Environmental, Cultural and Linguistic Factors Affecting Ulkatcho (Carrier) Botanical Knowledge

by

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We accept this thesis as conforming to the required standard

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ABSTRACT

Ethnobotanical fieldwork conducted in 1992 and 1993 and ethnographic and linguistic records are used to describe Ulkatcho plant knowledge. The Ulkatcho are a Carrier Athapaskan group whose traditional territory is located in central British Columbia: from the Upper Bella Coola Valley north to Burns Lake, south to Bute Inlet and east to the Fraser River. Therefore, the Ulkatcho people have access to a diverse range of ecosystems and plant species. Ulkatcho plant taxonomy is described as a lattice hierarchy encompassing both intellectual and utilitarian aspects. Ulkatcho and other Athapaskan botanical terms exhibit a variety of linguistic structures. The terms also reflect possible taxonomic expansions and taxa in the plant taxonomic systems. Botanical terms are shown to be less stable (i.e. change more rapidly in the evolution of a language) than general vocabulary. Relative importance values for plants were calculated using a modified version of the Index of Cultural Significance. Plants with the highest cultural significance are widespread species, and a majority were used as materials. Names of important plants were found to be more stable than those of less important types. A "percentage of change" formula was developed to compare historical and current Ulkatcho plant knowledge. In general species that are used are more

likely to show a change in plant knowledge than species that are not used; however, food and material use classes changed the least in plant knowledge and plants with high ICS values underwent as much change in plant knowledge as plants with low ICS values. Comparison of the Ulkatcho plant knowledge to that of Athapaskan and non-Athapaskan groups demonstrates that there are three major types of factors that effect plant use, classification and application of botanical terms: environmental (e.g. obvious physiognomic features of the plants and floristic diversity); cultural (e.g. inherited cultural framework, intercultural exchange and acculturation); and linguistic (e.g. linguistic affiliation and linguistic assimilation).

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CHAPTER 1: INTRODUCTION

Ethnobotany Defined

Ethnobotany is a diverse interdisciplinary field which incorporates paleoethnobotany, aboriginal plant names, medicines, foods, technologies, plant stories and folk taxonomies. Ethnobotanist Richard Ford (1994) describes the history of the discipline. The roots of ethnobotany as an academic study can be found among the explorers of the New World who commonly gathered data on medicinal plant use from indigenous peoples. American botany was the first scientific field to have an impact on ethnobotany since early floristic studies often included aboriginal plant use. By 1874 these studies were labeled aboriginal botany. In the 1890's, the discipline of anthropology was incorporated into aboriginal botany causing the theoretical emphasis to include indigenous people's point of view.

In 1895 ethnobotany was defined as "the study of plants used by primitive and aboriginal people" (Ford, 1994: 33). In the 1930's ethnobotanical research employed the tools and methods of the plant ecologist (e.g. quantitative techniques to determine human impact on the botanical environment). By the 1950's and 1960's linguistic concepts were integrated into ethnobotany to develop the study of folk taxonomies. In order to accommodate these theoretical changes ethnobotany has been redefined. I will define ethnobotany as the study of interrelationships between cultures and plants.

Plants are defined in the scientific world as encompassing all species found in the kingdom Plantae. Plantae comprises many different taxa including algae, mosses, ferns, angiosperms (i.e. flowering plants) and gymnosperms (i.e. cone producing plants). The fungi kingdom, which is separate from plantae, includes mushrooms and slime molds. Lichens are composite organisms including a fungus and a plantae organism (usually an algae). In this discussion of Ulkatcho ethnobotany, plants will be defined for convenience as including all species of plantae, fungi and lichens.

Purpose

This project was initiated by the Ulkatcho Band so that data could be collected and used to produce a book about Ulkatcho plants and medicine. (A separate publication will be produced by the Ulkatcho Band.) Therefore, the preliminary stages of this research were to produce a written document about Ulkatcho plant knowledge. The Ulkatcho Learning Center houses a copy of these data which includes Ulkatcho and scientific names of the plants studied and the recorded plant knowledge of individual Ulkatcho Elders. Ulkatcho botanical data are an important part of Ulkatcho heritage and shall be stored and used as the Ulkatcho Band sees fit. It is important to recognize the ownership of traditional plant knowledge by the Ulkatcho Band and individual Elders.

The following study focuses on the analysis of the Ulkatcho botanical knowledge particularly providing information about environmental, linguistic and cultural factors affecting botanical knowledge. Specific objectives of this study were to provide insight into:

1. The range of ecosystems available to the Ulkatcho people.
2. Ulkatcho plant taxonomy by comparing the taxonomy to other taxonomies and the patterns and factors that may affect the taxonomies.
3. Ulkatcho botanical vocabulary including linguistic structure, factors that affect the terms and how linguistic data can provide insight into Ulkatcho plant taxonomy.
4. Potential relationships between high relative importance of plants and other characteristics such as abundance of the plants, type of Ulkatcho plant knowledge and Ulkatcho plant names.
5. The changes over time in Ulkatcho botanical knowledge and the relationships of the changes to the relative importance of the plants or type of Ulkatcho plant knowledge, or both.

CHAPTER 2: THE ULKATCHO PEOPLE

The people of Ulkatcho live in central British Columbia, Canada. There are 500 registered Ulkatcho band members, the majority of whom (350 members) live in Anahim Lake (Birchwater, 1991). Anahim Lake was a site visited during traditional seasonal rounds; however, it did not become a permanent settlement until the 1950's when people started leaving Ulkatcho village (Birchwater, 1991). There were a variety of reasons that caused the relocation to Anahim Lake: jobs could be found near Anahim Lake due to the establishment of ranches; availability of better hay meadows for cattle and horses; there were health problems at Ulkatcho village such as tuberculosis; a road was built from Anahim Lake to Bella Coola so traditional trails were not needed; the Kenny Dam destroyed travel routes from Ulkatcho village; and school was available in Anahim Lake (Birchwater, 1991).

Language

The Ulkatcho people speak a dialect of the Carrier language. The term Carrier includes the Athapaskan dialects of central British Columbia from Takla Lake in the north, Ootsa Lake to the west, Quesnel to the east and Anahim Lake in the south (Krauss and Golla, 1981). Carrier has been divided into two distinct dialects: Central Carrier and Southern Carrier. Central Carrier is spoken by the people living in and around Fort Saint

James, Stuart Lake, Trembleur Lake and Takla Lake (Krauss and Golla, 1981). Southern Carrier is spoken in the communities from Prince George, Cheslatta, Stellaquo, Fraser Lake, Stoney Creek, Kluskus, Nazko, Quesnel and Anahim Lake (Krauss and Golla, 1981). However, data on Carrier dialectology is incomplete (Krauss and Golla, 1981). Here I refer to the people of Anahim Lake as Ulkatcho Carrier.

Most Ulkatcho people have traditionally spoken the Ulkatcho Carrier language. However, many Elders can speak or understand Chilcotin and/or Nuxalk. This multilingualism is a result of the Ulkatcho territory bordering on two other distinct language groups: Chilcotin and Nuxalk. Carrier and Chilcotin are Athapaskan languages, and these people share much common grammar and vocabulary (Krauss and Golla, 1981), whereas Nuxalk is a Salishan language and is completely unrelated linguistically.

Intercultural Exchange

Carrier and Chilcotin are interior groups sharing features of the Sub-Arctic and Plateau Culture Areas, whereas Nuxalk is a coastal group, classed within the Northwest Coast Cultural Area (cf. Turner, 1975, 1978). Historically, there has been considerable interaction among the Ulkatcho, Chilcotin and Nuxalk neighbors, and therefore it is not surprising that the Ulkatcho people share many customs and much cultural knowledge with these other groups (Goldman, 1941; Birchwater, 1991). It is interesting that these interactions occurred despite the existence of different, unrelated languages, in the case of Ulkatcho Carrier and the Nuxalk.

There were many routes by which intercultural exchanges occurred. A great deal of trading took place between the Nuxalk and the Ulkatcho peoples. Oolichan grease from the coast was traded for interior resources such as furs, obsidian and caribou meat (Birchwater, 1991). Marriages among Ulkatcho, Chilcotin and Nuxalk people were common (Birchwater, 1991; Goldman, 1940). Also many Ulkatcho people spent the winter months in Bella Coola (Goldman, 1940).

The result of the intercultural exchange can be seen in many aspects of Ulkatcho culture. For example Chilcotin and Nuxalk words have been integrated into the Ulkatcho lexicon. Also the Nuxalk potlatch-rank system has been adapted into the Ulkatcho non-ranked society (Goldman, 1940).

Seasonal Rounds

Before the establishment of the Anahim Lake Reserve, the Ulkatcho people traveled widely according to the season. Documentation of the Ulkatcho seasonal rounds is sparse especially regarding plant use. Temporary shelters were used in spring, summer and fall; whereas, in the winter semi-permanent shelters were used (Birchwater, 1991). Fur animals were trapped and some fishing was done in the winter months. Sometimes Ulkatcho people would stay for the first part of the winter in Bella Coola (Goldman, 1940). In February the Ulkatcho people would gather together to hunt caribou (Birchwater, 1991; Goldman, 1940). With the melting of the snow the Ulkatcho people would move to places like Stuie or Canoe Crossing in the Bella Coola valley for the spring salmon run (Birchwater, 1991). After the spring salmon run people would travel towards the mountains to collect plants and obsidian and to hunt mountain goats and marmots (Birchwater, 1991; Goldman, 1940). Many Ulkatcho people gathered at Tanya Lakes in July to fish for salmon and steelhead (Birchwater, 1991). Berry picking also had an effect on the seasonal rounds in summer (Birchwater, 1991). Hunting of fur-bearing animals such as beaver was important in the fall (Goldman, 1940).

