mostly small notched projectile forms. Similar edge-ground cobbles without pecked faces also were recovered.

Excavations in the eight by ten meter block N revealed a dark sandy loam twenty centimeters below the plow zone. Within this late prehistoric geologic stratum was found evidence for three circular

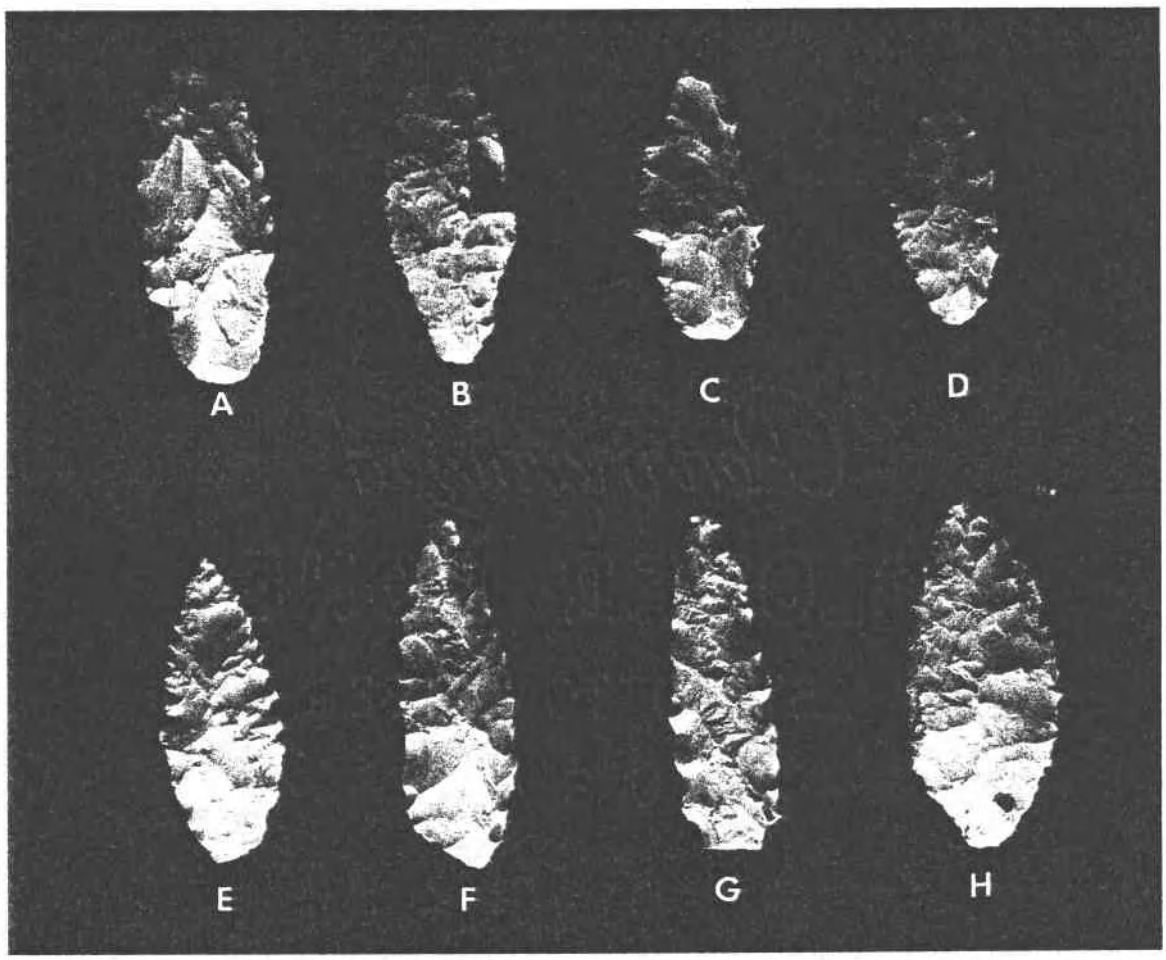


Figure 10

Large Lanceolate Projectile Points
35JA47

A-D	01-06A Fragments 35JA47
E	01-06B Test Pit M 2.4 m deep
F	01-06F
G	01-04C
H	Lanceolate Knife

Scale 1:1

house pits. These had been excavated through the dark sandy loam and into the yellow clay sediments. Floors ranged from 60-80 cm below the surface, with the living surfaces outside the houses churned up in the plow zone. Fire cracked rock was thick around the houses within the dark loam, but was exceedingly rare in the older yellow stratum.

The assemblage of artifacts on the house floors and within the house fill differ markedly from the cultural materials recovered in the yellow sandy clay stratum. Several varieties of small lanceolate points cluster within the houses including 01-06C, 01-06D, and the 01-06E types (Figure 11). The 01-06C type averages 30 mm in length, are thick in proportion to their width (less than 3.0 width to thickness ratio) and are predominately cryptocrystalline. None is serrated. Type 01-06D are slightly longer, greater in width and thinner (width to thickness ratio greater than 3.0) and are all of obsidian. Again, none are serrated. Type 01-06E are very small thin, lanceolate points, averaging less than 16 mm long and three mm thick (descriptions and metric data for these types are in Appendix B). Other projectile point types include small side-notched, corner, and base-notched varieties which do not conform to any named type (Figure 11;A-J). Completing the assemblage were numerous hopper mortars, thin asymmetrical lanceolate knives and other artifacts (see Brauner 1981a). Cores of cryptocrystalline are again small conical types. Obsidian was evidently brought in in the form of bifacially flaked blanks.

Site 35JA49 was situated on an alluvial sand deposit one half mile upriver from 35JA47. An estimated 30 m of the site had been destroyed by hydraulic mining, leaving only a remnant for investigation. Cultural material occurred within twenty to thirty centimeters of the plow zone. The site is characterized by small corner, side, and basal notched points and an assemblage similar to the house pit component at 35JA47. Type 01-06E points persist in small numbers, while 01-06C and 01-06D projectiles are absent. The site is either contemporaneous or slightly later than 35JA47.

In summary, the earliest lanceolate projectile points are the large, serrated 01-06A projectile points found at 35JA52 and 35JA53B. The age of 35JA52 is estimated on the basis of geological position and

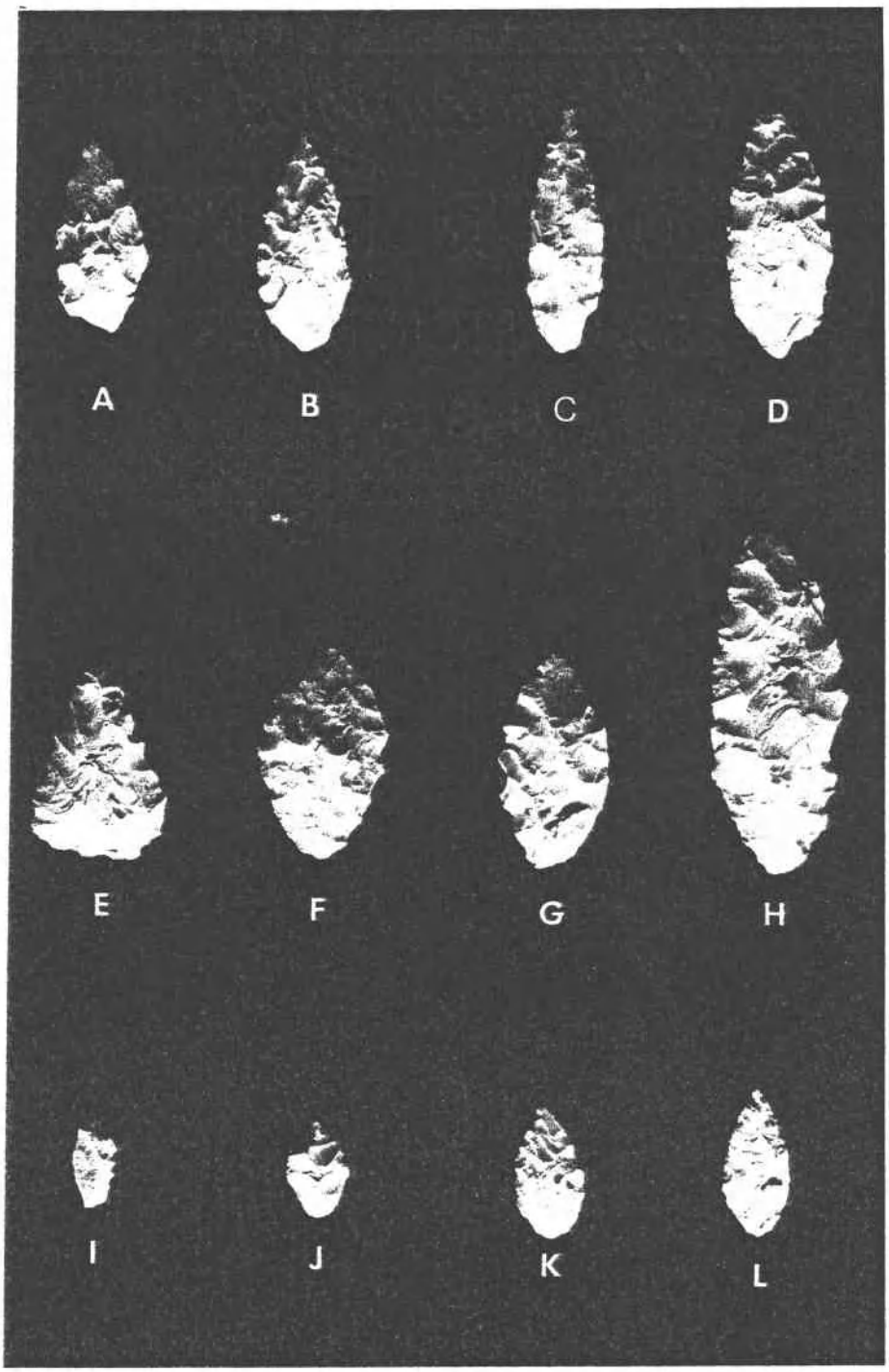


Figure 11

A-D	01-06C
E-G	01-06D
H	Lanceolate knife similar to 06D
I-L	01-06E

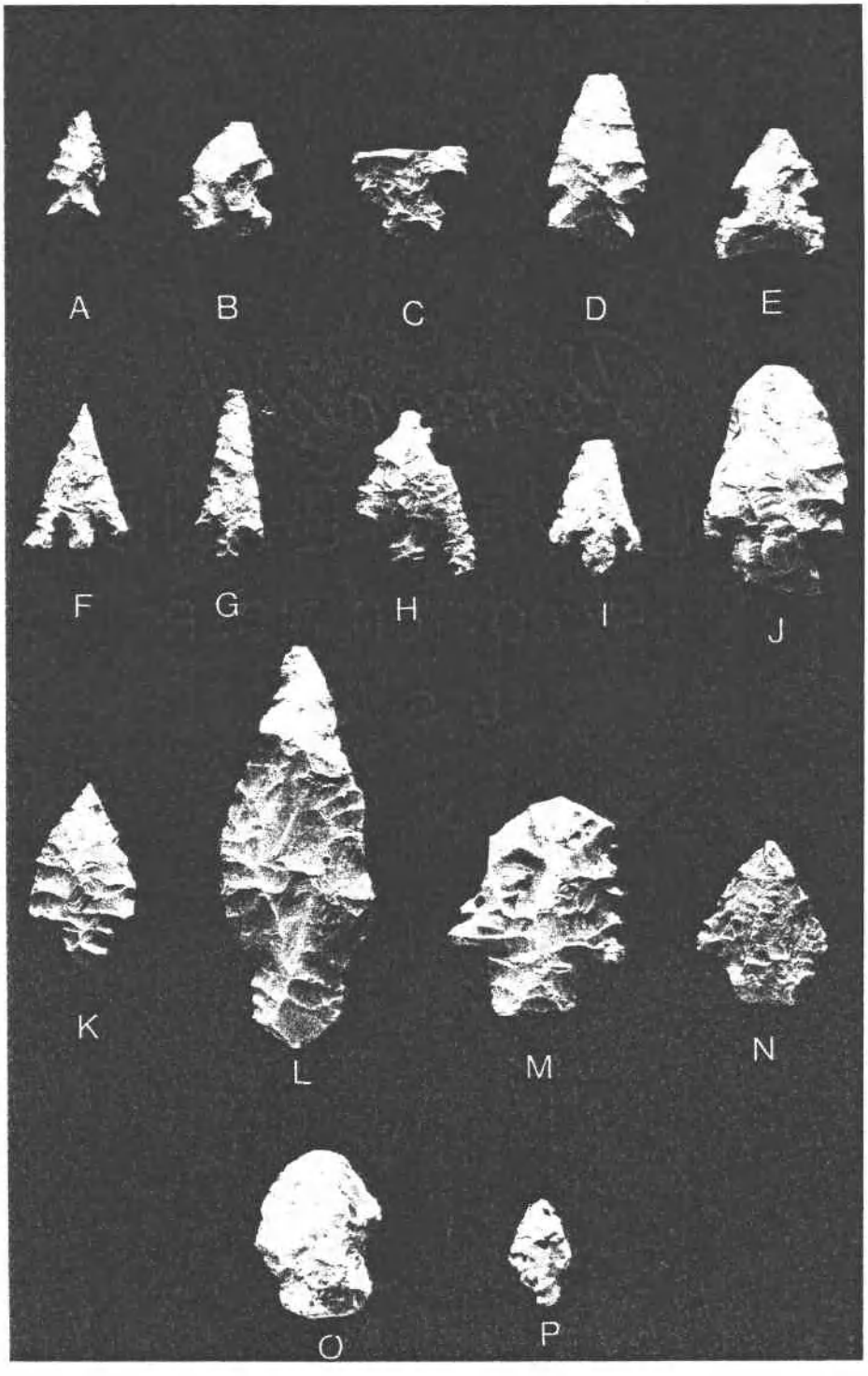
Scale 1:1

Figure 12

Assorted Projectile Points
35JA47

A	01-01A
B	01-01B
C	01-01C
D	01-01D
E	01-01E
F	01-02A
G	01-03B
H	01-02B
I	01-03A
J	01-03C
K	01-04A
L	01-04B
M	01-04D
N	01-04E
O	01-04G
P	01-04H

Scale 1:1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typological cross dating to be 4000-6000 B.P., with 35JA53B falling somewhere between 4000-5000 B.P. A few smaller lanceolate 01-06C points (Figure 6) also occur, along with two 01-06B points (Figure 5) which had been resharpened with serrations. The large serrated projectile point tradition continues in the lower levels of 35JA47. Here the projectiles occur in less frequency in deposits estimated to be 2000-4000 years old. Large stemmed projectile points, particularly type 01-04D, are found with the lanceolate projectile points in this same stratum, including one beautiful 01-06B specimen (Figure 10,E).

Four more lanceolate projectile point types were defined in association with three house pits in the upper stratum of 35JA47. These include the small, thick 01-06C type; wide, thin 01-06D variety, and the tiny 01-06E style (Figure 11). A large, thick lanceolate point from a house pit was given a separate 01-06F type designation. Type 01-06E also occurs in small numbers at 35JA49.

CHAPTER V

Comparative Data Base

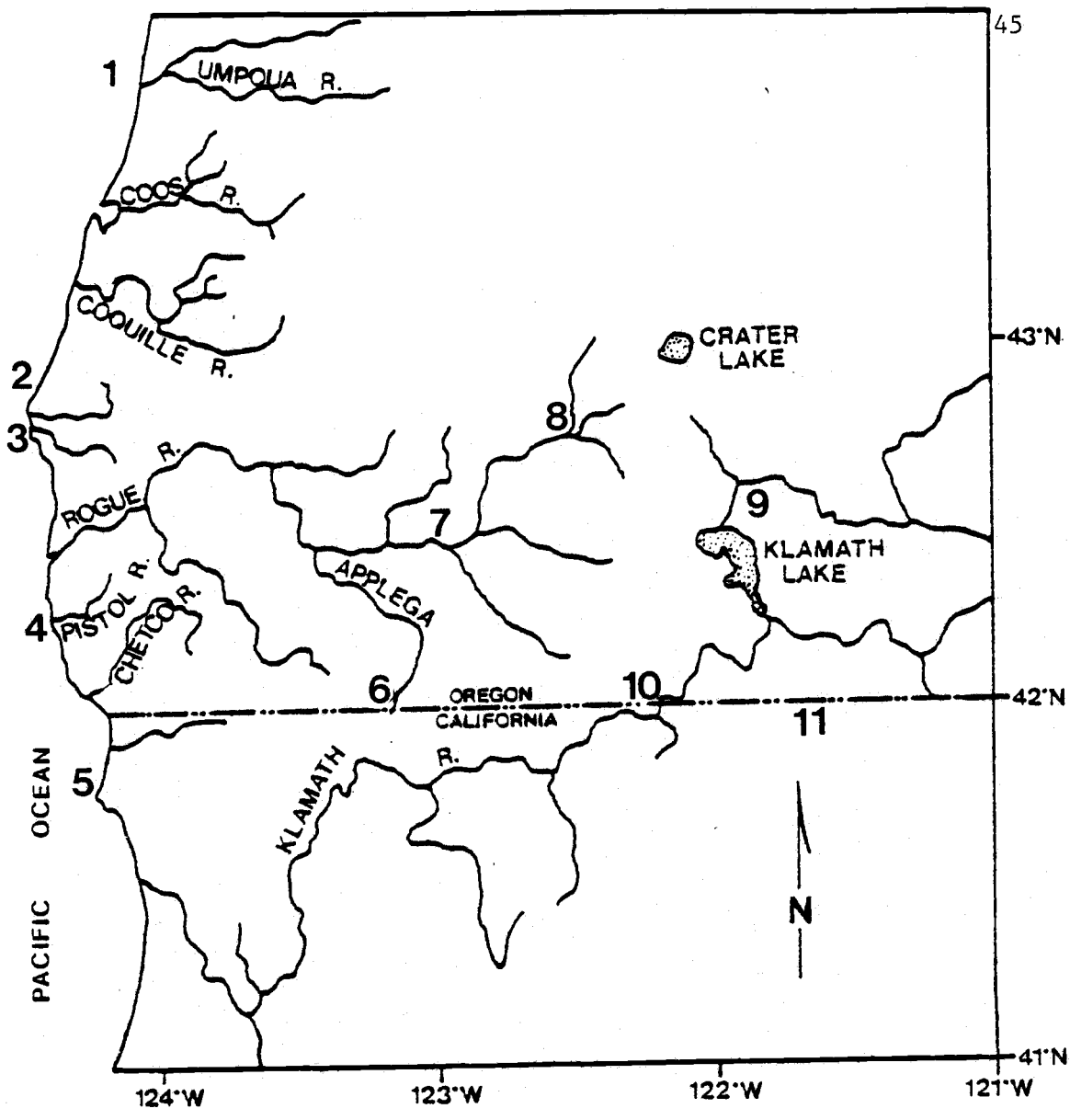
The following sites are reviewed to provide a background on the sites within southwestern Oregon which are known to contain lanceolate projectile points. The first several sites reviewed contain some of the older known materials in this part of the state and have projectiles more comparable to the serrated lanceolate form from 35JA52. The Elk Creek, Lost Creek, and Gold Hill sites provide information on the smaller leaf-shaped projectiles within the Rogue River drainage. Lastly a discussion of several important coastal sites is provided (Figure 13).

