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ETHNOBOTANY OF THE MAKAH AND OZETTE PEOPLE, OLYMPIC PENINSULA, WASHINGTON (USA)

Washington State University PH.D. 1983

ETHNOBOTANY OF THE MAKAH AND OZETTE PEOPLE, OLYMPIC PENINSULA, WASHINGTON (USA)

By

STEVEN J. GILL

A thesis submitted in partial fulfillment of
the requirements for the degree of

Doctor of Philosophy

WASHINGTON STATE UNIVERSITY
Department of Botany

1983

To the Faculty of WASHINGTON STATE UNIVERSITY:

The members of the committee appointed to examine the thesis of STEVEN J. GILL find it satisfactory and recommend that it be accepted.

Chairman

ACKNOWLEDGMENTS

The creation of this doctoral dissertation would not have been possible without the assistance of numerous people. First I wish to thank the members of my committee: Drs. Amy Jean Gilmartin, Richard D. Daugherty, and Richard N. Mack. Dr. Gilmartin, my chairperson, has consistently provided support and guidance throughout my graduate career at Washington State University. It was with her encouragement that I decided to pursue ethnobotanical research at Washington State University. Dr. Mack provided guidence and education in the discipline of plant community ecology that have proven most helpful in this and other research projects. He also helped me write more concisely with numerous suggestions and constructive critisism. As director of the Ozette Archaeological Project, Dr. Daugherty provided financial assistance for the archaeobotanical portion of my research. He also provided much guidance and advice concerning Pacific Northwest archaeology. All three have provided the moral support and encouragement that is so necessary in an undertaking of this kind. I would also like to thank Dr. Ronald Adkins, the Graduate School representative at my final oral examinination, for several helpful suggestions concerning this manuscript. I would like to acknowledge with gratitude partial financial support of this research provided by the Marion Ownbey Herbarium, the Department of Botany, and the Graduate Student Travel Fund, all of Washington State University.

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Perhaps the majority of assistance during my research came during my study of Makah - Ozette ethnobotany in the historic period. This research would have been impossible without the generous assistance and cooperation of the Makah Tribe. I shall never forget the generous

hospitality of this community. A special thanks goes of course to the many consultants who help with this project. Their names may be found in the methods chapter of part 2. Many people also guided me in the analysis and transcription of my data, particularly the linguistic data. These people include Arlingtion Flinn, Jr., John Thomas, Helma Ward, Hildred Ides, Maria Parker, Meredith Parker, Helen Peterson, Geoffrey Gamble, and Ann Renker. I would also like to thank Arlington Flinn, Jr., Greig Arnold, the Makah Language Program Staff, and The Makah Cultural and Research Center Staff for making their facilities available to me. The Makah Language Program and Sigma Xi provided funding for portions of this phase of my research. For this assistance I am most grateful.

Dozens of individuals, many unknown to me, collected seed and other plant samples during the years of excavation at Ozette. To these people, I express many thanks. I also wish to express my gratitude to the members of the Ozette staff who shared their knowledge of the site with me, and with whom I had many valuable discussions. I would especially like to thank Steve Samuels, David Huelsbeck, Gary Wessen, Gloria Gould-Wessen, Ray Depuydt, and Paul and Madge Gleeson. For sorting and counting numerous seeds, I thank Abdi Afshar and Angie Cole many times.

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Norton, Robert Brebner, and Nelsa and Buck Buckingham, to mention but a few.

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ETHNOBOTANY OF THE MAKAH AND OZETTE PEOPLE, OLYMPIC PENINSULA, WASHINGTON (USA)

ABSTRACT

by Steven J. Gill, Ph. D.
WASHINGTON STATE UNIVERSITY, 1983

Chairman: Amy Jean Gilmartin

In part 1 of a 3-part study on the ethnobotany of the Makah and Ozette people; data concerning distribution, habitats, abundance, and phenology are presented for 398 vascular taxa represnting 82 families, 228 genera, and 384 species. Along the coast plant community types include stands of the Picea sitchensis - Polystichum munitum habitat type, the P. sitchensis - Gaultheria shallon and P. sitchensis - Carex obnupta community types, and communities of coastal dunes, talus slopes, and tidal marshes. Inland most undisturbed vegetation is dominated by Tsuga heterophylla or T. heterophylla and Thuja plicata. At Cape Alava the understory dominant is usually Blechnum spicant. Prairies, particularly near Ozette, are dominated by an ericaceous flora with Pteridium aquilinum important or even dominant in drier areas.

Part 2 concerns traditional uses and names of plants by the Makah - Ozette people during the historic period. These data and original data from the Nitinaht are compared to available information for neighboring

peoples derived from published accounts. Both the Makah and Nitinaht had a detailed knowledge of plants occuring in their territories. Plants were vitally important resources in these cultures. The botanical nomenclature and classification systems of the Makah and Nitinaht follow the system of classification proposed by Berlin, Breedlove, and Raven (1974). This is significant as most ethnophytotaxonomic studies are from agricultural societies located in tropical and subtropical areas. The view that the system proposed by Berlin et al. is universal in all languages is supported.

Part 3 describes analyses of an estimated 448,943 seeds that were recovered and identified from the Ozette Village Site. Rubus spectabilis, Sambucus racemosa var. arborescens, Gaultheria shallon, and Vaccinium spp. comprised 99.7% of the seeds recovered. These species could have been procured locally and apparently were important food items. Recommendations are made concerning the collection of archaeobotanical samples from coastal wet sites.

TABLE OF CONTENTS

CHAPTER

PART 2

MAKAH - OZETTE AND NITINAHT ETHNOBOTANY IN THE HISTORIC PERIOD 1792 - 1982

CHAPTER

PART 3

BOTANICAL REMAINS FROM THE OZETTE VILLAGE SITE (45CA24)

LIST OF TABLES

PART 1

PART 3

LIST OF ILLUSTRATIONS

PART 1

PART 3

CHAPTER 1

GENERAL INTRODUCTION

The purpose of this study is to describe and provide an understanding of the utilization of botanical resources by the Makah and Ozette people. Plants were used for food, shelter, technological raw materials, medicine, art, ceremonial and religious activities, and fuel. The importance of botanical resources to native peoples in the Pacific Northwest has often been ignored by the region's ethnographers. However, as pointed out by Norton and Gill (1981), plants were critically important resources for native peoples in the Pacific Northwest. These people perceived as valuable many botanical resources which were overlooked or utilized in a very different manner by the Euro-americans who entered the region during the nineteenth century.

In the Pacific Northwest, plants were cultivated, transplanted, and managed through burning and thinning (Collins 1974:57; Cooper 1859:19; Duff 1952:73; French 1965; Norton 1979b; Reagan 1934:56-57; Suttles 1951a:60-61; Turner 1975:81, 164; White 1975). Rights to these botanical resources were often owned and inherited, and some plots were bounded, marked, and cleared (Collins 1974:55-56; Suttles 1951a:58, 60; 1955:27; Turner 1975:23, 58, 81, 164, 200, 221; Turner and Taylor 1972:249). Norton and Gill (1981:118) describe the importance of plant foods to maintaining healthy human populations, stating:

> The plants selected, prepared, and processed for food by the Native peoples supplied them with necessary nutrients not readily available from animal sources. While the nutritional value of

these foods has been disregarded or overlooked by the majority of contemporary researchers, analyses show that many of the plant resources would have made valuable and necessary contributions to the diet. Plant foods were indispensable for maintaining healthy, viable populations in the Pacific Northwest; contributing necessary fiber and nutrients to the diet, such as ascorbic acid and iron, which are lacking in the noted staple, salmon.

A major goal of this study is to determine how the Makah and Ozette People interacted with the botanical resources available to them. More specifically, this study attempts to answer the following questions: what plants did the Makah and Ozette People utilize for food and other purposes, how were these resources utilized, when and where were these resources available for exploitation, in what level of abundance did they occur, and what role did specific plants play in Makah - Ozette culture?

The results of this study are presented in three parts. In order to explore adequately ethnobotanical questions, the investigator must have access to detailed botanical information for the area under consideration. These botanical data were necessary in order to interpret ethnological information and archaeological materials collected during the study. Since the traditional territory of the Makah and Ozette People had never been adequately surveyed botanically, a thorough botanical study of this area was undertaken. Results are in Part I.

Prior to the current investigation, Makah ethnobotany has been poorly understood. For this reason and because it is necessary to have a reliable model of plant use patterns to interpret accurately archaeobotanical materials, interviews were conducted with 17 Makah and Nitinat consultants on this subject. The data collected from these interviews as well as those contained in the literature are presented in Part II.

The low importance attributed to botanical resources and their utilization by many students of Pacific Northwest cultures may be due in part to the paucity of botanical data assembled from most archaeological sites in the region. This lack of data may have contributed to the general belief among many scholars (e. g., Drucker 1951:62-63; Friedman 1976:205-208; Gleeson 1980:2, 7; Suttles 1968:61) that plant resources made insignificant contributions to precontact life. Because of the excellant preservation of plant materials, the Ozette Village Site provides a unique opportunity to study botanical resource utilization in a prehistoric context on the Northwest Coast. A description and interpretation of the plant materials recovered from the Ozette Village Site is provided in Part III of this report.

PART 1

BOTANICAL SURVEY OF TRADITIONAL MAKAH / OZETTE TERRITORY

CHAPTER 1

INTRODUCTION AND PHYSICAL ENVIRONMENT

Specific plant communities are fundamentally the result of interactions between two factors: (1) differences in the ecological amplitudes of the various taxa comprising the flora, and (2) the heterogeneity of the environment (Daubenmire 1968:3). In order to explain the vegetation of the study area, a brief description of the physical environment is provided.

Physical Setting and Geology

The study area is roughly a triangular-shaped region extending from Sekiu in the east to Tattosh Island in the northwest to the southern end of Lake Ozette in the southwest, on the extreme northwest corner of the Olympic Peninsula, Washington (Figure 1, 2, 3, and 4).

The topography in much of the region consists of steep, well drained slopes, varying from near sea level to about 580 meters.

Most of the bedrock in the study area is sedimentary in origin. Early workers recognized that the rocks along the coast had been folded and faulted, but apparently did not understand the complexity and intensity of these deformations (Weissenborn & Snavely 1968:F11). Cape Flattery and most of the study area along the Strait of Juan de Fuca is part of the Clallam Formation of Oligocene - Miocene age consisting of conglomerates, sandstones, and shales (Arnold 1906:458, 461-462). From

the Hoko River mouth to Clallam Bay are Pliocene conglomerates (Arnold 1906:465).

South of these deposits occurs a band of Eocene marine basalts known as the Crescent (McKee 1972:168) or Metchosin (Danner 1955:31) Formation, exposed in the study area on the southern portion of Cape Flattery (Weissenborn & Snavely 1968:F6). Basaltic rocks are also exposed at Point of Arches and Portage Head (Danner 1955:64; Weissenborn & Snavely 1968:F6). They have been intensively sheared, and, in most localities, altered to greenstone (Weissenborn & Snavely 1968:F6). It is not clear whether these basalts are part of the Crescent/Metchosin (Danner 1955:31, 64; Weissenborn & Snavely 1068:F6) or Solduck (McKee 1972:168) Formation.

Extending southwest of the Crescent Formation from near the Waatch River mouth to approximately the Ozette River are Eocene and Oligocene marine sedimentary and, less frequently, volcanic rocks (McKee 1972:168). During the Pleistocene all of the study area was covered by ice of the Vashon Stade of the Fraser Glaciation (Armstrong et al. 1965). At Cape Alava and Lake Ozette most of the area is overlain with thick Pleistocene glacial and alluvial deposits, these sediments also occur further to the north in inland areas (McKee 1972:168; Weissenborn & Snavely 1968:F4). The coastline is extremely variable: cliffs 20 - 80 m tall occur on the western edge of Cape Flattery, steep, eroding banks are found between Cape Alava and the Ozette River mouth, and regions of sand deposition occur, for example, at Sand Point. Along much of the coast there is a flat, rocky, wave-cut platform that is partially exposed during low tide. At Cape Alava this platform extends to 3 km from shore (Arnold 1906:455-456;

Weissenborn & Snavely 1968:F4), and often up to 1 km of it is exposed at low tide. The lower portion of the Waatch drainage, from near Neah Bay southwest to its mouth, forms an extensive tidal marsh occasionally flooded with sea water during storm tides. Unlike much of the Olympic Peninsula, there are no major rivers in the study area with extensive terrace development such as occur along the Hoh, Quilleute, and Quinault drainages to the south. However, the smaller Ozette, Tsues, Waatch, Sekiu, and Hoko Rivers have all or part of their courses in the area of interest. There are also a few small lakes and numerous creeks in the region. Prominent in the southwest portion of the study area is Lake Ozette with a north-south distance of just over 13 km. Several small prairies also occur in this region, particularly in the Ozette area (more information provided in Chapter 5). Their origins are probably various, and it is not unlikely that indigenous human populations played a role in the development of these areas.

Climate

The climate along the Washington Coast is mild, wet, and maritime, characterized by relatively warm rainy winters and cool moist summers. Three weather stations are located in the general area of interest and together provide over 100 years of data as well as illustrate macroclimatic differences within the area. The localities of these stations are (1) Tatoosh Island, (2) about 1.6 km east of Neah Bay, and (3) about 1.6 km north-northeast of Clallam Bay. In addition, from 1977 to mid-1981, Karen Underwood kept precipitation and temperature records at the Ozette Ranger Station, which is located about 4.5 km inland from the

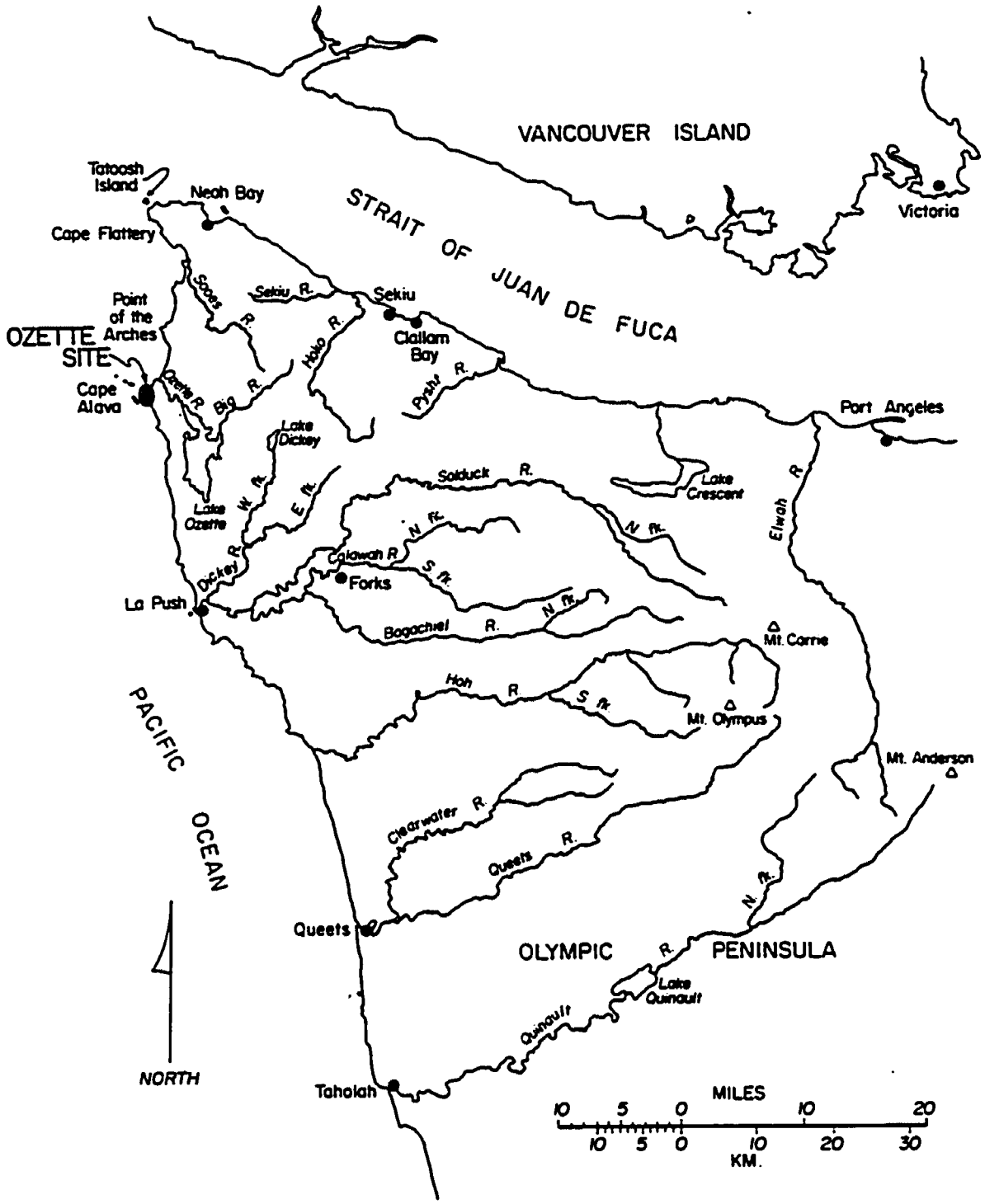

Figure 1. Map of Northwestern Olympic Peninsula

(from Samuels 1983, used with permission)

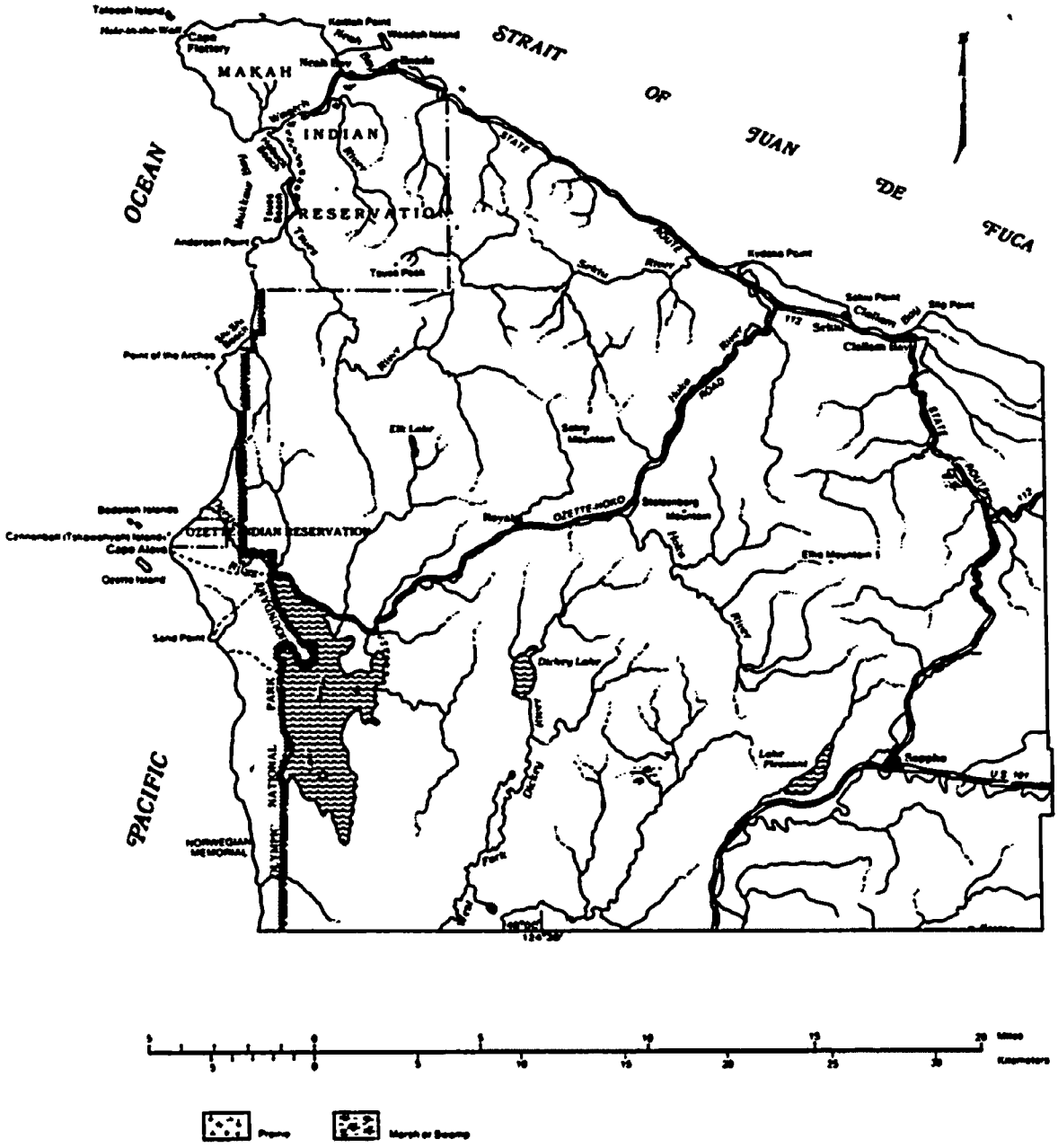

Figure 2. Map of Study Area

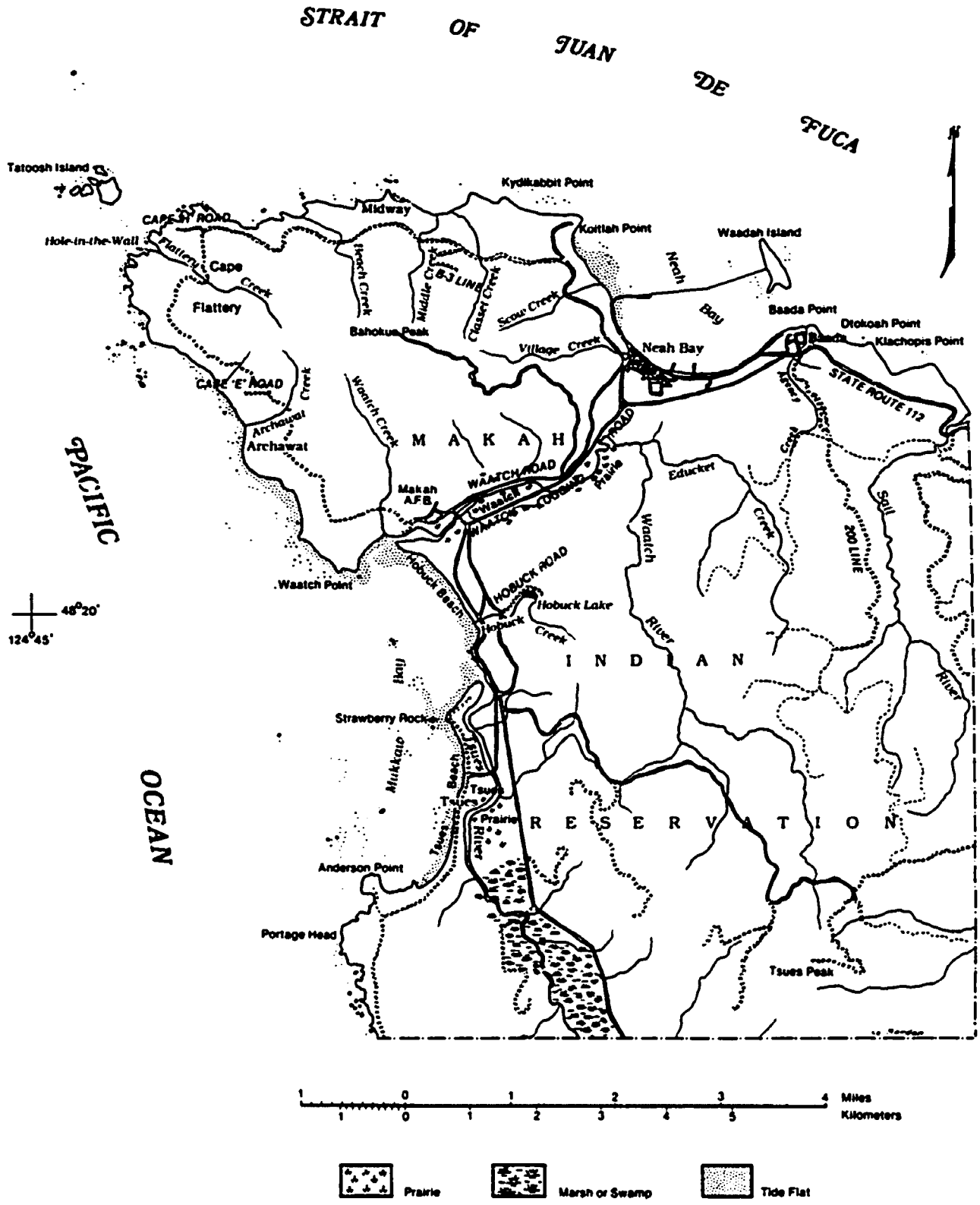

Figure 3. Map of Makah Reservation

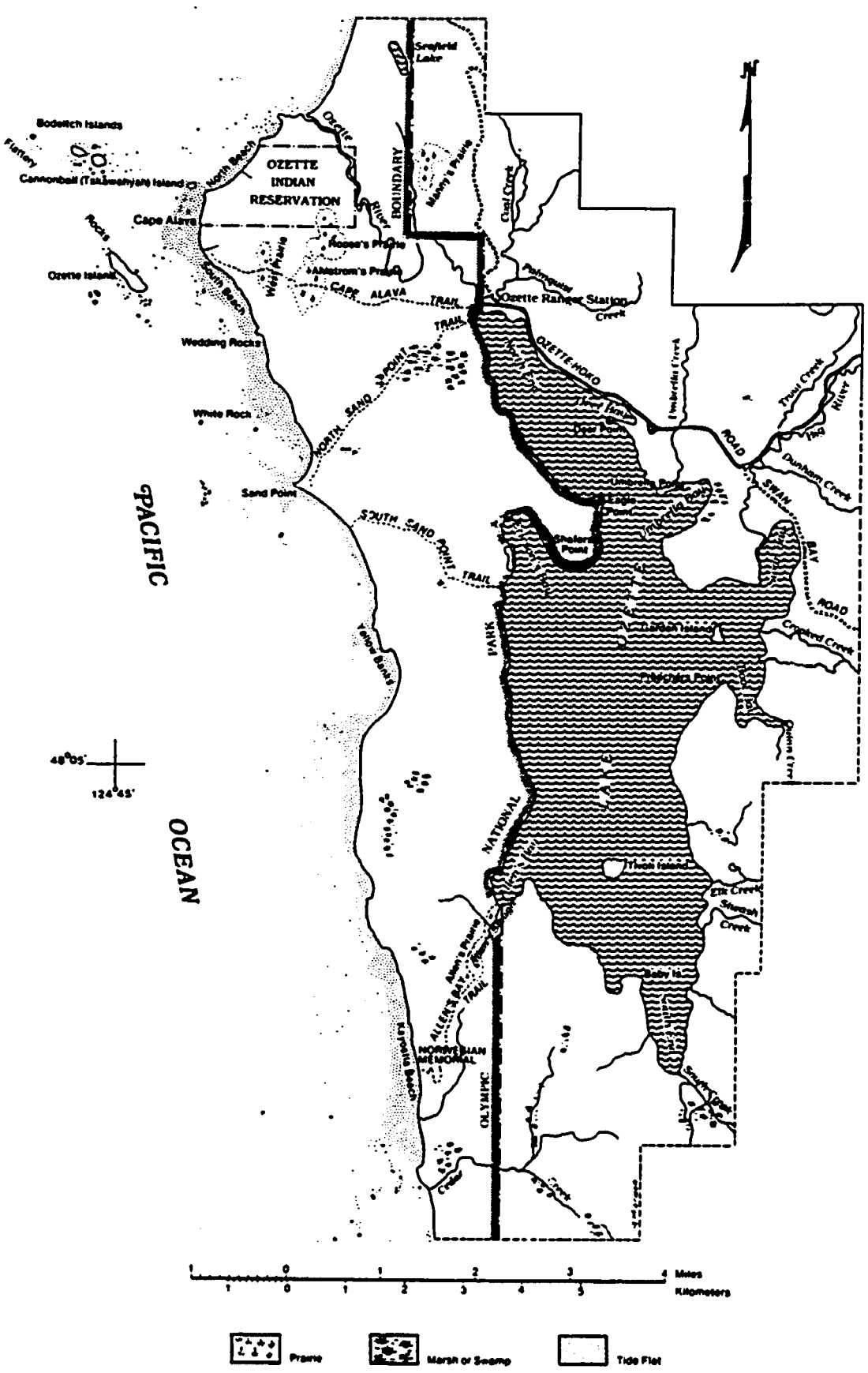

Figure 4. Map of Ozette Area

ocean at the north end of Lake Ozette. Her data are summarized in Tables 1 and 2 . Local variations in weather can be pronounced, as evidenced by the rainfall difference of over 540 mm between Tatoosh Island and Neah Bay, a distance of about 11 km. Temperature differences and the amount of fog present can also vary greatly from sites along the ocean to those a few kilometers inland. For example, during the summer of 1980 there were many occassions when Cape Alava experienced heavy fog for most of the day while areas inland from the coastal ridge crest where mostly clear and sunny. The magnitude and pattern of precipitation at Tatoosh Island, Neah Bay, and Clallam Bay are similar to that at Ozette (see Figure 5, also data summary in Table 3). The majority of precipitation occurs during October through March, while July and August are the driest months (Phillips and Donaldson 1972).

As illustrated by Figures 6, 7, 8, and 9, the amount of precipitation in any given year can vary greatly (U. S. Weather Bureau 1926; 1961-1964; 1965a; 1965b; 1965c; n. d.; U. S. Environmental Sciences Services Administration 1966-1970; U. S. Environmental Data and Information Service 1971-1979). The actual impact of these extremes is unknown, however, due to field data being available for only three fairly normal years, 1979-1981.

On Tatoosh Island, July and August have the greatest percentage frequency of hours with fog at 22.8 and 23.7, respectively (Phillips and Donaldson 1972). My observations at Cape Alava indicate a similar pattern of fog occurrence. Undoubtedly, the large amount of fog during an otherwise relatively dry period contributes to the luxuriant growth of epiphytic lichens, mosses, and ferns in this area.

As is typical of West Coast maritime climates, at Tatoosh Island the mean monthly temperatures vary less than 8.3° C on an annual basis. As one moves inland or up the Strait of Juan de Fuca, this variation between summer and winter increases, as is illustrated by Clallam Bay (see Figures 10, 11, 12).

During the summer, winds are usually from the south and southwest, and in winter, from the east and south, with storm winds typically from the south and southwest (Phillips and Donaldson 1972). Shore currents in the area arrive from the south during at least part of the year, as evidenced by part of the debris on the beach during 1981 being pumice from the 1980 Mt. St. Helens eruption.

Table 1. Precipitation (in mm) at Ozette Ranger Station*

Month	1977	1978	1979	1980	1981
January	331.0	129.0	72.4	147.3	118.6
February	334.0	147.3	390.1	379.2	248.2
March	204.5	159.3	168.4	226.8	217.2
April	127 (est)	133.9	131.1	154.2	269.5
May	200.7	128.0	72.6	67.8	84.3
June	86.1	64.3	41.1	90.7	157.5
July	79.5	15.2	56.1	98.0	na
August	102.9	145.5	15.7	62.5	na
September	67.8	187.2	140.5	134.1	na
October	177.0	64.3	176.3	99.1	na
November	390.0	170.7	162.8	423.9	na
December	261.0	178.8	567.4	343.7	na
Annual Total	2369.8	1523.5	1994.7	2227.3	na

*based on data from Karen Underwood, personal communication (1981)

Table 2. Temperatures (degrees Celsius) at Ozette Ranger Station*

	1977	1978	1979	1980
Mean avg. monthly temperature:	9.5	9.5	9.9	9.26
Mean avg. monthly low:	3.5	3.7	3.4	5.4
Mean avg. monthly high:	15.1	14.4	15.6	12.9
Low	na	-4.4	-8.3	-7.2
High	na	30.6	30.0	26.7
Range	na	17.2	20.6	16.1

*based on data from Karen Underwood, personal communication (1981)

Table 3. Precipitation Summary*

	Tatoosh Island	Neah Bay	Clallam Bay
Average annual precipitation (mm)	1973.3	2518.7	2089.2
Average number of days w/precipitation	199	202	148
Average snowfall (mm)	215.9	299.7	215.9
% frequency of hours w/precipitation	24.6	na	na
% frequency of hours w/fog	12.2	na	na

*based on Phillips and Donaldson 1972

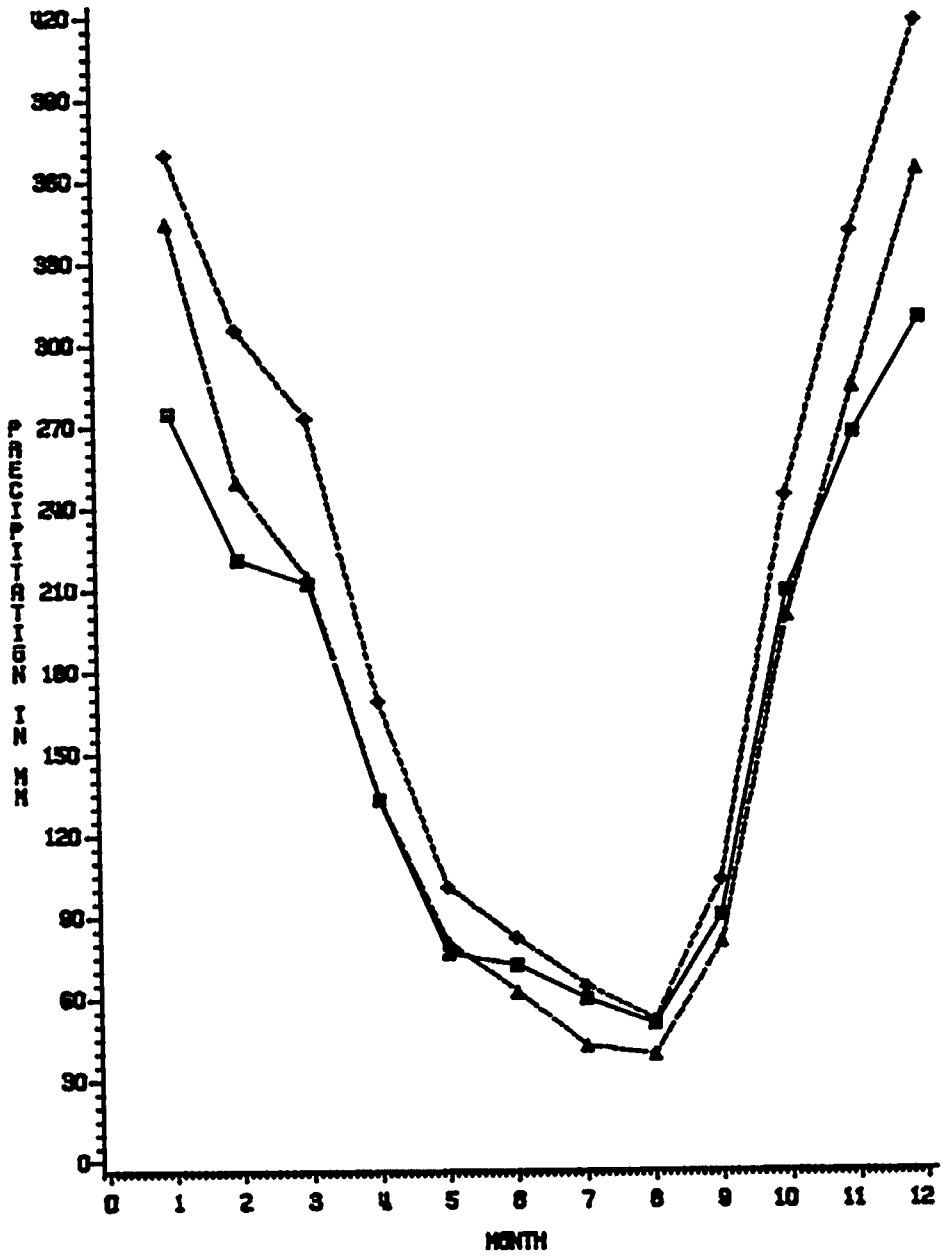

Figure 5. Average Monthly Precipitation for Tatoosh Island, Neah Bay, and Clallam Bay

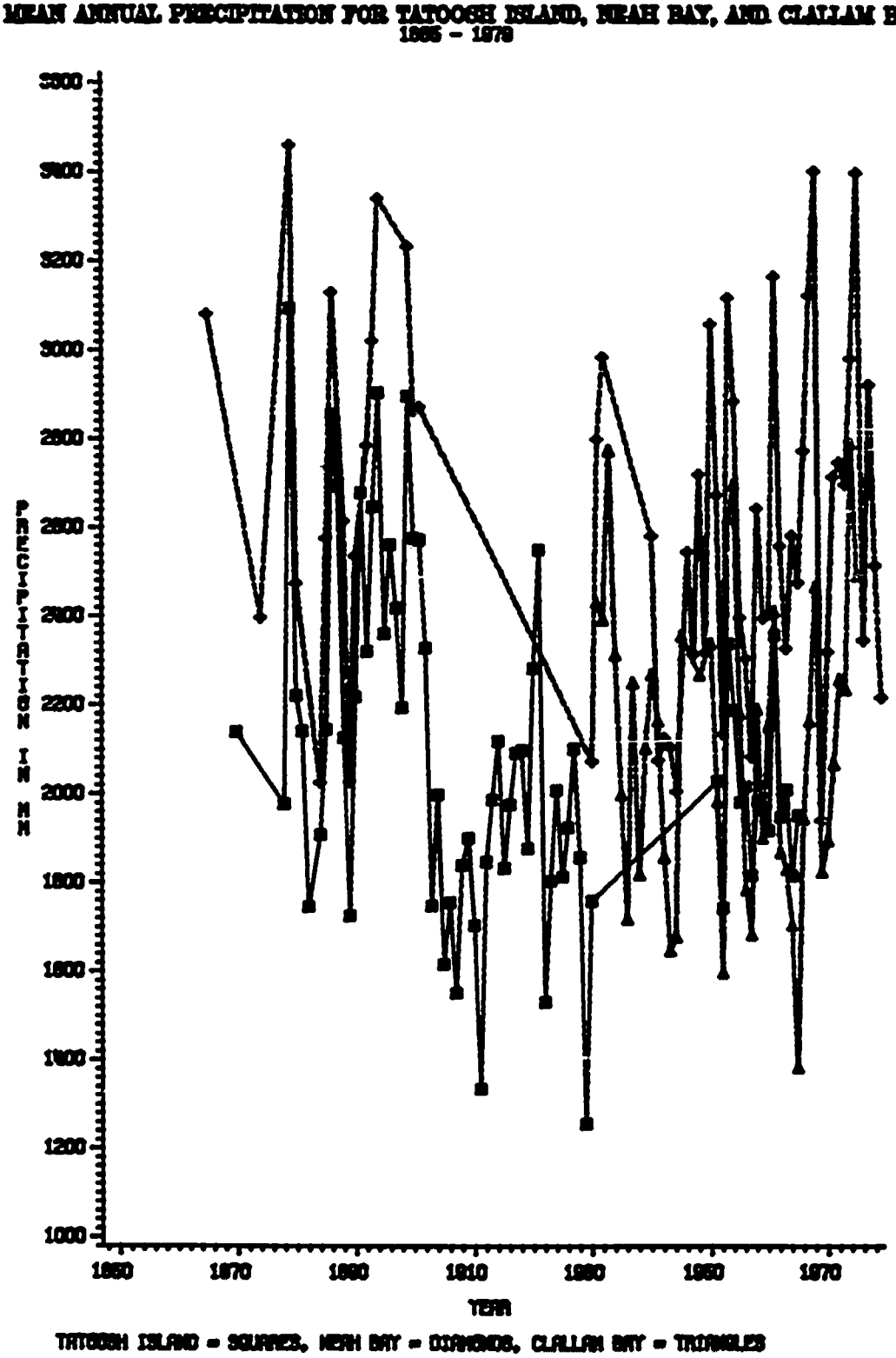

Figure 6. Mean Annual Precipitation for Tatoosh Island, Neah Bay, and Clallam Bay, 1865-1979

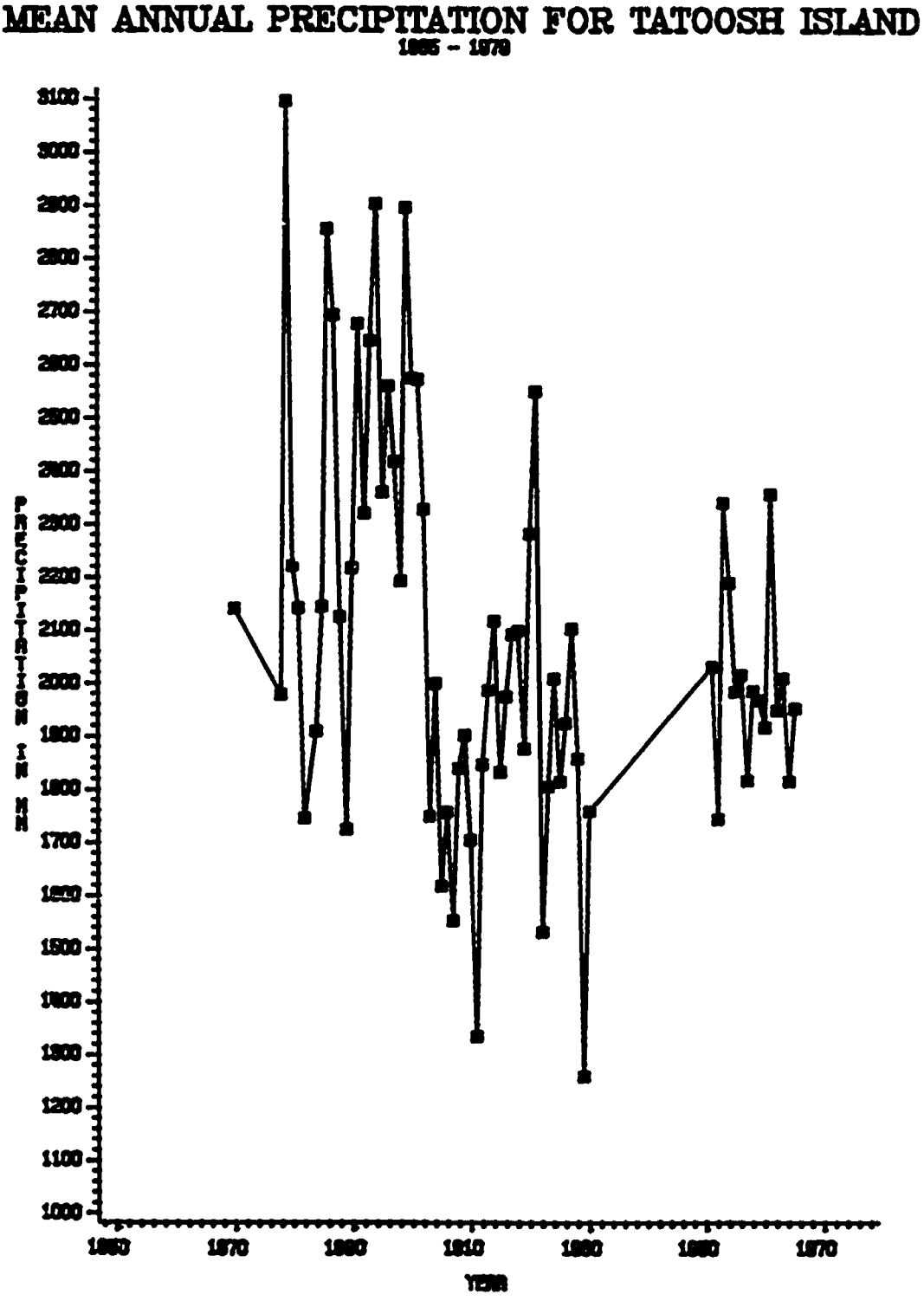

Figure 7. Mean Annual Precipitation for Tatoosh Island, 1865-1979

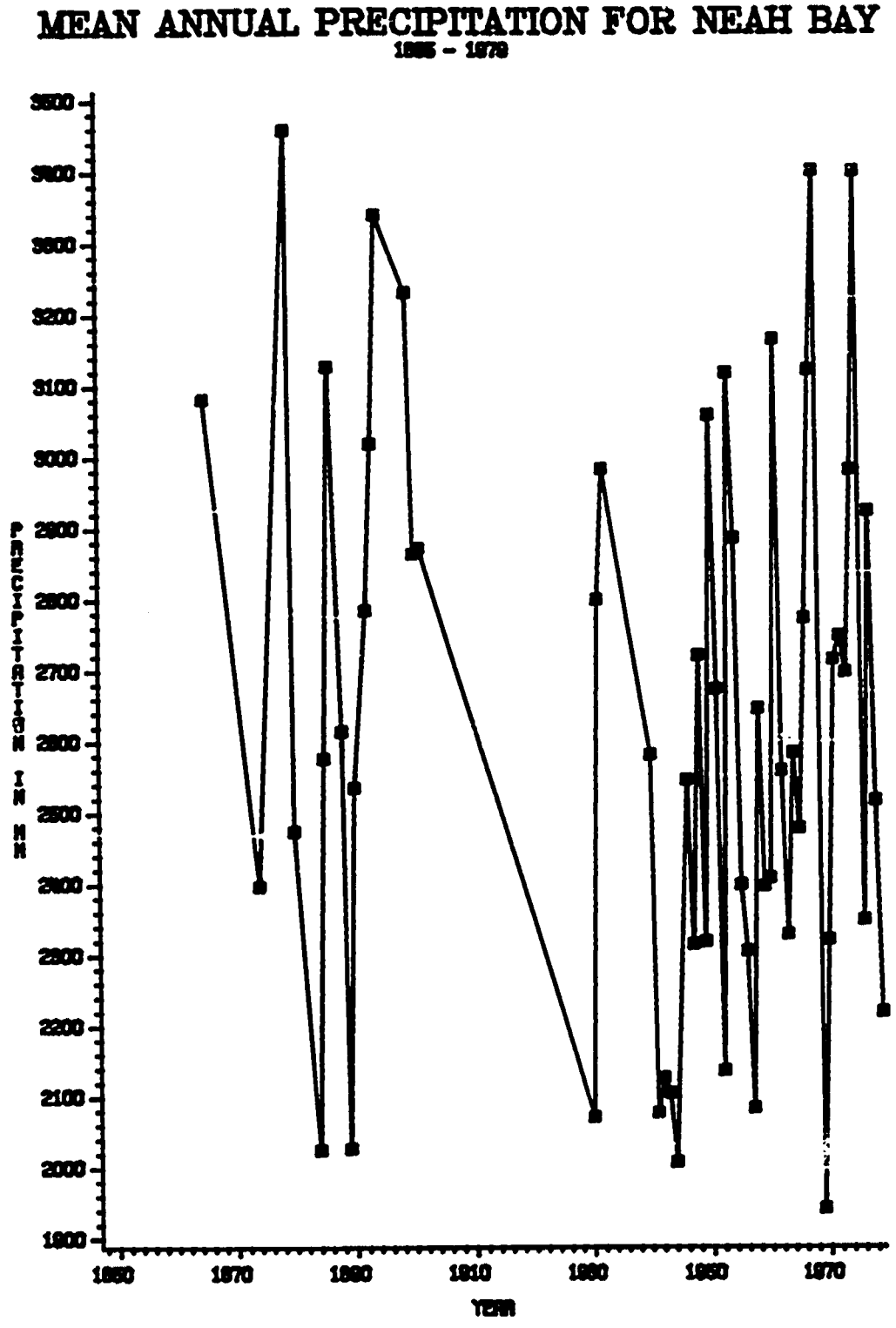

Figure 8. Mean Annual Precipitation for Neah Bay, 1865-1979

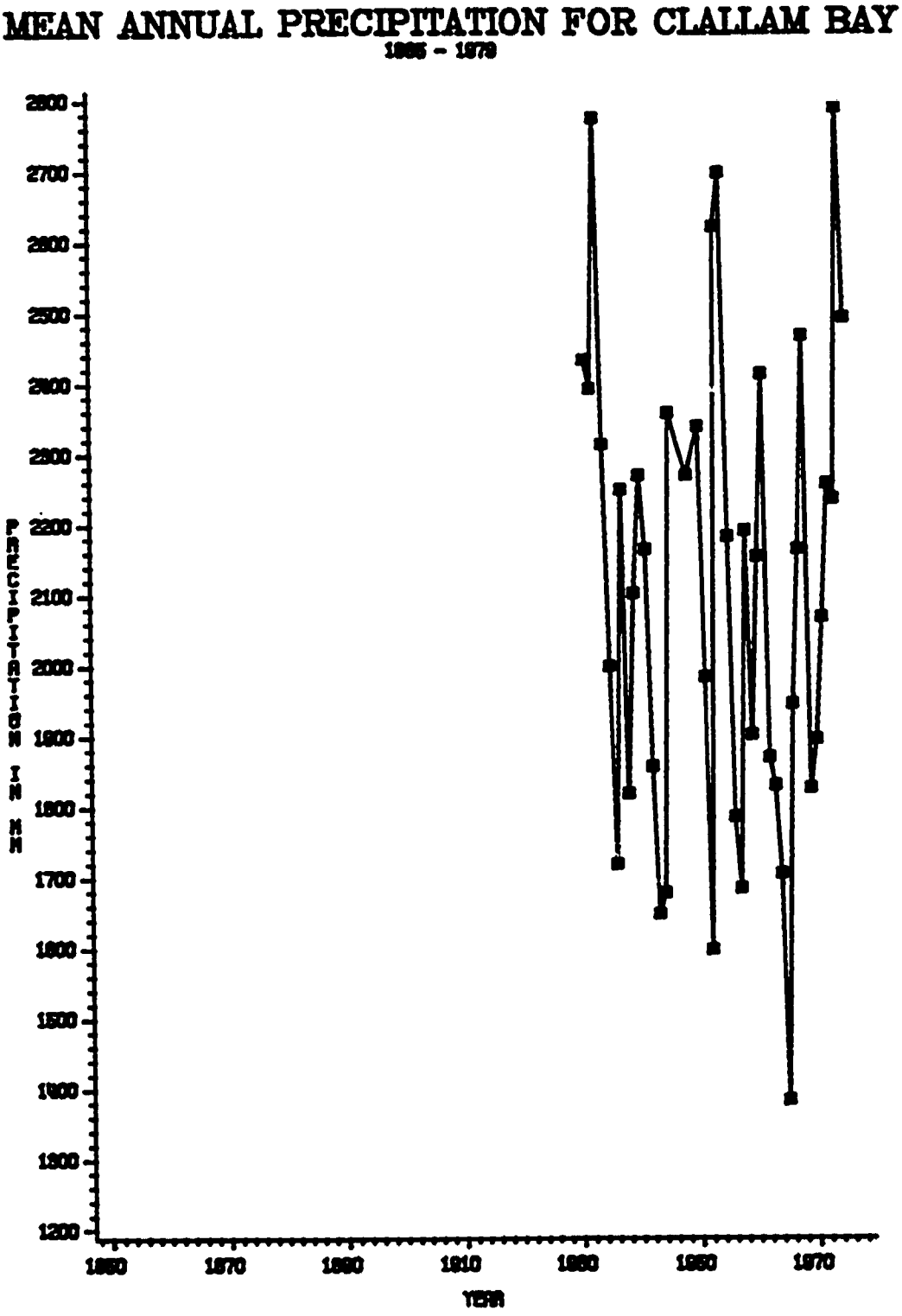

Figure 9. Mean Annual Precipitation for Clallam Bay, 1865-1979

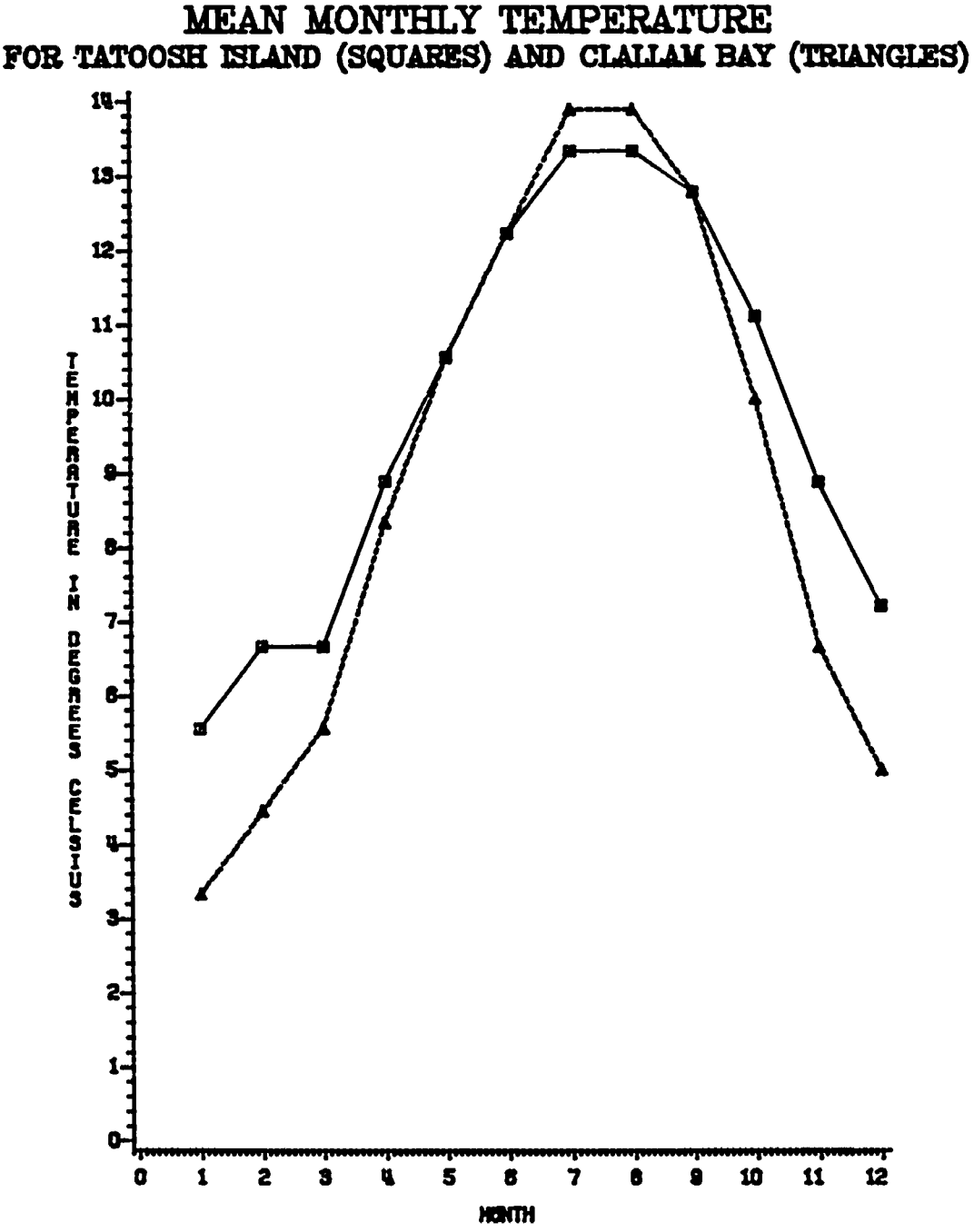

Figure 10. Mean Monthly Temperature for Tatoosh Island and Clallam Bay

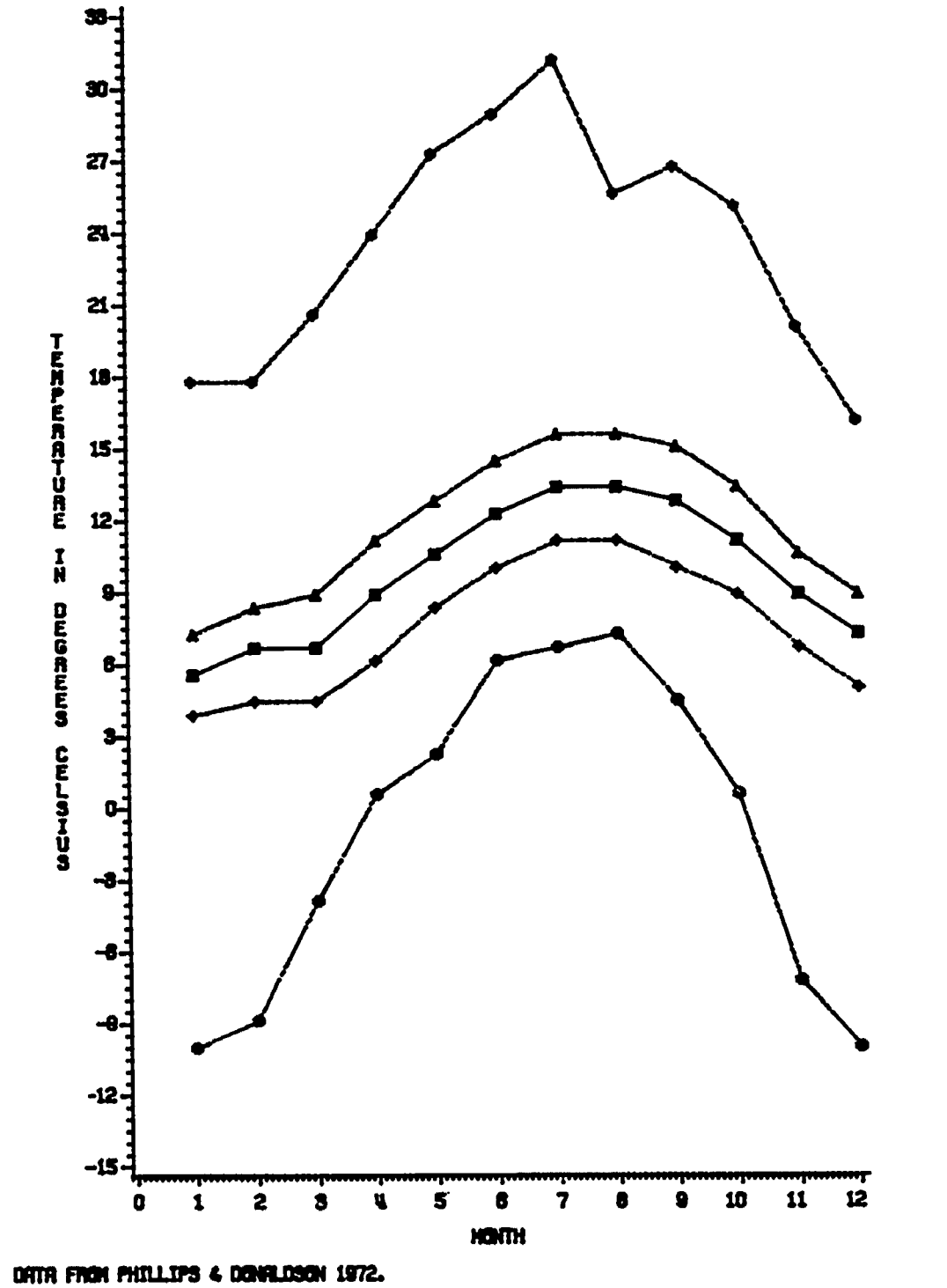

Figure 11. Monthly Temperature Data for Tatoosh Island

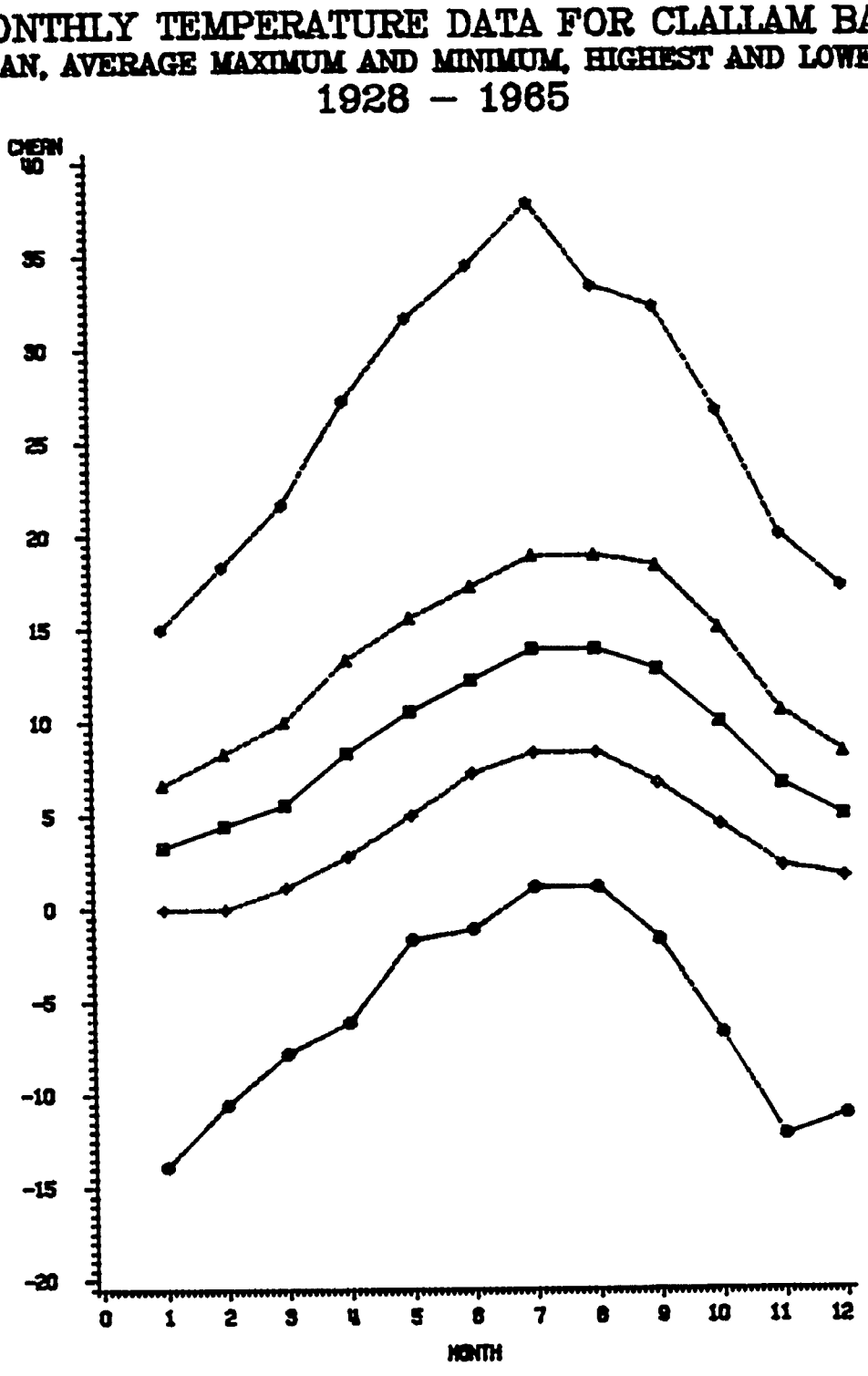

Figure 12. Monthly Temperature Data for Clallam Bay, 1928-1965

CHAPTER 2

PREVIOUS BOTANICAL EXPLORATION

Comparatively little botanical work has been conducted on this portion of the Olympic Peninsula. Archibald Menzies was the first European botanist to view the area on April 29, 1792 (Newcombe 1923:15-16), but apparently no botanical collections were made here. Some of the earliest botanical information that specifically concerns Makah Territory was recorded by James G. Swan (1870:2) who states,

> With but very few intervals, the whole of this portion of Washington Territory is covered with an almost impenetrable forest, which at Cape Flattery is composed of spruce and hemlock, and a dense undergrowth of crab apple, alder, elder, gualtheria [sic], raspberry, wild currant, and rose bushes.

By the early part of this century several floras had been published which included coverage of the northwestern portion of the Olympic Peninsula (Howell 1897-1903; Piper 1906; Piper & Beattie 1915; Reagan 1923). George N. Jones' "A Botanical Survey of the Olympic Peninsula" (1936) is the first comprehensive study of vascular plants of the Olympic Peninsula, and although over 45 years old, it remains one of the most important sources of botanical information for the area under consideration. Supplemental notes were published two years later (Jones 1938). Lake Ozette has received special attention from botanists over the years, and two lists of aquatic vascular plants have been published for the lake (Muenscher 1951; Scheffer & Hotchkiss 1945). More recent floristic works consider the northwest portion of the Olympic Peninsula:

Vascular Plants of the Pacific Northwest (Hitchcock et al. 1955-1969) and Flora of the Pacific Northwest (Hitchcock & Cronquist 1976). In 1979, a new species list for the Peninsula was produced (Buckingham & Tisch 1979), reflecting nomenclatural and floristic changes since Jones' (1936) work.

The Marion Ownbey Herbarium, Washington State University (WS) and the University of Washington Herbarium (WTU) possess several collections of plants made between 1901 and 1981 at Ozette and Cape Flattery (herbarium abreviations follow Holmgren, Keuken & Scholfield 1981). Many of the botanists in the 20th century (C. L. Hitchcock, G. N. Jones, I. C. Otis, J. W. Thompson) who visited the area apparently concentrated their efforts on the north end of Lake Ozette, especially along the northeast shoreline. Undoubtedly this was due, at least in part, to the relative inaccessibility of other areas on this portion of the Olympic Peninsula (a situation which holds true even today), and to the expectation that the area around Lake Ozette would be particularly interesting botanically because of the many varied habitats within a small area. The earliest specimens known from the study area were collected on Tatoosh Island by J. B. Flett in 1901 and by Winona Bailey in 1913. Other collections which have proved particularly helpful are those of I. C. Otis in 1927 and 1933 (WS, WTU), J. W. Thompson in 1933 (WTU), G. N. Jones in 1934 (WTU), M. Ownbey et al. in 1940 (WS, WTU), C. L. Hitchcock et al. from the late 1930s to mid-1960s (WS, WTU), and R. Daubenmire in 1966 and 1967 (WS).

During 1977, M. Gross collected 56 specimens from near the mouth of the Hoko River as part of the Hoko River Archaeological Project. One set of specimens is housed in the Hoko Project's herbarium at Washington

State University, another at the Makah Cultural and Research Center, Neah Bay. Gloria Gould-Wessen collected in the area around the Ozette Village Site (Cape Alava) and at North End, Lake Ozette, during 1978 and 1979. Her specimens are currently held by the Ozette Archaeological Project and most will be deposited at the Ownbey Herbarium (WS) in 1983. From 1977 through 1981, Karen Underwood collected in the Lake Ozette, Cape Alava, and Sandpoint area. Her collections have been deposited at WS and the Olympic National Park Herbarium in Port Angeles, Washington. Since 1976 Nelsa and H. W. Buckingham have been studying the flora of the Olympic Peninsula. Their careful work has resulted in the addition of over 100 taxa not previously attributed to the the Peninsula's flora (Buckingham 1982). Nelsa Buckingham made her extensive personal herbarium of Olympic Peninsula plants available to me for study. Additional Buckingham specimens are housed in the Olympic National Park herbarium and a few are at WS.

CHAPTER 3

MATERIALS AND METHODS

Collecting trips were made to the study area during November 1978, April, May, July, and August - September 1979, late June - early September 1980, and May, June, August - September 1981. With few exceptions all localities and community types (both disturbed and undisturbed) within the study area were visited. Due to the unavailablility of boats (for islands) and access routes (inland bodies of water) six potentially interesting sites were not visited by me during this study: Tatoosh Island, Waadah Island, Garden Island, Seafield Lake, Willoughby Lake, and a small pond located between Lake Ozette and Mora. Data were availible for the three islands from herbarium specimens. A few aquatic taxa may occur at Seafield Lake, Willoughby Lake, or at the pond but not elswhere in the study area.

Approximately 2,000 specimens were collected during the study, most of which represent vascular plant taxa, but also including bryophytes, lichens, and marine algae. Vascular plant collections typically were identified using Hitchcock and Cronquist (1976) and Hitchcock et al. (1955-1969), and by comparison with voucher specimens held by the Ownbey Herbarium (WS). Additional vascular floras consulted include Calder and Taylor (1968), Fernald (1950), Gleason (1952), Hulten (1968), Munz (1959), Taylor (1974), and Tutin et al. (1968). Bryophytes were identified using Lawton (1971), lichens with Hale (1979), and marine

algae were identified using Abbott and Hollenberg (1976) and Scagel (1967). To ensure accuracy, determinations of representative material for each vascular plant taxon was checked by Joy Mastrogiuseppe, Curator, Ownbey Herbarium. Determinations of bryophytes and lichens were checked by Doyle Anderegg, University of Idaho. Other individuals assisted with specific taxa and are included in the acknowledgements section. Where differences in interpretation arose (this occurred with approximately 1% of the specimens), I re-examined the material before final assignment to a taxon was made.

The majority of the vascular plant specimens, including representative material for each taxon and locality collected, will be deposited at the Marion Ownbey Herbarium, Washington State University (WS). Of the remaing specimens, some will be retained in my personal herbarium (e. g., population samples of Ericaceae) for further study. Others will be deposited with the Makah Cultural and Research Center, Neah Bay, and the Olympic National Park Herbarium, Port Angeles. When specimen distribution is complete (anticipated by the end of 1983) a listing of specimen locations will be deposited with the Ownbey Herbarium or may be obtained from the author.

When it was possible to locate specimens cited in published accounts (as discussed in the chapter on previous botanical exploration), these were examined, and if the taxon was unfamiliar to me, determinations were verified by Joy Mastrogiuseppe (WS specimens) or Bonnie Tucker (WTU specimens). In addition, the private collections discussed in chapter 4 were examined, and the data included in this report. The arrangement of

taxa and, with but few exceptions, the taxonomic boundaries used by Hitchcock and Cronquist (1976) are followed here. Common names and authors for each taxon are included in Chapter 7.

Community types were determined by reconnaissance. Data were collected concerning environmental setting, evidence of disturbance, evidence of successional changes, and floristic composition. Coverage values using the cover classes of Daubenmire (1959) were assinged for each taxon. These cover classes are as follows:

1	0	-	5%
2	5	-	25%
3	25	-	50%
4	50	-	75%
5	75	-	95%
6	95	-	100%

To gain a more complete understanding of vegetation dynamics many sites were visited during successive years and seasons. Definitions of ecological terms follows Daubenmire (1968).

CHAPTER 4

VEGETATION

The study area is part of the Picea sitchensis (Bong.) Carr. vegetation zone (Franklin and Dyrness 1973). This zone extends as a narrow strip along the Pacific coast from the Alaska Panhandle to northern California, generally at elevations below 150 m but up to 600 m when mountain masses are directly adjacent to the ocean. Daubenmire (1969:121) points out that Picea sitchensis is mainly confined to a very narrow strip along the ocean where it is climax under the influence of moderate salt spray. Further inland Tsuga heterophylla (Raf.) Sarg. replaces Picea sitchensis as the dominant species.

Kratz (1975) designated eight community types with Picea sitchensis dominant in the coastal strip of the Olympic National Park. In this area, all are restricted to within 200 m of the beach:

Picea sitchensis - Alnus rubra / Rubus spectabilis
Picea sitchensis / Gaultheria shallon
Picea sitchensis / Polystichum munitum
Picea sitchensis / Carex obnupta
Picea sitchensis / Maianthemum dilatatum
Picea sitchensis / Bryophytes
Picea sitchensis -
Tsuga heterophylla / Blechnum spicant
Tsuga heterophylla -
Picea sitchensis / Polystichum munitum.

Kratz did not distinguish between climax and seral stands, and two community types transistional between Picea sitchensis and Tsuga heterophylla dominated forests [Kratz's P. sitchensis - T. heterophylla / Blechnum spicant (L.) With. and Tsuga heterophylla - P. sitchensis /

Polystichum munitum (Kaufl.) Presl community types] were included as distinct vegetation units. Kratz (1975:37) also proposed that the Picea sitchensis zone be re-defined to apply only to the narrow band of P. sitchensis dominated communities directly along the coast, and that the Tsuga heterophylla zone "be enlarged to include the Tsuga - Picea - dominated communities along the edge of this Picea sitchensis zone."

Much of the forest in the current study area has been clear-cut, and at the present time is in various stages of regrowth. The area around Ozette between Lake Ozette and the Pacific Ocean is relatively undisturbed, and I will base most of the following discussion of vegetation on data I collected from this area.

Picea sitchensis - Polystichum munitum var. munitum Habitat Type

Most areas immediately along the open ocean and thus under the influence of salt spray are part of the Picea sitchensis - Polystichum munitum var. munitum habitat type. The soils here are relatively deep, often somewhat silty or clayey, and generally have moderate to good surface drainage. Slope varies from near level on the coastal terrace to steep on some portions of the coastal ridge. Rarely does this habitat type extend more than a few hundred meters inland from the shoreline.