Ulkatcho Traditional Use Area

The Ulkatcho traditional use area is the area over which the Ulkatcho people traveled to hunt, fish and gather plants (Sage Birchwater, 1995, Personal Communication, 1995). This area includes both Ulkatcho traditional territory and traditional territories of neighbouring First Nation bands. The Ulkatcho traditional territory is considered exclusive to the Ulkatcho People and is recognized as such by their neighbours. The boundaries of the use area fluctuate over time depending on the outcome of wars, marriages and assimilation.

Tobey (1981) describes Carrier territory (Central and Southern Carrier combined) but does not specifically describe the Ulkatcho territory. The Carrier territory is described as being bounded by Bear Lake in the north, by Morice Lake to the west, by Ulkatcho to the south and by the Rocky Mountains to the east (Tobey, 1981).

Morice (1932, 1909) and Smith (1920-23; 1929) do not describe the Ulkatcho traditional use area. Goldman (1940) states that the use area is considerable and includes Ulkatcho, Bella Coola and Tanya Lakes. Birchwater (1991) describes the Ulkatcho traditional use area but his description does not totally coincide with the territory delineated by Tobey (1981); according to Birchwater the Ulkatcho traditional use area extends further west and south but not as far east and north as that defined by Tobey. The Ulkatcho traditional use area is bounded by Burns Lake and Ootsa Lake in the north, by Bute Inlet, Chilko Lake and Nemiah Valley in the south, by Bella Coola, Kimsquit and Kitimat in the west and by the Fraser River in the east (Birchwater, 1991) (Figure 3.1). Here I adhere to the traditional use area as described by Birchwater (1991) because this area would encompass all plant species used by the Ulkatcho people, whereas the Ulkatcho territory would not.

Consultants

Many Elders have contributed their traditional plant knowledge in this study: Andrew Cahoose, Andy Cahoose, Annie Cahoose, Mary Joe Cahoose, Peter Cahoose, Wilfred Cassam, Michel "Kelly" Moffat Harris, Henry Jack, Johnny Jack, Maddie Jack, Eliza Leon, Frank Sill, Mack Squinas, and Pierre West (Figures 2.1 and 2.2). Wilfred Cassam, Maddie Jack, Eliza Leon and Mack Squinas have provided the greatest part of the information collected, since the most time was spent with them.

Figure 2.1: Henry Jack, Andy Cahoose, Frank Sill, Vince Toney, Maddie Jack, Peter Cahoose, Wilfred Cassam, Mack Squinas, Pierre West And Marvin Paul At Detna Lake

Figure 2.2: Eliza Leon At Stuie

CHAPTER 3: THE ENVIRONMENTAL SETTING

Physiography

Most of the Ulkatcho traditional use area falls within the physiographic region labeled the Interior Plateau. The Interior Plateau is divided into seven units of which three are found within Ulkatcho traditional territory: Fraser Basin, Nechako Plateau and Fraser Plateau (Holland, 1976).

The Fraser Basin is located east of the two plateaus and has an elevation below 914 m. The basin is flat to gently rolling and the bedrock is rarely exposed. The surface is dissected by the Fraser River and its tributaries, numerous lakes and poorly drained depressions (Holland, 1976). This area encompasses about 12 percent of the total Ulkatcho traditional use area.

The Nechako Plateau, which covers roughly 25 percent of the traditional territory, is either flat or gently dipping with very little exposed bedrock (Holland, 1976). Most of the plateau lies between 1 219 and 1 524 m. The numerous depressions left after the ice retreat are now ponds or lakes (Holland, 1976). One of these lakes, Ootsa Lake, is the largest lake found within the Ulkatcho traditional use area.

The Fraser Plateau is located south of the Nechako Plateau and is generally flat to gently rolling and is not dissected by many rivers or lakes. The elevation ranges from 1 219 to 1 676 m. In the areas surrounding Anahim Lake there are three shield volcanoes that project above the plateau level: the Rainbow, Ilgachuz and Itcha ranges (Holland, 1976). There is even an obsidian plug located within the Dean River Valley called Anahim Peak, **besbut'a** (Birchwater, 1991). The Fraser Plateau is the largest physiographic unit, making up 50 percent of the total Ulkatcho traditional use area.

The far western edge of the traditional territory (i.e. Bella Coola Valley) is part of the Coast Mountain physiographic region, composed of the Kitimat and Pacific ranges (Holland, 1976). The Coast Mountain physiographic region occupies roughly 13 percent of the traditional territory. The highest peak in the Ulkatcho traditional use area is Thunder Mountain at 2 681 m. The Coast mountains have intrusive igneous rocks that have undergone mountain glaciation and the valley bottoms and lower slopes have thick deposits of glacial drift (Meidinger and Pojar, 1991). The physical setting is a complex mixture of lakes, rivers (including fast glacial rivers), mountains, valleys and plateaus (Holland, 1976). The elevation ranges from 1000 m to 2480 m (Meidinger and Pojar, 1991).

Climate

The overall weather pattern in B.C. is greatly affected by the movement of westward weather systems across the coastal mountain ranges. The cooling and condensation of moisture associated with the process of orographic lifting results in large amounts of precipitation on the coast and much drier conditions on the other side of the Coast Mountains (Pojar et al., 1984). This process repeats itself over subsequent mountain ranges resulting in drier air masses as the weather systems move east.

Elevation and topography affect regional climates greatly. Temperatures usually decrease with increasing elevation. However, cold air can become trapped in valleys by overlying warm air resulting in increasing temperatures as the elevation increases (Pojar et al., 1984). Large lakes can lessen extreme temperatures (e.g. producing longer frost free periods in the surrounding area)(Pojar et al., 1984).

Most of the Ulkatcho traditional use area is classified as continental climate (i.e. dry, low lying air) which is located within the Interior Plateau. Precipitation varies greatly in the Interior Plateau (Schaefer, 1978). Open valleys experience 400 to 600 mm of precipitation per year. Precipitation is greater, 750 mm and over, over the rolling uplands. Generally the precipitation is spread evenly throughout the year with both a summer and a winter peak. The mean annual range of temperature in this region (i.e. the mean temperature of the warmest month minus that of the coldest month) is 25°C (Schaefer, 1978). In the northern valleys and the uplands the high annual range of temperature is due to the cold temperatures experienced in the winters (Schaefer, 1978). The amount of sunshine is approximately 1800 hr per year (Schaefer, 1978).

The coastal climate, part of the Coast Mountain physiographic region, has heavy precipitation compared to the continental climate. Many areas, especially with westerly exposures and high elevations, receive at least 2500 mm of precipitation annually (Schaefer, 1978). Most of the precipitation occurs as rain; however, this changes with higher elevations with snowfall increasing. The moderate temperatures are reflected in the small mean annual range of temperature which is 10°C (Schaefer, 1978).

Biogeoclimatic Zones

At least in part because of the diverse topography, the Ulkatcho traditional use area encompasses many different types of terrestrial vegetation including alpine tundra, alpine meadows, subalpine meadows, coastal and interior forests, agricultural pasture and alluvial areas. One system used to classify the complex array of ecosystems found in B.C. was developed by V.J. Krajina in 1949 (Meidinger and Pojar, 1991). His classification is based on Biogeoclimatic (BGC) Zones. These zones are based on the plant species composition, soils and climate in a given area (Meidinger and Pojar, 1991). This system of classification has been further developed by the Ministry of Forests of the Province of British Columbia.

Eight BGC zones occur within the Ulkatcho traditional territory: Sub-boreal Spruce (SBS), Engelmann Spruce-Subalpine Fir (ESSF), Montane Spruce (MS), Interior Douglas-fir (IDF), Mountain Hemlock (MH), Coast Western Hemlock (CWH), Sub-boreal Pine-Spruce (SBPS) and Alpine Tundra (AT) (Meidinger and Pojar, 1991). All of these zones comprise forest ecosystems except the last zone. The Ulkatcho traditional use area is dominated by the MS, SBPS and SBS zones, which occur in equal proportions (occupying approximately 20 percent each of the total territory). The IDF zone is the fourth largest zone (occupying 16 percent of total territory), whereas the remaining zones (AT, CWH, MH and ESSF) encompass relatively small areas (6 percent each) within the Ulkatcho traditional use area (Figure 3.1).

The CWH and MH are both coastal zones, with MH occurring at higher elevations (Meidinger and Pojar, 1991).

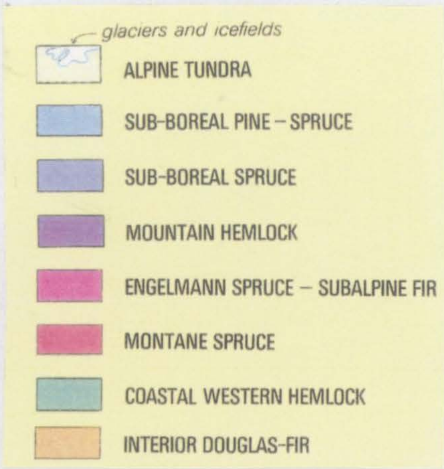
MH is dominated by *Tsuga mertensiana* (mountain hemlock) and *Abies amabilis* (amabilis fir). Many Ericaceae [e.g. *Vaccinium* spp. (blueberry) and *Rhododendron albiflorum* (White Mountain Rhododendron)] shrubs predominate. Herbs are of low importance but bryophytes dominate. The summers are short and cool while the winters are cool and wet in the MH zone (Meidinger et. al., 1991). The mean annual precipitation ranges from 1700 to 5000 mm; 20 to 70 percent of the precipitation occurs as snow (Meidinger and Pojar, 1991). The dominant soils in the MH zone are Ferro-Humic Podzols (Meidinger et. al., 1991).

Tsuga heterophylla (hemlock) is the most common species in the CWH zone. The herb layer is sparse, but the mosses *Hylocomium splendens* (stem moss) and *Rhytidiadelphus loreus* (lanky moss) are prominent. *Vaccinium* spp. (blueberry) and *Gaultheria shallon* (salal) are the prevalent shrubs. The CWH zone has cool summers and mild winters. The annual precipitation ranges from 1000 to 4400 mm with less than 15 percent occurring as snowfall (Meidinger and Pojar, 1991). The prevailing soil in the CWH is a Humo-Ferric Podzols (Meidinger et. al., 1991).