Kawumkan Springs Midden

The Kawumkan Springs Midden is a large midden deposit adjacent to the Sprague River northeast of Upper Klamath Lake. Excavations at the site were conducted by Luther Cressman and students from the University of Oregon from 1948-1951. The Klamath Indians occupied the Klamath Lake area in historic times and their culture was adapted to the riverine and marsh environment in which they lived (Cressman 1956:382).

Excavation into the midden involved the removal of four, 40 cm levels (Level I-IV, top to bottom). Type 11 projectile points, a leaf-shaped form, dominate all but the latest level, and occur with Great Basin point types and small, late projectile points in all levels. Type 11a (157 specimens) is described as long and narrow with a constricted stem forming a triangular termination or tang. Type B is similar to A but with a slight shoulder on one side. Cressman believed the variety was closely related to early Columbia River lanceolate points, and postulated that the midden was 7500 years old or more on the basis of typological cross dating (Cressman 1956:368). The midden revealed a trend from a generalized hunter/gatherer economy to a riverine/marsh adaptation in the later levels.

Aikens and Minor (1978) reanalyzed the projectile points from the site as part of an obsidian hydration study. Of the 374 points organized into 19 types by Cressman, many were considered too small to be



1. Umpqua Eden
2. Blacklock Point
3. Blundon Site
4. 35CU62
5. Point St. George
6. Applegate Lake
7. Gold Hill site
8. Elk and Lost Creek
9. Kawumkan Springs Midden
10. Salt Cave Locality
11. Nightfire Island

Figure 13: Archaeological sites discussed in Chapters IV & V.

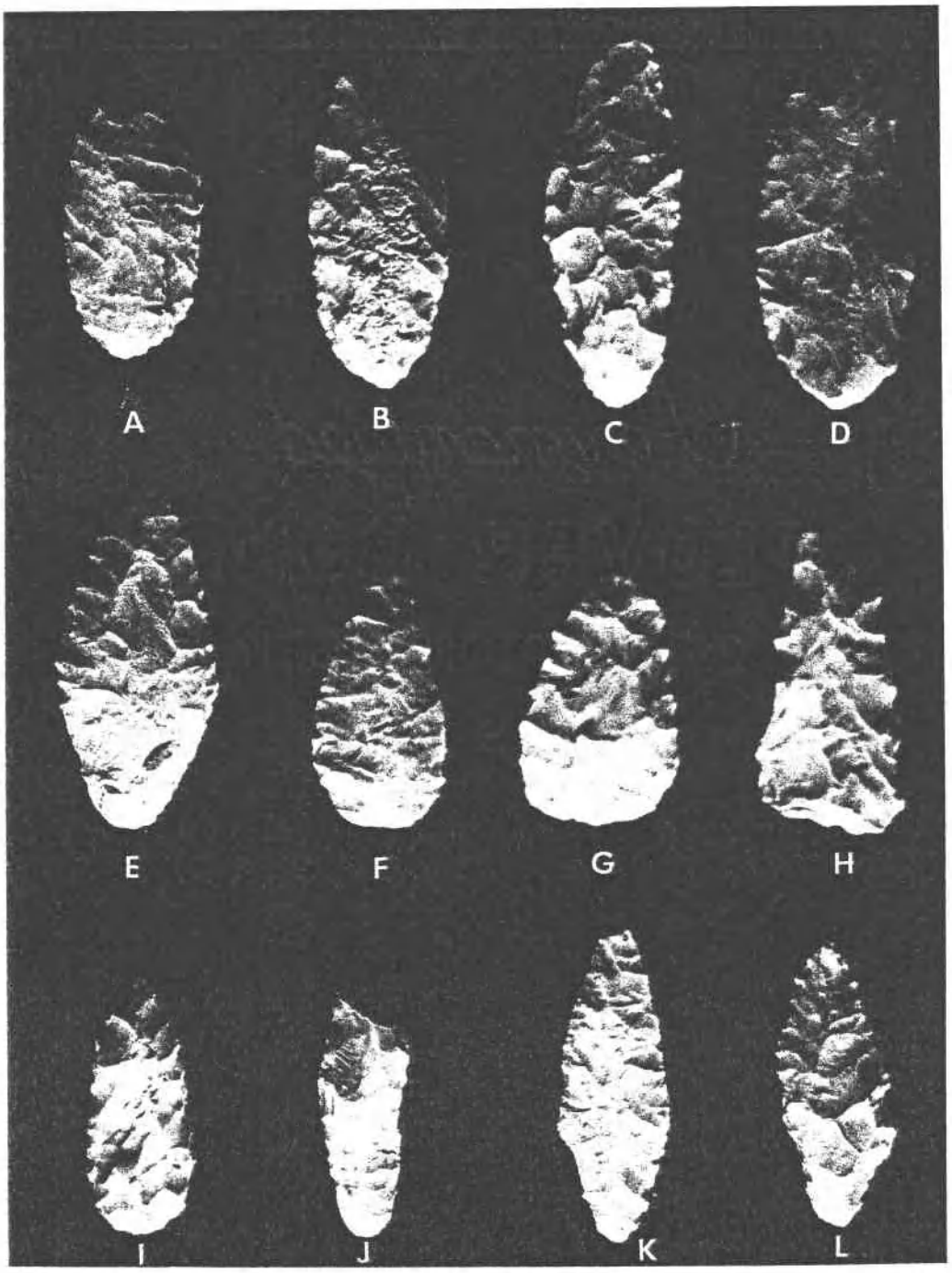


Figure 14
Kawumkan Springs Midden Foliate Points

A,B	Subvariety A
C-E	Subvariety B
F-H	Subvariety C
I,J	Subvariety D
K,L	Slightly shouldered variety

diagnostic and were omitted. This left 163 specimens categorized into 16 types (Aikens and Minor 1978:2). Only two specimens were considered Cascade points, and one of these is incomplete at the base. Another 28 specimens were grouped into a chunky foliate type with four subvarieties (Figure 14). These range in length from 19 to 43 mm. They are thick and are crudely made in comparison to the Cascade class. Another slightly shouldered foliate type of seven specimens are also crudely finished and exhibit slight shouldering. What first appeared as a large collection of Cascade material was actually a group of smaller, crudely made leaf-shape points. Obsidian hydration dating indicated that occupation began 5000 to 6000 B.P.

Other artifacts from the site include both a mano/metate and mortar and pestle complex which are represented at all levels. No edge ground cobbles recognized by Cressman as side polishers at the Dalles were described. The knife and scraper industry is poorly developed except for numerous small thumbnail scrapers. Only six leaf-shaped knives were found, none of which occurred early in the site. Although bone preservation was good, bone and antler tools were absent. Cressman describes the early adaptation of peoples to the marsh as similar to the food habits of the Great Basin (level IV), with the occupants of level III learning to exploit salmon runs, and with full development of a riverine and marsh economy my level II (Cressman 1956:450, 454, 468).

Nightfire Island

The Nightfire Island site (4SK4) is a low mound located on the dry margin of what was once the southwestern shore of Lower Klamath Lake. The site is approximately forty miles south of the Kawumkan Springs Midden site. In 1967 the University of Oregon conducted excavations recovering a large collection of stone artifacts and faunal remains. Twenty-five two by two meter units were dug and a sequence of ten strata defined (Sampson, n.d.) spanning from 6030 to 930 B.P. on the basis of twenty radiocarbon dates (Aikens and Minor 1978:14). It should be noted that the phase sequence given in Grayson (1973) is not considered valid

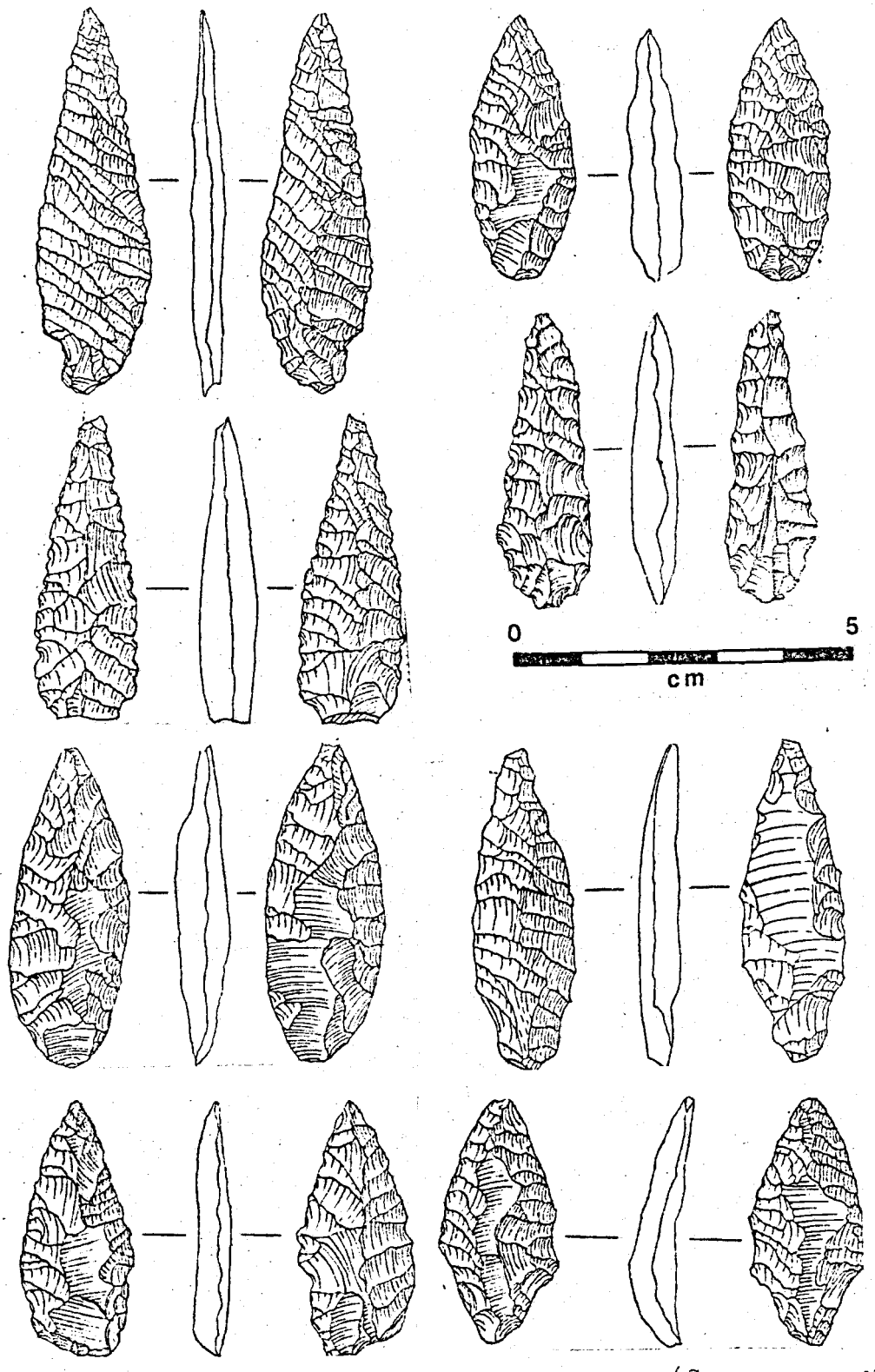
by Garth Sampson, who is completing the report on the site for his Ph.D. at the University of Oregon (Sampson, personal communication).

One hundred and fifty-three unstemmed, bifacially worked points were collected, dominated by specimens 30-45 mm in length. Analysis of lengths and weights by Sampson revealed a bimodal distribution, the larger group referred to as Cascade (Figure 15), and the smaller group as Cottonwood leaf-shaped. A length of 37.5 mm separates the two classes (Sampson, n.d.).

The "Cascade" points occur in stratum dated from 6000 to 3000 B.P., while the Cottonwood variety is present from 4000 to 2000 B.P. While the overall population is bimodal, the lengths and widths grade into one another and the two types are found in some of the same excavation units. Sampson suggests that the Cottonwood type is just a smaller version of the Cascade and observes no significant shifts in the shape or manufacture of the Cascade points through the sequence. Other point types occurring with the Cascade type, although not in the earliest levels include the northern side-notched, varieties of Elko points, and Humboldt concave base points. This last type closely parallels the Cottonwood leaf-shaped point in occurrence.

The Nightfile Island collection of leaf-shaped projectile points was examined at the University of Oregon. It was observed that many fragments which could not be identified as leaf-shaped point fragments were included in the Cascade class, as well as slightly asymmetrically stemmed specimens similar to Cressman's 11B class (Cressman 1956) which are probably knives. Thirty projectiles were then classed and measured as belonging to a leaf-shaped type, all but one of these are made of obsidian (Appendix B). Over one half of the specimens in this class are diagonally flaked, many of these having parallel oblique flake scars across the surface of the projectile. Approximately one third are not completely flaked on both surfaces. Only one cryptocrystalline and possibly one or two obsidian specimens exhibit edge serration. Over one half exhibit a platform remnant at the base.

Twenty Cottonwood leaf-shaped projectiles were also examined. These range from bipointed to triangular in shape, and no distinction could be made between several points in this class and a Cottonwood



Nightfire Island Cascade-like Points (Sampson, n.d.)
Figure 15

triangular type defined by Sampson. The class is characterized by rather rough flaking leaving uneven edges and random flake scars. Many exhibit diagonal flake scars from one edge, and others were not completely flaked after removal from the biface or core. Metric data is provided in Appendix B.

Analysis of the Nightfire Island materials is incomplete at this time. Sampson does not want to form component or phase groupings other than the ten stratum defined in the site. Because other flaked stone tools as well as other classes are not yet described an assemblage comparison is impossible. A few general observations are possible, however. Sampson describes the first occupation of the site as a "pioneer settlement by well adapted terrestrial hunters and gatherers who had yet to learn the complete subsistence potential of Lower Klamath Lake" (Sampson, n.d.). No evidence indicates they understood fishing or the snaring of birds, and systematic fishing is only encountered from about 3000 B.P. and later. Plant processing tools are not abundant until around 4000 B.P., with no edge-ground cobbles reported. Bones of the domesticated dog occur early, around 3500-5000 B.P. Sampson suggests that occupation was year-round at the site (Sampson, n.d.).

The Salt Cave Locality

The Salt Cave Locality consists of eleven archaeological sites twenty-four miles downriver from the Klamath Basin and just north of the California border. Survey and site excavation was conducted from 1961 to 1963 by the University of Oregon. Three sites, Border Village 35KL16, Big Boulder Village 35KL18, and Klamath Shoal Midden 35KL21, were extensively excavated.

The Klamath Shoal Midden is a deep, stratified midden with three gross geologic units. The lowest stratum contained sixteen unifacially-worked flakes and three bone tools, but no diagnostic materials (Mack 1979:405). A radiocarbon date of 7646±400 B.P. was obtained from charcoal within this stratum (Mack 1979:111). The second or middle stratum contained more cultural materials including three projectile points,

knives, cores, scrapers, and bone and antler tools. The points include an Elko corner notched, Elko side-notched, and one Gold Hill leaf-shaped point, all of which were from the upper part of the stratum. The uppermost or midden stratum contained abundant ground stone, bone, and lithic debris. The lower part of this stratum was dated to 1280±125 B.P. and 990±110 B.P. Gold Hill, Elko, and Northern side-notched points were found throughout the unit although they are more prevalent in the lower part of the unit. The Gunther barbed, Rose Spring, and Eastgate projectile points are from the upper layers and postdate AD 1000 (Mack 1979: 283).

At Big Boulder Village, several house pit depressions and a single test unit were excavated. The test unit recovered an Elko side-notched, Black Rock concave base, and two Humboldt concave base points from the lowest levels which may have been an old river terrace (Mack 1979:92).