The vegetation on the present coastal terrace in the Cape Alava area has been extensively disturbed both prehistorically by the Ozette Villagers and more recently by the activities of tourists. The overstory on less disturbed areas of the terrace is dominated by Picea sitchensis, and to a lesser extent by Alnus rubra Bong. Disturbance is too great on

most of the terrace to be able to determine with certainty the climax understory dominants. In most areas it appears to have been Polystichum munitum var. munitum. Consequently, the major portion of the coastal terrace near Cape Alava is included in the Picea sitchensis - Polystichum munitum habitat type. Also present are Pyrus fusca Raf., Rubus spectabilis Pursh, Sambucus racemosa L. var. arborescens (T. & G.) Gray, Salix hookeriana Barrett and/or S. piperi Bebb, and various herbaceous species. In areas of greater soil moisture Carex obnupta L. H. Bailey is abundant. Lonicera involucrata (Rich.) Banks var. involucrata is particularly common on recently disturbed sites, and Heracleum lanatum Michx. and Urtica dioica L. ssp. gracilis (Ait.) Seland. var. lyallii (Wats.) Hitchc. grow especially in areas enriched by debris from human activities (e. g., midden areas).

On the slope from the present coastal terrace to the ridge crest, the climax vegetation is dominated by Picea sitchensis and Polystichum munitum var. munitum. Alnus rubra occurs here, but is of secondary importance. Frequently present herbaceous species include Cardamine pulcherrima Greene, Galium aparine L., Galium triflorum, Michx. Maianthemum dilatatum (Wood) Nels. & Macbr., Montia sibirica (L.) Howell, Stachys mexicana Benth., and Tiarella trifoliata L. var. trifoliata. Rubus spectabilis, Sambucus racemosa var. arborescens, and Ribes bracteosum Dougl. also occur in this association but are not very prominent. Equisetum telmateia Ehrh. var. braunii Milde is occasionally common locally, and Carex obnupta occurs on relatively moist microsites within these stands. Tsuga heterophylla, a relatively salt spray intolerant species, and Thuja plicata Donn are essentially absent from these areas.

Alnus rubra and Equisetum telmateia var. braunii are typical pioneer species of primary seres of this habitat type. Rubus spectabilis and Sambucus racemosa var. arborescens are the dominant woody species in early stages of secondary succession. Table 4 lists plants occurring in the Picea sitchensis - Polystichum munitum var. munitum association.

Tsuga heterophylla - Blechnum spicant Habitat Type

The vegetation east of the ridge crest is different from the coastal terrace and slope and is dominated by Tsuga heterophylla in the overstory and Blechnum spicant in the understory. This is the most widespread habitat type in the Ozette area. The greatest concentration of Vaccinium ovatum Pursh at Cape Alava occurs in the area of transistion between the Picea sitchensis - Polystichum munitum and Tsuga heterophylla - Blechnum spicant associations. Within the Tsuga heterophylla - Blechnum spicant association Picea sitchensis and Thuja plicata occur, but generally have low coverage values. Gaultheria shallon Pursh, Menziesia ferruginea Smith var. ferruginea, Vaccinium ovatum, and V. parvifolium Smith typically occur in the shrub layer. Pyrus fusca is occasionally present on more open microsites. This association is more heterogeneous than the Picea sitchensis - Polystichum munitum association. In some areas bryophytes replace Blechnum as the understory dominant. Important species in these areas include Hylocomium splendens (Hedw.) B. S. G., Rhizomnium glabrescens (Kindb.) Koponen, and Rhytidiadelphus loreus (Hedw.) Warnst. In other areas Vaccinium parvifolium or Gaultheria shallon are much more prominent than usual.

Table 4. Plants occuring in the *Picea sitchensis* - *Polystichum munitum* Association

VASCULAR PLANTS

Picea sitchensis

Polystichum munitum var. *munitum*

Alnus rubra

Athyrium felix-femina

Blechum spicant

Cardamine angulata

Cardamine pulcherrima

Carex obnupta

Elymus hirsutus

Equisetum telmateia var. *braunii*

Galium aparine

Galium triflorum

Maianthemum dilatatum

Montia sibirica

Osmorhiza purpurea

Polypodium glycyrrhiza

Polypodium scouleri

Pyrus fusca

Ribes bracteosum

Rubus spectabilis

Sambucus racemosa var. *arborescens*

Stachys mexicana

Streptopus amplexifolius var. *americanus*

Tiarella trifoliata var. *trifoliata*

Vaccinium ovatum

MOSSES

Leucolepis menziesii

Plagiomnium insigne

Rhytidiadelphus loreus

Table 4, continued

LICHENS

Lobaria pulmonaria	Ramalina farinacea
Pseudocyphellaria anthraspis	Usnea spp.

In areas with slightly wetter soil Thuja plicata assumes dominance in the overstory with Tsuga heterophylla as a co-dominant. Lysichitum americanum Hulten & St. John and Sphagnum spp. (both usually absent in drier areas) are important components of the understory. Near Cape Alava these moister areas usually are quite small, and often only slightly lower in elevation than the surrounding terrain. At this time there seems little to be gained by formally designating names for all of these slight variations in vegetation structure. Table 5 lists species occurring in the Tsuga heterophylla - Blechnum spicant association at Cape Alava.

Picea sitchensis - Gaultheria shallon Community Type

This community occurs as a distinct and readily recognizable associe on areas of sand deposition along the open ocean. In the Ozette area stands of the Picea sitchensis - Gaultheria shallon community type are less common than those of the P. sitchensis - Polystichum munitum association. It is likely that in some coastal areas this community is the climax vegetation, but this has yet to be demonstrated. A good example of this associe occurs at Sand Point and the area immediately north along the coast. As Kratz has stated (1975:18), these beachland areas often are exposed to storm winds off the ocean, and, in some areas,

Table 5. Plant Species Occurring in the Tsuga heterophylla - Blechnum spicant Association at Cape Alava

VASCULAR PLANTS	
Tsuga heterophylla	Polypodium scouleri
Blechnum spicant	Polystichum munitum var. munitum
	Pyrola uniflora
Dryopteris austriaca	Pyrus fusca
Gaultheria shallon	Thuja plicata
Lysichitum americanum (wet areas)	Tiarella trifoliata var. trifoliata
Maianthemum dilatatum	Vaccinium ovatum
Menziesia ferruginea var. ferruginea	Vaccinium parvifolium
Picea sitchensis	
MOSSES	
Hylocomium splendens	Rhytidiadelphus loreus
Rhizomnium glabresens	Sphagnum spp. (wet areas)

one can find material deposited by storm waves at a distance of several meters back into these communities. Pteridium aquilinum (L.) Kuhn var. pubescens Underw. is often a minor component of this associe. As sand continues to accumulate along the shore placing greater distances between the ocean and a particular stand, the Picea sitchensis - Gaultheria shallon community will be replaced by a stand representing the Picea sitchensis - Polystichum munitum association. This successional pattern

may be observed as one goes inland along the current coastal terrace north of Sand Point.

Picea sitchensis - Carex obnupta Community Type.

Between the current coastal terrace and the base of the ridge to the east there often occur slight depressions that support a vegetation dominated in the overstory by Picea sitchensis and in the understory by Carex obnupta. Near Ozette stands of this community type are small, usually less than 50 m across in a line perpendicular to the coast. The soil here is wetter than that of surrounding areas. In localities where the coastline is nearby and stable or slowly eroding this community functions as an edaphic climax. Where beachland deposition is occuring this community is apparently eventually replaced by one dominated by Tsuga heterophylla.

Coastal Dunes

Most of the sand dune areas, such as near the mouths of the Tsues and Waatch Rivers, have been so disturbed by recent human activities that it would be unsafe to speculate concerning the detailed structure of the vegetation normally supported by these habitats. Several species recognized for their role in dune colonization and stabilization (Franklin & Dyrness 1973:291) occur here: Abronia latifolia Eschsch., Ambrosia chamissonis (Less.) Greene var. bipinnatisecta (Less.) J. T. Howell, Carex macrocephala Willd., Convolvulus soldanella L., Glehnia leiocarpa Mathias, Lupinus littoralis Dougl. and Polygonum paronychia Cham. & Schlect. The most common strand species are Cakile edentula (Bigel.)

Hook., C. maritima Scop. and Honkenya peploides (L.) Ehrh. Table 6 lists

Table 6. Species of Coastal Dunes

Abronia latifolia	Glehnia leiocarpa
Achillea millefolium	Hordeum brachyantherum
Aira praecox	Hypochaeris radicata
Allium cernuum	Lathyrus japonicus var. glaber
Ambrosia chamissonis var. bipinnatisecta	Lupinus littoralis
Arenaria serpyllifolia	Oxalis suksdorfii
Artemisia suksdorfii	Picea sitchensis
Bromus mollis	Plantago lanceolata
Carex macrocephala	Polygonum paronychia
Carex pansa	Potentilla pacifica
Cerastium arvense	Pteridium aquilinum var. pubescens
Cerastium semidecandrum	Pyrus fusca
Convolvulus soldanella	Rosa nutkana var. nutkana
Equisetum hymale	Salix hookeriana / piperi
Festuca myuros	Tanacetum douglasii
Fragaria chiloensis	Trifolium wormskjoldii
Glaux maritima	Vicia gigantea

additional species of sand dune areas.

Coastal Talus Slopes

Along the edge of cliffs overlooking the ocean (e. g., Hole-in-the-Wall) and on steep rocky slopes (such as the south end of Ozette Island), Gaultheria shallon typically comprises the dominant species. Table 7 lists plants occurring on more protected slopes (such as the east sides of Cannonball Island and Strawberry Rock). Amelanchier alnifolia Nutt., Angelica hendersonii Coulter & Rose, and Arabis hirsutus (L.) Scop. var. eschscholtziana (Andrz.) Rollins were limited to this

Table 7. Plants Occurring on Protected Coastal Talus Slopes

Achillea millefolium	Heracleum lanatum
Amelanchier alnifolia	Plantago lanceolata
Arabis hirsuta var. eschscholtziana	Rosa nutkana var. nutkana
Artemisia suksdorfii	Sanicula crassicaulis var. crassicaulis
Castilleja miniata var. dixonii	Sonchus oleraceus
Cerastium arvense	Trifolium dubium
Cirsium edule	Trifolium repens
Epilobium minutum	Urtica dioica ssp. gracilis var. lyallii
Fragaria chiloensis	

habitat, most of the other species are more widespread in distribution.

Tidal Marshes

Only one major tidal marsh occurs in the study area, along the lower drainage of the Waatch River. The area has been affected both by heavy livestock grazing and by the road connecting the Waatch Road north of the river with the Waatch Logging Road to the south. The greatest tidal effect occurs to the west of this road and bridge. Here Jaumea carnosa (Less.) Gray, Salicornia virginica L., and Triglochin maritimum L. are the dominant species. This was also the only location recorded for Cotula coronopilfolia L. and Puccinella pumila (Vasey) Hitchc. in the study area. East of the Waatch Bridge salt water has less influence, and Potentilla pacifica Howell becomes an important component of the vegetation.

Prairies

Among local residents the term "prairie" refers to any relatively wet, open area. As used here tidal marshes are excluded from this catagory. The majority of these prairies occur in the Ozette area. They vary from wet, boggy areas to relatively dry uplands. Prairies are generally characterized by relatively poor drainage and all support similar plant communities distinct from surrounding non-prairie areas. Trees are sparse and usually stunted.

The prairies have probably varied origins. Indigenous human populations may have played a role in the development of many of these areas. Fire was used by native peoples in other parts of western Washington, particularly the Puget Sound region, to maintain prairie

vegetation (Cooper 1859:19; Norton 1979b; Reagan 1923:203; 1934:56-57; White 1975), and it is likely that the Ozette and Makah people also used fire regularly as a managment tool. Previously Tsues Prairie was burned about every 10 years to maintain cranberry production (H. Ward pers. comm., 1981). Prairies were preferred homestead sites for white settlers, and they probably impacted most of these areas.

Most of the prairies are dominated by an ericaceous flora, especially Ledum groenlandicum Oeder, Gaultheria shallon, and Kalmia occidentalis Small. Vaccinium oxycoccos L. also is present, but usually not in great numbers. Pteridium aquilinum var. pubescens is often an important or even dominant component of drier prairie vegetation. Important also in drier areas is Blechnum spicant. Sphagnum spp. often predominate in moister areas. Prairies also provide the principle habitat for Drosera rotundifolia L., Empetrum nigrum L., Eriophorum chamissonis C. A. Mey, and the rare Gentiana douglasiana Bong. Pinus contorta Dougl. var. contorta, essentially absent elsewhere in the study area, is abundant on Allen's Prairie and scattered on Many's Prairie. Both populations contain healthy and vigorous individuals, and recruitment is apparent. See Table 8 for a complete list of species present.

Table 8. Plant Species Occurring on Prairies

Agrostis aequivalvis	Kalmia occidentalis
Agrostis scabra	Juncus effusus var. gracilis
Anaphalis margaritacea	Juncus ensifolius var. ensifolius
Apargidium boreale	Ledum groenlandicum
Blechnum spicant	Linnaea borealis
Calamagrostis nutkaensis	Lycopodium clavatum
Camasia quamash var. azurea	Maianthemum dilatatum
Carex ?livida	Myrica gale
Carex obnupta	Picea sitchensis
Carex phyllomanica	Pinus contorta var. contorta
Cornus unalaschkensis	Pteridium aquilinum var. pubescens
Danthonia spicata	Rhynchospora alba
Drosera rotundifolia	Sanguisorba officinalis
Empetrum nigrum	Sphagnum spp.
Eriophorum chamissonis	Spiranthes romanzoffiana var. romanzoffiana
Galium trifidum	Spiraea douglasii var. menziesii
Gaultheria shallon	Thuja plicata
Gentiana douglasiana	Tofieldia glutinosa var. brevistyla
Gentiana sceptrum	Trientalis arctica
Habenaria dilatata var. leucostachys	Tsuga heterophylla
Hypericum anagalloides	Vaccinium oxycoccos

CHAPTER 5

VASCULAR FLORA OF THE OZETTE - CAPE FLATTERY REGION

Data concerning distribution, habitats, abundance, and phenology were collected for 398 vascular taxa representing 82 families, 228 genera, and 384 species. Details are presented later in this chapter.

Unlike many areas of the Pacific Northwest where alien species comprise a major portion of the vascular flora both in abundance and number of species, the floristic composition of the study area has been relatively little changed with the advent of European settlers. Only six families (7.3%) are represented by alien species (see Table 9), and four of these (Taxodiaceae, Fagaceae, Hippocastanaceae, Amaryllidaceae) are persistant rather than truly established, and are the result of plantings by white settlers in the area. Thirty-four (14.9%) genera and 66 (17.2%) species are not native to the region. Most of these occur on disturbed sites associated with regular human activity, suprisingly few are associated with logging activities. Only two alien taxa have become dominant components of any particular habitat. Cakile edentula (Bigel.) Hook., introduced from eastern North America, and Cakile matitima Scop., introduced from Europe, are the dominant species of strand communities immediately above the high wave mark. Nowhere does one find the extensive populations of Cytisus scoparius (L.) Link and Digitalis purpurea L. so common in the Puget Sound region. One species documented by voucher specimens, Abronia umbellata Lam. var. acutalata (Standl.) Hitchc.,

apparently has disappeared from the study area, and perhaps from Washington as a whole (Washington Natural Heritage Program 1981:18).

Table 9. Summary of Vascular Plant Taxa

Family	Native Genera	Native Species	Introduced Genera	Introduced Species	Total Genera	Total Species
			Ferns & Fern Allies			
Lycopodiaceae	1	3	0	0	1	3
Selaginellaceae	1	1	0	0	1	1
Isoetaceae	1	2	0	0	1	2
Equisetaceae	1	3	0	0	1	3
Ophioglossaceae	1	1	0	0	1	1
Polypodiaceae	7	9	0	0	7	9
Sub-totals	12	19	0	0	12	19
			Gymnosperms			
Taxaceae	1	1	0	0	1	1
Taxodiaceae	0	0	1	1	1	1
Cupressaceae	1	1	0	0	1	1
Pinaceae	5	5	0	0	5	5
Subtotals	7	7	1	1	8	8
			Angiosperms			
			Dicots			
Salicaceae	2	5	0	0	2	5
Myricaceae	1	1	0	0	1	1
Betulaceae	1	1	1	1	2	2
Fagaceae	0	0	1	1	1	1

Urticaceae	1	1	0	0	1	1
Polygonaceae	2	6	0 (2)	3	2	9
Chenopodiaceae	2	2	0	0	2	2
Nyctaginaceae	1	2	0	0	1	2
Portulacaceae	1	4	0	0	1	4
Caryophyllaceae	3	5	1 (3)	3	4	8
Nymphaeaceae	2	2	1	2	3	4
Ceratophyllaceae	1	2	0	0	1	2
Ranunculaceae	3	6	0 (1)	1	3	7
Fumariaceae	1	1	0	0	1	1
Brassicaeae	4	6	2	3	6	9
Droseraceae	1	1	0	0	1	1
Saxifragaceae	6	7	0	0	6	7
Grossulariaceae	1	4	0	0	1	4
Rosaceae	13	17	3 (5)	7	16	24
Fabaceae	4	5	3 (4)	6	7	11
Geraniaceae	0	0	1	1	1	1
Oxalidaceae	1	2	0	0	1	2
Callitrichaceae	1	3	0	0	1	3
Empetraceae	1	1	0	0	1	1
Acearaceae	1	2	0 (1)	1	1	3
Hippocastanaceae	0	0	1	1	1	1
Balsaminaceae	1	1	0	0	1	1
Rhamnaceae	1	1	0	0	1	1
Malvaceae	0	0	1	1	1	1
Hypericaceae	1	1	0	0	1	1
Elantinaceae	1	1	0	0	1	1

Violaceae	1	2	0	0	1	2
Onagraceae	1	2	?1	?1	2	3
Haloragaceae	1	1	0	0	1	1
Araliaceae	1	1	0	0	1	1
Apiaceae	8	9	0	0	8	9
Cornaceae	1	2	0	0	1	2
Ericaceae	8	14	0	0	8	14
Primulaceae	3	4	0	0	3	4
Gentianaceae	1	2	1	1	2	3
Menyanthaceae	1	1	0	0	1	1
Convolvulaceae	1	1	0 (1)	1	1	2
Hydrophylaceae	2	2	0	0	2	2
Boraginaceae	2	3	0	0	2	3
Lamiaceae	4	4	0 (2)	2 (3)	4	6
Scrophulariaceae	4	7	1 (2)	2 (3)	5	9
Orobanchaceae	1	1	0	0	1	1
Lentibulariaceae	1	3	0	0	1	3
Plantaginaceae	1	2	0 (1)	2	1	4
Rubiaceae	1	4	0	0	1	4
Caprifoliaceae	5	5	0	0	5	5
Valerianaceae	1	2	1	1	2	3
Campamulaceae	2	2	0	0	2	2
Asteraceae	15	15	8 (10)	11	23	26
Sub-totals	124	179	27 (43)	52	151	231

Monocots

Alismataceae	1	1	0	0	1	1
Hydrocharitaceae	1	1	0	0	1	1
Juncaginaceae	1	1	0	0	1	1
Najadaceae	1	1	0	0	1	1
Potamogetonaceae	1	6	0	0	1	6
Ruppiaceae	1	1	0	0	1	1
Zosteraceae	2	4	0	0	2	4
Juncaceae	2	12	0	0	2	12
Cyperaceae	6	36	0	0	6	36
Poaceae	16	28	4 (8)	11	20	39
Sparganiaceae	1	3+1?	0	0	1	3+1?
Typhaceae	1	1	0	0	1	1
Araceae	1	1	0	0	1	1
Lemnaceae	2	2	0	0	2	2
Liliaceae	9	9	0	0	9	9
Amaryllidaceae	0	0	1	1	1	1
Iridaceae	1	1	1	1	2	2
Orchidaceae	4	4	0	0	4	4
sub-totals	51	113	6 (10)	13	57	126
TOTALS	194	318	34 (54)	66	228	384
TOTAL TAXA (including varieties and hybrids)						398

FERNS AND FERN ALLIES

LYCOPDIACEAE - The Clubmoss Family

Lycopodium clavatum L.

Ground-pine. In Manny's Prairie (Gill #1742), localized drier areas of Ahlstrom's Prairie (Buckingham #01186; Gould-Wessen on 1.VI.1979), on elevated mounds in the bog about 3/4 km west of Ahlstrom's known as West Prairie (Buckingham #0309), along Ericson's Bay (Gill #1621), and in the boggy area to the south of the pond immediately west of Ericson's Bay (Gill #1658). Also along 200-line about 1.5 km south of Baada (Gill #1979.5:102).

Lycopodium inundatum L.

Bog clubmoss. Rare, along the west shore of Ericson's Bay (Gill #1669). Also reported by Muenscher (1951:184) as occurring "on sandy boggy shore near the outlet," Lake Ozette. Searches near the lake outlet during August, 1981, failed to locate specimens of this species. On the list of taxa threatened in Washington (Washington Natural Heritage Program 1981:6).

Lycopodium sitchense Rupr.

Alaska clubmoss. Uncommon and localized in distribution, in drier areas of Ahlstrom's Prairie (Buckingham #0304; #01187; Gill #1768).

SELAGINELLACEAE - The Selaginella Family

Selaginella wallacei Hieron.

Wallace's selaginella. Rare and localized in this area, occurs on a more or less southwest facing rock outcrop exposed to marine influences near the mouth of the Waatch River, north side (Gill #1912; Gill, Peterson & Flinn #1980:474).

ISOETACEAE - The Quillwort Family

Isoetes echinospora Dur. (*I. braunii* Dur. in Jones 1936).

Bristle-like quillwort. In 15 - 30 cm of water, Lake Ozette (Otis #1587, WTU; also reported by Muenscher 1951:184).

Isoetes lacustris L. (*I. piperi* A. A. Eaton in Jones 1936).

Lake quillwort. In Lake Ozette (Jones #5971, WTU; Otis #1773, WTU) including the area about 3 km east of the Lake outlet (Hitchcock, Spellenberg & Sutherland #24070, WTU). Megaspores present during August.

EQUISETACEAE - The Horsetail Family

Equisetum x *ferrissii* Clute

Hybrid scouring-rush. Hybrid between *E. hymale* L. and *E. laevigatum* A. Br. Locally common. Northeastern shoreline on exposed lake bottom, North End, Lake Ozette (Gill #1527).

Equisetum fluviatile L. (=*E. limosum* L.)

Water horsetail. In Lake Ozette along the shoreline about 2 - 2.5 km east of the outlet (Buckingham #0338) and on Tivoli Island (Buckingham #02801). Common in the lake (Sheffer & Hotchkiss 1945:13), it is at times associated with Lobelia dortmanna (Muenscher 1951:185).

Equisetum hymale L.

Common horsetail or scouring-rush. Along the margins of Swan Bay, Lake Ozette (Gill #1979.8:232) and in sand at Hobuck Beach (Gill #1524; #1853).

Equisetum telmateia Ehrh. var. braunii Milde

Giant horsetail. Common, particularly in areas of soil disturbance, such as along road and railroad cuts, and in slide areas. Prefers well illuminated situations, and is a frequent component of the Picea sitchensis - Polystichum munitum var. munitum association. Coastal and inland, at Cape Alava (Gill #1979.4 123; #1979.5:173; #1979.5:291; #1979.9:265; #1980:323: #1980:517), on slide areas north of the Ozette River (Gill #1980:250), at Hobuck Lake (Gill #1980:594), along Village Creek (Gill #1980:462), 200-line (Gill #1979.5:104; #1979.8:60), State Route 112 east of Neah Bay (Gill #1979.5:202MP), and the logging railroad near Hoko (Gross #5). Spores released during April - June.

OPHIOGLOSSACEAE - The Adder's-tongue Family

Botrychium multifidum (Gmel.) Trevis.

Leathery grape-fern. Very rare in the study area. At Shafer's Point (Gill & H. W. Buckingham #1644). Spores shed during August - early September.

POLYPODIACEAE - The Fern Family

Adiantum pedatum L.

Maiden-hair fern. Rare in this area due to the scarcity of suitable habitats. On rock faces near the mouths of the Hoko (Gill #1979.7:27; #1979.8:208; Gross #57) and Waatch rivers, in the interior of Cape Flattery (Gill #1979.8:103), and along the first cove southwest of Tsues Beach (Gill #1894). Apparently also south of the Ozette River mouth (Gould-Wessen on 2.IX.1979). The sori ripen in late August.

Athyrium felix-femina (L.) Roth

Lady fern. Fairly common, widespread. A relatively minor component of the Picea sitchensis - Polystichum munitum var. munitum association. Also in open areas of Tsuga heterophylla forests, especially along watercourses. Cape Alava (Gill #1979.9:253), along Village Creek (Gill #1980:450), 200-line (Gill #1979.8:53) and at Hoko (Gross #62). Spores shed in mid-July.

Blechnum spicant (L.) With. [=Struthiopteris spicant (L.) Weis.]

Deer fern. Common and widespread, particularly in association with Tsuga heterophylla. Understory dominant in climax stands of the Tsuga heterophylla - Blechnum spicant habitat type. In this association

its coverage can exceed 50%, although more typically coverage is somewhat less than 25%. Also an important component of many of the prairies, especially in drier areas, and on logged areas of the interior. Sometimes a minor component in the Picea sitchensis - Polystichum munitum var. munitum association, although in these stands its coverage rarely exceeds a few (less than 5) per cent. It can be a significant member of the transistion zone between the Picea sitchensis - Polystichum munitum and Tsuga heterophylla - Blechnum spicant associations. Spores released during the latter portion of summer. Cape Alava (Gill #1979.4:13; #1979.4:91; #1979.4:113; #1979.4:216; #1979.4:233; #1979.9:256; #1980:326), along the Cape Alava Trail (Gould-Wessen in VII.1978), near the mouth of the Ozette River (Gill #1978.OZ:209), on West Prairie (Gill #1979.4:54), drier areas of Ahlstrom's Prairie (Gill #1979.5:219) where it comprises a significant portion of the vegetation, on Roose's Prairie (Gill #1979.5:229; Gill 1979.5:257), and on Manny's Prairie, where its coverage exceeds 25% in some areas. Also at Hobuck Lake (Gill #1980:604; Gill, Thomas & Parker #1980:577), near the mouth of the Hoko River (Gross #61), along 200-line about 2 km south of Baada (Gill #1980:566) and on Cape Flattery along B-3 line (Gill #1979.8:95), Cape E Road (Gill #1979.8:80; #1979.8:84B), and at Hole-in-the-Wall (Gill #1979.8:14).

Dryopteris austriaca (Jacq.) Woynar

Shield fern, wood fern. Fairly common. Occasionally epiphytic on Tsuga heterophylla, also on rotting logs. A minor component of the Tsuga heterophylla - Blechnum spicant association. Cape Alava (Gill #1979.4:235; #1980:324; #1980:328) Ozette Island (Gill #1980:532),

interior of Tivoli Island (Gill #1731), and at Hoko (Gill #1979.8:197; Gross #60). Spores released during mid-summer.

Polypodium glycyrrhiza D. C. Eat.

Licorice fern. Fairly common. Epiphytic on trees, e.g., Alnus rubra, Picea sitchensis, Sambucus racemosa var. arborescens, also on rocks along the coast-line and in the interior. A component of the Picea sitchensis - Polystichum munitum var. munitum association and many of the communities present on disturbed sites within this habitat type. Its coverage within these communities is less than 5%. Also in the interior, but much rarer here. Sometimes growing with Polypodium scouleri. Cape Alava (Gill #1978.0Z:103; #1979.4:85; #1979.4:86; #1979.4:127; #1979.4:130; #1979.5:148; #1980:419; #1980:420), Cannonball Island (Gill #1979.5:210), Ozette Island (Gill #1980:526; #1980:534), Ozette River mouth (Gill #1978.0Z:208; #1979.5:302; Gould-Wessen in IX.1978), Strawberry Rock (Gill & Flinn #1829), Hobuck Lake (Gill #1980:610), Cape Flattery (Gill #1979.8:101), Baada (Gill #1979.5:7MP; #1979.5:24MP), along 200-line (Gill #1979.5:96), at Hoko (Gill #1979.7:16; #1979.8:189; Gross #63), and along Clallam Bay (Jones #5845, WTU). Spores released beginning in late summer.

The taxonomic relationships among members of the Polypodium vulgare complex, to which P. glycyrrhiza and P. hesperium belong, are complicated and inadequately understood. The range of character variation among our specimens assigned to P. glycyrrhiza is large: pinnae shape varies from acuminate to blunt-obtuse, rhizome flavor varies from acrid to licorice-like. Frond size also varies greatly, although most of our

specimens are small compared to other material: often the blade lengths are less than the 10 cm given as a minimum length in Hitchcock and Cronquist (1976:52) although they are within the range observed by Lang (1971:238). The morphological extremes represented by our material are distinct, but no clear boundaries seem to exist within this range. No new taxonomic entities are proposed here.

Polypodium hesperium Maxon

Licorice fern. Very rare, epiphytic on trees. Found only on Cannonball Island where it was growing on Alnus rubra (Gill #1979.5:196).

Polypodium scouleri Hook. & Grev.

Leather leaf polypody. Not common, epiphytic, e.g., on Tsuga heterophylla, Picea sitchensis, and Alnus rubra. A minor component in the Tsuga heterophylla - Blechnum spicant association near the ecotone with coastal Picea sitchensis - Polystichum munitum var. munitum comunities. Also in coastal communities dominated by Picea sitchensis and Alnus rubra in the overstory, including climax stands of the Picea sitchensis - Polystichum munitum habitat type. Sometimes growing with Polypodium glycyrrhiza. At Cape Alava (Gill # 1978.OZ:101; #1979.4:199; #1980:325; #1980:418), on Ozette Island (Gill #1980:533), near the mouth of the Ozette River (Gill #1978.OZ:201), at Hole-in-the-Wall (Gill #1979.8:18), and on Waadah Island (Rigg on 20.VII.1934, WTU).

Polystichum munitum (Kaulf.) Presl var. munitum

Common swordfern. Common and widespread, especially along the coast. Understory dominant in climax stands of the Picea sitchensis - Polystichum munitum var. munitum habitat type. In mature undisturbed stands at Cape Alava its coverage typically exceeds 80%. Also occurs sparingly in the Tsuga heterophylla - Blechnum spicant association, its coverage here usually less than 5%. In the transistion zone between these two associations its coverage is generally between 25% and 50%. Frequently occurs in seral communities along the coast, often as a dominant species. A small community dominated by Alnus rubra in the overstory and P. munitum in the understory occurs at Cape Alava near the base of the coastal ridge. The status of this community is uncertain at this time. Swordfern does not tolerate continued trampling and other long term disturbance, as evidenced by the relative scarcity of this species in areas frequented by tourists and in cleared areas associated with the occupation of Ozette Village during the early 20th century. Spores shed in late July through late August (September). It may be of some use to note here that juvenile P. munitum var. munitum plants can resemble P. lonchitis (L.) Roth. Cape Alava (Gill #1978.OZ:104; #1978.OZ:111; #1979.4:12; #1979.4:77; #1979.4:114; #1979.4:126; #1979.4:198; #1979.4:215; #1979.5:123; #1979.5:136; #1979.5:147; #1979.5:157; #1979.5:290; #1979.7:58; #1979.7:77; #1980:320; #1980:729; #1980:732), Cannonball Island (Gill #1978.OZ:15; #1979.5:184), Ozette Island (Gill #1980:529A; #1980:531), Ozette River mouth (Gill #1978.OZ:207), Cape Alava Trail (Gould-Wessen in VIII.1978), about 3/4 km north-northeast of Sandpoint, along the Ozette River near the Lake Ozette outlet (Gill #1571), Tivoli Island (Gill #1716; #1730), Hobuck Lake (Gill #1980:603),

Cape Flattery (Gill #1493; #1494; #1495; #1496), Hole-in-the-Wall (Gill #1979.8:6), Village Creek (Gill, Peterson & Flinn #1980:452), Baada (Gill #1979.5:6MP), along 200-line (Gill #1979.5:98; #1979.8:57), and at Hoko (Gill #1979.7.22; Gross #59).

Pteridium aquilinum (L.) Kuhn ssp. aquilinum var. pubescens Underw.

Bracken. Common. Occurs in relatively poor soils, often immediately along the coast. Also in prairie areas where it is frequently an important or even dominant component of the vegetation, and in open swampy areas where it occurs in association with Thuja plicata, Ledum groenlandicum, and Gaultheria shallon. On the southeast tip of Ozette Island (Gill #1980:281B), along the second beach north of Cape Alava (Gill #1979.5:307) and the beach about 0.4 km south of Wedding Rocks (Gill #1980:682), in swampy areas along the Sandpoint Trail and along the south boundary of the Ozette Indian Reservation with the Olympic National Park, at the head of Ericson's Bay (Gill #1618), and on Manny's Prarie (Gill #1761), Roose's Prairie (Gill #1980:721) and drier portions of Ahlstrom's Prairie. Stunted plants on the sand dunes at Hobuck Beach (Gill #1979.8:141; #1980:494; #1980:559; Gill & Flinn #1823; Gill & Parker #1845). Also at Hole-in-the-Wall (Gill #1979.8:5; #1980:616) and Hoko Spit Campground (Gross #64). Fiddle-heads available in May, spores released in late summer.

GYMNOSPERMS

TAXACEAE - The Yew Family

Taxus brevifolia Nutt.

Western or Pacific Yew. Rare in the study area. Along the Cape Alava (Underwood on 25.VI.1980) and Sandpoint Trails, where there are approximately 30 individuals (Underwood pers. comm., 1981). Also on the south survey line between the Ozette Indian Reservation and the Olympic National Park (Gill #1980:714), on the east side of Elk Lake (Gill, A. & K. Flinn #1812), along the Allen's Bay Trail (Gill #1677), and along the Ozette Lake - Hoko River Road (Gross #34). The scarcity of yew in this area may be due, at least in part, to over-exploitation in the past, the wood being a valuable raw material to the Ozette and Makah people.

TAXODIACEAE - The Taxodium Family

Sequoia sempervirens (D. Don) Endl.

Redwood. A young individual occurs on the east bank of the Hoko River near the mouth where it was obviously planted (Gill #1979.8:209).

CUPRESSACEAE - The Cypress Family

Thuja plicata Donn

Red cedar. Fairly common and widespread, particularly in the interior. Prefers wet soils. A component of the *Tsuga heterophylla* - *Blechnum spicant* habitat type complex, becoming a co-dominant with *T. heterophylla* in moister areas. Dominant in the overstory of many swampy

areas. Stunted individuals occur on Roose's Prairie. Coverage rarely exceeds 25%, even where it is the dominant overstory species. Several individuals at Cape Alava have had bark stripped from a portion of their trunks for use as basketry materials. Cape Alava (Gill #1979.4:17; #1979.4:101; #1979.4:228; #1979.9:264), along the margins of Lake Ozette (see also Jones 1936, pl. 8, fig. B) at Swan Bay (Gill #1979.8:241) and the inlet between Eagle and Shafer's Points (Gill #1577), Tivoli Island (Gill #1719), Ozette River mouth (Gill #1978.OZ:206), along the Sandpoint Trail, Cape Flattery at Hole-in-the-Wall (Gill #1979.8:4) and along Cape E Road (Gill #1979.8:78), along 200-line (Gill #1979.5:97; #1979.8:51) and the Hoko - Ozette Road (Gill #1979.8:212), and at Hoko (Gill #1978.8:178; Gross #56). Also on West Prairie (Gill #1979.4:48) and Roose's Prairie (Gill #1979.5:225; #1979.5:235; #1979.5:254; #1980:719). Current forestry management practices on the northwestern portion of the Olympic Peninsula seem destined to reduce greatly the abundance of this species as more areas, especially old growth stands, are clearcut.

PINACEAE - The Pine Family

Abies amabilis (Dougl.) Forbes

Pacific silver fir. Uncommon, in interior areas above approximately 150 meters of elevation. Along 200-line about 4 km south of Baada (Gill #1979.8:70) and along logging road 9100 between roads 9116 and 9118, south of Neah Bay (Gill #1980:740).

Picea sitchensis (Bong.) Carr.

Sitka spruce. Common and widespread. Dominant overstory species along much of the coast, forming several community types. The most important of these are the Picea sitchensis - Polystichum munitum var. munitum, P. sitchensis - Gaultheria shallon, and P. sitchensis - Carex obnupta communities. The overstory dominant of climax stands of the Picea sitchensis - Polystichum munitum habitat type. Coverage here is typically between 50% and 75% in the overstory. Seedling establishment in this association is often confined to rotting logs, and Sitka spruce forms only a very minor component in the understory of these stands. In areas of beach accumulation and low human disturbance (e. g., north of Sandpoint) occur seral stands dominated by Picea sitchensis and Gaultheria shallon. Between the base of the coastal ridge and current coastal terrace there often occurs a depression in which Sitka spruce and Carex obnupta dominate. Sitka spruce also occurs further inland, and is a minor component of the Tsuga heterophylla - Blechnum spicant association. Vegetative growth begins in late April to early May. Male cones shed their pollen in May. Cape Alava (Gill #1978.OZ:53; #1978.OZ:102; #1979.4:10, #1979.4:18; #1979.4:96; #1979.4:99; #1979.4:205; #1979.4:212; #1979.4:227; #1979.5:138; #1979.5:143; #1979.5:144; #1979.9:252; #1980:289B; #1980:426), Cannonball Island (Gill #1978.OZ:9; #1979.5:189), Ozette Island, Ozette River mouth (Gill #1978.OZ:202), Norwegian Memorial (Gill #1887), Roose's Prairie, where stunted (Gill #1979.5:233; #1979.5:236), Hobuck Beach (Gill #1979.8:144), Hobuck Lake, along the south margin of Waatch Prairie (Gill & Flinn #1836), near the Waatch River mouth (Gill #1916; Gill, Thomas & Flinn #1980:550), Cape Flattery at Hole-in-the-Wall (Gill #1979.8:11) and along Cape E Road (Gill

#1979.8:84), along the beach between Baada and Dtokoah Points (Gill #1979.5:23MP), along 200-line (Gill #1979.5:100; #1979.8:46), and at Hoko (Gross #58).

Pinus contorta Dougl. var. contorta

Lodgepole or shore pine. Very localized in its occurrence. Along the edge of Ericson's Bay (Gill #1619; Underwood on 1.VII.1980) where it is associated with Vaccinium ovatum and Gaultheria shallon, in Allen's Prairie (Gill #1709), and in Manny's Prairie (Gill #1753). The trees on both prairies appear healthy and vigorus; recruitment is apparent. Allen's Prairie supports the largest population, and it is the dominant overstory species on the on the southwestern portion. Female cones produced by all three populations.

Pseudotsuga menziesii (Mirbel) Franco var. menziesii

Douglas fir. Uncommon (except where planted), in interior areas. Northeast of Hobuck Lake (Gill #1980:599), along B-3 line on Cape Flattery (Gill #1856), and along the Hoko - Ozette Road (Gill #1979.8:210; Gross #36).

Tsuga heterophylla (Raf.) Sarg.

Pacific hemlock, coast hemlock. Common and widespread. Only very rarely near the coast line, not as salt tolerant as Picea sitchensis. The closest proximity to the open ocean I observed was on the promontory just south of the Ozette River mouth. More typically in the Cape Alava area T. heterophylla does not occur closer to the ocean than the ridge crest that

runs parallel to and generally more than 100 m inland from the coast-line. An important forest component in much of the interior, it is the overstory dominant in climax stands of the Tsuga heterophylla - Blechnum spicant habitat type. At Cape Alava its coverage in the overstory of this association is often over 50%, and varies from 5% to 25% in the understory. In older second growth hemlock stands on Cape Flattery the overstory coverage can exceed 75%, with essentially no understory component. Hemlock quickly re-establishes itself in logged areas. A community occurs near the mouth of the Ozette River where T. heterophylla is the overstory dominant and Maianthemum dilatatum is the most prominant component of the sparse understory. Thuja plicata is of minor importance in the overstory here. Hemlock is also a component of the vegetation in West, Ahlstrom's, and Roose's Praries. In these areas coverage is low, generally less than 5%; the trees are also noticably stunted. Male cones shed their pollen in April. Cape Alava (Gill #1979.4:11; #1979.4:100; #1979.4:211; #1979.4:226; #1979.9:263), Ozette River mouth (Gill #1978.OZ:205; #1979.5:306), inland about 0.5 lm north-northeast of Sandpoint (Gill #1980:686), Tivoli Island (Lake Ozette), along logging road 9100 between roads 9116 and 9118 (Gill #1980:741), Hobuck Lake (Gill #1980:592; #1980:605), on Cape Flattery at Hole-in-the-Wall (Gill #1979.8:12), along B-3 line (Gill #1979.8:94), Cape E Road (Gill #1979.8:77), and Koitlah Point Road (Gill #1980:636). Also along 200-line (Gill #1979.5:93; #1979.8:45), the Hoko - Ozette Road (Gill #1979.8:213), at Hoko (Gill #1979.7:19; Gross #35), and in the following prairies: West (Gill #1979.4:47), Ahlstrom's (Gill #1979.5:221), and Roose's (Gill #1979.5:234; #1979.5:255; #1980:718).

DICOTYLEDONAE

SALICACEAE - The Willow Family

Populus trichocarpa T. & G.

Cotton-wood. Rare within the study area, found at the head of Ericson's Bay, Lake Ozette (Gill #1617).

Salix hookeriana Barrett

Hooker's willow, coast willow. Common. With the exception of two specimens (Gill #1979.5:1MP, from Baada; Underwood & Osaki during 1981, Ozette area) all of our material lacks reproductive structures and can thus only tentatively be assigned to this taxon. It is likely that several of the specimens attributed to *S. hookeriana* actually represent hybrid individuals, especially in the case of plants from Cape Alava where vegetative materials believed to represent *S. piperi* as well as *S. hookeriana* x *piperi* were collected. A similar problem exists with the Hobuck Beach population. Cape Alava (Gill #1979.5:114; #1979.7:56; #1979.7:85), Cedar Creek (Underwood on 30.V.1980), North End, Lake Ozette (Gill #1285, see also Jones 1936, pl. 8, fig B), Hoko - Ozette Road (Gill #1979.8:214), Hobuck Beach (Gill & Flinn #1824), Baada Point (Gill #1979.5:1MP), and 200-line about 4 km south of Baada (Gill #1979.8:71).

Salix hookeriana Barrett x *piperi* Bebb

See discussion under *S. hookeriana*. Upslope from excavation area, Ozette Archaeological Site, Cape Alava (Gill #1980:708).

Salix lasiandra Benth.

Pacific willow. Fairly common. Along margins of Lake Ozette at the picnic area immmediately southwest of outlet (Gill #1555; #1556) on Garden (Thompson #9414, WTU) and Tivoli (Gill #1717; #1801) Islands, along the Swan Bay Road (Underwood on 10.V.1981) and 200-line (Gill #1980:570). All specimens except Thompson's lacking flowers or fruit. Specimens in which varietal identity was clearly determinable belong to var. lasiandra (Gill specimens from Lake Ozette and Underwood specimen). This variety also reported from near the intersection of the Ozette - Hoko Road with State Route 112 (N. Buckingham pers. comm., 1982).

Salix piperi Bebb

Piper's willow. Not common. See discussion under S. hookeriana. Cape Alava (Gill #1979.5:120) and Hobuck Beach (Gill #1979.8:128).

Salix sitchensis Sanson

Sitka willow. Not common, on Tivoli Island (Gill #1800; #1806) and near the intersection of Willoughby Lake Main Line and logging road 9100 (Gill #1806). None of the material examined had flowers or fruit.

MYRICACEAE - The Sweet Gale Family

Myrica gale L.

Sweet gale. Fairly common, especially along lake shores and other open wet areas. Along the shores of Lake Ozette (Gould-Wessen in VIII.1979; Hitchcock #24075, WTU; Jones #5950, WTU; Otis #1588, WTU)

including North End (Gill #1979.4:183; #1284), Swan Bay (Gill #1979.8:229), and Ericson's Bay (Gill #1615; #1667; Underwood on 1.VII.1980), Garden Island (Thompson #9416, WTU), and Tivoli Island (Gill #1729). Also in Allen's slough (Gill #1686; #1703). Flowers in April, fruits during July - September.

BETULACEAE - The Birch Family

Alnus rubra Bong.

Red alder. Common and widespread. An overstory component of the Picea sitchensis - Polystichum munitum var. munitum association, coverage in undisturbed stands generally low, usually around 5%. On disturbed sites within the Picea sitchensis - Polystichum munitum habitat type red alder is often co-dominant with Sitka spruce. Also a dominant component of some seres found on clear-cut areas in the interior and on clay slides and slumpage areas along the coast. A small stand occurs at Cape Alava with A. rubra dominant in the overstory and Polystichum munitum var. munitum dominating the understory. The status of this community is uncertain at this time. Red alder is also prominent in the vegetation on offshore islands.

Alders contribute to both chemical and physical improvements of soils (Fowells 1965:84). Perhaps most significant is the contribution of nitrogen to the soil through symbiotic fixation by micro-organisms contained in the root nodules. The foliage also contains much more nitrogen than that of other indigenous tree species (Fowells 1965:84). Fruits in August - September. Cape Alava (Gill #1978.0Z:105; #1979.4:95;

#1979.5:152; #1979.7:87), Cannonball Island (Gill #1978.0Z:10; #1979.5:190), along South Beach (Gill #1980:400), Lake Ozette at Swan Bay (Gill #1979.8:239) and the inlet between Eagle and Shafer's Points, on Tivoli Island (Gill #1802), near Hobuck Lake (Gill #1980:596), along the margins of Waatch Prairie (Gill & Flinn #1841), at the mouth of the Waatch River (Gill #1906), at Hole-in-the-Wall (Gill #1979.8:24), on Koitlah Point (Gill #1980:624), along Cape E Road (Gill #1979.8:88), at Baada (Gill #1979.5:15MP), along 200-line (Gill #1979.8:61), at Hoko (Gill #1979.7:36; #1979.8:186B; #1980:510; Gross #33), and along the Hoko River - Lake Ozette Road (Gill #1979.8:211). Also on a slide area about 3/4 km north of the Ozette River mouth (Gill #1980:247).

Corylus avellana L.

Common or European filbert. A few trees are located between Norwegian Memorial and the creek about 0.8 km to the south at the site of an abandoned homestead, where they were planted by settlers (Gill #1878). The trees set fruit, but juveniles were found. Native to Europe.

FAGACEAE - The Beech Family

Fagus sylvatica L.

European Beech. Occurs on the north end of Tivoli Island, where several were planted by early settlers to form a tree lined "avenue" (Gill #1714; #1721). Native to central and southern Europe. No young individuals observed.

URTICACEAE - The Nettle Family

Urtica dioica L. ssp. gracilis (Ait.) Seland. var. lyallii (Wats.) C. L. Hitchc.

Nettle. Common. Along the coast, especially in areas where the soil has been enriched by human activities. Cape Alava (Gill #1979.4:136; #1979.4:185; #1979.5:213; #1980:518; Gould-Wessen on 1.VI.1979) and Cannonball Island (Gill #1980:278A). Flowers during May and June.

POLYGONACEAE - The Buckwheat Family

Polygonum amphibium L.

Water smartweed. In Lake Ozette (Underwood on 12.VII.1980) including the area immediately southwest of the outlet (Gill #1553).

Polygonum cuspidatum Sieb. & Zucc.

Japanese knotweed. Introduced, from Asia. In the developed area east of Baada (Gill #1979.5:200L; 179.8:44). Flowers during August.

Polygonum paronychia Cham. & Schlect.

Black or nailwort knotweed. Uncommon due to limited habitat. Sand dunes along Hobuck Beach (Gill #1980:480; Gill & Flinn #1821) and near Strawberry Rock (Gill #1979.8:110).

Polygonum persicaria L.

Heartweed. Weedy, common in wet sand along the upper tide-line near the mouth of the Hoko River (Gross #31). Also in the gravel parking area at Swan Bay (Gill #1979.8:217). Prefers full sun. Flowers during June - August.

Rumex acetosella L.

Sheep sorrel. A European weed, prefers disturbed sites. On Cannonball Island (Gould-Wessen on 6.VII.1979), beach areas at Cape Alava (Underwood on 30.V.1980), and at Hobuck Beach (Gill #1980.485). Flowers is May and June, fruits during July.

Rumex conglomeratus Murr.

Clustered dock. A European weed, along the northern portion of the Waatch Logging Road (Gill #1979.8:169).

Rumex obtusifolius L.

Bitterdock or broad-leaved dock. Along 200-line about 4 km south of Baada (Gill #1979.8:64). Also reported from along the Hoko River less than 0.4 km below Hoko Falls (N. Buckingham pers. comm., 1982).

Rumex occidentalis Wats. var. procerus (Greene) Howell

Western dock. Disturbed areas. Ozette Archaeological Field Camp, Cape Alava (Gill #1980:318) and along 200-line about 1.5 km south of Baada (Gill, Thomas & Flinn #1980:569). Flowers from June to early August.

Rumex salicifolius Weinm. ssp. salicifolius

Willow dock or narrow-leaved dock. Coastal in our area. At the southeastern base of Cannonball Island (Gill #1980:281A), the first beach southwest of Tsues towards Anderson Point (Gill #1892), and along the roadside just southwest of the Waatch Bridge adjacent to the tide marsh at the Waatch River mouth (Gill #1512).

CHENOPODIACEAE - The Goosefoot Family

Atriplex patula L. var. obtusa (Ch~m.) C.L. Hitchc.

Obtuse spearscale or orache. Along the east bank of the Hoko River near the mouth (Gill #1979.8:183). Flowers during late summer. The varieties of A. patula often are recognized at the specific level, although they tend to intergrade completely (Hitchcock et al. 1964:190).

Atriplex patula L. var. patula.

Spearscale or spe..r orache. Occurs among driftwood on the beach south of Cape Alava (Otis #1777, WS) and in sand near the waterline at the mouth of the Hoko River, west side (Gill #1979.8:174). Flowers during late summer.

Salicornia virginica L. (=S. ambigua Michx.)

Pickleweed or woody glasswort. Near the high-tide mark along the north side of the Waatch River mouth (Gill #1979.8.150; #1290; #1911) and in the salt marsh west of the Waatch Bridge (Gill #1513). Flowers during August and September.

NYCTAGINACEAE - The Four-O'clock Family

Abronia latifolia Eschsch.

Yellow sandverbena. In sand along Mukkaw Bay (Rogers #813, WS, WTU) including Hobuck Beach (Gill #1979.8:124; #1848; Gill & Flinn #1818; Gill, Flinn & Thomas #1980:558; G. B. & R. P. Rossbach #504, WTU) and the dune area near Strawberry Rock (Gill #1979.8:105). Flowers during June - August, fruits in September.

Abronia umbellata Lam. var. acutalata (Standl.) Hitchc.

Pink sandverbena. Collected in sand along shore of Mukkaw Bay by Marion Ownbey and Fred Meyer (#2259, WS, WTU) in July 1940. Although I have looked extensively for this species, I have not found it within the study area. It is included on the list of vascular plant taxa thought to be extinct or extirpated in Washington (Washington Natural Heritage Progran 1981:18).

PORTULACEAE - The Purslane Family

Montia parvifolia (Moc.) Greene var. parvifolia (=Claytonia parvifolia Moc.)

Small-leaved montia. Reported from along the Hoko River less than 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982).

Montia perfoliata (Donn) Howell (=Claytonia perfoliata Donn)

Miner's lettuce. Fairly common. Ozette Island (Gill #1980:539) and along 200-line about 1.5 km south of Baada (Gill, Thomas & Flinn #1980:568). Fruits in July, and probably earlier.

Montia sibirica (L.) Howell (=Claytonia sibirica L.).

Siberian montia, candyflower. Common. Along the coast in Picea sitchensis and Picea sitchensis - Alnus rubra dominated forests, also in disturbed areas. Cape Alava (Gill #1979.4:5; #1979.4:156; #1979.4:204; #1979.4:219; #1979.5:110; #1979.5:292; #1980:271B; Gould-Wessen in III.1979) and Ozette Island (Gill & Gould-Wessen #1980:288A). All materials determinable to variety represent M. siberica var. siberica. Flowers in March through late June, fruits in June and July.

Montia spathulata (Dougl.) Howell (=Claytonia spathulata Dougl. ex Hook.)

Pale montia. On disturbed faces of consclidating dunes along Mukkaw Bay (Buckingham #01865). Fruits during late April - early May.

CARYOPHYLLACEAE - The Pink Family

Arenaria serpyllifolia L.

Thyme-leaf sandwort. A European species, on consolidated sand dunes along Mukkaw Bay (Buckingham #01863). Flowers in May.

Cerastium arvense L.

Field chickweed or field mouse-ear. Coastal, in sand at Hobuck Beach (Gill #1980:486) and on Cannonball Island (Gill #1979.5:205). Also reported from Sand Point (N. Buckingham pers. comm., 1982). Flowers May through July.

Cerastium semidecandrum L.

Cerastium. Known from Vancouver Island (Hitchcock & Cronquist 1976:114), rare in our area. On consolidated dunes along the south shore of the Tsues River (Buckingham #01861). Flowers in early spring, fruits in late April - May.

Cerastium viscosum L.

Sticky chickweed. A European weed. On the southeastern portion of Ozette Island (Gill #1980:282B).

Honkenya peploides (L.) Ehrh.

Sea purslane. Fairly common along the upper beach throughout the study area. At Cape Alava (Gill #1979.7:74; Otis #1776, WS; Underwood on 25.VI.1980), the east base of Cannonball Island (Gill #1979.4:135; #1979.5:211; #1980:280A), on Ozette (Gill & Gould-Wessen #1980:289A) and Tatoosh (Flett on 14.VII.1901, WS) Islands, along the first beach southwest of Tsues towards Anderson Point (Gill #1893), the beach between Baada and Dtokoah Points (Gill #1979.5:16MP), and along the Strait of Juan de Fuca about 11 km west of Clallam Bay (Ownbey & Meyer #2262). Also near the Waatch (Gill #1283) and Sekiu (Gill #1303) River mouths, and the Hoko River mouth south of Kydaka Point (Gill #1979.7:33; #1979.8:184; Gross #30). Flowers in June.

Sagina crassicaulis Wats

Stick-stemmed pearlwort. Not common, strictly and immediately coastal in the study area. On Ozette Island (Gill & Gould-Wessen #1980:295; #1980:302; #1980:308) and a rock outcrop just above the high tide mark near the mouth of the Ozette River (Gill #1980:263). Flowers and fruits both may be found during late June.

Sagina occidentalis Wats.

Western pearlwort. Apparently uncommon. Along trail to Hole-in-the-Wall (Gill #1980:226). Flowers in June.

Sagina procumbens L.

Procumbent pearlwort. An introduced European weed. A few fragments of this species were found on a herbarium sheet of Callitriche heterophylla collected east of the Ozette Ranger Station (Buckingham #01185).

NYMPHAEACEAE - The Water-lily Family

Brasenia schreberi Gmel.

Water-shield. Fairly uncommon. Lake Ozette (Jones #5980, WTU; Otis #1786, WTU) including Swan Bay (Gill #1979.8:238) in shallow water.

Nuphar polysepalum Engelm. [=Nymphozanthus polysepalus (Engelm.) Fern.]

Yellow water-lily. Fairly common. In Lake Ozette (Jones #5973, WTU; Thompson #9421, WTU) including Swan Bay (Gill #1979.8:225), near the outlet (Gill #1551), and in the slight inlet between Eagle and Shafer's Points (Gill #1588). Flowers during July and August.

Nymphaea odorata Ait.

Fragrant or American water-lily. Introduced from Eastern North America, at the outlet of Lake Ozette (Hitchcock #24094, WS). Flowers during July and August.

Nymphaea tuberosa Paine

Tuberous water-lily. A species of eastern North America. Reported "in shallow bay off the east shore of Garden Island," Lake Ozette (Muenscher 1951:185).

CERATOPHYLLACEAE - The Hornwort Family

Ceratophyllum demersum L.

Hornwort, coon-tail. Reported as scarce in Lake Ozette (Scheffer & Hotchkiss 1945:14).

Ceratophyllum echinatum A. Gray

Thornwort. Lake Ozette (Jones #5980, WTU). Ceska and Ceska (1980:69-70) suggest that this species may be native in the Pacific Northwest.

RANUNCULACEAE - The Buttercup Family

Actaea rubra (Ait.) Willd.

Red baneberry. Rare. One specimen from near the Hoko River mouth (Sisleman & Perry #1, Hoko Archaeology Project Herbarium) consisting of a leaf and some seeds and apparently representing this species was examined. No other representative of this species was observed during the study.

Aquilegia formosa Fisch.

Red or Sitka columbine. Along the Hoko River less than 0.4 km downstrean from Hoko Falls (Buckingham #0295).

Ranunculus acris L.

Meadow buttercup. European, at Ozette (Underwood on 12.VI.1980). Flowers during June.

Ranunculus aquatilis L. var. capillaceus (Thuill.) DC.

White water-buttercup or water crowfoot. Rare, in Lake Ozette at Ericson's Bay (Gill #1635) and at the Rainier Landing (Buckingham #02804) (see also Scheffer & Hotckiss 1945:15).

Ranunculus flammula L. Creeping buttercup, lesser spearwort. Locally common, along the margins of Lake Ozette (Underwood in VI.1978) including Swan Bay (Gill #1979.8:226), near the outlet (Gill #1547), and along the inlet between Eagle and Shafer's Points (Gill #1584). Flowers in June - August.

Ranunculus repens L. var. repens

Creeping buttercup. In moist relatively open areas. Along the shore of North End (Lake Ozette) 1 - 2 km east of the outlet (Gill #1287), on Cape Flattery (Gill #1980:233), and at Hoko (Gill #1980:503; Gross #38). A European species. Flowers in June - July.

Ranunculus uncinatus D. Don var. parviflorus (Torr.) Benson

Little buttercup. Along the logging railroad near Hoko (Gross #3). Flowers in June.

Ranunculus uncinatus D. Don var. uncinatus

Little buttercup. Not common, disturbed areas at Cape Alava (Gill #1979.5:111; #1979.5:159). Flowers in May.

FUMARIACEAE - The Fumitory Family

Corydalis scouleri Hook.

Scouler's corydalis. Rare within the study area. In a wooded area inland and east of the Hoko River near the mouth (Gill #1980:507; Gross #11) and along the Hoko River about halfway between the mouth and headwaters (Underwood on 29.IV.1981). Flowers during May and June and fruits in July-early August.

BRASSICACEAE - The Mustard Family

Arabis hirsuta (L.) Scop. var. eschscholtziana (Andrz.) Rollins.

Hairy rockcress. East and southeast slopes of Cannonball Island on talus and on gravelley soils (Gill #1979.5:204; #1980:274A). Flowers during May and the fruits ripen during June-early July.

Barbarea orthoceras Ledeb.

American wintercress. Occurs on the northeast-facing shoreline of the southeast half of Ozette Island (Gill #1980:280B). Flowers during June and early July.

Brassica campestris L.

Field or common mustard. A European species found at Cape Alava (Gill #1979.5:215; #1979.7;64). Flowers from early May through late July-early August and fruits during July and August.

Cakile edentula (Bigel.) Hook. ssp. edentula var. edentula (following the taxonomic treatment of Rodman, 1974)

American searocket. Common strand species in the study area. At Cape Alava (Daubenmire on 25.VII.1966, WS; Gill #1979.7:68; #1979.7:72; #1979.9:270; #1980:425B), Norwegian Memorial (Gill #1881), Mukkaw Bay (Rogers #815, WS, WTU), Tsues Beach (Gill #1979.8:116; #1979.8:117; #1979.8:118), Strawberry Rock (Gill & Flinn #1835), and Hobuck Beach (Gill #1979.8:129; #1520; #1854). Also on the Quilleute Indian Reservation (Townsend s. n. on 15.VII.1917, WS; Otis #1559, WS, WTU; #1562, WS, WTU). Introduced from the eastern North American coast. The earliest known collection from Washington was made at Long Beach, Pacific County, on August 13, 1907 (McGregor s. n., DS, as cited in Rodman 1974:123),

followed by collections from Port Angeles, Clallam County, on June 26, 1908 (Flett #3381, US, cited in Jones 1936:163, Piper and Beattie 1915:168, and Rodman 1974:123), and Sand Island, Pacific County, on July 21, 1909 (Suksdorf #6689, WS). Barbour and Rodman (1970:373) determined with good supporting evidence that C. edentula was probably first introduced along the west coast in the San Francisco Bay area between 1880 and 1882. Flowers and fruits throughout the summer, commencing somewhat earlier than the following.

Cakile maritima Scop. ssp. maritima (following taxonomic treatment of Rodman 1974)

European searocket. Native to Europe, first collected along the west coast (north of Mexico) by Rose at Stinson Beach, Marin County, California, in May 1935 (Barbour & Rodamn 1970:376, Rose 1936:224). Rose also found this species later in 1935 at Salada Beach in San Mateo County (Rose 1936:224). The first known collection from Washington was made along Mukkaw Bay by Ownbey and Meyer (#2260, WS) July 22, 1940. Common on beaches within the study area above high water mark. Cape Alava (Gill #1979.7:67; #1980:425A; 1980:497), Norwegian Memorial (Gill #1880), Mukkaw Bay (Ownbey & Meyer #2260, WS), Tsues Beach (Gill #1979.8:119), Strawberry Rock (Gill & Flinn #1834), and Hobuck Beach (Gill #1979.8:135; #1521; #1855). Flowers and fruits somewhat later than the preceding species, throughout most of the summer.

Cardamine angulata Hook.

Angled or seaside bittercress. In somewhat disturbed mature Picea sitchensis stands directly along the coast. North Beach, Cape Alava (Gill #1979.4:143; #1979.5:297). Also reported from near the intersection of the Ozette - Hoko Road and State Route 112 (N. Buckingham pers. comm., 1982). Flowers during April and May.

Cardamine oligosperma Nutt. var. oligosperma

Little western or few seeded bittercress. In moderately disturbed Picea sitchensis stands directly along the coast. Cape Alava (Gill #1979.4:146; #1979.4:189). Flowers in early spring, fruit available as early as April.

Cardamine pulcherrima Greene

Slender toothwort. Fairly common along the coast in moderately disturbed areas of the Picea sitchensis - Polystichum munitum habitat type. The varietal status of this material is uncertain. Buckingham and Tisch (1979:15) report var. pulcherrima from the northern portion of the Olympic Peninsula and var. tenella (Pursh) Hitch. from the southwest through northern portion, in a clockwise direction. Cape Alava (Gill #1979.4:106; Gould-Wessen in III.1979).

Subularia aquatica L.

Awlwort. Found in Lake Ozette growing in mud from the edge of the lake to water depths of about 1 meter or more (Jones #5990, WTU; Hitchcock, Spellenburg & Sutherland #24073, WTU), including the area immediately east of the outlet (Buckingham #02725). Fruits in August.

DROSERACEAE - The Sundew Family

Drosera rotundifolia L.

Round-leaf sundew. Uncommon, due to restricted habitat. Occurs in Allen's Prairie (Gill #1689), Ahlstrom's Prairie (Gill #1980:696), Roose's Prairie (Gill #1979.5:251), Manny's Prairie (Gill #1746), and West Prairie (Gill #1980:436), in a bog along Ericson's Bay (Gill #1645; on Rigg 24.VIII.1933, WTU, *Rhynchospcra alba* sheet), and along a logging road about 0.2 km west of Manny's Prairie. Flowers in August.

SAXIFRAGACEAE - The Saxifrage Family

Boykinia elata (Nutt.) Greene

Slender or coast boykinia. Fairly common and widespread. Lake Ozette immediately southwest of outlet (Gill #1554), Cape Flattery near Hole-in-the-Wall (Gill #1980:227; #1980:614), along Village Creek (Gill, Peterson & Flinn #1980:456), and about 1.6km southwest of Neah Bay (Rogers #816, WS). Reported from near the Hoko River about 0.4 km below Hoko Falls (N. Buckingham pers. comm., 1982). Flowers June - August.

Boykinia major Gray var. *intermedia* Piper.

Mountain boykinia. Not common. The boggy area known as West Prairie (Gill #1980:438) and at Lake Ozette (Gunther on 30.VI.1935, WTU; Jones #5946, WTU). Flowers during June and July.

Heuchera micrantha Dougl. var. *diversifolia* (Rydb.) R. B. & L.

Small-flowered alumroot. Not common. On steep northwest-facing cliff of decomposing sandstone-conglomerate, Kydaka Point, near the mouth of the Hoko River (Gill #1980:509; Gross #20). Also may be present on Ozette Island (Gill & Gould-Wessen #1980:300, vegetative specimen). Flowers in late June-early July.

Mitella ovalis Greene

Oval-leaved or coastal mitrewort. 4.8 km southwest of Sekiu (Tisch #744, WS).

Tellima grandiflorum (Pursh) Dougl.

Fringecup. Fairly common. Cape Alava (Gill #1979.5:112), Cannonball Island (Gill #1979.5:195), Ozette Island (Gill & Gould-Wessen #1980:306), and Baada Point (Gill #1979.5:8MP). Flowers in May, fruits in late June - early July.

Tiarella trifoliata L. var. trifoliata

Trefoil foamflower. Common, along the coast and inland. At Cape Alava a component in both the Picea sitchensis - Polystichum munitum and Tsuga heterophylla - Blechnum spicant associations. Flowers from June - early August, fruits from Late July - early September. Cape Alava (Gill #1979.9:254; #1980:319; #1980:329; Gould-Wessen on 20.V.1979), near Hobuck Lake (Gill #1980:608), and at Hoko (Gill #1979.7:18; Gross #6). Also reported from Ahlstrom's Prairie (N. Buckingham pers comm., 1982).

Tolmiea menziesii (Pursh) T. & G.

Youth-on-age, pig-a-back plant, thousand mothers. Uncommon. Ozette Field Camp, Cape Alava (Gill #1979.5:170). Flowers during May.

GROSSULARIACEAE - The Currant or Gooseberry Family

Ribes bracteosum Dougl.

Stink currant. Fairly common and widespread. Cape Alava (Gill #1979.5:113; #1979.5:233; #1980:424), Umbrella Creek (Bugher & Underwood on 21.VI.1980), Cape Flattery (Gill #1979.8:104), along Village Creek (Gill, Peterson & Flinn #1980:458), along the Waatch River at the Neah Bay water-works (Gill #1980:238), Baada Point (Gill #1979.4:32; #1979.5:4), and along the rock cliffs on the east side of the Hoko River mouth (Gill #1980:505). Flowers in early May and fruit is ripe in July, often only a few flowers per raceme produce ripe fruit.

Ribes divaricatum Dougl.

Black gooseberry. Not common, at the Waatch River mouth (Gill #1980:551; Gill, Peterson & Flinn #1980:469), and a specimen, probably this species, from Cape Alava (Gill #1980:712). Fruits in July.

Ribes ?lacustre (Pers.) Poir.

Swamp gooseberry. A vegetative specimen most closely matching this species collected along Village Creek (Gill,Peterson & Flinn #1980:457). Buckingham and Tisch (1979:49) list this species as occuring in northern, central, and southern portions of the Peninsula.

Ribes laxiflorum Pursh

Trailing black currant. Fairly common and widespread. Flowers in April - early May, fruit is ripe in July. Sometimes grows as an epiphyte when young. Ozette Island (Gill #1980:524; Gill & Gould-Wessen #1980:304), along the Cape Alava Trail west of bridge over Ozette River (Underwood in 22.IV.1979), Baada Point (Gill #1979.4:30; #1979.4:31; #1979.5:14MP), and at Hoko (Gill #1979.7:30; #1979.8:196; Gross #48).

ROSACEAE - The Rose Family

Amelanchier alnifolia Nutt.

Serviceberry. Rare. On the east slope of Cannonball Island (Gill #1979.5:203), and on Strawberry Rock, about 1 km southwest of the Tsues River mouth (Gill & Flinn #1830). Apparently flowers in April or early May. I have not seen any ripe fruit.

Aruncus sylvester Kostel.

Goats beard, locally referred to as golden-rod. Fairly common and widespread. Flowers in June - early July, fruits in late July-August. Hole-in-Wall (Gill #1980:228), Village Creek (Gill, Peterson & Flinn #1980:459), along the Waatch River in interior areas (Gill & Peterson #1980:243), and along State Route 112 about 4.5 km west of the Hoko River (Gross #37).

Cotoneaster microphylla Lindl.

Small-leaf cotoneaster. An ornamental native to the Himalayas, one plant was found growing along the Waatch Logging Road (Gill #1979.8:168). Fruits in autumn.

Cotoneaster simonsii Baker

Simon's cotoneaster. An ornamental species native to the Himalayas, one specimen found growing along the Hoko River - Lake Ozette Road (Gill #1979.8.216). Fruits in August and September.

Fragaria chiloensis (L.) Duchesne

Coastal strawberry. Fairly common in coastal areas, both in sandy areas and on rocky slopes. Cannonball Island (Gill #1978.OZ:23A; #1979.5:199; #1980:270A; Gould-Wessen on 6.6.1979), Hobuck Beach (Gill #1979.8:142; #1980:481), Koitlah Point (Gill #1980:625), and just north of the Ozette River mouth. Flowers in June, also one collection with flowers from late November (Gill #1978.OZ:23A). Fruits not observed.

Geum macrophyllum Willd. var. macrophyllum

Large-leaved avens. Fairly common. Cape Flattery (Gill #1980:615; #1498), along the Waatch Road (Gill #1921), and along 200-line about 4 km south of Baada (Gill #1979.8:47). Flowers during July - early September, fruits in late July - September.

Holodiscus discolor (Pursh) Maxim.

Oceanspray. Uncommon. North shore of Waatch River near mouth (Gill #1979.8:147; #1980:468; #1910). Flowers in July, fruits in late summer.

Oemlaria cerasiformis (H. & A.) Landon [=Osmaronia cerasiformis (T. & G.) Greene]

Indian plum or osoberry. Not common, along the Strait of Juan de Fuca. Baada Point (Gill #1979.4:35) and at Hoko (Gill #1979.7:24). Flowers during April, fruits mid-July - early August.

Physocarpus capitatus (Pursh) Kuntze

Pacific ninebark. Along the Ozette River (Gould-Wessen on 7.VI.1979 and 9.VI.1979) and Lake Ozette (Gunther on 30.VI.1935, WTU; Jones #5935, WTU) including the inlet between Eagle and Shafer's Points (Gill #1587), along Ericson's Bay (Gill #1602; #1623), and on Tivoli Island (Gill #1723). Also reported from near the Hoko River about 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982). Flowers in May and June, fruits in August.

Potentilla pacifica Howell

Pacific silver-weed. Common and widespread, particularly in coastal areas and in the marshy area along the lower Waatch River. Flowers from late June through early September, seeds are ripe in August and September. Along the Ozette River near the mouth (Gill #1980:251), along Lake Ozette (Underwood on 1.VII.1980) including Ericson's Bay (Gill #1642) and on Tivoli Island (Gill #1712), Hobuck Beach (Gill #1979.8:138; Gill & Parker #1847; Gill, Thomas & Flinn #1980:561), Waatch River mouth (Gill #1905), Waatch Prairie (Gill #1979.8:172; #1980:650; Gill & Flinn #1837), along Village Creek (Gill, Peterson & Flinn #1980:453), in yards in Neah Bay (Gill #1980:573), and along the Hoko River near the mouth (Gross #41).

Potentilla palustris (L.) Scop.

Purple or marsh cinquefoil. Not common. At Swan Bay (Gill #1979.8:227) and along the east side of Elk Lake (Gill, A. & K. Flinn #1813).

Prunus avium L.

Sweet cherry. Introduced, near Roose's homestead (Gill #1979.5:269) and at the head of Ericson's Bay (Gill #1620; #1624).

Pyrus fusca Raf.

Western crabapple, wild crabapple. Common and widespread. An important member of many coastal communities. On the extensively disturbed coastal terrace between Cape Alava and the Cape Alava - Lake Ozette Trail Pyrus fusca is very common, with coverage values approaching 50% in some areas. It also occurs on sand dunes at Hobuck Beach and in seral stands of the Picea sitchensis - Polystichum munitum var. munitum habitat type. Occasional component in more open areas of the Tsuga heterophylla - Blechnum spicant habitat type; its coverage in climax stands is less than 5%. Flowers from mid May to early June, fruit ripen in late August - early September. Cape Alava (Gill #1979.4:8; #1979.5:108; #1979.5:129; #1979.5:131 #1979.5:153; #1979.7:53; #1979.7:84; #1979.9:261; #1980:330; #1980:520; Gould-Wessen on 1.VI.1979), Ozette River mouth (Gill #1979.5:299; #1979.5:304; #1980:266), South Beach (Gill #1980:403), along the Cape Alava - Lake Ozette Trail (Gill #1979.7:52; Gould-Wessen on 1.VI.1979), the west side of Ericson's Bay (Gill #1599), and along Allen's Bay (Gill #1787). Also on sand dunes at Hobuck Beach

(Gill #1979.8:139; #1980:488), along the north side of the Waatch River mouth (Gill #1980:572; #1909; Gill, Peterson & Flinn #1980:463; Gill, Thomas & Flinn #1980:545), near Hole-in-the-Wall (Gill #1979.8:1; #1979.8:9; #1979.8:21), on the east side of Baada Point (Gill #1979.5:11MP), and along the Hoko River near the mouth (Gill #1979.8:179; #1980:508; Gross #45).