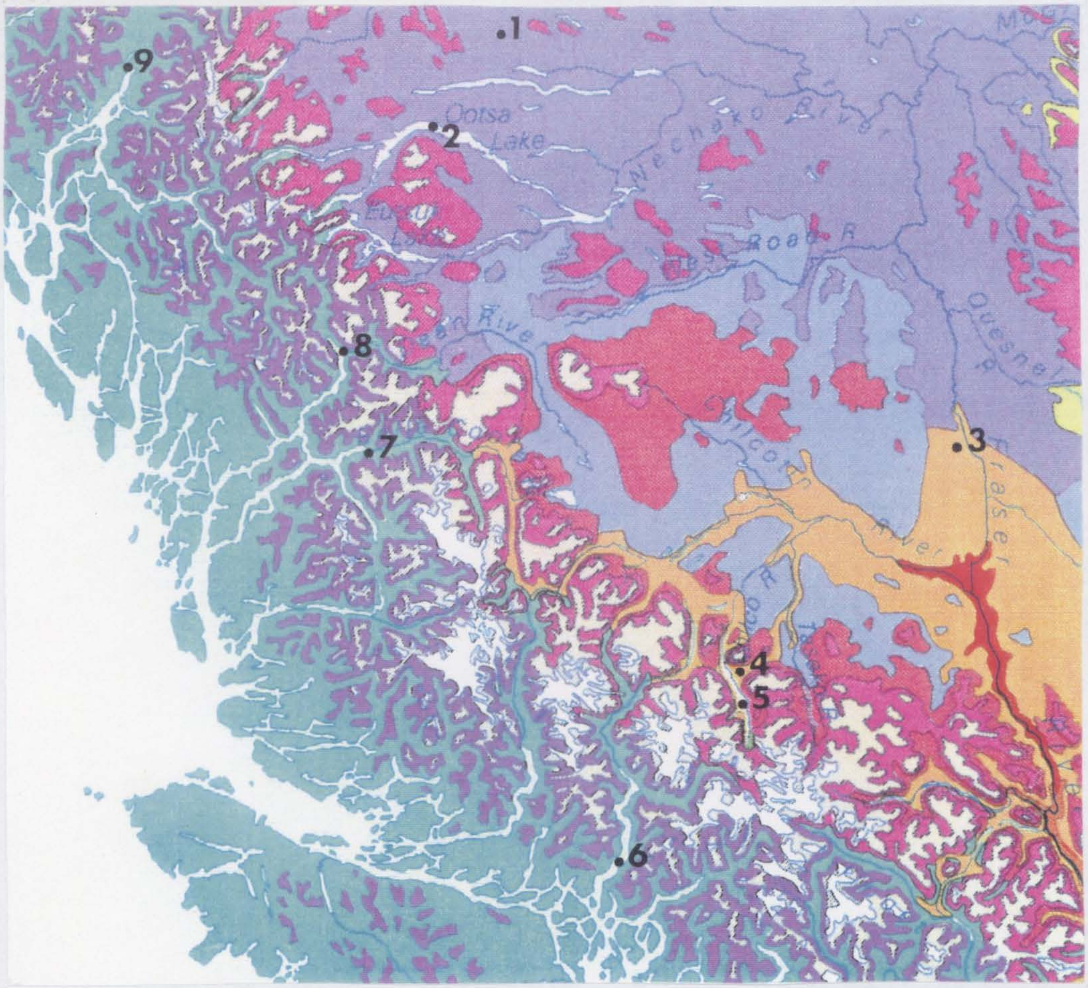
The remaining forested zones are interior zones with ESSF found at the highest elevation, MS at mid elevation and SBPS, SBS, and IDF at the lower levels (Meidinger and Pojar, 1991). SBS is located north of SBPS, whereas SBPS extends north of IDF.

Picea engelmannii (Engelmann spruce) and *Abies lasiocarpa* (subalpine fir) are the climax trees of the ESSF zone found along with many Ericaceae shrubs.

Figure 3.1: Ulkatcho Traditional Use Area Showing Biogeoclimatic Zones And Outermost Sites Visited
(Adapted from Meidinger and Pojar, 1991)



KEY
1. Burns Lake
2. Ootsa Lake
3. Fraser River
4. Nemiah Valley
5. Chilko Lake
6. Bute Inlet
7. Bella Coola
8. Kimsquit
9. Kitimat



Subalpine grasslands and meadows are commonly found in this zone. The subalpine grasslands are dominated by *Festuca* spp. (Fescue bunchgrass). The subalpine meadows contain many herbaceous species including *Veratrum viride* (Indian hellebore), *Valeriana sitchensis* (Sitka valerian) and *Senecio triangularis* (arrow-leaved groundsel). The ESSF zone has cool, short summers and cold, long winters (Meidinger et. al., 1991). Precipitation is variable according to location and ranges from 400 to 2200 mm per year with 50 to 70 percent falling as snow (Meidinger and Pojar, 1991). The soil in the ESSF zone is generally a Humo-Ferric Podzol (Meidinger and Pojar, 1991).

MS is a transition zone that contains many species found in ESSF, although *Picea engelmannii* x *glauca* (Engelmann and white spruce hybrid) is more common than *Picea engelmannii* (Engelmann spruce). *Lonicera utahensis* (Utah honeysuckle) and *Vaccinium scoparium* (grouseberry) are common understory species. The summers are short and warm whereas the winters are cold. The mean annual precipitation ranges from 380 to 900 mm. The soils range from Brunisolic in drier areas to Humo-Ferric Podzols in wetter areas (Meidinger and Pojar, 1991).

The dominant trees found in SBS are *Picea engelmannii* x *glauca* (hybrid white spruce) and *Abies lasiocarpa* (subalpine fir). *Pinus contorta* (lodgepole pine) grows in the dry areas. Wetland communities of *Carex* (sedge) marshes, *Betula* spp. (birch) fens and *Sphagnum* spp. (sphagnum moss) bogs are found commonly in this BGC zone. SBS has winters that are cold and snowy whereas the summers are relatively warm and moist (Meidinger et. al., 1991). Twenty-five to 50 percent of the 440 to 900 mm mean annual precipitation occurs as snow. The common morainal deposits in the SBS zone have Podzols, Brunisolic and Orthic Gray Luvisol soils (Meidinger et. al., 1991).

The SBPS zone contains mostly *Pinus contorta* (lodgepole pine). Other common trees include *Populus tremuloides* (trembling aspen), a seral tree, and *Picea glauca* (white spruce) (Meidinger and Pojar, 1991). The understory vegetation consists of low-growing shrubs such as *Arctostaphylos uva-ursi* (kinnikinnick) which is widespread (Meidinger and Pojar, 1991). The winters are cold and dry whereas the summers are cool and dry in the SBPS zone. The precipitation is low, 335 to 580 mm per year, with 30 to 50 percent occurring as snow (Meidinger and Pojar, 1991). The most common soils in the SBPS zone are Brunisolic Gray Luvisols and Orthic Dystric Brunisol which are found on the dominantly morainal deposits (Meidinger et. al., 1991).

Pseudotsuga menziesii (Douglas-fir) is the prominent tree species in IDF; however, many other species are found. *Picea engelmannii x glauca* (Engelmann and white spruce hybrid) occurs in wet areas. *Pinus contorta* (lodgepole pine) and *Populus tremuloides* (trembling aspen) are common seral trees (Meidinger and Pojar, 1991). *Shepherdia canadensis* (soapberry) and *Arctostaphylos uva-ursi* (kinnikinnick) are widespread shrubs. Grasslands are a prevalent feature of this zone and many are dominated by *Festuca* spp. (fescue bunchgrass) (Meidinger and Pojar, 1991). The summers are warm and dry and the winters are cool. The annual precipitation ranges from 300 to 750 mm. The soils are mostly Orthic or Dark Gray Luvisols and Eutric or Dystric Brunisols (Meidinger and Pojar, 1991).

The AT zone is treeless except for krummholz forms of tree species including *Abies lasiocarpa* (subalpine fir) and *Picea engelmannii* (Engelmann spruce) (Meidinger and Pojar, 1991). Lichens, bryophytes, dwarf shrubs and herbs dominate the vegetation. Dwarf *Salix* spp. (Willow) *Cassiope* spp. (mountain heather), *Empetrum nigrum* (crowberry) and *Dryas* spp. (mountain avens) are prevalent species. The climate is cold, windy with a short growing season in the AT zone. Precipitation (700 to 3000 mm per year) is mostly snow, 70 to 80 percent. The most common soils in the this zone are Regosols and Brunisols.

CHAPTER 4: ENVIRONMENT OF ULKATCHO TRADITIONAL USE AREA

Introduction

The floristic composition of a culture's use area is an important factor affecting ethnobotanical data (Turner, 1974) (see ch. 5, 6 and 7). A description of the flora provides a basis for understanding a culture's plant taxonomy, the diversity of plants used and the availability of plants to be named.

A detailed floristic study is not available for the large encompassing Ulkatcho traditional use area. Time constraints did not allow for such an undertaking; therefore, brief habitat descriptions were made and floristic inventories, especially species used by the Ulkatcho people, were complied. These results are compared to the flora of associated BGC Zones.

Materials and Methods

Plant Identification

I identified the plant specimens using: Cronquist (1971), Douglas et al. (1990), Hitchcock et al. (1961), Hitchcock et al. (1971), Hosie (1990), Scoggan (1978), Scoggan (1979) and Taylor et al. (1977) to identify vascular plants; MacKinnon et al. (1992) to identify lichens; Bandoni et al. (1976) and Miller (1987) to identify fungi; MacKinnon et al., (1992) and Schofield (1992) to identify mosses. The identifications were confirmed by Richard Hebda (all specimens excluding mosses and lichens), Robert Ogilvie (various specimens especially alpine species), Leon Pavlick (various specimens, some Poaceae), T.C. Brashaw (some Salicaceae), Adolf Ceska (some Cyperaceae) and Brenda Callan (fungi). A List of species with authorities is found in Appendix A.