Mack identifies two categories of projectile points, classes 19 and 20 which she states may be Cascade points (Figure 14, Appendix B). Class 19 includes three specimens, two of which have slight stems, and one of these is edge-ground on the lower half. None exhibits striking platforms at the base, and flaking is random, although diagonal from one edge on one specimen. None is serrated. Class 20 includes four specimens, although only two could be so identified from the collection at the University of Oregon. One exhibits the platform at the base and diagnoal flaking from one edge. The other is made on a thin obsidian flake, with slight diagonal flaking from the edges. Not all of the surface is flaked.

The context of these points does not suggest great antiquity. Two class 19 projectile points come from the upper stratum of the Klamath Shoal Midden and one from house pit 11 of the Big Boulder Village. Class 20 projectiles come from the upper stratum of Klamath Shoal Midden (two specimens) and from house pit three of Big Boulder Village (two specimens). The only possibility that these classes are older comes from the fact that the house pits were dug into the older terrace surface, and that older cultural materials were therefore thrown out of the houses and later slumped back into the house fill (Mack 1979:108).

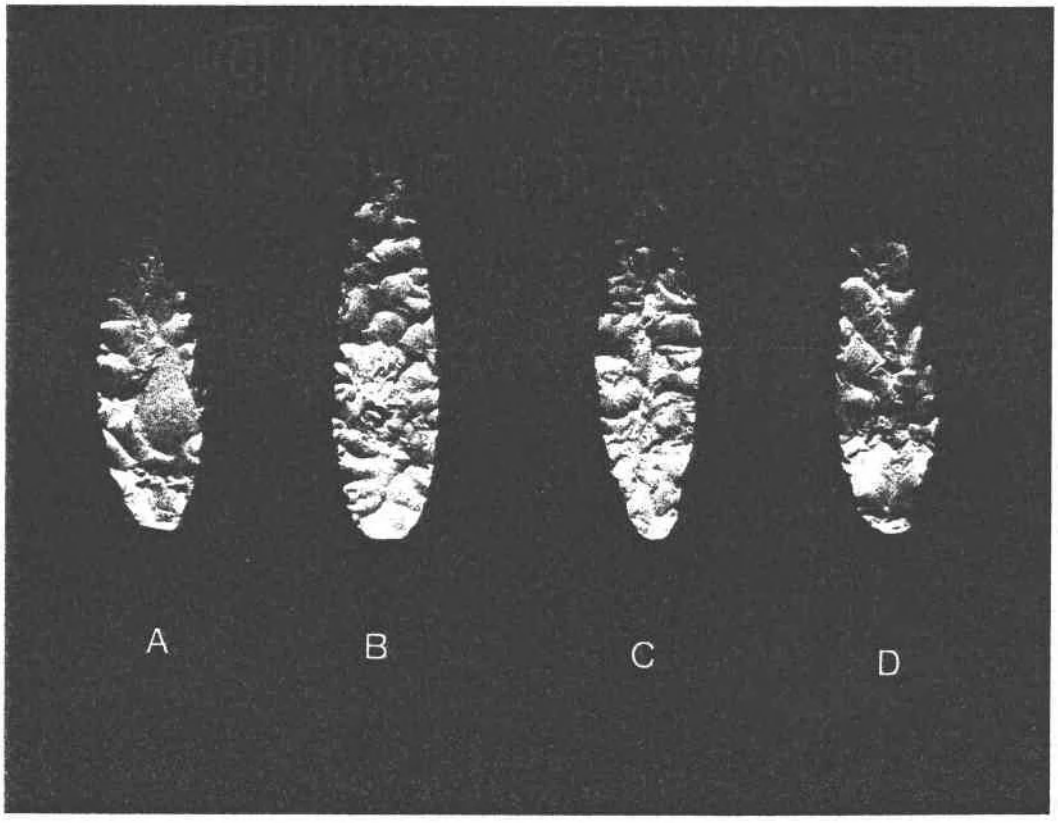


Figure 16

Salt Cave Locality Lanceolate
Projectile Points

A,B Type 20

C,D Type 19

Scale 1:1

The Gold Hill projectile points come from the upper and middle stratum of the Klamath Shoal Midden and in lesser numbers from Border Village (total of ten). They are described as leaf-shaped points with convex edges and a thick lenticular cross section. The point of maximum width occurs from one third to one half the length of the blade above the base. Flaking is random. All of the specimens are of obsidian. Mack postulates that either western Oregon groups or influence reached the Kalamth River around AD 100 (Mack 1979:294), pre AD 700 (Mack 1979:383), or pre AD 900 (Mack 1979:343).

Comparison of artifact assemblages from the Salt Cave Locality is difficult as most of the artifacts could not be grouped into assemblages due to excavation technique (Mack 1979:401). Furthermore, several of the Cascade-like point types were found in mixed, late house pit fill. No evidence for a blade/core industry is presented, and the only leaf-shaped knives are late, from the top of the Klamath Shoal Midden (Mack 1979:407). The earliest projectile points gound at the locality indicate early Great Basin influence in the Elko, Humboldt, Black Rock, and Northern side-notched forms. Evidence for influence from other areas arrives with the Gold Hill stype of projectile within the last 2000 years.

The Gold Hill Site

The Gold Hill excavations directed by Luther Cressman in 1930 and 1931 represented the first venture by professional archaeologists into the Rogue River drainage system (Cressman 1933a, 1933b). The site was on the south bank of the Rogue River opposite the town of Gold Hill. Excavations entailed the removal of numerous campsites and thirty-nine flexed burials. Cressman believed the area was a substantial habitation site.

The lower levels of the site included burials with large obsidian blades, leaf-shaped projectile points, stemmed projectile points, and stone mortars and pestles. Found in the upper levels were Gunther barbed projectile points, burials without finely made obsidian blades, and tubular stone pipes. The lower levels of the site were estimated

to be 2000 to 4000 years old. Cressman observed the development of the projectile points from a simple ovoid or leaf-shaped form at the lowest levels of the site to later tanged and barbed varieties (Cressman 1933b: 15).

The Gold Hill projectile point collection was examined and the leaf-shaped projectile points described and measured (Figure 14, Appendix B). This group is quite variable in both size and shape. Many of the smaller specimens were undoubtedly broken and reworked. Red cryptocrystalline silicates make up over one half the material used, with assorted cryptocrystallines and two obsidian specimens completing the group. Cross section varies from biconvex to planoconvex, bases are rounded, occasionally pointed. Flaking is generally random, and none of the points are serrated.

The Elk and Lost Creek Localities

Elk and Lost Creek are tributaries of the Rogue River entering the Rogue 32 and 36 miles, respectively, upriver from the Gold Hill site. Archaeological investigations took the form of salvage work prior to dam and reservoir construction. Work within the drainages includes reconnaissance (Cole 1966), the survey, testing, and larger excavations of Davis (1968a, 1968b, 1970, 1974, n.d.) and a reevaluation of Elk Creek cultural resources involving survey and testing in the 1979 field season (Brauner and Honey 1981).

Davis conducted testing and more extensive excavations at sixteen sites in the Lost Creek Locality, three sites in the Elk Creek drainage, and at the Far Hills Ranch site (35JA25) on the west bank of the Rogue River. The projectile point style found in the deepest stratum of many sites were small lanceolate points. Davis noted close similarities between these projectiles and those from the lower occupation levels of the Gold Hill site, and proposed the name Gold Hill for the type. The type was defined as averaging less than 30 mm in length, 15 mm in width, with a round base, lenticular cross section, and collateral flaking, with the greatest width falling near the center of the point (Davis 1968b:19).

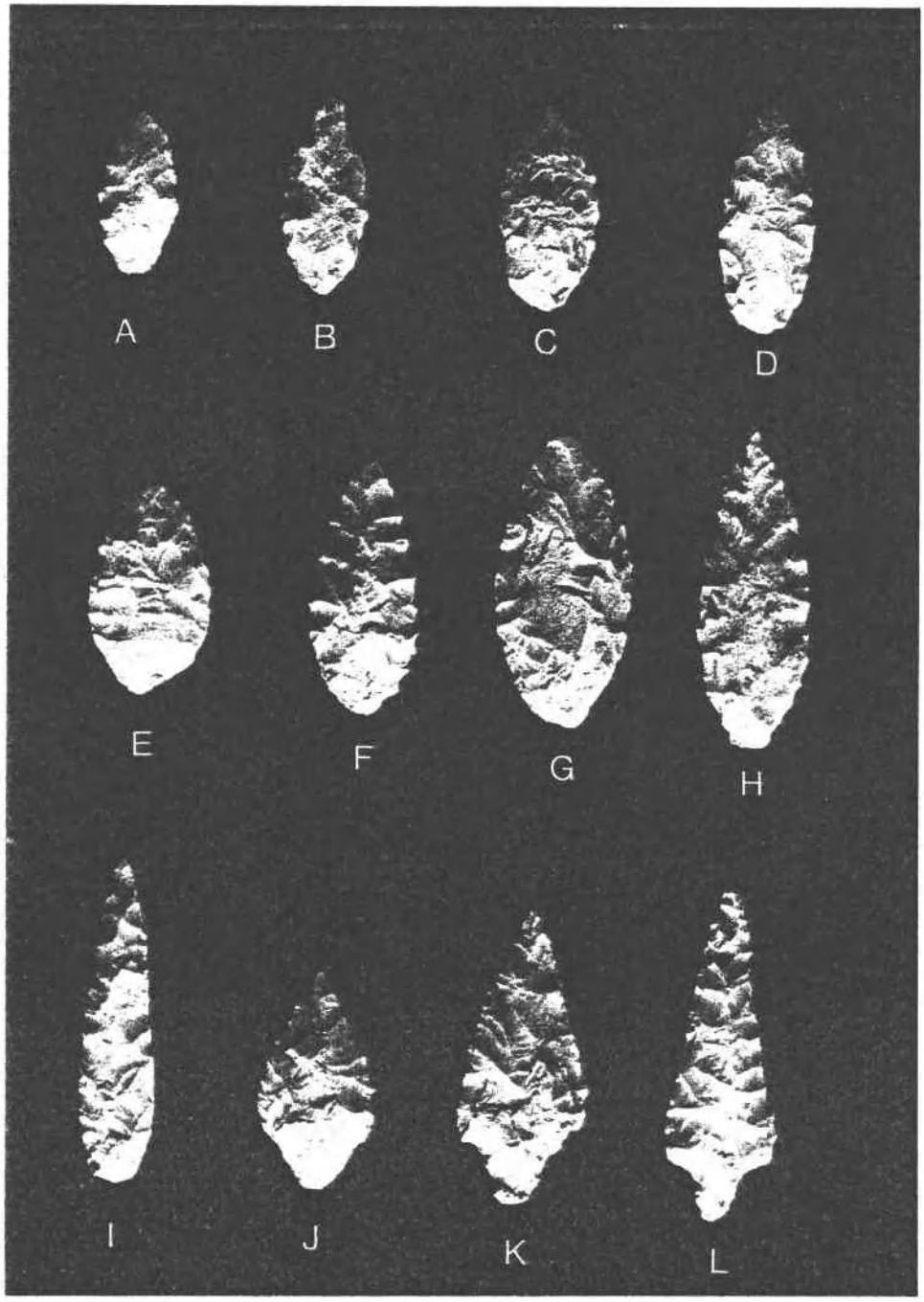


Figure 17

Early Gold Hill Site Points

A-H	"Gold Hill" type points
I	Probable drill
J-L	Stemmed points

Scale 1:1

In his early reports Davis defines two phases for the localities,

> The earlier Terrace phase is defined by occupation of stream terraces; Gold Hill points dominant; shouldered constricting stemmed points which may be a Gold Hill variety; stone bowl mortar; snubnosed scraper; keeled end scraper; expanding base drill.... The later Upland phase is defined by occupation of benches and knolls in hilly terrain; gunther barbed points dominant; Lingo points; mano and metate; hopper mortar; oval house pits. Gravers, burins, snubnosed scrapers, keeled end scrapers and expanding base drill probably continue from the early phase... (Davis 1968b:23-24).

An expanded phase grouping of four sets was presented in 1974 (Davis 1974) and retained the Gold Hill point as the oldest style, possibly dating to the 4th millennium B.C. He also went on to state

> Comparison showed the Gold Hill type to be taxonomically related to the western leaf-shaped tradition documented by the Cascade Cave assemblage and thus ultimately to the Cascade type point (Davis 1974:48).

In his most recent, unpublished work, Davis describes excavations at 35JA27, a knoll site one quarter mile northeast of 35JA26. This site had been heavily disturbed from logging, road construction, and vandalism in some areas. In the southern portion of the site a concentration of cultural material including obsidian points, a milling stone, and basalt awl were obtained, some 50-60 cm below the surface, in a matrix described as a clayey loam with mixed volcanic ash. This portion of the site, which Davis believed represented one of the oldest assemblages in either of the Elk and Lost Creek drainages has since been extensively vandalized (Davis, n.d.).

The collection of lanceolate projectile points from Elk and Lost Creeks, as well as the Far Hills Ranch site were reanalyzed to facilitate comparison with the Gold Hill site, the Applegate sites, and others. A total of 51 whole and fragmentary specimens were fit into the resultant typology (Appendix B and Figure 15). Forty-four of these fit into the general small lanceolate category 01-06C, and are produced on thick flakes with about one third exhibiting a diagonal flaking pattern. Interestingly, several serrated specimens were found in the 35JA27 collection, along with one from adjacent 35JA26.

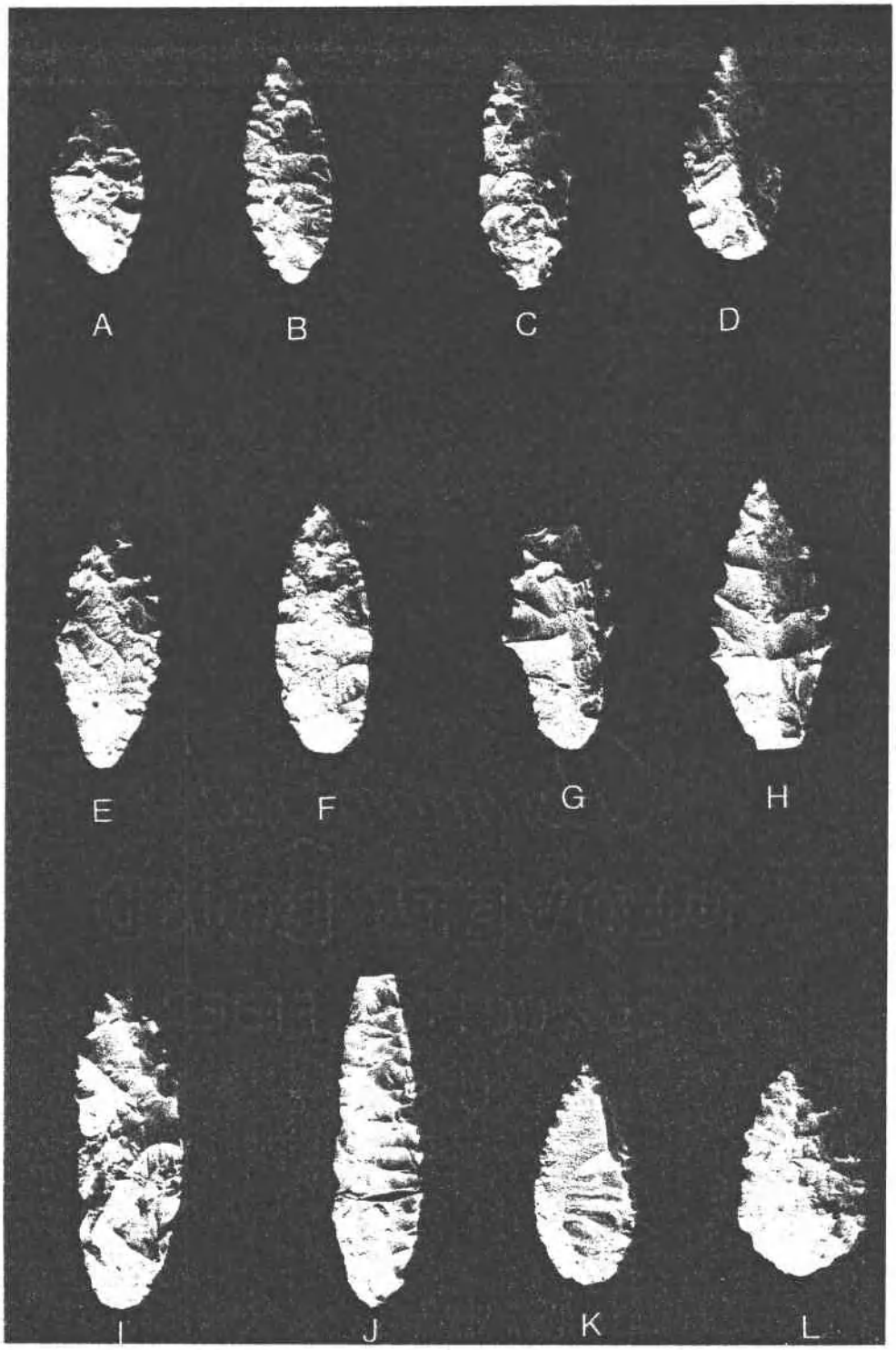


Figure 18
Elk and Lost Creek Points

A-F	01-06C	I	01-06F	L	01-06I
G	01-06A	J	01-06G		
H	01-06B	K	01-06H		

Scale 1:1

The Southern Oregon and Northern California Coast

The lanceolate projectile points from the southern Oregon coast and adjacent California coast occur in the oldest known sites, some 2000-3000 years old. While five sites are now dated to this period the sample of artifacts is small and the association of radiocarbon date and projectile points at times tenuous. A review of the evidence is presented for comparison with interior archaeological materials.