Pyrus malus L. Apple. A cultivated species, persisting on the coastal terrace immediately south of Cape Alava on the site of historic Ozette Village (Gill #1979.5:122). Flowers in May.

Rosa nutkana Presl var. nutkana

Nootka rose. Common in open and exposed areas along the coast and the Strait of Juan de Fuca, often in sand or on rocky slopes. Coverage approaches 50% in some areas. Flowers during June, occasionally in late November. Fruits ripen in late August - early September, and persist into the winter. Cape Alava (Daubenmire on 14.VI.1966, WS), Cannonball Island (Gill #1978.OZ:17; #1979.5:174; #1980:272A; Gould-Wessen on 6.VI.1979), South Beach (Gill #1978.OZ:26; #1980:401), dune area near Strawberry Rock (Gill #1979.8:106), Hobuck Beach (Gill #1979.8:122; #1980:495; Gill & Flinn #1819; Gill & Parker #1846), north side of the Waatch River mouth (Gill #1979.8:149; #1908; Gill, Thomas & Flinn #1980:547), Baada (Gill #1979.8:75), along the Hoko River near its mouth (Gill #1979.7:34; Gross #8), and at Kydaka Point (Gill #1979.8:177). Also reported from near the Hoko River about 0.4 km below Hoko Falls (N. Buckingham pers. comm., 1982).

Rubus discolor Weihe & Nees (=Rubus procerus Muell.)

Himalayan blackberry. An Old World species sparingly introduced in disturbed areas. Cape Flattery at the Cape Trail parking lot (Gill #1979.8:28), along the Koitlah Point Road (Gill #1980:644), along the Cape Loop Road just west of Neah Bay (Gill #1979.8:43), about 0.2 km west of Baada Point (Gill #1980:544), along the Hoko - Ozette Road (Buckingham #01200b), and at Swan Bay (Gill #1979.8:244). Flowers during June - August, fruits in late summer.

Rubus laciniatus Willd.

Evergreen or cut-leaf blackberry. Of European origin and sparingly introduced on disturbed sites in the study area. Lake Ozette (Gould-Wessen on 4.V.1979) including the west side of Ericson's Bay (Gill #1598), north side of the Waatch River mouth (Gill #1979.8:146, #1907; Gill, Thomas & Flinn #1980:556), and at Koitlah Point (Gill #1980:622). Fruits in late summer.

Rubus parviflorus Nutt. var. parviflorus

Thimbleberry. Fairly common, particularly in open and disturbed areas. Along the northeastern shore of North End, Lake Ozette (Gill & Shier #1531), near Hobuck Lake (Gill #1980:597B), along the north side of the Waatch River mouth (Gill #1979.8:145; Gill, Thomas & Flinn #1980:553), Cape Trail parking area, Cape Flattery (Gill #1979.8:31), along the Koitlah Point Road (Gill #1980:635), on the east side of Baada Point (Gill #1979.5:12MP), and at Hoko (Gill #1979.7:28; #1979.8:175; #1980:506; Gross #4). Flowers in June, ripe fruit available from mid July through mid

August, varying somewhat with local growing conditions. Sprouts available in May.

Rubus spectabilis Pursh

Salmonberry. Common and widespread. A minor component (overall coverage usually less than 5%) in climax stands of the Picea sitchensis-Polystichum munitum var. munitum habitat type, and an important and often dominant species in seral stands arising after disturbance in this habitat type. On old slide areas near Cape Alava coverage often approaches 90%. Also commonly occurs in open areas further inland. Flowers in early April to early May, sprouts available in late April to early May. Ripe fruit available from late June until early August, with peak season occurring in early to mid-July. Typically there are 60 - 100 drupelets per fruit, although occasional fruits with far fewer drupelets occur. Along the coast strip crows and other birds eat the fruits, and may have competed with the indigenous humans for this resource. Cape Alava (Gill #1978.OZ:106; #1979.4:2; #1979.4:3; #1979.4:79; #1979.4:186; #1979.5:115; #1979.5:117; #1979.5:149; #1979.5:168; #1979.7:59; #1979.9:257; #1980:260; #1980:445; #1980:521; Gould-Wessen on 1.VI.1979), inland along North Beach (Gill #1979.4:149; #1979.4:152; #1979.7:80; #1979.7:81A; #1979.7:81B; #1980:442), Cannonball Island (Gill #1978.OZ:23B; #1979.5:182), Tivoli Island (Gill #1720), Hobuck Lake (Gill #1980:607), Hobuck Beach (Gill #1979.8:131), along the edges of Waatch Prairie (Gill #1842), Cape Flattery along Cape E Road (Gill #1979.8:82) and near Hole-in-the-Wall (Gill #1979.8:20; #1979.8:38; #1980:229), Koitlah Point (Gill #1980:621), Village Creek (Gill, Peterson & Flinn

#1980:454), Baada and Dtckoah Points (Gill #1979.4:33; #1979.5:5MP) 200-line (Gill #1979.5:94; #1979.8:50), and at Hoko (Gill #1979.7:26; #1979.7:44; Gross #43).

Rubus ursinus Cham. & Schlecht.

Pacific blackberry or dewberry. The only blackberry native to the Pacific Northwest. Along the banks of the Hoko River near its mouth (Perry #14, Hoko River Archaeological Project Herbarium, WSU). Also reported from 0.2 km below Hoko Falls near the Hoko River bridge (N. Buckingham, pers. comm., 1981).

Sanguisorba menziesii Rydb.

Menzies' burnet. Rare, included on the list of sensitive taxa for Washington (Washington Natural Heritage Program 1981:15). Swan Bay, Lake Ozette (Gill #1979.8:219). Fruits during August - early September.

Sanguisorba officinalis L.

Garden burnet. Rare in study area. Allen's Slough (Buckingham #02746; Gill #1696) and near the outlet of Lake Ozette (Hitchcock #24096, WS). Flowers in late July - August.

Sorbus aucuparia L.

European mountain-ash or rowan tree. Not observed in the study area proper, but found well established immediately to the south along Quilleute Road between Mora and Mina Smith Roads, Quilleute (Gill #1891). Fruit ripens late August - September.

Spiraea douglasii Hook. var. menziesii (Hook.) Presl

Menzies' spiraea. Fairly common, in wet areas. Flowers late June - August. Along Lake Ozette margins (Gunther on 30.VI.1935, WTU; Jones #5987, WTU) including the northeast shore of North End (Gill & Schier #1529) and Swan Bay (Gill #1979.8:222). Also near the west edge of Allen's Prairie (Gill #1697) and reported from Ahlstrom's Prairie (N. Buckingham pers. comm., 1982).

FABACEAE - The Bean Family

Cytisus scoparius (L.) Link

Scot's broom. Native to southern Europe and sparingly introduced in this area. Found at Hobuck Beach (Gill #1980:487), Baada (Gill #1278), and Hoko (Gross #1). Flowers in late June - early July.

Lathyrus japonicus Willd. var. glaber (Ser.) Fern

Beach-pea. Fairly common in coastal areas along the upper beach. At Cape Alava (Daubenmire on 14.VI.1966, WS; Gill #1979.7:70; #1979.8:246; #1980:421; #1980:522; Gould-Wessen on 10.VI.1979; Underwood on 25.VI.1980), Hobuck Beach (Gill #1979.8:136), and along the Hoko River near its mouth (Gross #12). Flowers June through August, fruit ripe in July and August.

Lathyrus palustris L. var. palustris

Marsh peavine. Uncommon. Along the northern portion of the Waatch Logging Road (Gill #1980:649). Flowers in late July - early August.

Lotus corniculatus L.

Birdsfoot-trefoil. The Lotus corniculatus group is poorly understood taxonomically and is often treated as a single species (Tutin et al. 1968:v.2:174). When taxa of this complex are recognized at the specific level material from the study area is intermediate between L. corniculatus and L. pedunculatus Cav. An escaped European species, rare in this area. Along logging road 5609 near a small unnamed lake (Gill #1865). Flowers during late summer.

Lupinus littoralis Dougl.

Seashore lupine. Occurs in dune area along Mukkaw Bay including Hobuck Beach (Gill #1980:493) and on the dunes across from Strawberry Rock southwest of the Tsues River mouth (Gill #1979.8:111).

Medicago lupulina L. Black medic or hop clover. A European species, at Baada (Gill #1979.8:154).

Trifolium dubium Sibth.

Suckling or least hop clover. A weedy European species. Cannonball Island (Gill #1979.5:202), Cape Alava (Gill #1980:275C), Hobuck Beach (Gill #1980:491), and Hobuck Lake (Gill #1980:598). Flowers from May until August, fruits during July and August.

Trifolium pratense L.

Red clover. A European species introduced into this area. Hobuck Beach (Gill #1980:557) and Baada (Gill #1979.8:152). Flowers during July and August.

Trifolium repens L.

White clover. A European species. At the Ozette Archaeological Project field camp, Cape Alava (Gill #1980:256), on Cannonball Island (Gill #1979.5:200; #1980:283A), in sand at Hobuck Beach (Gill #1980:492), and at Baada (Gill #1979.8:155). Flowers from May through August, fruits during late summer. (Gill #1979.8:154). Fruits during late summer.

Trifolium wormskjoldii Lehm.

Springbank clover. Has a somewhat restricted habitat, prefering sandy areas along the coast, but it is fairly common in these areas. Hobuck beach (Gill #1980:482) and at the mouth of the Ozette River (Gill #1980:252). Flowers during June and July.

Vicia gigantea Hook.

Giant vetch. Common in coastal areas along the upper beach line, on the current coastal terrace, and on off-shore islands. Also on moist disturbed areas inland. Cape Alava (Daubenmire on 14.VI.1966, WS; Gill #1979.4:150; #1979.5:124; #1979.5:161; #1979.7:71; #1979.7:82; #1980:402; #1980:744; Gould-Wessen on 20.V.1979), Cannonball Island (Gill #1978.OZ:20; #1979.5:179), Ozette Island (Gill & Gould-Wessen #1980:292), Lake Ozette (Gill #1532; Underwood on 14.VI.1979), Hobuck Beach (Gill #1979.8:143), the Waatch River mouth (Gill #1904), along the Waatch River near the Neah Bay water works (Gill #1980:239), and near the mouth of the Hoko River (Gill #1979.7:39; Gross #13). Flowers during May through early July, fruit ripe during late June - September.

GERANIACEAE - The Geranium Family

Geranium dissectum L.

Cut-leaf geranium. A European species, found along the coast at Cape Alava (Underwood on 25.V.1980).

OXALIDACEAE - The Wood-sorrel Family

Oxalis oregana Nutt.

Oregon wood-sorrel. Fairly common, occurs at Village Creek (Gill #1980:449) and near the mouth of the Hoko River (Gill #1979.7:17; #1979.8:194). Flowers during mid summer.

Oxalis suksdorfii Trel.

Yellow wood-sorrel. Occurs on consolidated sand dunes along Mukkaw Bay (Buckingham #01215). Flowers during June and early July. On list of taxa sensitive in Washington (Washington Natural Heritage Program 1981:14).

CALLITRICHACEAE - The Water-starwort Family

Callitriche hermaphroditica L.

Autumnal water-starwort. Along the margins of Swan Bay, Lake Ozette (Buckingham #02809).

Callitriche heterophylla Pursh var. *bolanderi* (Hegelm.) Fassett

Different-leaved water-starwort. Aquatic, shallow water. Allen's Bay

(Gill #1674) and along the Hoko - Ozette Road in old gravel pits about 4.5 km east-southeast of the Lake Ozette outlet (Buckingham #01183; #01185). Fruits in late August.

Callitriche verna L. (=Callitriche palustris L. in Jones 1936:190)

Spring water-starwort. Shallow water, Lake Ozette (Jones #5979, WTU), including the margins of Swan Bay (Buckingham #02810) and in mud at the Rainier landing (Buckingham #02806).

EMPETRACEAE - The Crowberry Family

Empetrum nigrum L.

Crowberry. Relatively uncommon. Limited to prairie areas where its coverage often approaches 50%. On the following prairies: West (Gill #1979.4:53; Gould-Wessen on 1.V.1979), Roose's (Gill #1979.5:230; #1979.5:247; #1980:720; #1980:727), and Manny's (Gill #1740). Flowers during April, fruits in August.

ACERACEAE - The Maple Family

Acer circinatum Pursh

Vine maple. Enters only the eastern portion of the study area. Inland along Hoko River (Gill #1980:447).

Acer macrophyllum Pursh

Big-leaf maple. Fairly common in the eastern portion of the study area, a few scattered individuals in the southwestern portion. Along the Hoko - Ozette Road (Gill #1979.8:185; #1979.8:215; #1980:446), at Hoko (Gill #1979.7:45), and on Tivoli Island (may have been planted here, Gill #1718). The species was observed no further west than Tivoli Island during the current study.

Acer platanoides L.

Norway maple. Found on interior areas of Tivoli Island (Gill #1732), Lake Ozette, where planted by early settlers. Native to Europe and west Asia.

HIPPOCASTANACEAE - The Horse-Chestnut Family

Aesculus hippocastanum L.

Common horse-chestnut. On the north end of Tivoli Island (Gill #1715), Lake Ozette, where it was planted by early settlers. Native to the Balkan Peninsula. No fruit or juvenile plants observed.

BALSAMINACEAE - The Balsam or Touch-Me-Not Family.

Impatiens ecalcarata Blank.

Spurless jewelweed or touch-me-not. Occurs along the Waatch road on wet ground (Gill #1979.8:170; #1923). Flowers until mid September, fruit occur during August and September.

RHAMNACEAE - The Buckthorn Family

Rhamnus purshiana DC.

Cascara, chittam bark. Relatively uncommon. Flowers in May - June, fruits ripe in late July through late August. Mouth of the Ozette River (Gill #1979.5:305; #1980:246; #1980:265), along Indian Village (Cape Alava) Trail (Gill#1979.7:51; Gould-Wessen on 1.VI.1979; Underwood on 20.V.1979), Ericson's Bay (Gill #1622), east side of Elk Lake (Gill, A. & K. Flinn #1810), Tsues Point (Gill & Peterson #1980:571), Hole-in-the-Wall (Gill #1980:617), and about 6.4 km south of Cape Flattery (Hitchcock & Martin #3569, WS).

MALVACEAE - The Mallow Family

Malva moschata L.

Musk mallow. A garden escapee from Europe, occurs in Keller's Field just east of the Ozette Ranger Station (Underwood on 4.VIII.1980). Also reported from along the Ozette - Hoko Road across from the Royal School (N. Buckingham pers. comm., 1982). Flowers during July and August.

HYPERICACEAE - The St. John's-wort Family

Hypericum anagalloides C. & S.

Bog St. John's-wort. Along the shore of Lake Ozette (Hitchcock #24097, WTU; Jones #5972, WTU), including Ericson's Bay (Gill #1600) and on Shafer's Point (Gill & H. W. Buckingham #1646). Also in Ahlstom's

Prairie (Gill #1785) and West Prairie (Gill #1980:439). Flowers during July and August.

ELATINACEAE - The Waterwort Family

Elatine triandra Schkuhr

Three-stamen waterwort. In fairly shallow (ca. 1 m deep) water along the margin of Lake Ozette (Jones #5968, WTU).

VIOLACEAE - The Violet Family

Viola adunca Sm. var. cascadensis (Baker) Hitchc.

Cascade violet. Reported from consolidated sand dunes near the Tsues River mouth (N. Buckingham pers. comm., 1982).

Viola palustris L.

Marsh violet. At Lake Ozette (Underwood in V.1978) and reported from Allen's Prairie (N. Buckingham pers. comm., 1982). Flowers during spring.

ONAGRACEAE - The Evening-primrose Family

Epilobium angustifolium L.

Fire-weed. Common on disturbed sites, particularly logged areas. Cape Flattery (Gill #1979.8:33; #1979.8:87; #1491), north of Hobuck Lake (Gill, Thomas & Parker #1980:575), and near Eagle Point, Hoko (Gross #51). Flowers July - August.

Epilobium minutum Lindl.

Small flowered willow-herb. Common, particularly in disturbed areas. Cape Alava (Gill #1979.7:61), Cannonball Island (Gill #1980:284A), Hobuck Lake (Gill #1980:601), Cape Flattery (Gill #1979.8:7; #1980:234), and along 200-line about 4 km south of Baada (Gill #1979.8:63). Flowers June - August, fruits July - August.

Oenothera strigosa Mkze. & Bush

Common evening-primrose. Very rare in the study area. Along logging road 5609 about 3 km inland from Norwegian Memorial (Gill #1863). Found growing with a cultivated Lupinus. Possibly introduced from earth moving equipement used for logging or road construction.

HALORAGIDACEAE - The Water-milfoil Family

Myriophyllum spicatum L. var. exalbescens (Fern.) Jeps. (= M. exalbescens Fern.)

Water-milfoil. Reported from Lake Ozette (N. Buckingham pers. comm., 1982; Muenscher 1951:185).

Myriophyllum spicatum L. var. spicatum (=Myriophyllum verticillatum L. in Jones 1936:199).

Spiked water-milfoil. Elk Lake (Gill #1815). Fruits during late August - early Spetember. The M. verticillatum specimen (Jones #5980, WTU) cited in Jones (1936:199) is Ceratophyllum echinatum A. Gray.

ARALIACEAE - the Ginseng Family

Oplopanax horridum (Smith) Miq.

Devil's club. Rare within the study area, and possibly absent in most parts at the present time. Collected between Clallam Bay and Sekiu along State Route 112 (#1925). Also reportedly occurs at Sadie's Bluff south of Tsues (I. Ides pers. comm., 1981). Along the Strait of Juan de Fuca devil's club is much more common to the east of Clallam Bay.

APIACEAE (UMBELLIFERAE) - The Parsley Family

Angelica hendersonii Coulter & Rose

Henderson's angelica. Rare within the study area, found only on Strawberry Rock where it grows on a rocky bluff. Also occurs on a sea beach at La Push (St. John & Schweinfurth #5416, WS).

Angelica lucida L.

Seacoast angelica. Fairly common along the Pacific shoreline. Cape Alva (Daubenmire on 14.VI.1966, WS; Gill #1979.7:88; #1980:413), North Beach (Gill #1979.5:308), Cannonball Island (Gill #1978.0Z:22; #1979.5:212; #1980:275A), Ozette Island (Gill & Gould-Wessen #1980:314), Norwegian Memorial (Gill #1879), north end of Shi-Shi Beach (Gill #1902), and Hole-in-the-Wall (Gill #1979.8:15). Flowers from early May to early July, fruits fron late July to early September.

Conioselinum pacificum (Wats.) Coult. & Rose

Hemlock-parsley. Fairly common along the coast. Cape Alava (Gill #1980:416), Cannonball Island (Gill #1979.5:177; #1980:267), Ozette Island (Gill #1980:285B; Gill & Gould-Wessen #1980:315), Tatoosh Island (Bailey #19, WS), between Baada and Dtokoah Points (Gill #1979.5:21MP), and at Hoko (Gill #1979.7:31; Gross #54). Flowers in June - July, fruits shortly thereafter.

Glehnia leiocarpa Mathias

Glehnia. Relatively rare, due to restricted habitat. In sand along the coast. Along Mukkaw Bay (Hitchcock & Martin #3570, WTU), at Hobuck Beach (Gill #1980:560; #1822; #1850; Savage on 30.V.1980, WTU), and the dune area between Strawberry Rock and the mouth of the Tsues River (Gill #1979.8:108). Also occurs near the mouth of the Quilleute River (Otis #1563, WTU). Flowers during late May - early June, fruits in late July - August.

Heracleum lanatum Michx.

Cow parsnip. Common and widespread in open areas and on disturbed sites, particularly along the coast. A component in some seral and disturbed stands of the Picea sitchensis - Polystichum munitum var. munitum habitat type. Seems to prefer soils enriched with debris from human activities. Cape Alava (Gill #1978.OZ:54; #1979.4:6; #1979.4:188; #1979.5:121; #1979.5:132; #1979.5:145; #1979.5:162; #1979.5:309; #1980:255; #1980:414; Gould-Wessen in V.1979), Cannonball Island (Gill #1978.OZ:19; #1979.5:178), inland along North Beach (Gill #1979.4:124; #1979.4:154; #1979.7:79), and along the Hoko River near its mouth (Gill

#1979.7:37; Gross #14). Flowers during late May - July and occasionally in November, fruits from July onward.

Lilaeopsis occidentalis Coult. & Rose

Lilaeopsis. Aquatic. Lake Ozette (Thompson #9430, WTU), in North End near the lake outlet (Gill #1549) and about 3.2 km east (Hitchcock, Spellenberg & Sutherland #24074, WS, WTU), in Allen's Bay (Gill #1671), near the Rainier Landing (Buckingham #02803), and reported from Swan Bay (N. Buckingham pers. comm., 1982). Also in a brackish pool at La Push (Bunn s. n., summer 1943, WTU). WTU specimens on loan to MICH during study, data on these supplied by James Affolter (pers. comm., 1981).

Oenanthe sarmentosa Presl

Water-parsley. Common and widespread, particularly in moist areas. Cape Alava (Gill #1979.4:7; #1979.5:295; #1979.7:60; #1979.7:65; #1980:259; #1980:417; Gould-Wessen in IV.1979), along North Beach (Gill #1979.4:153; #1979.7:78), Hobuck Lake (Gill, Thomas & Parker #1980:586), interior areas south of Neah Bay (Gill #1979.8:162A; #1979.8:162B; #1980:241; #1980:242; #1980:646), along 200-line about 4 km south of Baada (Gill #1979.8:65), and at Hoko (Gross #39). Flowers June through August, fruits in late August - September.

Osmorhiza purpurea (Coult. & Rose) Suksd.

Purple sweet-cicely. Uncommon, only observed in the Cape Alava region. A minor component of the Picea sitchensis - Polystichum munitum var. munitum associatation, also on somewhat disturbed sites in this area.

Cape Alava (Daubenmire on 14.VI.1966, WS; Gill #1979.4:94; #1979.5:171; #1980:321) and inland along North Beach (Gill #1979.4:142; #1979.7:76). Flowers during June.

Sanicula crassicaulis Poepp. var. crassicaulis

Pacific sanicle. Not common, in open often rocky areas along the coast. Cape Alava (Gill #1980:274B), Cannonball Island (Gill #1979.5:209; Gould-Wessen on 1.VI.1979), and along Mukkaw Bay (Rogers #810, WS).

CORNACEAE - The Dogwood Family

Cornus stolonifera Michx. var. occidentalis (T. & G.) Hitchc.

Creek dogwood, red-osier dogwood. Fairly common in open wet areas. Along the Allen's Bay Trail (Gill #1676) and the margins of Lake Ozette (Jones #5947, WTU) including Allen's Bay (Gill #1788; Underwood on 7.VII.1980), Ericson's Bay (Gill #16..7), and Tivoli Island (Gill #1803). Also reported from about 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982). Fruits during August.

Cornus unalaschkensis Ledeb.

Western bunchberry or Unalaska dogwood. Fairly common and widespread. Occassionally epiphytic on Thuja plicata. Not observed immediately along the coast. Apparently the first published account of this species (as a taxon distinct from C. canadensis) in Washington was based on specimens from Devil's Lake, Mt. Walker, and Ahlstrom's Prairie collected in 1976 by Nelsa Buckingham and Edward Tisch (Buckingham & Tisch

1979: 20, 66), who regarded this material as hybrid between C. canadensis L. and C. suecica L. Bain and Denford (1979) regard C. unalaschkensis (2n = 44) as a distinct species, resulting from hybridization between C. canadensis (2n = 22) and C. suecica (2n = 22) and subsequent chromosome doubling to form a fully fertile allotetraploid. This contrasts with the situation in Alaska where the diploid C. canadensis x suecica occurs. All specimens from the current study area that have appropriate characters for study are attributable to C. unalaschkensis. Some fruiting materials from prairie areas approach C. canadensis in their morphological characters (e. g., Gill #1702, #1735), but these probably represent that extreme of character variation present within C. unalaschkensis.

Cape Alava - Lake Ozette Trail (Gill #1979.4:182; #1979.7:48; #1980:515; #1281; Gould-Wessen, spring 1978), North Sandpoint Trail (Underwood on 9.VII.1981), West Prairie (Osaki on 14.VI.1981, WS), Ahlstrom's Prairie (Buckingham #0322; Underwood on 12.VII.1981), Manny's Prairie (Gill #1735), Allen's Prairie (Gill #1702), and Allen's Bay Trail (Gill #1678). Flowers during June and July. Fruits ripen in late July and persist until the following spring.

ERICACEAE - The Heath Family

Arctostaphylos uva-ursi (L.) Spreng.

Bearberry, kinnick-kinnick. Very rare in this area, found only on the rocks bounding the east side of the first cove south of Tsues Beach (Gill #1896). No fruit observed during 1981.

Gaultheria shallon Pursh

Salal. Common and widespread. A component of several plant communities including both seral and climax stages of the Tsuga heterophylla - Blechnum spicant habitat type. In climax stands coverage is low, usually less than 5%, but in some areas, particularly in wetter areas, coverage can approach 25%. It is the understory dominant in the Picea sitchensis - Gaultheria shallon community type, often approaching 100% coverage in the shrub layer. Salal also is an important component of the vegetation on sites exposed to ocean storms, again becoming the dominant species in many cases, such as along the cliff edge at Hole-in-the-Wall, on the promentory near the Ozette River mouth, on the south end of Ozette Island, and at Sand Point. The substrate of these environments varies from nearly level sand at Sand Point to a steep rocky slope on the south end of Ozette Island. The important factors seem to be exposure to wind, salt spray, and light. This species is often a dominating member of those communities growing on recently clear-cut land, and occurs with coverage often greater than 25% on Ahlstrom's Prairie, although here in a much stunted form. On Roose's and Manny's Prairies salal is less important, coverage is usually less than 5%. Salal is most productive of fruit in areas more exposed to light, with the exception of the prairies. Flowers in June through July; ripe fruit available from mid-July (in sunny areas) to November, peaking in the latter portion of August. Each raceme averages 6.2 gynecia. Bears (and probably birds) eat the fruit and may have competed with the indigenous humans for this resource.

Cape Alava (Gill #1978.OZ:109; #1979.4:112; #1979.4:229; #1980:342; #1980:716; Gould-Wessen in VII.1978), Ozette Island (Gill #1980:284B), promentory at the Ozette River mouth (Gill #1978.OZ:204), Cape Alava - Lake Ozette Trail (Gill #1978.OZ:34; #1979.4:16; #1979.7:50), along logging road 9100 between roads 9116 and 9118 south of Neah Bay (Gill #1980:742), Hobuck Lake (Gill, Thomas & Parker #1980:580), Hole -in-the-Wall (Gill #1979.8:2; #1980:221; #1980:230; #1980:232; #1980:620), along Cape E Road (Gill #1979.8:79), B-3 line (Gill #1979.8:89; #1979.8:90), and 200-line (Gill #1979.5:99), between Baada and Dtokoah Points (Gill #1979.5:17MP), and at Hoko (Gill #1979.7:13; #1979.8:176; #1980:511; Gross #21). Also on the following prairies: West (Gill #1979.4:51), Ahlstrom's (Gill #1979.5:218), Roose's (Gill #1979.5:227; #1979.5:253), and Manny's (Gill #1752), and along the margins of Lake Ozette.

Hypopitys monotropa Crantz

Fringed pinesap. Rare in the study area, one specimen from a wooded area about 4.8 km southwest of Sekiu (Tisch #747, WS).

Kalmia occidentalis Small (K. polifolia Wang.)

Swamp laurel. Fairly common on wet sites and especially in the prairie areas. Coverage usually less than 5%. Along Lake Ozette in low, swampy areas (Underwood in V.1978) and along the small pond immediately west of Ericson's Bay (Gill #1605) including the boggy area to the south (Gill #1656). Also on West Prairie (Gill #1979.4:49; #1980:434), Ahlstrom's Prairie (Gill #1979.5:107; Gould-Wessen on 3.V.1979), Roose's

Prairie (Gill #1979.5:228; #1979.5:250; #1980:722), Manny's Prairie (Gill #1749), and Allen's Prairie (Gill #1695). Reported along the North Sand Point Trail (N. Buckingham pers. comm., 1982). Flowers throughout much of the summer, fruits during late summer.

Ledum groenlandicum Oeder

Labrador tea. Fairly common, most prominent in prairie areas where its coverage can exceed 25%. An important component of swampy areas dominated by Thuja plicata. On West Prairie (Gill #1979.4:50; #1980:245; #1980:431), Ahlstrom's Prairie (Gill #1979.5:217), Roose's Prairie (Gill #1979.5:226; #1979.5:248; #1980:723), Manny's Prairie (Gill #1739), and Allen's Prairie (Gill #1685; #1694). Also in the boggy area south of the pond immediately west of Ericson's Bay (Gill #1649), and along the east shore of Elk Lake (Gill, A. & K. Flinn #1811). Also reported to grow on Tsues Prairie by Neah Bay residents. Flowers in June, fruits during August.

Menziesia ferruginea Smith var. ferruginea

Fool's huckleberry. Common and widespread, particularly in Tsuga heterophylla forests. In the area around Cape Alava, it frequently is a component of the Tsuga heterophylla - Blechnum spicant association, its coverage usually less than 5%. It also occurs in transition areas between hemlock forests and those dominated by Picea sitchensis but apparently does not occur in most Sitka spruce dominated communities directly along the coast. Cape Alava (Gill #1979.4:120; #1979.4:232; #1979.9:258; #1980:343), Ozette River mouth (Gill #1979.5:298), Cape Alava - Lake

Ozette Trail (Gould-Wessen on 1.VI.1979), Allen's Bay Trail (Gill #1679), near Hole-in-the-Wall (Gill #1979.8:17; #1979.8:36) and along Cape E Road (Gill #1979.8:83), Cape Flattery, along Village Creek (Gill #1980:460), and at Hoko (Gill #1979.7:23; #1979.8:188; #1979.8:195; Gross #44). Flowers from mid May - early July, fruits in August.

Pyrola uniflora L. (=Moneses uniflora Gray)

Wood-nymph, wax-flower. Uncommon, but widespread, apparently limited to forests dominated by Tsuga heterophylla. Cape Alava (Gill #1979.4:111; #1979.9:266), Ahlstrom's Prairie (Gould-Wessen on 24.V.1979), on promentory north of Hole-in-the-Wall (Gill #1980:237) and at Hoko (Gross #9). Flowers during late May - June.

Vaccinium alaskaense Howell

Alaska huckleberry. Relatively rare. Along the Cape Alava - Lake Ozette Trail (Buckingham #0300; Gill #1979.4:38 #1979.7:94; #1980:444), and near Eagle Point east of the Hoko River mouth (Gross #55). Fruit ripe in July.

Vaccinium caespitosum Michx.

Dwarf huckleberry. Rare. Along the margins of Swan Bay, Lake Ozette (Buckingham #0344).

Vaccinium ovalifolium Smith

Oval-leaf huckleberry. Relatively rare. Along the Cape Alava - Lake Ozette Trail (Gill #1979.7:47; Gould-Wessen in IV.1979). Fruit ripe

in July. The differences between this species and Vaccinium alaskaense in this area are obscure.

Vaccinium ovatum Pursh

Evergreen huckleberry. Common and widespread. Occurs in Tsuga heterophylla and Tsuga heterophylla - Thuja plicata dominated forests, much more rarely in Picea sitchensis dominated communities along the Pacific coast. In the Tsuga heterophylla - Blechnum spicant association coverage sometimes exceeds 25%, although it is usually much less. In the Picea sitchensis - Polystichum munitum habitat type coverage of evergreen huckleberry is less than 5%. Flowering begins in April and continues until June. Ripe fruit appear towards the end of August, reach peak abundance in September, and continue to be available until the end of November.

Cape Alava (Gill #1978.OZ:51; #1979.4:14; #1979.4:78; #1979.4:104; #1979.4:217; #1979.4:231; #1979.5:133; #1979.5:146; #1979.8:247; #1979.9:250; #1980:339; #1980:341; #1980:717), mouth of the Ozette River (Gill #1978.OZ:203; #1979.5:303), Cape Alava - Lake Ozette Trail (Gill #1978.OZ:32; Gould-Wessen on 1.VI.1979), Tivoli Island (Gill #1722), and at Hole-in-the-Wall (Gill #1979.8:13).

Vaccinium oxycoccos L.

Wild cranberry. Fairly common, localized in bog and prairie areas. In the boggy area south of the pond immediately west of Ericson's Bay (Gill #1665) and on West Prairie (Buckingham #0315; Underwood on 25.VI.1980), Ahlstrom's Prairie (Gill #1980:443; Gould-Wessen on

9.V.1979), Manny's Prairie (Gill #1745), and Allen's Prairie (Gill #1690; #1701). Flowers during May - July, fruits in August - September.

Vaccinium parvifolium Smith

Red huckleberry. Common and widespread. An important component of many Tsuga heterophylla dominated forest communities. Also prominent in inland clear-cut areas. Apparently only rarely, if ever, present in the Picea sitchensis - Polystichum munitum habitat type near Cape Alava. Flowers in April, fruit ripe during July through August, peaking near the first of August, with some persisting into early September. Cape Alava (Gill #1979.4:107; #1979.4:119; #1979.9:262; #1980:340; #1980:715), mouth of the Ozette River (Gill #1979.5:300), Cape Alava - Lake Ozette Trail (Gill #1978.OZ:33; #1979.7:46; #1979.7:96), along logging road 9100 between roads 9116 and 9118 south of Neah Bay Gill #1980:739), Hobuck Lake (#1980:588; #1980:606), along the margins of Waatch Prairie (Gill & Flinn #1838), north side of the Waatch River mouth (Gill #1903), Hole-in-the-Wall (Gill #1979.8:19; #1979.8:30; #1980:231), along B-3 line (Gill #1979.8:92), Cape E Road (Gill #1979.8:81), Koitlah Point Road (Gill #1980:637), Village Creek (Gill, Peterson & Flinn #1980:455), and 200-line (Gill #1979.8:49), and at Hoko (Gill #1979.7:25; #1979.7:32; #1979.8:191; #1980:512; Gross #49).

Vaccinium uliginosum L.

Bog blueberry. Not common. Along the margins of Lake Ozette at Swan Bay (Buckingham #0342; #01178), along the west shore of Ericson's Bay, south portion (Gill #1668), and at the head of Allen's Bay (Gill

#1789). Also in Ahlstrom's Prairie where it is heavily grazed (Gill #1770). Flowers in June - early July, fruits in August - early September.

PRIMULACEAE - The Primrose Family

Dodecatheon jeffreyi van Houtte

Jeffrey's shooting star. Not common. Along the slight inlet between Eagle and Shaffer's Points directly across from Umbrella Bay (Gill #1580) and along Ericson's Bay, Lake Ozette.

Glaux maritima L.

Saltwort. Not common. On sand dunes along Mukkaw Bay (Buckingham #01216) and the Tsues River (Gunther on 18.VI.1935), and on Cape Flattery (Bailey #22, WS). Flowers during June and July.

Trientalis arctica Fisch.

Northern starflower. Occurs on Ahlstrom's Prairie (Gould-Wessen on 29.V.1979), West Prairie (Gill #1980:435), Manny's Prairie (Gill #1759), and Allen's Prairie (Gill #1700). Also in the bog just west of Ericson's Bay at the south end of a small pond (Gill #1650), and along the northern portion of the Allen's Bay Trail (Gill #1684). Flowers from late May to August, fruits in August and September.

Trientalis latifolia Hook.

Western starflower. Found along the Tsues River (Gunther on 18.VI.1935) and a logging railroad east of the Hoko River mouth (Gross #2). Flowers during June.

GENTIANACEAE - The Gentian Family

Centaurium umbellatum Gilib.

European or common centaury. Rare, in areas disturbed by logging activities. East of Lake Ozette (Underwood on 2.X.1980) and along Cape H Road, Cape Flattery (Gill #1979.8:37). Flowers August through October. Introduced from Europe.

Gentiana douglasiana Bong.

Swamp gentian. Locally common in bog and prairie areas. West Prairie (Gill #1980:437), Ahlstrom's Prairie (Gill #1979.7:91; Underwood in summer 1980), Manny's Prairie (Gill #1734), and Allen's Prairie. Also in a bog along Ericson's Bay (Rigg on 24.VIII.1933, WTU), along the southern portion of the west shore of Ericson's Bay, and in the boggy area south of the pond immediately west of Ericson's Bay, where the plants are unusually robust. Flowers from early July through early September. Very rare in Washington, the Ozette area and Snoqualmie Pass are the only known locations in the state. It also occurs from Alaska to Vancouver Island (Hitchcock and Cronquist 1976:360). Included on the list of sensitive plants of Washington (Washington Natural Heritage Program 1981:12).

Gentiana sceptrum Griseb.

Staff or King's gentian. Fairly common in wet areas. On West Prairie (Gill #1979.9:271), Ahlstrom's Prairie (Gill #1980:693; Gould-Wessen in VII.1979; Underwood on 25.VIII.1980), Manny's Prairie (Gill #1737), and Allen's Prairie (Gill #1699). Also along the margins of

Lake Ozette (Jones #5943, WTU; Otis #1772, WTU; Underwood on 27.VII.1980), including the northeast shore of North End (Hitchcock on 27.VII.1965, WTU) and the west side of Ericson's Bay (Gill #1601). Flowers from late July through early September.

MENYANTHACEAE - The Buck-bean Family

Menyanthes trifoliata L.

Buckbean. Occurs in shallow water along the margins of Lake Ozette (Gunther on 30.VI.1935, WTU; Jones #5984, WTU; Thompson #9419, WTU) including Ericson's Bay (Gill #1634; Underwood on 1.VII.1980) and Swan Bay (Underwood 2.VI.1981). Also along the margins of the small pond about 50 m west of Ericson's Bay (Gill #1604). Often associated with Utricularia intermedia and U. vulgaris, as noted by Muenscher (1951:185). Sometimes associated with Phragmites communis and Typha latifolia (Jones 1936:pl. 8, fig. B). Flowers throughout the summer, fruits during the latter portion of the summer.

CONVOLVULACEAE - The Morning-glory Family

Convolvulus sepium L. var. fraterniflorus Mack. & Bush

Hedge bindweed. A European species, it occurs at Baada (Gill #1979.8:74) and is reported from along the Hoko River by Jones (1936:214, variety not indicated). Flowers during August.

Convolvulus soldanella L.

Beach morning-glory. Not common due to restricted habitat. On sand dunes along the coast. Hobuck Beach (Gill #1979.8:126; #1980:479; Rossbach & Rossbach #492, WTU) and the dune area near Strawberry Rock about 0.8 km southwest of the mouth of the Tsues River (Gill #1979.8:109). Flowers in July.

HYDROPHYLLACEAE - The Waterleaf Family

Hydrophyllum tenuipes Heller

Slender-stem waterleaf. Not common in the study area, occurs along the eastern and southern margins. Near the seashore at Clallam Bay (Jones #5967, WTU), about 0.4 km southeast of the Hoko River mouth (Gill #1980:504), near Hoko River Falls (Buckingham #01201), and just north of the Norwegian Memorial hiker's shelter (Gill #1869; Underwood on 22.V.1981). Flowers during June - August, fruits during July - September.

Romanzoffia tracyi Jeps.

Tracy's mistmaiden. On sea stacks along the coast. Specimens examined from east of the study area at the Salt Creek Recreation Area (Buckingham #020) and to the south at La Push (Buckingham #02012). Also reported from Sand Point and Mukkaw Bay (N. Buckingham pers. comm., 1982). Flowers during April and May, fruits in June - July.

BORAGINACEAE - The Borage Family

Mertensia platyphylla Heller

Broadleaved or western bluebells. Along the Hoko River about 0.4 km downstream from the falls (Buckingham #01197).

Myosotis laxa Lehm.

Small flowered forget-me-not. Widespread, particularly in damp, disturbed areas. Along Hobuck Creek (Gill #1980:478), on the south side of Neah Bay (Gill #1979.8:163), and along the Waatch Logging Road (Gill #1980:647). Flowers and fruits during mid and late summer.

Myosotis scorpiodes L.

Common forget-me-not. Uncommon and sporadic within the study area, along the margins of Lake Ozette at Swan Bay (Buckingham #0339). Also reported from the lake by Jones (1936:220). Flowers in July.

LAMIACEAE (LABIATAE) - The Mint Family

Lycopus uniflorus Michx.

Northern bugleweed. Fairly common, in wet areas. Along the margins of Lake Ozette (Jones #5944, WTU) including Swan Bay (Gill #1979.8:228; #1979.8:230; #1979.8:234; #1979.8:235) and near the outlet (Gill #1552), along the margins of the small pond about 50 m west of Ericson's Bay (GIll #1606), and along the margins of Hobuck Lake (Gill, Thomas & Parker #1980:584). Flowers in August.

Mentha arvensis L. var. glabrata (Benth.) Fern.

Wild mint. Along the margins of Lake Ozette (Jones #5945, WTU) near Deer Bay (Gill #1535) and along the east shore across from Tivoli Island (Underwood on 27.VII.1980). Also on the south side of Neah Bay (Gill #1979.8:164). Flowers during July and August.

Mentha piperita L.

Peppermint. A cultivated species native to Europe. Along Swan Bay (Gill #1979.8:242) and Big River (Underwood on 9.IX.1980). Flowers in August and September.

Mentha spicata L.

Spearmint. Reported from near the Hoko River about 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982). Native to Europe.

Prunella vulgaris L.

Self-heal. Common, particularly in disturbed areas. Flowers June through August. Two poorly defined varieties occur in the Pacific Northwest -- the native variety, var. lanceolata (Barton) Fern., and the European var. vulgaris. Both apparently occur in the study area. Specimens representing P. vulgaris var. lanceolata occur along the Cape Alava - Lake Ozette Trail (Gill #1979.7:90), at Shafer's Point (Gill & H. W. Buckingham #1647), Hobuck Lake (Gill, Thomas & Parker #1980:578), Hobuck Creek (Gill, Peterson & Flinn #1980:477), Koitlah Point (Gill #1980:626), and interior areas of Cape Flattery (Gill #1979.8:102). Specimens most closely representing var. vulgaris occur on Ozette Island

(Gill & Gould-Wessen #1980:290) and near Hole-in-the-Wall (Gill #1980:225). Material with intermediate characters occurs at Hoko (Gross #42). The morphologic characters of these varieties completely overlap (see discussion in Hitchcock, Cronquist, Ownbey, & Thompson 1959:268).

Stachys mexicana Benth.

Coast betony or hedge-nettle. Common and widespread, especially along the coast. A minor component of the Picea sitchensis - Polystichum munitum var. munitum association, more prominent on disturbed areas in this habitat type, also on disturbed sites further inland. Cape Alava (Gill #1979.4:9; #1979.4:93; #1979.4:187; #1979.4:200; #1979.5:126; #1979.5:135; #1979.7:54; #1979.7:66; #1979.7:75; #1979.9:269; #1980:257), inland along North Beach (Gill #1979.4:147), on Cannonball Island (Gill #1979.5:176; #1980:276A), Ozette Island (Gill & Gould-Wessen #1980:297), Swan Bay (Gill #1979.8:243), along the Waatch Road (Gill #1979.8:167), at Hoko (Gill #1979.7:20; #1979.7:42; #1979.8:182; Gross #18; Perry # 10, Hoko Archaeological Project Herbarium), and along the Hoko - Ozette Road near State Route 112 (Buckingham #0287; #0290). Buckingham #0287 and Perry #10 are somewhat intermediate between S. mexicana and S. cooleyae Heller.

SCROPHULARIACEAE - The Figwort Family

Castilleja miniata Dougl.

Indian paintbrush, scarlet or common paintbrush. Two poorly defined varieties occur in the Pacific Northwest. The majority of the

material from the study area represents the seashore ecotype, var. dixonii (Fern.) Nels. & Macbr. most closely, but a few specimens (Gill #1980:235; Gould-Wessen on 6.VI.1979) more nearly represent var. miniata.

Widespread and fairly common on cliffs, talus slopes, and other rocky exposures along the coast. Also along road cuts in more interior areas. Cape Alava (Otis #1778, WTU), Cannonball Island (Gill #1979.5:187; #1979.5:206; #1980:282A), Ozette Island (Gill & Gould-Wessen #1980:291; #1980:291A), Strawberry Rock (Gill & Flinn #1828), interior of Cape Flattery (Gill #1980:235), Tatoosh Island (Gunther on 3.VIII.1935, WTU), damp cliffs 16 km east of Neah Bay (Hitchcock & Martin #3545, WTU), and at Hoko along the logging railroad (Gross #53). Flowers May - August, fruits in August onwards.

Digitalis purpurea L.

Foxglove. A Eurasian species, fairly common, particularly in disturbed areas. Flowers in June through August, ripe fruit follow in July onward, often both on the same plant. Cape Flattery along the main loop road (Gill #1980:236) and the Koitlah Point Road (Gill #1980:645), along 200-line about 4 km south of Baada (Gill #1979.8:54), and near the mouth of the Hoko River (Gill #1979.7:14, Gross #16).

Mimulus alsinoides Dougl.

Chick-weed monkey-flower. Rare in study area. Hoko Rock Shelter, Kydaka Point (Perry #11, Hoko Archaeological Project Herbarium). Flowers latter half of June.

Mimulus guttatus DC. var. guttatus

Yellow monkey-flower. Rare in the study area. Prefers moist seepage areas. Along the Hoko River less than 0.4 km downstream from the falls (Buckingham #0293).

Scrophularia californica Cham. & Schlecht.

California figwort. Common, particularly in moist disturbed areas along the coast and Strait of Juan de Fuca. Cape Alava (Gill #1979.7:63; #1980:258), Ozette Island (Gill & Gould-Wessen #1980:297A), Koitlah Point (Gill #1980:633), Neah Bay (Eyerdam #6637, WTU; Thompson #9441, WTU), Hoko (Gill #1979.7:42A; Gross #19), and Clallam Bay (Jones #5966, WTU). Flowers in June through August, fruits July - November.

Veronica americana Schwein.

American brooklime. Fairly common, particularly in disturbed areas. Flowers June through early September. Fruits during July onward. Cape Alava (Gill #1979.8:248), slide area about 3/4 km north of the Ozette River mouth (Gill #1980:248), Cape Flattery along trail to Hole-in-the-Wall (Gill #1980:224) and at Koitlah Point (Gill #1980:629), and along 200-line about 4 km south of Baada (Gill #1979.8:56; #1979.8:66).

Veronica chamaedrys L.

Germander speedwell. A European species, introduced near the outlet of Lake Ozette at the Ozette Ranger Station (Gill & Underwood #1283).

Veronica scutellata L.

Marsh, grass-leaved, or skull-cap speedwell. Reported from Lake Ozette (Huenscher #1951:185).

Veronica serpyllifolia L. var. humifusa (Dickson) Vahl

Thyme-leaved speedwell. Not common. Neah Bay (Gunther on 19.VI.1935, WTU).

Veronica serpyllifolia L. var. serpyllifolia

Thyme-leaved speedwell. A European variety, reported from Sand Point (N. Buckingham pers. comm., 1982).

OROBANCHACEAE - The Broomrape Family

Boschniakia hookeri Walpers.

Vancouver ground-cone. Along the Allen's Bay Trail (Gill #1683). Also in Allen's Prairie and along the Sand Point Trail (K. Underwood pers. comm. with photographs, 1981). Parasitic on Gaultheria shallon (Hitchcock & Cronquist 1976:444).

LENTIBULARIACEAE - The Bladderwort Family

Utricularia intermedia Hayne

Flat-leaved bladderwort. Locally common. Included on the list of threatened vascular plants of Washington (Washington Natural Heritage Program 1981:7). Lake Ozette at Swan Bay (N. Buckingham pers. comm.,

1982; Muenshcer 1951:185), along the northeast shore of North End (Gill #1533), immediately southwest of the lake outlet (Gill #1545), and at the base of the South Sandpoint Trail (Underwood on 2.V.1981). Also very common in the small pond immediately west of Ericson's Bay (Gill #1610, #1611).

Utricularia minor L.

Lesser bladderwort. Rare in the study area. Aquatic, along the west shore of Swan Bay, Lake Ozette (Buckingham #02753).

Utricularia vulgaris L.

Common bladderwort. Lake Ozette (Jones #5956, WTU; Thompson #9426, WTU) including Swan Bay (N. Buckingham pers. comm., 1982; Muenscher 1951:185) and the head of Ericson's Bay (Gill #1614). Scheffer and Hotchkiss (1945:15) report this species as being scarce in the lake. During 1981 it was not commonand was encountered much less often than U. intermedia.

PLANTAGINACEAE - The Plantain Family

Plantago lanceolata L.

English plantain, ribwort. A Eurasian species common in disturbed areas. Cannonball Island (Gill #1980:273A; Gould-Wessen on 10.Vi.1979), the dune area across from Strawberry Rock (Gill #1979.8:112), Hobuck Beach (Gill #1979.8:127), Koitlah Point (Gill #1980:630), and along the banks of the Hoko River near the mouth (Gross #32). Flowers June through August.

Plantago macrocarpa Cham. & Shlecht.

Alaska plantain. West Prairie (Buckingham #0318), also reported from Lake Ozette (Jones 1936:234). Fruits during July. Included on the list of sensitive vascular plant taxa for Washington (Washington Natural Heritage Program 1981:14).

Plantago major L. var. major

Common plantain. A Eurasian variety found in disturbed areas. Cape Alava at Ozette Archaeological Site field camp (Gill #1979.7:89; #1980:288B), and along 200-line about 4 km south of Baada (Gill #1979.8:48). Flowers throughout the summer, fruits in August.

Plantago maritima L. ssp. juncoides (Lam.) Hulten var. juncoides

Sea plantain. Not common, entirely along the coast, on rock outcrops and mudflats near high tide mark. Ozette Island (Gill #1980:277B; Gill & Gould-Wessen #1980:299) and north side of the Waatch River mouth (Gill #1291). Flowers in June.

RUBIACEAE - The Madder Family

Galium aparine L.

Cleavers or goose-grass. Common and widespread in coastal areas, especially where disturbed. A component of the Picea sitchensis - Polystichum munitum var. munitum habitat type. Infrequent inland. At least some of our material is of the variety echinospermum (Wallr.) Farw. Cape Alava (Gill #1979.4:191; #1979.5:116; #1979.7:57; #1980:254;

#1980:337), Cannonball Island (Gill #1979.5:196; #1979.5:208), inland from North Beach (Gill #1979.4:145; #1979.5:294), on a slide area about 3/4 km north of the Ozette River (Gill #1980:249), and along the Waatch Road (Gill #1979.8:171). Flowers during May - July, fruits late July - August.

Galium boreale L.

Northern bedstraw. Thicket along shore of Lake Ozette (Jones #5958, WTU). Reported from West Prairie, Ahlstrom's Prairie, and Allen's Prairie (N. Buckingham pers. comm., 1982), and from Ericson's Bay (N. Buckingham pers. comm., 1982).

Galium trifidum L. var. pacificum Wieg.

Small bedstraw or cleavers. Not common, apparently limited to prairie areas. Ahlstrom's Prairie (Gill #1786) and Roose's Prairie (Underwood on 7.IX.1980).

Galium triflorum Michx.

Sweet-scented or fragrant bedstraw. Common and widespread, particularly in Sitka spruce communities along the coast. A component of the Picea sitchensis - Polystichum munitum var. munitum association, its coverage less than 5%. Cape Alava (Gill #1979.4:89; #1979.4:202; #1979.4:218; #1979.5:134; #1979.9:255; #1980:275B; #1980:336), inland from North Beach (Gill #1979.5:296), Ozette Island (Gill & Gould-Wessen #1980:298), along 200-line (Gill #1980:567), and at Hoko (Gross #10). Flowers in June and July, fruits in late June through early August.

CAPRIFOLIACEAE - The Honeysuckle Family

Linnaea borealis L. var. *longiflora* Torr.

Western twinflower. Not very common, most prominent in bog and prairie areas. Flowers July through August. Cape Alava - Lake Ozette Trail (Gill #1980:442), Ahlstrom's Prairie (Gill #1979.5:223; #1774), Roose's Prairie (Gill #1980:721A; #1980:725) and Manny's Prairie (Gill #1744), and the boggy area immediately south of the small pond bordering the west side of Ericson's Bay (Gill #1657).

Lonicera involucrata (Rich.) Banks var. *involucrata*

Bearberry honeysuckle or black twinberry, locally called crowberry on the Olympic Peninsula. Common and widespread, particularly along the coast; prefers moist, open areas. Damaged south of Cape Alava by extensive feeding by deer. Cape Alava (Gill #1979.4:1; #1979.5:160; #1979.5:165; #1979.5:214; #1979.7:73; #1980:270B; #1980:519; #1980:709), Cannonball Island (Gill #1980:277A), Ozette Island (Gill & Gould-Wessen #1980:316), along the beach south of Wedding Rocks (Gould-Wessen no # or date), the northeast shore of North End, Lake Ozette (Gill #1530), along the margins of Waatch Prairie (Gill & Flinn #1840), near Hole-in-the-Wall (Gill #1979.8:32), along Village Creek (Gill, Peterson & Flinn #1980:451), Baada Point (Gill #1979.4:34; #1979.5:2MP; #1979.5:10MP), and along the Hoko River near its mouth (Gill #1979.8:186A; #1980:500; Gross #15). Flowers during May and June, fruits in July and August.

Sambucus racemosa L. ssp. *pubens* (Michx.) House var. *arborescens* (T. & G.) Gray (=*S. callicarpa* Greene)

Red elderberry. Common and widespread, particularly in moist areas with rich soil. Prefers open to partially shaded sites. An important component in seral stands of the Picea sitchensis - Polystichum munitum var. munitum habitat type along the coast and in several communities dominated by Picea sitchensis and Alnus rubra in the overstory. Also seral on disturbed sites further inland. Flowers in late April through May; fruit begin to ripen in late June and reach peak availability in July. Fruit continues to be available, especially inland, into the latter portion of August. Along the coast crows and other birds eat the fruit and may have been strong competitors with the indigenous humans for this resource. The lack of fruit predation by birds inland accounts in large part for the longer availability of the fruit in these areas.

Cape Alava (Gill #1978.OZ:110; #1979.4:4; #1979.5:109; #1979.5:151; #1979.7:55; #1980:261; Gould-Wessen in IV.1979), inland from North Beach (Gill #1979.4:128; #1979.4:148; #1979.4:151; #1980:423) and South Beach (Gill #1980:404), Ozette Island (Gill & Gould-Wessen #1980:305), along the Ozette River near the Lake Ozette outlet (Gill #1979.7:93), Swan Bay (Gill #1979.8:240), north side of the Waatch River mouth (Gill, Thomas & Flinn #1980:555), near Hole-in-the-Wall (Gill #1979.8:23), along the Koitlah Point Road (Gill #1980:643), interior areas south of Neah Bay (Gill & Peterson #1980:240), Baada Point (Gill #1979.5:13MP), along 200-line (Gill #1979.5:95; #1979.8:67), and along the Hoko River near its mouth (Gill #1980:499, Gross #46).

Symphoricarpos albus (L.) Blake var. laevigatus Fern.

Common snowberry. Rare. About 0.4 km south of Wedding Rocks (Gill #1980:673), north side of the Waatch River near its mouth (Gill #1979.8:148), and at Hoko (Gross #50). Flowers in July, fruits during August - September.

Viburnum edule (Michx.) Raf.

High-bush cranberry. In bog near Ericson's Bay (Rigg on 24.VIII.1933, WTU) and along the Allen's Bay Trail (Gill #1675). Fruit ripe in August - early September.

VALARIANACEAE - The Valerian Family

Valeriana scouleri Rydb.

Scouler's valerian. Quite rare in the study area. On a roadbank along State Route 112 halfway between Neah Bay and the Hoko - Ozette Road (Gill #1230), and along the Hoko River (Underwood on 29.IV.1981). Flowers from late April through May.

Valeriana sitchensis Bong.

Sitka valerian. Reported from Ahlstrom's Prairie (N. Buckingham pers. comm., 1982).

Valerianella locusta (L.) Betcke

European corn-salad. Introduced from Europe, reported from Sand Point (N. Buckingham pers. comm., 1982).

CAMPANULACEAE - The Harebell Family

Campanula rotundifolia L.

Scotch bellflower. A collection by Erna Gunther reported from Tatoosh Island (Jones 1936:238). Presumably this specimen was deposited at WTU, but it was not located during the current study.

Lobelia dortmanna L.

Water lobelia. Along the shallow margins of Lake Ozette (Thompson #9427, WTU; Otis #1770, WTU; Gunther on 30.VI.1935, WTU), including Swan Bay (Gill #1979.8:223), the area between Shafer's and Eagle Points (Gill #1578), North End (Underwood on 16.VII.1981), and near the lake outlet (Gill #1550). Sometimes associated with *Equisetum fluviatile* L. (Muenscher 1951:185). Flowers throughout July and August. On list of taxa sensitive in Washington (Washington Natural Heritage Program 1981:13).

ASTERACEAE (COMPOSITAE) - The Aster or Composite Family

Achillea millefolium L.

Yarrow, milfoil. Common and widespread within the study area. Along the coast in sandy areas, rocky areas (including talus slopes), and on rock outcrops; also along roadsides and in other disturbed situations inland. Two varieties of *A. millefolium* occur in the area: var. *californica* (Pollard) Jeps. is usually confined to maritime habitats (Gill #1980:269; #1980:311; #1825), and var. *lanulosa* (Nutt.) Piper (Gill

#1979.8:180; #1980:489; #1980:623) is more common inland. Flowers from late June through the end of August. Material examined from Cannonball (Gill #1978.OZ:21; #1979.5:175; 1980:269) and Ozette (Gould-Wessen & Gill 1980:311) Islands, the slope facing North Beach, Cape Alava (Gill #1979.4:155), the dune area along Mukkaw Bay near Strawberry Rock (about 0.8 km southwest of the Tsues River mouth) (Gill #1979.8:113), in sand at Hobuck Beach (Gill #1979.8:134; #1980:489 #1825; #1852), on rock near the north side of the Waatch River mouth (Gill #1980:470; #1980:549), the parking area for the trail to Hole-in-the-Wall (Gill #1979.8:29), Koitlah Point (Gill #1980:623), along the beach between Baada and Dtokoah points (Gill #1979.5:19MP), along 200-line about 4 km south of Baada (Gill #1979.8:59), and from near the Hoko River mouth (Gill #1979.7:40; #1979.8:180; Gross #40).

Ambrosia chamissonis (Less.) Greene var. bipinnatisecta (Less.) J. T. Howell (=Franseria chamissonis Less. var. bipinnatisecta Less.)

Silver bursage. Somewhat uncommon in the study area, limited to sand dune areas along the coast. Along Hobuck Beach (Gill #1979.8:132; #1980:490; #1525; #1851), Tsues Point near the Tsues River mouth (Gill #1980:S74), and in the dune area across from Strawberry Rock along Mukkaw Bay (Gill #1979.8:107). Flowers during the latter portion of July through August.

Anaphalis margaritacea (L.) B. & H. Pearly-everlasting. Grows in open areas along the coast and in disturbed sites such as clear-cut areas and along logging roads. Flowers from July through early September. On Ozette (Gill & Gould-Wessen #1980:293; #1980:303) and Cannonball (Gill

#1979.5:188) Islands, on Alhstrom's Prairie (Gill #1772), along logging road 9100 between roads 9116 and 9118 (Gill #1980:738) and Willoughby Lake Main Line (Gill #1808) south of Neah Bay, on the north side of Hobuck Lake (Gill #1980:585), at Hole-in-the-Wall (Gill #1979.8:10; #1980:737) and northwest of B-5 line (Gill #1492), Cape Flattery, along 200-line about 4 km south of Baada (Gill #1979.8:55), and on an old clear-cut near Eagle Point, about 1.6 km east of the Hoko River mouth (Gross #22).

Apargidium boreale (Bong.) T. & G. (=Microseris borealis Schultz-Bip.)

Apargidium. Allen's Prairie (Buckingham #02743). Flowers in August. On list of taxa sensitive in Washington (Washington Natural Heritage Program 1981:14).

Arctium minus (Hill) Bernh.

Common burdock. A Eurasian species that is not common in the study area. Occurs on disturbed sites, at the Makah Senior Citizen's Center, Neah Bay (Gill #1979.8:73), on Cape Flattery (Gill #1501), and near the north side of Hobuck Lake (Gill #1980:587).

Artemisia suksdorfii Piper

Suksdorf's sagebrush, coastal mugwort. Along the coast, especially on rocky situations and on sand. Ozette (Gill & Gould-Wessen #1980:301) and Cannonball (Gill #1979.5:180; #1979.5:181; 1980:268) Islands, Cape Alava (Gill #1980:731; Underwood on 28.VI.1979), Hobuck Beach (Gill #1980:562; G.B. & R.P. Rossbach #495, WTU), and Cape Flattery (Bailey #20, WS; Gill #1503). Flowers during late June and July.

Aster subspicatus Nees

Douglas' aster. Occurs at Hobuck Beach (Gill #1979.8:140) and at Swan Bay, Lake Ozette (Gill #1979.8:220; #1979.8:221). Also reported from Ericson's Bay and the Lake Ozette outlet (N. Buckingham pers. comm., 1982). Flowers during the latter portion of August and early September.

Bellis perennis L.

English daisy. A Eurasian species found on disturbed sites within the study area. Collected near Hole-in-the-Wall (Gill #1980:223), along Hobuck Creek (Gill #1980:476), and at Baada (Gill #1279). Flowers throughout the summer.

Bidens beckii Torr. (=Megalodonta beckii Greene)

Water marigold. Submerged at about 1 - 1.5 m in Lake Ozette (Thompson #9425, WTU, in part; reported by Muenscher 1951:185).

Chysanthemum leucanthemum L.

Ox-eye daisy. A Eurasian species sparingly introduced in this area. Found on disturbed sites along the Waatch Logging Road (Gill #1980:648), on Cape Flattery (Gill #1979.8:39), and near the mouth of the Hoko River (Gill #1979.7:35; #1980:501; Gross #17). Flowers June through August.

Cirsium edule Nutt.

Indian or edible thistle. Apparently rare in the study area, on talus at the eastern base of Cannonball Island just above the highwater mark (Gill #1980:271A). Flowers during June and July.

Cirsium vulgare (Savi) Tenore

Common, bull, or spear thistle. A Eurasian native, common along the coastal terrace and upper beach at Cape Alava, especially between the Cape Alava Trail and the spit to Cannonball Island (Gill #1979.7:62; #1980:710; #1980:713; #1980:728). Also on the northwest portion of Cape Flattery (Gill #1979.8:41; #1490) and along Willoughby Lake Main Line (Gill #1807 south of Neah Bay. Long-term summer residents at the Ozette Archaeological Field Camp believe C. vulgare is increasing in abundance at Cape Alava.

Cotula coronopifolia L.

Brass buttons. Introduced from South Africa, occurs in the tide marsh near the mouth of the Waatch River west of the Waatch Bridge (Gill #1515). Flowers during August.

Erigeron philadelphicus L.

Daisy fleabane or Philadelphia daisy. Reported from near the Hoko River about 0.4 km below Hoko Falls (N. Buckingham pers. comm., 1982).

Hypochaeris radicata L.

Spotted or hairy cats-ear. A European weed found mainly on disturbed sites within the study area. At Cape Alava (Gill #1979.7:86; Underwood on 25.V.1980), on the dune area across from Strawberry Island (Gill #1979.8:114), at Hobuck Beach (Gill #1979.8:125), near the mouth of the Waatch River, north side (Gill #1980:472), along B-3 line, Cape Flattery (Gill #1979.8:100), at Baada (Gill #1980:S43), and along the

logging railroad near the mouth of the Hoko River (Gross #47). Flowers from May through late August, fruits in July and August.

Jaumea carnosa (Less.) Gray

Jaumea. A species of tidal flats and marshes, occurs near the high tide mark along the north side of the Waatch River mouth (Gill #1505; #1913) and in the tidal salt marsh south of the Waatch River and west of the Waatch Bridge (Gill #1514). Flowers during August and September.

Lactuca muralis (L.) Fresen.

Wall lettuce. A European weed occasionally found on disturbed sites within the study area. Along B-3 line, Cape Flattery (Gill #1979.8:93) and 200-line about 4 km south of Baada (Gill #1979.8:58). Also reported from a sandy roadside bank near Clallam Bay (Jones 1930:259). Flowers and fruits during August.

Matricaria matricarioides (Less.) Porter

Pineapple weed. A weedy species native to the Pacific Northwest, found at the Ozette Archaeological Project Field Camp, Cape Alava (Gill #1980:253) and at Baada (Gill #1979.8:153). Both areas were subject to heavy trampling, a condition that is well tolerated by and tends to favor this species. Flowers throughout the summer.

Petasites frigidus (L.) Fries var. palmatus (Ait.) Cronq.

Sweet colts foot. Common in moist areas, particularly where disturbed. Along a creek at North Beach, Cape Alava (Gill #1979.4:158,

#1980:415), Cape-H Road (Cape Flattery) (Gill #1979.8:35), 200-line (Gill #1979.8:52, #1980:565), and State Route 112 east of Neah Bay (Gill #1979.4:36; #1979.5:200MP; #1979.5:201MP). Flowers in April, fruits in May.

Senecio jacobaea L.

Tansy ragwort. Previous to 1981 this species was infrequent in the study area, and occurred mainly near the north side of the Waatch River mouth (Gill #1979.8:151; #1980:471; #1980:548). In 1981, however, S. jacobaea was common throughout much of the study area, especially on Cape Flattery (Gill #1499). Local attempts at controlling this poisonous Eurasian weed have not been effective. Flowers during July and August.

Senecio sylvaticus L.

Wood groundsel. A weedy species, along a logging road about 0.2 km west of Manny's Prairie (Gill #1764).

Solidago canadensis L. var. salebrosa (Piper) Jones (=S. elongata Nutt. in Jones 1936)

Goldenrod. Prefers open and disturbed areas. Found on Ozette Island (Gill & Gould-Wessen #1980:307), along a roadside near Hobuck Lake (Gill #1980:602), along Willoughby Lake Main Line (Gill #1809), at Hole-in-the-Wall (Gill #1979.8:3; #1980:736) and interior logged areas of Cape Flattery (Gill #1497; Peterson & Gill #1857), and in shallow soil on a rock outcrop near the mouth of the Waatch River, north side (Gill #1980:552; #1917). Also reported from Lake Ozette (Jones 1936:242) and

less than 0.4 km below Hoko Falls at the Hoko River bridge, Ozette - Hoko Road (N. Buckingham pers. comm., 1982).

Sonchus asper (L.) Hill

Prickly sow-thistle. A European weed, found on a disturbed roadside near Hobuck Lake (Gill #1980:595) and near the mouth of the Sekiu River (Gill #1304). Flowers and fruits throughout the summer.

Sonchus oleraceus L.

Common sow-thistle. A weedy species of European origin, found only on the rocky southeastern side of Cannonball Island (Gill #1980:285A), although it is to be expected on other disturbed sites in this area. Flowers and fruits throughout the summer.

Tanacetum douglasii DC.

Northern dune or western tansy. Not common due to its restricted habitat. Found in sand along the coast, at Sand Point Tumbolo (Underwood, no # or date; on 2.IX.1980), Cape Alava (Gill #1980:651; Gould-Wessen in VI.1979), and Hobuck Beach (Gill #1979.8:133, #1980:496; #1820; #1849). Flowers during June through early August.

Taraxacum officinale Weber

Common dandelion. Introduced from the Old World and sparingly present on disturbed sites in this area. Collected on the top of Cannonball Island (Gill #1979.5:183) and at the Ozette Archaeological Project Field Camp (Gill #1979.5:172). Flowers throughout the summer.

MONOCOTYLEDONAE

ALISMATACEAE - The Water-plantain Family

Alisma plantago-aquatica L. var. *americanum* Schul. & Schul.

American water-plantain. Along the Ozette River just south of the Cape Alava Trail Bridge (Gill #1542). Also reported from Lake Ozette by Muenscher (1951:185). Although Muenscher does not specify which variety was collected, it is likely that these plants also represent *A. plantago-aquatica* var. *americanum*.

HYDROCHARITACEAE - The Frog's-bit Family

Elodea canadensis Rich. in Michx.

Canadian waterweed. In the Ozette River between the Lake Ozette outlet and the Cape Alava Trail bridge (Gill #1540) and at the Rainier Landing along the north shore of Lake Ozette (Buckingham #02805). Also near Eagle Point, Lake Ozette (N. Buckingham pers. comm., 1982), and in Swan Bay (N. Buckingham pers. comm., 1982).

JUNCAGINACEAE - The Arrow-grass Family

Triglochin maritimum L.

Seaside arrow-grass. Common in the tide marsh near the mouth of the Waatch River (Gill #1508). Fruits in August.

NAJADACEAE - The Water-nymph Family

Najas flexilis (Willd.) Rost. & Schmidt

Wavy water-nymph. In about 1 m of water, Lake Ozette (Jones #5974, WTU).

POTAMOGETONACEAE - The Pondweed Family

Potamogeton amplifolius Tuckerman

Large-leaved pondweed. Muenscher (1951:185) reports this species "in deep water off the east shore," Lake Ozette.

Potamogeton epihydrus Raf.

Ribbon-leaf pondweed. Locally abundant (Scheffer & Hotchkiss 1945:14) and widespread in Lake Ozette (Gunther on 30.VI.1935, WTU; Hitchcock #24092, WS, WTU; Otis #1585, WS, WTU; #1784, WS; Thompson #9422,WTU), including the shallow area just southwest of the lake outlet (Buckingham #02791; Gill #1568; #1569), Swan Bay (N. Buckingham pers. comm., 1982), and at the Rainier Landing (N. Buckingham pers. comm., 1982). Also in the Ozette River near the Cape Alava Trail bridge, about 100 m downstream from the outlet (Gill #1538), and in a pond about 50 m west of Ericson's Bay (Gill #1613). Jones' collection #5955 (WTU) and a portion of Otis' collection #1585 (WTU) as cited by Jones (1936:99) are actually P. gramineus. Flowers in July and fruits during August.

Potamogeton gramineus L.

Grass-leaved pondweed. A common and widespread aquatic species in Lake Ozette (Hitchcock #24090, WS, WTU; Hitchcock, Spellenberg & Sutherland #24071, WS, WTU; Jones #5955, WTU; Otis #1584, WS; #1585, WTU), including North End (Gill #1534; Underwood on 16.VII.1981), the northern shore of Eagle Point (Buckingham #02795), at the picnic area just southwest of the lake outlet (Gill #1567; #1570), in Swan Bay (N. Buckingham pers. comm., 1982), at the Rainier Landing (N. Buckingham pers. comm., 1982), and along Tivoli Island (N. Buckingham pers. comm., 1982). Also in a pond about 50 m west of Ericson's Bay (Gill #1612) and on the east side of Elk Lake (Gill, A. & K. Flinn #1817). Most prevalent in shallow water, flowers during July and August and fruits during late summer.

Potamogeton graminius L. x ?nodosus Poir.

A hybrid population of P. gramineus and apparently P. nodosus occurs along a slight inlet between Eagle and Shafer's Point: directly across from Umbrella Bay in Lake Ozette (Gill #1592; #1593; #1596).

Potamogeton natans L.

Floating-leaved pondweed. Locally abundant (Scheffer & Hotchkiss 1945:15), from shallow water in Lake Ozette (Thompson #9422.5, WTU), including near the outlet (Gill #1566) and in a slight inlet between Eagle and Shafer's Points (Gill #1594; #1595). It also occurs in the Ozette River near the Cape Alava Trail bridge, about 100 m downstream from the lake outlet (Gill #1536, #1539).

Potamogeton pusillus L.

Small pondweed. An aquatic species reportedly common in Lake Ozette (Scheffer & Hotchkiss 1945:15). No material representing this species was found during the current study.

Potamogeton richardsonii (Benn.) Rydb.

Richardson's pondweed. A common (Sheffer & Hotchkiss 1945:15) submerged species in Lake Ozette (Otis #1583, WS, WTU). Also in the Ozette River near the lake outlet (Gill #1537). Flowers during late summer.

RUPPIACEAE - The Ditch-grass Family

Ruppia maritima L.

Ditch-grass. In a roadside ditch along the Waatch Logging Road (Gill #1979.8:173).

ZOSTERACEAE - The Eel-grass Family

Phyllospadix scouleri Hook.