Specimens have been deposited at the Royal British Columbia Museum herbarium with duplicates at the Ulkatcho Learning Center, Anahim Lake, B.C.

Site Description

General habitat descriptions were made for each site. Additionally, Richard Hebda estimated quadrat coverage for each of the tree, shrub, herb and moss and lichen strata for Tanya Lakes. These notes, as well as species composition from the collections, were used to develop the site descriptions. A comparison has been made with the appropriate BGC Zone to aid in the description. Sites that are found in BGC Zones that occupy the largest area of Ulkatcho traditional use area are discussed first.

Results And Discussions

In total 304 different species (501 specimens) were collected over two years from 12 different sites; specimens from Anahim Lake and Tanya Lakes represent the bulk of the collection. These two sites were visited first and the goal was to collect as many different plants as possible. At other sites only new species were collected.

All of the sites I visited were part of the Ulkatcho traditional use area. Most of these sites are still visited by present day Ulkatcho people. The locations of the sites are shown in Figure 4.1.

Anahim Lake

Anahim Lake and the community of Anahim Lake lie in the rainshadow of the Coast Mountains on the western edge of the Fraser Plateau. The surface is flat to gently rolling (Figure 4.2). The main Ulkatcho Indian Band Reserve is located here.

Pinus contorta var. *latifolia* (lodgepole pine) is the dominant tree and in some forested areas the only tree species. Mature *Picea glauca* (white spruce) is occasionally found with *P. contorta* var. *latifolia* (lodgepole pine); however, it is usually in wetter sites such as surrounding non-forested wetlands. In some locations *Populus tremuloides* (trembling aspen) is a seral species found in ecotones between disturbed areas and *P. contorta* var. *latifolia* (lodgepole pine) woodland.
The most common forested areas of *Pinus contorta* var. *latifolia* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce) are open with 50 percent tree coverage (Figure 4.3). The understory vegetation is dominated by dwarf shrubs and lichens, mainly the dwarf shrub,

Figure 4.1: Location Of Sites Visited For Ulkatcho Ethnobotany Study
(Adapted from Dept. of Lands & Forests, 1975)

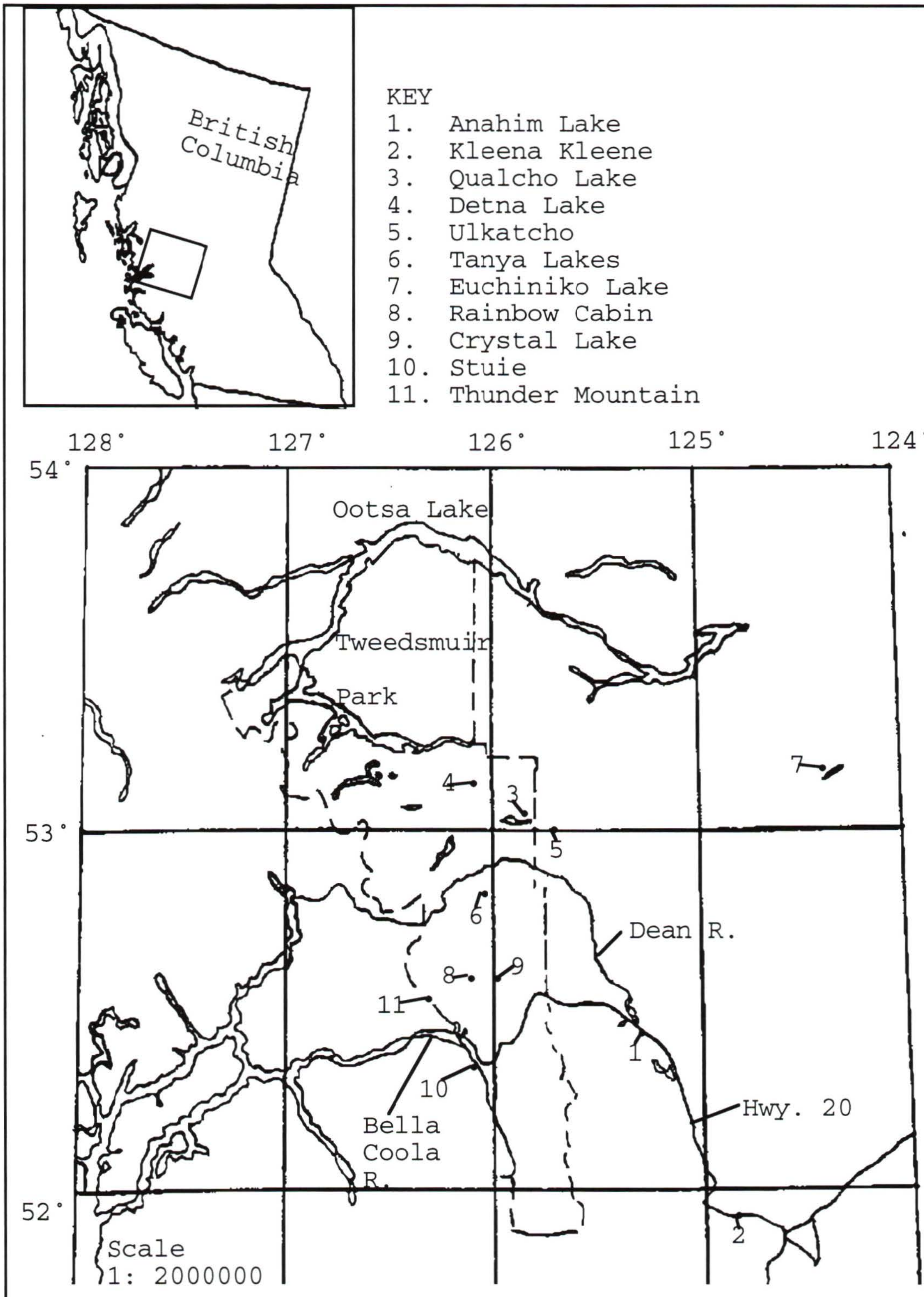
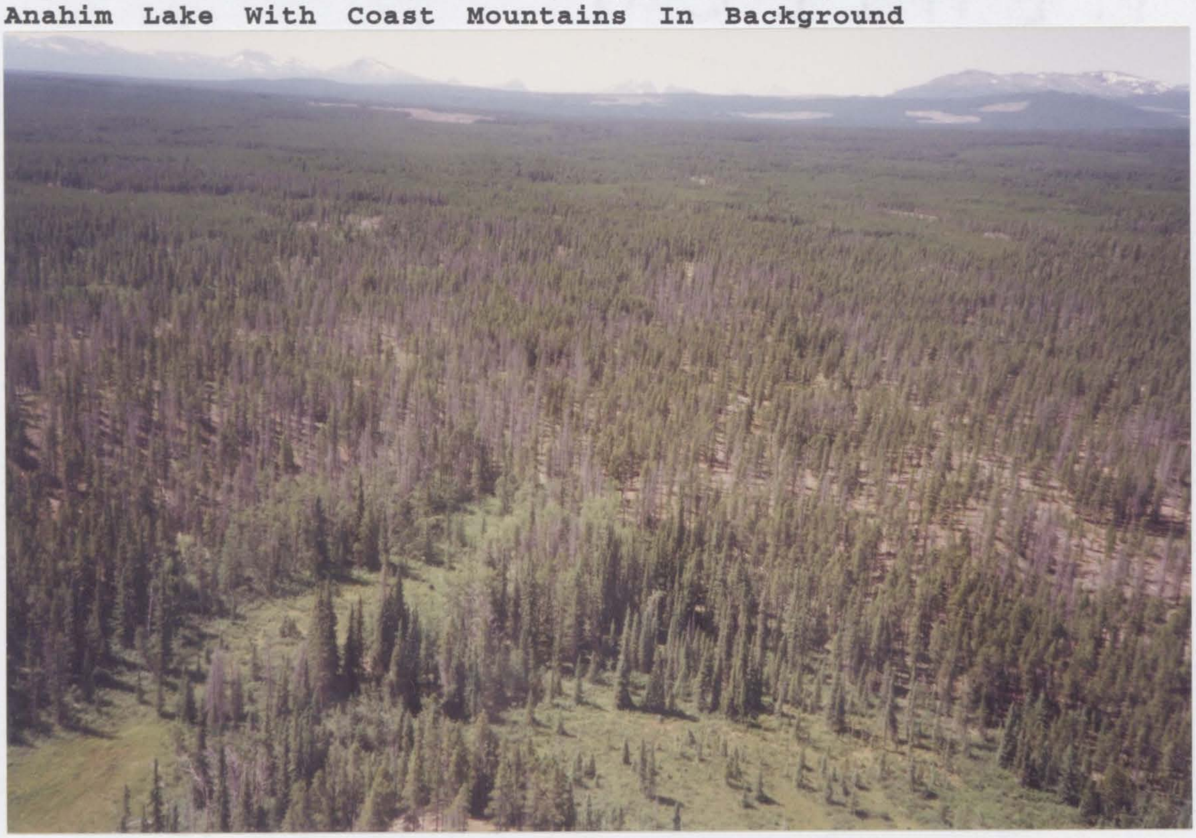


Figure 4.2: Anahim Lake Reserve With Ilgachuz Mountains in Background

Figure 4.3: *Pinus contorta* (lodgepole pine) Forest Near Anahim Lake With Coast Mountains In Background



Arctostaphylos uva-ursi (kinnikinnick), and the lichen, *Cladina mitis* (cladina). *Juniperus communis* var. *alpina* (juniper), *Shepherdia canadensis* (soapberry) and *Rosa woodsii* (Wood's rose) are also frequently found in the open understory. Other common ground lichens include *Nephroma resupinatum* (freckled lichen), *Stereocaulon paschale* (common coral lichen) and *Peltigera aphthosa* (freckled lichen). The most common tree lichen is *Bryoria fremontii* (black hair lichen) while *Cetraria ? canadensis* [Cetraria (yellow tree lichen)], *Usnea ? lapponica* (powdery old man's beard), and *Xanthoria candelaria* (orange lichen) are also prevalent. *Solidago spathulata* ssp. *spathulata* var. *neomexicana* (spike-like goldenrod) and *Cornus canadensis* (bunchberry) represent the less abundant herbaceous species.