The Umpqua Eden site (35DO83) is located on a high terrace at the mouth of the Umpqua River. Field investigations were carried out by Peter Stenhouse and later by Richard Ross and students from Oregon State University from 1978-1980. The site exhibits a complex stratigraphy of lower midden, intermediate living surfaces,upper midden, and intrusions of a plank house, historic postmaster house, and most recently logging activities disturbing most of the upper levels. The lower midden was dated by a charcoal sample to 2960±45 B.P. (DIC 1174), and contains barbed antler harpoon points, other bone points, baked clay objects, knife fragments, spall scrapers, two thick stemmed and one leaf-shaped projectile points. The leaf-shaped specimen was produced on a thin flake of obsidian and is diagonally flaked (see Figure 17,E). It is classed within the 1.13 class (see Appendix B).

Above the oldest midden stratum is an area of numerous living surfaces containing no shell and characterized by leaf-shaped, one large stemmed, and other small stemmed and basal notched points (Figure 17) as well as scrapers, drills, knives, and baked clay objects. The leaf-shaped points are both the 1.13 and 1.14 varieties.

The leaf-shaped projectile points completely drop out of the upper midden layer. One of the more significant aspects of the site is the evidence for an early maritime adaptation circa 3000 B.P. Occurring with and slightly after this occupation are the lanceolate or leaf-shaped projectile points.

The Blacklock Point site 35CU75 is located nine miles north of Port Orford on a bluff above the Pacific Ocean. Surface collection from the site by Reg Pullen, Coos Bay B.L.M. archaeologist includes a variety

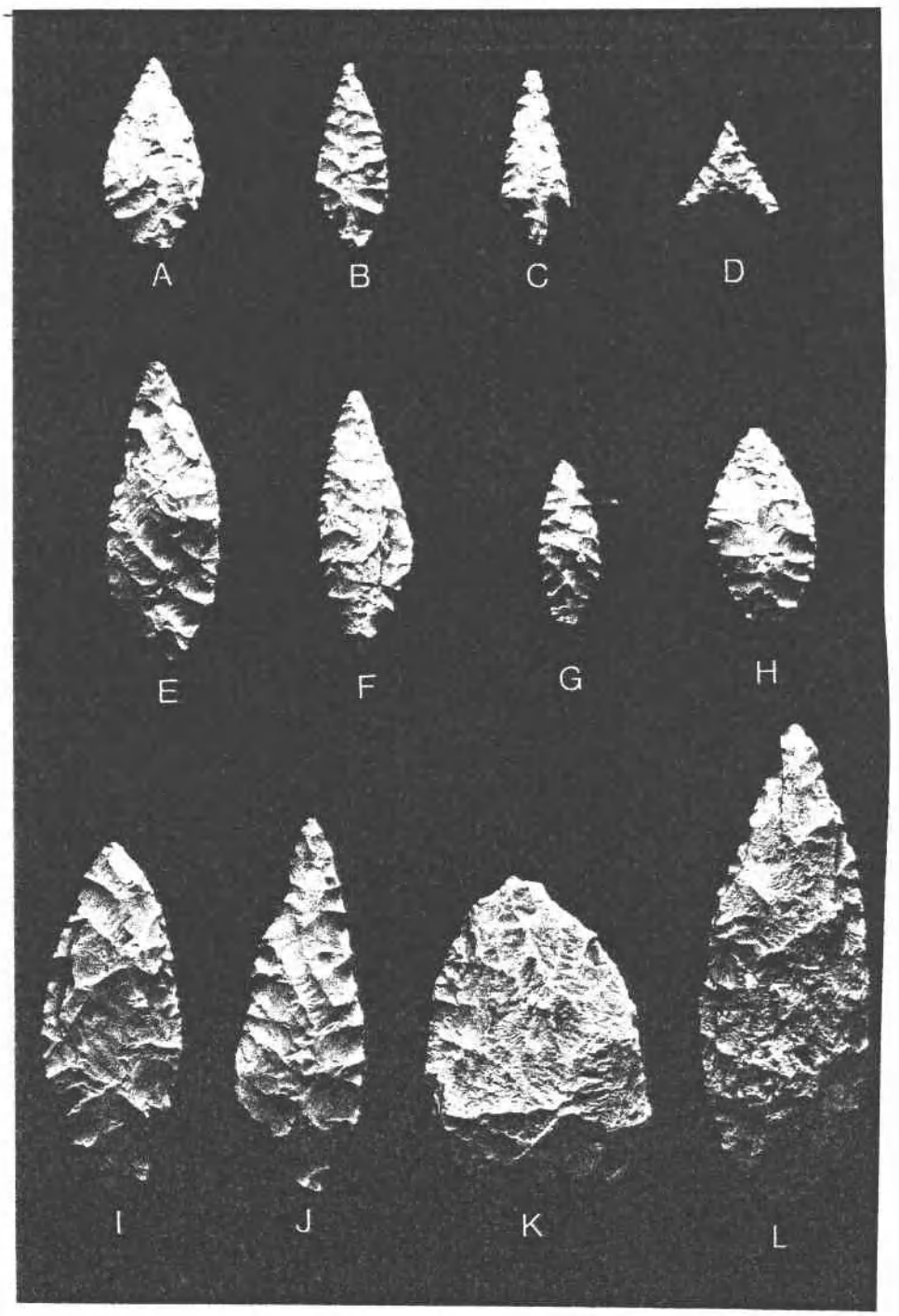


Figure 19
Umpqua Eden Points

A,B,H	Type 1.14	I,J	Thick stemmed
C	Small stemmed	K	Preform
D	Basal notched	L	Knife or preform
E,F,G	TYPE 1.13		

Scale 1:1

of projectile point types including narrow and wide stemmed points and large lanceolate serrated projectile points (Figure 18). These and other flake tools suggest a distinct lithic industry from that found in coastal midden sites (Ross, personal communication).

The site was tested in August, 1980 by Richard Ross and Sandy Snyder of Oregon State University. Two adjacent two by two meter test units were excavated to the top of a consolidated marine terrace 65-120 cm below the surface. A concentration of cryptocrystalline silicate debitage 20-30 cm thick was found lying on top of this terrace. No diagnostic chipped stone artifacts were recovered. Utilized and worked flakes and fragmentary ground stone, including one bowl fragment characterize the assemblage. The concentration of lithic material is contained in a distinct stratum visible eroding from the edge of the bluff. A charcoal sample recovered from this bluff face some six to seven meters from the test units was dated to 2750±55 B.P. (DIC 1911).

The site may have functioned at least in part as a lithic workshop. Cobbles or chert and agate are available in the adjacent stream gravels as well as in the bluffs themselves.

The Blunden site, 35CU106, is located on a high bluff overlooking the Pacific Ocean on the southwest edge of the town of Port Orford. The site was tested in 1979 by Rick Minor and students from the University of Oregon using auger holes and two, two by two meter test pits (Minor, Beckham and Greenspan 1980). Three strata were identified in test unit A including:

Stratum 1: a black silty sand to a depth of 55 cm with considerable marine shell, bones, and fire cracked rock.

Stratum 2: a reddish brown silty sand to 100-127 cm containing almost no marine shell or bone material but with stone artifacts, debitage and fire cracked rock.

Stratum 3: a compact yellow sand, cultural sterile.

A charcoal concentration 110-118 cm below the surface, and resting on Stratum 3 was the only cultural feature encountered. A radiocarbon

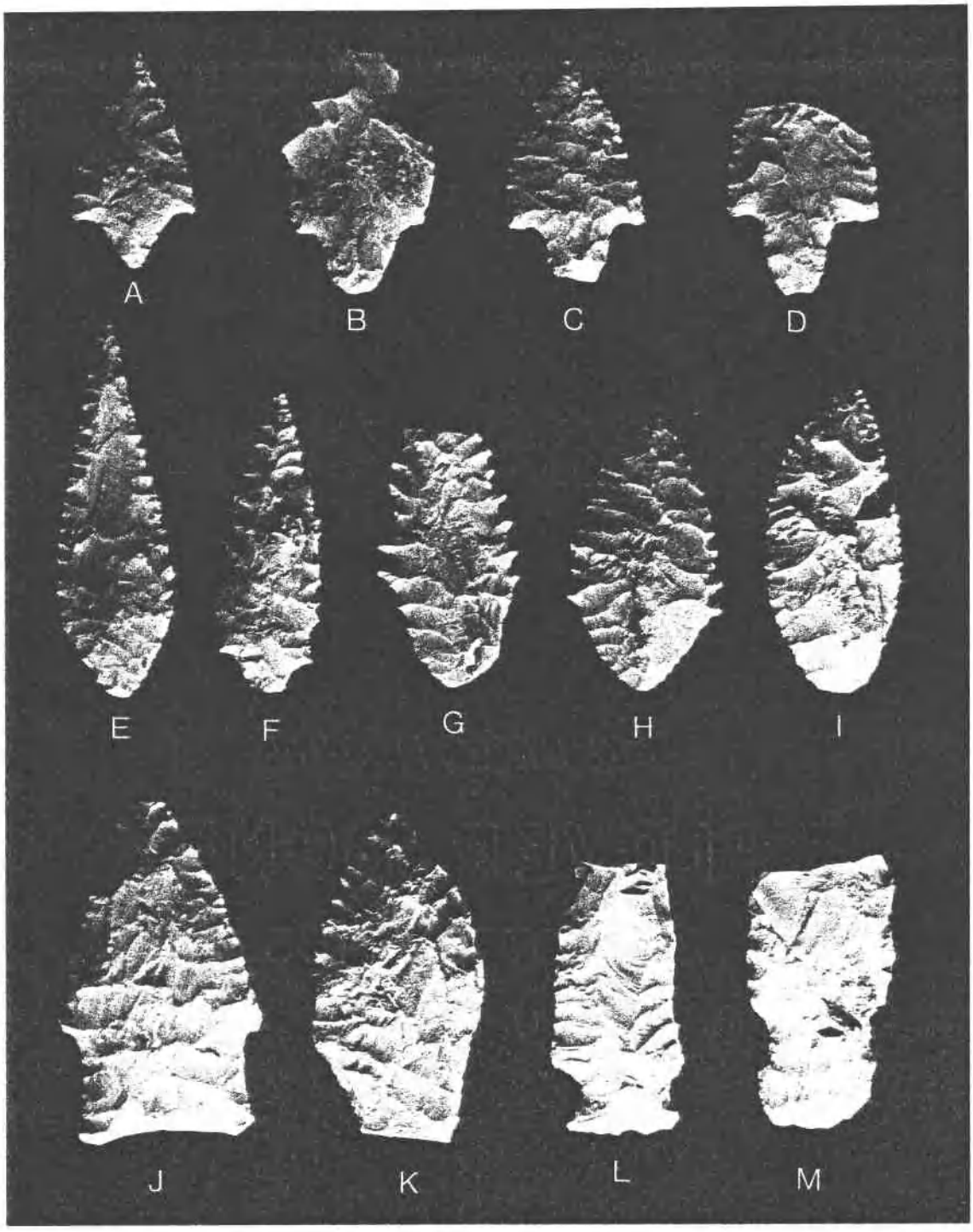


Figure 20
Blacklock Point Surface Collection

A-D	Constricting stem points
E-H	Lanceolate points
I	Lanceolate knife
J-M	Wide stem and notched points

Scale 1:1

date of 2050±80 B.P. was obtained from the charcoal. A single serrated lanceolate projectile point and a utilized flake were recovered nearby in the same excavation level. The point is fragmentary, 15 mm wide and exhibits a diagonal flaking pattern.

Site 35CU62 is situated in sand dunes north of the mouth of the Pistol River. In 1961 David Cole conducted salvage excavations in the only remaining corner of a house pit depression destroyed by highway construction. A partially burned wooden beam associated with the house dated at 3000±90 B.P. (Cressman 1977:194). A small collection of artifacts was recovered from an adjacent area disturbed by highway construction (Beckham and Minor 1980). These include one finely serrated point tip, one fragmentary biface, and a lanceolate or ovate serrated projectile point which is slightly stemmed at the base. The association of the 3000 year old date and these artifacts seems tentative at best, and no report was ever prepared on the work done at the site.

The Point St. George site 4DO11, is located twenty miles south of the Oregon-California border on a headland overlooking the Pacific Ocean. The site was excavated by Richard Gould of the University of California (Gould 1977, 1972). Two components were defined. The later component, F31 or Point St. George II represents a late prehistoric habitation area consisting of midden deposit with bone and antler tools, ground stone, and chipped stone artifacts with hollow base and tanged projectile points. The lower component F36 or Point St. George I consists of a much more limited occupation representing a flint chipping workshop. Chipped stone dominates the artifact categories almost to the exclusion of other types, with pointed stem and round base projectiles the most common. Charcoal from a pair of hearths in the lowest foot of the component was dated to 2260±210 B.P. and was in close association with the stone artifacts (Gould 1972:41). Projectiles from the early component are highly variable in form and are not regularly pressure flaked, with substantial areas unfinished. Of eleven illustrated round base points, all are described as possible knife blades, not projectile points, and only one is serrated (Gould 1966:120).

Gould found no evidence of any kind for a blade industry or well developed flake technology at the site, and suggested that material was so abundant that there was no need to conserve. He speculated that the first occupation of the coastline came as a response to the large quantities of natural flint available, with the early workshop evidence of a small camp occupied by people from the interior who needed the raw material (Gould 1966:87).

Other excavated sites on the coast containing leaf-shaped projectile points include the Lone Ranch site (Berreman 1944), 35CU9 (Ross 1977), the Pistol River site (Heflin 1966), and the Schwenn site 35DS16 (Leatherman and Krieger 1944) five miles upriver from the mouth of the Coquille. Surveyed but unexcavated occurrences include Indian Sands (35CU34) and Whalehead Cove (Berreman 1935), the Whiskey Run sites (35CU19 and 20), the Crooked Creek site (35CS9), as well as Bagnells Ferry (35CU25) on the lower Rogue, the Demert site (35CU85) on the upper Sixes River, the Barrows site (35CS61) on the lower Coquille River, and the Lescom site (35CS63) and Shorb site (35CS82) both on the upper Coquille.

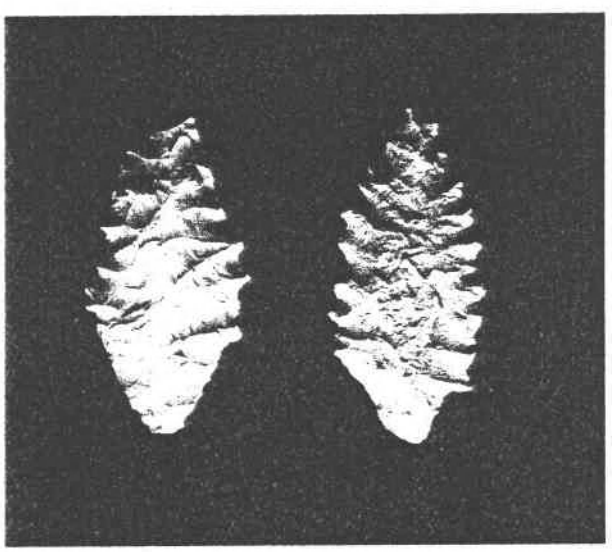


Figure 21
Whalehead Cove and CU-62 Lanceolate Points
Scale 1:1

It is interesting that in a study of amateur collections from Curry County, Pullen found that 36% of the leaf-shaped points were serrated. Although a much smaller sample, collections from Coos County had only 2.4% of the leaf-shaped points serrated, indicating a trend towards losing this trait as one moves north (Pullen, personal communication).

Previous reviews of the southern Oregon and northern California coast by Moratto (1973) and Beckham and Minor (1980) have stated that with the exception of the lower component of Point St. George all the known sites reflect a culture fully adapted to a littoral or marine environment. Other sites however, including the lower stratum of the Blundon site, a portion of 35CU9, and Blacklock point, as well as other bluff and slightly upriver sites suggest non-marine or interior adaptations. Unfortunately the lanceolate projectile points do not form a clear dichotomy between the two types of sites, marine and non-marine adapted, or at least this trend has not yet been established.

The early date associated with the maritime adaptation at the Umpqua Eden site provides evidence that possible two cultural adaptations, one interior and one coastal, coexisted on the southern and central Oregon coast circal 3000 B.P. More definitive data from these early sites will be needed before the relationships involved can be more fully explained.

CHAPTER VI

Discussion and Conclusions

The lanceolate projectile points recovered from the Applegate Lake project area have been described along with their context in Chapter 4. These include the large predominately serrated lanceolate types 01-06A and 01-06B from 35JA52 and the older deposits of 35JA47, and the 01-06C, 01-06D, and 01-06E forms from the house pits at 35JA47. But what of the greater areal relationships of the projectile points?

The lanceolate outline and edge serration of the 01-06A group brings to mind possible ties with the Cascade type of the southern Plateau. Comparison of size and shape (morphology) was accomplished using data collected first hand from the Granite Point collection, as well as other published sources (Appendix A). A t-test was run between the Applegate 06A and the Granite Point samples to determine what quantifiable traits differentiate the two populations. A null hypothesis that the populations are different and alternate hypothesis that they are similar was formulated, with t values below .05 or .01 indicating acceptance of the null hypothesis. Both thickness and width to thickness ratio were found to be different at the .01 level of significance, and although weight comparisons were not possible, they are also likely not to correspond with the heavy Applegate collection (Appendix C).