Scouler's surf-grass. Fairly common, on rocky tidal flats along the Pacific coast. Tsues Beach (Gill #1979.8:121) and in tidal pools at Cape Alava near Cannonball Island (Gill #1979.4:161; #1979.4:167; #1979.4:181).

Phyllospadix serrulatus Rupr. ex Aschurs.

Surf-grass. Fairly common, on rocky tide flats. Offshore at Cape Alava south of Cannonball Island (Gill #1980:355) and along South Beach (Gill #1980:391, #1980:427), and about 24 km west of Clallam Bay at the mouth of Rasmussan Creek (Hohn & Phillips #1672, WTU).

Phyllospadix torreyi Wats.

Torrey's surfgrass. Fairly common, especially in pools of the lower intertidal area. At Cape Alava (Gill #1979.4:168; #1980:354; #1980:354A) and along Tsues Beach (Gill #1979.8:120; Gill & Parker #1980:564). Also collected by Father Abair of St. Martin's College at Mukkaw Bay (N. Buckingham pers. comm., 1981). None of the Phyllospadix material examined was in flower or fruit, so determinations were made using vegetative characters. Hitchcock and Cronquist (1976:567) give the range of P. torreyi as from Oregon to Baja California. Scagel (1967:318), however, states the range as Alaska to Mexico.

Zostera marina L.

Eel-grass. Fairly common and widespread. In Neah Bay (Gunther on 26.VI.1935, WTU; specimen on loan during study, not examined by me, identity confirmed by R. E. Bigley, University of British Columbia), in the Waatch River intertidal area near the mouth (Gill #1506), and at Cape Alava (Gill #1980:355a). It was also collected as drift along Hobuck Beach (Gill #1861).

JUNCACEAE - The Rush Family

Juncus articulatus L.

Jointed rush. In a gravel pit along the north shore of Lake Ozette (Buckingham #02808) and reported from Swan Bay (N. Buckingham pers. comm., 1982). Fruits during August.

Juncus balticus Willd. var. *balticus*

Baltic rush. At the mouth of the Tsues River (Buckingham #01213) and in wet areas to the north of the Waatch Road (Gill #1292).

Juncus balticus Willd. var. *vallicola* Rydb.

Bog rush. Margin of a small pond at the head of Ericson's Bay (Buckingham #02730).

Juncus bolanderi Engelm.

Bolander's rush. In a gravel pit along the north shore of Lake Ozette (Buckingham #02807), along roadsides near Hobuck Lake (Gill #1980:589; #1980:593), and at the north end of the Waatch Logging Road just south of Neah Bay (Gill #1979.8:165). Flowers during late summer.

Juncus bufonius L.

Toad rush. This species prefers disturbed ground, occurs in a roadside ditch northeast of Hobuck Lake (Gill #1980:591) and in the Neah Bay Laboratory courtyard, Baada (Gill #1980:540). Flowers in July.

Juncus covillei Piper

Colville's rush. Reported from Lake Ozette (Jones 1936:125) and 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982).

Juncus effusus L. var. gracilis Hook.

Soft or common rush. In the boggy area known as West Prairie about 1/2 km west of Ahlstrom's Prairie and the same distance east of the Pacific Ocean (Buckingham #0316), in Ahlstrom's (Gill #1778) and Manny's (Gill #1750) Prairies, and along a logging road about 0.2 km west of Manny's Prairie (Gill #1767) where it grows with J. effusus var. pacificus. Reported from the shore of Allen's Bay (N. Buckingham pers. comm., 1982).

Juncus effusus L. var. pacificus Fern. & Wieq.

Pacific common rush. Occurs on disturbed ground (gravel pits) along the Ozette Lake - Hoko River Road east of the Ozette Ranger Station (Buckingham #01181) and along a logging road about 0.2 km west of Manny's Prairie (Gill #1765) where it grows with J. effusus var. gracilis.

Juncus ensifolius Wikst. var. ensifolius

Daggar-leaf rush. In Ahlstrom's Prairie (Gill #1779; Gould-Wessen in VI.1979) and in the wooded area to the west (Buckingham #0331). Also along the margins of Lake Ozette at the slight inlet between Eagle and Shafer's Points (Gill #1590), at the head of Ericson's Bay (Gill #1638), along the pond about 50 m west of Ericson's Bay (Gill #1608), and in the boggy area to the south of this pond (Gill #1660). Reported from Manny's Prairie (N. Buckingham pers. comm., 1982). Flowers in June.

Juncus filiformis L.

Thread rush. Along the shore of Lake Ozette (Otis #1771, WS). Fruits during August.

Juncus lesueurii Boland.

Salt rush. In a salt marsh at the mouth of the Tsues River (Buckingahm #01212).

Juncus nevadensis Wats. var. nevadensis

Sierra rush. Along Lake Ozette at Swan Bay (Gill #1979.8:231; #1979.8:236), the northeastern shore of North End (Gill #1528), near the lake outlet (Buckingham #02790; Gill #1562), along the north shore of Eagle Point (Gill, Buckingham & Buckingham #1562, #1573), the slight inlet between Eagle and Shafer's Points (Gill #1589), and the northeastern shore of Ericson's Bay (Gill #1643), and reported from Tivoli Island (N. Buckingham pers. comm., 1982). Also in the wooded area west of Ahlstrom's Prairie (Buckingham #0330). Flowers during July and August, and is often proliferative.

Juncus supiniformis Engelm.

Spreading rush. In the boggy area to the south of the pond immediately west of Ericson's Bay (Gill #1661; #1662). Fruits during August.

Luzula campestris (L.) DC. var. multiflora (Ehrh.) Celak.

Field woodrush. Collected only from the east slope of Cannonball Island (Gill #1979.5:201), although it is probably more widespread in the area than this would indicate.

Luzula parviflora (Ehrh.) Desv.

Small-flowered woodrush. Widespread in this area, occurs on the top portion of Ozette Island (Gill #1980:528), in Ahlstrom's Prairie (Gould-Wessen, no # or date), in the logged area east of Elk Lake (Gill #1816), in a forested area north of Hobuck Lake (Gill #1980:609), and near the mouth of the Sekiu River (Gill #1305). It also occurs at Cape Alava (Gill #1979.9:260; no specimens were found with either flowers or fruits) where it is a component of the transition zone between climax communities of the Picea sitchensis - Polystichum munitum var. munitum and the Tsuga heterophylla - Blechnum spicant habitat types.

CYPERACEAE - The Sedge Family

Carex aquatilis Wahl.

Water sedge. Margin of small pond at the head of Ericson's Bay (Buckingham #02731).

Carex cusickii Mack.

Cusick's sedge. Reported from Lake Ozette (Muenscher 1951:185).

Carex deweyana Schw.

Dewey's sedge. Reported at 0.4 km downstream from Hoko Falls (N. Buckingham pers. comm., 1982).

Carex interrupta Boeck.

Green-fruited sedge. On the banks of the Hoko River about 0.4 km below Hoko River Falls (Buckingham #01200) and on Tivoli Island (Buckingham #02744). According to Hitchcock and Cronquist (1976:588) the range of this species in Washington is in the lower reaches of the Columbia River east as far as Klickitat County. It is included on the list of sensitive species for the state of Washington (Washington Natural Heritage Program 1981:9). Its range in Washington is listed as the southwestern portion of the state.

Carex laeviculmis Meinsh.

Smooth-stem sedge. Allen's Slough (Buckingham #02798). Fruits in August.

Carex lenticularis Michx. var. lenticularis (= C. kellogii W. Boott in Jones 1936 and Muenscher 1951)

Lenticular sedge. In sandy soil along the shores of Lake Ozette (Otis #1533, WS), including near the outlet (Gill #1561), to the west of Eagle Point (Gill #1574), at Ericson's Bay (Gill #1633; #1639), on the north shore of Tivoli Island (Gill #1711), and at Swan Bay (Gill #1979.8:237). The C. lenticularis var. limnophila (Holm) Cronq. (= C. hindsii C. B. Clarke) specimen cited in Jones (1936:121) for Lake Ozette is actually C. lenticularis var. lenticularis (N. M. Buckingham, pers.

comm., 1981). Flowers in late June - August, fruits during August - September.

Carex leptalea Wahlenb.

Bristle-stalked sedge. Reported from Lake Ozette (Jones 1936:117).

Carex limosa L.

Mud or shore sedge. Reported from Lake Ozette (Muenscher 1951:185).

Carex livida (Wahl.) Willd.

Pale sedge. Along Ericson's Bay (Underwood on 2.V.1981), in the bog known as West Prairie (Buckingham #0326) and in Ahlstrom's Prairie (Gill #1781, vegetative; Gould-Wessen in VI.197-). Also apparently on Manny's Prairie (Gill #1748) and Allen's Prairie (Gill #1707), and in the boggy area to the south of the pond immediately west of Ericson's Bay (Gill #1659). No flowering or fruiting material has been seen from these last three areas, so the presence of this species at these locations must remain somewhat tentative. Flowers during May through July.

Carex lyngbyei Hornem.

Lyngby's sedge. Reportedly strictly maritime in distribution (Hitchcock & Cronquist 1976:587). Along Mukkaw Bay in a salt marsh area (Buckingham #01214), at tideline along the Hoko River (Gill #1979.7:43; Gross #22), and in the boggy area known as West Prairie about 1/2 km

inland from the Pacific Ocean (Gill #1980:441). It is also reported from Lake Ozette (Muenscher 1951:185).

Carex macrocephala Willd.

Bighead sedge. Not common due to restricted habitat, in sand along coast, at Hobuck Beach (Gill #1980:483) and along the Strait of Juan de Fuca 7 miles (ca. 11.2 km) west of Clallam Bay (Ownbey & Meyer #2257).

Carex mertensii Prescott

Merten's sedge. Reported from Lake Ozette (Muenscher 1951:185).

Carex muricata L.

Muricate sedge. West facing slopes along the Pacific Ocean, about 0.4 km south of Cape Alava (Tisch #723, WS).

Carex obnupta L. H. Bailey

Slough sedge, locally called basket sedge or basket grass. A common and very widespread species in this area, in a wide variety of moist, wet, and boggy habitats. It is a minor component of Tsuga heterophylla forests and is widespread but of minor importance in Picea sitchensis - Polystichum munitum var. munitum stands. It is also a minor component in the transition zone between climax stands of the Picea sitchensis - Polystichum munitum var. munitum and the Tsuga heterophylla - Blechnum spicant habitat types. Carex obnupta is the understory dominant in the depression often found between the base of the coastal ridge and the current coast terrace. P. sitchensis is the overstory dominant here.

C. obnupta is also locally dominant on the sandy terrace just above the driftwood zone at Cape Alava, is the major understory component of Salix hookeriana/piperi (see discussion of taxonomic problems under S. hookeriana) thickets found in this area, and is a major component of the vegetaion on portions of Ahlstrom's, Manny's, and Allen's Prairies. Flowers in April and May and fruits during July through September. Material was examined from Lake Ozette (Hitchcock on 27.VII.1965, WS), including the area about 1.5 km east of the Ozette Ranger Station (Gill #1286), the slight inlet between Eagle and Shafer's Points (Gill #1579), and Ericson's Bay (Gill #1636). Also Cape Alava (Daubenmire #671, WS; #672, WS; Gill #1979.4:15; #1979.4:122; #1979.4:157; #1979.5:125; #1979.5:137; #1979.7:83; #1979.9:259; #1980:272B), Ahlstrom's Prairie (Gill #1282; #1777), Manny's Prairie (Gill #1751), near the Norwegian Memorial Shelter (Gill #1868), Elk Lake (Gill, A. & K. Flinn #1814), Hobuck Lake (Gill, Thomas & Parker #1980:583), Hole-in-the-Wall (Gill #1979.8:22), along the Waatch Logging Road (Gill #1979.8:166), and near the mouth of the Hoko River (Gill #1979.7:21).

Carex oederi Retz. (= C. viridula Michx.)

Green sedge. Found in sandy soil along shores of Lake Ozette (Otis #1530, WS; #1580, WS), including Ericson's Bay (Gill #1626) and Swan Bay (N. Buckingham pers. comm., 1982). Fruits in August.

Carex pansa Bailey

Sand-dune sedge. This maritime species occurs at Hobuck Beach (Gill #1979.8:137; #1980.484), near the mouth of the Tsues River on Mukkaw

Bay (Buckingham #01864), and on sand dunes at Tsues near the turn to the Makah picnic grounds (Gill & Flinn #1827). Flowers during early summer and fruits in late summer.

Carex phyllomanica W. Boott

Coastal stellate sedge. On Ahlstrom's (Gill #1780) and Allen's (Gill #1708) Prairies, in the forested area to the west of Ahlstrom's Prairie on the Cape Alava Trail (Buckingham #0332), and in the boggy area south of the pond immediately west of Ericson's Bay (Gill #1664). It is also reported from Lake Ozette by Jones (1936:118). Fruits in August. According to Mastrogiuseppe (pers. comm., 1981), some of the material from the study area appears intermediate between this species and C. muricata L., to which it is closely related.

Carex pluriflora

Several-flowered sedge. In a bog west of Ahlstrom's Prairie (probably West Prairie) (Starr on 18.VI.1980, Olympic National Park Herbarium, Port Angeles, WA.). On the list of taxa sensitive in Washington (Washington Natural Heritage Program 1981:10).

Carex praticola Rydb. (= C. piperi Mack.)

Meadow sedge. Reported from Lake Ozette (Muenscher 1951:185).

Carex rostrata Stokes

Beaked sedge. Reported from Lake Ozette (Muenscher 1951:185).

Carex sitchensis Prescott

Sitka sedge. In the forested area between Ahlstrom's Prairie and West Prairie (Buckingham #0333), and along the margin of the pond immediately west of Ericson's Bay (Gill #1607) and in the boggy to the south (Gill #1648). Fruits in August.

Carex stipata Muhl.

Sawbeak sedge. On the banks of the Hoko River about 0.4 km below Hoko River Falls (Buckingham #01195).

Carex vesicaria L.

Along the margins of Lake Ozette at Swan Bay (Gill #1979.8:233), and immediately to the southwest of the lake outlet (Gill #1559). There are two varieties of this species in the Pacific Northwest, C. vesicaria var. major Boott and C. vesicaria var. vesicaria. Hitchcock et al. (1969:343) state that "no sharp line can be drawn between these two varieties." Our material is intermediate between the two.

Dulichium arundinaceum (L.) Britt.

Dulichium. Along the margins of Swan Bay (Gill #1979.8:224) and Ericson's Bay (Gill & N. Buckingham #1641), Lake Ozette. Flowers during the latter portion of August.

Eleocharis acicularis (L.) R. & S.

Needle spike-rush. In shallow water along the west shore of Swan Bay, Lake Ozette (Buckingham #02754).

Eleocharis ovata (Roth) R. & S. [= E. obtusa (Willd.) Schult.]

Ovoid spike-rush. Reported from Lake Ozette by Muenscher (1951:185).

Eleocharis palustris (L.) R. & S.

Common or creeping spike-rush. Reported from Lake Ozette (Muenscher 1951:185) including Swan Bay (N. Buckingham pers. comm., 1982) and Tivoli Island (N. Buckingham pers. comm., 1982); collected along the lake margin near the head of Ericson's Bay (Gill #1627). Flowers during August.

Eriophorum chamissonis C. A. Mey.

Chamisson's cotton-grass. This species prefers boggy areas. On Ahlstrom's Prairie (Gill #1775; Underwood on 30.V.1980), Roose's Prairie (Gill #1979.5:231; #1979.5:256; #1980:724), West Prairie (Gill #1980:440; Gould-Wessen on 7.V.1979), and Manny's Prairie (Gill #1747) in the Ozette area, and is reported from along the Tsues River near Waatch Point (Jones 1936:121). Frequent in prairie areas of suitable habitat, but only a minor component of the vegetation.

Rhyncospora alba (L.) Vahl

Beakrush. Rare within the study area, occuring in a sphagnum bog along Ericson's Bay, Lake Ozette (Rigg on 24.VIII.1933, WTU). Drosera rotundifolia is an associated species in this area. R. alba also occurs along the margins of Ericson's Bay (Gill #1625) and as a component of the bog vegetation found on Allen's Prairie (Gill #1691; #1705) where it is associated with Carex phyllomanica, Drosera rotundifolia, Ledum

groenlandicum, Myrica gale, Sphagnum spp., and Vaccinium oxycoccos. Fruits during August.

Scirpus acutus Muhl.

Hardstem bulrush. Found growing in water along the margins of Lake Ozette (Jones #5938, WTU). Muenscher (1951:185) stated that this species is probably the same as called S. validus Vahl. by Scheffer and Hotchkiss (1945:13). Muenscher also reports that along the east shore of Lake Ozette extreme plants are found having a height of 16 feet (ca. 4.8 m).

Scirpus cernuus Vahl

Low clubrush. In a salt marsh near the mouth of the Tsues River (Buckingham #01211). Flowers during June.

Scirpus cespitosus L.

Tufted clubrush. Along Ericson's Bay, Lake Ozette (Underwood on 2.V.1981).

Scirpus maritimus L.

Seacost bulrush. On the tide marsh to the north of the Waatch River near the mouth (Gill #1519). Fruits during late summer.

Scirpus microcarpus Presl

Small-fruit bulrush, locally known as bottom-grass due to its use in basketry. Common and widespread, in wet open areas. Along the swampy

margins of Lake Ozette (Jones #5939, WTU), in Ericson's Bay (Gill #1666; Underwood on 2.V.1981). Also in roadside ditches along State Route 112 (Buckingham #0286), along the north end of the Waatch Logging Road (Gill #1979.8:161) and near the turn to Bahokus Peak (Gill #1919; #1920), along 200-line about 4 km south of Baada (Gill #1979.8:62), along the Educket Road (Gill #1980:244; #1980:244A), and at Cape Alava (Gould-Wessen in VI.1979). Flowers during late June and early July, fruits during August and September.

Scirpus subterminalis Torr.

Water clubrush. In a small pond at the head of Ericson's Bay (Buckingham #02733).

Scirpus validus Vahl

Softstem bulrush. West of Eagle Point along the Lake Ozette shoreline (Buckingham #02794; Gill #1575) and on Tivoli Island (Buckingham #02802). Reported as locally abundant in Lake Ozette by Scheffer and Hotchkiss (1945:13) but believed to be S. acutus by Muenscher (1951:185).

POACEAE - The Grass Family

Agrostis aequivalvis (Trin.) Trin.

Alaska bentgrass. According to Hitchcock and Cronquist (1976:617), this species occurs from Alaska to Vancouver Island and the northwestern corner of the Olympic Peninsula where it has been collected from Lake Ozette (Hitchcock, Spellenburg, Sutherland & Kern #24089, WS)

and Allen's Prairie (Buckingham #02797; Gill #1706). Also reported from Manny's Prairie (N. Buckingham pers. comm., 1982).

Agrostis alba L. var. palustris (Huds.) Pers.

Creeping bentgrass. Probably native to Europe and introduced into the Pacific Northwest. Along the shore of Ozette Island (Gill #1980:283B), on shell midden at Cape Alava (Daubenmire on 25.VII.1966, WS), along Lake Ozette on a sandy northern shore (Hitchcock #24082, WS), and near the mouth of the Waatch River (Gill #1517).

Agrostis exarata Trin. ssp. minor (Hook.) Hitchc.

Spike bentgrass. On a sandy spit at the south end of Rialto Beach, Quileute Indian Reservation (Gill #1890) and on the breakwater at the mouth of the Quilleute River, La Push (Gill #1889).

Agrostis oregonensis Vasey

Oregon bentgrass. Along the margin of a pond about 50 m west of Ericson's Bay (Gill #1609), adjacent to a logging road about 0.2 km west of Manny's Prairie (Gill #1766), and in Allen's Slough (Buckingham #02796). Reported from Tivoli Island (N. Buckingham pers. comm., 1982) and Ahlstrom's Prairie (N. Buckingham pers. comm., 1982).

Agrostis scabra Willd.

Winter bentgrass, rough hair-grass, tickle-grass. Ahlstrom's Prairie south of the Cape Alava Trail (Gill #1776a).

Agrostis tenuis Sibth.

Colonial bentgrass. Native to Eurasia. On the sandy north shore of Lake Ozette (Hitchcock #24083, WS), along logging road 9100 between roads 9116 and 9118 south of the Makah Indian Reservation (Gill #1980:743), and at Koitlah Point where it grows on disturbed ground (Gill #1980:628). Also reported from Manny's Prairie (N. Buckingham pers. comm., 1982).

Aira praecox L.

Little hairgrass. A weedy grass introduced from Europe. On Ozette Island (Gill & Gould-Wessen #1980:296) in association with Sagina crassicaulis and in sand at Hobuck Beach (Gill #1980:498A) with Bromus mollis. In both places it is exposed to marine influences.

Alopecurus geniculatus L.

Water foxtail. Along roadsides on consolidated dunes near Mukkaw Bay (Buckingham #01218). Flowers during late June - early July.

Bromus mollis L.

Soft brome. Introduced from Europe. At Baada (Gill #1979.8:160) and in sand at Hobuck Beach (Gill #1980:498; 1293), where it sometimes grows with Aira praecox.

Bromus sitchensis Trin. var. sitchensis

Alaska brome. Seems to prefer disturbed areas. At Cape Alava (Daubenmire on 14.VI.1966, WS; Gould-Wessen, no # or date) and near the mouth of the Hoko River (Gross #26).

Bromus tectorum L.

Cheatgrass. Reported from near the intersection of the Ozette - Hoko Road with State Route 112 (N. Buckingham pers. comm., 1982). Introduced from Eurasia.

Calamagrostis crassiglumis Thurb.

Thurber's or thickglume reedgrass. Along the the margins of Lake Ozette (Helmrich #245C, WS). Collections have been made from near the outlet (Hitchcock #24079, WS; #24095, WS) to Swan Bay (Buckingham #01176), but it probably occurs elsewhere along the lake. Hitchcock and Cronquist (1976:629) and Jones (1936:112) regard Thurber's reedgrass as a rare species; it is known in Washington only from Lake Ozette and Whatcom Lake, from Mendocino County and Point Reyes Peninsula in California, and a few locations on Vancouver Island, British Columbia, and points north to Kodiak Island, Alaska. Thurber's reedgrass is on the list of threatened plants for the State of Washington and is also a canidate for Federal status on the 1980 Federal Register, Notice of Review (Washington Natural Heritage Program 1981:5). Flowers in the Ozette area from late June through July.

Calamagrostis nutkaensis (Presl) Steud.

Pacific reedgrass. On Ozette Island (Gill #1980:538; Gill & Gould-Wessen #1980:309), in Ahlstrom's (Gill #1776), Roose's (Gill #1980:720) and Manny's (Gill #1738) Prairies, in a sphagnum bog 0.4 km west of Lake Ozette (Hitchcock, Spellenburg, Sutherland & Kern #24088, WS), and on Strawberry Rock approximately 1.2 km southwest of the Tsues

River mouth (Gill & Flinn #1831). Also reported from Ericson's Bay (N. Buckingham pers. comm. 1982). Flowers during late June and July, fruits during August.

Dactylis glomerata L.

Orchard-grass. In open disturbed areas at Cape Alava (Gill #1980:735; Gould-Wessen in VI.1979). Flowers during early to mid-summer.

Danthonia spicata (L.) Beauv. var. pinetorum Piper

Poverty danthonia, common wild oatgrass. On Manny's Prairie (Gill #1756).

Deschampsia cespitosa (L.) Beauv. var. arctica Vasey

Tufted hairgrass. Along the shoreline of Lake Ozette (Helmrich #248, WS) and at tideline along the Hoko River (Gross #29) where it occurs with Festuca arundinacea. Flowers during June and July.

Deschampsia cespitosa (L.) Beauv. var. cespitosa

Tufted hairgrass. Along Allen's Slough (Buckingham #02799) and near the outlet of Lake Ozette (Buckingham #02793).

Deschampsia cespitosa (L.) Beauv. var. longiflora Beal

Tufted hairgrass. Along Lake Ozette near the head of Ericson's Bay (Gill #1640).

Elymus glaucus Bukl. var. glaucus

Western rye-grass or blue wild-rye. Prefers disturbed sites in this area, occurs south of the Ozette Archaeological Project Field Camp at Cape Alava (Gill #1980:734) and in association with Holcus lanatus near the mouth of the Hoko River (Gross #25).

Elymus hirsutus Presl

Hairy wild-rye or northern rye-grass. Apparently not common within the study area. East of the Ozette Archaeological Field Camp near the crest of the coastal ridge at Cape Alava, in the Picea sitchensis - Polystichum munitum var. munitum association (Gill #1980:322). Also reported from Marie's Road, Swan Bay (N. Buckingham pers. comm., 1982). Flowers during June and July.

Elymus mollis Trin.

Dune wild-rye or American dunegrass. Widespread along the coast, in rocky sand near the mouth of the Hoko River (Gross #27), at Baada (Gill #1979.5:18MP), near the high wave mark on the east base of Cannonball Island (Gill #1980:279A), on the mainland side of the spit to Cannonball Island (Gill #1979.7:69), and on the terrace south of the Ozette Archaeological Project Field Camp at Cape Alava (Gill #1979.5:163; #1980:730). Flowers in late June.

Festuca arundinaceae Schreb.

In wet sand at high tideline along Hoko River (Gross #28), here associated with Deschampsia cespitosa var. arctica.

Festuca bromoides L.

Barren fescue. Introduced from Europe; at the mouth of the Sekiu River (Gill #1306).

Festuca myuros L.

Rat-tail fescue. A species probably native to Europe. At Hobuck Beach in sand (Gill #1294), at Koitlah Point (Gill #1980:634), and at Baada (Gill #1979.8:157; #1979.8:157A; #1980:541). All of these areas are disturbed.

Festuca rubra L. var. (?)littoralis Vasey

Red fescue. This species was found only on Ozette Island (Gill #1980:278B; Gill & Gould-Wessen #1980:310), although it is to be expected elsewhere within the study area. Flowers during late June - early July.

Festuca subulata Trin.

Bearded or nodding fescue. Approximately 0.4 km north of the Norwegian Memorial shelter on an old beach terrace within the Picea sitchensis - Polystichum munitum var. munitum habitat type (Gill #1867).

Festuca subuliflora Scribn.

Coast Range fescue or crinkle-awn fescue. Forested west facing slopes adjacent to the Pacific Ocean, about 0.4 km south of Cape Alava (Tisch #719, WS).

Glyceria elata (Nash) Jones

Tall mannagrass. Along the east side of Swan Bay (Buckingham #02756) and the Hoko River about 0.4 km downstream from Hoko River Falls (Buckingham #01196).

Glyceria grandis Wats.

American mannagrass. Reported from Lake Ozette by Muenscher (1951:185).

Glyceria leptostachya Buckl.

Slender-spike mannagrass. On a riverside beach about 0.4 km downstream from Hoko River Falls (Buckingahm #02714).

Holcus lanatus L.

Common velvet-grass. Common and widespread within the study area; an introduced species prefering disturbed sites and other open areas. At Cape Alava (Daubenmire on 14.VI.1966, WS; Gill #1980:262; #1980:273B), Ahlstrom's Prairie (Gould-Wessen in VI.1979), Hobuck Lake (Gill #1980:600), the mouths of the Waatch (Gill #1295) and Sekiu (Gill #1307) Rivers, Koitlah Point (Gill #1980:632), Baada (Gill #1979.8:156; #1979.8:158; 1980:542), and near the mouth of the Hoko River (Gross #24).

Hordeum brachyantherum Nevski

Meadow barley. Both sides of the Waatch River mouth, on sand dunes (Gill #1900) and boardering tidal marshes (Gill #1516). Fruits during August and September.

Lolium perenne L.

Perennial ryegrass. A European species found in the disturbed area of the Ozette Archaeological Project Field Camp, Cape Alava (Gill #1980:317; Gould-Wessen, two collections in VI.1979), and on the sand dunes slong the south side of the Waatch River near its mouth (Gill #1901).

Panicum occidentale Schribn.

Western witchgrass. Along the shore of Lake Ozette in rich silt soil with a southeastern exposure (Huntley #775A, WS), also at the picnic area just southwest of the Lake Ozette outlet (Gill #1564) and at Shafer's Point (Gill & N. Buckingham #1645).

Phalaris arundinacea L.

Reed canarygrass. At the Lake Ozette outlet and along the Ozette River immediately downstream from the outlet (Buckingham #02792; Gill #1544; #1558). A..so along the slight inlet between Eagle and Shafer's Points (Gill #1591).

Phleum pratense L.

Common timothy. Introduced from Europe, on disturbed areas including the area around the Ozette Archaeological Field Camp (Gill #1980:733; Gould-Wessen in VI.1979) and the old Ahlstrom homestead (Buckingham #01191). Flowers during early and mid-summer.

Phragmites communis (L.) Trin.

Common reed. Along the margins of Lake Ozette (Jones #5937, WTU; Otis #1586, WS, WTU), including Swan Bay (Gill #1979.8:218). None of the materials seen from this area, all collected during August, have had fully mature flowers. According to Scheffer & Hotchkiss (1945:13), this grass was common at Lake Ozette, although based on 1979 - 1981 observations, it is now rare. The only population observed was in 1979 at Swan Bay, none were observed between the lake outlet and Allen's Bay during a collecting trip made by boat on August 26, 1981, although it is possible that a small population could have been missed. During the 1930s this species was sometimes associated with Menyanthes trifoliata, Typha latifolia, and Salix hookeriana at Lake Ozette (Jones 1936: pl. 8, fig. 3).

Poa annua L.

Annual blugrass. A cosmopolitan species native to Europe; collected at Baada (Gill #1979.8:159).

Poa pratensis L.

Kentucky bluegrass. Abundant under Picea sitchensis in an area four miles (ca. 6.5 km) south of Cape Flattery (Hitchcock & Martin #3502).

Puccinellia pauciflora (Presl) Munz var. microtheca (Buckl.) Hitchc. (=Glyceria microtheca Buckl.)

Weak alkali-grass. Reported from less than 0.4 km downstream from Hoko Falls at the Hoko River bridge (N. Buckingham pers. comm., 1982).

Puccinellia pauciflora (Presl) Munz var. pauciflora (= Glyceria pauciflora Presl)

Weak alkali-grass. Reported from Lake Ozette. (Muenscher 1951:185). Puccinellia pumila (Vasey) Hitchc.

Dwarf alkali-grass. In the tide marsh at the mouth of the Waatch River (Gill #1507). The relationship between this species and the closely allied P. nutkaensis (Presl) Fern. & Weath. is uncertain (Calder & Taylor 1968).

SPARGANIACEAE - The Bur-reed Family

Sparganium angustifolium Michx.

Narrow-leaf or floating bur-reed. Reportedly common in Lake Ozette (Scheffer & Hotchkiss 1945:15). All S. angustifolium specimens from Lake Ozette held by WS and WTU have been assigned to S. emersum (Jones #5985, WTU) or S. fluctuans (Otis #1582, WS, WTU; Thompson #9424, WTU). I doubt that Sheffer and Hotchkiss observed S. angustifolium in Lake Ozette since no correctly identified specimens of this species are known to exist from this locality.

Sparganium emersum Rehmann [= S. multipedunculatum (Morong) Rydb., S. simplex Huds.]

Simple-stem bur-reed. Locally abundant (Scheffer & Hotchkiss 1945:13) and forming conspicuous areas in the shallow water along the margin of Lake Ozette (Jones #5978, WTU; #5985, WTU). Jones specimen #5985, WTU, was incorrectly cited as S. angustifolium Michx. by Jones (1936:98).

Sparganium eurycarpum Engelm.

Broad-fruited bur-reed. Locally abundant (Scheffer & Hotchkiss 1945:13) and widespread in Lake Ozette, in mud within the lake including the area near the outlet (Gill #1543; Gould-Wessen, no # or date; Hitchcock #24087, WTU; Otis #1581, WS, WTU; #1785, WS) and Swan Bay (N. Buckingham pers. comm., 1982). Fruits in late August.

Sparganium fluctuans (Morong) Robins.

Fluctuating bur-reed. In Lake Ozette (Otis #1582, WS, WTU; Starr on 21.VII.1980, Olympic National Park Herbarium, Port Angeles, WA.), including shallow areas (Thompson #9424, WTU) and deep water in Allen's Bay (Buckingham #02800; Gill #1670; both vegetative). Flowers during the latter portion of summer. Lake Ozette is the only known locality for this species in Washington. Otis #1582 was incorrectly cited as S. angustifolium by Jones (1936:98). Reported from Idaho (Davis 1952:69-70), otherwise known from the northeastern United States and eastern Canada.

TYPHACEAE - The Cat-tail Family

Typha latifolia L. Relatively uncommon within the study area, cat-tails are never-the-less abundant in scattered localized areas. Collected 1 km south of the junction of logging road 9100 with Ozette Main Line (Gill #1979.8:249). They are also abundant in localized areas along the Ozette - Hoko Road (N. Buckingham pers. comm., 1982), logging roads southeast of Lake Ozette, and along the Waatch Road. Cat-tails are reported from the margins of Lake Ozette, where they grow with Menyanthes

trifoliata, Phragmites communis, and Salix hookeriana (Jones 1936: pl. 8, fig. B); however, my investigations of the Lake Ozette shoreline during 1979 - 1981 have yielded no populations of this species. N. Buckingham (pers. comm., 1982) located one population at the Rainier Landing during August 1981. Fruits during August.

ARACEAE - The Arum Family

Lysichitum americanum Hulten & St. John

Skunk cabbage. A common and widespread species in wet areas, particularly in stands with Thuja plicata and Tsuga heterophylla as overstory domminants, including the wet phase of the Tsuga heterophylla - Blechnum spicant habitat type. Flowers during April. Collected inland from Cape Alava (Gill #1979.4:37; #1979.4:121; #1980:331) and at Hole-in-the-Wall (Gill #1979.8:8).

LEMNACEAE - The Duckweed Family

Lemna minor L.

Duckweed or water lentil. Reported from Lake Ozette (Muenscher 1951:185).

Spirodela polyrhiza (L.) Schleid.

Great duckweed. Reported from Lake Ozette (Muenscher 1951:185).

LILIACEAE - The Lily Family

Allium cernuum Roth

Nodding onion. This species is uncommon within the study area, preferring coastal situations that, due to soil conditions, are effectively drier than is normal for this region. It has been collected from Tatoosh Island (Bailey #23, WS), the southernmost of two small islands in Mukkaw Bay (Ownbey #G.N. 62a, WS; #G.N. 62b, WS), sand dunes on the mainland directly across from these islands (Gill #1979.8:115), on Strawberry Rock (Gill & Flinn #1832), and on a rock outcrop near the mouth of the Waatch River (Gill #1980:473; #1980:554). Flowers during July and fruits in August.

Camassia quamash (Pursh) Greene var. azurea (Heller) Hitchc.

Camas. Rare, scattered and localized populations in Manny's Prairie (Gill & N. Buckingham #1760). Members of the Makah tribe state that camas did not occur in their territory, and that it was obtained from the Forks area (M. Parker, pers. comm. 1980), from the Quilleute who dug it at Quilleute Prairie (H. Peterson, pers. comm. 1980), from Taholah (I. Ides, pers. comm. 1981), and from the Victoria area (I. Ides, pers. comm. 1981).

Disporum smithii (Hook.) Piper

Fairy lantern or large-flowered fairy-bell. Uncommon, usually grows in Tsuga heterophylla forests. It is also a component of the vegetation found in clear-cut areas of the interior. Along B-3 line, Cape

Flattery (Gill #1979.8:91; #1979.8:99), and near the Hoko River Archaeological Site about 1/2 km upstream from the mouth (Gill #1979.7:15; #1979.8:190). Fruits in late July and August.

Erythronium revolutum Smith

Pink or coast fawn-lily or trout-lily. A rare species in this area, in lightly wooded and grassy areas on consolidated sand dunes along Mukkaw Bay (Buckingham #01210; #01860). Flowers during early May and fruits in the latter part of June. It is on the list of sensitive vascular plants for Washington (Washington Natural Heritage Program 1981:12).

Maianthemum dilatatum (Wood) Nels. & Macbr.

Beadruby, May-lily, or false lily-of-the-valley. Very common and widespread in a variety of habitats, including those dominated by Picea sitchensis (including climax stands of the Picea sitchensis - Polystichum munitum var. munitum habitat type), in the Tsuga heterophylla - Blechnum spicant habitat type, and in drier portions of the prairies. It occurs in both disturbed and undisturbed areas. In some Picea sitchensis communities M. dilatatum forms the understory dominant; the status of these Picea - Maianthemum communities is not clear at this time. M. dilatatum flowers in June, the fruit ripens in early autumn and persists until late November. It is found at Cape Alava (Gill #1979.4:87; #1979.4:105; #1979.4:144; #1979.4:201; #1979.4:213; #1979.4:234; Gould-Wessen on 1.VI.1979), on Cannonball (Gill #1978.OZ:24; #1979.5:207) and Ozette (Gill #1980:294) Islands, at the mouth of the Ozette River

(Gill #1979.5:301), on Ahlstrom's Prairie (Gill #1979.5:222) and Roose's Prairie (Gill #1979.5:232; #1979.5:252), at Hole-in-the-Wall (Cape Flattery) (Gill #1979.8:16; #1980:222), at Baada and Dtokoah Points (Gill #1979.5:20MP; #1979.5:25MP), and near the mouth of the Hoko River (Gill #1979.7:29; #1979.8:187; Gross #7).

Streptopus amplexifolius (L.) DC. var. americanus Schult.

Clasping-leaved twisted stalk or cucumber-root. A somewhat uncommon species in the study area. A minor component of both Tsuga heterophylla forests and those dominated by Picea sitchensis. Along the trail to Hole-in-the-Wall (Gill #1980:618), the Cape Alava Trail (Gill #1979.7:49), on Cannonball Island (Gill #1979.5:191), and on the terrace adjacent to North Beach (Cape Alava) (Gill #1979.4:141).

Tolfieldia glutinosa (Michx.) Pers. var. brevistyla Hitchc. (= T. occidentalis Wats. in Jones 1936)

Tolfieldia. Fairly common. At Lake Ozette (Gunther on 15.VI.1935, WTU) including the area between Eagle and Shafer's Points (Gill #1576) and along Ericson's Bay (Gill #1632; Rigg on 24.VIII.1933, WTU). Also on Ahlstrom's Prairie (Gill #1773; Gould-Wessen, no collection number or date, probably from here or West Prairie), Roose's Prairie (Gill #1979.5:249), West Prairie (Gill #1980:433) and Manny's Prairie (Gill #1736). Flowers during June - early July, and fruits in August.

Trillium ovatum Pursh

Western wake-robin or white trillium. Relatively rare in the study area, in wooded areas, preferring Tsuga heterophylla as an overstory dominant. Near the mouth of the Hoko River (Gill #1979.8:193), along 200-line about 1.6 km south of Baada (Gill #1979.5:101), and just west of the Ozette Ranger Station at Lake Ozette (Underwood on 31.III.1979). Flowers during late March through May.

Veratrum californicum Durand var. caudatum (Heller) Hitchc.

California false hellebore. Very rare in the study area. In wet areas along logging road 5600 between 5000 and 5605 south of Lake Ozette (Gill #1862).

AMARYLLIDACEAE - The Amaryllis Family.

Narcissus poeticus L.

Poet's narcissus. A southern European species escaped on consolidated dunes along Mukkaw Bay (Buckingham #01862). Flowers during early May.

IRIDACEAE - The Iris Family

Iris pseudacorus L.

Yellow flag. An introduced European species, reported "in shallow water near shore of Garden Island," Lake Ozette (Muenscher 1951:185).

Sisyrinchium angustifolium Mill. (= S. idahoense Bickn. in Jones 1936, S. littorale Greene)

Blue-eyed grass. Along the Tsues River (Gunther on 18.VI.1935, WTU), in a bog along Ericson's Bay (Rigg on 24.VIII.1933, WTU), near the outlet of Lake Ozette (Henderson #796, WTU), and on Ozette Island (Gill #1980:279B; Gill & Gould-Wessen #1980:287B). Also reported from West Prairie (N. Buckingham pers. comm., 1982). Flowers in June and fruits during July and August.

ORCHIDACEAE - The Orchid Family

Calypso bulbosa (L.) Oakes

Fairy-slipper, Venus-slipper. On sand dunes near the Tsues River mouth under scrub Picea sitchensis (N. Buckingham pers. comm., 1981).

Corallorhiza maculata Raf.

Pacific or spotted coral-root. A population with spot-free petals occurs along the Cape Alava Trail between Ahlstrom's Prairie and the ocean (Buckingham #0329).

Habenaria dilatata (Pursh) Hook. var. leucostachys (Lindl.) Ames

White bog-orchid, bog-candle. Uncommon in study area, prefers boggy habitats. On Allen's Prairie (Gill #1698) and in the boggy area south of the pond about 50 m west of Ericson's Bay (Gill #1663). Flowers during August.

Spiranthes romanzoffiana Cham. var. romanzoffiana

Hooded ladies-tresses. Fairly common. On Ahlstrom's Prairie (Gill #1771) and along the margins of Lake Ozette at Ericson's Bay (Gill #1631) and the slight inlet between Eagle and Shafer's Points (Gill #1581). Reported from along the west shore near the Lake Ozette outlet (N. Buckingham pers. comm., 1982) and on Allen's Prairie (N. Buckingham pers. comm., 1982). Flowers during August and early September.

PART 2

MAKAH - OZETTE AND NITINAHT ETHNOBOTANY IN THE HISTORIC PERIOD 1792 - 1982

CHAPTER 1

INTRODUCTION

Introduction

I attempt to record all available information concerning the traditional uses and names of plants by the Makah People. General information is also provided on the role of plants in Makah culture. Part 2, chapter 7 consists of a list of plant species having Makah names or traditional uses. Also included are introduced species having uses differing from standard U. S. utilization patterns. For example, the use of Camellia sinensis (L.) Ktze. (commercial tea) as a beverage is not included, but the use of the leaves as a poultice to stop bleeding is. In part 2, chapter 4 I discuss the role of plants in Makah - Ozette and Nitinaht cultures. Chapter 5 is devoted to botanical nomenclature and classification in Makah and Nitinaht. I have also included an appendix (appendix A) on the orthography used to transcribe Makah and Nitinaht.

The Northwest Coast Culture Area

The Makah are part of the Northwest Coast Culture area, a region that extends from southern Alaska to northwestern California (Driver 1969; Drucker 1965; Wessen 1982). The people of the northwest coast were diverse in language and physical features, but they held in common many distinctive cultural characteristics that separated them from their neighbors to the north, south, and interior (Driver 1969; Drucker 1965;

Kroeber 1923; Boas 1966). These differences include a heavy reliance on marine resources; a single, easily recognizable artistic style; a highly developed woodworking technology; and the potlatch complex (Barnett 1955:35-58, 77; Boas 1966:2-3; Collins 1974:60-64; Cook 1846:284; Driver 1969:20, 178; Drucker 1951:36; 1955:24-41; 1965:22; Eells 1887; Elmendorf 1960:56-57; Gunther 1927:195; Haeberlin & Gunther 1930:15; Kroeber 1923; Olson 1927; 1936; Riley 1968; Swan 1870; Turner & Efrat 1982:10; Waterman 1920).

The northwest coast was much more densly populated than most other North American regions north of Mexico (Driver 1969:292). These large human populations were supported by abundant food resources and a complex culture and sophisticated technology which allowed for effective exploitation of these resources. The ability to process (through drying, fermenting, smoking, cooking, and rendering) and store food materials permitted greater exploitation of food resources during periods of seasonal abundance and lessened the impact of resource scarcity during unfavorable weather. For example, winter was a time mostly free of subsistence activities during which ceremonial, artistic, and social pursuits were undertaken.

Accounts of northwest coast subsistence often emphasized the importance of marine food resources and attribute only a minor role to plant food items (e. g., Barnett 1955:78; Boas 1966:2-3; Drucker 1951:36, 62-63; 1955: 24-37; Elmendorf 1960:56; Friedman 1976:205-208; Gleeson 1980:2, 7; Gunther 1927:195, 198; Suttles 1968:61; Swan 1870:19; Wessen 1982:16). Although abundant plants may not always have been available to

various northwest groups on an annual basis, their importance must not be overlooked. In addition to adding variety to the diet, plants supplied native populations with essential nutrients and fiber not available from animal sources (Norton & Gill 1981:118). At least the Upper Skagit (Collins 1974:55) and Lummi (Stern 1934) were practicing early stages of horticulture at the time of European contact. "Wapato" (probably Sagittaria latifolia Willd.) may have been transplanted by Salish peoples along Puget Sound (Haeberlin & Gunther 1930:21). Botanical resource management practices on the Northwest Coast included cultivation, weeding, planting, transplanting, thinning, and burning (Collins 1974: 55, 57; Cooper 1859:19; Duff 1952:73; French 1965; Norton 1979b; Reagan 1934:56-57; Stern 1934:43; Suttles 1951a:60-61; 1951b:281; Turner 1975:81, 164; H. Ward, pers. comm. 1981; White 1975). Rights to botanical resources were often owned and inherited, and some plots were divided into marked segments (Collins 1974:55-56; R. McGee, pers. comm. 1983; Suttles 1951a:58,60; 1951b:281; 1955:27; Turner 1975:23, 58, 81, 164, 200, 221; Turner & Taylor 1972:249). In addition to serving directly as food, plants also supplied most of the raw materials for the manufacture of the tools, weapons, canoes, nets, and baskets necessary for the harvest of animal resources and the containers needed to store food products (Norton & Gill 1981).

The Makah People — Cultural and Linguistic Affiliations

At present the Makah Nation has about 1410 members; 927 live on the Makah Reservation (A. Flinn, pers. comm. 1983). Their traditional territory is located on the northwestern tip of the Olympic Peninsula,

although the exact extent of their ancestral territory is not clear. This is no doubt due at least in part to territorial disputes between the Makah and their neighbors, misconceptions concerning Makah territorial concepts by government officials and agencies, and disruptions caused by the intrusion of white people into the area beginning at the end of the eighteenth century.

Permanent villages and the most definite territorial boundaries were located near the shoreline. territorial boundaries were most clearly defined. Swanton (1953:427-428, 433) lists five winter villages: Baada [bi?id?a], Neah [di•ya], Waatch [wa?ač̓], Sooes (or Tsues) [č̓u•yas], and Ozette [?use•?iɬ]. He distinguishes between the Makah (Baada, Neah, and Waatch), and the Ozette (Ozette and Tsues), although usually the distinction is made between Ozette and the remaining villages (Riley 1968). Swanton gives their collective territory as extending from Lake Ozette to the Hoko River. Other sources give the southern boundary for the Makah as Cape Johnson (Riley 1968) and the eastern boundary as the Lyre River (A. Flinn, pers. comm. 1982; Riley 1968) or Freshwater Bay (Riley 1968). Cape Johnson is usually regarded as being in Quileute territory, and the Klallam are usually considered to have occupied the territory along the Strait of Juan de Fuca as far west as the Hoko River (Gunther 1927:177). To the north, the Makah fished extensively for Pacific Halibut (Hippoglossus stenolepis Schmitt) at Swiftsure Bank off the southwest coast of Vancouver Island. Some descrepancies arose territory because people from one village or group often exploited resources at localities outside their home area (Riley 1968). Information concerning interior areas is generally unclear, reflecting the low

cultural and economic importance of this region compared to the coastal strip.

The relationship between Ozette and the remaining Makah villages is uncertain. Since the mid-1800s the Ozette have been grouped with the Makah villages to the north for governmental purposes (Riley 1968) because the Ozette and Cape Flattery people spoke very similar dialects. Riley (1968) noted and elders in Neah Bay tend to agree that there were minor dialect differences between the Ozette people and people from other Makah villages. According to Riley (1968), the Quileute made a clear distinction between the Ozette and Makah. Ozette persisted until about 1920 when government pressure forced residents to relocate to Neah Bay (Wessen 1982:16).

The Makah interacted extensively with neighboring peoples, both locally and on a regional basis, and had a reputation as fierce raiders (Colson 1953:5-6; Wessen 1982:16). In historic times they travelled widely and often married members of various Vancouver Island and western Washington peoples (Colson 1953:6; Wessen 1982:16). They conducted extensive trade, exchanging both commodities from their own territory and acting as middlemen in the movement of materials between the Washington coast and Vancouver Island (Singh 1956:137-144).

The Makah and Ozette spoke closely related dialects of Makah, a language belonging to the southern Wakashan language sub-family. At present, the Ozette dialect is no longer distinct from Makah. The other two languages in the Wakashan sub-family are Nitinaht and Nootka, both found on the west coast of Vancouver Island. These languages are related

to the northern Wakashan languages — Kwakwala, Haisla, and Bella Bella. To the east of the Makah are the Klallam, who speak a Coast Salish language; and to the south are the Quileute whose language belongs to the Chimakuan language family.

Although several earlier attempts had been made to reduce Makah to a written form (beginning with Swan in the mid-eighteenth century), an official alphabet was not adopted until 1978 (Makah Language Program 1979). Most recent work on the Makah language has been conducted by William Jacobsen of the University of Nevada - Reno (1969; 1971; 1979) and the Makah Language Program staff.

CHAPTER 2

PREVIOUS ETHNOBOTANICAL RESEARCH ON THE PACIFIC NORTHWEST COAST

Early Works

In the Pacific Northwest the first accounts of plant utilization by indigenous populations are found in the journals and publications of the early explorers along the coast. Important among these are the works of Captain James Cook (1846) who visited Nootka Sound and other portions of the Northwest Coast in 1778, Archibald Menzies (1923) and Jose Mariano Mozino (1970) from visits in 1792, and John R. Jewitt's narrative of his captivity among the Nootkan in 1803 to 1805 (1975). James G. Swan made relatively detailed notes on plant utilization during his years of residence at Shoalwater (Willapa) Bay (1857) and Neah Bay (1870). Some of these data are included in Swan's book Almost Out of the World - Scenes from Washington Territory (1971).

Until the early 1970s, most published ethnobotanical data for the Pacific Northwest coast were contained in ethnographic works focusing on other aspects of native culture or on native culture in general. South of Makah territory beginning at the mouth of the Columbia River, these include Ray's (1938, especially pp. 119-123) study of the Lower Chinook, Olson's (1936, esp. pp. 51-58, 82-86) research on the Quinault, and, more recently, Powell and Jensen's (1976) work with the Quileute. In 1934 Reagan published a paper on Quileute and Hoh plant utilization. East of

Makah territory ethnographic works on the Klallam (Gunther 1927, esp. pp. 195-226), Twana (Elmendorf 1960, esp. pp. 125-131, 194-197, 245-249), Lummi (Stern 1934, esp. pp. 41-53, 88-96), Haro and Rosario Straits Coast Salish (Suttles 1951a, esp. pp. 58-65, 225-229, 231-244), and British Columbia Coast Salish (Barnett 1955) all contain information on plant utilization. White (1975) studied Indian land use and environmental change in Island County (Washington), including much data on the management of botanical resources. North of Makah territory ethnographic works containing ethnobotanical data have been published for the Clayoquot (Nootka) (Koppert 1930), northern and central Nootka (Drucker 1951), and the Kwakiutl (Boas 1909; 1921). Hats from the Nootka Sound region held by the Peabody Museum (Harvard University) have been described by Willoughby (1903).

Works of a more regional nature have included Olson's study of adzes, canoes, and house types (1927), and Underhill's (1944) summary of native culture along the Washington and Oregon coasts. Barry (1929) discussed the use of several categories of plants by the indigenous peoples of the Oregon Territory, but most of his data are very generalized, both concerning the people involved and the species utilized. Drucker's (1955) book on the Indians of the Northwest coast contains some general comments concerning plant utilization. Singh's (1956) dissertation on aboriginal economic systems on the Olympic Peninsula contains information on plants used and traded in this area. His work is poorly referenced, however, which decreases its usefulness. Gunther's (1945; 1973) work on the ethnobotany of western Washington summarizes those ethnobotanical data published through 1940, and contains much previously unpublished data based on her own research.

A few ethnographic works have been published during the twentieth century that have a major focus on the Makah. Some of these contain ethnobotanical data. The most important of these is Densmore's (1939, esp. pp. 311-321) work on Nootkan and Quileute music. She recorded data on all types of plant use, but her work is particularly useful as a source of information on the medicinal use of plants. Colson (1953) provided a few data on Makah plant utilization during the late 1930s and early 1940s, although they are generalized for the most part. Curtis (1916) wrote extensively on the Nootka, and included data and photographs concerning the Makah, including a list of Makah plant terms.

Beginning in the early 1970s, researchers currently associated with the British Columbia Provincial Museum have made significant contributions to our knowledge of that province's ethnobotanical heritage. Nancy Turner has been the most prolific contributor. Her published works include research on Haida, Bella Coola, and Lillooet plant taxonomies (1974), Bella Coola ethnobotany (1973), plants utilized by Nootkan people of Nootka Sound at the time of Captain James Cook's visit in 1778 (1978b), and a study of traditional native uses of Oplopanax horridum (Smith) Miq. (1982). Turner has also written three handbooks that together provide a summary of most non-medicinal uses of plants by the native peoples of British Columbia. The first two concern food plants of coastal (1975) and interior (1978a) peoples, and the third concerns the use of plants in native technologies (1979). Turner has also co-authored several additional papers on indigenous plant utilization. These include research on the Vancouver Island Coast Salish (Turner & Bell 1971a,b), the Kwakiutl (Turner & Bell 1973), Hesquiat (Turner & Efrat 1982), and the use of

Trifolium wormskjoldii, Potentilla pacifica, and P. anserina in the Pacific Northwest (Turner & Kuhnlein 1982). Other recent studies on Pacific Northwest coast ethnobotany include Norton's work with the Kaigani Haida (1981), Pteridium aquilinum Kuhn. (1979a), and the association between indigenous food plants and anthropogenic prairies in western Washington (1979b), French's (1965) regional overview, and Fleisher's (1980) work with the Klallam.

CHAPTER 2

MATERIALS AND METHODS

The methods used for this study are outlined by Norton and Gill (1981). These include, when possible, field trips with consultants, tape recording interview sessions, collection of voucher speciemens, and cross-checking data during other interview sessions with the same consultant ant with other consultants (Norton & Gill 1981). Most of the previously unpublished data were collected during interviews with Makah and Nitinat consultants during April 1979 through September 1982 on the Makah Indian Reservation, Washington. The following people contributed information to this study:

Ruth Claplanhoo	(RC)
Lyda Colfax	(LC)
Roger Colfax	(RC)
Arlington Flinn, Jr.	(AF)
Kathleen Flinn	(KF)
Merideth Flinn Heilman	(MF)
Hildred Ides	(HI)
Isabell Ides	(II)
Hillary Irving	(ZI)
David Kallappa	(DK)
Merideth Parker	(MP)
Ty Parker	(TP)
Helen Peterson	(HP)
John Thomas	(JT)
Alberta Thompson	(AT)
Jim Tollerud	(TL)
Helma Ward	(HW)

Arlington Flinn, Jr., and Maria Parker assisted with several of the interview sessions. The sources for plant terms and information provided by consultants are indicated by the appropriate initials as given above. MLP refers to the Makah Language Program data files, and MLP 1979 refers to the Makah Alphabet Book listed in the Literature Cited section.

When possible, interviews with consultants were conducted during field trips. Meridith Parker, Helen Peterson, John Thomas, and Helma Ward participated in these excursions. When it was not possible to make actual collecting trips into the field with consultants, fresh plant materials were used during the interviews whenever possible. Pressed herbarium specimens were only used when fresh materials were not available. Most plant specimens used during interviews were pressed and retained as herbarium voucher specimens. Tape recordings of interview sessions were made whenever possible, this being the case for most interview sessions. These were transcribed in Neah Bay and Pullman. Transcriptions of interviews done in conjunction with the Makah Language Program are held in closed files in the Makah Language Program archives and by the author.

Plant identifications were made using Hitchcock and Cronquist (1976) and Hitchcock et al. (1955-1969), and by comparison with specimens on deposit in the Marion Ownbey Herbarium (WS). To insure botanical accuracy, the identify of more difficult materials was verified by Joy Mastrogiuseppe, Curator, Ownbey Herbarium.

The orthography I used for the transcription of my linguistic data was adopted by the Makah Language Program in 1978 (MLP 1979). The Makah Tribal Government is in the process of adopting this orthography as the official alphabet for the Makah language (A. Flinn, pers. comm. 1982). Appendix A provides a guide to the Makah orthography. My analysis of Makah and Nitinaht plant classification and nomenclature was based on data I collected in Neah Bay mostly during 1981 and 1982.

CHAPTER 4

PLANTS IN MAKAH - OZETTE AND NITINAHT CULTURE

Introduction

Plants played an important role in all aspects of Makah and Nitinaht culture. Makah use of plants for food and materials was similar to that of other peoples on the Northwest coast, but, as is true throughout the area, medicinal uses of plants were much more individualized. Following is an overview of Makah and Nitinaht plant utilization, details for each species used are given in part 2, chapter 7.

Food

Prior to European contact, neither the Makah nor Nitinaht practiced any conventional form of horticulture. The collection of plant foods was done primarily by women. Similar to other coastal peoples, the Makah and Nitinaht began harvesting plants early in the spring and continued through the late autumn. The first vegetable foods of the year were "sprouts," young shoots of various plants, especially Equisetum telmateia Ehrh., Rubus spectabilis Pursh, and Heracleum lanatum Michx., which provided a pleasant change from the dried foods of winter. Generally, "sprouts" were available beginning in March. Berries and other fruit begin to ripen as early as late May in the case of salmonberries (Rubus spectabilis), and several others ripen in rapid succession beginning towards the end of June. The last available fruit is Vaccinium ovatum Pursh which is often

still available at the end of November. Berries and probably roots were dried and stored for use in winter.

Several Makah consultants estimated that plant foods constituted formerly about 50% of the diet, but this percentage was probably somewhat less in the precontact period. JT said that among the Nitinaht wealthier households would have plant foods once a day, while for commoners these foods were a delicacy.

Among the Makah, at least some plant resources were owned by individuals or families. These tended to be those resources that were valuable and of limited availability, such as Thuja plicata Donn (cedar) bark, or managed to some degree, such as Vaccinium oxycoccos L. (cranberry) fruit (RM; Swan diaries, 22.VIII.1862). In contrast among the Nitinaht each type of area (ocean, beach, "the bush") had a different set of rules. Rights to a territory were governed by one man, who would send people to gather fish, berries, and shellfish. He also had responsibilities for the care of these people (JT). Others wishing to use these territories were required to obtain permission from the owner (JT). Occasionally, a whole community would mark out a territory and then sub-divide it for each household (JT).

Materials

Plants provided the majority of raw materials used by the Makah and Nitinaht for the manufacture of containers, clothing, mats, canoes, houses, tools, and weapons. Plants were also used as fuel, for dye, glue, personal decoration, and for recreation.

As in other Northwest coast cultures, labor was divided among the Makah and Nitinaht such that men were mainly involved in the use of wood and in the manufacture of tools for carving, hunting, and fishing. Women specialized in the use of cedar bark and other plant materials for making baskets and mats. This pattern is true for the most part even today — woodworking is done primarily by men, although a few women carve, and basketry apparently is exclusively a female activity.

Thuja plicata (red cedar) was and is the most important technological species, followed by Alnus rubra Bong. (red alder). Other species, such as Carex obnupta L. H. Bailey (basket sedge), Urtica dioica L. (nettles), Nereocystis luetkeana (Mert.) Post. & Rupr. (bull-whip kelp), and Oplopanax horridum (Smith) Miq. (devil's-club) had more limited and specialized uses. Specific data for technological uses of plants are presented in chapter 7.

Medicine

As in most cultures, Makah and Nitinaht healing arts take many forms. These can be as straight forward as the administration of a herbal tea or poultice, or can involve singing and rituals. Within the memory of older tribal members, the Makah had an active medicine society /ċa•yak/ (HP), /ċa•yiq/ (Jacobsen 1969). Some of the old women were skilled as physicians both in the methods of the /ċa•yak/ and in the preparation of medicinal herbs (Swan 1870:78). Medicinal herbs were eaten, taken as teas or decoctions, and used for poultices and compresses. The degree of secrecy surrounding a particular herbal remedy varied. Some, like Pyrus fusca Raf. (crab-apple) bark, were and are generally known throughout the

community. Other remedies were secret and the property of an individual, and sometimes payment for the use of the remedy was required. Various herbal remedies are described in chapter 7. It should be understood that this is not a complete pharmacopoeia of the Makah and Nitinaht. Details concerning certain medicines have been forgotten, and others are still secret and the property of various individuals.

Trade

Due to their geographic location, the Makah were particularly well situated for the conduct of trade. Swan (1870:30) stated that the Makah were

> "emphatically a trading, as well as a producing people; and in these respects are far superior to the Clallams [Klallam] and other tribes on the Fuca Strait and Puget Sound."

Prior to white settlement in western Washington, the Makah served as a trade link between the coastal peoples of Washington south to the mouth of the Columbia River and the Nootkan and Nitinaht peoples of Vancouver Island. The Makah also conducted trade with Salish peoples to the east along the Strait of Juan de Fuca to Puget Sound (Colson 1953:5; Singh 1956:148; Swan 1870:30-32). Plant products traded included house planks (Swan 1870:4-5), canoes (Swan 1870:35), bentwood boxes (Swan 1870:42), cedar bark mats (Gunther 1973:20), bulrush and flag mats (Swan 1870:5-6), packets of cedar bark (Swan 1870:45), ceremonial masks made of alder and maple (Swan 1870:69), beargrass for basketry (II; Densmore 1939:320; Turner & Efrat 1982:56), soapberries (II), and camas (HP; II; Swan 1870:25).

CHAPTER 5

BOTANICAL NOMENCLATURE AND CLASSIFICATION IN MAKAH AND NITINAHT

Introduction

Plant classification systems of aboriginal peoples are not, in general, well documented. Although many studies on the Northwest Coast have included lists of plant terms (Densmore 1939; Norton 1981; Swan 1870; Turner 1974; Turner & Efrat 1982), only two (Turner 1974; Turner & Efrat 1982) provide information on botanical classifications in these languages, and Turner's (1974) investigation of Haida, Bella Coola, and Lillooet plant taxonomy is as yet the only comprehensive study from the Northwest Coast.

Conklin (1969) defines a folk taxonomy as "A system of monolexemically-labeled folk segregates related by hierarchic inclusion..." and calls segregates within the classification "folk taxa." Keesing (1966), however, has stated that

> "If we insist that the descriptive units of an ethnography be lexically labelled, we are likely to arrive at a very limited sort of description.... But there is ample evidence that expectations and distinction need not be directly mapped in a language."

Both the works of Berlin, Breedlove and Raven (1968; 1974), and Turner (1974) have demonstrated the existence of unlabelled taxa in ethnophytotaxonomic systems. As will be shown below, unlabelled taxa also exist in Makah and Nitinaht.

Berlin, Breedlove and Raven (1974) have identified a set of six taxonomic levels, which they term "taxonomic ethnobiological catagories," which appear to be universal in all languages. They are as follows:

1) Unique Beginner. The highest taxonomic level in a particular semantic domain. In many ethnophytotaxonomic systems this taxonomic unit is more or less equivalent to the English folk catagory "plant."

2) Major Life-form. This level contains only a few generalized taxa. Examples in English would include "tree," "vine," "herb," and "seaweed." The majority of lower ranked taxa are included in a life-form catagory, although some important generic taxa are often not included within a life-form taxon. In Tzeltal almost all of these generics not included in a life-form catagory were cultivated and/or morphologically unusual (Berlin, Breedlove, & Raven 1974:30).

3) Intermediate taxa. Taxa at this level often are unlabelled linguistically and have been termed "covert catagories" (Berlin, Breedlove, & Raven 1968). These catagories are often more ambiguous and ephemeral than the other five listed (Turner 1974:29). An English equivalent would be "evergreen trees."

4) Generic taxa. These taxa are linguistically the usual names for different kinds of plants and the greatest number of folk taxa are found at this level. In Nitinaht and Makah most of these taxa are monotypic. Examples from English include "maple," "squash," "cherry," "tulip," and "raspberry." Other researchers often refer

to this level as "specific" and use the term "generic" for more general taxa (see, for example, Price 1967).

5) Specific taxa. Typically specific taxa exist as sets of few members within a particular generic. Specific taxa are genrally less common than generic. Examples from English include "red huckleberry," "sugar maple," and "white pine."

6) Varietal taxa. Only occasionally recognized in ethnophytotaxonomies, usually reserved for plants of critical importance to the culture in question. An example from English would be "baby lima beans." No varietal forms are presently known from Makah or Nitinaht.

The data and discussions presented in the following sections on Makah and Nitinaht plant classification and botanical nomenclature are based on data I collected in Neah Bay during 1979 - 1983.

Plant Classification in Makah and Nitinaht

Unique Beginner

Neither Makah nor Nitinaht contain an independent term inclusive of all plants, although this category is conceptially recognized, and is essentially equivalent to the English folk concept of "plant." This concept may have developed in the post-contact period. However, linguistic evidence strongly suggests a catagory more or less equivalent to terrestial plants (vascular plants, probably bryophytes and some lichens) in Makah, or terrestial vascular plants in Nitinaht prior to

contact. Both Makah and Nitinaht have suffixes that more or less indicate terrestial vascular plants. The Makah suffix is /-bap/ and the Nitinaht /-apt/ (or, in some linguistic environments, /-pat/). This is equivalent in most cases to the Nootkan /-mapt/. On the Pacific Northwest Coast, Kwakwala and various Salishan languages also have suffixes that seem to indicate "plant" (Turner & Efrat 1982:20).

Major Life-forms

There are apparently four major life forms in Makah and six in Nitinaht. The largest of these in terms of constituent taxa is /ɬ̓aqap/ (M) or /ɬ̓aqpat/ (N). In both languages the terms can be analyzed to component parts: /ɬ̓aq-/ is a root indicating "to grow" or "growing" and /-(b)ap/ (M) or /-pat/ (N) is a suffix indicating "plant" (cf. /ɬ̓aqsiɬ (M) → 'growing now' = spring). The Hesquiat cognate, /ɬ̓aqapt/, apparently serves as a unique beginner applicable to all types of plants. In Makah and Nitinaht these terms are used as broad life-form catagories to indicate herbaceous plants, although the precise conscriptions differ in that the Makah /ɬ̓aqap/ apparently includes /p̓uʔup/ (mosses and moss-like plants) whereas the Nitinaht /ɬ̓aqpat/ does not.

Other major life-form catagories in Makah and Nitinaht are /šuč̓as/ (M,N) for trees; /q̓u•č̓aqtup/ (M) and /ʔu•č̓aqtpapt/ (N) for fleshy fruits[1] in general; and /č̓ayupsi/ (M) and /ca•ypiš/ (N) for seaweeds.[2] In Nitinaht /p̓uʔup/ (mosses and moss-like plants) acts as a life-form catagory whereas

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[1] The Nitinaht /ʔu•č̓aqtp/ can be used either for fleshy fruits or to mean a special food not basic to the diet, in which case it can include sprouts as well as fruit.

[2] In Nitinaht, taba•x (seagrasses) also can be classified as /č̓i•daxtp/ (low tide food), which includes other items like chitons.

in Makah /ˈpuʔup seems to ba a sub-catagory of /ˈχaqap/. Fungi, /dayacuʔ/ (N), are a distinct life-form in Nitinaht, but apparently no equivalent term exists in Makah at present. It should be noted that the life-form catagories are not completely mutually exlusive: /ciχapiχbap/ (M), /ciχapχapt/ (N) (crab-apple, Pyrus fusca), for example, can be classified either as a /ˈsučas/ (M,N) (tree) or /ˈquˑcaqtup/ (M), /ʔuˑcaqtpapt/ (N) (fleshy fruit).

Intermediate Taxa

In both Makah and Nitinaht there are several intermediate taxonomic categories. These categories tend to be informal and some are not recognized linguistically. Thus their existence as currently defined cannot be substantiated for pre-contact times, although intermediate categories undoubtedly existed. In Makah /ˈpuʔup/ is apparently an intermediate category, although in Nitinaht /ˈpuʔup/ functions as a life-form category. Ferns in general are called /šiχipt/ in Nitinaht, which is also the generic term for bracken (Pteridium aquilinum). In Makah some consultants used the term /pileˑpileˑbap/ for ferns in general, whereas others stated that no general term exisits for this groups of plants. /pileˑpileˑ/ is the Makah generic for swordfern (Polystichum munitum). Edible roots, berries, and sprouts are recognized as categories by the Makah, but apparently these are unmarked linguistically. In Nitinaht, several intermediate categories besides /šiƛipt/ are recognized. These are /ˈtiˈtidičqƛ/ (stone fruits), /qaway/ (aggregate "berries"), /ʔaqpat/ (grass, hay), and /šačkapt/ (spiney plants).

Generic Taxa

The majority of plant terms in both Makah and Nitinaht are of this catagory, similar to English folk taxa such as "maple," "raspberry," "apple," "lettuce," etc. In both Makah and Nitinaht most of these terms sho a one-to-one correspondence with botanical species. These names can take several forms, as discussed in the section on Makah and Nitinaht nomenclature. Some names, especially those applied to culturally unimportant or introduced species, may be used for two or more, almost always closely related, botanical species. For example, /hapa•pix̌/ (M) may apply to either Ribes bracteosum Dougl. or R. laxiflorum Pursh, and /qaqawšakk^{w}/ (N) is used for various introduced blackberries and raspberries (Rubus spp.). If particular botanical species has high cultural significance, there are often several terms applicable, each referring to a particular stage of growth or plant part. A good example are the various Makah terms for salmonberry (Rubus spectabilis) or the Makah and Nitinaht terms for salal (Gaultheria shallon).

Specific and Varietal Categories

These categories are far less numerous than those of the generic level of classification. As in Haida, Bella Coola, and Lillooet (Turner 1974), no varietal level categories are known from Makah or Nitinaht. In fact, this level of distinction in folk phytotaxonomies is, as far as has been determined, limited to agricultural societies (Turner 1974). In Tzeltal varietal names are limited to highly important cultigens (Berlin, Breedlove, & Raven 1974:32). In Makah, the specific category has been used to distinguish introduced species from each other and similar indigenous species. No specifics are currently known from Nitinaht.

Makah and Nitinaht Names for Plants

As is true in other languages, the Makah and Nitinaht terms used for objects, including plants, more or less reflect the underlying cognitive systems found within these cultures. Makah and Nitinaht are polysynthetic languages in which words are formed by combining an initial stem with one or more suffixes. There are no prefixes, and each stem begins with a consonant. Because of the languages are polysynthetic, most plant names can be analyzed into meaningful constituent parts, but since the correct meaning of the plant name cannot be determined on the basis of the constituent parts alone, these words or phrases must be considered as distinct lexical units (Colby 1966:4). These expressions or lexical units as defined above are semantically exocentric and may be contrasted with endocentric forms in which the constituent parts in sum do provide the total meaning (Colby 1966:4). The term lexeme had been used for exocentric expressions (Berlin, Breedlove, & Raven 1974; Colby 1966), a use which will be followed here.

In all ethnobiological lexicons two types of names are distinguishable for classes of plants and animals: One type consists of generally unique, "single-word" lexemes that can be demonstrated to be semantically unitary and linguistically distinct; the second type consists of terms from the first type in variously modified forms (Berlin, Breedlove, & Raven 1974:27). English examples of type one include "huckleberry," "spruce," "maple," and "salmon." In the second category we find "red huckleberry," "Sitka spruce," "vine maple," and "sockeye salmon". Expressions of the first category apparently are more basic and

salient psychologically than those of the second type (Berlin, Breedlove, & Raven 1974). Berlin, Breedlove, & Raven (1974:28) have called the first class of terms primary lexemes and the second group secondary lexemes. They (1974:28-29) further divide primary lexemes into two categories: Unanalyzable (e. g., spruce, sedge, beech, fir) and Analyzable (e. g., blackberry, cotton grass, plane tree, cattail, pineapple). Analyzable primary lexemes are again divisable into two forms, productive (blackberry, cotton grass, plane tree) and unproductive (cattail, pineapple). Productive forms have one constituent that indicates a category superordinate to that of the lexeme in question, whereas unproductive forms have no constituent part making a category superordinate to the form in question (Berlin, Breedlove, & Raven 1974:28-29).

In Makah and Nitinaht all known generic and higher taxa are indicated by primary lexemes, and secondary lexemes are used to lable taxa at the specific level. Due to the nature of the Makah and Nitinaht languages, there is often more than one form that can be used for a specific plant. Using Makah for an example, a given species, such as Rubus spectabilis, may be refered to by the unanalyzable primary lexeme /qakwey/ (salmonberry) or the productive form /qakwaš̆bap/ (salmonberry plant), or in the case of Vaccinium ovalifolium (oval-leaf huckleberry) an unproductive /x̆ux̆uyaqɬ/ ('slivers inside,' refering to persistent styles on fruit), and the productive /x̆ux̆uyaqɬbap/ ('slivers inside plant') forms.