Non-forested wetlands are prevalent because of poorly developed drainage (Meidinger et al., 1991). Common wetland communities include *Betula glandulosa* (dwarf birch), *Salix* spp. and *Equisetum arvense* (horsetail) associations and *Carex* spp. (sedge) fens. Grass or sedge dominated meadows, which are occasionally wet, are also found around Anahim Lake. Horses commonly graze in these meadows and fens.

Anahim Lake is located within the Sub-Boreal Pine-Spruce (SBPS) Biogeoclimatic Zone. It is located in the southwest part of the zone which has been classified as the SBPSxc subzone (Meidinger and Pojar, 1991). This is the driest of all of the subzones located in the SBPS (Meidinger et. al., 1991). Meidinger and Pojar (1991) do not mention that *Picea engelmannii* (Engelmann spruce) occurs in this zone. I found that it was locally more abundant than *Picea glauca* (white spruce).

Table 4.1: Plant Species Collected At Anahim Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Agaricus sp.	Field Mushroom
Agoseris glauca	Yellow Agoseris
Agrostis ?stolonifera	Bentgrass
Allium cernuum	Nodding Onion
Antennaria rosea	Rosy Pussytoes
Arceuthobium americanum	American Dwarf Mistletoe
Arctostaphylos uva-ursi	Kinnikinnick
Artemisia biennis	Biennial Wormwood
Aster borealis	Boreal Aster
Aster foliaceus	Leafy Bracted Aster
Beckmannia syzigachne	American Slough Grass
Capsella bursa-pastoris	Shephard's Purse
Carex rostrata	Beaked Sedge
Cetraria canadensis	Cetraris (Yellow Tree Lichen)
Chenopodium album	Lamb's Quarters
Chenopodium capitatum	Strawberry Blight
Descurainia sophia	Flixweed
? Dicranum fuscescens	Curly Heron's Bill Moss
Eleocharis palustris	Creeping Spike Rush
Elymus trachycaulus	Wild Rye Grass
Epilobium hornemannii	Hornemann's Willowherb
Equisetum scirpoides	Dwarf Scouring Rush
Fragaria virginiana	Wild Strawberry
Galium boreale	Northern Bedstraw
Galium trifidium	Small Bedstraw
Hippuris montana	Mountain Mare's Tail
Hordeum brachyantherum	Meadow Barley
Hordeum jubatum	Foxtail Barley
Juniperus commmunis	Juniper
Lemna minor	Lesser Duckweed
Lemna trisulca	Ivy Leaved Duckweed
Matricaria matricarioides	Pineapple Weed
Medicago sativa	Alfalfa
Parnassia palustris	Northern Grass of Parnassus

Table 4.1 cont.: Plant Species Collected At Anahim Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Peltigera aphthosa	Freckled Lichen
Petasites sagittatus	Arrow Leaved Colt's Foot
Phleum pratense	Timothy
Picea engelmannii	Engelmann Spruce
Picea glauca	White Spruce
Pinus contorta var. latifolia	Lodgepole Pine
Plantago major	Common Plantain
Pleurozium schreberi	Red Stem feather Moss
Poa sp.	Bluegrass
Polemonium pulcherrimum	Showy Jacob's Ladder
Polytrichum piliferum	Awned Haircap Moss
Populus balsamifera	Black Cottonwood
Potentilla sp.	Cinquefoil
Potentilla gracilis	Graceful Cinquefoil
Potentilla palustris	Marsh Cinquefoil
Ranunculus aquatilis	Water Buttercup
Ranunculus cymbalaria	Shore Buttercup
Ranunculus macounii	Macoun's Buttercup
Ranunculus repens	Buttercup
Ribes oxyacanthoides	Northern Smooth Gooseberry
Rorippa islandica	Marsh Yellowcress
Rosa woodsii	Wood's Rose
Rumex occidentalis	Western Dock
Rumex salicifolius	Willow Leaved Dock
Salix spp.	Willow
Salix glauca	Diamond Willow
Sedum lanceolatum	Lance Leaved Stonecrop
Shepherdia canadensis	Soapberry
Sium suave	Water Parsnip
Solidago spathulata	Spike-like Goldenrod
Sparganium emersum	Simple Stemmed Bur Reed
Spirodela polyrhiza	Great Duckweed
Stereocaulon paschale	Common Coral Lichen
Suillus sp.	Mushroom
Taraxacum officinale	Dandelion
Trifolium pratense	Red Clover
Trifolium sp.	Clover
? *Usnea lapponica*	Powdery Old Man's Beard
? *Xanthoria candelaria*	Orange Lichen

Kleena Kleene

This site is primarily used for collecting *Armillaria ponderosa* (pine mushroom). Mushroom picking is a recently acquired activity (within the last 15 years) that supplies Matsutake-type mushrooms to Japan. The mushrooms are sold to mushroom buyers and are not eaten by the Ulkatcho people. The season is usually in September, but in 1993 the mushrooms were ready in the beginning of August.

The forest at Kleena Kleene is dominated by *Pinus contorta* (lodgepole pine), 50% coverage, and *Picea engelmannii* (Engelmann spruce), 10%. The substrate is very dry and sandy. The herb stratum is dominated by *Arctostaphylos uva-ursi* (kinnikinnick), 40% coverage, and lichens, 10% coverage, such as *Cladonia cariosa* (cladonia scale) and *Cladonia borealis* (common pixie cup).

Kleena Kleene is located in the same subzone (SBPSxc) as Anahim Lake.

Table 4.2: Plant Species Collected At Kleena Kleene Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Antennaria rosea	Rosy Pussytoes
Armillaria ? mellea	Honey Mushroom
Armillaria ponderosa	Pine Mushroom
Ceanothus velutinus	Snowbush Ceanothus
Cladonia borealis	Red Pixie Cup
Cladonia cariosa	Cladonia Scale
Clitocybe ? dealbata	Sweat Causing Clitocybe
Comandra livida	Bastard Toad Flax
? Entoloma abortivum	Fungus
Equisetum hyemale	Common Scoring Rush
? Fuscoboletinus sp.	Fungus
? Hydenellum diabolus	Teeth Fungus
Penstemon fruiticosus	Shrubby Penstemon
Sedum lanceolatum	Lance Leaved Stonecrop
? Tricholoma columbetta	Fungus

Qualcho Lake

The site beside Qualcho lake was used as a summer and winter residence and a place for gathering (Maddie Jack). This area is located on the southern edge of the Nechako Plateau.

A small wet meadow occurs beside the lake. The most abundant herbs are *Agoseris glauca* (yellow agoseris) and *Potentilla gracilis* (graceful cinquefoil). The edge of the meadow is outlined with *Populus tremuloides* (trembling aspen). The forested area surrounding the meadow is dominated by *Picea glauca* (white spruce). The tree coverage is about 60 percent. The most frequent shrub is *Viburnum edule* (highbush cranberry), and *Linnaea borealis* (twin flower) and *Pyrola asarifolia* (pink wintergreen) make up the sparse herb layer.

Qualcho Lake is located within the moist, cold Sub-Boreal Pine-Spruce (SBPSmc) subzone (Meidinger and Pojar, 1991). This subzone is moister and milder than Anahim Lake country (Pojar et. al., 1984). *Picea glauca* (white spruce) and *Pinus contorta* (lodgepole pine) stands are found in moister depressions and without disturbances such as fire, the climax species would be *Picea glauca* (white spruce) (Pojar et. al., 1984) which is found at Qualcho Lake.

Table 4.3: Plant Species Collected At Qualcho Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Agoseris glauca	Yellow Agoseris
Arnica cordifolia	Heart Leaved Arnica
Cicuta douglasii	Water Hemlock
? Clavulinopsis laeticolor	Yellow Fingers
Linnaea borealis	Twin Flower
Mentha arvensis	Field Mint
Penstemon procerus	Small Flowered Penstemon
Potentilla gracilis	Graceful Cinquefoil
Pyrola asarifolia	Pink Wintergreen
Rubus idaeus	Raspberry
Sarcodon ? imbricatus	Toothed Mushroom
Viburnum edule	Highbush Cranberry

Detna Lake

Detna Lake, located in the Nechako Plateau, is the site of the "row of rocks". Mack Squinas explained the story behind the origin of the "row of rocks" at Detna Lake. The "row of rocks" was laid down in the past at the beginning of an "Indian" war. Each rock represents one individual who went off to fight in the war. Whenever the Ulkatcho people visit the site each rock is carefully cleaned of dirt and moss growth (Figure 2.1).

This site is situated in an open *Pinus contorta* (lodgepole pine) woodland. *Pinus contorta* (lodgepole pine) provides 40 percent coverage whereas *Picea glauca* (white spruce) provides 10 percent coverage. *Picea glauca* (white spruce) also grows in the understory. The herb layer is dominated by *Arctostaphylos uva-ursi* (kinnikinnick) (40 percent coverage). The lichens *Nephroma resupinatum* (freckled lichen) and *Cladina mitis* (cladina) prevail on the floor reaching 15 percent coverage. The rest of the surface is covered with *Pinus contorta* (lodgepole pine) needles.

Detna Lake is found in the moist cold Sub-Boreal Pine-Spruce subzone (SBPSmc) (Pojar et.al., 1984; Meidinger and Pojar, 1991). Meidinger and Pojar (1992) states that this subzone has *Picea glauca* (white spruce) as the dominant tree, the herb layer has more species than the very dry, cold subzone (SBPSxc, e.g., Anahim Lake) and the moss layer is well developed; however, this is not found at Detna Lake. The Detna Lake site is very dry and has a species composition similar to Anahim Lake.