Technologically the two types may be significantly different. The Cascade Technique is not evident in the cores, debitage, and intermediate or finished artifacts from 35JA52 or elsewhere in the project area. While the early stages of core reduction may not have been accomplished at 35JA52 other evidence of a blade reduction technology would be evident. Some of the blade/blanks brought to the site could have broken during the subsequent manufacture and could possible be found in the site if the technique was employed. Data available on blades from the Lower Snake River Region (Appendix A) indicates that on the average the blades are too thin to produce the thick Applegate lanceolate projectile points. A thick flake technology leaving the striking platform at the

base to absorb the force of impact is evident on the Applegate specimens. No correlation of planoconvexity and the striking platform indicative of blade manufacture was noted in the Applegate drainage.

Flaking pattern of the two populations is generally similar, characterized by regular collateral pressure flaking terminating at a center ridge. A slight diagonal or double diagonal tendency is observable on some of the Applegate specimens but too few Cascade points were examined to make conclusions regarding this trait among other collections. Edge serration is more common and more deeply indented on the Applegate specimens that on the finely serrated Granite Point collection.

While exhibiting similarity in outline, the two types differ in technology, serration, thickness, and probably weight. Both populations probably functioned as spear tips with or without use of the atlatl, but differences in the projectiles reflect subtle differences in the weapon system of which they were a part or local variation in reduction technology.

After a review of the projectile points it is necessary to review the total material assemblage and the environmental adaptation it represents when assessing similarity of culture. The Old Cordilleran Culture assemblage includes Cascade points, blades or blade tools, leaf-shaped knives, and edge-ground cobbles in addition to other traits described by Butler but considered too ubiquitous in time and space to be useful. The adaptive strategy typical of the Old Cordilleran Culture was that of a generalized hunting, gathering, and fishing people. Semi-permanent or permanent villages were not known. Food grinding implements other than the speculated use of edge-ground cobbles are poorly represented.

The assemblage at 35JA52 shows little resemblance to this pattern. No leaf-shaped knives were recovered, and edge-ground/surface pecked cobbles found at 35JA52 are morphologically different than the above edge-ground river cobbles. Other food processing tools such as manos, grinding slabs, and stone bowls are foreign to the Old Cordilleran assemblage. Fishing is conjectural as bone preservation was extremely

poor at 35JA52, yet no fishing related artifacts were recovered. A land mammal hunting adaptation is in evidence from the number and variety of projectile points recovered. The overall artifact assemblage bears little resemblance to the Old Cordilleran Culture assemblage and adaptation appears somewhat different, with increased emphasis on vegetable foods.

To the east and in the Klamath Basin, three sites were discussed in Chapter V; Kawumkan Springs Midden, Nightfire Island, and the Salt Cave Locality. As noted earlier the Kawumkan Springs Midden is not now considered to be as old as originally postulated, with an initial occupation sometime circa 5000 B.P. Only two Cascade points were noted among a large collection of thick, crudely made leaf-shaped points recovered from the site. A few leaf-shaped knives were found with none from the oldest level. Edge-ground cobbles were not recovered, and food grinding technology not representative of the Old Cordilleran Culture was present. Fishing was not known to the earliest inhabitants, which are characterized as representing a Great Basin hunting and gathering adaptation. All this is not indicative of the Old Cordilleran Culture.

Initial occupation of Nightfire Island was also that of a well adapted terrestrial hunting and gathering people not familiar with the resource potential of Lower Klamath Lake. The lanceolate points characteristic of these people are similar in size and shape to those of the southern Plateau (Appendix B,C) but the resemblance ends there. No blade/core technology similar to the Cascade Technique has so far been recognized (Sampson, personal communication). Pressure flaking is variable, some exhibiting parallel oblique flake scars across the entire face of the point which is not found among southern Plateau specimens or the Applegate collection. Only one specimen can be said to be serrated. Other measurable differences between the Nightfire Island and Applegate 01-06A type includes thickness, with the Applegate group thicker, and width to thickness ratio, where the Nightfire collection exceeds the Applegate group. Differences in material preference are

also apparent, with the Nightfire Island folk preferring obsidian and the Applegate people cryptocrystalline silicates, even though obsidian was used by the people at 35JA52 for a variety of other projectile points and other tools.

Edge-ground cobbles are not reported from Nightfire Island. A more detailed assemblage comparison will have to wait for the full analysis of the site, but so far little support can be seen for the Old Cordilleran Culture at this site.

The Salt Cave Locality likewise offers little evidence for affinities with the Old Cordilleran Culture or the upper Applegate River. The lanceolate projectile point forms with one exception are not similar in form or technology to Cascade points. Both types described as possible Cascade types come from house pit fill or the upper portion of Klamath Shoal Midden dating to within the last one thousand years. Other evidence of the Old Cordilleran Culture such as blade manufacture and edge-ground cobbles is lacking.

The Klamath Basin offers no substantial evidence of Old Cordilleran Culture occupation. Besides the great differences in projectile points and artifact assemblages one must ask why a people well adapted to the taking of fish, including salmon as early as 7675±100 B.P. at the Dalles (Cressman 1960:24) would not have taken this knowledge with them if in fact it was a related group of people settling in the Klamath Basin. It would appear that a separate riverine adaptation by hunting and gathering peoples possibly from the Great Basin took place in the Klamath Basin at a later time than is recorded in the southern Plateau.

The Gold Hill site, upper Rogue River sites, and 35JA47 all contain a small lanceolate projectile point readily distinguishable from the serrated 06A variety. All of these points are rather nondescript in form and are predominately of cryptocrystalline. The Salt Cave Locality Gold Hill points are also similar in size and shape and are of obsidian. Analysis of the technology used in the production of these projectile points is incomplete and was not attempted for this

work. Platform remnants are visible less often on this group than on the larger Cascade and Cascade-like points from Granite Point, Nightfire Island, and 35JA52. This may be a functional difference relating to the weapon system.

A study of the morphological aspects of the projectile points was accomplished assisted by a series of t-tests. Along the Rogue River the small lanceolate points of the Gold Hill site and the upper Rogue River sites investigated by Davis revealed similarity in all categories compared and confirms the relatedness of the two forms as first observed by Davis (1968b). The 01-06C type from 35JA47 differs significantly from the Gold Hill site collection in width and weight categories at the .01 level, yet when matched against the Elk Creek Locality the type compares favorably in all aspects (Appendix C). While slightly smaller than the Gold Hill collection they do fall within the range of variation of the form for the Rogue drainage as a whole.

While the Gold Hill or 06C type is taxonomically related to the Cascade point type (within the broad 06 category) as Davis suggested (1974:48), there is little difficulty distinguishing populations of the two subtypes. While there is some overlap in size, when the Gold Hill type was compared to the Granite Point collection of Cascade points, significant differences were found in four of the seven measures at the .01 level (Appendix C). Weight comparison was not possible, but it is also likely to be significantly different. Technological differences include lack of serration on the Gold Hill projectiles, greater numbers of platform remnants on the Cascade points, and so far, no indication of a blade technology in the manufacture of the Gold Hill points.

Association of the 01-06C type at 35JA47 with small basal, corner, and side-notched points, as well as baked clay objects indicates that the site may be somewhat later than the Gold Hill component at the Gold Hill site, and possibly the upper Rogue. Occurrence of the 01-06D and 01-06E types is so far unreported from other sites within the region and suggests that the people of the upper Applegate drainage had a somewhat distinct culture from that found at the other sites. They did however

share some artifact forms with the middle and upper Rogue River peoples. Functional differences in the points and ethnic differentiation are also possibilities.

The "Gold Hill" points from the Salt Cave Locality are similar to the Gold Hill collection in all aspects except weight. The Salt Cave Locality specimens are slightly lighter. An emphasis on obsidian is interesting since Mack (1979) notes that local cryptocrystalline stone was available. Point finishing is similar to the Gold Hill site. Further to the east, the Cottonwood leaf-shaped class from Nightfire Island differs significantly from the Gold Hill collection in several categories and are more poorly finished, particularly at the base (Appendix C).

The age of the Gold Hill point style may extend back several thousand years, possibly even 4000-6000 years ago if those few found among the large serrated projectiles at 35JA52 are considered. At this time level they were overwhelmingly subordinate to the larger variety, at least in the upper Applegate Valley. Davis doe not now consider the Gold Hill points from the upper Rogue sites to extend back as early as the fourth millennium B.C. as he had previously suggested (Davis, 1974, personal communication), the period of most popularity may have been 2000-3000 years ago, persisting along the upper Rogue River and the Salt Cave Locality to close to 1000 B.P. (Davis n.d., Mack 1979). A composite bone sample from the house pit fill at 35JA47 will eventually date that component, but has yet to be processed.

Looking towards the coast a very incomplete and diverse situation is encountered. The leaf-shaped points from the midden sites such as Umpqua Eden and the Lone Ranch sites may be related to the interior tradition of Gold Hill points, but small sample size precludes definitive statements. One type from the Umpqua Eden site, 1.13 (Figure 19) is not observed at the interior sites.

The serrated leaf-shaped projectile points from the coast have little resemblance to the Gold Hill type, which is never found to be serrated. They are instead, more closely related to the 01-06B,

pentagonal 01-07A, or ovate 01-08A forms from 35JA52 (Figures 5 and 6). The single 01-06B type point recovered from the Blundon site was dated to around 2000 B.P. but only more extensive work will show if this time frame is an average for the type on the coast or is in fact a late occurrence. It may be that at least some of the bluff sites were occupied in advance of other dated sites on the coast by peoples with serrated lanceolate and other projectile styles. Only a systematic investigation of coastal sites as well as sites upriver from the coast will lead to an explanation of cultural relations between the coast and interior. Investigations on the Siskiyou National Forest and Coos Bay B.L.M. district lands will be particularly useful in this regard.

The leaf-shaped projectile points within the Rogue River drainage and some adjacent rivers can be divided into several separate types. The serrated lanceolate projectile points, 01-06A and 01-06B, from 35JA52, the lower levels of 35JA47, and possibly those from 35JA27 along Elk Creek appear to have the greatest antiquity. An estimated date of from 4000-6000 years ago is assigned to the 35JA52 site. They also occur in the lower levels of 35JA47 at an estimated age of 2000-4000 years ago in smaller quantities. Reaching their period of popularity somewhat later are the Gold Hill (06C) and Gold Hill-like projectile points from numerous sites within the interior, and on the coast. Other leaf-shaped forms such as the 01-06D and 01-06E varieties are found in relatively late context on the upper Applegate River. As the large serrated lanceolate projectile points are not found east of the Cascades, they may represent an early phenomena of the Rogue River and adjacent drainages such as the Coquille to the north and Pistol River to the south. The smaller Gold Hill type while firmly established in the Rogue River drainage may have close ties to similar bipointed and leaf-shaped projectile points in the Willamette Valley. Drawing a geographical boundary around this type is fruitless at this time.

As the lanceolate "Cascade" points and the greater assemblage configurations from southwestern Oregon do not indicate a homogeneous Old Cordilleran Culture occupation, the linguistic evidence with respect to

a Penutian/Old Cordilleran Culture movement into southwest Oregon and California will now be reviewed.

Penutian languages of western North America were first classed into an all encompassing Penutian phylum by Sapir (1929). He included the coordinate groups of Californian, Oregon, Plateau, and Mexican Penutian as well as Chinookan and Tsimshian in his superstock. Silverstein remarks however that

> ...by the criteria of regular sound correspondences among languages and of the reconstruction of total proto-forms of words, Penutian in the sense used here is not a proven genetic relationship...rather the label may be taken as a summary for 1) a number of interlocking hypotheses, first brought together by Sapir (1929), that project where and how to look for such correspondences among forms and 2) encourage progress in schematizing how such correspondences can be achieved (Silverstein 1979:650).

He further notes the great linguistic diversity of the superstock, equalling perhaps that of the entire continent (Silverstein 1979:651).

The three groups of interest here--Californian, Oregon, and Plateau Penutian have undergone considerable reanalysis with the Plateau grouping faring the most poorly. The Plateau designation includes Lutaian (Klamath/Modoc), Waiilatpuan (Mollale/Cayuse), and Sahaptin (Sahaptin/Nex Perce). Rigsby (1965) in trying to determine whether relationships between the Plateau Penutian languages were genetic resemblances retained from a common ancestral past or diffusional or areal resemblances, found the latter to be the case. He also states that methods may not be powerful enough to penetrate the time depths involved with long-range comparison (Rigsby 1965:108, 230). Silverstein (1979:679) also does not consider Plateau Penutian to be genetically related, but does believe that Klamath or Lutuamian has strong possibilities for relationship with Californian Penutian to the south.

Whistler (1977) suggests that Penutian entries into California were in a series of four events from the Plateau or Great Basin. He considers the Californian Miwok-Costonoan family as the earliest of these entries, possibly marked by a mortar and pestle technology appearing 4500-5000 B.P. (Whistler 1977:13).

While trying to connect the linguistic and archaeological evidence several California archaeologists, particularly Ragir (1972) neglect information on Plateau archaeology, skewing their data base which has resulted in erroneous conclusions or hypotheses. To my knowledge no convincing arguments have been presented for similarity in the lanceolate projectile points in California and the Plateau, only the comparison of gross outline. Jensen (1976) in fact found that a group of Windmiller Culture leaf-shaped points did not cluster with his Plateau group.

With the latest interpretations of Penutian not being genetically related on the superstock or Plateau Penutian level less credance can be given to the movement of a closely related people. New interpretations such as that by Whistler further discourage such a simple solution as a single mass migration of a people. Until more convincing archaeological and linguistic evidence is presented the likelihood of a Penutian/Old Cordilleran correspondence and migration cannot be supported.

Comparison of the lanceolate projectile points and accompanying assemblages between the upper Applegate River and other sites in southwestern Oregon reveals considerable regional diversification at a time level as early as 6000 years ago. No convincing evidence can be found to support the presence of the Old Cordilleran Culture.

The Old Cordilleran Culture concept should probably be restricted to an area of south central and southeastern Washington, northeastern Oregon, and adjacent Idaho on the basis of similar stone tool technology and assemblages along the lines of Bense (1972) and Swanson and Leonhardy (1972). Outside this area the lithic technology and/or associated tools vary too greatly to indicate cultural continuity.

Also notable is the older stemmed projectile point assemblage found in the Applegate River drainage which precludes interpretation of the lanceolate point tradition as the pioneer tradition in southwestern Oregon west of the Cascades. It is not unlikely that most of western Oregon was inhabited by small groups of Native Americans at early time levels (8000-10,000 B.P.) and older as has been shown for eastern Oregon.

While the Penutian languages of Oregon and California cannot be shown to be genetically related to one another, the linguistic evidence does indicate an early Penutian core area within Sahaptin territory with possible expansion outward. Archaeological evidence for actual movements of this group with a distinctive tool kit are not supported by the artifact assemblages of southwestern Oregon.

Lithic technologies and projectile point forms can and did function in different environments. They cannot by themselves be used as indicators of single adaptation (Butler 1961) and do not by themselves indicate an analytic linguistic abstraction (Pettigrew 1974 and Haun 1977). They can suggest evolutionary affinity or the exchange of ideas (Nelson 1969). A single cultural element such as a lanceolate projectile can be borrowed quite easily with a minimum of interaction, while the sharing of language through diffusion requires a long or intense contact. The spread of the idea of a lanceolate projectile point and presumably the entire weapon system can be interpreted as a case in the sharing of a single trait or idea, while linguistic diffusion involved a slow process of band intermarriage and cultural change. This latter case may be appropriate in southwestern Oregon with respect to cultures with lanceolate projectile points.

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APPENDICES

APPENDIX A

The Identification of Cascade Artifacts

The following artifact descriptions are taken from the Lower Snake River Region (Cascade Phase). Data from the Indian Well I component is also included as it was considered the type site by Butler (1961). For a complete inventory of Cascade Phase artifacts see Bense (1972). The aim here is to bring together the information on various artifacts to aid in comparing these materials to other regions.

Levallois-like Cores

These are planoconvex cores, oval in outline, with the dorsal surface retaining a single flake scar on one ridge along the long axis, and the ventral surface dome-shaped. The striking platform for removing flakes from the dorsal surface is faceted and high angled, 55-80°. Side-struck specimens also occur. Size ranges from 45 mm to 85 mm long, although occasionally larger. A range of exhaustion is evident in the cores, with those most fully exhausted exhibiting edge retouch and polish indicating use for chopping and scraping. Some cores may be so fully reduced as not to be recognizable (Bense 1972:148; Leonhardy et al. 1971:39).

Primary Levallois Flake

The dorsal surface of this flake shows a radial series of flake scars from preparation of the core face. Some degree of platform preparation in the form of small flakes and abrasion is evident on most flakes. Cross and longitudinal sections tend to be cancavoconvex and thickest in the middle. Length ranges from 4 cm to 15 cm, width from 1.9 cm to 9 cm (Muto 1976:119).

Secondary Levallois-like Flake

This flake is struck directly behind the primary flake scar. The dorsal surface carries the primary flake scar and platform preparation flakes, as well as some radial flaking from core shaping.

Distal Ridge Truncation Flake

This flake is removed from the distal portion of the core and has dorsal flake patterning including portions of the primary or secondary flake scar and several radial preparation scars (Muto 1976:120).

Blades

For this discussion "A", "B", and "C", and corner removal blades are lumped together although Muto presents evidence for separating these out on the basis of flake scar pattern and cross section. These blades fit the criteria of flakes twice as long as wide with roughly parallel sides, and a triangular to trapezoidal cross section, although some exhibit a polygonal cross section also. Many are prismatic, bearing two or three prism-like facets on the dorsal side. Unmodified blades exhibit the striking platform remnant at the proximal end, this remnant often faceted by preparation flake scars. Two sets of metric data are available from the Lower Snake River Region, those from 45GA3 (Nelson 1965) and those from 45WT41 (Leonhardy 1970). Nelson's measurements include fourteen non-blade flakes with unifacially retouched striking platforms in addition to the blades. Leonhardy's measurements are on Windust component blades.