As indicated above, both Makah and Nitinaht have suffixes meaning "plant" or "species of plant" [/-bap/ (M); /-apt/, /-pat/ (N)]. These suffixes can be added (often other liguistic processes are also involved) to many terms used for berries, roots, etc., to indicate the plant that bears them or the species as a whole. For example, /lu•lux^{w}ac/ (M) → thimbleberry, /lu•lux^{w}acbap/ (M) → thimbleberry bush (Rubus parviflorus), /ʔtuʔulq/ (N) → strawberry, /ʔtuʔulqapt/ (N) → strawberry plant [Fragaria chiloensis (L.) Duchesne], /k^{w}a•dis/ (M) → camas [bulb], /k^{w}a•disbap/ (M) camas plant (Camassia quamash).

In other cases the name for a plant is derived from some perceived quality of the taxon, e. g., /ʔiǐi•ʔaqƛbap/ (M) → /ʔiǐi•/ = red /-aqƛ-/ = inside /-bap/ = plant (Taxus brevifolia, yew), or /bačɬe•ʔytapt/ (N) → strong tasting/smelling plant, /bačɬe•ʔy/ = strong taste or smell, root word 'to bite,' /-apt/ = plant (Chamaecyparis nootkaensis, yellow cedar); the method used to harvest the plant or plant product, e. g., /his(i•)ʔatq(a)bap (M) → red huckleberry plant (Vaccinium parvifolium), /hisi•ʔa•d (M) → red huckleberry, from /hisi•ʔat-/ meaning "to chop off," refering to the method traditionally used to havest the fruit; or from an association of the plant with some other plant or animal, e. g., /ʔapʔesbap/ (M) → lit. 'cranberry plant' (Ledum groenlandicum, Labrador tea) because it grows in close association with /ʔapʔes/ (M) (cranberries, Vaccinium oxycoccos L.), or /ƛuk^{w}ǐtqapt/ (N) → 'raven plant' (Berberis aquifolium and/or B. nervosa, Oregon-grape), /ƛu•k^{w}ǐid/ (N) = raven, or /ʔčaqatq(a)bap/ → 'crowplant' or crowberries [Lonicera involucrata (Rich.) Banks var. involucrata, black twinberry], /ʔča•qa•duʔu/ = crow.

Sometimes the name for a plant is derived from the way it was used, for example, /daqcapt/ (N) → 'oil dish plant' (vine maple, Acer circinatum Pursh), /daqac/ (N) = oil dish. Very occasionally the stem word has no apparent meaning without the /-bap/ or /-apt, -pat/ suffix, e. g. /ƛ̓akabap (M) → hemlock (Tsuga heterophylla).

Many other plants have names that do not contain the /-bap/ or /-apt, -pat/ suffix. These are of two types. One is exemplified by the Makah and Nitinaht terms for nettles (Urtica dioica L.), /qalupqi•/ (M) and /ʔesipt/ (N). Others take the form of what the Makah call "looks like" names (because of their linguistic form). These names are formed by adding the suffix /-k̓uk^{w}/ (M) or /-k̓k^{w}/ (N), usually with other linguistic modifications, to the term for some other object. Many of these names are used for introduced species that resemble an indigenous type. Perhaps the best examples are the terms applied to introduced Rubus species, derived from the terms for salmonbery fruit, /qakwey/ (M) and /qaway/ (N). In Nitinaht the introduced blackberries and raspberries are called /qaqawšak̓k^{w}/ ('looks like salmonberry'). In Makah /qaqawašk̓uk^{w}/ ('looks like salmonberry') is usually reserved for raspberries, and secondary lexemes such as /ʔiʔi•xiq qaqawask̓uk^{w}/ ('looks like big salmonberries' → cut-leaf blackberry, Rubus laciniatus) typically are used for non-indigenous blackberries. In other cases the names are based on some non-botanical object. These names are more frequently used for plants of relatively low economic importance, for example, /xixicbuqk̓uk^{w}/ (M) = 'looks like herring eggs (/xi•cbuʔu/)' → goat's-beard, Aruncus sylvester, or /pi•pi•laqak̓k^{w}/ (N) = 'leaves look like kidney' (/pi•la•/ = kidney) → water-lily, Nuphar polysepalus.

CHAPTER 6

IMPACT OF EUROPEAN CULTURE ON MAKAH PLANT UTILIZATION

Many changes have taken place in the lifestyle of the Makah people since the Spanish attempt to establish a fort at Neah Bay in 1792. The use of plants for food, material culture, and medicine has been profoundly altered. Several exotic plant species have become extablished in the area, and various cultivated plants, such as potatoes (Solanum tuberosum L.) and other cultivated varieties, were introduced by the mid-1800s. The more important of these species were named by the Makah (see section in previous chapter on Makah botanical nomenclature).

As far as can be determined, the Makah were a non-horticultural people. The question of whether any type of horticulture was practiced on the Northwest Coast prior to European contact is, however, complicated due to the lack of data. The earliest accounts from the area make no reference to cultivation practices (Suttles 1951b:272). Reports from the middle of the nineteenth century onward mention both cultivation of the potato and the use of horticultural practices in the management of indigenous species. The earliest known gardens in the Pacific Northwest were those established by the Spanish at Neah Bay and Nootka Sound. The gardens at Nootka Sound were established around 1790, and in 1791 Juan Pantoja y Arriaga noted that "some fine cabbage, lettuce, radishes, potatoes, turnips, garlic, onions, carrots, artichokes and tomatoes have been grown" (Wagner 1933:162).

Salvador Fidalgo, commander of the Spanish settlement at Nuñez Gaona [Neah Bay] also established a garden which produced enough "green vegetables" to feed all his crew (Wagner 1933:63-64, 66). The Spanish settlement at Neah Bay was short-lived, however, lasting only from May 29 to the abandonment of the settlement on September 27, 1792.

To the south near the mouth of the Columbia River, the earliest known cultivation by Europeans occurred in 1795 when the crew of the Ruby under Captain Charles Bishop planted a garden on a small Island near Ilwaco.

Culturally, potatoes were the most important introduced plant to the Makah and other native peoples on the Northwest Coast. Although there was an opportunity for introduction from the Spanish when they had a settlement at Neah Bay, Suttles (1951b) has proposed that the source of potatoes in the Pacific Northwest was from the fur companies, with Fort Langley the most likely source for the people along the Strait of Juan de Fuca and northern Puget Sound. By 1839 cultivation of potatoes had spread to the Gulf of Georgia and the Strait of Juan de Fuca, and by the 1850s to Puget Sound (Suttles 1951b) and the outer Washington Coast (Swan 1857). qa•wic, the Makah - Nootkan term for potatoes, has cognates in many other Northwest Coast languages (Turner and Efrat 1982:82). Suttles (1951b) traced this term to the Straits Salish root *ka'uis, manifest as ska'us in northern Straits dialects and ska'uc and ska'wəc in Klallam and Samish, respectively. These terms originally refered to the tubers of Sagittaria sp. A similar transference has occured in Puget Sound Salish and Twana (Elmendorf 1960:127; Hess 1976:340). Suttles (1951b:278) suggested that

since the terms for potato seem to be tracable back to the Halkomelem or perhaps, more specifically, the Lower Fraser word for Sagittaria, the potato itself dispersed by the Indians of the Lower Fraser region.

Potatoes were quickly adopted by the Makah and soon partially replaced wild roots in the diet. In the 1860s, according to Swan (1870:33), potatoes were esteemed by the Makah more as a luxury item rather than as ordinary food. Suttles (1951b) suggested that potatoes were quickly and readily accepted partly because they had a cash value at trading posts and thus potential value and superior status even at a distance from the post. In societies clearly understanding and valuing the concepts of rank and status, as was the case on the Northwest Coast, it seems likely that this aspect of value would have had an effect on the plant's acceptance by the people of the Northwest Coast. In addition to potatoes, other non-indigenous foods began replacing traditional items as contact with Europeans increased and became more regular during the nineteenth century. The European residents in Neah Bay during the early 1860s planted potatoes, lettuce, cabbage, asparagus, corn, beets, carrots, parsnips, and tobacco (Swan diaries, 1862-1863).

Increasing availability of non-traditional foods such as flour, sugar, molasses, imported fruits and vegetables, beef, pork, poultry, and snack foods high in sugar and salt has profoundly affected the diet. By ca. 1865 bread and molasses were popular among the Makah, at least during special occasions (Swan 1870:26). Use of wild foods, especially roots and greens, has diminished until today few people utilize wild food plants other than berries. During 1982 some of the Makah Language Program staff

collected and prepared Camassia quamash (camas) bulbs in the traditional manner. When these were distributed to various elders in the community, some said that they had never expected to eat camas again, although all remembered it from when they were young.

Most technological uses of plants have also disappeared as inexpensive substitutes have become available. Several people, however, still make baskets, carve, and make other artistic objects, especially from Thuja plicata (red cedar), Alnus rubra (red alder), and Carex obnupta (basket sedge). The dyes and paints used to decorate these objects presently are derived from commercial sources.

Modern U. S. medicine, combined with the influence of Christian missionaries, has diminished drastically the use of Makah healing practices. Today most Makah seek the services of the resident Bureau of Indian Affairs doctor or other medical specialist when an illness or accident strikes. Many people still use herbal remedies, however, for mild and/or chronic aliments, especially those, such as the common cold and arthritis, for which modern medicine has few effective cures.

CHAPTER 7

PLANTS USED BY THE MAKAH-OZETTE AND NITINAHT

INTRODUCTION

This chapter is self explanatory, but the conventions and symbols are explained here as an aid. As stated in the materials and methods chapter, the orthography used to transcribe my data is the one adopted by the Makah Language Program (MLP) in 1978 (MLP 1979), and is presented in Appendix A. My transcriptions are phonetic, thus some variation will occur for transcriptions provided by different native consultants. Jacobsen (1969; 1971; 1979) used essentially the same orthography in his work with the Makah Language. Jacobsen's approach to transcription has differed somewhat from mine concerning a few minor points. Readers should consult the 'Additional Notes on Transcription' section of Appendix A for a detailed listing of these differences.

Most earlier works are unreliable in their transcriptions of Makah terms. There are a number of reasons for this, including inadequate linguistic training, but perhaps the most important is a lack of understanding concerning the phonemic system in Makah. Often researchers made no distinctions between the Makah /k/ and /q/; /h/, /x/ and /x̣/; /k^w/ and /$k̓^w$/; /c/ and /ts/; etc. Since two or more Makah sounds were merged to one transcription symbol, it is often impossible to reconstruct the actual term. Thus plant terms from the literature are presented as they appeared in the source material. Gunther (1973:12) stated that the

phonetic transcription in her work "is not uniform because it was done by too many people," but that all variations are based in the Phonetic Transcription of Indian Languages (Smithsonian Misc. Collections 66, No. 6, 1916). Densmore (1939:xxiv) noted that the vowels used in her transcriptions have continental values and the consonants represent nearest English equivalents, except that /ai/ is pronounced as aisle, /c/ represents the English sh, and /x/ the sound of German ch in a prepalatal position. Swan used /r/ following /a/ to represent the "Italian sound," as in father, and after /ai/, etc., to represent a neutral vowel as in English but and French je. /Th/ is an aspirated t, as in French the. Curtis' /hl/ is generally equivalent to /ɬ/. In the work of Goss, Ides and Ides (1974), it should be noted that double vowels (VV) are equivalent to long vowels (V•) in the present study. In Goss, Ides and Ides (1974) as well as other works, the /k/ series of consonants are often used where /q/ should be. Usually /kw/, /k̓w/, /qw/, and /q̓w/ as used by Goss et al. (1974) are equivalent to /k^{w}/, /k̓^{w}/, /q^{w}/, and /q̓^{w}/, especially at the beginning of words where only one consonant always preceeds the first vowel. /kl/, /kɬ/, /k̓l/, /k̓ɬ/, /tl/, /tɬ/, /t̓l/, and /t̓ɬ/ at the beginning of words represent /ƛ/ and /ƛ̓/, this equivalence generally holds in other word positions also.

When not clear from the context, I have used "M" to indicate Makah terms and "N" for Nitinaht. Where no terms are listed for a particular species, this indicates none were elicited in the current study, nor were any present in the literature or Makah Language Program (MLP) word files. This does not necessarily mean that no term existed in the languages in question, however. Data attributed to the various consultants listed in

the materials and methods chapter are from my research in the Neah Bay area during 1979 - 1983. Unattributed data are based on my observations. The remaining information is derived from published and and unpublished sources as indicated.

Herbarium specimens, unless otherwise noted, are housed at the Marion Ownbey Herbarium, Washington State University (WS). The acronym, mcrc, following specimen numbers indicates specimens deposited at the Makah Cultural and Research Center, Neah Bay. Specimen numbers are only included when that particular specimen was discussed with one or more consultants. For other material, the specimens cited in Part I are representative.

FUNGI

MUSHROOMS (~AGARICALES)

M: ciciyapux^{w}ɛ̓kuk^{w} → 'looks like hats' - mushrooms (HW)
[term also used for Rubus leucodermis Dougl. (HI, JT)]

N: ci•ciyapqu?s → 'things with hats on the ground' (JT)

Neither HP nor MP knew of anyone eating wild mushrooms among the Makah. Turner and Efrat (1982:27) stated that mushrooms apparently were not used by the Hesquiat people.

POLYPORACEAE — THE BRACKET FUNGUS FAMILY

Fomes sp.

Bracket fungus

The powdered fruiting bodies were used as a body deodorant by the Makah (Gunther 1973:50).

LYCOPERDIACEAE — THE PUFFBALL FAMILY

Calvatia liliacina Berk

Puffball

The Makah used the inner portion [gleba] of puffballs to arrest hemorrhages, and the spores were applied to heal leg sores (Densmore 1939:316). Puffball spores were used as a hemostatic by various other Native American groups (Gill 1977:37; Gilmore 1919:10; Vogel 1970:213) and by U. S. physicians during the nineteenth century (Stille & Maisch 1879). The species has antibacterial properties (Bianco and Ceruti Scurti 1972).

MARINE ALGAE

Seaweeds in General

N: ʔca•ypiš, ʔca•ypiš - all seaweeds, including edible types (JT)

MP stated that marine algae were infrequently used by the Makah although seaweeds all had names. Kelps (mostly Laminariales) were used to cover salmonberry sprouts (Rubus spectabilis) for steaming (HI, HW). Densmore (1939:13) noted the use of kelp (species not indicated) for tanning hides. According to HW, the only "seaweeds" eaten by the Makah were Phyllospadix spp.

Gunther (1973:50) and Swan (1870:5) said that the Makah used seaweeds to chink cracks in their houses. Gunther also gave uses for two unidentified seaweeds:

Crab seaweed

M: xala'wick!bupt (Gunther 1973:50)

This algae was placed on the breasts of new mothers to stimulate milk flow (Gunther 1973:50).

Tall seaweed

M: kalkatsup (Gunther 1973:50)

The holdfasts were eaten (Gunther 1973:50).

PHAEOPHYTA — BROWN ALGAE

FUCACEAE — THE BLADDERWRACK FAMILY

Fucus sp.

Bladderwrack

M: kaka'lak!oka dub (Gunther 1973:50)

According to Gunther (1973:50), Makah children allowed dried pieces of this seaweed race on the beach with the wind.

LAMIARIACEAE — THE KELP FAMILY

Nereocystis luetkeana (Mert.) Post. & Rupr.

Bull-whip kelp

M: wa•qaʔat (II)

ʔca•yupsi (MP)

N: wa•qa•t → 'skinned back penis' (JT), derived from

wa•qayu → 'foreskin back' because of appearance

(JT)

sanabɬ - kelp line

The Makah used the solid stipes of bull-whip kelp for fish lines (HW, II; Gunther 1973:50; Swan 1870:23,40; Underhill 1944:26; Waterman 1920:37) and for tying (MP). Swan (1870:40) stated that kelp was collected by means of two sticks joined like an inverted letter "A" with a stone sinker at the bottom. 12.5 - 15 cm above the sinker a knife-blade was fastened between the two sticks, and a line fastened to the upper ends. This device was slipped over the kelp head and lowered to the base of the stipe, a slight pull severed the plant near its base. Swan (diaries, 5.XI.1859) described the manufacture of kelp lines as follows:

> "The kelp is first soaked in fresh water from 2 to 5 days or until it turns white. It is then dried in the smoke, then wet and stretched and rubbed to make it of uniform size. It is them coiled up for use. When dried it is brittle and easily broken. To be used it has first to be wet, when it becomes pliable and exceedingly strong."

Swan later noted (1870:40) that a running brook was prefered for soaking the stipes and that sun drying followed smoke drying. The lines required several days' exposure to the sun and air before they were sufficiently cured. Swan also gave the usual line length as 80 to 100 fathoms (146 - 183 m). However, on April 20, 1862, Swan recorded the following in his journal (diaries, 20.IV.1862):

> "Hehebar was drying a new kelp line on the beach today. It was made up of pieces knitted together in lengths averaging 5 fathoms each. Counted these lengths and found 56 making the whole line 280 fathoms or 1680 feet long. Hehebar says he uses the whole length when fishing at the mouth of the Straits. This line must be intended for 2 as it seems impossible to fish with 280 fathoms in only 90 fathoms of water."

In the Cape Flattery area Nereocystis leutkeana exhibits two growth forms. The most common are large plants, with stipes almost always longer than 5 m and usually at least 1 cm in diameter throughout most of their length. The pneumatocysts are usually 7 - 12 cm in diameter. This form is used for the fish lines mentioned above. The second, less common, form has stipes usually 1 - 2 m long and about 0.5 cm in diameter. The pneumatocysts arise from the stipes more abruptly than in the preceeding, and are usually 3 - 5 cm in diameter. According to Swan (1870:41), lines for small fish were made from this form. Swan (diaries, 2.XI.1859; 1870:41) also noted the use of hollow kelp stipes in the manufacture of halibut hooks [/čibu•d/ (singular), /čibu•dabadax/ (plural)]. For details concerning /čibu•d/ manufacture, see Makah uses of Tsuga heterophylla.

The enlarged upper portions of stipes were used as bottles for storing oil and water (Gill 1982), as waterbottles for fishermen, and to hold bait (Swan 1870:40). The bulbous portion of the stalk was also used to mold deer tallow (Gill 1982).

Makah children used bull-whip kelp to make "kelp cars" which they towed around on the beach (HW). Gunther (1973:50) noted the similar use of bull-whip kelp for toy wagons among Makah children, who also dragged the stems along the beach and pretended to be harpooning whales.

The Nitinaht also used the lower stipes of Nereocystis luetkeana for ropes and fishing lines (JT). The enlarged upper portion of the stipes were used as molds for cosmetics, as steam boxes for making halibut hooks (N: /čibu•ƛ̓/), and as funnels for pouring water directly onto hot rocks in pit cooking (JT). The enlarged portions were also used for oil storage bottles after they were dried and rinsed in fresh water. These bottles could be used to store water in extreme necessity when no [sea mammal] bladders were available (JT). The blades were used to cover fish in the boat while at sea so that they would not dry out (JT).

Use of kelp along the Pacific coast was widespread. The Quileute, Quinault, Hesquiat, Nootka, Kwakiutl, and Haida all used the stipes to make fish lines (Drucker 1951:21-22; Gunther 1973:50; Reagan 1934:70; Turner 1979:44-45; Turner & Bell 1973:261; Turner & Efrat 1982:25), and the Kwakiutl used the stipes for nets, ropes, and harpoon lines as well (Turner & Bell 1973:261). The Klallam used the dried lower stipe for string (Fleischer 1980:193). The Quileute, Quinault, Hesquiat, and Kwakiutl used the long hollow stipes store oil (Gunther 1973:50; Turner & Bell 1973:261), although Drucker (1951:92) maintains the Nootka did not use kelp bulbs to store oil except when they were bought, oil and all, from the southern Kwakiutl. More recently, these bottles were used to store molasses (Gunther 1973:50; Turner 1979:45). The Hesquiat also use the hollow stipe to mold a skin ointment made of deer fat and cottonwood resin (Turner & Efrat 1982:25).

RHODOPHYTA — RED ALGAE

BANGIACEAE — THE BANGIA FAMILY

?Porphyra sp.

Red laver

N: ʔa•ypiš - refers to both edible seaweed and seaweed in general (JT)

This algae was used for food by the Nitinaht (JT). Turner (1975:36-38) found that Porphyra perforata J. Agardh. was widely employed as food by British Columbia coastal peoples, particularly in middle and northern areas. Usually the plants were collected in spring.

LICHENS

STICTACEAE — THE STICTA FAMILY

Sticta sp.

M: didi'dichia → 'growing on rocks' (Densmore 1939:315)

This lichen was mashed, made into a poultice, and used by the Makah to treat running sores, especially leg sores caused by bruises from walking among rocks (Densmore 1939:315).

USNEACEAE — THE USNEA FAMILY

Usnea sp(p). (Gill #1980:464)

Tree lichen

M: No name given (HP, HW, II, MP)

N: ˌpuʔup (JT), refers to whole organism, term applied to all mosses and moss-like plants, both epiphytic on trees and bushes, and terrestial (JT)

The Makah used Usnea spp. as a source of yellow dye (HP) and as a remedy for boils (II). Usnea spp. were also collected and put in bags for use as pillows when feathers were unavailable (MP). Differences between species are not recognized (HP).

The Nitinaht used Usnea spp. to bandage wounds, diaper babies, and for women's sanitary napkins (JT).

Turner and Bell (1971:68) reported the use of Usnea spp. as a source of green dye by the Coast Salish of Vancouver Island and the mainland.

BRYOPHYTES — MOSSES, LIVERWORTS, AND HORNWORTS

Hepatics

M: Thle-thle-sús-sok-kowie - "the liverwort that tastes like spruce" (Swan diaries, end of bk. 5; 1870:101)

This plant was used by the Makah to treat coughs and as a diuretic (Swan 1870:81).

Musci — Mosses

M: ʔpuʔup - general term for all mosses and moss-like organisms (HW, II, MP; Jacobsen 1979)

ʔpuʔupʔ (Goss, Ides & Ides 1974)

N: ʔpuʔup - any moss (JT)

There are no known uses for mosses among the Makah (HW), and the Makah apparently did not distinguish linguistically between different types of mosses (MP). But at one time the terminology for mosses may have been more complex (see, for example, Densmore 1939:319 and Hesquiat bryophyte terms in Turner and Efrat 1982).

MNIACEAE — THE MNIUM FAMILY

Mnium punctatum L.

Mnium

The "leaves" [phyllidia] were used by the Makah to treat swelling on the legs and would reportedly heal the swelling regardless of the cause (Densmore 1939:319).

Polytrichum sp.

Haircap moss

M: susu'chku, sussuch'ku → 'resembling a tree'
(Densmore 1939:319)

Densmore's consultant was told by her father to eat this plant freely, but no explanation of this instruction was given (1939:319).

Sphagnum sp.

Sphagnum, peat-moss

M: pū'ū'p (Gunther 1973:50)

Sphagnum was used by the Makah for dressing wounds (Gunther 1973:50). Sphagnum's absorptive qualities have been recognized throughout the temperate world and in the Pacific Northwest it was preferred over other mosses for wound dressing, sanitary napkins, baby diapers, and bedding (Turner 1979:60). During World War I, sphagnum was used in place of absorbent cotton in surgical dressings, and was considered superior to absorbent cotton in several respects (Hotson 1918; 1921a; 1921b; Nichols 1918).

FERNS AND FERN ALLIES

SELAGINELLACEAE — THE SELAGINELLA FAMILY

Selaginella wallacei Hieron. (Gill #1980:474)

Wallace's selaginella

M: ṗuʔup (HW, MP)

This is the term for all mosses and moss-like plants.

No name was given by HP or II.

This plant apparently was perceived as a moss by HW and MP, and thus the term /ṗu?up/ was applied to it. No use is known (HP, HW, II).

EQUISETACEAE — THE HORSE-TAIL FAMILY

Equisetum x ferrissii Clute (Gill #2127)

Hybrid horse-tail or scouring rush

M: wa•q̓itbap → 'frog plant' (HI)

wa•q̓it = frog (MLP 1979)

It is not entirely clear whether /wa•q̓itbap/ refers to E. x ferrissii, which was the specimen being discussed, or to mature vegetative E. telmateia Ehrh. shoots, or both. HI noted that when "they [the plants] got those long leaves or whatever [whorled lateral branches], they call that frogs' /ba?ax/, /wa•q̓itbap/, because it [the plant] belongs to the frogs."

No use is known for this plant (HI). It is doubtful that the Makah distinguish between this taxon and E. hymale L.

Equisetum hymale L. (Gill #1853)

Common horse-tail or scouring rush

M: t̓u•x̌ʷseyap (MP)

This is the term usually applied to fertile shoots of E. telmateia Ehrh.

No use was specified for this species (MP). It is doubtful that the Makah distinguish between this species and E. x ferrissii Clute.

Equisetum telmateia Ehrh. var. braunii Milde

(Gill #1979.5:202MP; #1980:462; Gross #5, mcrc)

Giant horse-tail

M: ba?ax - sterile shoots (HP, HW, II, MP)

ba?axˌ - horsetail (Goss, Ides & Ides 1974)

ba'axbupt (Gunther 1973:15)

ʔtu•x̌ʷseyap (HP, HW, II, MP)

→ 'it has a head on it' (HW, II) - the fertile shoots

ʔtux̌ʷ (M & N) = head (Haas 1969; Jacobsen 1969;

ʔtu(•)x̌ʷ (N) = skull, lit. 'what used to be a head' (JT)

tu?uxsaap - big horsetail (Goss, Ides & Ides 1974)

wa•q̓itbap → 'frog plant' (HI)

wa•q̓it = frog (MLP 1979)

It is not entirely clear whether this term refers to E. x ferrissii Clute, which was the specimen being discussed, or to mature vegetative E. telmateia shoots, or both. HI noted that when the plants "got those long leaves or whatever [whorled lateral branches], they called that frogs' /ba?ax/, /wa•q̓itbap/, because it belongs to the frogs."

N: ba?ax - sterile shoots (JT)

The young sterile shoots are peeled (HW, MP) or washed or soaked in cold water (HP) and eaten raw by the Makah (HP, HW, II, MP). This was a favorite food (HP, MP). The young fertile shoots were also peeled (HW) and eaten raw (HW, II; Gunther 1973:15), or steamed and then eaten (MP). After being boiled in water for about 10 minutes the strobili were eaten (HP). Gunther (1973:15) stated that the Makah ate the strobili as a cure for diarrhoea. The shoots were collected for food in March, the fertile shoots appearing about a week prior to the sterile ones (HP). No medicinal value is currently known by the Makah for this species (HP, LC). The Nitinaht also use both the fertile and sterile shoots for food (JT) and the vegetative shoots as a source of drinking water when travelling (JT). According to present day consultants, the roots were not used by either the Makah (HP, MP) or the Nitinaht (JT). Gunther (1973:15), however, stated that later in the season the Makah ate the tuberous "bulbs" after cooking. Swan (1870:25) maintained that Equisetum tubers were eaten raw.

The use of E. telmateia for food is widespread in the Pacific Northwest. In addition to the Makah and Nitinaht, the Klallam, Quileute, Quinault, Sechelt, Squamish, Saanich, and Straits Salish ate the young fertile shoots (Fleisher 1980; Gunther 1927:197; 1973:15; Turner 1975:42; Turner & Bell 1971a). The young vegetative shoots were eaten by the Klallam (Gunther 1927:197) and by the Hesquiat, who sometimes would collect 20 or more kg at a time (Turner & Efrat 1982:28). The tuberous "bulbs" were eaten raw by the Cowlitz, Swinomish, and possibly Quinault

(Gunther 1973:15; Olson 1936:53), and cooked by the Klallam, Cowlitz, Lower Chinook, and perhaps the Quinault (Gunther 1973:15; Olson 1936:53; Ray 1938:120). Gunther (1973:15) found that the Quileute do not use these "bulbs" for food. Fleisher (1980) reported that the Klallam collected the "bulbs" during the spring and in January when they wash out of banks along the beach.

POLYPODIACEAE — THE FERN FAMILY

Adiantum pedatum L. (Gross #57, mcrc)

Maiden-hair fern

M: yuyu•xɬcbica•ɬ → 'the leaves work even when there is no wind' (LC, RX)

Compare with Nootkan /yuxɬ/ - 'to get blown by the wind', /yu/ - wind blowing (Haas 1972)

kloklo'sasûd → 'leaves wither quickly' (Densmore 1939:317)
tlotlotc'sadit → 'dry fern' (Gunther 1973:14)

The dark petioles were split in two, worked until soft (HP), and then used for black in basketry by the Makah (HP, MP; Guther 1973:14). The Quinault and Tlingit also used the petioles to imbricate baskets (Gunther 1973:14; Turner 1979:61).

LC's grandmother used to chew or eat the fronds as a remedy for "weak stomach" (grease intolerance). According to Densmore, the Makah chewed the leaves as a remedy for stomach trouble and sore chests (1939:313), and chewed and swallowed them to check internal hemorrhages

from wounds (1939:317). She said this was one of the most valuable medicines and that "those who knew it carried it on the war path" (Densmore 1939:317). The Hesquiat also use the fronds medicinally. An infusion made from ashes of the dried fronds and another unknown ingredient was drunk for shortness of breath and to give strength and endurance, particularly for dancers during winter (Turner & Efrat 1982:29). Sometimes the green fronds were chewed by the Hesquiat for the same purpose (Turner & Efrat 1982:29).

The roots were also used by the Makah, but for what purpose is not known (HW). II knew of no Makah name or use for maiden-hair fern.

Athyrium felix-femina (L.) Roth (Gill #1980:450)

Lady fern

No Makah (HP, MP) or Nitinaht (JT) names or uses were recorded during this study. The Makah ate the "bulbs" on the root and it was said that the Klallam ate the new shoots (Densmore 1939:317). She also stated that "the stems of four ferns" were pounded and boiled by the Makah, and given to women to promote easy labor. The fern fronds were stripped from the stalk in a downward motion towards the roots and a prayer was offered that the child would "slip" as easily as the fronds of the fern were removed (Densmore 1939:317). Gunther (1973:14) found that the Quileute and Quinault ate the center of the rhizomes after they had been roasted and peeled. The Quinault dug the ferns in August and the Quileute prepared the "roots" [rhizomes] by baking them in a pit overnight (Gunther

1973:14). The fiddleheads were eaten by the Hesquiat as a remedy for internal ailments (Turner & Efrat 1982:29).

Blechnum spicant (L.) With. [=Struthiopteris spicant (L.) Weis.]

Deer fern

M: Ii'tsbakûk → 'resembles another plant called /Ii'tsba/' (Densmore 1939:319)

N: šiɬipt - plant (JT)

šiɬa• - roots (JT)

[Note: JT exhibited some confusion between this species and Pteridium aquilinum (L.) Kuhn, he used these terms more frequently for Pt. aquilinum, and only once for Blechnum spicant. He also has used these terms for Polystichum munitum (Kaulf.) Presl var. munitum. Linguistic evidence from Makah (Gunther 1973:14) and Hesquiat (Turner & Efrat 1982:32) also suggests that /šiɬa•/ and /šiɬipt/ more properly refer to Pt. aquilinum.]

HP said the Makah only used the fronds for flavor in cooking by placing them under the under the items to be cooked. Neither HW nor II knew of any Makah use or name for this species. No Nitinaht use is known (JT).

Densmore (1939:319) noted that among the Makah the little leaves were eaten by anyone staying in the woods a long time without food. She also found that the green leaves were eaten as a remedy for lung trouble

and for distress in the stomach (1939:313). The young, tender pinnae and the peeled central portion of the stalk were both eaten by the Hesquiat when no other food was available (Turner & Efrat 1982:29).

The Quileute boiled deer fern leaves and drank the liquid as a remedy for general ill health, and the Quinault chewed the raw, young leaves to treat colic (Gunther 1973:15).

Polypodium glycyrrhiza D. C. Eat.

(=P. vulgare L. var. occidentale Hook., P. falcatum Kellogg)

(Gill #1979.5:24MP; Gross #63, mcrc)

Licorice fern

M: x̌ix̌itap (II, HI & HW) → 'crawling root thing' (HI & HW)

x̌iktup - crawling thing (HI & HW)

x̌i•ʔuk^{w} - crawling (HI & HW)

x̣ix̣it̀ - 'licorice fern' (Jacobsen 1969)

xexiti (Goss, Ides & Ides 1974)

xexi'ṭ → 'crawling root on trees' (Gunther 1973:13)

hur-há-tee (Swan 1870:101)

The rhizomes were eaten raw by the Makah, especially children, because of their good, licorice-like flavor (HP, HW, II, LC, MP). HP said,

> "When I was a little girl, we used to eat that you know. We'd get it off the trees, and clean it; chew on it. All the little girls and boys of that time would eat it. We used to eat it because it gives nice taste in your mouth."

The Makah also chewed the rhizomes to curb the appetite when on hunting trips (HP), and used them as a remedy for internal ailments (HW). Swan stated that

> "the Makahs use it alone, either simply chewing it [the rhizome] and swallowing the juice, or boiling it with water and drinking the decoction" (1870:81).

According to Gunther (1973:13) the Makah roasted, peeled, and chewed the rhizome, and swallowed the juice as a cough remedy. The Quinault also used the "root" as a cough medicine, eating the rhizome raw or after baking in the coals a bit (Olson 1936:181). Reagan (1934) noted that this fern was often chewed by the Indians [specific group(s) not indicated].

Polypodium scouleri Hook. & Grev. (Gill #1980:418)

Leather-leaf polypody

According to MP, this fern (part not indicated) was eaten. Except for Hesquiat children who used to chew the thick rhizomes of this species (Turner & Efrat 1982:30), no other people along the west coast of Washington or British Columbia are reported to have used this species for food.

Polystichum munitum (Kaulf.) Presl var. munitum

(Gill #1979.5:17MP; #1980:452)

Swordfern

M: pile•pile• - this term is used because the Makah used to pluck the pinnae off while saying /pile•/ (HI, HP, MP)

pale•pale• - alternative form of /pile•pile•/ (HI & HW)

pliplabap (Goss, Ides & Ides 1974)

plɨ̄pla'bupt (Gunther 1973:13)

[Terms linguistically similar to the Makah /pile•pile•/ exist for swordfern in Klallam /pilapilaxiltc/ and Quileute /pila'pila'bupt/ (Gunther 1973:13; Turner 1979:66). Because of the ending /-bupt/, Gunther suggested the Quileute term may be borrowed from Makah (1973:13). The Quileute terms for ferns is general are also linguistically related: /pla'pla/ (Gunther 1973:13), /pilapila/, /pilapilapat/ - fern plants (Powell & Woodruff 1973:51).]

totoqwa's → 'roots above the ground' (Gunther 1973:13)

N: bibeʔtaƛ̓kʷapt → 'looks like sockeye salmon' (JT)

-ƛ̓kʷ - affix meaning 'looks like'
-apt - affix meaning 'plant'

šiƛ̓ipt (JT)

[/siλipt/ was also used by JT for Pteridium aquilinum (L.) Kuhn, and, less frequently, for Blechnum spicant (L.) With.]

Roots were steamed or cooked in a pit similar to preparing salmonberry (Rubus spectabilis Pursh) sprouts /q̓uq̓u•skad(i)ɬ/ and eaten by the Makah (II, MP). The outside portion was the part eaten, and, according to MP, the roots are similar to artichokes. According to Gunther (1973:13), the rhizome was boiled and eaten by the Makah and Klallam. The Quileute peeled and pit baked the rhizome, and ate it with fresh or dried salmon eggs (Gunther 1973:13). The Quinault pit baked the

rhizomes by placing them on hot rocks, covering them with swordfern fronds and sand, and building a hot fire on top (Gunther 1973:13). The Squamish, Sechelt, Nootka, Kwakiutl, and Haida also cooked, peeled, and ate the rhizomes, usually with grease or dried salmon eggs (Turner 1975:56). Turner (1975:56) also stated most groups apparently regarded the rhizomes, which were usually dug in the spring, as a starvation food.

The Makah and Nitinaht used swordfern leaves for lining cooking pits (HP, JT), both above and below foods (HP). The leaves were used when steaming salmonberry sprouts on hot rocks (HP), and were thought to give the sprouts flavor (HP). Gunther also noted that the Makah used the leaves for steaming sprouts (1973:13). The Quileute, Quinault, Chehalis, and Cowlitz used swordfern leaves in baking camas (Gunther 1973:13). The leaves were also used by the Makah to wipe salmon (HP).

The game /pile•pile•/ was played frequently in Neah Bay earlier this century (HP), and went as follows: One would take a deep breath and pluck the pinnae one by one saying "/pile•/" for each, all in one breath. The winner is the one who gets to the top (apex) of the frond, pulls the most pinnae off, before running out of breath (HP, HW). In Neah Bay anyone could play this game (HP), but among the Nitinaht, where adults also play /pile•pile•/, the game was a /tupa•t/ or family privilege exercised at big potlatches (JT). HP related the following information:

> "I found out it was a family game, S. was telling me it was a family game. But I always thought that here in Neah Bay anybody could play it. But she said it was a /tupa•t/, that means it belonged to a family. But here in Neah Bay that I know of anybody could play it, we used to play it all the time. We played it in school sometimes, too."

The Nitinaht now play a modern version of this game where a line is strung with clothespins which are removed one at a time, /pila•/ (N) being said for each as they are removed (JT).

The Klallam also play this game with swordfern leaves (Fleisher 1980; Gunther 1973:13), as do Squamish children and children of other southern British Columbia coastal peoples (Turner 1979:66).

Pteridium aquilinum (L.) Kuhn var. pubescens Underw.

(Gill #1980:559; #1845)

Bracken

M: hahaditaqʔukʷ → 'looks like strawberry leaves' (HW)
ha•ditap = strawberry

pile•pile•bap (MP)

kʔeplebap (Goss, Ides & Ides 1974)

sikla'bupt (Gunther 1973:14)

sik!la' - rhizomes (Gunther 1973:14)
sḥí-h̄la - bracken roots (Curtis 1916:1-200)

N: šiχipt - leaves (JT)

šiχa• - roots [rhizomes] (JT)

[Note: JT expressed some confusion concerning the application of these terms. Usually they were applied to Pteridium aquilinum, but both were also applied to deer fern (Blechnum spicant (L.) With.) and /šiχipt/ to swordfern (Polystichum munitum (Kaulf.) Presl var. munitum). Evidence from Makah (Gunther 1973:14) and Hesquiat (Turner & Efrat 1982:32)

suggests that /šiχa•/ and /siχipt/ more properly refer to Pt. aquilinum.]

The Makah and Nitinaht both ate the steamed rhizomes ("roots") (MP, JT). MP thought that the Makah collected the rhizomes when the leaves were just starting to grow. Among the Nitinaht the rhizomes were eaten with fish prior to the introduction of non-indigenous vegetables (JT). The Nitinaht did not eat the fiddleheads (JT). To treat toothaches the Makah placed fiddleheads on each side of the gums adjacent to the affected tooth (HW).

Virtually all Coastal Indian peoples utilized the rhizomes for food (Gunther 1973:14; Norton 1979a; Turner 1975:56, 58). The Hesquiat dug the rhizomes in autumn after the fronds had turned brown (Turner & Efrat 1982:32). In coastal British Columbia the rhizomes usually were dug in late autumn or in winter (Turner 1975:58). The Makah, Quileute, Squaxin, Swinomish, Klallam, and some British Columbia groups used fronds to wipe fish during cleaning and preparation (Fleisher 1980; Gunther 1973:14; Turner 1979:68). The Makah, Quileute, Squaxin, and Swinomish also used the leaves to lay fish on while cleaning them (Gunther 1973:14). Reagan (1934) noted that the Quileute pounded the "roots" [rhizomes] to a pulp which was dried, mixed into a sort of dough, and baked into bread. Reagan did not, however, see any bread made from fern-paste.

GYMNOSPERMS

TAXACEAE — THE YEW FAMILY

Taxus brevifolia Nutt.

Western or Pacific Yew

M: ƛ̓iǐ•ʔaqƛbap → 'red inside plant' (HI)

ƛ̓iǐ• - red

ƛ̓iɨ- - red (Jacobsen 1971)

-aqƛ- - inside

-bap - affix meaning plant

tL'ixa'ktLbΔp (Waterman 1920:30)

tL'i'xuk - red (Waterman 1920:30)

u'bΔp - kind, species (Waterman 1920:30)

k'lexedakxɬebapt (Gunther 1973:16)

k̓̓laxaxtɬebap (Goss, Ides & Ides 1974)

k̓̓lǐ-ă̄hl̄-a-bŭp (Curtis 1916:204)

klắ-hairk-tle-bupt (Swan 1870:101)

N: ƛatapt - tree (JT; Haas 1972)

Yew was used by the Makah when a hard, tough, resilient wood was needed. The Makah used yew wood to make whale harpoon shafts (Gunther 1973:16; Swan 1870:20; Waterman 1920:30) which were about 5.5 m long, thickest in the center and tapered towards the ends. They were made in two pieces joined in the middle by a scarf joint, firmly secured by a narrow strip of bark wound very tightly around the joint (Swan 1870:20). The Makah also used yew for canoe paddles (Gunther 1973:16; Swan 1870:38; Waterman 1920:26), although Swan noted that, at least in the mid-nineteenth century, paddles were usually obtained through barter with

the Clyoquot (1870:38). The wood commonly was used for fish clubs. These were about 3 dm long and sometimes were carved (Swan 1870:41-42). Bows were also made from yew (Gunther 1973:16; Swan 1870:47), as were wedges for making boards from cedar logs (Swan 1870:4). Gunther stated that the Makah favored yew for carving spoons and dishes, and that they made lidded square trinket boxes which were burnt out of one piece of wood (1973:16). Yew was also used for the wooden plug used to stopper the holes in sealskin floats (Waterman 1920:36). The Nitinaht made chest high digging sticks [N: /ƛapa•yak/] of yew or Pyrus fusca Raf. wood (JT).

Throughout western Washington and coastal British Columbia, native peoples used yew when strength and resiliency were required. Items manufactured from the wood include weapons, war clubs, bows, harpoons, adze handles, fish hooks, dip nets, canoe bailers, fur seal and sea-lion clubs, wedges, digging sticks, mussel and chiton prying sticks, dishes, spoons, paddles, needles, mat-pressers, etc. (Gunther 1973:16; Turner 1979:117-120; Turner & Efrat 1982:48).

CUPRESSACEAE — THE CYPRESS FAMILY

Chamaecyparis nootkatensis (D. Don) Spach

Yellow cedar

M: bačʔupbap (HW)

bač- - 'to bite' (HW)

M: Batch la roid (Swan diaries 15.I.1862)

Swan does not identify this species, but the description given best fits yellow cedar.

h̄lé-ĭsh-uk (Curtis 1916:203, see terms under Thuja plicata)

ṫleešuk - yellow cedar (Goss, Ides & Ides 1974)

N: bačłe•ẏ̓tapt - tree (JT)

bačłe•ẏ̓- → strong taste or smell, root word 'to bite' (JT)

bač- - to bite, snap shut (Haas 1972)

ba- - to bite (Haas 1972)

This species is not indigenous to Makah territory and is only occasionally available, as driftwood or through trade. The wood is used for carving. Swan (diaries 15.I.1862) noted in his diary that the bark of a tree best matching this species was used to make capes with white pine [probably Pinus monticola Dougl.]. The Nitinaht mixed yellow cedar bark fibers with nettle fibers and dog hair to make a stonger rope (JT).

The bark was used by coastal peoples in British Columbia for weaving clothing, blankets, mats, hats, and for mask decorations. Yellow cedar bark is considered more valuable than the bark of Thuja plicata Donn because it is light-colored, soft-textured, and fine-grained (Turner 1979:71). The wood is also used for carving by British Columbia coastal peoples (Turner 1979:70-71).

Thuja plicata Donn

Red cedar

M: ɬe•ʔišu•k^{w} - cedar (LC, MP, RC, RX)

ɬeyišu•k^{w} šučas - cedar tree (II)

ƛ̓leheaxtabap, ƛ̓ɬeheaxtabap - red cedar

(Goss, Ides & Ides 1974)

klá-e-shook - cedar (Swan 1870:101)

kla-áe-sook - cedar (Swan 1870:65)

picup - [inner] cedar bark

(HW, II, MP, RC; Jacobsen 1979; MLP 1979)

picub - 'it's inner cedar bark' (Jacobsen 1979)

pī'ts•ōp - 'bark, dried but not broken'
(Gunther 1973:19)

péet-sup - cedar bark (Swan 1870:95)

he-sé-yu - apparently finely separated cedar bark of softest texture, used in baby cradles (Swan 1870:18)

sŭt-e - "cedar-berries" [cones?] (Curtis 1916:200)

N: x̌ubpat - tree (JT)

su•baqaƛ̓ - cedar branch ropes (JT)

wapayu• - finely separated soft cedar bark (JT)

Thuja plicata was the most important arboreal species among cultures of the Pacific Northwest coast (Gunther 1973:20; Turner 1979:74). Without this species, many aspects of life would have been more difficult and certain cultural elaborations virtually impossible. Cedar was used for house planks, house posts, roof boards, dug out canoes, and boxes almost to the exclusion of other species (Gunther 1973:20; Turner 1979:74). Cedar wood was also used for dishes, arrow shafts, spear poles,

barbecuing sticks, fish spreaders and hangers, herring racks, masks, rattles, dipnet hooks, fish clubs, fishing floats, fish weirs, benches, berry drying racks and frames, ceremonial drums, paddles, drill and hearth for starting fires, spindles for spinning mountain goat wool, and for spirit whistles (Gunther 1973:20; Turner 1979:74-77).

Among the Makah cedar played a role in almost every aspect of life. The wood was used for canoes (HW; Densmore 1939:19; Swan 1870:35-37; Waterman 1920:9), totem poles (HW), boxes (AF; Swan 1870:42), house planks (Swan 1870:4-5), cradles (Swan 1870:18), arrow shafts (Swan 1870:48), and fish barbecuing sticks and cross pieces (AF, KF, MF). Swan found that the cedar boards and planks used in Makah houses were made principally by the Indians of Vancouver Island and procured by the Makah through barter. These were split from the cedar log with a series of wedges (Swan 1870:4-5).

Swan said that although canoes were an important manufactured product of the Makah, the largest and best canoes were made by the Clyoquot and Nitinaht of Vancouver Island (1870:35). Swan describes the manufacture of canoes as follows:

> "Canoes of the medium and small sizes are made by the Makahs from cedar procured a short distance up the Strait or on the Tsuess River. After the tree is cut down and the bark stripped, the log is cut at the length required for the canoes, and the upper portion removed by splitting it off with wedges, until the greatest width is attained. The two ends are then rough-hewed to a tapering form and a portion of the inside dug out. The log is next turned over and properly shaped for a bottom, then turned back and more chopped from the inside, until enough has been removed from both inside and out to permit it to be easily handled, when it is slid into the water and taken to the lodge of the maker, where he finishes it at his leisure." (1870:35-36)

Much time and labor was required to cut down a large cedar, and, according to Swan (1870:36), only "chiefs" with slaves at their disposal would attempt such large operations. Swan (1870:38) also stated that

> "Until very recently it was the custom to ornament all canoes, except the small ones, with rows of the pearly valve of a species of sea-snail. These shells are procured in large quantities at Nittinat [Nitinaht] and Clyoquot, and formerly were in great demand as an article of traffic. They are inserted in the inside of the edge of the canoe by driving them into holes bored to receive them. But at present they are not much used by the Makahs, for the reason, I presume, that they are continually trading off their canoes, and find they bring quite as good a price without these ornaments as with them."

At present bent-wood boxes are made infrequently by the Makah. Apparently box manufacture was uncommon even in Swan's time (1860s). He described the process as follows:

> "Vessels for carrying water, and large boxes for containing blankets or clothing, are made in the following manner: a board as wide as the box is intended to be high, is carefully smoothed with a chisel, then marked off into four divisions, and at each of the marks cut nearly in two. The wood is then wet with warm water, and gently bent around until the corners are fully formed. Thus three corners of the box are made, and the remaining one formed by the meeting of the two ends of the board, is fastened by wooden pegs. The bottom is then tightly fitted by pins, and the box is made. The water box or bucket consists of one of these, and the chest is simply two large boxes, one shutting down over the other. These boxes are manufactured principally by the Clyoquot Indians, very few being made by the Makahs, on account of the scarcity of good cedar. They procure these by barter, and every lodge has a greater or less number of them according to the wealth of the occupants." (Swan 1870:42)

Cedar wood was also used to make the wings of a type of fishing lure known as /kak-te-wahd'-de/ (Swan 1870:42), and, according to Densmore (1939:12), cedar was used to make halibut hooks, although Tsuga heterophylla (hemlock) seems to have been more frequently used.

Many manufactured goods were made from the fibrous inner portion of cedar bark throughout the Pacific Northwest coast region (Drucker 1951:92-99; Gunther 1973:20; Turner 1979:85; Underhill 1944:109). Even today most Makah families have baskets or other items made of cedar bark. At present the most common use of the inner bark is for basketry (HP, HW, II). The bark is peeled from the trees in May because later in the growing season it becomes pitchy (MP). Formerly, the long bark strips were sun dried, folded into compact form, and used as items for barter or trade (Swan 1870:45). After being split radially to the desired width and tangentially to the appropriate thickness, the bark is used for basketry (HP, II, MP; Underhill 1944:109), or pounded soft and made into clothes (HW, MP; Densmore 1939:11; Swan 1870:60) or used to line baby cradles (MP; Swan 1870:45). Cedar bark pounded until it was as soft as cotton was used to rub the face (HP). Softened cedar bark was also used by the Makah for gun-wadding and as a towel substitute (Swan 1870:45). The linings and head bands of Makah, Quileute, and Quinault rain hats were made of split cedar [bark] (Gunther 1973:20). According to Gunther (1973:20), the narrower strips of bark were woven into mats, although the use of bark for matting was much more prevalent to the north. She also stated that the Makah preferred to obtain these cedar bark mats through trade with the Nootka, and were the only coastal people in Washington to attempt cedar bark mat manufacture (Gunther 1973:20; see also Underhill 1944:109). Swan (1870:45), however, has stated that cedar bark mats were one of the principal items made by Makah females during winter, and that cedar bark was the only raw material used. The Makah, Quileute, and Clyoquot used cedar bark mats as canoe sails (Densmore 1939:21; Gunther 1973:20; Swan

1870:38, 45; Waterman 1920:23). Cedar bark mats were also used to cover spring salmon when cooked on a rack above a fire (Densmore 1939:14). The Makah made blankets of doghair yarn and prepared cedar bark. The yarn served as the warp, and the cedar strips as weft (Densmore 1939:15-16).

Carrying baskets, worn on the back with a strap around the forehead, were made from cedar twigs or spruce roots (Swan 1870:46). Large ropes were made of cedar limbs that were stripped of leaves, soaked in water, and twisted into rope (Gunther 1973:20; Swan 1870:39-40; Waterman 1920:37-38). These ropes could be as thick as a man's wrist (Densmore 1939:18). The heavier grades were used by the Makah, Quileute, and Quinault for towing home dead whales (Gunther 1973:20; Swan 1870:39). The Hesquiat also used cedar withe ropes in whale hunting (Turner & Efrat 1982:36). Cedar roots were made into ropes used with seal skin floats by the Makah (Waterman 1920:36). The Nitinaht made ropes of red cedar (JT), but the uses of these ropes were not specified. The bark, wood, and roots were used technologically by the Nitinaht (JT), but the precise purposes were not specified.

The Makah used cedar bough tea as a remedy for coughs (LC). In this regard it is interesting to note that the Klallam boiled cedar limbs for tuberculosis medicine (Gunther 1973:20). Densmore (1939:308) also noted the medicinal use of cedar, but no specifics were given. For scouring the body in bathing, both for ordinary purposes and in preparing for ceremonial occasions, the Makah used the limbs, bark, and leaves of cedar (Gunther 1973:20; Swan 1870:19, 63).

The Makah made ceremonial headresses of cedar bark (Swan 1870:45), as did the Quileute (Powell & Jensen 1976), Kwakiutl (Turner & Bell 1973), and Vancouver Island Coast Salish (Turner & Bell 1971a). The bark is still used in the ceremonial headresses of the Makah and Nitinaht.

Cedar was also used as a dye-stuff, but neither the method used nor the color obtained were specified (Densmore 1939:308). Curtis (1916:200) listed "cedar-berries" [cones?] as a food. No additional information concerning the use or exact identity of "cedar-berries" is known.

PINACEAE — THE PINE FAMILY

Picea sitchensis (Bong.) Carr.

(Gill #1979.5:23MP; #1980:426; #1980:550)

Sitka spruce

M: wiƛ̓a•q(a)bap - spruce tree (HI, II, LC, MP, RC, MLP)
→ 'doesn't burn good tree' (HI), 'doesn't burn very good... it wants to go out all the time' (LC)

wik̓aakbap (Goss, Ides & Ides 1974)

wi-h̄l̄á-ka-bŭp (Curtis 1916:204)

k!lõ'pate (Gunther 1973:17)

do-hó-bupt - spruce (Swan 1870:101)

łak̓itbis - pitch (HI & HW, HP) → 'something that's sticky-like' (HP); gum, chewing-gum (Jacobsen 1971)

łek̓itbis → 'pitch off from the spruce tree' (II)

łałak̓it - chewing gum (HP)

ɬaḵ̓it - 'to chew gum' (Jacobsen 1971)

k!ṗak'kē'dibis - gum (Gunther 1973:17)
kluck-áit-ā-bis - pitch (Swan 1870:101)

N: tu•x̌upt → 'derived from /tu•x̌uk^{w}/ = 'scared' because they're sharp' - whole tree (JT)

[The Hesquiat name, /tu•ḥmapt/, is also derived from 'to scare' /tu•ḥsiƛ/ (Turner & Efrat 1982:449).]

tu•x̣^{w}upt (Jacobsen 1969)
ʔiš̌iḵ̓i•yp - pitch (JT)

Formerly children ate the "little cones" (MP) which MP said taste "real good". The buds were also eaten (MP) after being stripped of needles (HP). Gunther (1973:17) stated that "only the Makah use any part of the spruce tree as food and they eat the young shoots raw." The Makah (HP, II, MP; Gunther 1973:17), Quinault (Gunther 1973:17), Haida (Turner 1975:60; Norton 1981), and Kwakiutl (Turner 1975:60; Turner & Bell 1973) used the pitch as chewing gum. Spruce pitch is what /ʔi?iskis/, the mythological big woman of the woods, chews (HP). She uses it to blind children who wander too far from home (Gill 1982).

The Makah also used spruce pitch as stomach medicine (ZI). According to Gunther (1973:17), the Makah burned spruce bark with wild cherry [Prunus emarginata (Dougl.) Walp.] bark and placed the resultant charcoal on an infant's navel when the cord came off. The boughs were used by the Makah for rubbing while bathing (Gunther 1973:17). A decoction of a unspecified portion was used as a strengthening bath and also "taken internally to clear the blood" (Densmore 1939:318).

Makah whalers would sometimes place a sprig of spruce in their hair knots with a feather when going to sea (Swan 1870:17). The Nitinaht used the branches ceremonially during the /χuk^{w}ala/ to initiate the children (JT).

Pitch was used by the Makah to glue things together (HP) and to repair items such as harpoons (II) and to protect the harpoon point (Gunther 1973:17; Waterman 1920:31). Swan (1870:39) stated that the harpoon head

> "is made of sheet copper or sheet iron.... The barbs are of elk or deer horn.... These are fixed on each side of the blade or point, fitted tightly, and kept in place by cords or strips of bark. The whole is then covered with spruce gum, which is obtained by setting a fat pitch-knot by the fire, and catching the melted pitch in a shell placed beneath. It is then kneaded till it acquires the consistency of soft cobbler's wax, and is applied and distributed with the fingers. The whole blade and a portion of the barbs are covered with this pitch, which when cool is hard and smooth, and forms a tapering wedge-shaped spear-head. The pitch is then scraped from the edge of the blade, which is ground very sharp."

The Nitinaht obtained their best pitch from Sitka spruce (JT). The pitch was ignited and caught with a mussel shell as it melted. They would line up the whole family of a whale hunter and make them chew the pitch until it was the right consistency. Then the hunters would put the pitch on their harpoons, smooth it over, and then burn off the excess (JT). Finally they would shine it until it was smooth like shellac (JT). The Nitinaht also used spruce pitch to fill cracks and knot-holes in canoes, and to waterproof boxes. These boxes were used only for cold materials as hot water would melt the pitch (JT). The Makah, Quileute, Quinault, Nootka, and Kwakiutl also used the pitch for caulking canoes (Gunther 1973:17; Turner 1979:100).

Spruce roots were used for basketry by all peoples on the Pacific Northwest Coast (Gunther 1973:17; Turner 1979:100-103). The Makah made conical rain hats /biλayak cikya•puxʷs/ of spruce roots woven so compactly as to exclude water (Gill 1982; Swan 1870:16). They also made burden baskets /qa?awac/ (Gill 1982) and ropes for towing whales (Swan 1870:39; Waterman 1920:37) from the roots, and spruce root lines were attached to seal skin floats used in whaling (Waterman 1920:36). The Nitinaht used split spruce roots for basketry (JT). The use of spruce roots for basketry and rain hats has also been specifically reported for the Quileute (Gunther 1973:17) and Quinault (Olson 1936:55). According to Turner (1979:100), the Makah made wedges from the wood of larger spruce roots.

Pinus spp.

Pines

M: čabasbap → 'sweet-smelling plant' (HW, MLP)

[Goss, Ides and Ides (1974) gave the term /čabaasbap/ for white fir (Abies sp.).]

čabas - sweet (Jacobsen 1971)

čabaspaɬ - 'to taste sweet, smell good' (Jacobsen 1971)

N: čabsapt - term for all pine species (JT)

According to Swan (diaries 15.I.1862) the bark of /Batch la roid/ [?Chamaecyparis nootkatensis (D. Don) Spach] was used by the Makah to make capes with "white pine" [probably Pinus monticola Dougl.]. He also noted the use of "white pine" bark in Makah medicine, stating,

> "One of their remedies to reduce a strumous tumor is by means of actual cautery, prepared from the dried inner bark of white pine, which is applied by a moxa [/boo-chitl/ (Swan 1870:101)] or cone. The skin is first wet with saliva at the desired point; the moxa then placed upon it and set on fire. The bark burns very rapidly and causes a deep sore, which is kept open by removing the scab as often as it forms, until relief is felt." (Swan 1870:79)

Swan (1870:79) said this practice seemed to be common among all coastal tribes in the vicinity.

Tsuga heterophylla (Raf.) Sarg.

Coast hemlock

M: ƛ̓akabap (HI & HW, LC, RX)

klaƛ̓abap (Goss, Ides & Ides 1974)

klak!a'bupt (Gunther 1973:18)

Tkaka'bup (Densmore 1939:311)

Tkatka'bup (Densmore 1939:316)

klar-kár-bupt (Swan 1870:101)

ḱla-ká-bŭp (Curtis 1916:203)

č̓iti•bit - hemlock bark dye (HI & HW)

N: qʷiƛ̓qapt - tree (JT; Haas) → 'no-fire wood' (JT)

č̓i•ti?bit - hemlock bark dye (JT)

According to II, the Makah just used hemlock for lumber. Swan (1870:18) found that the Makah made a face paint from hemlock bark found on decayed roots or in the forks of old roots that have been long underground. The bark was fire dried, and, when used, it was rubbed on a stone with saliva and applied to the face. Vermilion was prefered when available, however. The Quinault mixed pitch with ground hemlock bark to

make a dark brown face paint (Gunther 1973:18). Densmore said the Makah prepared a red dye as follows:

> "The inner bark was pounded and boiled in salt water. This made a reddish paint that was applied to spears and similar articles, and seemed to preserve the wood. Some believed that a painted paddle lasted longer if held over a fire thus baking the paint." (1939:320, see also p. 23)

The black color on harpoon poles was made by applying a decoction of outer hemlock bark after which the pole was held over a fire. The resulting blackish color was said to be "very lasting" (Densmore 1939:22). A glossy brwon paint was prepared by pounding dried inner hemlock bark and mixing it with whale oil. This paint had a pleasant odor and sometimes was used as a face paint (Densmore 1939:23). The Nitinaht used the bark as a source of brown dye, bark from progressively lower on the trunk gives darker color. This dye was used for dying basketry material and gill nets "so the fish won't see it" (JT). The Klallam, Lummi, Snohomish, Chehalis, Saanich, Bella Coola, Hesquiat, and Kwakiutl also made and used this dye (Gunther 1973:18; Turner 1973; 1979:115; Turner & Bell 1973; Turner & Efrat 1982:45).

The Makah also used hemlock bark medicinally. The growth of bark [callus] that forms over a wound to the tree was dipped in water, rubbed on a rock, and used as a poultice for old, persistant sores (Densmore 1939:316). The powdered bark was mixed with oil and rubbed in the hair as a remedy for head lice (Densmore 1939:316). Gunther (1973:18) said the pitch was put on the hair to remove vermin. Incised wounds and lacerations were treated with a poultice of finely chewed hemlock bark, and the same treatment was used to stop the bleeding from a gun-shot wound (Swan 1870:78). Hemlock bark was used by the Makah to make a tea used as

an astringent (Swan 1870:80). They also drank a hot decoction of an uspecified part of the tree for internal injury (Densmore 1939:318). Hemlock bark tea with licorice fern (Polypodium glycyrrhiza) was used by the Klallam to stop hemorrhages (Gunther 1945:18). The pitch was used by the Makah to prevent sunburn and by the Cowlitz to prevent chapping (Gunther 1973:18). The Hesquiat used hemlock pitch mixed with deer grease on their face to prevent their skin from cracking and peeling in the sun. They also used it to heal face sores (Turner & Efrat 1982:45). Makah whalers used hemlock twigs to rub themselves during ritual bathing and twigs were worn on the forehead by whalers during the hunt (Waterman 1920:38).

The Makah (Gunther 1973:18), "Canadians" [Nitinaht] (HW), Hesquiat (Turner & Efrat 1982:45), Klallam (Fleisher 1980), Bella Bella (Turner 1973), and Kwakiutl (Turner & Bell 1973) all used hemlock boughs to collect fish eggs. All of the above groups collected herring spawn except the Klallam, who collected ling cod eggs. HW noted that the "Canadians" let the herring spawn on the limbs, then lifted the limbs out of the water and allowed the eggs to dry on the branches. Halibut hooks (M: singular /čibu•d/, plural /čibu•dabadax/) were made from hemlock knots, which were used in preference to spruce because they contain no pitch to offend the fish (Swan 1870:23, 41). The process used to make a /čibu•d/ was described by Swan as follows:

> "The knots are first split into small pieces, and after being shaped with a knife, are inserted into a hollow stem of the kelp [Nereocystis luetkeana] and roasted or steamed in the hot ashes until they are pliable; they are then bent into the required form, and tied until they are cold, when they retain the shape given them. A barb made of a peice of bone is firmly lashed on the lower side of the hook with slips of spruce cut thin like a ribbon or with strips of bark of the wild cherry. The upper arm of the

> hook is slightly curved outward, and wound around with bark to keep it from splitting. A thread made of whale sinews is usually fastened to the hook for the purpose of tying on the bait, and another of the same material loosely twisted, serves to fasten the hook to the kelp line." (1870:41).

Densmore (1939:12) also found that hemlock was used for halibut hooks.

The Nitinaht ate the yellowish-green [young] growth as food, and even the old leaves could be eaten sparingly in order to keep oneself alive if one was hungry in the woods (JT). The Quileute chewed the young shoot tips and spat them on swellings to reduce them (Gunther 1973:18). The Klallam boiled the tips and drank the infusion to "cure" tuberculosis and as an appetite stimulant (Gunther 1973:18). The Quileute used the bark for tanning hides (Gunther 1973:18; Reagan 1934), and applied the juice obtained by boiling finely chopped bark to spruce root baskets to make them watertight (Gunther 1973:18).

ANGIOSPERMS

Dicots

SALICACEAE — THE WILLOW FAMILY

Populus trichocarpa T. & G.

Cotton-wood

M: ʔqabiċaqbap - 'cotton-wood' (Jacobsen 1969)

N: ʔkʷa•dqapt - 'cotton-wood' (JT)

Cotton-wood fibers were used by the Nitinaht to make stronger ropes in combination with dog hair and nettle [Urtica dioica L.] fibers (JT). Swan (1870:69) said that during the mid-nineteenth century masks were sometimes carved from cotton-wood, principally by the Clyoquot and Nitinaht, who sold them to the Makah.

Salix hookeriana Barrett (Gill #1979.5:1MP)

S. piperi Bebb

S. lasiandra Benth. (Gill #1980:570)

Hooker's or coast willow, Piper's willow, and Pacific willow, respectively.

M: klīk'tci'bupt → 'dog plant' - S. hookeriana
(Gunther 1973:27)

kĭt-chí-bŭp - willow, species not specified
(Curtis 1916:204)

N: ʔitipt - this term used for any willow species (JT)
[Note: First /i/ sounds like an English long i, as in bite. In the Makah orthography this sound would be most closely represented by /ay/.]

Willow (S. hookeriana and/or S. piperi) was used to make baskets by the Makah (MP). The bark of S. piperi was used for basketry by the Quileute, and several coastal peoples of Washington and British Columbia used the bark of various Salix spp. for string, rope, fishing lines, different types of fish nets, and duck nets (Gunther 1973:26-27; Turner 1979:262).

A willow species at Tsues is used for medicine by the Makah (HP). Gunther found that the Makah used the leaves of S. hookeriana as an antidote for shell-fish poisoning, and that they soaked the roots and used the water for a hair wash (1973:27). MP knew of no Makah names for willow species, and considered S. hookeriana a weed.

The Nitinaht used the roots of S. hookeriana and/or S. piperi as a towel to rub down after bathing. The roots are said to be very soft (JT).

MYRICACEAE — THE SWEET-GALE FAMILY

Myrica gale L. (Gill #2143)

No name or use for this species is known for either the Makah or Nitinaht (HI, HW, JT).

BETULACEAE — THE BIRCH FAMILY

Alnus rubra Bong. (=A. oregana Nutt.)
(Gill #1979.5:15MP)

Red alder

M: q̓ʷaxsa•bap (MLP)
qwaaksaabap - alder (Goss, Ides & Ides 1974)

qwΔxsa'bΔp [qʷaxsa•bap] (Waterman 1920:27)
kwárk-sah-bupt (Swan 1870:101)

kwa'sambat (Densmore 1939:311)

N: qaqapt - tree (JT; Haas 1969)

The Makah used the leaves for cooking halibut heads and salmonberry sprouts /q̓uq̓u•skad(i)ɬ/ (II). HW has heard it said that the Makah formerly smoked alder leaves. Swan (1870:27) said dried alder bark or Gaultheria shallon Pursh leaves were used for smoking when no Arctostaphyllos uva-ursi was available. Wooden bowls and dishes were and still are made of alder (AF, KF; Swan 1870:42-43), as were oil containers (Densmore 1939:321), canoe-bailers (Densmore 1939:321; Waterman 1920:27), baby cradles (Gunther 1973:27), and small canoes sold to white people as curiosities (Swan 1870:37). The bark was used in /χuk^{w}ali•/ headresses after it was pounded and placed in water colored by cedar bark (Densmore 1939:321).

The outer bark was used by the Makah for making red paint (Densmore 1939:22, 320-321) or dye (Swan 1870:43,46). According to Swan, the bark was chewed and spit into a dish to form a bright red, permanent dye used for dyeing cedar bark or grass (1870:43). The Nitinaht also used the bark as a dye. The best dye was obtained from the bottom portion of the trunk near the ground as the dye is darker , almost black, towards the base (JT). This dye was used to dye baskets. The material to be dyed was submerged in the solution and boiled (JT). Some of the cedar bark used to make mats was dyed red with alder bark by the Nookta (Drucker 1951:95). Masks were and are also made of alder, and according to Swan (1870:69) these were principally made in the mid-nineteenth century by the Clyoquot and Nitinaht people who sold them to the Makah. The Makah would paint these masks according to their own tastes (Swan 1870:69).

The wood was used by both the Makah and Nitinaht for smoking and drying fish (II, MP, JT). The Makah also used alder wood for barbecuing seal meat (Gill 1982). Alder bark is used for medicine by the Nitinaht mixed with some other unspecified bark (JT). Alder bark was used by the Hesquiat to make a medicine for treating tuberculosis and other internal ailments, usually boiled with hemlock (Tsuga heterophylla) bark (Turner & Efrat 1982:62). JT stated that if you see a creek without alder along its banks, the water isn't good to drink. The Quileute used sewn alder bark cones were used to store elderberry [Sambucus racemosa L. var. arborescens (T. & G.) Gray] clusters. Cones were about 30 cm tall and had their ends folded over to protect the elderberries. The alder bark cones and their contents were stored in creeks (HW).

Gunther (1973:27) found that, except for cedar (Thuja plicata), alder is the most widely used wood in Northwest Coast woodworking. It was used for dishes, spoons, platters, canoe bailers, paddles, masks, rattles, headresses, labrets, etc. (Gunther 1973:27; Turner 1979:193-194). The bark was almost universally used for dye in the Pacific Northwest, the colors ranging from bright red to almost black, depending on the preparation technique used (Gunther 1973:27; Turner 192-194). The dye was especially useful to cammoflage fish nets (Gunther 1973:27). The use of Alnus species for dye is widespread within the range of the genus.

Corylus avellana L. (Gill #1878)

Common or European filbert

Neither MP nor II knew a Makah name or use for this European species that persists near Norwegian Memorial. Although no specimen of the native C. cornuta Marsh. was available for examination by the consultants, apparently no traditional name or use is remembered for this species, either.

?Corylus cornuta Marsh. var. californica (DC.) Sharp

Hazel

M: hul-li-á-ko-bupt (Swan 1870:44)

hul-liák - a type of gambling disk (Swan 1870:44)

Swan reported that hazel grew on Cape Flattery and vicinity, and that disks for a gambling game known as /la-hul-lum/ were made from the wood. At present no C. cornuta is known from Makah territory.

URTICACEAE — THE NETTLE FAMILY

Urtica dioica L. ssp. gracilis (Ait.) Seland. var. lyallii (Wats.) Hitchc.

Nettle

M: qalupqi• (HI, HP)

According to JT, the Makah name for nettles refers to the fact that nettles leave a rash on the skin.

qalupqi (Jacobsen 1979)

kalupki (Goss, Ides & Ides 1974)

kalū'p'ki (Gunther 1973:28)

kau-lup-kay (Swan 1870:101)

N: ʔesipt - plant (JT)

Long ago the Makah used nettles in rituals for whaling and fishing (HI). Whale hunters would rub their bodies with nettles in order to be strong (HP). Sometimes a whaler would wear nettles while praying, believing the torture would help him get whales (Densmore 1939:47). Seal hunters rubbed down with nettles to protect themselves from the weather (ZI). Nettles were also used to rub down after the morning bath (MP). Gunther (1973:28) said that the Makah rub their bodies with nettles for purification after handling a corpse.

HI related the following use of nettles in fishing:

> "As a child I saw my father when he'd take this halibut line, fish line, and he'd tighten it from one end of the yard to the other, while it was being stretched like that, otherwise they coil and tangle you know. He'd take a handful of those leaves and he'd rub it along the line and it gave it kind of a green color. I don't know if that was just for the color or if he thought there was some medicine in it or something, for good fishing or something. Might have been just to tint the line."

Waterman (1920:37) said that nettle fiber lines were sometimes used as fish lines, and that the harpoon lanyard, made of whale sinew, was wound with nettle fiber string and covered with a wrapping of cherry bark.

The stems were put under splints to hasten the healing process (ZI). Tea made from boiled nettle roots was given to expectant mothers (TL). MP says nettle tops were eaten.[3] According to HI, the Makah used the fibers for string, but she had never seen this done. HI also thought that nettle fibers were used in weaving baskets. HP said the people used

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[3] Although nettles produce painful stings when fresh, the cooked leaves and shoot tops make a delicious, mild tasting green vegetable.

to blow their noses on the stings produced by nettles as a remedy.

Nettle fiber lines were used by the Nitinaht for fish and duck nets (JT). Yellow cedar (Chamaecyparis nootkatensis) bark or cotton-wood (Populus trichocarpa) fibers were mixed with nettle fibers and dog hair to make stronger ropes (JT). Nettle fibers were used among almost all of the native people of Washington and British Columbia (Gunther 1973:28; Turner 1979:265, 267).