Table 4.4: Plant Species Collected At Detna Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Boletus sp.	White Bolete Mushroom
Comandra livida	Bastard Toad Flax
Cornus canadensis	Bunchberry
Empetrum nigrum	Crowberry
Ledum groenlandicum	Labrador Tea
Lycopodium complanatum	Ground Cedar
Spiraea betulifolia	Flat Top Spirea
Spiraea douglasii	Hardhack

Ulkatcho

Ulkatcho was a traditional gathering spot and was the focal point of many traditional trading trails (Birchwater, 1991). It was also a permanent settlement for many years. People still visit Ulkatcho often and a summer gathering occurs here every two years. This site is very flat and is part of the Fraser Plateau.

The forested area of Ulkatcho was not observed, but it is located in the same subzone (SBPSmc) as Qualcho Lake and Detna Lake. The meadow that now encompasses the old village was disturbed by humans for many years and can be very wet during the summer. The meadow is dominated by grasses (these were not collected), *Castilleja miniata* (common red paintbrush) and other herbaceous perennial flowers. Notable species at the edge of the meadow include *Heracleum lanatum* (cow parsnip) and *Lonicera involucrata* (black twin berry). *Populus tremuloides* (trembling aspen) surrounds the meadow vegetation.

Table 4.5: Plant Species Collected At Ulkatcho Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Amanita pantherina	Mushroom
Aquilegia formosa	Red Colombine
Collomia linearis	Narrow Leaved Collomia
Cornus canadensis	Bunchberry
Gentianella amarella	Northern Gentian
Geranium richardsonii	White Geranium
Rosa acicularis	Prickly Rose
Sedum lanceolatum	Lance Leaved Stonecrop

Tanya Lakes

Located on the northern edge of the Fraser Plateau, Tanya Lakes is a traditional gathering area for the Ulkatcho people. It is situated along the Nuxalk-Carrier Grease trail. Tanya Lakes was visited in July to catch and dry spring salmon and steelhead (Birchwater, 1991). Gatherings still occur about every two years at Tanya Lakes.

The dominant tree is *Pinus contorta* (lodgepole pine), although there are some moister sites covered exclusively with *Picea engelmannii* (Engelmann spruce). The most common forested areas are composed of 50 percent *Pinus contorta* (lodgepole pine), 10 percent *Abies lasiocarpa* (subalpine fir) and less than 1 percent of *Picea engelmannii* (Engelmann spruce). There are some areas that have a higher concentration of these trees, up to 85 percentage coverage, with increasing *Pinus contorta* (lodgepole pine) and *Abies lasiocarpa* (subalpine fir) (Figure 4.4). The shrub layer is comprised mostly of *Abies lasiocarpa* (subalpine fir), *Lonicera involucrata* (black twin berry) and *Rosa woodsii* (Wood's rose). Also present are *Juniper communis* (juniper), *Ribes lacustre* (black gooseberry), *Viburnum edule* (highbush cranberry), *Rubus parviflorus* (thimbleberry), and *Amelanchier alnifolia* (Saskatoon berry). The dwarf shrub stratum includes *Pachistima myrsinites* (falsebox) and *Rubus pedatus* (trailing raspberry). *Arnica cordifolia* (heart leaved arnica), *Cornus canadensis* (bunchberry), *Linnaea borealis* (twin flower), *Pyrola secunda* (one-sided wintergreen) and *Heracleum lanatum* (cow parsnip) are frequently found in the herb layer. Infrequent species include *Comandra livida* (bastard toad flax), *Moneses uniflora* (single delight), *Vaccinium membranaceum* (black huckleberry) and in more open sites *Vaccinium caespitosum* (dwarf blueberry). In wetter areas, especially beside creeks, *Sanguisorba sitchensis* (Sitka burnet), *Athyrium filix-femina* (lady fern), *Gymnocarpium dryopteris* (oak fern), and *Streptopus amplexifolius* (twisted stalk) are commonly found. The moss layer is dominated by *Pleurozium schreberi* (red stem feather moss) which grows between five and ten cm thick. The lichens *Cladina mitis* (cladina) and *Cladonia ?ecmocyna* (orange foot lichen) are also found. Wetlands are commonly found in poorly drained postglacial depressions (Figure 4.5). A frequent type of wetland is a fen dominated by *Carex* spp. (sedges), *Salix* spp. (willows) and *Potentilla palustris* (graceful cinquefoil). A small bog wetland found near the campsite had a low shrub layer made of about two percent of *Betula glandulosa* (dwarf birch) and one percent of *Salix* sp. (willow). *Eriophorum chamissonis* (Chamisso's cotton grass), *Potentilla palustris* (graceful cinquefoil) and *Carex rostrata* (beaked sedge) were prevalent in the herb layer. *Platanthera dilatata* (white bog archid), *Agrostis scabra* (hair bent grass) and *Vaccinium oxycoccos* (bog cranberry) also occurred. The moss layer was well developed having about 40 percent coverage mostly made up of *Sphagnum* spp. (sphagnum moss).

Figure 4.4: ***Pinus contorta*** **(lodgepole pine) And** ***Abies lasiocarpa*** **(subalpine fir) Forests Surrounding Tanya Lakes With Rainbow Mountains In The Background**

Figure 4.5: Carex spp. (sedge) Fen Located Near Tanya Lakes With ***Eriophorum chamissonis*** **(cotton grass)**

Tanya Lakes site is located within the moist, cold Sub-Boreal Spruce zone (SBSmc) (Meidinger and Pojar, 1991). The dominant climax tree species in this zone are *Picea engelmannii x glauca* (Engelmann and white spruce hybrid) and *Abies lasiocarpa* (subalpine fir) (Meidinger et. al., 1991); however, these species were not dominant at Tanya Lakes. Also the hybrid spruce was not encountered, only *Picea engelmannii* (Engelmann spruce) (Note, that only field identification occurred since no sample was collected). *Pinus contorta* (lodgepole pine) is said to be common in the drier parts of the zone but Tanya Lakes is in the moist cold subzone. Wetlands, such as shrub-fen complexes, are common in SBS zone such as the ones found in the areas surrounding Tanya Lakes.

Table 4.6: Plant Collected At Tanya Lakes And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Abies lasiocarpa	Subalpine Fir
Achillea millefolium	Yarrow
Actaea rubra	Baneberry
Agrostis scabra	Hair Bentgrass
Alnus incana	Speckled Alder
Alnus sinuata	Sitka Alder
Amanita muscaria	Fly Agaric
Amelanchier alnifolia	Saskatoon Berry
Anemone multifida	Pacific Anemone
Antennaria neglecta	Pussytoes
Antennaria rosea	Rosy Pussy Toes
Aquilegia formosa	Red Columbine
Arctostaphylos uva-ursi	Kinnikinnick
Arnica chamissonis	Arnica
Arnica cordifolia	Heart Leaved Arnica
Arnica parryi	Rayless Arnica
Artemisia norvegica	Mountain Wormwood
Aster ascendens	Aster

Table 4.6 cont.: Plant Species Collected At Tanya Lakes And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Aster foliaceus	Leafy Bracted Aster
Athyrium filix-femina	Lady Fern
Betula glandulosa	Dwarf Birch
Boletus sp.	Boletus
Boletus edulis	Edible Boletus
Bovista pila	Puffball
Bryoria fremontii	Black Hair Lichen
Carex chordorrhiza	Cordroot Sedge
Carex diandra	Lesser Panicled Sedge
Carex interior	Sedge
Carex sitchensis	Sitka Sedge
Carex utriculata	Sedge
Castilleja miniata	Common Red Paintbrush
Cetraria canadensis	Cetraria (Yellow Tree Lichen)
Cicuta bulbifera	Bulbous Water Hemlock
Cladonia ? ecmocyna	Orange Foot Lichen
Comandra livida	Bastard Toad Flax
Cornus canadensis	Bunchberry
Cornus stolonifera	Red Osier Dogwood
Elymus trachycaulis	Wild Rye Grass
Empetrum nigrum	Crowberry
Epilobium hornemannii	Hornemann's Willowherb
Epilobium latifolium	River Beauty
Equisetum arvense	Horsetail
Equisetum fluviatile	Horsetail
Equisetum spp.	Horsetail
Eriophorum chamissonis	Chamisso's Cotton Grass
Fontinalis antipyretica	Water Moss
Fragaria virginiana	Wild Strawberry
Galium boreale	Northern Bedstraw
Galium trifidum	Small Bedstraw
Gentianella amarella	Northern Gentian
Geum macrophyllum	Large Leaved Avens
Gymnocarpium dryopteris	Oak Fern
Heracleum lanatum	Cow Parsnip
Heuchera glabra	Smooth Alumroot
Hieracium gracile	Slender Hawkweed
Juniperus communis	Juniper
Ledum groenlandicum	Labrador Tea
Linnaea borealis	Twin Flower
Lonicera involucrata	Black Twin Berry
Lonicera utahensis	Red Twinberry
Lycopodium annotinum	Stiff Clubmoss
Lycopodium complanatum	Ground Cedar
Mitella ? pentandra	Five Stamened Mitrewort
Moneses uniflora	Single Delight