45GA3

	Average (mm)	Range (mm)
Length	38	20-59
Width	27	12-43
Thickness	5	2-12

Measurement for 89 complete flakes and blades with unifacially retouched striking platforms.

45WT41

	Average (mm)	Range (mm)
Length	49	31-64
Width	21	15-37
Thickness	6	2-19
Platform length	10	2-29
Platform width	4	1-19
Platform angle	71°	50-80°

Measurements for 32 prismatic blades, Component 1.

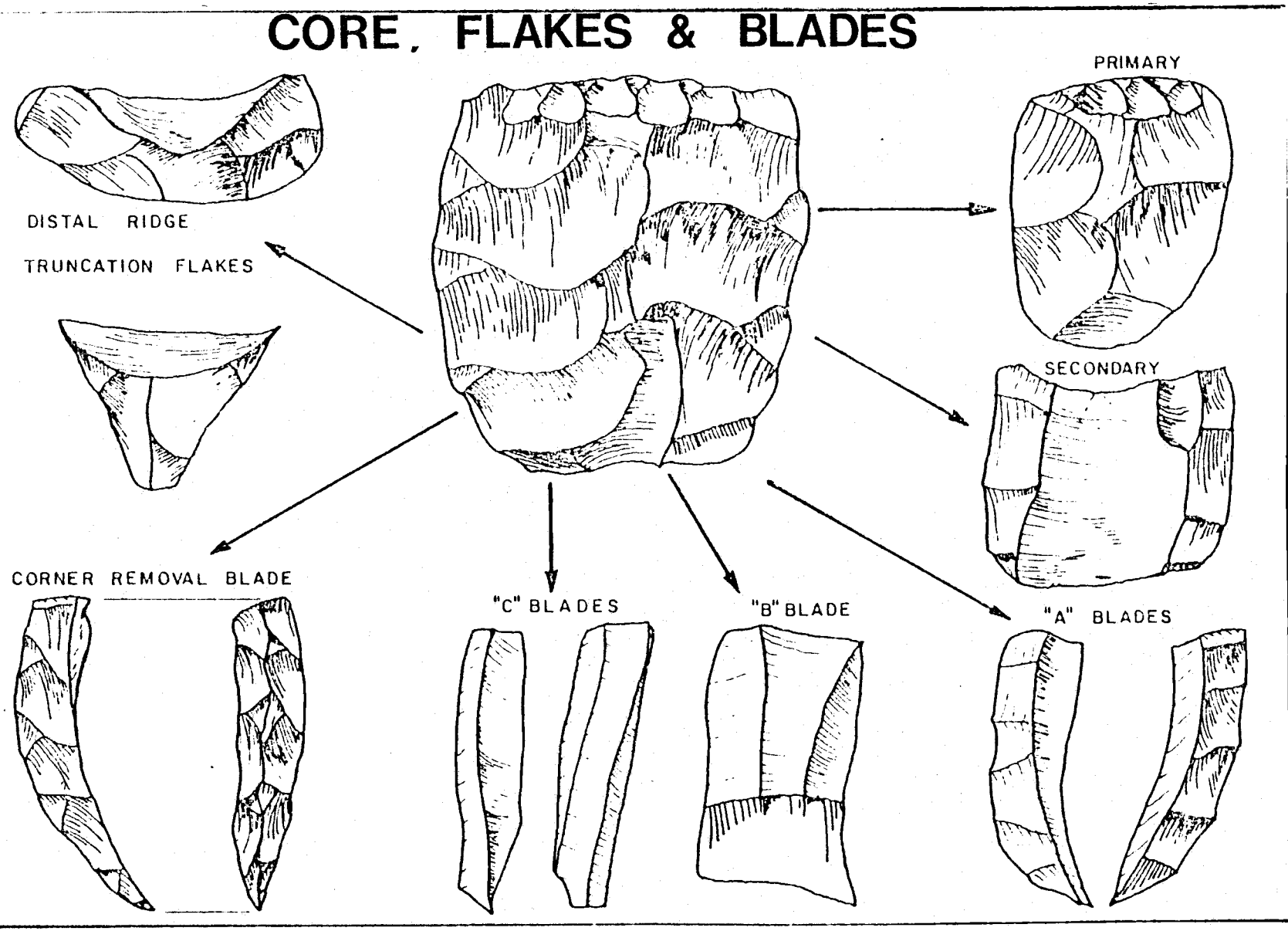

Figure 22 Cascade Technique Products

Lanceolate Projectile Points

These points have symmetrically convex sides; tip acute; base rounded, straight, or acute; maximum width 1/3 to 1/2 length of the point above base; cross section thin triangular to thick lenticular, some planoconvex; remnant of striking platform often visible at proximal end; most specimens neatly pressure flaked overall; some specimens flaked overall on the dorsal surface and marginally retouched on the ventral surface; approximately one third are finely serrated along the edges. Metric data is available from Butler (1961), Nelson (1969, six sites), Bense (1972, thirteen sites), and Jensen (1976) for the Indian Well I group along with Butler.

Indian Well I (Butler, 1961)

	Average (mm)	Range (mm)
Length	65	28-80
Width		11-20
Thickness		3-9

27 out of the 116 specimens are edge serrated
most cryptocrystalline, one or two basalt, two obsidian

Indian Well I (Jensen, 1976)

	Average (mm)
Length	44.5
Width	13.8
Thickness	6.0

Note: these measurements are from twenty-five specimens but exactly where they were measured is not known as the collection was dispersed among amateurs.

Lower Snake River Region (Nelson, 1969)

	Average (mm)	Common Range	Extreme Range
Length		30-55	25-67
Width		11-18	9-22
Thickness	5-6	4-8	3-9
Length/Width		2.4-4.0	2.2-4.4

Number of specimens in sample not given

Lower Snake River Region (Bense 1972)

	Average (mm)	Range (mm)
Length		34-71
Width		11-23
Thickness		3-12

Edge serration on 36% of the complete points (144). Material includes 194 cryptocrystalline, 156 basalt, 36 not reported, 367 total.

Oval Knives

These come in two size categories, but are otherwise very similar. Outline is broad lanceolate; tip acute; base straight to sub-acute; cross section planoconvex to biconvex; edges symmetrically convex in most cases but a few are asymmetrical; few unifacially flaked; percussion flakes overall; pressure retouch on many specimens. Size ranges are:

	Large (Means data mm)	Small (Range given mm)
Length	74	39-64
Width	35	21-27
Thickness	8	7-9

Material

Large 50 cryptocrystalline; 143 basalt; 4 obsidian; 37 no report
Small 53 cryptocrystalline; 40 basalt; 0 obsidian; 10 no report

Triangular Knives

Outline triangular; base straight; cross section lenticular to planoconvex; percussion flaked overall; pressure retouch on many; 11 specimens all of basalt.

Edge-Ground Cobbles

Edge-ground cobbles are found in as widely separated areas as the Pacific Northwest, Southern California, and the Caribbean, and have been given many designations such as tanning stones, pebble grinders, and side polishers. In the Pacific Northwest the first use of the term "edge-ground cobble" was used in connection with the Goldendale site. Butler (1962) and Warren and company (1963) define edge-ground cobbles as oblong cobbles, oval or triangular in cross section, with one or more

of the longer edges ground at nearly right angles to the broad face of the cobble. The ground area or facet is slightly convex in transverse section, and straight to slightly convex in longitudinal section. On some striae are visible parallel to the transverse axis of the cobble. Edges on some are quite narrow, and on others are up to 35 mm wide. The rounded ends and sides are sometimes battered. The term cobble implies a stone between 64 mm and 256 mm in length according to the Wentworth grade scale (Butzer 1964:158). Those from Weis Rockshelter, Idaho range from 10.5-16.5 cm in length, 7.5-10.5 cm in width, and 3.0-7.5 cm in thickness. Cobbles of basalt, quartz, feldspar, and other igneous rocks make up the majority of the specimens in the southern Plateau.

Cort Sims (1971), in the most thorough review of the edged cobble to date, notes that two types of edged cobbles are recognized by some archaeologists, the edge-ground cobble, and the edge abraded cobble. The edge abraded cobbles have edges that vary from quite even to relatively smooth, and occasionally have striae parallel to the longitudinal axis of the cobble. The facets are similar to ground cobbles in transverse and longitudinal section, but tend to be narrower on the whole. The facets are sometimes beveled and both longitudinal edges of the facet form distinct angles which at times exhibit conchoidal fractures. The features on abraded cobbles suggest a combined striking and dragging motion (Sims 1971:23). Both kinds of cobbles occur together in the middle Columbia River, lower Snake River, and in the north-central Idaho area, but the edge abraded cobble occurs along through central Washington to south-central British Columbia.

A variety of uses have been proposed for the edged cobble in the Northwest. Prominent among these proposals are the processing of root crops such as camas and kous (Butler 1965) and hide preparation (Lewis). Edge abraded cobbles have been suggested as a by-product of the manufacture of blades (Crabtree and Swanson 1968). Of the 116 specimens described by Bense (1972) 50 appear abraded and 16 polished with over one third exhibiting end battering.

APPENDIX B

Projectile Point Typologies and Metric Data

Applegate Lanceolate Projectile Points

01-06A Lanceolate; rounded base; sides symmetrically convex; produced on a thick flake; biconvex to planoconvex cross section; maximum width 1/3 to 1/2 length of the point above base; remnant of the striking platform often visible at proximal end; haft narrower than blade after last serration; pressure flaked overall; some exhibit diagonal flaking from one edge, a few double diagonal; approximately 3/4 serrated; approximately 1/3 resharpened removing serration.

	Range	Mean	S.D.
Length	30-54	43.4	9.5
Width	13-21	16.7	2.5
Thickness	4-10	7.4	1.4
Weight	2.8-7.9g	4.9	1.6
L/W Ratio	2.3-3.5	2.7	0.5
W/T Ratio	1.9-3.2	2.3	0.4
Max Width	.37-.51	.43	0.05
Max Thick	.31-.46	.37	0.05

Material	Cryptocrystalline	24
	Obsidian	1
N Sample	7 complete, 18 fragmentary	35JA52

*One complete specimen from 35JA53B and four fragments from 35JA47 not included here, but listed in data inventory, Appendix E.

01-06B Same as resharpened 01-01A, but edge serration retained. Metric data given in Appendix E for three specimens.

01-06C Small Lanceolate, base round; sides symmetrically convex; produced on a thick flake; biconvex to planoconvex in cross section; flaking random; no edge serration.

35JA47

	Range(mm)	Mean(mm)	S.D.
Length	26-36	30.7	3.6
Width	10-17	12.4	2.1
Thickness	4-8	5.8	1.3
Weight	1.0-4.2	2.3	0.9
L/W Ratio	2.1-3.4	2.5	0.4
W/T Ratio	1.7-3.0	2.2	0.4
Max Width	.31-.48	.42	.05
Max Thick	.36-.53	.44	.06

Material	Cryptocrytalline	8
	Obsidian	4
N Sample	12 complete specimens	

35JA52

	Range(mm)	Mean(mm)	S.D.
Length	24-32	27.0	4.4
Width	10-16	13.0	2.2
Thickness	4-7	5.5	1.0
Weight	1.9-2.8	2.2	0.5
L/W Ratio	1.9-2.0	2.0	0.1
W/T Ratio	2.0-2.7	2.4	0.3
Max Width	.40-.50	.45	.05
Max Thick	.36-.67	.48	.16

Material	Cryptocrystalline	3
	Obsidian	3
N Sample	3 complete, 3 fragmentary	

01-06D Medium sized Lanceolate, base rounded to straight, sides convex to straight; cross section biconvex; less often planoconvex; generally broad and thin; random pressure flaking, no edge serration, some not completely flaked on ventral surface; Width/Thickness ratio > 3.0.

	Range	Mean	S.D.
Length	22-35	28.1	3.3
Width	12-20	16.3	2.3
Thickness	2-7	4.8	1.3
Weight	.9-3.9	2.2	0.9
L/W Ratio	1.4-2.2	1.7	0.3
W/T Ratio	2.7-6.0	3.6	0.9
Max Width	.26-.48	.38	0.08
Max Thick	.19-.67	.41	0.15

Material	Obsidian 15
N Sample	12 complete, 3 fragmentary, all 35JA47

01-06E Very small Lanceolate, rounded base, sides symmetrically convex, cross section lenticular to triangular, produced on thin flakes, flaking random, occasionally diagonal, sometimes edge retouch only.

	Range(mm)	Mean(mm)	S.D.
Length	12-21	15.3	2.8
Width	6-10	8.2	1.0
Thickness	2-5	3.0	0.8
Weight	.2-.9g	0.5g	0.2
L/W Ratio	1.3-2.4	1.9	0.3
W/T Ratio	1.8-4.5	2.8	0.6
Max Width	.20-.59	.41	0.10
Max Thick	.08-.62	.33	0.16
Material	Cryptocrystalline	6	
	Obsidian	19	
N Sample	25 complete		

01-06F Same as 06A, except not serrated, quite thick, planoconvex cross section. See Appendix E for data.

Elk Creek, Lost Creek, and Far Hills Ranch
Lanceolate Projectile Point Typology

06A Same as Applegate 06A

	Mean
Width	16mm
Thickness	7mm
Material	1 cyrptocrystalline
N Sample	1 fragmentary specimen JA27

06B Same as Applegate 06B

	Range	Mean
Length	-	37mm
Width	16-17mm	16.5mm
Thickness	-	7mm
Weight	-	3.8g
L/W ratio	-	2.2
W/T ratio	2.3-2.4	2.35
Max. Width	-	.41
Max Thick	-	.38
Material	Obsidian 1 Cryptocrystalline 1	
N Sample	JA27 1 JA26 1	

06C Medium size lanceolate; round base, sides symmetrically convex; produced on a thick flake; biconvex to plano-convex cross section; one fifth retain striking platform at proximal end; random pressure flaking overall, some with diagonal flake scars from one edge; none serrated; similar to Applegate 06C but slightly larger.

	Range	Mean	S.D.
Length	23-36mm	29.3mm	3.6
Width	10-17mm	12.9mm	1.4
Thickness	4-8mm	5.9mm	1.0
Weight	1.3-4.2g	2.3g	0.7
L/W ratio	1.7-3.3	2.3	0.4
W/T ratio	1.6-3.0	2.2	0.4
Max. Width	.31-.52	.43	0.06
Max. Thick	.17-.56	.42	0.10

Material	Obsidian	5
	Cryptocrystalline	39
N Sample	27 complete, 17 fragmentary	
	JA5-4, JA6-3, JA7-1, JA10B-3, JA14-1	
	JA16-2, JA19-7, JA23-3, JA25-14, JA26-6	
	All sites combined.	

Lost Creek Locality

	Range	Mean	S.D.
Length	23-35mm	29.2mm	3.5
Width	10-15mm	12.6mm	1.4
Thickness	4-7mm	5.8mm	1.0
Weight	1.3-3.8	2.2mm	0.7
L/W Ratio	1.7-3.3	2.3	0.4
W/T Ratio	1.7-3.0	2.2	0.4
Max. Width	.32-.52	.43	0.06
Max. Thick	.17-.56	.39	0.13

Material	Cryptocrystalline	21
N Sample	13 complete, 8 fragmentary	
	JA5-4, JA6-3, JA7-1, JA16-2,	
	JA19-7, JA23-3, JA14-1	

Elk Creek Locality

	Range	Mean	S.D.
Length	23-31mm	27.6mm	3.0
Width	12-14mm	12.7mm	0.7
Thickness	4-8mm	5.6mm	1.1
Weight	1.5-2.9g	1.9g	0.5
L/W Ratio	1.9-2.4	2.2	0.2
W/T Ratio	1.6-3.0	2.4	0.4
Max. Width	.42-.52	.46	0.04
Max. Thick	.31-.48	.43	0.08

Material	Obsidian	5
	Cryptocrystalline	4
N Sample	7 complete, 2 fragmentary	
	JA10B	3
	JA26	6

Far Hills Ranch JA-25

	Range	Mean	S.D.
Length	25-36mm	31.3mm	3.9
Width	12-17mm	13.4mm	1.6
Thickness	5-8mm	6.4mm	0.9
Weight	2.0-4.2g	2.8g	0.8
L/W Ratio	1.8-2.8	2.3	0.4
W/T Ratio	1.7-3.0	2.1	0.3
Max. Width	.31-.48	.39	0.07
Max. Thick	.36-.51	.45	0.07

Material Cryptocrystalline 14

N Sample 7 complete, 7 fragmentary

06F Same as Applegate 06A but is not serrated and does not possess slightly constricted hafting element, flake scar pattern diagonal from one edge.

	Mean
Length	46mm
Width	15mm
Thickness	9mm
Weight	5.4g+
L/W Ratio	3.1
W/T Ratio	1.7
Max Width	.48
Max Thick	.48

Material Cryptocrystalline 1

N Sample JA25 1

06G Lanceolate, Round base, sides symmetrically convex, plano-convex cross section, produced on a thin flake, regular pressure flaking perdendicular to edges.

	Mean
Length	50mm
Width	12mm
Thickness	5mm
Weight	3.0g
L/W Ratio	4.2
W/T Ratio	2.4
Max Width	.26
Max Thick	.36

Material Cryptocrystalline

N Sample 1 complete JA25

06H Same as 06C except produced on a thin flake, edge retouch only; prominent platform and bulb of percussion.