The Nootka rubbed their bodies with nettles, often until the blood came, during ritualistic bathing prior to entering the water (Drucker 1951:167). Nettles were also used for body rubbing in the bathing rituals of Nootkan whalers (Drucker 1951:169). Quileute seal hunters rubbed themselves prior to going out, to help themselves stay awake through the night (Gunther 1973:28). The use of nettles for medicine was also widespread and usually seemed to be based on the irritant properties of the plant (Gunther 1973:28). Among the illnesses treated with nettles were rheumatism (Coast Salish, Quileute, Chehalis), paralysis (Quinault), a counter-irritant for pain (Hesquiat), colds (Snohomish), headache (Quinault), soreness and stiffness (Klallam), and childbirth (Lummi, Squaxin, Cowlitz, Quinault, Kwakiutl) (Gunther 1973:28; Turner & Bell 1971a; 1973; Turner & Efrat 1982:76).

POLYGONACEAE — THE KNOTWEED FAMILY

Polygonum cuspidatum Sieb. & Zucc. (Gill #1979.5:200MP)

Wild bamboo

This Asiatic ornamental is regarded as an obnoxious weed (MP). It occurs locally in Neah Bay, and has no known Makah uses (MP).

Rumex sp. (Gill #1980:412; #1980:416)

Dock

MP did not recognize these plants (Makah).

Rumex obtusifolius L.

Bitterdock or broad-leaved dock

M: huap'si → 'breaks up a plan' (Densmore 1939:310, 321)

According to Densmore (1939:321) this medicine was used by the Makah when near a mortal enemy. The fresh roots were pounded and then rubbed on the body. She also said a man would pay from five to ten blankets for one application of this medicine (Densmore 1939:321).

Rumex occidentalis Wats. var. procerus (Greene) Howell (Gill #1980:569)

Western dock

JT knew of no Nitinaht name or use for this species.

CHENOPODIACEAE — THE GOOSEFOOT FAMILY

Salicornia virginiana L.

Pickleweed or woody glasswort

II knew of no Makah name or use for this species.

NYCTAGINACEAE — THE FOUR-O'CLOCK FAMILY

Abronia latifolia Eschsch. (Gill #1848; #2173)

Yellow sandverbena

No name or use for yellow sand verbena is presently known by the Makah (MP, HW, HI). JT did not recognize this species (Nitinaht). According to Gunther (1973:29), the large roots were eaten by the Makah and the Klallam. The Makah ate the roots in autumn.

PORTULACACEAE — THE PURSLANE FAMILY

Montia perfoliata (Donn) Howell (=Claytonia perfoliata Donn)
(Gill #1980:568)

Miner's lettuce

JT knew of no Nitinaht name or use for this plant.

Montia sibirica (L.) Howell (=Claytonia sibirica L.)

Siberian montia, candyflower

M: kakawuse' → 'remedy for use in childbirth'
(Densmore 1939:317)

The whole plant was chewed and swallowed by Makah women to hasten or initiate labor (Densmore 1939:317). It was also pounded without water and applied to the abdomen as a remedy for constipation (Densmore 1939:314).

Among the Hesquiat this species is regarded as a good medicine. The chewed leaves are applied to cuts and sores as a poultice, and the juice from a broken stem used for sore, red eyes, or if a foreign object gets in one's eye (Turner & Efrat 1982:71).

CARYOPHYLLACEAE — THE PINK FAMILY

Honkenya peploides (L.) Ehrh. (Gill #1979.5:16MP)

Sea purslane

This species is considered a weed by MP, and has no known name or uses among the Makah (II, MP).

NYMPHAEACEAE — THE WATER-LILY FAMILY

Nuphar polysepalum Engelm. [Nymphozanthus polysepalus (Engelm.) Fern.]
(Gill #2158)

Yellow water-lily

N: pi•pi•laqakk^{w} → 'leaves look like kidney' (JT)

pi•la• = 'kidney' (JT)

The Nitinaht boiled the rhizome to make a medicinal drink, but the specific ailment for which it was used is not known (JT). The Makah placed patients over steaming roots [rhizomes?] and the Quinault heated the roots [rhizomes?] and applied them to painful areas, especially used for rheumatism (Gunther 1973:29). HI and HW knew of no Makah names or uses for this plant. Medicinal use of yellow water-lilies was widespread in the Pacific Northwest (Gunther 1973:29).

RANUNCULACEAE — THE CROWFOOT OR BUTTERCUP FAMILY

Aquilegia formosa Fisch.

Red or Sitka Columbine.

Gunther (1973:30) stated that although this plant is plentiful at Hobuck, the Makah have no name or use for it.

Ranunculus flammula L. (=R. reptans L.)

Creeping buttercup, lesser spearwort

M: kɬitc'sapbupt - whole plant (Gunther 1973:29)

kɬitc'sap - leaves (Gunther 1973:29)

[The Makah term /ƛičsap/, phonetically very similar to Gunther's term for the leaves, is used for Potentilla pacifica Howell.]

According to Gunther, the roots of this species were dug between September and February, cooked on hot rocks, dipped in whale or seal oil, and eaten with dried salmon eggs (1973:30). However, anyone familiar with R. flammula will immediately perceive that this use is very unlikely. This buttercup is a diminuative creeping plant with small, thin roots, and it is very unlikely that one could collect enough material to even equal the calories expended in the process. I suspect an identification error and believe that the plant actually used was Potentilla pacifica (see note concerning the Makah name, above).

Ranunculus uncinatus D. Don (=R. bongardi Greene)

Little buttercup

Densmore learned that the Makah mashed the leaves or stalk and applied this without water as a poultice covered with a small shell (1939:316). This poultice was used for wounds and injuries to prevent blood poisoning. It produced a blister and was reapplied if soreness returned (Densmore 1939:316).

Ranunculus sp.

Buttercup

The Makah made poultices of mashed buttercup leaves (species not indicated) and applied them to sores. Only a small amount was used, usually about what could be heaped on a dime, as if too large an area of

skin was covered the poultice itself would cause a sore (Densmore 1939:315). Densmore said this was a frequently used remedy. The mashed leaves were made into a roll about an inch long and tied on the sore (1939:315). Often this remedy was applied at night, and by morning the sore would be opened (Densmore 1939:315). The Hesquiat used Ranunculus spp. as "counter-irritants" on sores and aches (Turner & Efrat 1982:71).

BERBERIDACEAE — THE BARBERRY FAMILY

Berbaris aquifolium Pursh and/or B. nervosa Pursh

Barberry, Oregon-grape

M: klook-shítl-ko-bupt (Swan 1870:93,101)

kluksitɬkobupt → raven plant (Gunther 1973:30)

[probably ƛukšiƛqabap]

ƛu•kšu•d - raven (MLP 1979)

N: ƛukʷštqapt → 'raven plant' (JT)

ƛu•kʷši•d = raven (JT)

According to Gunther (1973:30), the Makah considered the fruit only as raven food, and said that the berries make children ill. Recently, however, some people have tried to use the fruit for preserves (AF, KF). The roots (HW; Gunther 1973:30) or possibly the leaves (HW) were used as a source of yellow dye by the Makah. Swan (1870:46) stated that the bark of the root was used to dye beach grass used in basketry and as ornament on some types of mats by boiling the bark and immersing the grass in the resulting solution. Bark was not dyed in this manner (Swan

1870:46). Oregon-grape does not grow in Makah territory but was obtained while travelling or through trade (Gunther 1973:30). Use of the roots for dye was widespread in western Washington (Gunther 1973:30-31) and the southern coastal area of British Columbia (Turner 1979:189).

The bark is used medicinally by the Nitinaht and is considered to have more healing power than the bark of Pyrus fusca Raf. (JT). Mixed with hemlock (Tsuga heterophylla) and alder (Alnus rubra?), barberry is supposed to make a good drink for treating tuberculosis (JT). The medicinal use of the roots for treating a variety of ailments was widespread among the native peoples of western Washington (Gunther 1973:30-31). The root contains several alkaloids, the most important of which is berberine, and it has been officially recognized in U. S. medicine, mostly for use as a bitter stomachic (Wood & Osol 1943:203-205). Berberine has been shown to have antibiotic properties (Wood & Osol 1943:205).

BRASSICACEAE OR CRUCIFERAE — THE MUSTARD FAMILY

Cakile edentula (Bigel.) Hook. var. edentula (Gill #1980:425b; #1854)

American searocket

MP know of no Makah name or use for this introduced species.

Cakile maritima Scop. ssp. maritima (Gill #1980:425a; #1855)

European searocket

MP knew no Makah name or use for this recently established European species.

CRASSULACEAE — THE STONECROP FAMILY

Sedum sp. (Gill #1980:475)

Sedum, stonecrop

M: čačaˑqƛ → 'they got water in them' (HI)

čaˑ - stem refering to water

čaʔak = water (MLP 1979)

-aqƛ- - inside

tcatca''kɬk → 'water plant' (Gunther 1973:31)

cha'chakli → 'filled with water' (Densmore 1939:317)

Among the Makah the leaves were eaten (HP, MP) and used to treat bedwetting (ZI). HW knew of no uses for this species. Gunther (1973:31) said sedum was eaten when there was doubt about the safety of local [drinking] water, due to malicious spirits. Makah women chewed and swallowed little bunches of leaves to "bring on her periods," continuing this activity until the desired result was obtained (Densmore 1939:317). JT knew of no Nitinaht name or use for this plant.

SAXIFRAGACEAE — THE SAXIFRAGE FAMILY

Boykinia elatea (Nutt.) Greene (Gill #1980:456)

Slender or coast boykinia

The Makah pick these flowers for use in boquets (HP, MP).

Tellmia grandiflorum (Pursh) Dougl. (Gill #1979.5:8MP)

Fringecup

MP made the observation that this species "doesn't go into anything but flowers and then they dry up." No use is known.

Tolmiea menziessii (Pursh) T. & G.

Youth-on-age, pig-a-back plant

M: tca'c'wē (Gunther 1973:31)

According to Gunther (1973:31), the Makah eat the sprouts raw in the spring.

GROSSULARIACEAE — THE CURRANT OR GOOSEBERRY FAMILY

Ribes bracteosum Dougl. (Gill #1979.5:4MP; #1980:424; #1980:458)

Stink currant, wild currant

M: hapa•pix̌ → 'hair on them round things' - term refers to the

fact that the fruit has pubescence (HI & HW)

-pix̌ - affix meaning 'spherical object'

hă̆-pá-pá-bupt - currant, species not identified

(Swan 1870:101)

hihisatqx̣̀uk^{w} → 'looks like red huckleberry' (MP)

hisi•ʔa•d = red huckleberry

(Vaccinium parvifolium Smith)

-x̣̀uk^{w} - affix meaning 'looks like'

HW uses the term /hihisatqx̣̀uk^{w}/ for 'tame currant'

x̣̀i•daqaɬpix̌ → 'moldy round things' (HI & HW)

x̣̀i•daq- → 'smoke onto something'

x̣̀i•daqaɬ = mold

x̣̀i•daqbis = fog

x̣̀olo?o - currant, species not identified (Goss,

Ides & Ides 1974)

k!lōlō''o (Gunther 1973:32), note similarity to Quileute

term /klo•''o/ (Gunther 1973:32)

[Compare with Makah terms for Ribes laxiflorum Pursh]

The Makah apparently do not distinguish between this species and Ribes laxiflorum. The fruit are used for food by the Makah (MP; Densmore 1939:320; Underhill 1944:66). Swan noted the use of wild currant bark (species not indicated) to make a medicinal tea (1870:80). The use of the fruit for food was common among the Coastal Indians of British Columbia (Turner 1975:171)

Ribes divaricatum Dougl. (Gill #1980:469; #1980:551)

Black gooseberry, wild gooseberry

M: šačka•piǐ → 'sharp round things' - gooseberry (Gill 1982)

šačk- = sharp

-piǐ - affix meaning 'spherical object'

šačkaabaƥ - gooseberry, species not identified (Goss, Ides & Ides 1974)

catctka'bupt (Gunther 1973:32)

shatch-káh-bupt - gooseberry, species not specified (Swan 1870:101)

shach-ka-bŭp - gooseberry, species not specified (Curtis 1916:200)

ciǐapiǐ (HP) → 'sour round thing' - this word usually reserved for wild crab-apple Pyrus fusca Raf.

N: ƛabu•x^{w}ay - fruit (JT)

ƛabu•x^{w}ayapt - plant (JT)

The fruit are eaten fresh by the Makah (HP). Gunther found that the Makah soaked the bark and used the resultant solution for an eye wash (1973:32).

The Nitinaht used this species only for food, the plant has no medicinal uses (JT). The raw fruit were eaten with oil by the Hesquiat (Turner & Efrat 1982:69) and raw or stewed by the Quileute (Reagan 1934). Turner (1975:173) found that all coastal Indian groups in British Columbia except the Haida ate the fruit.

Ribes ?lacustre (Pers.) Poir. (Gill #1980:457)

Swamp gooseberry, wild gooseberry

M: tiẍapiẍ [ciẍapiẍ] → 'something sour' (HP)

→ 'sour round thing' - this term usually reserved for wild crab-apple (Pyrus fusca)

A vegetative specimen most closely matching this species was collected with HP and AF along Village Creek. According to HP, the fruit were eaten by the Makah.

Ribes laxiflorum Pursh (Gill #1979.5:14MP; Gross #48, mcrc)

Trailing black currant, wild currant

M: hapa•piẍ → 'hair on them round things' - term refers to the fact that the fruits has hairs on it (HI & HW)

hă-pá-pá-bupt - currant, species not specified (Swan 1870:101)

hihisatqʼukʷ → 'looks like red huckleberry' (Gill 1982)

hisi•ʔa•d = red huckleberry (Vaccinium parvifolium)

-ʼukʷ - affix meaning 'looks like'

HW uses the term /hihisatqʼukʷ/ for 'tame currant'

ʼkulu•l - fruit (II)

ʼkoloʔo - currant, species not identified (Goss, Ides & Ides 1974)

ʼƛi•daqaɬpiẍ → 'moldy round things' (HI & HW)

ʼƛi•daq- → 'smoke onto something'

ʼƛi•daqaɬ = mold

ʼƛi•daqbis = fog

[Compare with the Makah terms for Ribes bracteosum]

The fruit were eaten fresh by the Makah (HW, II, LC, MP; Gunther 1973:32) and occasionally used for making jelly (II). Swan (1870:30) noted the use of wild currant bark (species not indicated) to make a medicinal tea. The Hesquiat, Skagit, Lummi, and some coastal British Columbia peoples also ate the fruit of this species (Gunther 1973:32; Turner 1975:178; Turner & Efrat 1982:69).

ROSACEAE — THE ROSE FAMILY

Aruncus sylvester Kostel

(Gill #1980:228; #1980:243; #1980:459; Gross #37, mcrc)

Goat's-beard, sometimes locally refered to as golden-rod

M: x̌ix̌icbuqǩuk^{w} → 'looks like herring eggs' (HW)

x̌i•cbuʔu = herring eggs (HW)

x̣i•cbuʔ - herring or smelt eggs (Jacobsen 1969)

-ǩuk^{w} - affix meaning 'looks like'

x̌ix̌icbuqǩuwiq - 'the goat's-beard plant' (Gill 1982)

-°iq - suffix roughly equivalent to English definite article 'the' or indefinite article 'a (an)' (Jacobsen 1979)

x̌ix̌icbux̌s → 'it looks like smelt eggs' (MP), 'herring eggs on the bush' (HI)

x̣ix̣icbuq^{w}x̣^{w}s - a type of flower, unidentified (Jacobsen 1969)

xa'xa'tsbūkkūk → 'flowers that look like herring eggs' (Gunther 1973:33)

Hihi'iboklosis → 'plant with flowers that look like

herring eggs' (Densmore 1939:310, 314)

q̓ʷa•yaxˇbap (sometimes approaches /q̓ʷa•yaxˇabap/)
- term used for male plant, as no female plant was available for study with II, it is not known if the term /q̓ʷa•yaxˇbap/ is limited to male plants or if it also applies to females

This species was used by the Makah for medicine (II). The roots were simmered, never boiled, to make a medicine to treat rheumatism (MP). The roots were reputed to be very good medicine (HP) and are also beleived to be a source of dye (HP). According to HW, the roots were used in the same manner as wild crab-apple (Pyrus fusca Raf.) and "the fern" (Polypodium glycyrrhiza). The juice of the roots was taken for internal healing (HW). The roots was pounded, soaked in water, and the liquid drunk (HW). LC and RX did not know any Makah name or use for this plant.

Gunther stated that the Makah drank an infusion made from the roots for kidney trouble and gonorrhea (1973:34). Densmore said that the leaves were chewed as a remedy for people spitting blood and showing symptoms of tuberculosis (1939:313). She also noted that the fresh roots were ground on a rock slab, a small amount of water added, and this mixture drunk cold with no other preparation as a remedy for pain in the area of the kidneys (Densmore 1939:314).

Fragaria chiloensis (L.) Duchesne

Coastal strawberry

M: ha•ditap (HW, MP, RC) - wild strawberry fruit, this term

used for commercial strawberries

xadi̱tup (Goss, Ides & Ides 1974)

xadi'tap (Gunther 1973:36)

háh-de-tup (Swan 1870:103)

hár-de-tup (Swan 1870:101)

N: tù?ulq - fruit (JT)

tù?ulqapt - plant (JT)

The fruit are eaten fresh by the Makah (AT, HW, TL; Densmore 1939:320; Gunther 1973:36) and used for jams and jellies (HW). Gunther (1973:36) said the Makah usually ate the fruit in "picnic fashion," that parties of women and children would go to the strawberry fields to pick and eat them on the spot because the fruits were too small and soft to transport.

The Quileute (Gunther 1973:36; Powell & Jensen 1976:73; Reagan 1934), Quinault (Gunther 1973:36), and Hesquiat (Turner & Efrat 1982:72) also ate the fruit, and the Quileute chewed the leaves and spat them on burns (Gunther 1973:36). Strawberries were usually eaten fresh by coastal peoples as the fruit did not preserve well by drying (Turner 1975:197).

Holodiscus discolor (Pursh) Maxim. (Gill #1980:468)

Oceanspray

M: tsik'wip (Gunther 1973:33)

N: ciysapt - plant (JT)

kaleyk - term for the wood when it is made into sticks for barbecuing fish (JT).

This species was used for medicine by the Makah (HP). Gunther (1979:33) said the Makah peeled the bark, boiled it, and used the resultant tea as a tonic for convalescents and athletes. II and MP knew of no Makah name or use for this species.

Among the Nitinaht the wood has a reputation for being very hard. Nitinaht children use it to make practice bow and arrows, and the women use it for knitting needles (JT). The branches are also used for holding fish while barbecuing because they don't burn (JT), a property also recognized by the Swinomish (Gunther 1973:33). The wood was widely used in western Washington for roasting tongs (Gunther 1973:33) and in western Washington and British Columbia for digging sticks (Gunther 1973:33; Turner 1979:236).

Oemlaria cerasiformis (H. & A.) Landon

[=Osmaronia cerasiformis (T. & G.) Greene]

Indian plum or osoberry, locally called wild cherry (HI & HW)

M: ẋaqaš̆bap (HI & HW)

[HI and HW were uncertain as to whether this term properly refers to this species or Rhamnus purshiana DC.]

The bark contains a healing agent and can be used as a mild laxative (HI). According to HI, her father said that this species was known to cure tuberculosis just by drinking tea made from the bark. For medicinal purposes the whole bark is boiled like tea to make a dark brown, bitter drink (HI).

HI and HW said that a long time ago the Makah stripped the bark from around the stem or branch, and used this to bind the harpoons. HI noted that these strips are strong, and thought that it was the inner part of the bark that was used for stripping. Neither HI no HW had heard of eating the fruit.

JT knew of no Nitinaht name or use for this species.

Potentilla pacifica Howell

(Gill #1980:453; #1980:561; Gross #41, mcrc)

Pacific silver-weed or cinquefoil

M: ƛičsap (II, JT), term used for both plants and roots

[Gunther (1973:29) gave the phonetically very similar Makah term /klitc'sapbupt/ for whole Ranunculus reptens (=R. flammula) plants and /klitc'sap/ for the leaves, but this apparently was a misidentification.]

ki'chapi (Densmore 1939:310, 320)

[Densmore gives the species as P. anserina L., which looks very similar to P. pacifica. P. anserina occurs mostly east of the Cascade Mountains (Hitchcock & Cronquist 1973:216) and is not known from Makah territory.]

N: ƛicsap - roots (JT)

The Makah ate the roots of this species (MP; Densmore 1939:320, see note above). The Nitinaht rub off the outer "bark" (JT) and eat the

roots raw (HP, JT) or steam them (JT). HI, HW, and LC knew of no name or use for this species.

The Quileute steamed the roots and dipped them in whale oil before eating (Gunther 1973:37). The Hesquiat dug the roots in mid-July and boiled or steamed them and then ate them with oil or "stink salmon-eggs" (salmon eggs that have been aged for several months before eating). The Hesquiat placed the ends of the roots back in the ground to grow for the following year (Turner & Efrat 1982:73). Turner (1975:200) said that Potentilla pacifica roots were utilized as food by almost all coastal peoples. Cinquefoil patches were often "owned" by certain chiefs among the Nootka, and that other persons were not allowed to dig the roots without asking permission, sometimes having to pay for the privilege (Turner 1975:200; Turner & Kuhnlein 1982). Contrary to HP's and JT's information concerning the Nitinaht, Turner (1975:200) said that the roots were never eaten raw, as they are very bitter.

Prunus emarginata (Dougl.) Walp.

Bitter cherry, wild cherry

M: ƛ̓ix̌a•ʔap̓aɬ → 'red on one side' - cherry bark (HI & HW)

ƛ̓ixa•- - red

ʔap̓aɬ - 'one side'

h̄le-ha-bah̄l-e-b̆up - cherry, species not given (Curtis 1916:203)

N: di•d̓ik^{w}a•d̓ibapt (JT)

This species does not presently occur in Makah territory, the nearest known localities are on the northern part of the Olympic Peninsula to the east (Buckingham & Tisch 1979:47). Since no specimens were available for examination by the consultants in this study, the taxonomic identity of the plant material used by them is not certain.

Swan (1870:41) reported that wild cherry bark was used by the Makah to lash the the bone barb of a halibut hook /čibu•d/ in place. Harpoon lanyards made of whale sinew and wound with nettle fiber string were wrapped with cherry bark (Waterman 1920:37). The Makah used wild cherry bark as a blood purifier (MP), tonic (MP), and as a laxative (HW). Gunther said that the Makah burned Prunus emarginata bark with Picea sitchensis bark and applied the charcoal powder to an infant's navel when the cord came off (1973:17). Swan said that the Makah make a medicinal tea from wild cherry bark, but he did not specify the purpose of this medicine. The Quinault used cherry bark as a purgative (Olson 1936:181).

The Nitinaht used strips of cherry bark for baskets (JT), as did the Hesquiat (Turner & Efrat 1982:73), southern Kwakiutl (Turner & Bell 1973), Puget Sound Salish groups (Gunther 1973:37), Coast Salish of British Columbia (Tuner 1979:238; Turner & Bell 1971a), Klallam (Fleisher 1980), and perhaps the Quinault (Gunther 1973:37).

Wild cherry bark was also used by the Quinault in tying the prongs of fish spears (Gunther 1973:37), by the Hesquiat in harpoon manufacture to fasten the head to the shaft (Turner & Efrat 1982:73), by the Vancouver Island Salish in the manufacture of harpoons, spears, fishing lines, nets, bows, and arrows (Turner & Bell 1971a), and by the southern Kwakiutl to tie up harpoons, flounder spears, and arrows (Turner & Bell 1973).

Pyrus fusca Raf. (Gill #1979.5:11MP; #1980:463; #1980545)

Crab-apple

M: ciẍapiẍ → 'sour spherical object' - fruit

(HI & HW, HP, HW, II, LC, MP, MLP)

[/ciẍapiẍ/ is occasionally applied to Ribes divaricatum (HP)]

ciẍ- - sour (Jacobsen 1969; 1971)

ciχi•p̓aɬ - 'to taste sour' (Jacobsen 1969; 1971)

tiẍapiẍ - fruit (MP)

cixapiχ (Goss, Ides & Ides)

tsīxa'pix - fruit (Gunther 1973:38)
t̂sĭ-ĥŭp-iĥ (Curtis 1916:200)

ciẍapiẍbap - tree, leaves (HP, HW, HI & HW)

ciẍi•bap - tree (HW) → 'sour plant'

[this term also used for Oxalis oregana Nutt. (HP)]

tup!kū'bupt - plant (Gunther 1973:38)
dópt-ko-bupt (Swan 1870:101)

c̓aqa•bisu•c ciẍapiẍbap → 'bark belonging to crab-apple plant' (Gill 1982)

ciẍapiẍpaɬ → 'crab-apple season' (September) (MLP)

N: ciẍapx̌ - fruit (JT) → 'sour round object'

ci•χ- - sour (Jacobsen 1969)

ciẍapx̌apt - tree (JT)

ciẍapx̌i•c c̓aqabs → 'crab-apple's bark' (JT)

The fruit are eaten (Densmore 1939:308-309) when ripe (LC, MP), especially by children (Gill 1982), and used to make jelly (II, MP). According to Gunther (1973:38), the Makah, Quinault, Lower Chinook, and Cowlitz all softened the fruit by storing it in baskets, whereas the Quileute, Swinomish, and Samish ate the fruit raw. Throughout coastal British Columbia crab-apples were important as food. Generally the fruit were harvested green and allowed to ripen in storage (Turner 1975:202-204). The Hesquiat ate crab-apples, and dried the fruit after which it was stored in boxes lined with cedar-bark matting (Turner & Efrat 1982:73). Apparently the Nootka took much care of their crab-apple trees (Turner 1975:203), indicative of the importance of this species in Nootkan society.

According to LC, the most popular and healing medicine to the Makah was crab-apple bark. A small amount of bark was taken and steeped "just a little bit." If steeped too long, it would cause vomiting (LC). HW said this medicine was prepared either by soaking the bark a few days or by boiling it "a short time" and then drinking the solution the following day when cold. LC said the strength of the preparation can be increased with time so that after three months a strong solution can be taken without vomiting. The bark is used for just about any internal ailment (HW), to heal whatever is wrong with one (MP), and was considered a complete medicine all in itself (LC). The bark of larger trees was peeled for use as a laxative (MP). Crab-apple bark was used to heal "your insides" (HW), ulcers (HW), and the heart and other internal organs (LC). The bark is also used as a "blood purifier" (MP). LC said it "puts something in your blood that cuts down the clots." Crab-apple was also

used for treating fractures and to "cure" tuberculosis (ZI), and as a tonic (HI; Densmore 1939:315, 318). HP also noted the use of crab-apple for medicine.

According to Gunther (1973:38), the Makah peeled the bark and soaked it in water which was then drunk for intestinal disorders, dysentery, and diarrhoea. Densmore (1939:315, 318) reported that a decoction of crab-apple bark was used for washing sores, for boils, or for a bad case of bleeding hemorrhoids. For lung trouble, the Makah chewed the leaves which had been soaked in water (Gunther 1973:38). Gunther said the leaves are "very bitter" and "make one feel drunk" (1973:38). This drunken feeling is probably caused by cyanide poisoning.

Among the Nitinaht the bark and roots of crab-apple were both used as a tonic for young men in training. Crab-apple was also used as a medicine. Following treatment with an extract of Sambucus racemosa L. var. arborescens (T. & G.) Gray during puberty rites, Nitinaht boys were given crab-apple as a tonic to "repair the damage done by the elder" (JT).

The Quileute used a tea made from crab-apple bark for lung trouble (Gunther 1973:38). Crab-apple tea was also used as a remedy for gonorrhea (Reagan 1934). The Klallam and Quinault used an infusion of crab-apple bark as an eye wash (Gunther 1973:38). Crab-apple bark tea was used by the Quinault "to cure 'any soreness inside, for it goes all through the blood'" (Gunther 1973:38).

Rosa nutkana Presl var. nutkana (Gill #1980:547; #1846)

Nootka rose

M: χi•q̓ʷa•y - hips (II)
k̓liqwa?abap (Goss, Ides & Ides 1974)

k!liqwai''abupt (Gunther 1973:34)

klikwat'ibak → 'plant which produces rose berries'
- Rosa sp.[4] (Densmore 1939:315)

klilwa'tibat → 'it produces klikwatroseberries'
- Rosa sp.[4] (Densmore 1939:310)

k̓lí-ḳai - rose hips (Curtis 1916:200)

N: pat?ay - hip (JT)

The Makah ate the hips (HP, II, MP; Gunther 1973:34), but they were not favored because they are so seedy (II). HP said the seeds were removed before eating the hips. The Nitinaht also ate the hips and petals for food (JT). Nootka rose leaves occasionally were used by the Makah for tea (HW). The Makah (children?) also used to thread the hips to make necklaces. Densmore (1939:315) said the leaves of Rosa sp.[4] were mashed and used as a poultice for any sore. It was supposed to be good for severe pain and any form of abscess. The leaves were also used as a poultice for sore eyes (Densmore 1939:315). A decoction of the leaves was similarly used (apparently as an eye wash) (Densmore 1939:317).

The Hesquiat, Swinomish, Snohomish, Quinault, Saanich, Cowichan, Bella Coola, Haida, and Tsimshian ate the hips for food (Gunther 1973:34; Turner 1973; 1975:206; Turner & Bell 1971a; Turner & Efrat 1982:74). The Klallam ate the hips to sweeten their breath (Gunther 1927:305; 1973:34).

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[4] Rosa nootkana var. nootkana is the only indigenous rose species known to occur in Makah territory.

The Kwakiutl, however, state that eating the hips would give one "an itchy bottom" (Turner & Bell 1973). The Menominee of northeastern Wisconsin believed that eating Rosa humilis Marsh. hips would cause a healthy person to get an "itching like the piles" (Smith 1923:50). Smith gave the Menominee name as /sipitiä'min/, meaning "to itch (like the piles)." He also believed that the Meskwaki and Prairie Potawatomi names for Rosa blanda Ait., /sipitia'min/ and /sipitiamin/, respectively, mean the same as the Menominee term (Smith 1928:242-243).

Rubus discolor Weihe & Nees

Himalayan blackberry

The fruit are eaten by the Makah. Blackberries did not formerly occur at Neah Bay, and thus there is, according to LC and RC, no Makah name for them.

Rubus laciniatus Willd. (Gill #1980:556)

Cut-leaf blackberry

M: ʔiʔi•x̌iq qaqawaš̀kuk^{w} → 'it looks like big salmonberries'
(II)

ʔiʔi•x̌^{w} = big
-ºiq - article suffix approximately equivalent to the English 'the'
qawaš̌- - refering to salmonberries
-k̀uk^{w} - suffix meaning 'looks like'

N: qaqawš̌ak̀k^{w} → 'looks like salmonberries' - this term

also used for raspberries (JT)

The Makah eat the fruit of this European species fresh (II; Densmore 1939:319) and use them to make pies and jam. LC and RC believe (correctly) that blackberries did not occur at Neah Bay 80 to 100 years ago, and thus there are no well known names for these species. II's name for R. laciniatus is typical of many names given introduced species in that it is a secondary lexeme.

Rubus leucodermis Dougl. (Gill #2111)

Black-cap

M: ciciyapux^{w}sk̓uk^{w} → 'looks like hats' (HI, JT), term also used for mushrooms (HW)

cikya•pux^{w}s, ciya•pux^{w} = hat

-k̓uk^{w} - affix meaning 'looks like'

N: ciciypak̓k^{w} → 'looks like hats' (JT)

Black-caps are eaten fresh and used for pies and jam (MF). They do not grow in the Neah Bay area and today are collected in the Pysht region.

Rubus parviflorus Nutt. (Gill #1980:553)

Thimbleberry

M: lu•lux^{w}ac - fruit (HI, HP, HW, II, MP, RC, MLP; Jacobsen 1979:3), sometimes sounds like /lu•lu•x^{w}ac/

loloqwacas (Goss, Ides & Ides 1974)

lu•lux^{w}acbap - plant (HI, HP, HW, MP), sometimes sounds like /lu•lu•x^{w}acbap/

lu•lux^{w}bap - plant (HP)

lūlūwats (Gunther 1973:34)

Lulu'whatsbup → 'plant bearing thimbleberries' (Densmore 1939:311, 319)

lo-lo-wits (Swan 1870:101)

[Swan identified this plant as R. odoratus, a species of eastern North America. There can be little doubt that R. parviflorus is the intended species.]

lu•lux^{w}acpaɬ → 'thimbleberry season' (July-August) (HW, MLP)

qa•ɬqawey - sprouts (HI & HW, II)

→ 'puny little objects around' (HI & HW),

'prickly' (HW)

qa- - 'to prick' (HI & HW; Jacobsen 1971)

kothl-kowie (Swan 1870:101, see note above)

q̓uq̓u•skadɬ - sprouts (MP), this term is usually reserved for Rubus spectablis Pursh sprouts.

N: ʔeʔciy̓ - fruit (JT)

ʔeʔciyapt - plant (JT)

ʔicsiy̓c - fruit (JT)

JT also used the terms /ʔicsiy̓c/ and /ʔeʔciy̓/ for large-leaf clover (Trifolium sp.)

Formerly the fruit were just eaten fresh (II, LC, MP, TL; Densmore 1939:315, 319), but more recently it has been discovered that the fruit make good jam (II) and jelly (MP). The sprouts were also eaten (HP, II,

MP; Gunther 1973:34; Swan 1870:25, see above note), although less frequently than Rubus spectabilis sprouts /ququ•skad(i)l/. Unlike salmonberry sprouts, thimbleberry sprouts were not cooked, rather, they were eaten raw (II). Thimbleberry sprouts are not considered as tastey as salmonberry sprouts, being somewhat bitter (HP). The leaves were collected in autumn, boiled, and the resultant tea drunk for anemia and to strengthen the blood (Gunther 1973:35). Densmore also noted that the dry leaves had a medicinal use (1939:319) and that a "certain growth on the plant" was powdered and applied to sores (1939:315).

The fruit were eaten by most if not all of the coastal peoples in Washington and British Columbia (Gunther 1973:34; Turner 1975:215). The young sprouts were eaten by all coastal groups in British Columbia (Norton 1981; Turner 1975:215) and the Klallam, Swinomich, Samish, and Upper Skagit of Washington (Gunther 1973:34). Sprouts were very popular among the Hesquiat (Turner & Efrat 1982:74).

Rubus spectabilis Pursh (Gill #1979.5:5MP; #1980:422; #1980:454)

Salmonberry

M: qakwey - salmonberry fruit
(HP, HW, II, LC, MP, HI & HW, MLP)
[sometimes approaches /qakuwey/ (HP)]
qakawai, qakiwai (Goss, Ides & Ides 1974)
qakwašbap - salmonberry bush (HP, II, MP, RC, HI & HW; Jacobsen 1969)
[sometimes approaches /qakuwašbap/ (HP)]
ka'k'wē - fruit (Gunther 1973:35)

ka'k'wē'abupt - plant (Gunther 1973:35)

ka'knip - black salmonberries (Densmore 1939:310)

ka'kuip → 'the berries will be salmonberries'
(Densmore 1939:317)

kak-wé (Curtis 1916:200)

q̓uq̓u•skad(i)ɬ - salmonberry sprout

(HI & HW, HP, HW, II, LC, MP, MLP)

→ 'prickly things on it' (HW)

siqa•da•k quq•skad(i)l - cooked sprout (HP, HW & HI)

siqa• - to cook

t̓iči̓u•qʷey q̓uq̓u•skad(i)ɬ - sprouts steamed on hot rocks,
pit cooked sprouts (HW & HI, II)

t̓iči̓u•p = cooking pit

la•ʔlačx̌ qakwašbap - salmonberry flower (HP)

la•ʔalačx̌al qakwašbap (HW & HI),

la•la•ʔlačx̌al qakwašbap (MP) - salmonberry bushes
in bloom

la•ʔalačx̌s̓ʔal qakwašbap - salmonberry bushes coming into
flower (HI & HW)

la•ʔlačx̌ = flower

qulu•l - young, unripe salmonberry fruit (HW & HI)

č̓a•wic̓key → 'transparent becoming water' - almost ripe
salmonberry fruit (HW & HI)

siqi•ʔal qakwey → 'already cooked salmonberries - ripe
salmonberry fruit (HW & HI)

kʷa•sukʷ - salmonberry stems when they turn to wood
(HI & HW)

q̓uq̓u•skad(i)ɬpaɬ → 'salmonberry sprout season (May) (MLP)

qakwaš̓paɬ → 'salmonberry season' (~June) (MLP)

N: qaway - fruit, also used as a general term for Rubus spp. fruit (JT)

č̓a•ẃ̓ickay̓ → 'transparent becoming watery' - almost ripe salmonberries (JT)

šišič̓qa•d̓ɬ → 'sharp along the length of it' (JT)

-d̓ɬ - 'along the length' (JT)

Salmonberry fruit and sprouts were used for food throughout western Washington and coastal British Columbia (Gunther 1973:35; Turner 1975:220-221). According to Gunther (1973:35), the fruit was considered too soft to preserve thru drying. Salmonberry plants were perhaps the most important food plant for the Makah. The fruit are eaten fresh during June and July (HP, HW, II, LC, MP; Densmore 1939:320; Swan 1870:25) and canned for winter use (HW, II, MP). Currently they are also frozen (Gill 1982). Generally the Makah did not dry salmonberries (MP, II), because the fruits were considered too wet for this preservation method (II). Occasionally, however, salmonberries and elderberries [Sambucus racemosa L. var. arborescens (T. & G.) Gray] were mixed and dried together (Gill 1982). MP, however, doesn't think that salmonberries were ever mixed with elderberries. Evidence from the Ozette Village archaeological site indicates that salmonberries were an important food to the people living here, and that they may have mixed elderberries with salmonberries, or even made dried salmonberry-elderberry cakes.

Sprouts reached peak availability in early May, and were eaten in quantitiy by the Makah (Gill 1982; Swan 1870:25). They were collected when about 30 cm long (Gill 1982) and were eaten (LC) raw after peeling (HW, II, MP) or after steaming for a couple hours on hot rocks (HW, II, MP). Sometimes the sprouts were boiled before eating (HP). The availability of large amounts of sprouts was often the occasion for sprout parties (MP). Makah women would collect canoe loads of sprouts and pit steam them on the beach (HI). People would sing and dance while waiting for the steaming sprouts to finish cooking (HI). Salmonberry sprouts were often eaten with fermented salmon eggs /ʔacpa•b/ collected during the previous autumn (AT, HW). R. spectabilis was also used medicinally by the Makah. They pounded the bark and laid it on aching teeth or festering wounds to kill the pain (Gunther 1973:35). Women scraped up, chewed, and swallowed the paper-like bark to check hemorrhages following childbirth, the quantity used was "'a little handful at a time'" (Densmore 1939:317).

The Makah used dried salmonberry branches for pipe stems (Swan 1870:27).

Rubus ursinus Cham. & Schlecht. (Gill #2110)

Pacific blackberry or dewberry

M: čičeyas → 'vines on the ground' (LC)

čiči•yas → 'strung out on the ground' (HI)

čiče / čiči• - string or rope

-yas - affix meaning ground

čičeyas qaqawaškuk^{w} → 'it's strung on the ground that way' (II), lit. 'looks like salmonberries strung out on

the ground'

qawaš- - refers to salmonberries

-ʔkukʷ - affix meaning 'looks like'

tsee-tsee-ess - 'vine evergreen' (Swan 1870:101), Swan made no other identification of this plant, but it seems likely that it is Rubus ursinus.

The fruit are eaten fresh by the Makah (II, LC) and used for pies and jam (MF). They are harvested during July and early August (AF, KF, MF). Rubus ursinus does not grow in the Neah Bay - Ozette area, the closest occurance is near the mouth of the Hoko River and below Hoko Falls near the Hoko River bridge. At present the fruit are usually collected in the Clallam Bay - Pysht area.

Several peoples on Vancouver Island and the coast of southern British Columbia ate the fruit fresh or mashed and dried the fruit into cakes for storage (Tunrer 1975:223; Turner & Efrat 1982:75). The Hesquiat also boiled the entire "vine" and drank the resulting solution for stomach troubles and a general sick feeling (Turner & Efrat 1982:75).

Rubus sp(p).

Raspberries

M: qaqawaškukʷ → 'they look like salmonberries'
- fruit (II, RC)

kakawaškuk (Goss, Ides & Ides 1974)

lú-luh-wúčs - 'black raspberries' (Curtis 1916:200), this term is generally reserved for Rubus parviflorus

(thimbleberry)

N: qaqawšakk^{w} → 'looks like salmonberries' - fruit, this term also used for blackberries (JT)

Raspberries are not native to the Neah Bay area, but have been cultivated in gardens, especially during the earlier part of the twentieth century.

Sorbus aucuparia L. (Gill #1891)

European mountain-ash or rowan tree

No Makah name or use is known for this introduced European species (HP, II, MP).

Sorbus sp.

Mountain ash

N: čaxeyksapubapt → 'adze-handle plant' - plant (JT)

čaxeyk - adze

čax- - to adze (Haas 1972)

sapub - handle

-apt - affix meaning 'plant'

The Nitinaht do not use the fruit (JT).

FABACEAE OR LEGUMINOSE — THE LEGUME FAMILY

Lathyrus japonicus Willd. var. glaber (Ser.) Fern.

(Gill #1980:421; #1980:522; Gross #12,mcrc)

Beach-pea

No terms are known for this species in Makah (HW, II, LC, MP) or Nitinaht (JT), nor were any uses known by the individuals cited. TL, however, said the immature seeds are eaten as peas (Makah). Turner and Efrat (1982:68) report that the Hesquiat did not eat the seeds nor did they use the plant.

Trifolium wormskjoldii Lehm. (=T. fimbriatum Lindl.)

Trifolium spp. (Gill #2172)

Springbank or beach clover, clover

M: ḵo•xtap - Trifolium sp. (II)

ḵo•x- → 'suck on it' (JT), in reference to nectar in flowers

kɬōxtap → T. wormskjoldii (Gunther 1973:38)

N: ʔicsiy̓c - 'large-leaf clover' (JT)

ʔeʔciy - 'large-leaf clover' (JT)

[JT also used terms /ʔicsiy̓c/ and /ʔeʔciy̓/ for thimbleberry (Rubus parviflorus).]

naxu• - 'small-leaf clover,' has longer petioles and more pointed leaflets than large-leaf clover (JT)

Gunther (1973:38) found that the Makah used the roots of T. wormskjoldii for food after steaming them. Densmore (1939:319) said the plant was found on Tatoosh Island and was eaten for food by the Makah. II said that her grandmother used to dig two kinds of roots at "the prairie." She said one type was "real sweet, white, and stringy." The names of the two roots were /ʔko•xtap/ [Trifolium sp.] and /ɬičsap/ [Potentilla pacifica]. HW knew of no Makah names or uses for clover. HI thought clover was used for medicine of some kind.

Among the Nitinaht small-leaf clover roots were eaten raw or cooked with fermented salmon eggs, N: /ʔacpa•b/ (JT). These roots reportedly have a floavor similar to ginger (JT). The roots of large leaf clover were also eaten (JT).

Turner (1975:167) said that Indian people differentiate between two types of Trifolium wormskjoldii "roots," the long rhizomes and the short fleshy taproots. In most literature accounts it is not clear whether the "roots" refered to are actual roots or the rhizomes.

The Hesquiat ate large quantities of T. wormskjoldii rhizomes. These were dug in autumn after the leaves had died down (Turner & Efrat 1982:68). The ends of the "roots" [rhizomes] were placed in the ground to propagate (Turner & Efrat 1982:68). Among the Nootka tales of famous feasts give accounts of steaming clover "root" piles so high that young men had to climb up on the roof of a house to pour water on them to make steam (Drucker 1951:62). The utilization of T. wormskjoldii "roots" by the Nootka, Kwakiutl, and Haida showed characteristics similar to agriculture, in that larger rocks and sticks were removed, and only the

largest rhizomes were harvested (Turner 1975:164; Turner & Bell 1973), but Drucker (1951:57) maintains that the Nootka did not intentionally clear or weed clover patches. Among the Nootka, Kwakiutl, and Haida clover patches were owned by chiefs, families, or individuals (Drucker 1951:57; Turner 1975:164).

Vicia gigantea Hook. (Gill #1980:239; Gross #13, mcrc)

Giant vetch

M: čàčà•pacaqƛi•bap → 'looks like canoes on the back part of them' (JT), refering to the seed pods

čàpac - canoe (MLP 1979)

-aqƛ- - inside

-bap - plant

tcatcapatsaklī'bupt → 'canoe plant,' because the pods are shaped similar to canoes (Gunther 1973:39)

chicha, patsklibap → 'plant bearing moss' (Densmore 1939:320), this term is phonetically similar to the preceding, and has no apparent relationship to moss, /pàu?up/

N: čàčàpacaqƛapt → 'looks like canoes on the back part of them' (JT)

According to HP, this is a Makah "love medicine." She said that if you want your girl-friend to love you, take the plant and rub down with it after bathing, and she will love you forever. HW, II, and LC knew of no Makah name or use for this species, and JT knew of no Nitinaht use.

Densmore (1939:320) found that young Makah girls pounded the root of this plant and rubbed it on their bodies to attract boys. Gunther (1973:39) said that the Makah soaked the roots and used the resulting solution as a hair wash. She also said that among the Quinault deserted spouses would rub themselves with giant vetch roots, wrap them up, and place them under their pillows to bring back their mates (1973:39).

OXALIDACEAE — THE WOOD-SORREL FAMILY

Oxalis oregana Nutt. (Gill #1980:449)

Oregon wood-sorrel, "sour-leaves"

M: čeˑbaxbap → 'sour plant,' called this because it tastes sour (MP), HI indicated an alternative form of this terms exists in which /č/ is replaced by /c/.

čeˑbaxyul - sour (MP)

cabaxšiɬ - sour (HI)

cabaxšil - it's sour (HI)

ciχiˑbap → 'sour plant' (HP), HW used this same term for crab-apple tree (Pyrus fusca Raf.)

ciχ- - sour (Jacobsen 1969; 1971)

ciχiˑpaɬ - 'to taste sour' (Jacobsen 1969; 1971)

Chaiba'kcun, Tcaiba'kcun → 'sour' (Densmore 1939:310, 313)

The Makah collect the leaves of this plant along creeks (HP) and eat them fresh (HP, MP). According to Densmore (1939:313) the Makah ate the whole plant either fresh or cooked in a very small amount of water as

a remedy for "summer complaint." JT knew of no Nitinaht name or use for this species.

ACERACEAE — THE MAPLE FAMILY

Acer circinatum Pursh and Acer macrophyllum Pursh

Vine maple and big-leaf maple, repectively

N: daqcapt → 'oil dish plant' - vine maple tree (JT)

daqac - oil dish (JT)

ʔibiċqapt - big-leaf maple tree (JT)

ʔabiċqapt - maple (Jacobsen 1969)

MP said the Makah used maple for making baskets. II knew no Makah name or use for either maple species because they did not grow in the Neah Bay - Tsues area. Canoe bailers were hollowed from single blocks of maple or alder (Waterman 1920:27). Swan (1870:43) found that bowls were sometimes made from knots taken from decomposed logs of maple. During the mid-nineteenth century masks were sometimes made of maple, principally by the Clyoquot and Nitinaht, who sold them to the Makah (Swan 1870:69).

Native peoples of the Northwest coast used maples for many technological purposes (see Gunther 1973:39-40; Turner 1979:154-155, 159-162). The Clyoquot Nootka and Quinault made large, open-work carrying baskets from vine maple splints (Gunther 1973:40; Turner 1979:154), and the Quileute, Quinault, Chehalis, and Lummi used maple for the wattleworks of fish traps (Gunther 1973:40; Olson 1936:28, 36). Many of the native peoples having ready access to big-leaf maple used the wood for making

carved items, including dishes, bowls, spoons, spindle whorls, and canoe paddles (Gunther 1973:40; Turner 1979:160-161).

RHAMNACEAE — THE BUCKTHORN FAMILY

Rhamnus purshiana DC. (Gill #1980:571; #2169)

Cascara, chittam bark

M: ƛ̓akaš̌bap (HW & HI), HW and HI were uncertain whether this term properly refers to Rhamnus purshiana or to Oemlaria cerasiformis.

k̓lubuq̓wa·s̓ubap - cascara (Goss, Ides & Ides 1974)

Kla'bokusibup, Kla'boku'sibûp (Densmore 1939:310, 314), Densmore said this name is applied to Rhamnus alnifolia L'Her, however, this species is not known from the Olympic Peninsula (Buckingham & Tisch 1979:49), and it seems likely that a simple misidentification was made.

k!labuq!wacbupt (Gunther 1973:40)

N: s̓abasiʔ - approximate English equivalent is 'laxative'

The Makah mixed the bark of this tree with crab-apple bark so the crab-apple would not constipate the user (HP). They also used the bark as a laxative (HI, HW, TP). MP knew no Makah name or use for this species. The Nitinaht also used the plant as a laxative (JT). The Hesquiat harvest cascara bark in July and August, and it is said by them to be the best kind of laxative (Turner & Efrat 1982:72). Gunther (1973:40) said the

bark was used as a laxative everywhere in western Washington. Densmore stated that the Makah used the inner bark of Rhamnus purshiana as a remedy for dysentery (1939:314). For this remedy, the bark was peeled, pounded, added to water, and boiled, the proportion being a handfull of bark to quart of water (Densmore 1931:314). She also said a dececoction of Rh. alnifolia bark was used as a physic, and that it could be made stronger by boiling in sea water (Densmore 1939:314, see above note). According to Gunther, the Makah eat the berries fresh in July and August (1973:40). I am not aware of any other reports of the fruit being used for food among the native peoples of western Washington or coastal British Columbia.

THEACEAE — THE CAMELLIA FAMILY

Camellia sinensis (L.) Ktze.

Commercial tea

ti• (HW; Jacobsen 1971), English loan-word

ti•ʔiq - 'the tea' (Jacobsen 1971)

N: ti• (JT), English loan-word

The leaves are used by some Makah for poultices to stop bleeding (HW).

VIOLACEAE — THE VIOLET FAMILY

Viola adunca Sm.

Yellow violet

Gunther (1973:40-41) stated that Makah women eat the roots and leaves of this species during labor of childbirth.

ELAEAGNACEAE — THE OLEASTER FAMILY

Shepherdia canadensis (L.) Nutt.

Soap-berry or soopolallie

M: ʔpaca•ʔpacš → 'it foams' (HI, II, RC), lit. 'to foam occasionally' (Jacobsen 1971), term used for both the fruit and the dessert made from soapberries

ʔpac- = 'to foam' (Jacobsen 1971)

ʔpacšil → 'it's foaming'

ʔpacabis → 'foam'

ʔpaca•bis → 'foam' (Jacobsen 1971)

patsa'p'ats -berries or plant (Gunther 1973:41)

Soapberries do not grow in Makah territory. Instead they were and are obtained from friends and relatives or purchased from people from the Puget Sound area (II). At one time a pint of soapberries sold for five dollars (II). Sometimes soapberries are collected by the Makah during trips to Puget Sound and vicinity (HI). The berries were dried or canned for storage (HI). HI said that to make a desert, a large spoonful of soapberries is mixed with about ¼ cup water. This mixture is then whipped into a froth either by hand or with a salal (Gaultheria shallon Pursh) branch. Hands were carefully washed before preparing this food. Soapberries are somewhat bitter and at present the froth is usually

sweetened with sugar (HI). This method of soapberry preparation was very similar for all Pacific Northwest peoples having access to the fruit (Fleisher 1980:199; Gunther 1973:41; Turner 1975:134; Turner & Bell 1971a; 1973).

ONAGRACEAE — THE EVENING-PRIMROSE FAMILY

Epilobium angustifolium L. (Gill #1980:575)

Fireweed

M: popoxsa'dix → 'feather plant' (Gunther 1973:41)
this term also used for Eriophorum chamissonis
C. A. Mey. (Gunther 1973:41)

N: ʔaʔadakqi• → 'fire on the top part' (JT)
ʔadk- - fire (Haas 1969)
ʔaʔa•dku•k^{w} - fire all over (Haas 1969)

According to Gunther (1973:41), the Makah do not use this species.

ARALIACEAE — THE GINSENG FAMILY

Oplopanax horridum (Smith) Miq.

Devil's club

M: ʔa•ʔałbap (II)
ha•ʔałbap → 'fishing for plant' [fishing lure plant]
(HI & HW)

N: ʔayx^{w}q^{w}apt → 'cod fishing lure plant' - plant (JT)
ʔaʔayx^{w}s - cod fishing (JT)

ʔayx^{w}q^{w}eɬ̓k - cod fishing lure made of devil's club (JT)

ʕayx^{w}q^{w}apt → 'cod-fish lure plant' (Turner 1982)
q̓u•quɬ̓a•ckapt → 'cod-fish lure plant' - plant (JT)

q̓u•quɬ̓a- - propeller like lure for cod-fish (JT)

The Makah carved pieces of devil's club wood about 5 cm long to make lures for bass fishing (II) and they formerly made little hooks (TP) for catching bass (HP, MP). According to HP, these hooks could be used without bait because they were white.

The Nitinaht used devil's club wood for at least two types of fishing lures (Turner 1982). One type consisted of a small, fish-shaped piece of devil's club wood to which a hook and a line were attached. This was pulled through the water and functioned in a manner similar to modern fishing lures. It was especially good for catching "sea-bass" (Turner 1982). The second type consisted of a streamlined piece of red cedar (Thuja plicata) wood with a flat strip of devil's club wood fastened around the cedar wood lengthwise and lashed on the rear portion with Sitka spruce (Picea sitchensis) root. The devil's club wood strips extended to form two rounded wings which gave a propeller-like action to the lure (Turner 1982). This type of lure was pushed into the water from a canoe with a long pole and released. The lure then spins up to the surface of the water. When the cod would come to look at the lure, it was speared (JT; Turner 1982). The Hesquiat, Manhousat, and Klallam also used the wood to make fishing lures (Fleisher 1980; Gunther 1973:41; Turner 1979:173; 1982; Turner & Efrat 1982:61).

The use of devil's club for medicine is not very widespread among the Makah. HW said that the "Canadians" [Nitinaht] dig devil's club for medicine, but that the Makah use it only for fish hooks. An unspecified portion of the plant was used by the Makah to make poultices for sore spots, perhaps after cooking or boiling (DK). The plant [bark?] is also used for treating arthritis (AF). The bark (ZI) and root (HP) were both used medicinally, but for what illness wasn't indicated.

The Nitinaht used the bark to make a tea for treating arthritis, rheumatism, and bone ailments (JT; Turner 1982). An infusion of devil's club bark with Alnus and Abies bark (species not specified) was used for treating tuberculosis (Turner 1982). The Nitinaht burned the plant to make charcoal that was used to make a protective face paint for ceremonial dancers (JT; Turner 1982). Devil's club was considered sacred by the Nitinaht and neighboring Coast Salish groups. The Nitinaht used devil's club charcoal because the plant is spiney. A person wearing this kind of paint would have so much power you could not look them in the eye (JT in Turner 1982). The Nitinaht did not use the fruit (JT).

Devil's club was widely used for medicine in the Pacific Northwest. An excellent review of these uses is provided by Turner (1982), and only those uses recorded for the Quileute, Klallam and Nootka will be noted here. A decoction was used in a bath by the Ohiat for arthritis and rheumatism (Turner 1982). The Central Nootkan mixed the ashes of devil's club with water which they drank for strength (Turner 1982). The Quileutue or Hoh also used the plant for medicine (Reagan 1934).

The Hesquiat boiled the bark of devil's club, added various types of berries, including Vaccinium spp. and Lonicera involucrata, to the solution, and used the mixture to color basket materials and other objects (Turner & Efrat 1982:61).

APIACEAE OR UMBELLIFERAE — THE PARSLEY OR CELERY FAMILY

Angelica lucida L. (=Coelopleurum longipes Coult. & Rose)

(Gill #1980:413; #1902)

Seacoast angelica

M: hu•ba•q (HP, HW, MP)

[See Makah and Nitinaht terms for Heracleum lanatum Michx.]

MP noted that this species looks similar to wild rhubarb, but isn't. The peeled petioles (?) were eaten by the Makah (HW, MP). MP stated that neither the central stalk nor roots were eaten. According to Densmore (1939:314) this plant was chewed by the Makah as a physic.

Conioselinum pacificum (Wats.) Coult. & Rose

(Gill #1979.5:21; #1980:416; Gross #54, mcrc)

Hemlock-parsley

No name or use is known by the Makah for this species (HW, II, LC, MP). MP speculated that perhaps there was some food value to either the root or stem.

Glehnia leiocarpa Mathias (Gill #1980:560; #1850)

Glehnia

No Makah or Nitinaht name or use is known (MP, JT).

Heracleum lanatum Michx. (Gill #1980:414; Gross #14)

Wild rhubarb, Indian rhubarb, cow parsnip

M: ki•stap (HP, HW, II, LC, MP, MLP) - the outer portion (II)

qi•stap - term used for type with "dark strings" (HP)

kī'stop (Gunther 1973:42)

hu•ba•q (II, LC, MP, RX) - said to be very similar to /ki•stap/, only a different, milder, type (MP), apparently the petioles? (II)

N: qistu•p - leaf blade and petiole (JT)

hu•ba•q - hollow central stem of cow parsnip (JT)

[Note: The usage of these terms is not equivalent between Makah and Nitinaht. Hesquiat is more closely equivalent to Nitinaht: /hum̓a•q/ = stem of flower buds, /qilcu•p/ = young petioles (Turner & Efrat 1982:60).]

Heracleum lanatum was collected for food in the late spring before the plants started flowering (MP). The peeled petioles were eaten fresh (HP, II, MP) with oil (HP). The roots, however, were not eaten (II, MP). II said in the past it was difficult to obtain wild rhubarb

> "because, you know, just Waatch people used to get them. You know, there was no road them days, it was real treat to people when they'd get some."

Gunther (1973:42) said that the Makah ate the young tops raw in the spring, and later in the season also ate the stems. /hu•ba•q/ was a favored food of the Makah (LC, RX). According to LC it follows "fox-tails" [Equisetum telmateia] in season. LC described the preparation of /hu•ba•q/ as follows:

> "You cut it off the root, you don't pull it up... so it can grow next year. You cut it off and then you peel the outer skin. Then you eat the insides. This is also considered a kind of spring tonic."

/ki•stap/ is more bitter than /hu•ba•q/. It was eaten after peeling (HW). LC stated that one must take a knife and cut off the skin of /ki•stap/ because the skin is very bitter.

> "Our parents never cared for us to eat /ki•stap/ because if you got any of the skin around your lips, you know, you might get a sore" (LC).[5]

The leaves, however, were apparently heated and used as a compress by the Makah for treating eye problems (HW).

The central stalk is considered strong medicine by the Makah (ZI). The Nitinaht believe that if pregnant women eat the hollow stalks of cow parsnip, the children will be epileptic (JT).

Makah and Quileute girls made baskets of cow parsnip blossoms [inflorescences] by twining the flower stems with seaweed (Gunther 1973:42).

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[5] Stuhr (1933;137) stated that Heracleum lanatum is acrid, irritant, and poisonous. The sap of a related species of the Caucasus, H. mantegazzianum Samm. & Levier, causes severe blisters and rash, with scarring and brown discoloration of the skin that may last for many years (Hardin & Arena 1974:19). I have observed poison-ivy-like blisters on tourists at Ozette where Heracleum lanatum was implicted as the causitive agent by circumstantial evidence.

Heracleum lanatum was utilized as a green vegetable throughout much of British Columbia and western Washington (Gunther 1973:42; Turner 1975:105). Formerly both the young petioles and flower stalks were popular foods among the Hesquiat (Turner & Efrat 1982;60). The Quileute and Quinault dipped the young stems in seal oil when eating them (Gunther 1973;42). Apparently the shoots were a favorite food for the Quileute as Reagan (1934:66) said, "They will go miles for a mess of these shoots." Swan (1857:87) said that peeled cow parsnip stalks were eaten raw with dried salmon eggs in the Shoalwater [Willapa] Bay area. According to Ray (1938:121), the Lower Chinook ate both the root and stem of cow parsnip.

Oenanthe sarmentosa Presl (Gill #1980:417; #1980:586; Gross #39, mcrc)

Water-parsley, wild celery

M: wawakĭ'xbupt → 'frog plant' (Gunther 1973:42)

No name or use for this plant was known by the Makah or Nitinaht consultants (HP, HW, II, LC, MP, JT). Gunther (1973:42) stated that Makah and Quileute children used the older stems for whistles and that the Makah pound the root between stones and use it as a laxative, which was said to be very potent. Underhill (1944:65) reported that the Makah, Cowlitz, Skokomish, and Snohomish used the greens for food, the Hesquiat also may have eaten the stems of water-parsley (Turner & Efrat 1982:61).

CORNACEAE — THE DOGWOOD FAMILY

Cornus stolonifera Michx. var. occidentalis (T. & G.) Hitchc.

(Gill #2144)

Red-osier dogwood

M: kitɬčebap - dogwood, species not specified

(Goss, Ides & Ides 1974)

kitl-che-bupt - dogwood, species not indicated

(Swan 1870:101)

No name or use for this species was presently known by the consultants for either Makah or Nitinaht (HI, HW, JT). Swan said that inferior bows were made of a species of dogwood growing around Neah Bay (1870:47).

Cornus unalaschkensis Ledeb.

[Formerly Olympic Peninsula material was included in Cornus canadensis L. (see Part I), all usage data from the literature included here were listed under this taxon.]

Western bunchberry

M: būbūkwak!tibupt → 'berries with pebbles in them' - plant

(Gunther 1973:43)

būbūkwak!ɬt - berries (Gunther 1973:43)

Gunther (1973:43) stated that the Makah eat the berries, but that the Quinault considered them poisonous. The fruit are also eaten by the

Hesquiat (Turner & Efrat 1982:64) and other more northern coastal peoples (Turner 1975:131).

ERICACEAE — THE HEATH FAMILY

Arbutus menziesii Pursh

Pacific mandrone

JT knew no Nitinaht name or use for this species.

Arctostaphyllos uva-ursi (L.) Spreng. (Gill #1896)

Bear-berry or kinnick-kinnick

M: q^{w}iša• - smoke (noun), term for tobacco, kinnick-kinnick, any substance used for smoking (HW, MP)

q^{w}iš.- - to smoke (Jacobsen 1971)

q^{w}išapuɬ - habitual smoker (HW)

q^{w}iši•ʔiːks → 'eating smoke' - smoke (verb) (MP), lit., 'to consume smoke' (Jacobsen 1971)

-'iːks - 'to consume' (Jacobsen 1971)

kwīca' (Gunther 1973:44), probably equivalent to /q^{w}isa•/

kuušaa - 'tobacco' (Goss, Ides & Ides 1974)

kóo-shá - tobacco (Swan 1870:101), smoke (Swan 1870:103)

kush-á - tobacco, smoke (Swan 1870:104)

kush-sets - tobacco-pipe (Swan 1870:104)

kush-she-áiks - 'to smoke a pipe' (Swan 1870:104)

klár-kupt (Swan 1870:101), probably equivalent to /λaqap/,

meaning 'plant, bush, grass, leaves'

In Hesquiat A. uva-ursi is called /λaqapt/, which is also the term for 'any plant' (Turner & Efrat 1982:64).

N: bu•ʔk^{w}qχapt → 'burned inside plant,' probably referring to the fruit (JT)

bu•ʔaqχ → 'burned inside' (JT)

bu- - burning (Haas 1972)

II formerly picked kinnick-kinnick for her mother who dried it and sold it to smokers. The Makah also ate the berries (II). JT said the Nitinaht roasted kinnick-kinnick leaves to facilitate crushing them, and then smoked them. II stated that kinnick-kinnick does not grow in the Makah Reservation area. I have observed it only once in this region, on a rocky cliff south of Tsues. MP did not know this species.

Swan noted that the Makah sometimes smoked and that generally the material used for this purpose was "uva-ursi" mixed with a little tobacco (1879:27). He stated that

> "occasionally an Indian will swallow a quantity of the smoke, which, being retained a few seconds in the lungs or stomach, produces a species of stupefication, lasting from five to ten minutes and then passing off. (Swan ****:***)."

Underhill (1944:66) also noted the use of A. uva-ursi leaves for smoking by the Makah. Apparently the Makah did not smoke before European contact (Densmore 1939:15).

The use of Arctostaphyllos uva-ursi leaves for smoking was widespread throughout the North American range of the species. In the Pacific Northwest, intoxication resulting from "swallowing"

kinnick-kinnick smoke also has been reported for the Hesquiat (Turner & Efrat 1982:64-65), Quileute (Reagan 1934), Chehalis (Gunther 1973:44), Lower Chinook (Swan 1972:155), and Okanogan (Turner, Bouchard, & Kennedy 1980:101). The fruit were eaten by several indigenous groups in the Pacific Northwest (Gunther 1973:44; Turner 1975:140).

Gaultheria shallon Pursh (Gill #1979.5:17MP; 1980:580)

Salal

M: ƛ̓akyicapix̌ → 'purple round object' - salal fruit

(HI & HW, HW, II, LC, MP, RC, RX, MLP)

ƛ̓akyic - purple (HW & HI)

ƛ̓a-kíc̓s-up-iń (Curtis 1916:200)

ƛ̓akyicapix̌bap - salal plant (HI & HW, HW, MP)

ƛ̓akyicapix̌paɬ - 'salal berry season' (August) (HI & HW)

ƛ̓u•šakʌ ƛ̓akyicapix̌ - dried salal berry cakes (Gill 1982)

salax̌bap - salal plant, salal leaves (HW, II, MLP)

sala'xbupt (Gunther 1973:43)

salal'abup (Densmore 1939:314)

salo'labup (Densmore 1939:311)

xenyecipiɬ (Goss, Ides and Ides 1974)

The presence of an /N/ in the term indicates it is borrowed, as Makah words typically lack the /n/ sound.

bŭ-ká-baƛ̓ - salal roots (Curtis 1916:200)

N: ƛ̓eyicapx̌ - salal fruit (JT)

ƛ̓ayicapx̣ - salal fruit (Haas 1969)

ɮe•pat - leaves (JT)

łe•ptapt - plant (JT)

Both the Makah (HP, II, LC, MP; Densmore 1939:317, 319) and Nitinaht ate salal fruit. The berries were also dried for future use (HP, HW, II, LC, MP). HW said her grandmother used to mash the berries into cake about 15 - 20 cm square and 2 - 3 cm thick. These cakes were sun/air dried for winter use. The cakes were placed in the sun during the day and taken in at night. In the winter-time she would pull the cakes apart and soak them [in water], and "they would be just like fresh" (HW). HP also noted that salal berries were mashed up and made into cakes which were sun dried. These were made during "salal berry season" (August) (HP). Presently the Makah eat the fruit fresh and use them for pies (HP) and jellies (MP).

Salal berries were perhaps the most widely used fruit (both fresh and dried) on the Pacific Northwest coast (Gunther 1973; Turner 1975:141-142). The cakes were soaked in water to prepare them for eating, and dipped in whale or seal oil (Gunther 1973:43). The salal berry cakes made by the Lower Chinook weighed as much as 4.5 to 7 kg (Gunther 1973:43).

Salal leaves were used by the Makah to flavor smoked fish (HP, MP). They were also cooked with halibut /šu•yuł/ heads to remove the fishy taste of the heads (HW) and to add flavoring (II), a few branches being added to the cooking water (Densmore 1939:14). Formerly the Makah steamed halibut heads with salal leaves used for flavoring (HP, MP). MP said this imparted a "real good" flavor to the fish heads. For cooking spring salmon, a layer of salal leaves was laid on a rack above a fire,

the salmon placed on the leaves and then covered with cedar mats (Densmore 1939:14).

Salal branches were used to whip soapberries (Shepherdia canadensis) into froth (HI). The wood of salal has no known use (II).

The Makah chewed salal leaves as a remedy for thirst (ZI), to dry the mouth (LC), and to sweeten the breath (Densmore 1939:314, 317). The berries were used as a remedy for excessive menstrual flowing (Densmore 1939:317). Among the Nitinaht fresh salal leaves are soaked in hot water to make a tea which is used as a stomach tonic (JT).

The Makah (Gunther 1973:43; Swan 1870:27) and Quileute (Reagan 1934) used salal leaves for smoking.

Reagan (1934) reported that the Quileutue used salal brush in /χuk^{w}ali•/ ceremonies.

Ledum groenlandicum Oeder (Gill #1980:431)

Labrador tea, known locally as Indian tea, tea leaves, and cranberry leaves

M: ʔapʔesbap - leaves plant (HW, II, MP), lit. 'cranberry plant'

ʔapʔes - cranberry

-bap - affix meaning 'plant'

L. groenlandicum is called /ʔapʔesbap/ because it grows in close association with /ʔapʔes/. Consultants

recognized that /p̀ap̀ʔesbap/ and /p̀ap̀ʔes/ are different plants, despite their names.

pàpesbap (Goss, Ides & Ides 1974)

bū̀pesbupt - 'same name as cranberry, because they always grow together' (Gunther 1973:43)

N: ti•papt → 'tea plant' (JT), from English tea

The Makah steep Labrador tea leaves in hot water to make a beverage tea (HP, HW, II, MP; Gunther 1973:43). The tea is also used as a kidney medicine (HP). Vaccinium spp. leaves were similarly used. A tea made from L. groenlandicum leaves (or sometimes Vaccinium spp. leaves) and lots of sugar would be given to mothers after childbirth to bring back their strength (HW). HW said people "always had sacks of those cranberry [L. groenlandicum] leaves." HW doesn't know why Labrador tea plants are called /p̀ap̀ʔesbap/ since cranberries do not grow on them. The leaves are ready to harvest when the "wool" on the undersides of the leaves turns brown (HW), in the fall (HP). Gunther (1973:43) stated that a stronger infusion made from the leaves than that used for tea was used by the Makah as a blood purifier and that the same preparation was used by the Quinault for rheumatism. The Nitinaht use the tea as an appetite stimulant (JT). Several other coastal peoples used the leaves for tea (Turner 1975:143), and the leaves of Ledum spp. have been used for tea by various Indian and white populations across northern North America (Grieve 1971:460; Turner 1975:143; Turner & Szczawinski 1978:56-57).

Because many of the native terms for L. groenlandicum in western Canada are derived from the English /tea/, it has been suggested that this

species wasn't used as a beverage tea in this area prior to European contact (Turner 1975:144; Turner & Szczawinski 1978:57). Linguistic evidence from western Washington tends to support this view.

Menziesia ferruginea Smith var. ferruginea (Gill #1980:460)

Fool's huckleberry, rusty menziesia

This species was mistakenly identified by HP as /x̌ux̌uyaqX/, a Makah term usually applied to Vaccinium alaskaense Howell and V. ovalifolium Smith. MP knew of no name or uses for this species. According to Densmore (1939:320), the twigs were woven into matting together with cedar bark by the Makah and these mats were used to cover canoes to prevent cracking by the sun.

Monotropa uniflora L.

Indian pipe.

Gunther's informant knew of no Makah name or use for this species (1973:43).

Pyrola uniflora L. (=Moneses uniflora Gray)

Wood-nymph, one-flowered wintergreen

M: Kiki'chidoas, Kiki'tcidoas → 'growing on rotten logs,' term for the plant when it is used as a cough remedy (Densmore 1939:310, 313)

Tloho'chiklĭs, Tloho'chitlis → 'covered by something,' referring to the plant when it is used with a shell covering to treat abscesses (Densmore 1939:311, 315)

The Makah drank a tea made from the entire plant as a remedy for coughs. In mild cases this solution was taken in the morning and evening, in more severe cases the patient would drink freely of the tea (Densmore 1939:313). The leaves were mashed, heated, and placed in an Acmaea instabilis Gould (unstable limpet) shell which was then bound over an abscess to cause the formation of a blister and to draw out the pus (Densmore 1939:315). A similar method was used on wounds and injuries to prevent blood poisoning, and as a remedy for boils (Densmore 1939:316).

Pyrola sp.

According to Swan (1870:79), the Makah bruised Pyrola elliptica into a pulpy mass and applied it by means of a bandage as a rubefacient to tumors. He said the plant is very common in the woods and is capable of causing a blister on the skin of a white person (Swan 1870:79). P. elliptical does not occur on the Olympic Peninsula (Buckingham & Tisch 1979:48; Jones 1936:207). The only member of the genus known from Makah territory is Pyrola uniflora. Perhaps this is the species to which Swan was referring.

Vaccinium alaskaense Howell (Gill #1980:444)

Alaska huckleberry, blue huckleberry

M: x̌ux̌uyaqX - fruit (HI & HW, MP)

→ 'they've got slivers on them [inside],' refering to the persistent styles on the fruit (HI & HW)

x̌ux̌uyaqχbap - plant (HI & HW)

xoxoyaktɬ - 'blue huckiberry,' species not indicated (Goss, Ides & Ides 1974)

The Makah eat the fruit fresh on the spot and they also canned them with red huckleberries (Vaccinium parvifolium Smith) (MP). Formerly all huckleberry species were dried into cakes for future use (HI).

Turner (1975:146) reported that the fruit were eaten fresh or dried in cakes by practically all coastal Indian groups of British Columbia.