Table 4.6 cont.: Plant Species Collected At Tanya Lakes And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Montia linearis	Miner's Lettuce
Nuphar polysepalum	Yellow Water Lily
Osmorhiza chilensis	Mountain Sweet Cicely
Pachistima myrsinites	Falsebox
Parnassia fimbriata	Fringed Grass-of-Parnassus
Peltigera aphthosa	Freckled Lichen
Pinus albicaulis	Whitebark Pine
Pinus contorta	Lodgepole Pine
Platanthera dilatata	White Bog Orchid
Pleurozium schreberi	Red Stem Feather Moss
? Pohlia nutans	Moss
Polemonium pulcherrimum	Showy Jacob's Ladder
Populus tremuloides	Trembling Aspen
Potentilla palustris	Marsh Cinquefoil
Pterospora andromedea	Pinedrops
Pyrola asarifolia	Pink Wintergreen
Pyrola secunda	One Sided Wintergreen
Ranunculus aquatilis	Water Buttercup
Ranunculus uncinatus	Least Buttercup
Ribes glandulosum	Skunk Currant
Ribes lacustre	Black Gooseberry
Rosa woodsii	Wood's Rose
Rubus arcticus	Dwarf Nagoonberry
Rubus idaeus	Raspberry
Rubus parviflorus	Thimbleberry
Rubus pedatus	Trailing Raspberry
Rumex acetosella	Sheep Sorrel
Salix barclai	Bebb's Willow
Salix glauca	Diamond Willow
Salix pedicellaris	Bog Willow
Salix ? pseudomonticola	Willow
Salix scouleriana	Scouler's Willow
Sambucus racemosa	Red Elderberry
Sanguisorba sitchensis	Sitka Burnet
Shepherdia canadensis	Soapberry
Smilacina racemosa	False Solomon's Seal
Smilacina stellata	Star Flowered False Solomon's Seal
Solidago multiradiata	Northern Goldenrod
Sorbus scopulina	Mountain Ash
Spiraea douglasii	Hardhack
Streptopus amplexifolius	Twisted Stalk
Thalictrum occidentale	Western Meadow Rue
Trifolium repens	White Clover
Vaccinium caespitosum	Dwarf Blueberry
Vaccinium membranaceum	Black Huckleberry

Table 4.6 cont.: Plant Species Collected At Tanya Lakes And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Veronica sp.	Speedwell
Viburnum edule	Highbush Crabberry
Viola adunca	Early Blue Violet

Euchiniko Lake

The eastern-most island on this lake is associated with an Ulkatcho story told to me by Mack Squinas. This island was formed when the monster man **Neganashas** drank from the lake and suddenly he turned into the island. The outline of the island looks like a man.

This island has a surface that is flat to gently rolling. The dominant trees are *Picea glauca* (white spruce) and *Pinus contorta* (lodgelpole pine) and provide 50 percent coverage. *Populus tremuloides* (trembling aspen) is also found around the edge of the woodland. *Rosa acicularis* (prickly rose) is prevalent in the shrub layer. *Arctostaphylos uva-ursi* (kinnikinnick) is the prevalent species in the dwarf shrub layer.

This site is located in the dry, warm Sub-Boreal Spruce zone (SBSdw) (Meidinger et al., 1991). The species composition is similar to that at Anahim Lake, with *Pinus contorta* (lodgepole pine) and *Arctostaphylos uva-ursi* (kinnikinnick) being prevalent, but the species composition is a little more diverse. Anahim Lake is in a different zone (SBPS).

Table 4.7: Plant Species Collected At Euchiniko Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Achillea millefolium	Yarrow
Alnus incana	Speckled Alder
Arctostaphylos uva-ursi	Kinnikinnick
Calamagrostis canadensis	Bluejoint Small Reed Grass
Castilleja miniata	Common Red Paintbrush
Elymus trachycaulus	Wild Rye Grass
Juniperus communis	Juniper
Lathyrus ochroleucus	Creamy Peavine
Lonicera involucrata	Black Twin Berry
Picea glauca	White Spruce
Poa sp.	Bluegrass
Populus balsamifera	Black Cottonwood
Rosa acicularis	Prickly Rose
Russula ? emetica or alutacea	Mushroom
Senecio plattensis	Groundsel
Shepherdia canadensis	Soapberry
Solidago spathulata	Spike-like Goldenrod

Nuxalk-Carrier Trail Between Tanya Lakes And Rainbow Cabin

The Nuxalk-Carrier Grease trail was used by the Nuxalk and Carrier people to trade oolichan grease for *Shepherdia canadensis* (soapberry) berries and dried moose meat (Birchwater, 1991). Many Ulkatcho Elders used these trails extensively when they were younger, often on horseback. The trails are still in use today, although not as frequently as in the past.

The Nuxalk-Carrier Grease Trail from Tanya Lakes to Rainbow Cabin increases in elevation by about 400 m, to 1400m. The terrain is rugged and has many steep switchbacks. The trail transverses meadows, fens and forests of *Pinus contorta* (lodgepole pine) and *Picea* *engelmannii* (Engelmann spruce) and of *Pinus contorta* (lodgepole pine) and *Abies lasiocarpa* (subalpine fir). The *Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce) forests occur at lower elevations, whereas the *Pinus contorta* (lodgepole pine) and *Abies lasiocarpa* (subalpine fir) forests were found at higher elevations. The forests consist of many old *Pinus contorta* (lodgepole pine) with an understory of *Abies lasiocarpa* (subalpine fir). The trees provide 50 to 85 percent coverage. Scattered individuals of *Thuja plicata* (western red cedar) and *Tsuga heterophylla* (hemlock) are also found. The most common herbs are *Arnica cordifolia* (heart leaved arnica), *Pedicularis bracteosa* (bracted lousewort) and *Sanguisorba sitchensis* (Sitka burnet). In wetter sites, such as along creeks, *Oplopanax horridum* (devil's club) is found. *Veratrum viride* (Indian hellebore) is frequent in the higher elevations. Large open wet grasslands contain many herbaceous species including *Cirsium foliosum* (leafy thistle), *Angelica ?genuflexa* (kneeling angelica), *Artemisia michauxiana* (Michaux's mugwort) and *Potentilla* sp. (cinquefoil).

This section of the trail crosses from the SBS zone to ESSF zone; a detailed description of this trail was not possible due to time constraints.

Table 4.8: Plant Species Collected On The Nuxalk-Carrier Trail Between Tanya Lakes And Rainbow Cabin Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Calamagrostis canadensis	Bluejoint
Carex sitchensis	Sitka Sedge
Carex utriculata	Sedge
Cirsium foliosum	Leafy Thistle
Cladina mitis	Cladina
Dryopteris carthusiana	Wood Fern
Epilobium hornemannii	Hornemann's Willowherb
Oplopanax horridum	Devil's Club
Pedicularis bracteosa	Bracted Lousewort
Platanthera dilatata	White Bog Orchid
Rhododendron albiflorum	White Mountain Rhododendron
Rubus parviflorus	Thimbleberry
Sanguisorba sitchensis	Sitka Burnet
? Schistidium apocarpum	Water Moss
Sedum divergens	Spreading Stonecrop
Sphagnum capillifolium	Common Red Sphagnum
Thuja plicata	Western Red Cedar
Tsuga heterophylla	Hemlock
Veratrum viride	Indian Hellebore

Rainbow Cabin

Rainbow cabin was used in the past and is still used as an overnight rest area when people are traveling along the Nuxalk-Carrier Grease Trail. It is located within a glacial valley in the Rainbow Ranges.

Parkland surrounds the cabin and is dominated by large *Pinus contorta* (lodgepole pine) with an understory of *Abies lasiocarpa* (subalpine fir) and patches of *Salix* spp. (willow). *Pinus contorta* (lodgepole pine) covers about 5 percent of the area and the *Salix* sp. (willow) makes up all the shrub layer which provides 10 percent coverage. The herb layer is chiefly composed of *Sorbus sitchensis* (mountain ash), *Artemisia michauxiana* (Michaux's mugwort) and *Achillea millefolium* (yarrow). Other herbs present include *Potentilla* sp. (cinquefoil), *Phleum alpinum* (alpine timothy), *Rumex acetosa* (sour dock), *Heracleum lanatum* (cow parsnip), *Valeriana sitchensis* (Sitka valerian) and *Fritillaria camschatcensis* (rice root).

Rainbow cabin is located in the Engelmann Spruce-Subalpine Fir zone, in the dry cold parkland (ESSFdcp) subzone (Meidinger and Pojar, 1991). The parklands found in this zone are characterized by a large variety of herbaceous species and clumps of trees (Meidinger and Pojar, 1991). The trees found in dry regions are primarily *Pinus contorta* (lodgepole pine) (Meidinger et. al., 1991). These characteristics describe the area around Rainbow Cabin.

Table 4.9: Plant Species Collected At Rainbow Cabin And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Abies lasiocarpa	Subalpine Fir
Agoseris glauca	Yellow Agoseris
Angelica ? genuflexa	Kneeling Angelica
Arnica chamissonis	Arnica
Castilleja miniata	Common Red Paintbrush
Erigeron peregrinus	Fleabane
Fritillaria camschatcensis	Rice Root
Gentianella amarella	Northern Gentian
Heracleum lanatum	Cow Parsnip
Lonicera involucrata	Black Twin Berry
Phleum alpinum	Alpine Timothy
Populus balsamifera	Black Cottonwood
Potentilla drummondii	Drummond's Cinquefoil
Rumex acetosa	Sour Dock
Russula ? cascadensis	Cascade Russula
Salix commutata	Variable Willow
Senecio triangularis	Arrow Leaved Groundsel
Thalictrum occidentale	Western Meadow Rue
Trollius laxus	Globe Flower
Valeriana sitchensis	Sitka Valerian

Crystal Lake And Surrounding Area Along The Nuxalk-Carrier Grease Trail

Crystal Lake is located in the Rainbow Mountains. The landscape around the lake is flat; however, the trail leading to the lake has many sections with steep inclines and rolling hills.

The most common type of vegetation along the trail is herb meadow (Figure 4.6). The surface has slopes of 25° and a few mountain streams. The most common krummholz form of species is *Abies lasiocarpa* (subalpine fir). Prevalent herbs are *Hieracium gracile* (slender hawkweed), *Phleum alpinum* (alpine timothy), *Arnica amplexicaulis* (clasping arnica), *Senecio triangularis* (arrow leaved groundsel)and *Epilobium latifolium* (river beauty). *Salix arctica* (Arctic willow) is also widespread growing as a dwarf shrub.

At the highest elevations the surface is flat with some small ponds and streams. Ninety percent of the surface is covered with rocks and gravel (Figure 4.7). The most common vegetation is mat forming species and included *Phacelia sericea* (silky phacelia), *Silene acaulis* (moss campion) and *Campanula lasiocarpa* (mountain harebell). Other common species were *Solidago multiradiata* (northern goldenrod), *Salix* spp. (willow), and *Caltha leptosepala* (two flowered white marsh marigold).