	Mean
Length	31mm
Width	15mm
Thickness	4mm
Weight	1.6g
L/W Ratio	2.1
W/T Ratio	3.8
Max. Width	.45
Max. Thick	.12

Material Cryptocrystalline 1

N Sample 1 complete JA7

06I Broad Lanceolate to Ovate; round base, sides symmetrically convex, biconvex cross section, not all completely flaked on ventral side, otherwise random flake scars.

	Mean
Length	31mm
Width	18mm
Thickness	5mm
Weight	2.8g
L/W Ratio	1.7
W/T Ratio	3.6
Max. Width	.34
Max. Thick	-

Material Cryptocrystalline 1

N Sample 1 complete JA25

Metric Data

Salt Cave Locality Type 19

	Range(mm)	Mean(mm)	S.D.
Length	35-44	39.0	4.6
Width	12-14	13.0	1.0
Thickness	6-8	7.0	1.0
Weight	2.4-3.8	3.1	0.7
L/W Ratio	2.9-3.1	3.0	0.1
W/T Ratio	1.8-2.0	1.9	0.1
Max Width	.34-.54	.48	0.18
Max Thick	.37-.51	.46	0.08
Material	Obsidian 3		
N Sample	3 complete		

Salt Cave Locality Type 20

	Range(mm)	Mean(mm)	S.D.
Length	34-49	40.5	7.7
Width	12.5-14	13.5	1.0
Thickness	4-6	5.0	0.9
Weight	1.9-3.8	2.6	1.0
L/W Ratio	2.7-3.5	3.1	0.6
W/T Ratio	2.3-3.5	2.9	0.8
Max Width	.29-.39	.34	0.08
Max Thick	.21-.41	.31	0.14

*First four indices taken from Mack 1979:296 N=4
Second four on two specimens that were definitely in the class when collection was viewed.

Salt Cave Locality Type 22 Gold Hill Leaf

	Range(mm)	Mean(mm)	S.D
Length	24-35	29.7	3.2
Width	12-16	14.3	1.3
Thickness	4-7	5.5	1.0
Weight	1.3-2.6	1.9	0.4
L/W Ratio	1.8-2.6	2.2	0.3
W/T Ratio	2.0-3.0	2.4	0.4
Max Width	.34-.51	.40	0.05
Max Thick	.18-.64	.39	0.16

*First four indices from Mack 1979:296 N=10
Second four on specimens measured N=8

Granite Point (45WT41)

	Range (mm)	Mean (mm)	S.D.
Length	34-71	49.2	8.0
Width	11-23	16.6	2.0
Thickness	3-10	5.9	1.0
Weight	-	-	-
L/W Ratio	2.1-4.0	3.0	0.6
W/T Ratio	1.9-4.2	3.0	0.8
Max Width	.31-.44	.40	0.04
Max Thick	.28-.62	.43	0.12

* First three indices from Leonhardy 1970:149 N=22
Last four, N=17

Material		
	Cryptocrystalline	11
	Basalt	6

Umpqua Eden (35DO83) 1.13

	Range (mm)	*Mean (mm)*	*S.D.*
Length	24-42	34.7	7.7
Width	7-16	12.3	3.8
Thickness	4-6	5.0	1.2
Weight	.7-3.1	2.1	1.0
L/W Ratio	2.6-3.4	2.9	0.4
W/T Ratio	1.8-3.2	2.5	0.6
Max Width	.38-.50	.44	0.05
Max Thick	.24-.55	.41	0.16

Material		
	Cryptocrystalline	3
	Obsidian	1

N Sample 4 complete

Umpqua Eden (35DO83) 1.14

	Range (mm)	Mean (mm)	S.D.
Length	27-28	27.3	0.6
Width	10-15	13.0	2.6
Thickness	4-6	4.7	0.6
Weight	.9-2.1	1.5	0.6
L/W Ratio	1.9-2.7	2.2	0.5
W/T Ratio	2.5-3.0	2.8	0.3
Max Width	.37-.50	.43	.07
Max Thick	.37-.46	.40	.05

Material		
	Cryptocrystalline	3

N Sample 3 complete

Nightfire Island "Cascades"

	Range (mm)	Mean (mm)	S.D.
Length	38-67	44.8	6.5
Width	12-20	16.4	2.2
Thickness	5-10	6.5	1.4
Weight	2.7-9.8	4.4	1.7
L/W Ratio	2.2-3.6	2.8	0.4
W/T Ratio	1.8-3.6	2.6	0.5
Max Width	.20-.54	.41	0.07
Max Thick	.26-.53	.37	0.08
Material	Cryptocrystalline	1	
	Obsidian	29	
N Sample	30 complete		

Nightfire Island Cottonwood Leaf-Shaped

	Range (mm)	Mean (mm)	S.D.
	25-38	31.8	4.0
Width	11-17	14.2	1.7
Thickness	3-7	5.2	1.3
Weight	1.0-3.5	2.2	0.8
L/W Ratio	1.5-3.1	2.3	0.4
W/T Ratio	1.7-5.0	2.9	0.8
Max Width	.03-.43	.33	0.10
Max Thick	.14-.51	.35	0.12
Material	Obsidian	20	
N Sample	20 complete		

Gold Hill Site 35JA130

	Range (mm)	Mean (mm)	S.D.
Length	*22-44*	*30.6*	*5.8*
Width	*10-19*	*13.7*	*2.2*
Thickness	*5-10*	*6.2*	*1.2*
Weight	*1.3-5.6*	*2.7*	*1.1*
L/W Ratio	*1.8-2.9*	*2.2*	*0.3*
W/T Ratio	*1.3-2.8*	*2.2*	*0.4*
Max Width	*.28-.68*	*.43*	*0.10*
Max Thick	*.24-.67*	*.43*	*0.11*
Material	*Cryptocrystalline*	*28*	
	Obsidian	*2*	
N Sample	*30 complete*		

APPENDIX C

T-Test Comparisons (two tailed)

Applegate 06A vs Granite Point

Length	.242
Width	.920
Thicknes	.003
Weight	-
L/W	.266
W/T	.003
Max Width	.123
Max Thick	.101

Applegate 06A vs Gold Hill Site

Length	.011
Width	.000
Thickness	.002
Weight	.011
L/W	.052
W/T	.505
Max Width	.939
Max Thick	.060

Applegate 06A vs Nightfire Island Cascades

Length	.727
Width	.615
Thickness	.015
Weight	.521
L/W	.716
W/T	.009
Max Width	.479
Max Thick	.992

Gold Hill site vs Nightfire Island Cottonwood

Length	.370
Width	.328
Thickness	.010
Weight	.122
L/W	.859
W/T	.004
Max Width	.001
Max Thick	.034

Granite Point vs Nightfire Island Cascades

Length	.201
Width	.711
Thickness	.201
Weight	-
L/W	.247
W/T	.074
Max Width	.296
Max Thick	.078

Gold Hill Site vs Salt Cave Goldhill Points

Length	.759
Width	.941
Thickness	.228
Weight	.008
L/W	.709
W/T	.216
Max Width	.296
Max Thick	.507

Granite Point vs Gold Hill Site

Length	.000
Width	.000
Thickness	.435
Weight	-
L/W	.000
W/T	.001
Max Width	.141
Max Thick	.966

Gold Hill Site vs Upper Rouge River (Elk, Lost, Far Hills)

Length	.321
Width	.085
Thickness	.271
Weight	.149
L/W	.784
W/T	.864
Max Width	.876
Max Thick	.694

T-Test Comparisons (two tailed)

Applegate 06C vs
Gold Hill Site

Length	.085
Width	.003
Thickness	.016
Weight	.002
L/W	.196
W/T	.962
Max Width	.941
Max Thick	.972

Applegate 06C vs
Upper Rouge Sites

Length	.255
Width	.025
Thickness	.062
Weight	.018
L/W	.276
W/T	.874
Max Width	.808
Max Thick	.787

Applegate 06C vs
Elk Creek

Length	.995
Width	.057
Thickness	.537
Weight	.326
L/W	.116
W/T	.578
Max Width	.959
Max Thick	.070

Applegate 06C vs
Applegate 06D

Length	.761
Width	.000
Thickness	.323
Weight	.128
L/W	.000
W/T	.000
Max Width	.151
Max Thick	.764

Applegate 06C vs
Salt Cave Gold Hill Points

Length	.156
Width	.007
Thickness	.268
Weight	.301
L/W	.163
W/T	.321
Max Width	.552
Max Thick	.241

Applegate 06C vs
Nightfire

Length	.014
Width	.000
Thickness	1.000
Weight	.041
L/W	.298
W/T	.008
Max Width	.001
Max Thick	.074

APPENDIX D
Replicative Study Data

Table 1

No.	Initial Flake		Biface Blank		Projectile Point	
	Dimensions	Wt.(g)	Dimensions	Wt.(g)	Dimensions	Wt.(g)
1	60x45x10mm.	25.9	57x20x8mm.	9.9	56x16x8mm.	5.6
2	85x50x15mm.	34.4	48x21x7mm.	7.7	46x15x6mm.	3.6
3	80x50x20mm.	61.9	62x20x10mm.	12.2	60x19x9mm.	8.0
4	100x85x25mm.	210.5	59x25x11mm.	16.0	59x18x9mm.	8.8

Table 2 Debitage Size and Weight

	Recovered in ¼ inch screen						Not Recovered
No.	½cm²	½-1cm²	1-2cm²	2-3cm²	3cm²	Wt.(g)	Wt.(g)
1 Perc.	4	24	10	1	0	9.7	6.7
Pres.	1	0	0	0	0	0.1	3.9
2 Perc.	0	12	14	2	0	11.6	8.8
Pres.	0	0	0	0	0	0.0	3.7
3 Perc.	5	45	21	6	3	29.4	16.0
Pres.	0	2	0	0	0	0.3	4.7
4 Perc.	2	58	40	17	10	94.5	24.5
Pres.	0	2	0	0	0	0.3	6.4

Table 3 Percentage Debitage Recovered by Manufacture by Weight

No.	Percussion	Pressure	Combined
1	59.1	2.5	48.0
2	56.9	0.0	48.1
3	64.8	6.0	58.9
4	79.4	4.5	75.4

Table 4 Percentage Debitage Recovered of Total by Weight (g)

No.	Percussion	Pressure	Total
1	98.9	1.1	100.0
2	100.0	0.0	100.0
3	98.9	1.1	100.0
4	99.7	0.3	100.0

APPENDIX E

Lanceolate Projectile Point Data

Column

1) NO Artifact Number

2) L Length (mm)

3) W Width (mm)

4) T Thickness (mm)

5) L/W Length to Width Ratio

6) W/T Width to Thickness Ratio

7) MAXW Ratio of the distance from the base to the widest place on the projectile point divided by total length L.

8) MAXT Ratio of the distance from the base to the thickest place on the projectile point divided by total length L.

9) WT Weight (gr)

10) XS Cross section measured at the widest place on the projectile point. Four classes 1)biconvex, 2) diamond-shaped, 3)planoconvex, 4)triangular. Thin, lenticular specimens were classed as biconvex.

11) MAT Material, one of 1)obsidian, 2)cryptocrystalline, 3)basalt

12) SER Serration, either 1) not serrated, or 2) serrated.

13) FLAK Degree of pressure flaking, either 1)100%, or 2) less than 100%.

14) P Flaking pattern, either 1) random, or 2) diagonal from at least one edge, if not more.