Vaccinium ovalifolium Smith (Gross #55, mcrc)

Blue huckleberry, oval-leaf huckleberry

M: x̌ux̌uyaqχ (HI & HW, II), approaches xoxoyaqλ in pronunciation (II),

fruit, → 'they've got slivers on them [inside],' referring to persistent styles on the fruit (HI & HW)

xoxoyaktɬ - 'blue huckleberry,' species not indicated (Goss, Ides & Ides 1974)

xōxōyak (Gunther 1973:44)

x̌ux̌uyaqχbap - plant (HI & HW)

yayax̌a•d - fruit (LC)

The fruit are eaten fresh by the Makah and canned for winter use (II). Formerly all species of huckleberries were dried into cakes for future use (HI). The leaves are used for a strengthening tea served with lots of sugar given to mothers after childbirth (HW). Ledum groenlandicum leaves were also used for this purpose, and were generally preferred to Vaccinium spp. leaves (HW).

The fruit were eaten fresh or dried into cakes by virtually all Indian peoples in western Washington and coastal British Columbia (Gunther 1973:44; Turner 1975:151).

Vaccinium ovatum Pursh

Evergreen huckleberry

M: yayaǩa•d - fruit (HI & HW, II)

yayaǩatq(a)bap - plant (HI & HW, II)

N: sidbux^{w}siy̓c - fruit (JT)

The Makah use the fruit for food (HW, II). Previously the fruit of all huckleberry species were dried in cakes for future use (HI). Tea made from the leaves and a large amount of sugar was given to new mothers to help bring back their strength after childbirth (HW). The leaves of most huckleberry species can be used in this manner, but usually the leaves of Ledum groenlandicum are preferred (HW). The Hesquiat, Sechelt, Quinault, and possible other Nootkan and some Vancouver Island Salish ate the fruit (Gunther 1973:44; Olson 1936:54; Turner 1975:154).

Swan (1857:89) describes a "whortleberry" most closely resembling this species that the Indians near Willapa Bay dried for storage.

Vaccinium oxycoccos L.

Cranberry

M: p̀ap̀ʔes - fruit (II, MP, RC; Jacobsen 1971; 1979)

→ 'spilled on the ground'

→ 'scattering on the beach' (Jacobsen 1971), from pa-pa-is (Jacobsen 1971)

papees (Goss, Ides & Ides 1974)

pap'es (Gunther 1973:45)

páp-pas (Swan 1870:95, 101)

pa-pés (Curtis 1916:200)

p̀ap̀ʔespaɬ - 'cranberry season' (September) (MLP)

N: p̀ap̀eʔs → 'strewing on the beach' - fruit (JT)

The Makah collected the fruit from the prairies and ate them fresh (II). The fruit were also canned for later use (HW, II) and used for jam, jellies, and pies (HW). Cranberry pies are no longer made, however (HW). In the past the cranberry marsh at Tsues was burned every ten years or so to maintain cranberry production (HW). Swan (1870:25) indicated that cranberries were harvested in autumn until November. On October 25, 1861, Swan was served cranberries while taking supper at Cobetsi's lodge (Swan diaries, 25.X.1861). Although he never explicitly mentions trade of cranberries between the Makah and white people, he provided evidence for this in his diary on October 23, 1859, recording that "Mr. Webster shipped

on board of the Hartford 23 barrels of cranberries" (Swan diaries, 23.X.1859). Along Willapa Bay cranberries formed an important article of trade between whites and Indians during the mid-nineteenth century (Swan 1857:89). All coastal peoples in British Columbia ate the fruit, and they were a common item of trade between neighboring groups (Turner 1975:155).

Vaccinium parvifolium Smith (Gill #1980:588; Gross #49, mcrc)

Red huckleberry

M: hisi•ʔa•d - fruit (HW, II, LC, MP, RC, RX, MLP), meaning 'to chop off,' referring to the technique traditionally used to harvest the fruit (HI & HW)

hi•si•s (HI & HW), hi•si•sa (Jacobsen 1979:40) - to chop or whip

his- - to chop (Jacobsen 1971)

hisi•saƛ̓ - you chop it [command] (HI & HW)

hisi•yak - axe (Jacobsen 1971)

ʔisi•ʔa•d - alternative form of above term

hisi•ʔatq(a)bap - red huckleberry plant or bush (HW, II)

hisʔatqbabiq - the red huckleberry plant

hisʔatqpaƛ - 'red huckleberry season' (July) (MLP)

-paƛ - affix meaning 'season'

héy-se-ahd (Swan 1870:101)

hi-sí-ad (Curtis 1916:200)

xixsī'•'ad (Gunther 1973:44)

xisii?ad (Goss, Ides & Ides 1974)

x̌ux̌uyaqƛ̓ - fruit (HP)

χ̌uχ̌uyaqχbap - plant (HP)

[The application of these terms to Vaccinium parvifolium probably is in error, they are usually reserved for blue huckleberries.]

N: χ̀iχ̌apχ̌ → 'red round object' - fruit (JT)

χ̀iχ̌a - red

-pχ̌ - round object

χeχ̌apiχ̌ (HP)

[In Makah, χeχ̌apiχ̌ (HP), χ̀iχ̌api•χ̌ (JT), χ̀iχapiχ (Jacobsen 1979) means red snapper.]

The fruit are eaten fresh by the Makah when ripe in July and early August (HP, II, LC, MP, RX; Densmore 1939:320), and canned for winter use (II, KF). At present the fruit are also frozen (AF, KF). Traditionally the fruit were "chopped" or "brushed" off the plants into a basket held at one's front (HI), and hence the name /hisi•ʔa•d/ (see above list of terms).

The berries were eaten throughout western Washington and coastal British Columbia (Gunther 1973:44; Turner 1975:157-158). Some native groups in western Canada harvest the fruit by shaking the bushes or using wooden combs to rake the berries off the branches (Turner 1975:157-158). The Quinault also brushed or combed the fruit off the twigs (Gunther 1973:44).

Vaccinium uliginosum L. (Gill #1789)

Bog blueberry

M: yayaǩa•d - fruit (HW, MP)

yayaǩatq(a)bap - plant (HI & HW)

These terms are also used for Vaccinium ovatum (HI & HW, II) and cultivated Vaccinium spp. (HI & HW, HW)

There is some disagreement among local residents whether this is a "wild" (MP) or possibly "tame" species. The Makah obtained the fruit of this species at Ozette and along Hood Canal (MP). The leaves and great quantities of sugar were used to make a tea given to mothers for a few days after childbirth to bring back their strength (HW). Usually, however, the leaves of Ledum groenlandicum were preferred for this purpose (HW).

The fruit were eaten wherever available by several coastal groups in British Columbia, including the Nootka (Turner 1975:159).

Vaccinium spp.[6]

Blue huckleberries

M: ko-ho-ak-tl (Swan 1870:101)

ƕoƕ-wé-ak'$\overline{\text{hl}}$, ya-yáƕ-had - 'blue huckleberries' (Curtis 1916:200)

ǩuǩuyaqƛ - 'blue huckleberries' (HP, MP),

'black huckleberry' (RC) → 'they've got slivers on them,' referring to the persistant styles on the fruit

[6] Included here are those data concerning huckleberries where the species in question is unknown. Also included are some data that apply to huckleberries in general.

(HI & HW), often used for Vaccinium alakaense and V. ovalifolium

ƛ̓uƛ̓uyaqƛ̓bap - the plant or bush

yayaƛ̓a•d - blue huckleberry (MP)

This is perhaps the most generalized or ambiguous term for huckleberries, being variously used for Vaccinium ovatum, V. ovalifolium, V. uliginosum, and cultivated blueberries.

yayaƛ̓atq(a)bap - the plant or bush

N: bi•šapƛ̓ - black huckleberry, fruit (JT)

ƛ̓ica•pƛ̓ - gray huckleberry, fruit (JT)

ƛ̓ic- - white

ƛ̓is - white

-pƛ̓ - round object

The Makah can huckleberries (HW) and formerly dried them into cakes about 20 cm x 20 cm x 2.5 cm (HI). LC has heard that the fruit will keep in water, but her mother never used this procedure; she always canned her huckleberries. Tea made from huckleberry leaves was used as a medicine for kidney disorders (HP) as was tea from Ledum groenlandicum leaves (HP). Both black and gray huckleberries are ripe in July (JT).

CONVOLVULACEAE — THE MORNING-GLORY FAMILY

Convolvulus soldanella L.

Beach morning-glory

M: la'a'latck → 'flowers' (Gunther 1973:45)

[la•ʔ(a)lacx̌ is the general Makah term for flower]

No Makah or Nitinaht use is known for this species (JT; Gunther 1973:45). JT knew of no Nitinaht name for beach morning-glory.

HYDROPHYLLACEAE — THE WATER-LEAF FAMILY

Hydrophyllum tenuipes Heller (Gill #1869)

Slender-stem water-leaf

MP knew of no Makah name or use for this plant.

BORAGINACEAE — THE BORAGE FAMILY

Myosotis laxa Lehm. (Gill #1980:478)

Small flowered forget-me-not

The Makah rubbed the plant on their hair, it is supposed to act like hairspray (MP).

LAMIACEAE OR LABIATAE — THE MINT FAMILY

Lycopus uniflorus Michx. (Gill #1980:584)

Northern bugleweed

JT knew of no Nitinaht name of use for this species.

Prunella vulgaris L. var. lanceolata (Barton) Fern.

(Gill #1980:477; #1980:576)

Self-heal

No name or use for this species is known by either the Makah or Nitinaht (JT, MP).

Stachys ?mexicana Benth

[Gunther (1973:45) identified her material as Stachys ciliata Dougl. As no herbarium vouchers were located, it is not clear whether this material actually represents S. mexicana, S. cooleyae Heller, or both. S. mexicana is by far the more common species in the area frequented by the Makah.]

Hedge nettle

M: ada''babupt → 'milk plant' (Gunther 1973:45)
a-dab-a-bupt - 'blind nettles' (Swan 1870:101)

According to Gunther (1973:46), the Makah and Quileute used the whole plant to cover steaming sprouts.

SCROPHULARIACEAE — THE FIGWORT FAMILY

Castilleja miniata Dougl.

[Gunther (1973:46) gave C. angustifolia (Nutt.) Don. var. bradburii Fern. as the species used by the Makah. This species is limited, however, to sagebrush hills and plains in parts of

Wyoming, Montana, Idaho, and Utah (Hitchcock & Cronquist 1976:421). The only Castilleja known from the Makah area is C. miniata.]

Indian paint-brush

M: k'lik'lixuse'uk → 'red top plant' (Gunther 1973:46)

HW said this species had a Makah name, but she did not remember it. She also noted that the plants are less common now than in the past. Gunther (1973:46) maintained that the Makah had no use for this plant, but Densmore (1939:321) stated that the petals were removed and the nectar sucked from the flowers, and that a hummingbird trap was made by tying a bunch of the flowers to a stick placed upright in the ground. Hummingbirds were used as a charm by whalers (Densmore 1939:321).

Digitalis purpurea L.

Foxglove

JT knew of no Nitinaht name or use for this Eurasian species.

SOLANACEAE — THE NIGHTSHADE FAMILY

Solanum tuberosum L.

Potato

M: qa•wic (MP; Jacobsen 1979)

N: qa•wac (JT)

Although potatoes do not meet the criterion of being a native species or established introduction, or of being used in some unusual manner, it is included here because of its early introduction, and because the Makah still cultivate an apparently distinct form known as "Ozette potatoes."

The Makah do not remember from where or from whom they obtained potatoes (MP). As discussed in the chapter on the impact of European culture on plant utilization, Suttles (1951b) has proposed that the source of potatoes in the Pacific Northwest was from the fur companies, with Fort Langley the most likely source for the peoples along the Strait of Juan de Fuca. In the 1860s, according to Swan (1870:33), potatoes were esteemed by the Makah as a luxury item rather than as ordinary food. Potatoes were particularly favored because "you didn't have to break 'em up, you just peel them and dip them in oil and have smoked fish with 'em" (MP). "Ozette potatoes" are prefered over other varieties because "you just plant them, they don't need any care" (TP). Formerly these were grown at Ozette and by almost everyone in Neah Bay and supplied to schooners by local residents (TP). Some people still grow Ozette potatoes in their gardens at present (MF).

PLANTAGINACEAE — THE PLANTAIN FAMILY

Plantago major L.

Common plantain

Densmore (1939:315) stated that the Makah applied the entire plant to sores to draw out the pus. The Hesquiat used the leaves as a poultice for cuts, sores, infections, and drawing out pus (Turner & Efrat 1982:70).

Plantago maritima L. ssp. juncoides (Lam.) Hulten var. juncoides

Sea plantain

JT knew of no Nitinaht name or use for this species.

RUBIACEAE — THE MADDER FAMILY

Galium aparine L.

Cleavers, goose-grass, stick bedstraw

M: qwiti'bupt (Gunther 1973:46)

Gunther said the Makah regarded this as a sticky weed and do not use it (1973:46). While examining a specimen of G. triflorum (Gill #1980:567), JT noted that the "sticky kind" was good for the hair, making it grow long (Nitinaht).

Galium triflorum Michx.

Sweet-scented or fragrant bedstraw

M: apsi'i → 'for the hair' (Densmore 1939:310, 316)

up'sī''ī (Gunther 1973:46)

The Makah mashed the plant and rubbed it on their hair (Densmore 1939:316; Gunther 1973:46), as did the Quinault and Klallam (Gunther 1973:46). The Makah also pounded the leaves, mixed this with cold water, and applied the mixture to their hair to stimulate its growth (Densmore 1939:316; see also Gunther 1973:46). HI said that the type of Galium that has a sweet scent when crushed was used as a perfume. The Lummi made similar use of G. triflorum, rubbing their bodies with the plant for good smell (Gunther 1973:46).

CAPRIFOLIACEAE — THE HONEYSUCKLE FAMILY

Lonicera involucrata (Rich.) Banks var. involucrata

(Gill #1979.5:10MP; #1980:451)

Bearberry honeysuckle or black twinberry, locally called crowberries

M: čaq̓atq(a)bap → 'crow plant' (HI & HW, II)

čaq̓atq- - root word refering to 'crow'

čaˑq̓aˑduʔu = crow

-bap - affix meaning 'plant'

čaq̓atqbabiq - term used to indicate crowberry fruit (HI & HW)

čakaťkebap - 'honeysuckle' (Goss, Ides & Ides 1974)

tcakat'kebupt → 'crow plant' (Gunther 1973:48)

Chaa'kabûp → 'crow plant, meaning the berries are grown on purpose for the crows' (Densmore 1939:310, 318)

chaa, tcaa - crow (Densmore 1939:310, 318)

bûp - plant (Densmore 1939:310, 318)

Densmore does not identify this plant, but her description best fits that of Lonicera involucrata.

Makah children are strongly warned that the fruit are poisonous, that they make one sick if eaten (HP, HW, MP). The fruit may have been used as an emetic (II), and possibly as a dye for basketry materials (II). As a remedy for dandruff, the fruit was mashed and applied to the scalp (HP). Crows allegedly eat the berries (HP). LC knew of no use for this species.

Makah and Quinault women chew the leaves during confinement [childbirth] (Gunther 1973:48). Densmore (1939:318) gave two uses for /chaa'kabûp/. Two or three leaves were sometimes chewed by sick people to strengthen them, acting as a tonic or stimulant. To see how long a person would live, a "stack" of leaves about 2.5 cm high was prepared and the person required to swallow this packet. If the leaves were retained the person would live to an old age, if vomited, the person would not live so long. In Makah, Quileute, Quinault, Green River, and Hesquiat the terms for Lonicera involucrata all associate the plant with crows (Gunther 1973:48; Powell & Woodruff 1973:52; Turner & Efrat 1982:63).

Sambucus racemosa L. var. arborescens (T. & G.) Gray

(Gill #1980:555; Gross #46, merc)

Red elderberry

M: cikyey - fruit (HW, HW & HI, II, LC, MP; Jacobsen 1979; MLP 1979)

cikiyey - fruit (LC)

cikyašbap - bush (HW, HW & HI, II)

cikiyašbap - bush (MP)

cikyašbabiq - the elderberry bush (Gill 1982)

cikeešbap (Goss, Ides & Ides 1974)

tsīkī''ē (Gunther 1973:47)
t͡sīk-yé (Curtis 1916:200)

N: ci•yay - fruit (JT)

ciysapt - bush (JT)

The fruit were widely used for food in western Washington and coastal British Columbia (Gunther 1973:47; Turner 1975:125). Turner (1975:125) noted that in British Columbia the fruit were not regarded highly, and that frequently they were mixed with other types of berries to make the elderberries more palatable. Apparently the berries were always cooked before eating (Gunther 1973:47; Turner 1975:125).

The Makah ate elderberries in season and canned them for winter use (II). MP said the berries tasted rather bland, and were eaten mixed with sugar after steaming. HP doesn't like the fruit. The Nitinaht also ate elderberries (JT). Formerly the Makah steamed the berries, dried them in the sun, and placed them in [bentwood cedar boxes] for storage (MP). Among the Quileute another technique was also used to preserve elderberries. This was to pick the berry clusters and place them in sewn alder (Alnus rubra) bark cones that were submerged in cold creeks for storage (HW). HW said the berries were "just like fresh" when they were removed from the creek. Sometimes dried berry cakes were made of elderberries and salmonberries (Rubus spectabilis) mixed together (Gill

1982). Evidence from the archaeological site at Ozette indicates similar cakes may have been made by the protohistoric Ozette people. The Quileute preserved elderberries for winter use by wrapping the cooked fruit in skunk cabbage leaves and burying the package in swamp muck (Reagan 1934).

The use of elderberries fresh and for canning was more common among the Quileute at La Push than at Neah Bay (HW; Gill 1982), and elderberries seem to have been poorly regarded by most Makah. According to HP and LC, the Quileute used the fruit "a lot" for food, canning large quantities for winter use, but the Makah did not use elderberrfies very much. LC said the Makah and the Quileute formerly made wise-cracks at ball games when Neah Bay played La Push. The Makah would say "you can't win because you eat /cikiyeys/," and the Quileute would say "you folks can't win because you eat fish heads."

Formerly the Makah used the fruit to water-proof cedar-bark rain hats (HP). The fruit was crushed thoroughly and them smeared over the hat to water-proof it (HP). A glue made from the flowers was also used for water-proofing hats (HP).

According to Swan (1870:80), the Makah used elder bark tea for medicine, but he did not specify for what ailment. A decoction of the bark was used to counteract "an evil charm" (Densmore 1939:316). A cupful of this solution "was drunk if a man thought he had swallowed poison" (Densmore 1939:319). This acted as an emetic and purgative, and "'was used when Indians poisoned each other'" (Densmore 1939:319). The solution produced when the pounded root was soaked in water was used as a hair wash (Densmore 1939:316). Pounded fresh leaves were placed on abscesses and boils (Gunther 1973:47).

The Nitinaht used the bark for a very strong laxative (JT). Athletes formerly drank the extract to "draw out all the slime in the system" and to obtain "better wind" and more endurance (JT). This drink was prepared by peeling off the bark, scraping the outside, and then soaking it in water. Bark nearest the trunk is strongest. The preparation becomes stronger as it sits, a cupful being the dosage after an hour or so, but only a teaspoonful if it has soaked overnight. This solution acts both as an emetic and a purge (JT). At puberty boys were given this solution to "clean them out" followed by crab-apple (Pyrus fusca) as a tonic to "repair the damage done by the elder" (JT). The Hesquiat chewed the roots to clean out the stomach (Turner & Efrat 1982:63).

Symphoricarpos albus (L.) Blake

Common snowberry

M: Hidak'sasii (Densmore 1939:321)

According to Densmore (1939:321), /Hidaksas/ is the term used when an Indian doctor wants to kill a person.

According to Densmore (1939:321), when an Indian doctor wanted to kill someone, he threw "an instrument" into that person. Fresh snowberry leaves were swallowed to counteract the effect, and the plant was highly valued. The leaves were also chewed as a remedy for urine stoppage, and was considered to be a strong medicine (Densmore 1939:314).

ASTERACEAE OR COMPOSITAE — THE ASTER (COMPOSITAE) FAMILY

Achillea millefolium L. (Gill #1980:470; #1852)

Yarrow

M: kastupbap (Goss, Ides & Ides 1974)

klastu'bat → 'blossoms look like the spots on a child's face when peeling from sunburn' (Densmore 1939:310)

k!astub'bupt (Gunther 1973:49)

The Makah used yarrow for many medicinal purposes. According to MP, "it was almost like an antibiotic." The leaves were chewed (MP) or boiled for tea (Gunther 1973:49) for use as a blood purifier. Yarrow would be taken by an expectant mother close to the time of birth so that she would have an easy delivery (HP). HW noted a similar use stating that the plant was taken at the start of labor "to hurry the baby." Densmore recorded two procedures whereby this plant was used at childbirth (1939:317). In the first, the leaves of three small plants were pounded to a quart of cold water. The water was boiled and the solution administered to obtain an easy childbirth. In the second method, the entire plant was chewed and swallowed for similar results. Gunther (1973:49) stated that Makah women ate the raw leaves to produce sweating at childbirth and drink a stronger yarrow tea to heal the uterus after birth. The Klallam used a similar tea at childbirth (Gunther 1973:49). Both the Makah and Nitinaht chew the leaves and swallow the juice as a remedy for sore throats (MP, JT). The Makah also chew the leaves "to clean one out" (MP). As a remedy for tuberculosis, the Makah chewed and

swallowed the entire plant (Densmore 1939:313). In severe cases it was chewed constantly, in less severe cases it is chewed in the morning and at night (Densmore 1939:313).

Yarrow was used for a great number of ailments by the native peoples of western Washington (Gunther 1973:49) and coastal British Colubia (Turner 1973; Turner & Bell 1971a; 1973; Turner & Efrat 1982:61). Often these remedies were based on the aromatic and astringent properties of the plant. The use of yarrow is widespread in folk medicine throughout much of North America and Europe, especially in the treatment of colds, bleeding, and amenorrhea (Grieve 1971:864; Krochmal & Krochmal 1973:25; Wood & Osol 1943:1241).

Ambrosia chamissonis (Less.) Greene

var. bipinnatisecta (Less.) J. T. Howell

(Gill #1980:574; #2128)

Silver bursage

According to HP, a plant with blood-red latex that looks like (or may be) silver bursage is a good medicine for strength and healing (Makah). HI knew of no name or use for this species. Turner & Efrat (1982:62) noted that Hesquiat children play with A. chamissonis (var. not indicated), making marks on their hands with the blood-colored juice to make it appear as if they were injured.

Anaphalis margaritacea (L.) B. & H. (Gill #1908:585)

Pearly-everlasting

M: kla''stupbupt (Gunther 1973:48)

Ptiklo'kobûp → 'to make the skin soft' (Densmore 1939:321)

Gunther (1973:49) found that the Makah do not allow children to play with this plant because they believe it causes sores, but Densmore (1939:321) stated that a young girl would massage her body after bathing with a wad of pearly-everlasting leaves to soften her skin. JT knew of no Nitinaht name or use for this species.

Arctium minus (Hill) Bernh. (Gill #1980:587)

Common burdock

JT knew of no Nitinaht name or use for this Eurasian species.

Artemisia suksdorfii Piper (Gill #1980:562)

Suksdorf's sagebrush, coastal mugwort

No Nitinaht name or use known (JT).

Bellis perennis L. (Gill #1980:476)

English daisy

MP knew of no Makah name or use for this Eurasian species.

Cirsium vulgare (Savi) Tenore

Common, bull, or spear thistle

N: sackapt - term for any thorny or spiney plant (JT)

Neither the Makah nor Nitinaht use this Eurasian species (HP, JT). Densmore, however, said that a Cirsium sp. root was used for pain in confinement.

Hieracium sp.

Hawkweed

M: chia'kabat, tci'akabat - 'male plant'
(Densmore 1939:310, 315)

Hdaowk'tci'akabat - 'female plant' (Densmore 1939:315)

No member of this genus was observed in traditional Makah territory during 1978 - 1982. The roots of the 'female plant' were used by the Makah to treat a person who was growing thin and had a rash over the entire body that resembled the sting of nettles (Densmore 1939:315). The freshy pounded roots were eaten and reportedly had a pleasant taste (Densmore 1939:315). Densmore said the roots were easily obtainable and therefore they were not dried (1939:315).

Hypocharis radicata L. (Gill #1980:472)

Spotted or hairy cat's-ear, Pacific dandelion

No Makah name or use was given for this European species, which is considered a weed (HP, MP).

Jaumea carnosa (Less.) Gray

Jaumea

HP knew of no Makah name or use for jaumea.

Petasites frigidus (L.) Fries var. palmatus (Ait.) Cronq.

(Gill #1980:415; #1980:565)

Sweet colt's-foot

M: kwai'yabûb, kwai'yabup → 'turns the mouth brown'
(Densmore 1939:311)

N: qiqistpakk^{w} → 'looks like cow parsnip' (JT)
qistu•p = Heracluem lanatum leaf blade and petiole (JT)

No uses are currently known for this species by either the Makah or Nitinaht (MP, JT). A poultice made of the mashed root was used for treating severe bruises and was renewed until the soreness was gone. The fresh leaves were applied to the bruises obtained after slipping on the rocks (Densmore 1939:316). The leaves were also reportedly used as a seasoning for steamed food, particularly salmonberry (Rubus spectabilis) sprouts (Densmore 1939:319).

The Makah term given by Densmore is similar to the Quileute (/qwai'ēxput/) and Quinault (/qwai''ax/) terms given by Gunther (1973:49) and probably indicates linguistic borrowing. The Quileute used the root for cough medicine, either eaten raw of boiled to make tea (Gunther 1973:49).

Senecio jacobea L. (Gill #1980:471)

Tansy ragwort

MP speculated that this Eurasian species may be used to make a medicinal tea. Neither HP (Makah) nor JT (Nitinaht) knew any use for this plant. No name is known in either language.

Solidago canadensis L. var. salebrosa (Piper) Jones

Goldenrod

No Makah or Nitinaht names or uses known for goldenrod (HP, II, JT).

Sonchus oleraceus L.

Common sow-thistle

Densmore (1939:321) said that Makah children broke the stem off and put dots of the latex on ther cheeks to resemble tatoos.

Tanacetum douglasii DC. (Gill #1849)

Northern dune or western tansy

MP knew of no Makah name or use for this species.

Taraxacum officinale Weber (=Leontodon taraxacum L.)

Dandelion

According to Densmore, the roots of this Old World species were boiled by the Makah and used as a remedy to "clear the blood" (1939:313).

MONOCOTS

ZOSTERACEAE — THE EEL-GRASS FAMILY

Phyllospadix scouleri Hook.

Phyllospadix serrulatus Rupr. ex Aschurs.

Phyllospadix torreyi Wats. (Gill #1980:564)

Zostera marina L.

Surf-grasses and eel-grass

M: ʔca•yuqʷsi (II), probably equivalent to /ʔayupsi/, seaweed
ʔuʔu•tabac (LC)

taba•x̌ - Phyllospadix spp. and Zostera marina (Gill 1982)

xu•xʷap - apparently limited to Phyllospadix torreyi (Gill 1982)

xūxwa'p - Phyllospadix scouleri (Gunther 1973:21)

N: taba•x - Phyllospadix spp. and Zostera marina (JT)

The Makah used the white, sun-bleached leaves of Phyllospadix torreyi in basketry (II, MP) for decoration (Gill 1982). Swan (1870:46) stated that the Makah used 'eel-grass' for pure white in basketry. The leaves are difficult to use because they break easily (II). Gunther (1973:21) noted that Ph. scouleri is tough and durable, but never used for basketry.

The inflorescences are said to be sweet like candy, and were eaten fresh by the Makah at the collection site as they do not keep well. The Makah also chewed on the "roots" [rhizomes] for their sweetish taste (HW, LC, MP), and ate the rhizomes raw (MP; Gill 1982; Gunther 1973:21; Swan 1870:25). Probably the rhizomes of all four species were used in this manner, although specific data is not available on Zostera marina.

JUNCACEAE — THE RUSH FAMILY

Juncus bolanderi Engelm. (Gill #1980:589)

Bolander's rush

JT knew no Nitinaht name or use for this species.

Luzula sp. (=Juncoides sp. in Densmore 1939)

Woodrush

M: kloklo'chibabok → 'it resembles the green dye plant'
(Densmore 1939:311)

kloklo'tcibakok → 'it looks like the green dye-plant'
(Densmore 1939:317)

Among the Makah a woman who had had no children would eat freely of the tender new shoots to induce fertility (Densmore 1939:317).

CYPERACEAE — THE SEDGE FAMILY

Carex obnupta L. H. Bailey (Gill #1980:576; #1980:583)

Basket sedge, slough sedge

M: čí•bap (HW, II)

N: čibpat - vegetative plants (JT)

tuxtux - fruiting plants (JT)

The Makah use the leaves for the horizontal strands in basketry (II). After picking, each leaf is split exactly in half lengthwise along the mid-rib from bottom to top with the thumbnail before they are dried for storage or used (II). The Nitinaht do not use the leaves of fruiting plants (JT). The Hesquiat harvest the leaves in late July and August, and use them to weave all sizes of fine, close-work, wrapped-twine baskets (Turner & Efrat 1982:51-53). The Hesquiat only use the vegetative plants, refered to as "female," as a source of leaves for basketry, and laughed at anyone using the flowering or "male" plants (Turner 1979:125; Turner & Efrat 1982:53). The leaves are prepared for use in the same manner as used by the Makah (Turner & Efrat 1982:53).

Carex sitchensis Prescott

Sitka sedge

Underhill lists this species as used by the Makah for the bottoms of twined baskets (1944:109). Gunther states that a sedge, perhaps this species, was used by the Makah for the bottom of trinket baskets

(1973:22). The Hesquiat used the leaves of this species to make basket handles because they are "real strong" (Turner & Efrat 1982:53).

Carex sp.

Sedge

An unidentified sedge was used by the Makah woven with cedar bark for the bottoms of baskets (Densmore 1939:320).

Eriophorum chamissonis C. A. Mey

Cotton-grass

M: popoxsa'dix → 'feather plant', this term applied to any downy plant (Gunther 1973:22).

MP did not recognize this species. Gunther (1973:22) states that cotton-grass was not used by the Makah.

Scirpus acutus Muhl. and Scirpus validus Vahl

Bulrushes, tules

M: tu•d?axbap - tules or bulrushes (S. acutus and S. validus), sometimes used to indicate cat-tails (Typha latifolia L.) (Gill 1982)

tu•d?ax - a type of mat made from /tu•d?axbap/ (Gill 1982)

t!u'daxbupt - S. acutus (Gunther 1973:22)

The Makah used the shoots to make mats. According to Gunther (1973:22), they collected tule at Lake Ozette and used it to make mats similar to cat-tail mats. Swan said bulrush and flag [cat-tail?] mats were obtained from the Klallam for use as sleeping mats and pillows, as these were "better adapted for sleeping upon than the cedar [Thuja plicata] bark mats of their own manufacture" (Swan 1870:5-6).

The Hesquiat used the stems to make baskets, handles for shopping baskets, and basket lids (Turner & Efrat 1982:53). Large bundles of stems were dried and used to make mats. Because these mats were soft and spongy, they were piled beneath bedding as mattresses in the old days (Turner & Efrat 1982:53).

Scirpus americanus Pers. (Gill #1980:448)

American or three-cornered bulrush

HP called this "sweet-grass". The shoots are obtained from the Hoquiam - Aberdeen area (HP) and Vancouver Island (Densmore 1939:320), and are used by the Makah in making baskets (HP, Densmore 1939:320). Scirpus americanus is used by the Hesquiat in weaving hats, basket handles, and shopping bags (Turner & Efrat 1982:54), and by the Nootka for weaving baskets, basket lids, and handles (Turner 1979:131). Vancouver Island Salish collected the leaves during late summer, sun dried them, and used them to make mats and baskets (Turner & Bell 1971a).

Scirpus microcarpus Presl

Small-fruit bulrush, "bottom-grass"

M: čiłtqi•babap (II), čiłtqi•yabap → 'cross-weave grass' (HI), name for the plant

čiłtqi•b (HI, II), name for the part used in weaving [the leaves]

The leaves are used by the Makah for the bottom portion of baskets (II). Apparently this species was sometimes obtained from La Push (II).

POACEAE (GRAMINEAE) — THE GRASS FAMILY

Elymus mollis Trin.

Dune wild-rye, American dune-grass

M: tcupxa'bupt (Gunther 1973:21)
čupxabap - 'rye-grass' (Goss, Ides & Ides 1974)

MP regarded this species as a weed. Gunther (1973:21) stated that bundles of the roots are used by the Makah for rubbing after bathing, braided roots tied in bundles were used for the same purpose by the Quileute. The section of stem about 5 cm long above the root was chewed as a remedy for urine stoppage among the Makah (Densmore 1939:314).

Phragmites communis (L.) Trin. (=P. phragmites Karst.)

Common reed

Underhill (1944:109) stated that this species was used for basket and mat imbrication by the Makah, Quileute, and Quinault.

TYPHACEAE — THE CAT-TAIL FAMILY

Cat-tail

M: salaxa'xbupt (Gunther 1973:21)

sala'xax - 'mat' (Gunther 1973:21)

salaxax (Goss, Ides & Ides 1974)

salaǎ•ɬbap - plant (II, MP)

salaǎ•ɬ - leaves (MP)

salaǎ•ɬiq → 'the cat-tail leaves' (Gill 1982)

salaǎ•ɬsš → 'cat-tail leaves made into...', usually refering to mats (Gill 1982)

tu•d?axbap (MP, RC) → ~ 'mat plant', refers to fact that mats were made from them. Apparently this term properly indicates tules and bulrushes (Scirpus acutus and S. validus), but it is sometimes used to indicate cat-tails.

tu•d?ax - a type of mat made from /tu•d?axbap/ (RC; Gill 1982)

tcacu'p - 'male stalk' (Gunther 1973:21)

N: salaǎ•ɬapt (JT)

II stated that cat-tails never used to grow in the Neah Bay - Tsues area, and that they only occurred towards Puget Sound. Gunther notes that

> "At Neah Bay the Makah state that cat-tails have always been very scarce, and their gathering necessitates some travel from their villages" (1973:21).

Habitat suitable for cat-tails is much greater in the Makah area now than in the past as a result of roads and logging activities, but plant materials excavated from the Ozette Village Site at Cape Alava indicate that cat-tails were available to the villages about 210 - 300 years ago.

The Makah used the leaves to make mats (HW, II, MP) which were used for rugs (HW), mattresses (HW), and sitting and eating mats (HW). Sitting mats are about 1.2 m by 1.8 - 2.4 m (HW). Small rolls of mats were used as pillows (HW). Gunther said the Makah call the fruiting stalk "the wife" and use it for mats, whereas the 'male stalk' /tcacu'p/ is never utilized (1973:21). The leaves are also used by the Makah for basketry (MP) and skirts /wadiš/ (Gill 1982). Recently people have begun using cat-tails occasionally for food. MP stated that she never knew one could eat cat-tails until her daughter married a man from South Dakota who ate them, now she eats them, too. She also stated that people used to eat the "fresh part as they start growing". MP knew no traditional use for the heads, although now days some people cook and eat them when they are in flower. HW had heard that the heads were used like down for filling, but has not seen this for herself.

The Nitinaht used the leaves to make loose, soft baskets, skirts, and capes (JT). The leaves are collected in late August or early September "when the brown thing falls off" (JT). No Nitinaht name or use is known for the heads (JT). The Nitinaht never ate cat-tails (JT).

Among the Hesquiat, the name /cakupuk lucmapt/ (lit. 'husband of /lucmapt/') was applied to fruiting cat-tail plants. These were considered the "male" plants while non-fruiting cat-tails were considered "female" (Turner & Efrat 1982:58). Leaves from both "male" and "female" plants were used for basket bottoms, bags, and mattresses (Turner & Efrat 1982:58). The Hesquiat always removed the outside edge of the leaves before using them. These edges were reserved for basket bottoms and for sewing mats together (Turner & Efrat 1982:58).

According to Gunther (1973:21), most of the native peoples in western Washington used the fruiting stalks of cat-tails for making mats. These were used as hangings and screens inside winter houses, as mattresses, kneeling pads in canoes, and as raincoats and capes (Gunther 1973:21). Turner (1979:150) said it is generally maintained that the Nootka and Kwakiutl did not originally make cat-tail mats, but learned this technology from neighboring Salish peoples within the last century. Swan said of the Makah,

> "...on [their beds] are laid Clallam mats, which, being made of bulrushes and flags, are better adapted for sleeping upon than the cedar bark mats of their own manufacture" (1870:5-6).

ARACEAE — THE ARUM FAMILY

Lysichitum americanum Hulten & St. John

[L. camtschatcense (L.) Schott.]

Skunk cabbage

M: tibu•t (II, MLP, Jacobsen 1979, MLP 1979)

tibut (Goss, Ides & Ides 1974)

tibû't (Densmore 1939:311)

tibiut (Densmore 1939:314)

tĭ́-bút (Curtis 1916:200)

N: tibu•t (JT)

tibu•ti•c ƛubac̓ - roots (JT)

The Makah used the leaves to cover sprouts while they were cooking because the leaves are so big (II). They also used the roots medicinally (HP, II), including the treatment of arthritis (II). According to Densmore (1939:314), the Makah chew a small amount of skunk cabbage root, which was said to be hot like pepper, to soothe the stomach after an emetic of Sambucus racemosa L. (red elderberry) roots. Women chewed the root to cause an abortion (Gunther 1973:22). As a result of its reputed uterine action, the Quileute pounded the root, boiled it, and drank the juice to bring about easy delivery (Gunther 1973:22). The Makah boiled the root and drank the solution as a blood purifier, while the Quinault used the same preparation to clean out the bladder (Gunther 1973:22). The Makah warmed skunk cabbage leaves and applied them to their chests for pain (Gunther 1973:22). Many other peoples, including the Quileute, Skokomish, Quinault, Klallam, Hesquiat, and Kwakiutl, used the leaves for poultices (Gunther 1973:22; Turner & Bell 1973; Turner & Efrat 1982:49).

The Makah used skunk cabbage leaves for lining berry baskets and for drying salal (Gaultheria shallon Pursh) fruit (Gunther 1973:22). In coastal British Columbia skunk cabbage leaves were used wherever available for lining berry baskets, berry drying racks, and steaming pits (Turner 1975:72; 1979:121-122). The Quileute also used the leaves for wrapping

salal and elder berries while drying (Gunther 1973:22), and to cover foods cooking in roasting pits (Reagan 1934). Reagan (1934) also said the Quileute wrapped fruit, usually cooked, in skunk cabbage leaves and buried them in the muck of some swampy area until needed, when they are dug up and recooked. Although the leaves have an unpleasant odor, it is my experience that they impart no unpleasant flavor to the cooked food.

LILIACEAE — THE LILY FAMILY

Allium cernuum Roth (Gill #1980:473; #1980:554)

Nodding onion

M: ḵiyiḵiy (II), apparently a general term for onions

ḵiyeiḵli - 'onion' (Goss, Ides & Ides 1974)

klī''yē'klī'yēbupt (Gunther 1973:24)

N: q̓iyaq̓iya (JT)

Onions are thought not to occur in the Neah Bay - Tsues area by some residents (II). Allium cernuum bulbs were used for food by the Makah (HP, MP) and the Nitinaht (JT). The onion is considered better once the flowers are gone (JT). Gunther says the Makah eat onions sparingly, usually only when travelling alone (1973:24). The Klallam, Quileute, and Quinault also eat them (Fleisher 1980; Gunther 1973:24; Reagan 1934). The Makah and Quinault chew the plant and place it on the chest for pleurisy pains (Gunther 1973:24).

Camassia quamash (Pursh) Greene

Camas

M: k^{w}a•dis (II, MP, RC; Jacobsen 1979)

[Note: k^{w}a•dis erroneously equated with 'wild onion' in MLP 1979.]

k^{w}a•disbap - camas plant (HI)
kwaadis (Goss, Ides & Ides 1974)

kwa'dis (Gunther 1973:24)
kwad-dis (Swan 1870:101)

N: k^{w}a•dis (JT)

Camas was a favorite food of those Makah who remembered it. Everyone questioned on the subject maintained that camas doesn't grow in Makah territory [see, however, Part I for locality of Camassia quamash var. azurea (Heller) Hitchc. at Manny's Prairie near Ozette], although the bulbs were sometimes collected near Forks. The Makah obtained camas from the south (MP; Swan 1870:25) including Taholah (II), the Quinault (Swan 1870:25), Forks (MP), La Push (II), and the Quileute (HP; Swan 1870:25), who collected the bulbs at Quillayute Prairie (HP; Gunther 1973:24) and Forks Prairie (Gunther 1973:24), and from the Victoria area (II) and the Vancouver Island people (HP; Swan 1870:25) of British Columbia. Reagan (1934) noted that camas was especially abundant at Quillayute and Forks Prairies.

Camas bulbs were pit cooked in the same manner as salmonberry (Rubus spectabilis Pursh) sprouts (II), although apparently no one now regularly digs camas nor knows how to prepare the bulbs (II). According to Swan (1870:26), the preparation of camas requires constant heat for

nearly two days. People have attempted to cook camas on the stove without much success (II). The bulbs were eaten alone or dipped in oil (HP).

During August, 1982, several members of the Makah Language Program staff collected camas from a prairie south of Forks and prepared the bulbs following traditional methods. When portions of the cooked camas were distributed to elders in the community, some indicated that they never expected to eat camas again in their life-time. The cooked bulbs are soft, light brown, and somewhat sweet to taste.

Camas was used for food in the Pacific Northwest wherever it was available, and often was a staple article in the diet (Gunther 1973:24; Reagan 1934; Turner 1975:79; Turner & Bell 1971a; Underhill 1944:65). Generally the bulbs were dug after flowering (May - August) and steamed in pits (Gunther 1973:24; Turner 1975:79). Peoples not having direct access to the bulbs often obtained them through trade (Gunther 1973:24; Turner 1975:79; 1978:77-78). Gunther (1973:24) stated that except for choice varieties of dried salmon, no article of food was more widely traded than camas.

Disporum smithii (Hook.) Piper

Fairy lantern or bellwort

Gunther (1973:25) said this species was used by the Makah as a love medicine, but her informant claimed not to know the exact procedure for use. Gunther (1973:25) reported the same information for Disporum hookeri (Torr.) Nicholson var. oreganum (Wats.) Jones, but this was

probably a misidentification, as D. hookeri is not known from Makah territory.

Lilium columbianum Hanson

Tiger lily

M: ƛ'kūp (Gunther 1973:25)

This species is not known from Makah territory at present, nor is it known whether or not the corms were eaten, although it is possible that the bulbs were obtained through trade from the Quileute or Klallam, or both. The Klallam gathered the bulbs in late autumn and buried them in holes dug in house floors and lined with cedar boughs to keep them fresh (Gunther 1973:25). They prepared them by pit steaming (Fleischer 1980). The Quileute and Quinault gathered this species where they collected camas (Camassia quamash). The bulbs were generally eaten wherever obtainable in coastal British Columbia and western Washington (Gunther 1973:25; Turner 1975:90).

Maianthemum dilatatum (Wood) Nels. & Macbr.

[=Unifolium dilatatum (Wood) Greene in Densmore 1939]

(Gill #1979.5:25MP)

Beadruby, false lily-of-the-valley, locally known as snakeberries

M: kuwi'kabûp, kuwi'kabuk → 'stolen plant'

(Densmore 1939: 311, 318). Based on its name, Densmore's informant thought that /qwe•ti/ must have stolen this plant at some time (1939:318). Note similarity to Hesquiat /ku•ẁi•kmapt/, lit. 'theif plant' (Turner & Efrat 1982:55).

tli'ikibupt → 'snake plant' (Gunther 1973:25)

MP said they (Makah children) were told not to eat the fruit, although she did not know whether the fruit is poisonous. Densmore, however, said the fruit is edible (1939). Gunther stated that the Makah chew the long roots and swallow the juice to correct sterility (1973:25). They also pounded the root, made it into a decoction, and dropped the solution into the eye to remove a "white growth". Ten or twelve roots were boiled in one-half cup water, and as much solution as the eye would take administered thrice daily (Densmore 1939:318).

Streptopus amplexifolius (L.) DC.

Twisted-stalk

Makah women chewed and swallowed the roots to produce labor when childbirth was too long delayed. An expectant mother would locate a plant and mark it so she could dig the roots later if needed (Densmore 1939:317; see also Gunther 1973:25). Densmore does not indicate the species of Streptopus used, however S. amplexifolius is the only species known from Makah territory.

Trillium ovatum Pursh

Western wake-robin, white trillium

M: tcatca'olk!us → 'sad flower' (Gunther 1973:25)

The Makah pound the bulb and rub it on their body as love medicine (Gunther 1973:26). Among the Quinault, a woman would cook the bulb and drop it in the food of the man she wanted as a lover (Gunther 1973:26). HI knew of no Makah name or use for this species.

Xerophyllum tenax (Pursh) Nutt.

Beargrass

M: χak^{w}adis (HW)
ʔa•łtads (II)
ʔaałtadis (MP; Jacobsen 1969)
ʔaaałxtadis (Goss, Ides & Ides 1974)

Beargrass does not grow in Makah territory, and is usually obtained from Quinault, although occasionally it is obtained from other sources, such as the Yakima area (II). Densmore calls it "basket-grass from Taholah" (1939:320). The leaves are used for basketry (II, Densmore 1939:320), and were split prior to use (Densmore 1939:320). The preparation of beargrass was more difficult than for Carex obnupta. II noted that "you just scrape and scrape and scrape" the leaves. The Hesquiat note a similar preparation procedure (Turner & Efrat 1982:56). Most peoples of southern and central British Columbia (Turner 1979:132) and all those of western Washington (Gunther 1973:23) used the leaves in basketry, especially for fine imbrication and decoration. Most of the

British Columbia peoples did not have direct access to the plant, and obtained it through trade with neighboring groups in Washington (Turner 1979:132). The Hesquiat bought beargrass from the Makah and Quileute, and still buy it when abailable for about $1.00 per 2.5 cm bundle (Turner & Efrat 1982:56). The leaves were also a common item of trade at Columbia Rapids, the center of Chinook salmon trade (Turner 1979:132).

UNIDENTIFIED VASCULAR PLANTS

x̌ʷa•cx̌ʷac → 'plant similar to celery' (Jacobsen 1979)
wharts whats (Swan diaries, book 7, 1863)

x̌ʷa•cx̌ʷa•c → crumbling (MLP)

x̌ʷa•ckačiɬ → crumbling (MLP)

This plant grew at Anderson Point (MP) and at Hoko (II), but could not be located during the present study. Swan said the plant was a herb and that the root and leaf stalks were eaten (Swan diaries, book 7, 1863). It is considered rather juicy (II, MP), and looked somewhat like a "sprout" (II). MP said, "I think it was a little bit tastey, too." II said, however, that "it seemed nobody really cared to eat it, not like /ba?aʁ/ and /hu•ba•q/." /x̌ʷa•cx̌ʷac/ was collected in late spring (MP).

PART 3

BOTANICAL REMAINS FROM THE OZETTE VILLAGE SITE (45CA24)

CHAPTER 1

INTRODUCTION

LOCATION OF THE OZETTE VILLAGE SITE (45CA24)

The Ozette Village Site is at 48°10' N, 124°44' W, at Cape Alava, 23 km south of Cape Flattery on the northern coast of the Olympic Peninsula, Washington (see Figure 1). The area immediately offshore from the village consists of a broad rockshelf studded with several islands, numerous seastacks, and rocks. Up to one km of the shelf is exposed during low tides. Ozette Island, the Bodelteh Islands, and Cannonball (Tskawahyah) Island are the most important of the offshore islands, and the only islands large enough to support arboreal plant communities. These islands and the offshore rockshelf provided some protection from storms. Ozette Island in particular provided protection from the full fury of storms arriving from the southwest. Immediately northwest from the village is the tidal Cannonball Island, which probably was used as an ideal lookout post for whales and human visitors from the sea. The Ozette site itself for the most part lies on a narrow coastal bench, 20 to 30 m wide at its greatest extent, and varying in height from 2 to 10 m above sea level. Behind the site is a steep slope which levels off into another bench at about 30 m in elevation and eventually reaches a height of about 50 m at the coastal ridge crest. Additional information concerning regional geology and climate is presented in part 1, chapter 2.

BOTANICAL ENVIRONMENT AND RESOURCE AREAS

The vegetation and floristic composition of traditional Makah - Ozette territory are given comprehensive treatment in part I, therefore only brief comments concerning local vegetation are presented here. Uses made of the various species listed by the Makah and other coastal peoples during the historic period may be found in part II.

The Ozette Village Site proper is located in the Picea sitchensis - Polystichum munitum var. munitum habitat type, and at present this is the dominant association along most of the coast at Cape Alava. Botanical resources prominent in this area include Picea sitchensis, Polystichum munitum, Alnus rubra, Polypodium glycyrrhiza, Pyrus fusca, Ribes bracteosum, Rubus spectabilis, Sambucus racemosa var. arborescens, and Salix hookeriana and/or S. piperi. In soils enriched by debris from human activities, Heracleum lanatum and Urtica dioica ssp. gracilis var. lyallii are common. Equisetum telmateia var. braunii is occasionally locally common, especially on disturbed sites. In the slight depression often occuring at the base of the coastal ridge Carex obnupta is the dominant undersory species.

Inland from the Ozette Village Site to the east of the coastal ridge crest occurs the Tsuga heterophylla - Blechnum spicant habitat type. A very different set of botanical resources occurs in this area. Important among these are Thuja plicata, Tsuga heterophylla, Lysichitum americanum, Gaultheria shallon, Vaccinium ovatum, and V. parvifolium.

At present two areas near Ozette are noteworthy for the abundance and productivity of Gaultheria shallon fruit. The first of these are the stands of the Picea sitchensis - Gaultheria shallon community type near Sand Point, and the second is the south end of Ozette Island. Stunted salal is prominent on Ahlstrom's Prairie, but is not very productive of fruit.

Prairies provided another set of botanical resources not readily found elsewhere. Ahlstrom's and Rooses's Prairies are both easily accessible on foot from Ozette, but access to Manny's and Allen's Prairies would have been more difficult. Botanical resources for these areas include Ledum groenlandicum, Vaccinium oxycoccus, Gaultheria shallon, and Pteridium aquilinum var. pubescens. Camassia quamash var. azurea occurs sparingly on Manny's Prairie, but apparently was not harvested here during the historic period.

Although offshore environments were most significant in terms of animal resources, they also supplied some important plant materials. The intertidal rockshelf usually supports abundant amounts of Phyllospadix scouleri, P. serrulatus, P. torreyi, and Zostera marina. Deeper waters contain large quantities of kelp, including the technologically important Nereocystis leutkeana.

CULTURAL AFFILIATIONS

The cultural and linguistic affiliations of the Makah (including the Ozette) were discussed in chapter part 2, chapter 1. It is likely that prior to contact Ozette had a large degree of political independence

from the other Makah villages. It is also likely that the Ozette interacted far more intimately with the Quileute than did other Makah villages and, according to Riley (1968), the Quileute made a clear distinction between the Ozette and the Makah. The Ozette Village was occupied until the early 1900s when the population rapidly decreased as the occupants were forced to move to Neah Bay so the children could attend school. The village site and mouth of the Ozette River have been used intermittently since the abandonment of the village as seasonal hunting and fishing camps.

HISTORY OF ARCHAEOLOGY AT THE OZETTE VILLAGE SITE

The Ozette Site was first recorded as an archaeological site by Daugherty in 1947. The first archaeological testing of the site occurred in 1955 (Stallard & Denman 1955), and the first large scale excavations of the site occurred in 1966 and 1967 (Daugherty & Fryxell 1967). After an interruption, excavations were resumed by Daugherty in 1970 and fieldwork continued until 1981. The excavations during 1966 and 1967 indicated that some portions of the site may have been occupied for more than 2000 years. The materials recovered suggest that a sophisticated and relatively stable maritime culture occupied Cape Alava during most of the period represented by the deposits (Gustafson 1968; Wessen 1982:17-18).

In February 1970, severe tidal and wave erosion and bank slumpage at Cape Alava exposed a large water-logged deposit containing house planks and a wide variety of wooden and woven plant fiber artifacts normally absent in northwest coast archaeological deposits. The area excavated during 1970 - 1981 was a neighborhood within the Ozette Village, including

three complete houses, portions of four others, and the exterior areas immediately surrounding these houses. The excavation area was subject to numerous clay slides during the period of occupation by the Ozette villagers. Most of these, while undoubtedly an inconvenience, were not catastrophic. Massive clay slides were much less frequent, destroying and burying houses and their contents. The clay slides provided an impervious covering to the site which greatly inhibited normal decay processes, resulting in unusually good preservation of wooden artifacts, basketry, and other plant remains usually absent from northwest coast sites. Of the more than 50,000 artifacts and 40,000 structural elements recovered, approximately 90% were partially or wholly made of plant materials (Huelsbeck 1983:7).

SITE STRATIGRAPHY OF THE B70 EXCAVATION AREA

Eight major stratigraphic units are known from the excavation area (Figure 2). Following is a brief description of each.

Unit VIII

Unit VIII basal deposits consisting of unconsolidated materials have been encountered in the northeast portion of the excavation area. These are composed almost equally of gravel-sized, sand-sized, and silt/clay-sized particles (Samuels 1980:46-47; Samuels 1983:11). Organic layers up to 30 cm thick are interdigitized with the gravel layers. Both the gravel and organic layers contain cultural material (Samuels 1983:11).

Unit VII

The oldest major cultural deposits known from this portion of the site comprise Unit VII — a shell midden with excellent organic preservation (Samuels 1983:13; Wessen 1982:18,21). Unit VII has been radiocarbon dated to about 800 B. P., based on two dates, 790±80 (WSU 1865) and 810±70 (WSU 1777) (Mauger 1979:4).

Unit VI

Unit VI consists of an accumulation of both massive and redeposited clay layers. These layers contain material from at least one clay slide and clay redeposited by flowing water (Wessen 1982:21). The duration of Unit VI is estimated at 300 to 400 years, and although occasional cultural material has been found thoughout Unit VI clays in the B70 excavation area, there is no evidence of major occupation in this area during Unit VI times (Samuels 1982:13; Wessen 1982:21). Midden deposits several hundred meters north along the beach suggest a continuous occupation. The B70 area was probably wet and not a desirable house location during most of Unit VI time (Samuels 1983:13).

Unit V

Unit V is a major protohistoric cultural layer and the focus of excavations during 1970 - 1981. At least some portion of seven houses and three distinct exterior middens are known from Unit V (Samuels 1983:13-24; Wessen 1982:21-25). Of the seven houses known from Unit V, Houses 1, 2, and 5 have been completely excavated, and Houses 4, 6, and 7 exposed only to a very minor extent.

The occupation of Unit V began approximately 450 years ago (Mauger 1979:4), a radiocarbon date of 440±90 B. P. (WSU 1778) has been determined for an early portion of Unit V. Unit V can be divided into three stratigraphic units throughout most of the excavation area (Figures 2 & 3) as follows (Samuels 1983:14):

1. Early: Houses 1 and 5 were constructed during this time, as were the initial whalebone features (Samuels 1983:14). Shortly after House 1 was built, House 5 was constructed behind (east) House 1 (Figure 4). House 5 was only occupied for a short period of time, then abandoned and dismantled, probably due to drainage problems (Gleeson, Mauger, and Fisken 1976:20; Samuels 1983:18; Wessen 1982:23). This stratigraphic level has been labelled as Unit V temp. VII (Mauger 1975:13-14).

2. Middle: Shortly after House 5 was abandoned, a relatively large clay slide buried much of the southern portion of the B70 area (Figure 5). House 3 was built at approximately this time immediately to the north of Houses 1 and 5 on exterior midden from these occupations (Samuels 1983:14, 18-19). The end of the middle Unit V stratigraphic level is marked by a new phase of construction in the excavation area. Previously this middle level was termed Unit V temp. VI (Mauger 1975:14).

3. Late: The reconstruction of the whalebone retaining wall east of House 1 just prior to the construction of House 2 marks the beginning of this last level in Unit V (Figure 6) (Samuels 1983:14, 21). The construction of House 2 quickly followed the reconstruction of the whale bone feature, and was largely superimposed over the locality previously occupied by House 5 (Samuels 1983:21). This level previously was designated as Unit V temp. V (Mauger 1975:14-15).

House 1 was used throughout the Unit V period, and was in use when destroyed by the Unit IV clay slide (Samuels 1983:22). Interpretation of Unit V microstratigraphy has suggested that House 2 was built about midway through the Unit V period, and it was also in use at the time of the slide (Samuels 1983:22). Although House 3 was occupied for a considerable period, it seems to have been at least partially abandoned prior to when the clay slide occurred (Samuels 1983:22). At present the absolute dates of Unit V events are uncertain. Dendrochronological studies currently in progress may eventually provide this information. Two preliminary dates have been obtained from fragments of wall plank in House 1: 1613 A. D. and 1719 A. D. (Jozsa et al. 1983:24). In both samples the outer growth rings and bark were missing, thus neither provide a cutting date. Therefore, at least one plank was added to House 1 after 1719 A. D. A radiocarbon date of 440±90 B. P. (WSU 1778) from an early House 1 hearth area provides an approximate early limit for Unit V occupation (Mauger 1979:4). These data and the deterioration and repair sequences of Houses 1 and 2 have resulted in a tentative estimate of the span of occupation at about 100 years for House 1 (Samuels 1983:24).

Unit IV

Unit IV consists of a massive clay slide that smashed and buried the Unit V houses. Although much of the clay lacks cultural material, a large quantity of cultural debris is present in the lowermost portion of the Unit IV clay. These materials are derived from Unit V deposits and were transported downslope with the clay slide. Most of the midden was undisturbed by the slide although in several instances large blocks of

midden were plucked up and redeposited within the slide (Mauger 1978:43; Samuels 1983:24-25). As these cultural materials within Unit IV originated in Unit V, Unit V plus the lower portion of Unit IV are termed Cultural Level V (Wessen 1982:21).

The Unit IV clay slide was a rapid event, preserving an instant of Ozette Village life at the time of the slide as well as debris deposited during the previous period of occupation. The essentially impervious cap of clay contributed greatly to the presevation of organic materials in Unit V.

Unit III

Unit III overlays the Unit IV clay, and is a well preserved shell midden with the remains of at least one longhouse. The Unit III deposits contain glass, metal, and ceramic meterial, and although undated, clearly represent an early historic occupation (Samuels 1983:25; Wessen 1982:21).

Unit II

Unit II consists of another massive clay slide deposit that buried much of the southern excavation area around 1850 A. D. (Samuels 1983:25).

Unit I

Unit I is the most recent cultural horizon at Ozette, and includes materials collected from the present ground surface. The early part of Unit I is undated, but is of late historic age and likely represents the final occupation of the Ozette Village prior to abandonment during the early 20th century (Wessen 1982:22).

LITERATURE

To date no analyses of seeds in an archaeological context have been published from the central Northwest Coast cultural area. An analysis of seeds recovered from the Hoko River 'wet site' (45CA213) was conducted by Richard Bigely, but to date the results are unavailable. Ecklund (1980) analyzed "cones" recovered from the Hoko 'wet site'. Her conclusion based on these data was that the climate in the immediate area of the site was essentially the same 2500 - 3000 years B. P. as at present. She drew no conclusion concerning subsistence activities of the people living here at this time. Ecklund-Johnson currently is analyzing seed samples from the Hoko Rock Shelter site (45CA21) located at the mouth of the Hoko River. At Ozette, several studies have been conducted concerning various aspects of subsistence and technology. These include Friedman's (1975) analysis of wooden artifacts, Croes' (1977) analysis of Ozette basketry, Mauger's (1978) study of Ozette shed roof houses, Gleeson's (1980) work on Ozette woodworking technology, Wessen's (1982) research concerning shellfish utilization, DePuydt's (1983) analysis of bird remains, and Huelsbeck's study of mammal and fish utilization (1981; 1983).

CHAPTER 2

COLLECTION AND ANALYSIS OF THE BOTANICAL SAMPLES

The procedures used for obtaining botanical data from the archaeological materials at Ozette can be divided into two distinct phases: sample collection and sample analysis. I had no involvement with the collection methods used by the vast majority of excavators. Over the period of excavation hundreds of excavators of various skill levels worked at Ozette; not all were conscientious collectors of seeds and plant fragments. The sampling strategies of excavators generally fell into two categories. Usually leaves, cones, twigs, and small seed caches were collected in their entirety, and excavators collected presumably representative subsamples of large seed concentrations. However, two biases existed in the collection of samples: 1) variation in collecting procedures between individual excavators despite attempts to achieve consistency in this regard; and 2) differential recovery of taxa due to the differing properties of each type of item, including size, color, shape, and specific gravity. Thus, Rubus spectabilis (salmonberry) and Sambucus racemosa var. arborescens (elderberry) seeds are fairly well represented spatially in the Ozette collection, whereas Ericaceous seeds are very probably far underrepresented. Vaccinium spp. (huckleberry) and Gaultheria shallon (salal) seeds are about the same size, shape, and color as large sand grains, and are therefore easily overlooked, especially by inexperienced excavators. During 1970 - 1978 22 sample (average 2.4 per year) were collected that contained Gaultheria - Vaccinium seeds. In 1979

I attempted to increase excavator awareness of these small seeds. During July - October 1979, 14 samples containing this seed type were collected. Thus it seems evident that prior to 1979 the majority of Gaultheria - Vaccinium seeds were undetected by excavators. Even if collection procedures had been perfectly uniform throughout the excavation of the site, the samples recovered would not be in one-to-one correspondence with deposited material, due to differential preservation resulting from variations in the depostional and post-depositional environment.

In water-screened squares, material accumulated in the screen boxes was bagged and shipped to Pullman for further processing. After arrival in Pullman, the material was thoroughly dried then submerged in a tank of water to separate wood chips and other vegetal matter from the remainder of the sample (Huelsbeck 1980:57). Twigs, cones, and miscellaneous floated materials were given to me for identification. With but few exceptions, all of the plant remains from these samples consisted of Picea sitchensis cones and twigs.

I sorted the sample material into seed and non-seed portions, and identified the sample contents by comparing the archaeological materals to known plant specimens from the Marion Ownbey Herbarium (Washington State University). The numbers of salmonberry and elderberry seeds of greater than 1 cc in volume were often estimated using linear regressions of known numbers of seeds per volume (see Figures 7 & 8). All volume measurements were made using the same 10 ml graduated cylinder to control for packing effects that would be introduced by using cylinders of differing diameters. A rough estimate of 3000 seeds per ml was used for Gaultheria

- *Vaccinium* seeds. This estimate was based on data provided by Dimock et al. (1974) and Crossley (1974).

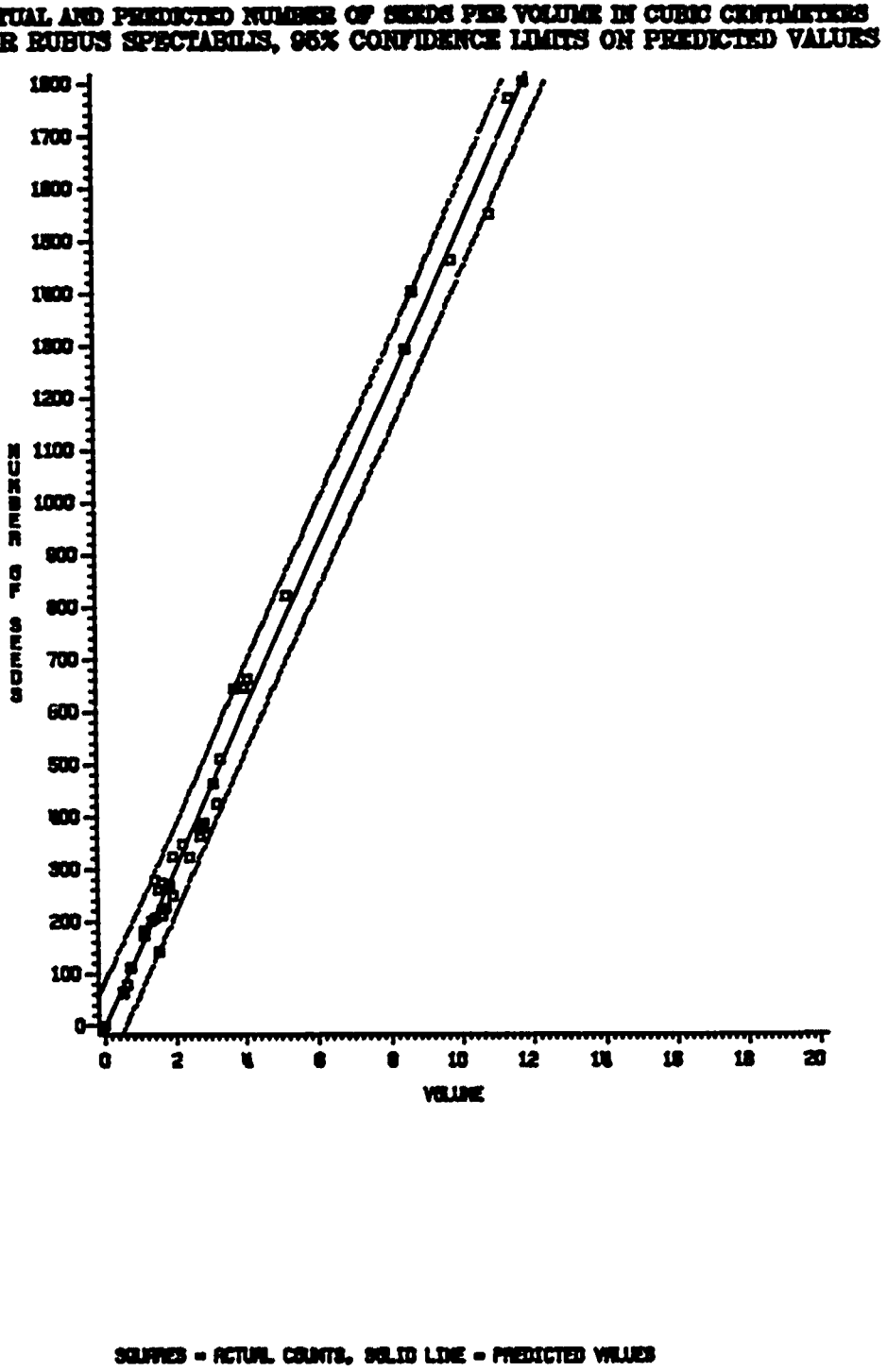

Figure 7. Estimates of Rubus spectabilis Seeds by Volume

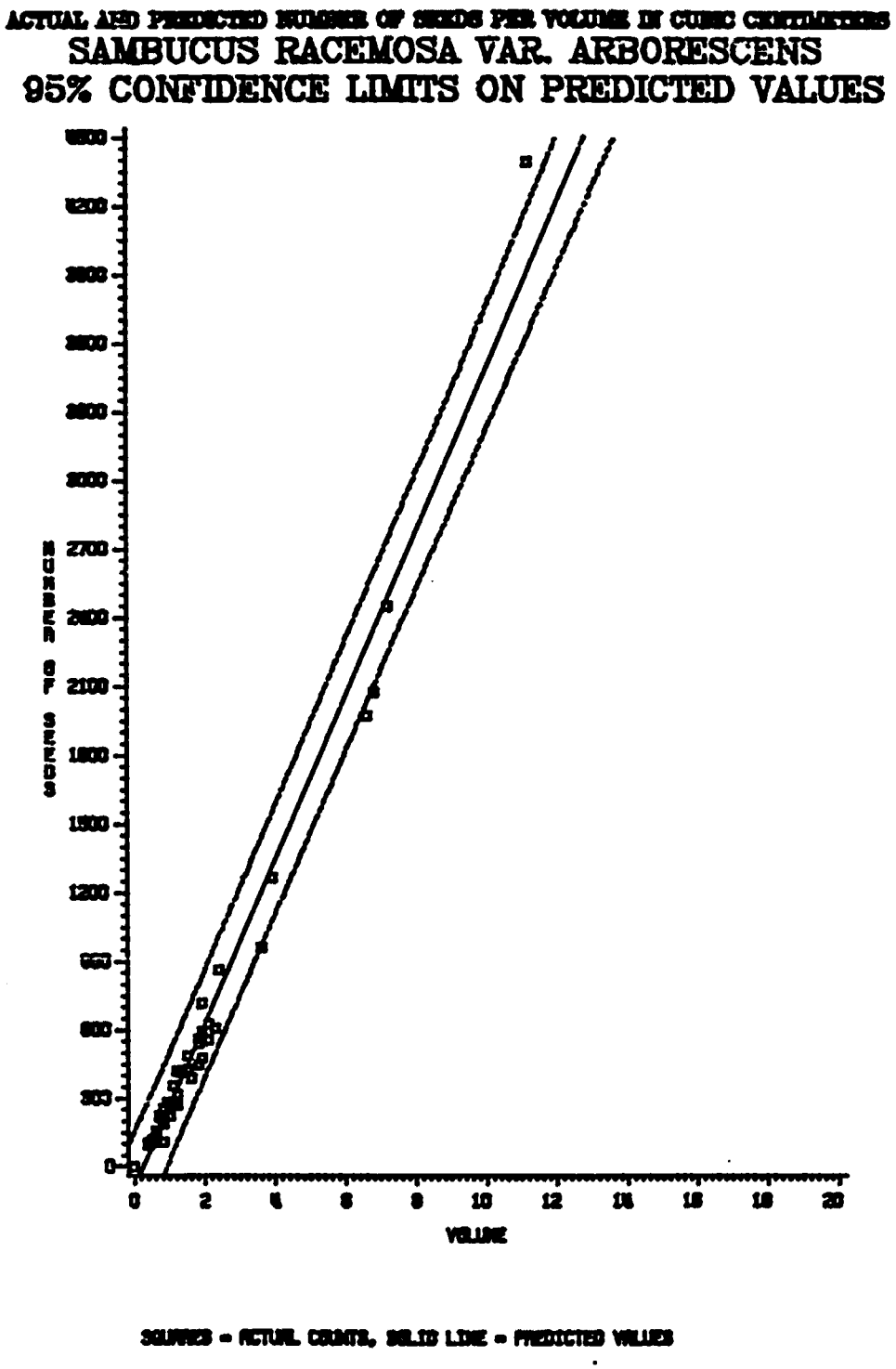

Figure 8. Estimates of Sambucus racemosa Seeds by Volume

CHAPTER 3

BOTANICAL SAMPLES FROM THE OZETTE SITE (45CA24)

Introduction

The collection of plant remains from Ozette includes an estimated 449,968 identified items, 448,943 of which are non-coniferous seeds (see Table 1). A total of 15 genera are represented in the sample. Of the non-coniferous seeds, 23.9% were Rubus spectabilis, 20.6% were Sambucus racemosa var. arborescens, and 55.3% were Gaultheria - Vaccinium. These three seed types composed 99.7% of the non-coniferous seeds recovered and 99.5% of the total collection. Of the remaining material (0.2% of total number of items), Picea sitchensis cone pieces were the most common item (42.2% of remaining material, 0.1% of total collection).

Unit VII Plant Remains

Only one sample was recovered from Unit VII, a Picea sitchensis cone showing little degradation from square 149. It is very unlikely that this material was of any cultural significance, and it probably indicates spruce was present in the Ozette Village area at about 800 B. P.

Unit VI Plant Remains

As was mentioned earlier, although there is no evidence of major occupation in the excavation area during the Unit VI period, midden deposits to the north suggest a continous occupation of the Ozette area

Table 1. Summary of Ozette Botanical Samples

Taxon	Unit III	IV	V	VI	VII	Total
Rhodophyta			1			1
Polystichum munitum						
frond fragments		1	53			54
Pteridium aquilinum						
frond fragment			1			1
Thuja plicata						
branchlets			10			10
bark fragments		1	153			154
Picea sitchensis						
needles	1	1	14			16
twig fragments	4		151			163
cone pieces	5		371	35	1	432
seeds			55			55
Pinus contorta cone			1			1
Tsuga heterophylla						
needles			27			27
cones	1		4			5
Alnus rubra parts			6			6
Corylus cornuta nuts			2			2
% non-coniferous seeds			0.0%			0.0%
Rosa nutkana seeds			10			10
% non-coniferous seeds			0.0%			0.0%
Rubus spectabilis seeds	10643	50	89806	6615		107114
% non-coniferous seeds	30.4%	90.9%	22.5%	44.7%		23.9%
small Rubus seeds	148		843	228		1210
% non-coniferous seeds	0.4%		0.2%	1.5%		0.3%
Rubus sp. seeds	1		6			7
% non-coniferous seeds	0.0%		0.0%			0.0%
Apiaceae seeds				3		3
% non-coniferous seeds				0.0%		0.0%

Table 1, continued

Taxon	Unit III	IV	V	VI	VII	Total
Gaultheria shallon leaves and stems		96	1			101
Gaultheria - Vaccinium seeds	7503		240624	11		248138
% non-coniferous seeds	24.4%		60.3%	0.0%		55.3%
Sambucus racemosa var. arborescens seeds	16751	5	67618	7292		92303
% non-coniferous seeds	47.8%	9.1%	16.9%	53.6%		20.6%
Scirpus micorcarpus seeds	16		140			156
% non-coniferous seeds	0.1%		0.0%			0.0%
Total non-coniferous seeds	35062	55	399040	14786		448943
TOTAL	35073	154	399888	14821	1	449968

during this time. Forty-one samples containing 14,821 items were collected from this unit (see Table 2). Thirty-nine of these collections were located under the House 2 - House 5 area. Eleven of the 41 samples contained various berry seeds, the other 30 were composed of Picea sitchensis (Sitka spruce) cone parts. The spruce cones were in no apparent cultural context, and were deposited by trees occuring locally in the area. Excavators recovered 14,783 berry seeds from Unit VI. Of the seed bearing samples, all contained Rubus spectabilis (salmonberry) and Sambucus racemosa var. arborescens (elderberry) seeds. Although the seed percentages varied from 1.9% salmonberry and 97.1% elderberry to 99.4% salmonberry and 0.6% elderberry, in 7 of the 11 samples the less numerous of the two species composed at least 20% of the sample.