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	WS	MAT	SER	FLAK	P
					APPLEGATE JA-52 06A								
J-2539	52	19	9	2.7	2.1	.38	.31	7.9	2	2	1	1	2
K-0795	54	17	8	3.2	2.1	.41	.41	5.8	3	2	1	1	2
D-0221	52	15	8	3.5	1.9	.42	.33	5.3	4	2	1	1	1
J-3509	-	21	8	-	2.6	-	-	-	3	2	2	2	1
J-4129	41	17	8	2.4	2.1	.39	.46	4.2	1	2	1	1	1
C-0376	34	15	8	2.3	1.9	.41	.35	4.0	3	2	1	1	2
J-5032	30	13	7	2.3	1.9	.47	.37	2.8	1	2	2	1	2
K-0988	41	17	7	2.4	2.4	.51	.39	4.2	3	2	1	1	2
C-0409	-	18	8	-	2.3	-	-	-	1	2	1	1	2
J-3684	-	14	6	-	2.3	-	-	-	1	2	2	1	1
J-4316	-	13	7	-	1.9	-	-	-	1	2	1	1	2
J-3757	-	17	8	-	2.1	-	-	-	3	2	1	2	2
J-1828	-	15	5	-	3.0	-	-	-	1	2	1	1	2
J-2640	-	21	10	-	2.1	-	-	-	1	2	2	1	2
J-3877	-	20	9	-	2.2	-	-	-	2	2	1	1	2
K-0721	-	17	8	-	2.1	-	-	-	2	2	1	1	2
J-3217	-	16	8	-	2.0	-	-	-	1	2	2	1	1
J-5209	-	16	6	-	2.7	-	-	-	1	2	1	1	2
J-5311	-	13	5	-	2.6	-	-	-	1	2	2	1	2
J-5243	-	13	4	-	3.3	-	-	-	4	1	1	1	2
J-5162	-	17	8	-	2.1	-	-	-	3	2	1	1	2
J-1125	-	17	7	-	2.4	-	-	-	1	2	1	1	2
J-0250	-	19	7	-	2.7	-	-	-	3	2	1	1	1
J-4001	-	20	9	-	2.2	-	-	-	3	2	1	1	1
J-2210	-	18	7	-	2.6	-	-	-	1	2	1	1	1
					JA-52 06B								
J-5346	36	15	8	2.4	1.9	.42	.33	3.5	3	2	1	1	2
D-0213	-	16	7	-	2.3	-	-	-	1	2	1	1	2
					JA-52 06C								
K-0270	-	15	7	-	2.1	-	-	-	1	1	2	1	2
J-4588	32	16	6	2.0	2.7	.44	.41	2.8	1	1	2	1	1
K-0750	24	12	6	2.0	2.0	.50	.67	2.0	3	1	2	1	2
J-4732	25	13	5	1.9	2.6	.40	.36	1.9	4	1	2	1	1
K-0203	-	10	4	-	2.5	-	-	-	3	2	2	1	1
K-0504	-	12	5	-	2.4	-	-	-	3	2	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					JA-47 06A								
K-0575	-	14	7	-	2.0	-	-	-	1	2	1.	1	2
0-0541	-	17	10	-	1.7	-	-	-	3	2	2	1	1
N-1971	-	18	7	-	2.6	-	-	-	3	1	2	1	2
N-1970	-	18	8	-	2.3	-	-	-	1	2	1	1	1
					JA-47 06B								
N-1075	41	16	8	2.6	2.0	.41	.41	4.0	3	2	2	1	2
					JA-47 06C								
N-1988	34	15	7	2.3	2.1	.44	.53	3.2	1	2	2	1	1
N-2057	27	12	7	2.3	1.7	.41	.41	2.0	3	2	2	1	2
N-1449	30	13	5	2.3	2.6	.37	-	1.8	1	2	2	1	1
N-2047	27	13	5	2.1	2.6	.44	-	2.1	3	2	2	1	2
N-1879	31	12	4	2.6	3.0	.39	.42	1.6	1	2	2	1	2
N-1694	34	10	5	3.4	2.0	.44	.41	1.7	3	2	2	1	1
N-1932	26	10	4	2.6	2.5	.46	-	1.0	1	2	2	1	1
N-1422	27	10	6	2.7	1.7	.44	.44	1.9	1	2	2	1	2
N-1653	30	13	5	2.3	2.6	.37	-	-	1	1	2	2	1
JA-014	24	9	4	2.7	2.3	.42	.29	.8	1	1	2	1	1
0-0486	19	10	6	1.9	1.7	-	-	1.2	1	1	2	1	1
0-1078	22	11	5	2.0	2.2	.50	.50	1.1	1	1	2	1	1
					JA-47 06D								
N-1170	32	17	6	1.9	2.8	.31	.50	3.0	1	1	2	1	2
N-1903	35	16	6	2.2	2.7	-	-	3.3	3	1	2	2	1
N-1433	27	18	5	1.5	3.6	.33	.67	2.2	1	1	2	1	1
000051	27	19	5	1.4	3.8	.30	.41	2.1	1	1	2	1	1
0-0573	28	20	7	1.4	2.9	.39	.21	3.9	3	1	2	2	1
N-2071	30	16	4	1.9	4.0	.37	.50	2.1	1	1	2	1	1
N-1606	27	14	3	1.9	4.7	.48	.30	1.4	1	1	2	2	2
N-1943	25	12	2	2.1	6.0	.44	.40	1.0	1	1	2	2	1
N-2079	22	12	4	1.8	3.0	.45	.45	.9	1	1	2	1	1
N-0942	27	17	4	1.6	4.3	.26	.19	1.8	4	1	2	1	2
N-1675	28	17	5	1.6	3.4	-	.50	2.3	3	1	2	1	2
N-1354	29	15	5	1.9	3.0	.48	-	2.3	3	1	2	1	2
000005	-	18	5	-	3.6	-	-	-	1	1	2	2	1
N-1957	-	16	6	-	2.7	-	-	-	3	1	2	2	1
N-1052	-	17	5	-	3.4	-	-	-	3	1	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					JA-47 06E								
N-1514	21	9	3	2.3	3.0	.29	.62	.7	1	1	2	2	1
N-0041	12	8	3	1.5	2.7	-	-	.5	1	2	2	1	1
N-1960	14	9	3	1.6	3.0	.50	.29	.5	3	1	2	1	1
0-0691	16	9	2	1.8	4.5	.50	.31	.4	1	2	2	1	1
N-1488	18	10	5	1.8	2.0	-	-	.9	1	2	2	1	2
N-2053	21	9	3	2.3	3.0	.33	.33	.6	3	1	2	1	2
N-0456	18	9	3	2.0	3.0	.33	.11	.7	1	2	2	1	1
N-0005	14	9	3	1.6	3.0	-	-	.5	1	2	2	1	1
N-1468	18	9	4	2.0	2.3	-	-	.7	3	1	2	1	1
N-1096	-	8	3	-	2.7	-	-	-	1	1	2	1	1
47-011	17	7	3	2.4	2.3	.41	.29	.5	1	1	2	1	2
0-0008	18	8	3	2.3	2.7	-	-	.6	3	1	2	2	1
N-1775	16	9	3	1.8	3.0	-	-	.4	3	1	2	2	1
N-0580	17	9	5	1.9	1.8	.59	.41	.7	3	2	2	1	1
N-1790	15	8	2	1.9	4.0	.47	.40	.3	3	1	2	2	1
0-0783	18	9	4	2.0	2.3	.44	.28	.6	1	1	2	2	1
N-1485	13	7	2	1.9	3.5	.38	-	.3	1	1	2	2	1
0-1093	-	8	3	-	2.7	-	-	-	1	1	2	2	1
0-0974	15	7	3	2.1	2.3	.47	.60	.4	3	1	2	2	1
0-0714	15	7	3	2.1	2.3	.20	.20	.4	3	1	2	1	1
N-1466	13	9	3	1.4	3.0	-	-	.3	3	1	2	2	1
N-1533	12	7	2	1.7	3.5	-	-	.3	1	1	2	2	1
N-1976	12	9	4	1.3	2.3	-	-	.3	1	1	2	1	1
N-0558	12	7	2	1.7	3.5	.33	.8	.2	3	1	2	1	1
0-1005	12	8	3	1.5	2.7	.33	-	.3	1	1	2	1	1
N-1753	13	6	2	2.2	3.0	.54	-	.3	1	1	2	1	1
0-0634	13	8	3	1.6	2.7	.46	.31	.4	2	1	2	1	1
					JA-47 06F								
N-2020	26	15	10	1.7	15	.50	69	67	3	2	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					GOLD HILL SITE								
1-0369	37	14	8	2.6	1.8	.41	.38	4.2	3	2	2	1	1
1-0302	38	16	8	2.4	2.0	.32	.50	4.2	4	2	2	1	1
1-0357	35	15	6	2.3	2.5	.37	.37	2.9	3	2	2	1	1
1-0348	33	14	7	2.4	2.0	-	-	3.4	1	2	2	1	1
1-0368	31	13	7	2.4	1.9	.42	.61	2.8	3	2	2	1	1
1-0369	32	11	7	2.9	1.6	.50	.38	2.3	2	2	2	1	1
1-0364	26	10	7	2.6	1.4	.42	.50	1.8	3	2	2	1	1
1-0343	30	16	6	1.9	2.7	.33	.33	2.3	1	2	2	1	1
1-0302	30	15	6	2.0	2.5	.43	.43	2.7	1	2	2	1	2
1-0369	27	15	6	1.8	2.5	.44	.44	2.2	2	2	2	1	2
1-0369	27	12	5	2.3	2.4	-	-	1.8	3	2	2	1	1
1-0302	25	12	5	2.1	2.4	.60	.40	1.4	1	2	2	1	1
1-0369	24	12	5	2.0	2.4	.46	.38	1.5	2	2	2	1	2
1-0286	24	12	6	2.0	2.0	.29	.42	1.7	1	2	2	1	1
1-0342	39	19	8	2.1	2.4	.46	.28	5.6	3	2	2	1	1
1-0338	34	16	8	2.1	2.0	.47	.44	4.1	1	2	2	1	1
1-0363	40	17	10	2.4	1.7	-	-	5.3	1	2	2	1	1
1-0324	29	16	6	1.8	2.7	.45	-	3.0	1	2	2	1	1
1-0275	44	16	6	2.8	2.7	.34	.55	3.7	1	2	2	1	2
1-0298	28	14	5	2.0	2.8	.50	.46	2.1	1	2	2	1	1
1-0295	30	13	5	2.3	2.6	.57	-	2.3	3	2	2	1	1
1-0333	22	11	5	2.0	2.2	.45	.55	1.3	1	2	2	1	2
1-0369	28	13	6	2.2	2.2	.68	.43	2.5	1	2	2	1	1
1-0302	25	11	6	2.3	1.8	.28	.28	1.7	1	2	2	1	1
1-0284	26	10	5	2.6	2.0	.46	.54	1.6	1	2	2	1	1
1-0360	24	12	6	2.0	2.0	.33	.67	2.0	1	2	2	1	1
1-0312	25	12	5	2.1	2.4	.40	.48	1.4	1	2	2	1	1
1-0369	29	16	6	1.8	2.7	-	-	3.3	1	2	2	1	1
1-0277	38	15	6	2.5	2.5	.34	.32	2.9	1	1	2	1	2
1-0332	38	13	5	2.9	2.6	.34	.24	1.8	3	1	2	1	2
					FAR HILLS RANCH JA-25								
012230	36	13	7	2.8	1.9	.42	.36	3.3	1	2	2	1	1
012730	31	12	6	2.6	2.0	.48	.52	2.5	3	2	2	1	1
012730	35	17	8	2.1	2.1	.31	.46	4.2	1	2	2	1	2
012230	29	12	6	2.4	2.0	.41	.48	2.3	1	2	2	1	2
012232	25	14	6	1.8	2.3	-	-	2.0	1	2	2	1	1
012326	29	15	5	1.9	3.0	.34	-	2.3	1	2	2	1	1
012232	34	14	6	2.4	2.3	-	-	3.1	1	2	2	1	2
012032	-	12	6	-	2.0	-	-	-	3	2	2	1	2
012326	-	12	5	-	2.4	-	-	-	3	2	2	1	1
012300	-	15	6	-	2.5	-	-	-	3	2	2	1	1
25-251	-	13	7	-	1.9	-	-	-	1	2	2	1	2
012030	-	15	8	-	1.9	-	-	-	1	2	2	1	1
012232	-	12	6	-	2.0	-	-	-	3	2	2	1	2
012232	-	12	7	-	1.7	-	-	-	3	2	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					LOST CREEK JA-5								
000046	26	12	4	2.2	3.0	.46	.42	1.3	1	2	2	2	1
000026	29	12	5	2.4	2.4	.52	.17	2.0	3	2	2	1	1
000005	-	11	6	-	1.8	-	-	-	3	2	2	1	1
000087	25	15	7	1.7	2.1	.44	.28	2.7	1	2	2	1	2
					JA-6								
100-18	32	14	7	2.3	2.0	.34	.44	2.6	3	2	2	1	1
152-18	32	13	7	2.5	1.9	.47	.34	2.8	3	2	2	1	1
100-18	28	11	6	2.5	1.8	-	-	1.8	1	2	2	1	2
					JA-7								
-78-2	33	10	6	3.3	1.7	.42	.39	1.6	1	2	2	1	1
					JA-18								
111-38	23	13	6	1.8	2.2	.43	.57	1.9	1	2	2	1	1
148-60	-	12	6	-	2.0	-	-	-	1	2	2	1	2
					JA-19								
324013	35	14	5	2.5	2.8	.46	-	2.4	3	2	2	1	1
324014	31	15	7	2.1	2.1	.32	-	3.8	1	2	2	1	1
343813	27	13	6	2.1	2.2	-	-	2.2	1	2	2	1	2
323914	-	14	6	-	2.3	-	-	-	3	2	2	1	2
1025-2	-	12	7	-	1.7	-	-	-	1	2	2	1	2
1025-3	-	14	7	-	2.0	-	-	-	1	2	2	1	1
324023	-	12	5	-	2.4	-	-	-	1	2	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					JA-23								
505613	28	13	5	2.2	2.6	.39	.54	1.7	3	2	2	2	1
505012	-	13	5	-	2.6	-	-	-	3	2	2	1	1
5052-4	-	10	5	-	2.0	-	-	-	1	2	2	1	1
					JA-14								
000045	31	12	4	2.6	3.0	-	-	1.9	1	2	2	1	1
					ELK CREEK JA-26								
58X849	29	12	5	2.4	2.4	.45	.31	1.7	3	1	2	1	2
8-0009	31	13	5	2.4	2.6	.42	.45	1.9	1	2	2	1	2
4-0015	23	12	6	1.9	2.0	.43	-	1.8	3	2	2	1	1
3-0012	31	13	8	2.4	1.6	.48	.48	2.9	2	1	2	1	1
1-0002	27	13	6	2.1	2.2	-	-	1.7	1	2	2	1	1
8-0002	25	12	5	2.1	2.4	.48	-	1.5	1	1	2	1	1
					JA-10B								
000083	27	13	6	2.1	2.2	.52	.48	2.1	1	2	2	1	2
000085	-	14	5	-	2.8	-	-	-	1	1	2	1	1
000086	-	12	4	-	3.0	-	-	-	1	1	2	2	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					SALT CAVE LOCALITY TYPE 19								
Y3-026	44	14	8	3.1	1.8	.55	.50	3.8	2	1	2	1	1
H2-004	38	13	7	2.9	1.9	.34	.37	3.0	1	1	2	1	1
L3-039	35	12	6	2.9	2.0	.54	.51	2.4	4	1	2	1	1
					TYPE 20								
8-2-24	49	14	6	3.5	2.3	.29	.41	3.8	3	2	2	1	2
Q3-003	38	14	4	2.7	3.5	.39	.21	1.9	1	1	2	2	1
					TYPE 22								
T2-011	31	16	6	1.9	2.7	.39	.65	2.3	1	1	2	1	1
2-34-2	29	12	5	2.4	2.4	.38	.41	1.7	3	1	2	1	1
41-004	32	15	7	2.1	2.1	.38	.44	2.7	1	1	2	1	1
Q4-003	33	15	5	2.2	3.0	.39	.18	1.8	4	1	2	2	1
P3-001	34	13	5	2.6	2.6	.41	.35	2.0	3	1	2	1	1
P2-009	29	14	7	2.1	2.0	.52	.55	2.0	2	1	2	1	1
T2-008	24	13	5	1.8	2.6	.38	.33	1.5	1	1	2	1	2
L1-014	29	12	6	2.4	2.0	.34	.21	1.5	4	1	2	1	1
					NIGHTFIRE ISLAND COTTONWOOD LEAF-SHAPE								
313-02	35	17	6	2.1	2.8	.03	.51	3.5	1	1	2	2	1
262-01	36	12	5	3.0	2.4	.39	.14	2.0	3	1	2	1	2
263-02	33	15	5	2.2	3.0	.33	.30	2.0	3	1	2	1	2
396-01	26	11	4	2.4	2.8	.35	.27	1.0	1	1	2	2	1
590-02	38	12	7	3.2	1.7	.39	.29	3.0	3	1	2	1	2
12-003	30	16	6	1.9	2.7	.17	-	3.3	1	1	2	1	2
594-01	30	13	5	2.3	2.6	.23	.37	1.8	1	1	2	1	2
590-03	28	13	6	2.2	2.2	.32	.46	1.9	3	1	2	1	2
145-04	25	14	4	1.8	3.5	.32	.32	1.4	4	1	2	2	1
223-05	35	16	7	2.2	2.3	.34	.34	3.0	1	1	2	1	2
182-02	35	14	6	2.5	2.3	.34	.23	2.6	1	1	2	1	1
257-04	35	15	7	2.3	2.1	.43	.40	3.0	4	1	2	1	2
116-05	32	14	4	2.3	3.5	.41	.47	1.4	4	1	2	2	1
116-04	27	13	3	2.1	4.3	.33	-	1.2	1	1	2	2	1
T-0008	29	16	7	1.8	2.3	.38	.38	2.9	3	1	2	2	1
432-01	37	14	6	2.6	2.3	.43	.51	3.0	1	1	2	1	2
70-008	26	17	4	1.5	4.3	.27	-	1.7	1	1	2	1	2
33-001	35	13	5	2.7	2.6	.34	.46	2.1	4	1	2	1	2
556-06	33	15	3	2.2	5.0	.36	.15	1.7	1	1	2	2	1
287-03	32	15	5	2.1	3.0	.41	-	2.3	1	1	2	1	2

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					NIGHTFIRE ISLAND "CASCADES"								
546U6A	46	18	7	2.6	2.6	.48	.37	4.6	4	1	2	1	2
381Y80	40	17	7	2.4	2.4	.45	.32	3.8	3	1	2	1	2
545-U2	67	19	8	3.5	2.4	.48	.42	9.8	4	1	2	2	1
454-R2	41	19	7	2.2	2.7	.44	.39	5.5	1	1	2	1	1
B4D521	40	15	8	2.7	1.9	.27	.30	3.7	3	1	2	1	2
K34131	40	14	7	2.9	2.0	.42	.48	3.8	2	1	2	2	1
J42624	41	16	7	2.6	2.3	.46	.32	4.8	4	1	2	2	1
V3-4-3	42	15	6	2.8	2.5	.40	.26	3.1	3	1	2	1	2
C33463	46	20	7	2.3	2.9	.39	.39	5.1	1	1	2	1	2
910-10	41	14	6	2.9	2.3	.44	.46	3.8	1	1	2	1	2
262-03	44	16	5	2.8	3.2	.45	.30	3.0	4	1	2	2	1
138-11	47	16	5	2.9	3.2	.43	.43	4.0	1	3	2	1	1
362-01	39	14	7	2.8	2.0	.33	.46	2.9	3	1	2	1	2
529-02	46	16	5	2.9	3.2	.41	.28	3.7	1	1	2	1	2
529-01	52	15	6	3.5	2.5	.54	.31	5.1	3	1	2	2	1
134-01	56	20	9	2.8	2.2	.36	.46	8.5	1	2	1	1	2
570-01	38	14	6	2.7	2.3	.50	.45	2.9	3	1	2	1	2
111-01	38	17	5	2.2	3.4	.39	.26	3.0	4	1	2	1	2
531-01	52	18	10	2.9	1.8	.52	.44	7.0	1	1	2	1	2
568-01	39	15	5	2.6	3.0	.38	.36	2.9	4	1	2	1	2
379-01	50	14	5	3.6	2.8	.20	.50	3.2	3	1	2	1	2
141-02	51	18	5	2.8	3.6	.39	-	4.4	1	1	2	1	2
182-01	52	16	5	3.3	3.2	.29	.35	4.7	3	1	2	1	2
181-02	40	15	6	2.7	2.5	.42	.27	3.3	1	1	2	2	1
400-11	47	20	7	2.4	2.9	.36	.30	5.8	3	1	2	1	2
57-001	42	18	7	2.3	2.6	.43	.43	4.6	1	1	2	1	2
556-05	39	16	6	2.4	2.7	.51	.41	3.1	3	1	2	2	1
667-01	41	12	5	3.4	2.4	.37	.32	2.7	1	1	2	1	2
57-004	40	15	6	2.7	2.5	.38	.27	2.9	1	1	2	2	1
556-04	47	20	9	2.4	2.2	.45	.53	6.9	1	1	2	1	1

NO	L	W	T	L/W	W/T	MAXW	MAXT	WT	XS	MAT	SER	FLAK	P
					UMPQUA EDEN 1.13								
B-0053	42	16	6	2.6	2.7	.38	.55	3.1	1	1	2	1	2
000049	38	13	6	2.9	2.2	.42	.24	2.6	3	2	2	1	2
4-0012	24	7	4	3.4	1.8	.50	.46	.7	1	2	2	1	1
5E-017	35	13	4	2.7	3.3	.46	-	1.8	1	2	2	1	2
					UMPQUA EDEN 1.14								
4-0011	27	14	5	1.9	2.8	.37	.37	1.6	1	2	2	1	2
B-0001	27	10	4	2.7	2.5	.41	.37	.9	1	2	2	1	2
4-0010	28	15	5	1.9	3.0	.50	.46	2.1	1	2	2	1	1
					GRANITE POINT 45WT41								
001232	54	18	5	3.0	3.6	.41	.33	-	1	2	2	1	1
001088	63	18	6	3.5	3.0	.40	.29	-	1	2	1	1	2
000C10	45	17	7	2.6	2.4	.44	.42	-	1	2	2	1	1
000C69	66	20	5	3.3	4.0	.44	.53	-	4	2	2	2	1
000171	41	16	4	2.6	4.0	.39	.29	-	4	3	1	2	1
001148	45	17	4	2.6	4.3	.44	.53	-	4	3	1	2	1
001054	36	17	5	2.1	3.4	.42	.28	-	3	3	2	1	1
000C18	55	15	6	3.7	2.5	.40	.36	-	3	2	2	1	1
000062	37	15	8	2.5	1.9	.41	.62	-	3	2	1	1	1
000921	40	14	7	2.9	2.0	.38	.55	-	2	3	2	1	1
001048	37	16	6	2.3	2.7	.38	.35	-	3	3	2	1	1
000481	34	16	4	2.1	4.0	.35	.53	-	1	3	2	1	1
000263	72	21	10	3.4	2.1	.42	.56	-	3	3	2	1	1
001036	48	12	5	4.0	2.4	.31	.31	-	3	2	1	1	1
001024	72	19	6	3.8	3.2	.42	.51	-	3	3	1	1	1
001001	56	16	7	3.5	2.3	.36	.34	-	3	2	2	1	2
000964	36	16	5	2.3	3.2	.36	.56	-	3	2	2	1	1