Only one sample contained seeds representing the Gaultheria - Vaccinium seed type. The low number (n=11) of seeds makes interpretation difficult. Assuming that the abundance and frequency of these seeds in the Unit VI samples reflects their abundance in the deposits (there are reasons why this may not be true, see part 3, chapter 2), this would indicate that the people discarding refuse in this area were not concurrently using Gaultheria shallon or Vaccinium spp. in a way that would produce debris that would be transported to the excavation area for disposal. Interestingly, the only Apiaceae seeds (possibly Oenanthe sarmentosa) that were not determined to be of recent origin were recovered from Unit VI samples, each containing one seed associated with various berry seeds (see Table 2). The significance of these seeds is uncertain, but their association with the berry seeds is probably accidental, either as contamination as the fruit were being collected, or perhaps the plants were growing on the deposition site and their seeds became mixed with the berry seeds at the time of deposit.

Table 2. Botanical Remains Recovered from Unit VI

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Apiaceae	Picea sitchensis cone pieces	Picea sitchensis needles
24	5	510	50	288			6	
25	1	380	15	68				
27	1	860	40	804	11	1		
32	1	70	34	3524				
47	1						1	
55	4						5	
56	3	610	36	207		1	4	2
59	1	14		283				
78	1	541	2	260				
79	1	534	30	344				
91	1						1	
92	1	814	7	1520				
114	1	1498	14	626		1		
117	11						12	
142	1	784		5				
149	7						7	
Total		6615	228	7929	11	3	36	2
% of total seeds		44.7%	1.5%	53.6%	0.1%	0.0%		
% Frequency of seed containing samples		100%	81.8%	100%	9.1%	27.3%		

Total seeds - 14786

Plant Remains Recovered from Unit V

Unit V provided the bulk of the botanical material (399,888 items; 399,040 non-coniferous seeds) recovered from the Ozette Village Site (see Table 1), and provides more detailed information concerning prehistoric plant utilization by the Ozette people than does any other unit. As each house floor midden reflects the activities of the house occupants, each of these will be presented separately, beginning with the oldest house constructed. Exterior midden can be associated with the various Unit V houses, and, where possible, data from this material are presented follwoing the data from the associated house(s).

House 1

Only two collections of non-artifact plant material were recovered from House 1. However, because of the excellent preservation of artifacts and structural remains made from wood and other plant materials, as well as that of the two samples, I believe that a significant number of seeds and other small plant parts were present in the House 1 floor midden, but were not recovered by the excavation procedures used in this portion of the site. Part of a Polystichum munitum var. munitum (swordfern) frond was recovered from square 6 (see Figure 9 for location of squares in the excavation area). Both pinnae and rachis were present, and showed little evidence of degradation. The second sample, from square 132, contained 66 Rubus spectabilis seeds.

House 5

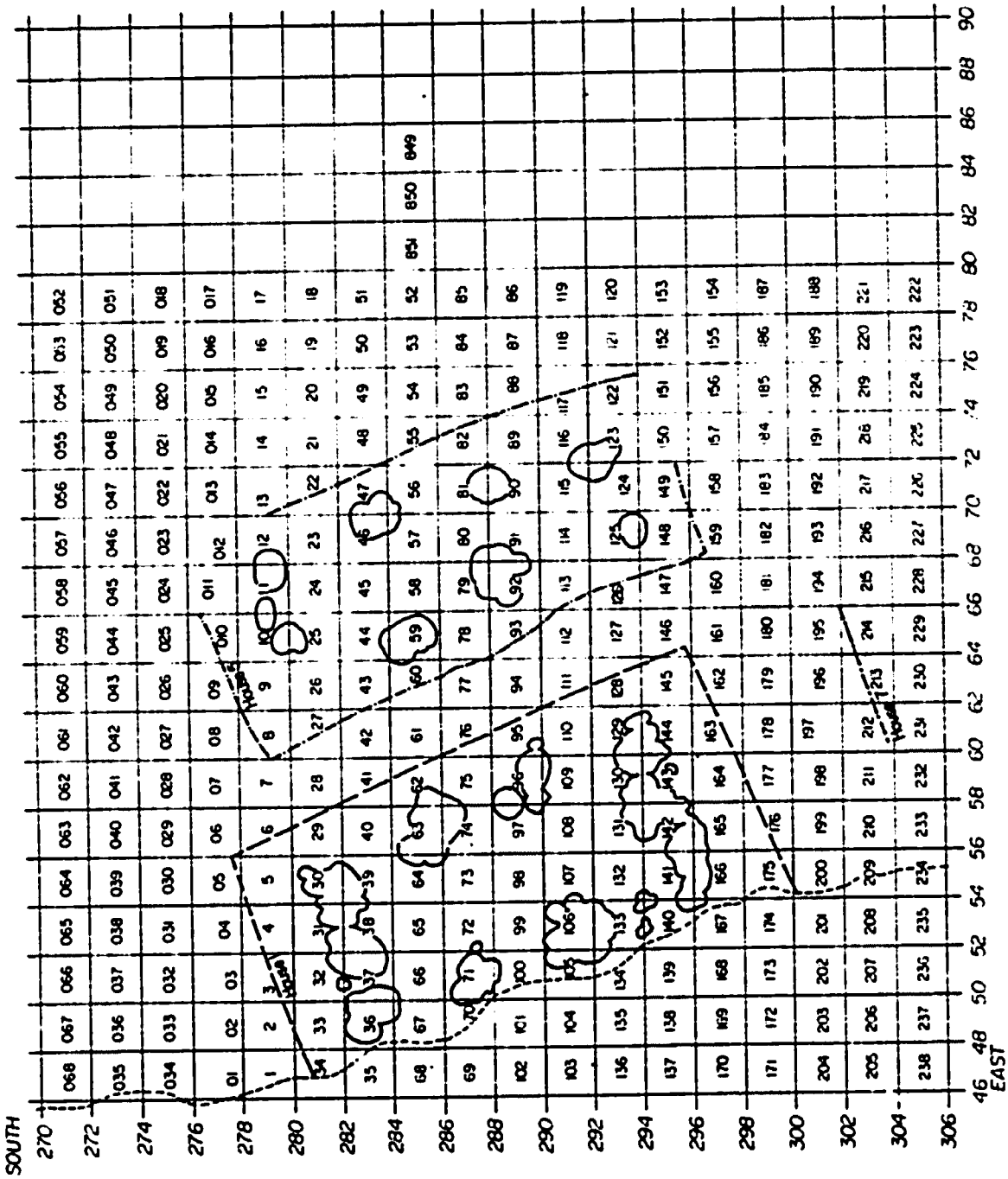

Figure 9. Location of Excavation Squares and Houses in Early Unit V

Thirty-four samples containing plant parts were processed from House 5. The plant remains collected were not evenly distributed throughout the house and are not uniquely associated with any particular feature or structure of the house. Instead, these collections are more a function of the excavations techniques used for each square. With one exception, all of the Picea sitchensis samples recovered were from water-screened squares. Of the other plant remains, 8 of the 13 samples were from water-screened sqaures. With the exception of some of the spruce cones, most of the plant remains were in good condition, exhibiting little decay or other degradation.

Picea sitchensis (Sitka spruce)

Spruce parts were common and widespread in the House 5 midden (Table 3). Thirty cone pieces were recovered, 5 of which showed little or no evidence of decay. The remaining cone pieces were moderately to severly degraded. Eight spruce twig fragments were also recovered from House 5. It is likely that the spruce parts recovered from this house floor represent material originally on the ground surface where House 5 was constructed, debris from branches collected for firewood, material deposited while the occupants of House 5 were temporarily absent (presumably taking their roof planks with them), and cones and twigs deposited immediately after the abandonment of House 5.

Table 3. *Picea sitchensis* Parts Recovered from House 5

Square	No. of samples	Type of material	No. of pieces
10	1	twig fragments	2
24	2	cones	3
25	1	twig fragments	2
45	1	cones	2
55	1	cone	1
56	1	cone	1
57	1	cones	2
58	1	cone	1
59	1	cone	1
79	1	cones	2
81	1	twig fragments	1
82	1	cone	1
123	2	cones	5
		twig fragments	2
149	3	cones	7
		twig fragment	1
159	3	cones	4

Total cones - 30

Total twig fragments - 8

Rubus spectabilis (Salmonberry)

Salmonberry seeds were present in 13 of the samples collected and comprised 72.5% of all seeds recovered from House 5 (see Table 4). With one exception, all of the samples containing salmonberry seeds also contained elderberry (Sambucus racemosa var. arborescens) seeds, and all of the samples with elderberry seeds also contained salmonberry seeds. The relative percentages of the two species varied greatly among the samples, however, from 98.3% salmonberry and 0.6% elderberry to 1.6% salmonberry and 98.0% elderberry. Six of the samples contained small Rubus seeds of undetermined species (see Table 4). Based on their appearance, it seems clear that most of these seeds represent malformed and aborted Rubus spectabilis seeds, although it is possible that some represent another species, such as Rubus parviflorus (thimbleberry). Because some of these seeds may not be R. spectabilis, they are tabulated separately. These small Rubus seeds comprise only a small portions (0.7%) of the total seeds recovered from House 5. If some of them represent a species other than R. spectabilis, that species was of little imprtance to the occupants of House 5.

Table 4. Seeds Recovered from House 5

Square	No. of samples	Rubus spectabilis	Small Rubus	Rubus sp.	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Scirpus microcarpus
10	4	1455	19		484	4	
24	1	24					
26	3	2626	62	1	963		1
45	1	173			18		
56	1	6263	15		1654		
79	1	1057	30		105		
90	1	997			85		
93	1	754			1627		
Totals		13349	126	1	4936	4	1
% of total		72.5%	0.7%	0.0%	26.8%	0.0%	0.0%
% Frequency of seed containing samples		100%	46.15%	7.69%	92.31%	7.69%	7.69%

Total seeds - 18417

Gaultheria shallon (salal) and Vaccinium spp. (Huckleberries)

The seeds of Gaultheria shallon and Vaccinium spp. present in the Ozette area are difficult to distinguish even with ideal preservation. With the archaeological materials from Ozette, species identification is not accurate. For reasons discussed more fully elsewhere in part 3, chapter 2, it is very likely that seeds from Gaultheria shallon and Vaccinium spp. are far underrepresented in the collections from House 5 and most other areas of the site. I believe these seeds were generally unrecognized and thus not collected by the excavators of House 5.

Sambucus racemosa var. arborescens (Elderberry)

Elderberry seeds were the second most numerous (n=4936, 26.8%) plant remain recovered from House 5 (see Table 4). All of the elderberry seeds were directly associated with salmonberry seeds.

Scirpus microcarpus (small-fruit bulrush)

Only one seed of this type was recovered from House 5. It significance, if any, is unknown.

Early Unit V (Unit V temp. VII) Exterior Midden

Material Associated with House 1
prior to House 5 construction

Two seed samples from square 44 were recovered from exterior midden deposited prior to the construction of House 5, and are associated with House 1. Included are 1805 Rubus spectabilis seeds, 1158 Sambucus racemosa var. arborescens seeds, and one Gaultheria - Vaccinium seed (see Table 5).

Samples Associated with House 1
Prior to House 3 Construction

Eight botanical samples were recovered from the exterior midden north of House 1 in material deposited prior to the construction of House 3 (see Table 5). These samples contained a total of 1292 Rubus spectabilis seeds, 1873 Sambucus racemosa var. arborescens seeds, and 4 Picea sitchensis cone pieces.

Exterior Midden Associated with
Houses 1 and 7

Three samples, from squares 197, 210, and 211, were collected from the exterior midden between Houses 1 and 7 (see Table 5). The total of these samples included 105 Rubus spectabilis seeds and 5735 Sambucus racemosa var. arborescens seeds.

Table 5. Botanical Remains Recovered from Early Unit V Exterior Midden (Unit V temp. VII)

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Picea cone pieces	Picea sitchensis twig fragments
		Material associated with House 1 prior to House 5 construction					
44	2	1805	14	1158	1		
% of total		60.6%	0.5%	38.9%	0.0%		
		Material associated with House 1 prior to House 3 construction					
02	2	890				1	
029	5	132		31		3	
032	1	272		1842			
Totals		1292		1873		4	
% of total		40.8%		59.2%			
		Material associated with Houses 1 and 7					
197	1	1057	2	9			
210	1			358			
211	1	1		4311			
Totals		1058	2	5735			
% of total		15.57%	0.03%	84.40%			
		Material associated with House 5					
09	1					2	
117	7					7	
122	1	164	2	548			
149	7					6	5
Totals		164	2	548		15	5
% of total		23.0%	0.3%	76.8%			

Exterior Midden Associated with
House 5

Excavators recovered a total of 16 botanical samples from squares 09, 117, 122, and 149 that are associated with House 5. Only the material from square 122 contained berry seeds, 164 Rubus spectabilis and 548 Sambucus racemosa var. arborescens. The remaining samples contained 13 Picea sitchensis cone pieces and 5 spruce twig fragments.

House 3

Only the southern portion of House 3 has been excavated, and therefore the 7 botanical collections from this house were limited to a small portion of the total house floor midden. Two partially decomposed Picea sitchensis cones were recovered, one each from squares 010 and 027. One sample consisting of two excellently preserved Thuja plicata branchlets was collected from square 09. Since at present no red cedar grows west of the coastal ridge crest at Ozette, it is almost certain that these two branchlets were deposited by the occupants of House 3. The branchlets may be the debris resulting from rope making or basketry. Four samples containing 42,603 seeds were also recovered from House 3 (see Table 6). One sample consists of a shell fragment of Corylus cornuta (hazelnut). This species currently does not occur in the Ozette - Makah area. Swan (1870:44), however, said that hazel grew at Cape Flattery and vicinity during the mid-1800s. In any case, it seems likely that this shell originated outside of the Ozette area, and probably was obtained through trade, as a gift from visitors, or as a result of travel. The remaining 3 samples consisted almost entirely of Rubus spectabilis

(n=27,716; 65.1% of seeds) and Sambucus racemosa var. arborescens (n=14,874; 34.9% of seeds) seeds, with 10 small Rubus seeds in one of the samples.

Table 6. Seeds Recovered from House 3

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Corylus cornuta
02	1	5		9	
04	1	27692		12894	
033	1	19	10	1973	
041	1				1
Total		27716	10	14874	1
		65.1%	0.0%	34.9%	0.0%
Total seeds - 42603					

Middle Unit V Exterior Midden (Unit V temp. VI) Associated with Houses 1 and 3

During the period between the abandonment of House 5 and the construction of House 2, the area east of House 1 and south of House 3 was unoccuppied, and this area collected refuse from the surrounding houses. More botanical samples (n=94) were collected from this stratigraphic level than from any other. The contents of these samples fall into two

categories: conifer parts (61 samples) and angiosperm seeds (35 samples). Although these samples are not randomly distributed, the pattern reflects no discernable cultural behavior on the part of the Ozette villagers.

Conifer Remains

Picea sitchensis cones were the most common and widespread conifer remain collected. They were recovered from a total of 18 squares for a total of 177 pieces (Table 7). It seems unlikely that these cones resulted from any cultural activity of the Ozette people. The majority of cones were deposited by spruce trees growing locally in the village area at this time. All of the needles recovered from this level were associated with berry seeds. Six of the 7 needles are of Tsuga heterophylla. This species currently does not occur west of the coastal ridge crest, and it is unlikely that it did so during Unit V times. The hemlock needles recovered were probably accidentally collected by the Ozette villagers while berry picking in interior area. Thuja plicata does not at present occur west of the coastal ridge crest, and the two branchlets recovered from the temp. VI deposits probably represent debris from basketry or rope manufacture.

Rubus spectabilis (salmonberry) and Sambucus racemosa var. arborescens (elderberry) seeds

Twenty-six of the 35 samples containing seeds contained both salmonberry and elderberry seeds (Table 8). An additional two samples consisted of salmonberry seeds and one sample contained elderberry, Gaultheria - Vaccinium, and Scirpus microcarpus seeds, but no salmonberry.

91.7% of the salal - huckleberry seeds were not closely associated with either salmonberry or elderberry seeds. Of the seeds from this level, 0.06% consisted of small Rubus seeds. It is apparent that most of these are malformed and aborted salmonberry seeds.

Table 7. Conifer Parts from Middle Unit V Exterior Midden (Unit V temp. VI)

Square	No. of samples	Picea sitchensis cone pieces	Picea sitchensis twig fragments	Picea sitchensis needles	Tsuga heterophylla needles	Thuja plicata branchlets
011	2	4				
012	1	1				
12	1	1				
13	1	1				
56	2	3				
57	4	8	1			
58	1	8				
80	3	10		1*	1*	
81	2	40				
82	1	3	4			2
90	6	32	4			
91	1	4				
117	1	1				
112	6	6				
123	1	4				
149	7	15			5*	
150	20	35				
159	1	1				
Total	61	177	9	1	6*	2

* Associated with seeds

Table 8. Seed Samples from Middle Unit V Exterior Midden (Unit V temp. VI)

Square	No. of samples	Rubus spectabilis	Small Rubus	Rubus sp.	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Scirpus microcarpus
10	5	2042	2		9541	3	
23	1	1270	9		61	2	3
26	1	1149		3	217	36	3
28	1	845	30		1556		
43	1	15			2522		
45	4	44			3504	168	16
46	1	572	26		134	1	
47	1	7564	40		3130		2
56	1					54000	53
57	5					42575	4
58	1	39					
59	4	2483	30		82		
79	1	1452			46		
80	2	36			143	13500	
91	1	30			142	6000	
122	2	963	27		703	26	21
124	1				270		
149	2	1078	13		4	120006	2
Total	35	19582	177	3	22055	236317	104
% Total		7.0%	0.1%	0.0%	7.9%	84.9%	0.0%
% Frequency of samples		80.0%	28.6%	2.9%	77.1%	51.4%	31.4%

Total seeds - 278238

Gaultheris - Vaccinium Seed Type
(Salal and Huckleberris)

Approximately 278,238 seeds were recovered from middle Unit V exterior midden (see Table 8)

236,317 (84.9%) were of the Gaultheria - Vaccinium seed type. To areas, square 149 and squares 56, 57, 80, and 91, produced 99.9% of the Gaultheria - Vaccinium seeds. Possibly waste material from berry cakes was deposited at these locations. The 96,575 Gaultheria - Vaccinium seeds from squares 56 and 57 were not associated with the seeds of any other berries. The 120,000 seeds from square 149 were associated with one seed each of Rubus spectabilis and Sambucus racemosa var. arborescens. I believe this to be a casual relationship, however, and not of cultural significance. Thus 91.7% of the Gaultheria - Vaccinium seeds were not associated with the salmonberry - elderberry material. Although there is overlap in the availability of ripe salmonberry and elderberry fruit with that of salal and huckleberries (especially Vaccinium parvifolium), the peak availabilities are different — salmonberries and elderberries in mid-July, red huckleberry in late July to early August, and salal, evergreen huckleberry (Vaccinium ovatum), and bog blueberry (V. uliginosum) in mid-August to early September. Vaccinium alaskaense and V. ovalifolium fruit are ripe in July, but they are relatively rare in the Ozette area. Salal, and to a lesser extent, huckleberries were dried for future use by the Makah and other Pacific Northwest Coast peoples. Although the Gaultheria - Vaccinium seeds indicate collecting activities during late summer, their presence does not necessarily indicate occupation of the excavation area during this time of year, as the seeds

could very possibly be waste from dried berry cakes made elsewhere. Hemlock (Tsuga heterophylla) neddles were associated with the Gaultheria - Vaccinium seeds recovered from squares 80 and 149. This suggests an inland collection site for at least part of the material recovered in these two samples.

About 98% of the Scirpus microcarpus seeds recovered from this level were associated with Gaultheria - Vaccinium seeds. This presence suggests the that collection or processing of the berries occurred in wet localities. With the exception of Vaccinium uliginosum and V. caespitosum, Scirpus micorcarpus does not usually occur in close proximity to salal or huckleberry plants. Another explanation for this association is that Scirpus microcarpus seeds became mixed with the Gaultheria - Vaccinium seeds at the time of deposition. This possibility is discussed more fully in the following chapter.

Exterior Midden Associated with Houses 1 and 3

North of House 1 and south of the western portion of House 3 is an area of exterior midden not clearly differentiated into middle and late levels. Therefore, samples from this area are considered together (Table 9). Sambucus racemosa var. arborescens (elderberry) seeds were recovered in 100% of the 9 samples, comprising 51.5% of the seeds collected. Rubus spectabilis seeds occurred in 7 of the 9 samples, composing 46.9% of the seeds recovered. Only 14 (0.1% of the seeds recovered) Gaultheria - Vaccinium seeds were collected from this area. It is likely that many more seeds of this type were present in the deposits than these 14 seeds would indicate.

Table 9. Botanical Samples from Exterior Midden Associated with Houses 1 and 3

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Picea sitchensis needles
3	1	56	1	149	14	
02	1			224		
03	4	1727	60	3891		
04	1	1376	30	41		
06	2	1518	71	834		3
Total	9	4677	162	5139	14	3
% Total seeds		46.9%	1.6%	51.5%	0.1%	
% Frequency of samples			77.8%	55.6%	100%	11.1%
Total seeds - 9978						

House 2

Seventy-six botanical samples were recovered from House 2 floor midden. Greater botanical diversity was found in this area than in any other portion of the site. The eastern portion of the interior of House 2 was anomalous in that few artifacts and structural remains were encountered on the surface of the floor midden. Gleeson, Mauger, and Fisken (1976:19) speculated that either the area had been swept clear of cultural material down to the floor midden surface by the Unit IV clay slide, or that the focus of activity in the house was along the western margin. Assuming that excavation techniques did not significantly affect the recovery of botanical remains, the distribution of berry seeds and spruce cones and twigs tends to support the second alternative.

Marine Algae

One sample from square 82 contained material probably representing a species of the Rhodophyta (red algae). This square contained a variety of plant debris, and it is unlikely that this specimen is of any great cultural significance. Swan (1870:5) noted that the Makah used dried seaweed and moss to chink their houses against draughts in the mid-1800s. Since square 82 contained a portion of the east House 2 wall (see Figure 10 for location of squares and house walls during the occupation of House 2), the sample recovered may have been used for this purpose.

Bryophytes

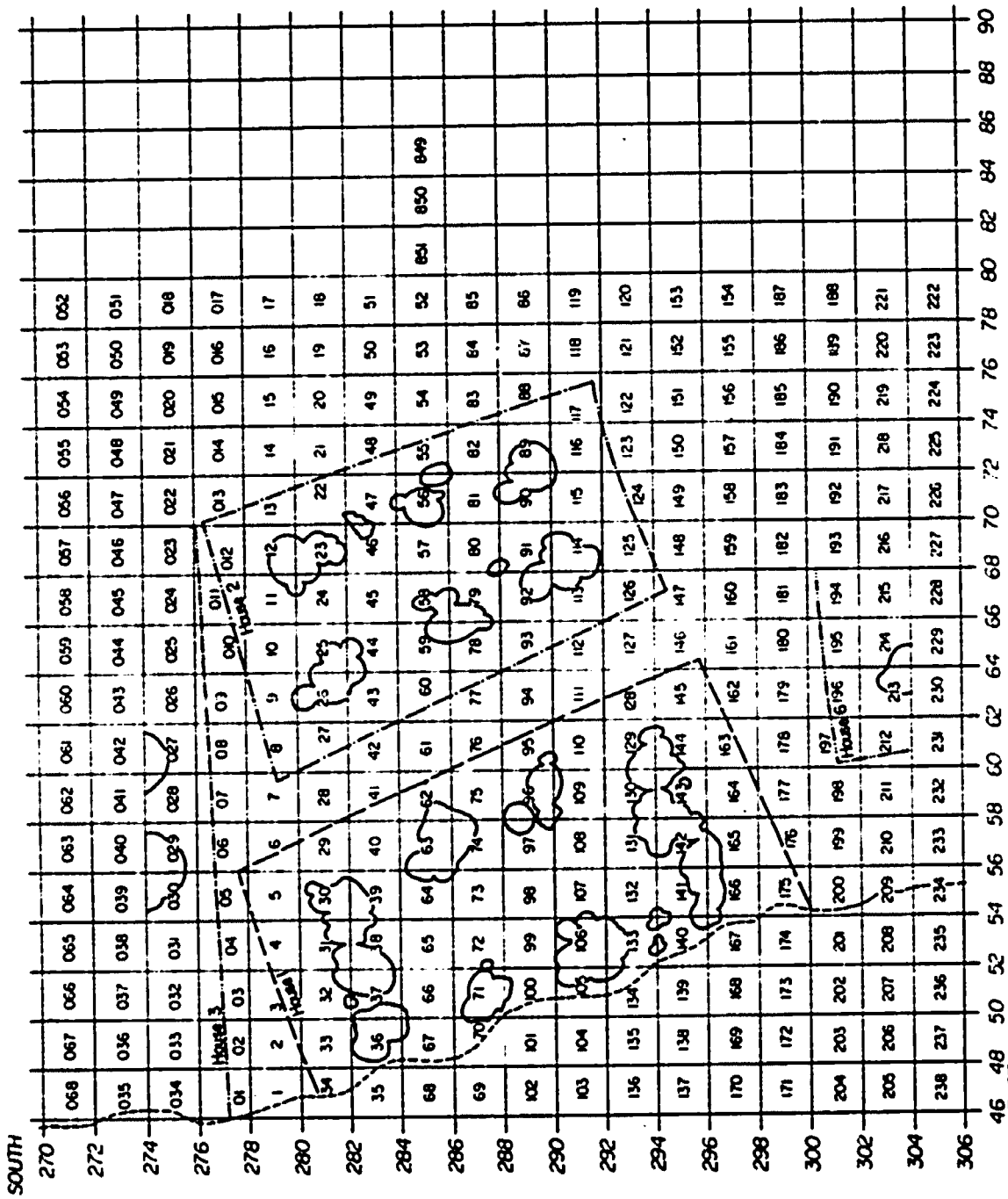

Figure 10. Excavation Squares and House Location during the Late Unit V Period (Unit V temp. V)

Seven samples containing bryophytes were recovered from House 2 (see Table 10). Most of the material was well preserved but unidentifiable due to the small size of the fragments and the absence of structures necessary for identification. I believe that most of the bryophytes recovered were of little cultural significance. Swan (1870:5) said that the Makah used dried seaweed and moss to chink their houses in the mid-1800s. Some of the moss recovered from House 2 may have been used for this purpose. Others may have been brought into the house with firewood or other materials. Two of the mosses from House 2 were recovered from Unit IV slide material. These probably originated upslope from House 2 and were deposited as a consequence of the Unit IV clay slide.

Polystichum munitum var. munitum (Swordfern)

No special pattern was evident among the swordfern remains (Table 11) and, since this is an evergreen species, they provide little insight concerning the seasonality of House 2 occupation. In one sample from square 115, Unit IV, a leaflet was recovered that was still green at the time of exposure to the air, but rapidly turned black after exposure, indicating that it had been incorporated as part of the Unit IV clay slide. This provided excellent evidence that, as expected, swordfern was a component of the vegetation upslope from the Ozette Village at the close of Unit V times.

Table 10. Bryophytes Recovered from House 2

Square	Unit	Identity	No. of samples	Plant parts	Total no. of pieces
10	V	Hylocomium splendens	1	gametophytic plant	1
		unident. moss	1	gametophyte fragment	1
43	IV	unident. moss	1	gametophyte fragment	1
45	IV	unident. moss	1	gametophyte fragment	1
57	V	unident. moss	1	gametophyte fragments	2
82	V	cf. Claopodium crispifolium	1	gametophytic plant	1
		unident. moss		gametophyte fragments	7
93	V	unident. moss	1	gametophyte fragment	1
Total			7		15

Thuja plicata (Western red cedar)

Eight samples containing scrap pieces and fragments of cedar were collected from House 2 floor midden (Table 12). As cedar presently does not occur west of the coastal ridge crest, and it is highly unlikely that it did during Unit V times, all of these remains are interpreted as resulting from the activities of House 2 occupants. The inner bark recovered is probably waste from basket, mat, clothing, or perhaps ceremonial headdress manufacture. Two categories of cedar branchlets were

Table 11. *Polystichum munitum* var. *munitum* Material from House 2

Square	No. of samples	Plant parts	Total no. of piecess
10	2	frond fragments with sori, pinna fragment	2
11	1	pinna fragment	1
24	1	frond fragments	12
45	2	fragments: frond, frond with sori	2
55	1	pinnae fragments	7
57	1	pinnae fragments	4
59	1	frond and pinnae fragments with sori	13
79	1	frond fragment	1
82	6	pinnae fragments	8
115	1 (Unit IV)	pinna	1
	1	pinna	1

uncovered in House 2. The first consists of unmodified fragments, and may be the result of a wide variety of activities, including basketry, rope or string manufacture, or medicine. The second category consisted of branchlet fragments with their leaves stripped from the lower portion. These fragments are interpreted as debris resulting from the manufacture of ropes or carrying baskets (see part II).

Table 12. Thuja plicata Scraps from House 2

Square	No. of Samples	Type of Material	No. of Pieces
13	1	inner bark	compact mass
24	1	(?) bark fragments	2
25	2	branchlets, lower portions stripped of leaves	2
45	1 (Unit IV)	(?) bark fragment	1
58	1	inner bark	est. 100
81	1	branchlets with leaves	3
82	1	branchlets with leaves	1
93	1	(?) bark fragment	1

Picea sitchensis (Sitka spruce)

Spruce parts are common in the House 2 floor midden (Table 13). Interestingly, all of these samples, with the exception of the well preserved spruce branch from square 43, were recovered from water-screened squares. It is also interesting that although Rubus spectabilis and Sambucus racemosa var. arborescens seeds were sometimes collected from water-screened squares, their distribution is mutually exclusive of that of the spruce parts. The cultural significance of this distribution, if any, is uncertain, owing to the difficulty in separating culturally dependent distribution patterns from those associated with the excavation techniques. Three of the cone samples from square 90 were apparently

collected from the portion of the deposit where the bottom of the House 2 floor midden contacted Unit V temp. VI clays. It is likely that these cones were deposited just prior to House 2 construction. Two alternative explanations (not mutually exclusive) are likely for most of the remaining materials. The first is that the material represents debris deposited while the occupants of House 2 were temporarily residing elsewhere during the annual subsistence round. Swan (1870:6) noted that when a Makah household had insufficient boards for both winter and summer quarters, they would use the roof-boards for whichever house they were currently occupying. The second possibility is that the spruce cones and twig represent debris from branches collected for firewood, projectile point or other artifact manufacture, or ceremonial activities. The well preserved branch from square 43 must have been well buried almost immediately after removal from the tree. Under normal circumstances Sitka spruce branches rapidly loose their needles after being picked. The needles on the square 43 specimen were still attached when recovered, and a faint spruce aroma was still evident. I believe this branch was either deposited by the Unit IV slide or immediately prior to the slide by the occupants of House 2. Comparison of this sample with specimens of known seasonality suggests an early spring date for deposition, possibly March.

Table 13. *Picea sitchensis* Parts Recovered from House 2

Square	No. of Samples	Type of Material	No. of Pieces
011	1	cone	1
012	3	cones	3
11	1	cone	1
23	1	cone	1
43	1	branch with needles, excellent condition, buds just swelling, probably deposited in early spring	1
46	1	cone	1
56	2	cone twig fragments	1 2
57	1	twig fragments	6
58	1	cones twig fragment	22 1
80	3	cone twigs	4 11
81	2	cones twigs	5 27
82	5	cones twigs	6 63
88	1	twig	1
89	1	twig fragments	6
90	5	cone fragments twig fragment	10 1
117	1	cone	1

Totals: 56 cones and cone pieces, 117 twig fragments, 1 branch with needles attached

Pinus contorta var. contorta
(Lodgepole pine)

One cone in excellent condition was recovered from House 2, square 012. No others are known from the site. The nearest lodgpole pine to Ozette occurs on Manny's Prairie and along Ericson's Bay, Lake Ozette. Additional trees also grow on Allen's Prairie near the southern end of Lake Ozette. Lodgepole pine does not occur along the coast in the Ozette area. The most probably explanation for the occurance of this cone in the House 2 deposits is that the cone was collected by someone residing in the house during a visit to one of the localities where this species occurs. Among the Ozette artifacts analyzed by Friedman (1975), only one unidentified object was made from Pinus contorta.

Tsuga heterophylla (Coast
hemlock)

Hemlock cones and needles were rare in House 2 (Table 14). This is not suprising since it is very unlikely that hemlock grew any nearer to the Ozette Village 400 years ago than it does today. Ten of the 13 needles recovered were associated with berry seeds, especially Rubus spectabilis and Sambucus racemosa var. arborescens seeds, and probably represent material accidentally collected with the fruit. If this is an accurate supposition, and I believe it is, it indicates trips to inland (at least east of the coatal ridge) areas for berry harvesting.

Alnus rubra (Red alder)

Table 14. Tsuga heterophylla Remains from House 2

Square	No. of Samples	Type of Material	No. of Items
11	1	needle	1
56	1	cone fragment, probably hemlock	1
59	1	needles	2
60	1	needles	8
81	1	cones	2
82	1	needles	2

Six alder leaf fragments were recovered from square 89. They propbably represent miscellaneous debris, although they may have been deposited as a consequence of the landslide that covered this area of the village or as a result of cooking activities.

Corylus cornuta (Hazel)

One hazel-nut was recovered from square 58. This is an interesting find as hazel does not occur in traditional Makah - Ozette territory at present (see discussion in following chapter).

Rosa nutkana (Nootka rose)

Two House 2 samples contained seeds of this species. One, from square 124 contained 7 seeds, and the second, from square 93, contained 3 seeds associated with 15 elderberry and 1770 salmonberry seeds (see Table

15). During the historic period, the Makah ate the fruit, but they were not favored because the fruit are so seedy.

Rubus spectabilis (Salmonberry)

Salmonberry seeds were the most numerous seeds recovered from the House 2 floor midden (see Table 15). All except one of the samples containing salmonberry seeds contained elderberry (Sambucus racemosa var. arborescens) seeds as well. Five of the seven samples containing salmonberry seeds were from non-water-screened squares, and none were from the eastern portion of the house. The water-screened to non-water-screened square relationship suggests a strong correlation exists between excavation technique and the nature and quantity of plant material recovered. The east to west distribution pattern of cones and seeds is associated with the artifact and structural remain distribution anomaly mentioned earlier.

Seventy-eight small Rubus seeds were found in five of the seven samples containing salmonberry seeds (see Table 15). It is apparent that most of these seeds are malformed and aborted Rubus spectabilis seeds, although a few may represent a small seeded species, such as Rubus parviflorus (thimbleberry).

Table 15. Seeds Recovered from House 2 Floor Hidden

Square	No. of samples	Rubus spectabilis	Small Rubus	Rubus sp.	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Rosa nutkana
25	1	265	2		4		
42	1	112	2		864		
45	1	363		1	40		
59	1	15	2		2		
60	1	1400	62		133	3	
78	1	39					
82	1					3	
93	1	1770	10		15		3
123	1			1			
124	1					7	
Total	10	3964	78	1	1059	6	10
% Total		77.5%	1.5%	0.0%	20.7%	0.1%	0.2%
% Frequency		70%	50%	10%	70%	20%	20%
Total seeds - 5118							

Gaultheria shallon (Salal)

Portions of one leaf were recovered from House 2 floor midden in square 44, and a branch with material representing 20 to 25 leaves was recovered from the interface between Unit IV and V in square 43. The material in square 43 exhibited little degradation, and probably was deposited at the time of the Unit IV slide, perhaps even as a consequence of it. The available material suggests deposition during the dormant season for this species — sometime between late fall and spring. Salal does not today occur between the village and the coastal ridge crest at Cape Alava. If this material was deposited as a consequence of the clay slide, it suggests a somewhat different understory in this area than occurs at present.

Gaultheria - Vaccinium (Salal and Huckleberry) Seeds

Six seeds of this type were recovered from House 2 floor midden (Table 15). Interpretation of so few seeds is tenuous, but it seems reasonable that the fruit of these species were being used for food by House 2 residents, although perhaps not always when they were in residence at Ozette. It is likely that many more seeds of this type were present in the House 2 floor midden, but that excavators failed to collect them. The problems associated with these seeds are discussed elsewhere in part III of this report.

Sambucus racemosa var. *arborescens* (Elderberry) Seeds

Elderberry seeds were the second most numerous item recovered from House 2 (Table 15). The distribution of these seeds closely follows that of salmonberry, and indeed, only 1 elderberry seed was recovered that was not directly associated with salmonberry seeds.

Botanical Sample Recovered from Late Unit V Exterior Midden (Unit V temp. V)

Eighteen late Unit V exterior midden samples are spatially associated with House 2 (see Figure 10 and Table 16). Two contained seeds, the remaining 16 *Picea sitchensis* cones. Of the seed samples, each was a mixture of *Rubus spectabilis*, *Sambucus racemosa* var. *arborescens*, *Gaultheria* - *Vaccinium*, and *Scirpus microcarpus* seeds. One sample from late Unit V exterior midden is associated with Houses 1 and 6 (Table 16). It contained 1267 salmonberry and 987 elderberry seeds.

Exterior Midden Between Houses 1 and Houses 2 and 5

Twelve botanical samples were collected between House 1 and Houses 2 and 5 (Table 17). All contained *Rubus spectabilis* and *Sambucus racemosa* var. *arborescens* seeds, and 5 contained *Gaultheria* - *Vaccinium* seeds. Of the *Gaultheria* - *Vaccinium* seeds recovered from square 76, at least some of them appear to be *Vaccinium parvifolium*. The material from square 76 also contains 6 *Tsuga heterophylla* needles, suggesting that these fruit were collected from and inland locality.

Table 16. Botanical Samples Recovered from Late Unit V Exterior Midden (Unit V temp. V)

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Scirpus microcarpus	Picea sitchensis cone needles pieces
				Samples associated with House 2			
54	1	602	40	95	504	9	
55	2						5
122	5	104	2	46	170	3	4
149	2						4
150	4						4
159	4						5
Total	18	706	42	141	674	12	22
%Total seeds		44.8%	2.7%	9.0%	42.8%	0.8%	
Total seeds - 1575							
				Samples associated with Houses 1 and 6			
197	2	1264	9	987			2
		55.9%	0.4%	43.7%			
Total seeds - 2260							

Table 17. Botanical Samples from Exterior Midden Between House 1 and Houses 2 and 5

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Tsuga heterophylla needles
41	1	223	13	111		
76	2	426	70	3648	315*	6
77	1	1916		387		
94	2	1040	5	651	1	17
95	1	48		394	1000	
112	1	820	7	1264		
127	2	438	10	1111		
146	2	5771	55	903	41	
Total	12	10682	160	8469	1357	7
% Total seeds		51.7%	0.8%	41.0%	6.6%	
% Frequency of samples		100%	66.7%	100%	41.7%	
Total seeds - 20668						

*Some apparently Vaccinium parvifolium

Exterior Midden Associated with House 3 and Houses 2 and 5

Twenty-one sapmles were recovered from this area (Table 18), 6 of which were associated specifically with Houses 2 and 3, and two that were deposited after the abandonment of House 3. These last 7 samples consisted of Picea sitchensis cones and twig fragments. Four of the remaining 14 samples contained Sambucus racemosa var. arborescens seeds, and 3 of these 4 samples also contained Rubus spectabilis seeds.

Miscellaneous Samples from Unit V

Nineteen samples from Unit V were of uncertain stratigraphic relationship (Tables 19 and 20). All of the species from these samples are found in other samples with the exception of a Pteridium aquilinum (bracken) petiole fragment recovered from square 89, unique in the Ozette collection.

House 4

One seed sample was collected from House 4, which was excavated only to a minor extent. (House 4 is located to the north of the main excavation area.) This sample consisted of 50 Rubus spectabilis seeds and 2 Sambucus racemosa var. arborescens seeds from square 767, Unit D. Unit D correlates with the Unit IV clay slide, and House 4 is therefore a Unit V structure.

Table 18. Botanical Samples from Exterior Midden Associated with House 3 and Houses 2 and 5

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborscens	Picea sitchensis needles	Picea sitchensis twig fragments	Picea sitchensis cones
08	2	13		476	3		2
09	3	2613	8	159			1
010	3			26		5	2
011	6					3	6
Total	14	2626	8	661	3	8	11
% Total seeds		79.7%	0.2%	20.1%			
% Frequency in seed samples		75%	25%	100%			
Total seeds - 3295							
Samples associated with Houses 2 and 3							
010	4					6	
012	2						2
Total	6					6	2
Samples associated with House 2 after House 3 abandonment							
012	2						2

Table 19. Unit V Seed Samples of Uncertain Stratigraphic Relationship

Square	No. of samples	Rubus spectabilis	Small Rubus	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Scirpus microcarpus
91	1	12		48	2250	23
124	1	4		91		
181	1	386	4	318	1	
182	1	450	40	983		
Totals	4	852	44	1440	2251	23

Table 20. Unit V Non-seed Samples of Uncertain Stratigraphic Relationship

Square	No. of samples	Picea sitchensis cone pieces	Picea sitchensis twig fragments	Tsuga heterophylla needle	Polystichum munitum frond	Pteridium aquilinum petiole
89	1		1			1
91	1			1*		
122	1	9				
123	9	26	1			
149	2	2				
158	1	1				
160	1				1	
Totals	16	38	2	1	1	1

* Associated with berry seeds

Plant Remains Recovered From Unit IV

Samples recovered from Unit IV consisted of 154 items, 55 of which were seeds. With two exceptions, all of the plant remains collected from Unit IV were associated with House 2, and are reported with the other House 2 data. The exceptions were both from square 61, and consisted of a total of 3 Sambucus racemosa var. arborescens seeds.

Plant Remains Recovered from Unit III

Sixteen botanical samples from Unit III containing a total of 35,062 seeds and 11 conifer parts were collected (see Table 21). Sambucus racemosa var. arborescens (elderberry, n=16,751) and Rubus spectabilis (salmonberry, n=10,643) seeds were the most common and widespread, occurring in 14 of the 17 samples. The two species were always associated with each other, but the relative abundance of each varied greatly, from 0.2% salmonberry and 99.8% elderberry, to 94.3% salmonberry and 5.2% elderberry. Small Rubus seeds were found in 9 of the samples containing salmonberry seeds (Table 21). It is apparent that most of these are malformed and aborted Rubus spectabilis seeds, although a few may be from a small seeded Rubus, such as R. parviflorus (thimbleberry). These small Rubus seeds represent 0.4% of the seeds collected.

Gaultheria shallon - Vaccinium seeds were the third most abundant type recovered (n=7503), occuring in 2 of the 17 samples (Table 21). Three of these seeds were associated with salmonberry and elderberry. Only one large sample of Gaultheria - Vaccinium seeds was recovered from Unit III, and these may have originated from a dried berry cake. Scirpus

microcarpus seeds (n=16) were the only other seeds recovered from Unit III (Table 21). They represent 0.05% of the seeds collected. The significance of these Scirpus seeds, if any, is unknown.

Five Picea sitchensis cone pieces and 4 twig fragments were recovered from Unit III (see Table 21). These do not appear in any discernable cultural context and probably were deposited by one or more locally occurring spruce trees.

Botanical Samples from Units I and II

Botanical samples were not recovered from Unit II. One sample was collected from Unit I, square 26, consisting of 2 Vicia gigantea (giant vetch) seeds. Based on their appearance, it was determined that these seeds were recent contamination and of no cultural significance.

Table 21. Botanical Samples Recovered from Unit III

Square	No. of samples	Rubus spectabilis	Small Rubus	Rubus sp.	Sambucus racemosa var. arborescens	Gaultheria - Vaccinium	Scirpus microcarpus	Picea sitchensis cone pieces	Picea sitchensis needles	Picea sitchensis twig fragments
013	2	337	12		4194					
21	1	1270	4		911					
122	5	2741	61	1	5799	7500	2		1	
123	4	1094	24		988			4		4
127	1	2090	35		495	3				
149	1							1		
150	1	90	8		3524					
158	1	20			412		14			
159	1	3001	4		428					
Total	17	10643	148	1	16751	7503	16	5	1	4
% Total seeds		30.4%	0.4%	0.0%	47.5%	21.4%	0.1%			
% Frequency in samples with seeds		93.3%	60.0%	6.7%	93.3%	13.3%	13.3%			

Total seeds - 35062

CHAPTER 4

DISCUSSION AND ANALYSIS

There is little taxonomic diversity of the seeds collected from Ozette. Excluding conifers only 8 taxa of seeds were identified from the site, and 99.7% of these seeds belonged to just three seed types: Rubus spectabilis (salmonberries), Sambucus racemosa var. arborescens (red elderberries), and Gaultheria - Vaccinium (salal and huckleberries). All species except Corylus cornuta today occur with a few minutes' walk from the Village, and were probably collected locally by the village residents.

As one examines the distribution of seeds and other plant remains recovered from the Ozette site, it becomes apparent that much more material was recovered from Houses 2, 3, and 5 than from House 1, resulting from a change in orietation of the Ozette Project with time. When excavation began in 1970, the site was being eroded by storms and wave action, exposing structural remains, basketry, and other artifacts. The excavators working during the early phases of the project were to salvage these materials before they were washed away by high water. Later, as it became evident that long term excavations would be undertaken, a more research-oriented approach was adopted with greater emphasis on the recovery of non-artifact materials. The abundance of botanical samples recovered clearly reflects this change in project orientation. The remainder of this chapter summarizes the data and conclusions drawn from the seed and plant fragment samples, and summarizes

Ozette plant utilization data presented by Friedman (1975) in her study of wood, and that of Croes (1977) in his study of Ozette basketry.

SEEDS

The Gaultheria - Vaccinium seed type was the most common seed recovered from Unit V, and were also present in Units III and IV. Only 10 of the 240,624 Gaultheria - Vaccinium seeds recovered were from House floor middens (4 from House 5, 6 from House 2). The Gaultheria - Vaccinium seeds recovered from the middle portion of the Unit V deposits (n=236,317) suggests that the fruit were an important food item during this period. The very low abundance and frequency of these seeds from House floor middens compared to exterior middens suggests that the fruit was processed prior to being used in the houses.

The reasons for this is straight forward. The Makah historically made sun-dried berry cakes of mashed salal berries and, to lesser extent, huckleberries. At least the drying, and probably the mashing, portions of the process would have been conducted outside of the houses. The mashing stage of the cake manufacturing procedure is the most likely to produce spillage. Any spillage of the dried cakes in the house would be relatively easy to clean up, and would thus leave little evidence in the house floor midden. Because these fruit were often dried for future use, their presence in the Ozette collection does not necessarily indicate occupation of the Ozette Village during salal and huckleberry season (August and September).

Salmonberry and elderberry seeds were the second and third most common seeds for Unit V. In Units III and VI elderberry was the most common seed, followed by salmonberry. These taxa were abundant in both interior and exterior deposits, and were almost always closely associated with each other, suggesting a cultural association of these two fruits. In the Ozette area salmonberries and elderberries ripen a approximately the same time during mid-summer. There are two alternative explanations for the association of these two seed types. First, the Ozette villagers may have collected, processed, or utilized the fruits at similar times and the seeds were therefore inadvertently deposited in close association in Units VI, V, and III. The second explanation is that the fruits of the two species were mixed, the salmonberries increasing the palatability of the elderberries and the elderberries serving as an extender for salmonberries. If the juxtaposition of the seeds was accidental, I would expect more of the samples to consist of only salmonberry or elderberry seeds. I believe that the Ozette villagers intentionally mixed the fruit of salmonberry and elderberry during Unit VI through Unit III times. Elderberries were not highly regarded by the Makah or many other coastal peoples (see part 2), and in British Columbia Turner (1975:125) has noted that native peoples frequently mixed elderberries with the fruit of other species to make the elder more palatable.

During the historic period the Makah and Quileute preserved elderberries for future use (see part 2), but salmonberries were rarely dried by the Makah as they considered the fruit too wet to preserve by drying. Thus, the seed samples suggest at least partial occupation of the Ozette Village (including Houses 2, 3, and 5) during late June and July.

Salmonberry sprouts historically were an important vegetable for the Makah and other coastal peoples. Traditionally, the Makah cooked salmonberry sprouts on the beach (see Part II). Even if the sprouts were cooked in the excavation area, no evidence of their use would be expected in the archaeological deposits.

It is difficult to interpret the cultural significance of the 10 Rosa nutkana (Nootka rose) seeds recovered from House 2. The Makah ate the hips, but these fruit were not favored because they are so seedy. The seeds are not frequent enough to suppose that the fruit played more than a very minor role as a food item. Other possibilites include medicinal use or collection by a child present in House 2.

The two Corylus cornuta nut remains, one each for Houses 2 and 3, were unexpected. At present, this species does not occur in near Makah - Ozette territory, and the closest locality where nuts can be procured is near Port Angeles. Swan, however, reported hazel from Cape Flattery and vicinity during the mid-1800s (1870:44). The presence of this material suggests two possibilities. First, that the nuts were procured through trade or as gifts from an area where the species occured in Unit V times, or secondly, that hazel grew in closer proximity to Ozette than at present, or both. The fact that only two nuts were recovered, and that it is more likely that these items would have been observed by excavators than would berry seeds, clearly suggests that hazel nuts were insignificant in the subsistence of the villagers residing in the excavation area.

The botanical samples from Ozette contain 156 Scirpus microcarpus seeds, 140 of these were recovered from Unit V. Within Unit V, 74.28% of the Scirpus seeds were from middle exterior midden (temp VI). 98.08% of these seeds were associated with Gaultheria - Vaccinium seeds. This suggests the possibility that collection or processing of the fruit occurred in wet localites. A more likely possibility is that Scirpus microcarpus was growing in the temp. VI excavation area, and that the seeds were shed into the same area where the villagers were depositing refuse. The close association of the Scirpus seeds with the similar sized salal and huckleberry seeds rather than with the much larger salmonberry and elderberry seeds is probably attributable to variations in the excavation techniques used. The small, infrequent Scirpus microcarpus seeds often may have gone unnoticed by the excavators when they were collecting salmonberry and elderberry seeds.

The absence of various taxa among the seeds collected at Ozette is worthy of note, as these species produce edible fruit, and are present in the Ozette area today. Seeds or other evidence of Ribes (currants and gooseberries) were not recovered from the site although R. bracteosum, R. laxiflorus, and probably R. divaricatum presently occur at Cape Alava. The Makah used the fruit of all three species for food, and the bark of at least some of these species was used medicinally. The fruit are ripe in July, as are those of salmonberry and elderberry, and it is likely that at least some villagers were resident at Cape Alava during that portion of the year.

Fragaria chiloensis (coastal strawberry) occurs on Cannonball Island and other open areas near the coast. No seeds of this species were recovered in the Ozette collections. Gunther (1973:36) said the Makah usually ate the fruit in "picnic fashion" on the spot as they are too small and soft to transport. This pattern of harvest would explain the absence of these seeds from the material collected.

Oemleria cerasiformis (Indian plum) is not known from the Cape Alava area, but occurs along the Strait of Juan de Fuca at Baada Point and at Hoko. No seeds of Indian plum were found at Ozette, and this simply may be due to the relative inaccessibility of the fruit to the Ozette villagers. Only one artifact from Ozette, a bow, is known to have been made of Indian plum wood (Friedman 1975:199).

Perhaps most surprising among the seeds absent from Ozette is Pyrus fusca (crab apple). The trees are very common on the coastal terrace south of the excavation area at present. The fruit are eaten by the Makah, and many coastal people collected the fruit and allowed them to ripen in storage. Thus, it is surprising that seeds of this species are absent from the material recovered from the site. The seeds may have been present and missed by excavators, but the seeds are of a relatively large size range, and I would expect the seeds to occur in fairly obvious concentrations. Three other explanations could account for the absence of these seeds the site: (1) the fruit were not used by the residents of the area excavated, at least not while they were in residence at Ozette; (2) for some reason the seeds were not preserved in any of the deposits examined; or (3) crabapple trees were rare in the Ozette area during the

occupation of the village. I find all three explanations somewhat unsatisfactory for the following reasons, but no other reasonable explanation has presented itself. Firstly, I would find it surprising if none of the residents of this neighborhood used crabapple fruit for food, especially when we consider that, in total, several hundred years of occupation and many families were involved. Since Ozette was occupied during much of the year and ethnographic data suggest the fruit were stored for future use, I would expect evidence of this fruit to be present in the village even if the people were not in residence when the fruit are ripe in late August and early September. Perhaps other subsistence activities conflicted with the harvest of crab-apple fruit. The suggestion that the seeds were not preserved in the Ozette deposits does not agree well with the excellent preservation of other plant materials found throughout much of the excavation area. Finally, it seems unlikely that crab-apple was rare in the Ozette area throughout Unit V and Unit III times, a period of several hundred years. Friedman (1975:199-200) found 2 fish clubs and 3 wedges made of crab-apple wood among the artifacts recovered at Ozette.

Only six of 10822 Rubus seeds collected at Ozette were not assignible to salmonberry. At least one other species Rubus parviflorus (thimbleberry) was probably available to the Ozette, and two others R. leucodermis (blackcap) and R. ursinus (Pacific blackberry) may have been as well. The fruit of all three species are eaten by the Makah today, and the sprouts of thimbleberry were eaten fresh as a vegetable. Although today the Makah use thimbleberries for jam and jelly, formerly the fruit were only eaten fresh. Perhaps the best explanation for the absence of

seeds from these Rubus species is that the fruit were not collected and brought back to the village, but rather were eaten fresh at the locality where the fruit were available.

According to Gunther (1973:40), the Makah ate the berries of Rhammus purshiana (cascara) fresh in July and August. If the Ozette did so they left no evidence of this in the deposits excated. I am not aware of any other reports of the fruit being used for food among the native peoples of western Washington or coastal British Columbia. One comb and 3 miscellaneous objects recovered from Ozette were made of cascara wood (Friedman, 1975:197).

Soapberries (Shepherdia canadensis) do not occur in the Ozette area, so their absence from the collection is not surprising. The seeds, if they had been present, would hve suggested trade for the fruit with people living to the east along the Strait of Juan de Fuca.

Gunther (1973:43) stated that the Makah ate bunchberries (Cornus unalaschkensis). No evidence for the use of this fruit was uncovered from Ozette, although the plants are common in inland areas at Capa Alava.

Empetrum nigrum (crowberry) occurs on prairies in the Ozette area, and has edible fruit. No evidence for its use was recovered from Ozette, however.

More suprising it the absence of cranberry (Vaccinium oxycoccus) seeds among the seed samples from Ozette. Cranberries occur on the priaires in the Ozette area, and in the historic period the fruit were important to the Makah. Formerly Tsues Prairie was burned by the Makah to

enhance cranberry production, and by the mid-1800s ownershp of cranberry marshes was evident. The importance of cranberries at this time may have been due, at least in part to trade with white settles and merchants (see part II).

CONES, TWIGS, LEAVES, AND BARK

Cones, twigs, leaves, and bark fragments comprised 0.23% of the items recovered from the excavation area. All of the species identified occur on the Ozette Village Site proper at present, or within a kilometer of the excavation area. Picea sitchensis (Sitka spruce) cones make up 42.15% of this portion of the collection, 44.54% if spruce seeds are excluded. It is unlikely that these cones, or the spruce twigs recovered, were of any cultural significance, although some of the material may be debris from old branches collected for firewood or from branches collected for the manufacture of projectile points and blanket pins or for ceremonial purposes. I believe the cones and other spruce material recovered provide excellent evidence that Sitka spruce was the dominant overstory species in the Ozette Village area. Friedman (1975:113) reported that Sitka spruce was primarily used at Ozette in the manufacture of wedges, arrow points, and blanket pins. The wedges were almost always made from a section of the spruce stem rather than from a branch. Although the ethnographic literature usually cites yew (Taxus brevifolia) as the prefered wood for wedges, Friedman (1975:113) found that yew was much less frequently used for wedges (<10%) than was spruce (almost 88%). 53.9% of the wooden projectile point recovered from Ozette were of Sitka spruce. Three other taxa were also frequently used for this purpose:

Tsuga heterophylla (23.4%), Abies sp (12.2%), and Thuja plicata (8.7%) (Friedman 1975:125,130-131). Of the 14 artifacts identified as blanket pins recovered from Ozette, 50.0% were manufactured from Sitka spruce. The remaining were of red cedar (7.1%), fir (14.3%), hemlock (14.3%), and yew (14.3%) (Friedman 1975:130, 132-133).

The Tsuga heterophylla (coast hemlock) needles recovered were usually associated with berry seeds, and probably represent accidental contamination of the fruit at the time of collection by the villagers. If so, this indicates at least some of the berries were being picked at inland locations. Because of difficulties in distinguishing hemlock from Abies sp. (fir) wood, Friedman (1975) treated artifacts made from these species tgether. They were the main woods used in the manufacture of halibut hooks, float plug stoppers (or, possibly, bunts — blunted points shot at birds to stun them), and small harpoon shafts, and an important material for arrow points (Friedman 1975:135). Friedman (1975:142) determined that of the 192 halibut hooks analyzed, 60% were manufactured from hemlock, 38% from fir, and 2% from spruce. Most appeared to be made from the wood of roots and limbs.

Considering its importance to the Ozette people, Thuja plicata (red cedar) fragments were relatively rare in the Ozette botanical samples, and consisted of debris from various manufacturing processes. Again, however, this scarcity of small fragments is probably more a function of excavation techniques that of rarity in the midden deposits. All of the house planks recovered at Ozette were apparently made of cedar (Mauger 1978:61), as were at least 4 of the rafter support posts (Mauger

1978:107). Split cedar bark strips were the basketry materials most commonly used at Ozette (Croes 1977:21), followed by cedar splints (Croes 1977:23). Red cedar was also used for the manufacture of a wide variety of additional items. 95.1% of the 142 arrow shafts analyzed from Ozette were of red cedar wood, the remaining 4.9% were of Douglas fir (Pseudotsuga menziesii) (Friedman 1975:85). Of the 357 box fragments analyzed by Friedman (1975:91), all were made of cedar. She also examined 63 box pegs and found 61 to be of red cedar, 1 of yew (Taxus brevifolia), and 1 of salmonberry (Rubus spectabilis). Game paddles and fire starting hearths often were made of old kerfed box parts (Friedman 1975:95, 100). One of the most impressive artifacts recovered at Ozette is a whale "saddle" made of red cedar inlaid with over 700 sea otter teeth (Friedman 1975:102). The Ozette practiced weaving on a true loom. Of the loom parts analyzed, most were or red cedar, the rest Douglas fir (Friedman 1975:102-103).

Other conifer woods were also used by the Ozette, although no fragments were included in the botanical samples analyzed in this study. Yew was important to the Ozette because of its strength. Its scarcity in the Ozette area may be due, at least in part, to over exploitation by the Ozette people. Of the bows recovered and analyzed from Ozette, 78.2% were of yew, the remaining bows were of Thuja plicata, Cornus nuttallii Aud., Menziesia ferruginea, Oemleria cerasiformis, Acer macrophyllum, and Rubus spectabilis (Friedman 1975:45). Fifteen of 17 carved clubs are of yew, the remaining two are made from crab-apple (Pyrus fusca) wood (Friedman 1975:47). All of the 35 large harpoon shafts (probably used for whaling) analyzed were made from yew (Friedman 1975:52). The strength and density

of yew wood made it the most suitable of available woods for this purpose. Weaver's swords from Ozette were also made of yew as well as of Cornus nuttallii and Acer macrophyllum (Friedman 1975:70-71). Finally, of the wooden tool handles analyzed by Friedman, 31.4% were of yew wood (1975:68).

Douglas fir (Pseudotsuga menziesii) was relatively inaccessible to the Ozette people, and was infrequently used by them. A salmon-roasting stake and 3 herring rake fragments identified as Douglas fir were recovered from Ozette (Friedman 1975:108-110).

Alnus rubra (alder) and Acer macrophyllum (big-leaf maple) were the most frequently used hardwoods among the Ozette artifacts analyzed by Friedman (1975), and the two species seem to have been used almost interchangeably. These species were used for bowls and canoe bailers (Friedman 1975:162). Alder, yew, and big-leaf maple were all used for the manufacture of canoe paddles (Friedman 1975:163).

Sambucus racemosa var. arborescens (elder) was used for the float plugs in seal skin floats used for whaling (Friedman 1975:175). Because elder stems have a large soft pith, they are ideal for this purpose. Elder wood was also used for combs, as were yew, red cedar, cascara (Rhamnus purshiana), Pacific dogwood (Cornus nuttallii), and salal (Gaultheria shallon).

Various other hardwood trees and shrubs were occasionally used by the Ozette. The majority of lance heads analyzed by Friedman (1975:185, 188) were made of Menziesia ferruginea. Salmonberry wood was used for

children's bows, rarely for projectile points and float plugs, and for gambling discs. Oemleria cerasiformis (Indian plum) was used for one artifact (a bow) of those analyzed (Friedman 1975:199). Among the Ozette artifacts the use of willow (Salix spp.) is only known for the crutch handle of canoe paddles. Although Fraxinus latifolia Benth. (Oregon ash) is not directly available to the Ozette people, 3 bowls, 5 bowl fragments, and 1 small carved figure excavated from Ozette were made of this species (Friedman 1975:184). It is likely that these items were obtained by the Ozette through trade with more southern peoples. Neither Cornus nuttallii nor Arbutus menziesii (madrone) occur in the Ozette area. Both could have been obtained from the east along the Strait of Juan de Fuca. The nearest known madrone tree to Ozette at present grows along Lake Crescent. Pacific dogwood was used for 1 weaver's sword, 3 bows, and 4 combs; madrone for 1 tool handle and one miscellaneous object (unspecified) (Friedman 1975:198). These items, or at least the wood for their manufacture, were probably obtained through trade with people living to the east along the Strait of Juan de Fuca. Finally, two additional species were used in basketry by the Ozette that have not been previously discussed in part III of this report. These are Typha latifolia (cattail) and/or Scirpus acutus (tule or bulrush), used for mats, and cherry bark (Prunus emarginata?), used for baskets (Croes 1977:23).

CHAPTER 5

RECOMMENDATIONS AND CONCLUSIONS

RECOMMENDATIONS FOR THE RECOVERY OF PLANT MACROFOSSILS

American archaeologists have been encouraged for over 50 years to collect plant remains from archaeological sites for identification and interpretation by botanists (Darrah 1938; Ford 1979; Watson 1976). Use of these data for the reconstruction of the subsistence activities and palaeoecology of prehistoric cultures is obvious (Ford 1979). Currently, the most commonly used methods for recovery of plant macrofossils are collectively known as flotation techniques or flotation analysis (Watson 1976). It has only been since the late 1960s that flotation techniques have been more or less routinely applied in archaeology to ensure the recovery of smaller plant fragments, such as seeds (Struever 1968; Watson 1976).

Although flotation techniques are more frequently used for the recovery of plant macrofossils, washing materials through a series of standard soil screens also produces useful results (Colyer and Osborne 1965). I have found that with certain matrices types, particularly those with high clay content, water-screening using a series of fine meshed screens offers superior results to those obtained with standard flotation analysis. The use of special chemical solutions that have a higher specific gravity than that of water (for example, carbon tetrachloride, saturated aqueous solutions of zinc chloride, salt water) or that help

defloculate the water (sodium silicate) can increase the yield of plant macrofossils from these difficult soils (Minnis and Le Blanc 1976; Watson 1976). However, do not believe that these significantly more expensive (and in the case of carbon tetrachloride and zinc chloride, potentially dangerous) processes yield superior results to water-screening in these cases. In addition, to avoid damaging the sample, chemical salts must be removed from the specimen before drying. This added step can add significantly to the time needed to process each sample.

For coastal sites I recommend the following sampling strategies:

1. That a 10 cm by 10 cm matrix column be collected from the corner of each excavated square for processing to recover plant remains. Vertically, these samples should be divided on stratigraphic criteria or at 10 cm intervals, whichever is the lesser distance. If necessary, these samples can be washed through a series of fine screens prior to transport to the lab. An additional advantage to using screens to process the samples is that this technique does not require that the sample be completely dry prior to processing, a distinct plus in situations such as Ozette where even the middle of summer is cool and wet.

2. Samples should also be recovered from all cultural features encountered, such as hearth areas, pit areas, and areas of soil dicoloration.

3. In situations where excavation is accomplished using water-screening, a set of fine screens can be situated in the outflow of the screen box to recover seeds and other small plant materials. This can be especially useful in detecting low seed concentrations and in situations where the artifact density precludes taking a 10 cm by 10 cm column sample.

4. Any seed concentrations that become apparent should be collected in total by the excavator or, if very large, subsampled in such a way that the diversity and relative proportions of seeds represented in the whole sample are also accurately represnted in the set of subsamples. Although the correct sampling method for these caches will vary with the

situation encountered, subsamples of known volume should be taken from near the center and margins of the cache, and the cache mapped, so that the contents may be calculated.

5. Finally, plant material recovered in screen boxes can be most easily separated from bone, shell, and rock by flotation of the samples. Although few seeds will have been retained by the screen box (due to the relatively large mesh of the screen), this is an effective means for recovering cones, twigs, and small pieces of wood.

CONCLUSIONS

The data compiled during this study concerning the use of plants by the Makah during the historic period and the Ozette villagers prior to European contact demonstrate extensive knowledge of local plant resources by these people. Uses for 131 biological taxa (as compared to folk taxa) were recorded for the Makah during the historic period, and Makah names were recorded for 107 biological taxa. Linguistically the Makah had complex terminology for species of special economic importance, such as Rubus spectabilis, Gaultheria shallon, and Thuja plicata.

Far fewer taxa are known from Ozette, but this was expected to some extent as evidence for medicinal uses and the use of food items such as sprouts, roots, and bulbs would be unlikely to be preserved in an archaeological context, even with the degree of preservation found at Ozette. The 448,943 non-coniferous seeds recovered from the excavation area of the Ozette Village provide ample evidence of the importance of berries in the diet. Of these seeds 99.69% were salmonberry (Rubus spectabilis), elderberry (Sambucus racemosa var. arborescens), salal (Gaultheria shallon) or huckleberry (Vaccinium spp.). All of these could be easily procurred locally. Only the two hazel-nuts (Corylus cornuta)

indicate travel or trade of food items by the Ozette. Friedman's (1975) analysis of wooden artifacts recovered from the Ozette site indicated that the Ozette people carefully selected raw materials for the manufacture of artifacts, and were familiar with the properties of a wide variety of woods. She concluded that only the presence of Oregon ash (Fraxinus latifolia) indicated trade of wood or articles made of wood, or travel by the Ozette people. I believe that the artifacts made of madrone (Arbutus menziesii) and Pacific dogwood (Cornus nutallii) also suggest trade or travel, as neither occur in traditional Makah - Ozette territory at present.

The seeds recovered from Ozette also provide insight into the seasonality of occupation. Historically the Makah almost universally considered salmonberries too wet to dry into berry cakes for storage. If this was also true during the occupation of Ozette, the presence of over 100,000 salmonberry seed in the Ozette collection strongly suggests occupation during the period when these fruit are available (mid-June through July). Conversely, the absence of cranberry (Vaccinium oxycoccos) and crab-apple (Pyrus fusca) seeds may indicate that at least residents of the excavation area may have been absent for the village during this season (late August through mid-September), or occupied with other subsistence pursuits that precluded devoting time to the harvest of these two fruits. The well preserved spruce branch recovered from House 2 suggests the catastrophic Unit IV clay slide that buried this area of the village occurred in early spring (possibly March). None of the other plant material contradicts this conclusion.

CHAPTER 6

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APPENDIX A

PRONUNCIATION GUIDE FOR SYMBOLS USED IN TRANSCRIBING MAKAH TERMS

Many of the sounds in Makah are very different from those occuring in English, and are difficult for monolingual English speakers to hear and pronounce. A description of the writing system and a pronunciation guide are included below so that non-linguists can make vocal approximations of the Makah terms and phrases in this report.

The alphabet used is the one proposed for official adoption by the Makah Tribe. The ordering of the letters follows that used by the Makah Language Program. Those desiring additional information are refered to Jacobsen (1979) and the Makah Language Program (1979).

ʔ	"glottal stop", a stopping of air flow as when English speakers say "uh-uh" (i. e., ?uh?uh) for "no" or as some say Hawaii (i. e., Hawai?i).
a	like u in nut, bus.
a•	like a in father.
b	similar to English.
c	like ts in mats.
c̓	glottalized counterpart of the preceding, similar to ts sound in English, but with a strongly exploded quality, no English equivalent.
č	like ch in church.

c̓	glottalized counterpart of "c", not present in English.
d	similar to English.
e	like e in bet, left.
e•	like a in sad, ant.
h	similar to English.
i	like i in it, nip.
i•	like ee in beet, see.
k	similar to English.
k̓	glottalized counterpart of "k", not found in English.
k^w	similar to "k" but with rounded lips, similar to qu sound in quit.
$k̓^w$	glotallized counterpart of "k ", not found in English.
l	similar to English.
ɬ	a sound made by attempting to pronounce an "s" while holding the tongue in the position for an "l", the closest English approximation in sound value is the thl in athlete when athlete is correctly pronounced.
ƛ	expresses a sound like "t" and "l" pronounced together as if they were one sound, somewhat similar to the tl in rightly.
ƛ̓	glottalized counterpart of the preceding, no equivalent in English.
m	similar to English, very rare in Makah.
n	similar to English, very rare in Makah.
o	a somewhat variable sound, like the o in not or sore.
o•	like "o" above, but held longer.
p	similar to English.
p̓	glottalized counterpart of "p", not found in English.

q	like "k" above, but farther back in the throat, no equivalent in English.
q̓	glottalized counterpart of "q", no English equivalent.
q^{w}	similar to "q" but with rounded lips, no English equivalent.
$q̓^{w}$	glottalized counterpart of "q ", no equivalent in English.
s	similar to English.
š	like sh in shoe, hush.
t	similar to English.
t̓	glottalized counterpart of "t".
u	like u in put, oo in hook.
u•	like oo in spoon, loop.
w	similar to English.
x	like an "h" made with the middle of the tongue raised, not present in English, but similar to ch in German ich.
x^{w}	an "x" made with rounded lips.
x̌	like an "x", but made farther back in the throat, similar to ch in German Bach or Scottish loch, or the x in the Russian сахар, хата.
$x̌^{w}$	a "x" made with rounded lips, not found in English.
y	similar to English.

In addition to the above, the Nitinat words included here contain three additional sounds:

ʔ	"pharyngeal stop" a stop produced by pharyngeal constriction.
b̓	similar to "b" but with exploded quality
d̓	similar to "d" but with exploded quality

$\dot{w}$	similar to "w" but with a weakly exploded quality.
$\dot{y}$	similar to "y" but with a weakly exploded quality.

Additional notes on transcription and pronounciation.

Jacobsen (1979:3) maintains that following u and u• the labialized consonants k^w, $\dot{k}^w$, q^w, $\dot{q}^w$, x^w, $\check{x}^w$ occur to the exclusion of the corresponding non-labialized consonants k, $\dot{k}$, q, $\dot{q}$, x, $\check{x}$. Consequently he and others frequently do not include the ^{w} with these consonants when they follow u or u•. In order to stress pronounciation and because there appear to be a few exceptions to this rule, I have included the ^{w} whenever it occurs phonetically.

Certain consonants (e. g., s, s) can occur singly or in pairs, when doubled this indicates a prolonging of the sound.

There are no silent letters in Makah words.

Emphasis in Makah is on the first syllable except when the vowel in that syllable is short, in which case emphasis occurs on the second syllable.