This area falls within the Alpine Tundra biogeoclimatic zone. The vegetation for the area surrounding Crystal Lake fits the description of the Southern Interior tundra subzone (Meidinger and Pojar, 1991).

Figure 4.6: Subalpine Meadow Near Crystal Lake With *Pinus contorta* (lodgepole pine) and *Abies lasiocarpa* (subalpine fir) Forests In Background

Figure 4.7: Alpine Tundra Near Crystal Lake With *Phacelia sericea* (silky phacelia) In Foreground

Table 4.10: Plant Species Collected At Crystal Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Abies lasiocarpa	Subalpine Fir
Agoseris glauca	Yellow Agoseris
Arnica amplexicaulis	Clasping Arnica
Arnica cordifolia	Heart Leaved Arnica
Arnica mollis	Hairy Arnica
Artemisia norvegica	Mountain Wormwood
Aster modestus	Great Northern Aster
Caltha leptosepala	Two Flowered White Marsh Marigold
Campanula lasiocarpa	Mountain Harebell
Carex macloviana	Thick Headed Sedge
Carex spectabilis	Showy Sedge
Cassiope mertensiana	Mertens' Cassiope
Castilleja miniata	Common Red Paintbrush
Castilleja parviflora	Small Flowered Paintbrush
Cerastium beeringianum	Bering Chickweed
cf Montia sp.	Indeterminate
Deschampsia atropurpurea	Mountain Hairgrass
Dryas octopetala	White Mountain Avens
Epilobium anagallidifolium	Alpine Willowherb
Epilobium cf. lactiflorum	White Flowered Willowherb
Epilobium latifolium	River Beauty
Erigeron peregrinus	Subalpine Daisy
Hieracium gracile	Slender Hawkweed
Hieracium triste	Woolly Hawkweed
Juncus castaneus	Chestnut Rush
Juncus parryi	Parry's Rush
Lupinus sericeus	Silky Lupine
Luzula piperi	Piper's Woodrush
Myosotis alpestris	Mountain Forget-me-not
Oxyria digyna	Mountain Sorrel
Parnassia fimbriata	Fringed Grass of Parnassus
Pedicularis bracteosa	Bracted Lousewort
Pedicularis langsdorfii	Langsdorf's Losewort
Pedicularis ornithorhyncha	Bird's Beak Lousewort
Penstemon procerus	Small Flowered Penstemon
Phacelia sericea	Silky Phacelia
Phleum alpinum	Alpine Timothy
Platanthera dilatata	White Bog Orchid
Poa leptocoma	Bog Bluegrass
Poa secunda	Bluegrass
Polemonium pulcherrimum	Showy Jacob's Ladder
Potentilla diversifolia	Blue Leaved Cinquefoil
Rhizocarpon geographicum	Green Map Lichen
Salix arctica	Arctic Willow

Table 4.10 cont.: Plant Species Collected At Crystal Lake And Surrounding Area Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Sanguisorba sitchensis	Sitka Burnet
Saxifraga bronchialis	Prickly Saxifrage
Saxifraga caespitosa	Tufted Saxifrage
Saxifraga lyallii	Red Stemmed Saxifrage
Saxifraga tolmiei	Tolmie's Saxifrage
Sedum lanceolatum	Lance Leaved Stonecrop
Sedum roseum	Roseroot
Senecio triangularis	Arrow Leaved Groundsel
Sibbaldia procumbens	Creeping Sibbaldia
Silene acaulis	Moss Campion
Solidago multiradiata	Northern Goldenrod
Trisetum spicatum	Spike Trisetum
Trollius laxus	Globeflower
Vahlodea atropurpurea	Mountain Vahlodea
Valeriana sitchensis	Sitka Valerian
Veronica wormskjolii	Alpine Speedwell

Stuie

Stuie is a campsite that is still visited by Ulkatcho people for fishing and berry picking. This site is located beside the Atnarko River in the Pacific Ranges. A full description cannot be given because this site was visited briefly. The closed forest (80 percent tree coverage) is dominated by *Pinus contorta* (lodgepole pine) and *Pseudotsuga menziesii* (Douglas fir) (Figure 2.2). There are also some smaller trees of *Tsuga heterophylla* (western hemlock) and *Thuja plicata* (western red cedar). Along the river's edge are *Salix* spp. (willow). The most numerous herbs are *Chimaphila umbellata* (prince's pine), *Linnaea borealis* (twin flower) and *Pyrola secunda* (one sided wintergreen).

The Stuie area is located in the Coastal Western Hemlock zone, but is somewhat dry and probably fits into dry submaritime subzone (CWHds) (Meidinger et. al., 1991). *Tsuga heterophylla* (hemlock) is usually the most common species in this zone; however, *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) are widespread in the drier sections (Meidinger and Pojar, 1991) such as was found in Stuie. Common herbs in the submaritime area that were found in Stuie include *Pyrola secunda* (one sided wintergreen) and *Linnaea borealis* (twin flower) (Meidinger and Pojar, 1991).

Table 4.11: Plant Species Collected At Stuie Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Chimaphila umbellata	Prince's Pine
Malus fusca	Western Crabapple
Pinus contorta	Lodgepole Pine (old dry wood)
Pseudotsuga menziesii	Douglas Fir

Thunder Mountain

This site, located near the west side of Thunder Mountain, between the Noosgulch River and Thunder Mountain, is visited annually by Ulkatcho people for berry picking. The area is part of the Kitimat Ranges and is located in a valley with steeply ascending sides.

The Thunder Mountain site consists of a dense thicket of young trees on a slope of 30°. The trees were no taller than 2 m. The dominant trees were *Tsuga mertensiana* (mountain hemlock) and *Abies amabilis*

(amabilis fir). The most frequent shrubs included *Sorbus sitchensis* (mountain ash), *Amelanchier alnifolia* (Saskatoon berry), *Vaccinium alaskaense* (Alaskan blueberry) and *Vaccinium parvifolium* (red huckleberry) (Figure 4.8). *Cornus canadensis* (bunchberry) and *Moneses uniflora* (single delight) predominated in the herb stratum. Behind the thicket are taller older trees, but this area was not visited.

The subzone that this site is located in is the moist maritime Mountain Hemlock subzone (MHmm) (Meidinger and Pojar, 1991). A site association that is commonly found and matches the above description is the *Tsuga mertensiana-Abies amabilis-Vaccinium* spp. (mountain hemlock, amabilis fir, and blueberry) association (Meidinger and Pojar, 1991).

Table 4.12: Plant Species Collected Near Thunder Mountain Arranged Alphabetically By Scientific Name With English Common Name

Species	English Common Name
Alnus incana	Speckled Alder
Anaphalis margaritacea	Pearly Everlasting
Cirsium vulgare	Bull Thistle
Clintonia uniflora	Queen's Cup
Cornus canadensis	Bunchberry
Gymnocarpium dryopteris	Oak Fern
Ribes glandulosum	Skunk Currant
Smilacina stellata	Star Flowered False Solomon's Seal
Tsuga heterophylla	Hemlock
Vaccinium alaskaense	Alaskan Blueberry
Vaccinium parvifolium	Red Huckleberry
Viburnum edule	Highbush Cranberry

Figure 4.8: Maddie Jack Picking *Vaccinium ?alaskaense* (Alaskan blueberry) Berries Near Thunder Mountain

Summary And Conclusions

The habitat descriptions and species lists demonstrate that the range of available ecosystems and plant species is great for the Ulkatcho people. This range was illustrated even though all of the ecosystems in the Ulkatcho traditional use area were not described and two BGC zones were not represented by the sites visited.

CHAPTER 5: ULKATCHO AND DINE (NAVAJO) PLANT TAXONOMIES

Introduction

A major component of ethnobotanical studies is the description of the plant taxonomic systems of different cultures (Berlin, 1992; Turner, 1974). Plant taxonomies reflect how the cultures name and classify plants within their environment.

There are many views used to explain the basis of plant taxonomies. Most views deal with factors generated within a taxonomy ('internal factors'). These views can be seen to form a continuum between two dichotomous approaches, characterized as intellectual and utilitarian. Factors outside of a taxonomy (i.e. 'external factors') also affect its characteristics. These factors include linguistic origins and floristic diversity (Turner, 1974).

The plant taxonomic systems for two Athapaskan cultures, Ulkatcho and Dine (Navajo), are described here and compared. The observed similarities and differences are explained from the perspective of internal and external factors. Ulkatcho and Dine (Navajo) provide a useful comparison because they are from the same language family but their territories are located in different environments; therefore, two external factors, linguistic origin and floristic diversity, can be studied. Internal and external factors are compared with environmental, cultural and linguistic factors. Differences and similarities between these cultures' ethnotaxonomies are also described.

Background

Internal Factors Affecting Plant Taxonomies

Berlin (1992) summarized the intellectualist's view that a taxonomy is based on humans' innate ability and need to group things in the universe according to the objects' perceived morphological differences. Plants and animals are seen by all humans as reflecting a series of discontinuities, with similar degrees of morphological boundaries recognized between these discontinuities by all people. Therefore, there should be similarities among taxonomic systems of different cultures. According to this view, plants are named and classified irrespective of their utility or cultural role.

Those of the utilitarian view suspect that the natural world is primarily named and recognized based on human 'uses'. These uses are not strictly economic in nature. The uses incorporate plants that are poisonous, are look-a-likes (similar to another used plant), or have cultural importance such as in religious rites (Hunn, 1981).

Hunn (1981) argues that genetic discontinuities in the plants, produced by genetic transmission and natural selection, will be reflected in taxonomic systems but the selective process for recognizing plants is based on utility. A selection process must occur because the number of discontinuities in nature far surpasses the observed potential of taxonomic systems.

Bulmer (1967), working on Karam folk classification in Papua New Guinea, adds further evidence which bears on the cultural influence on biological taxonomies. He feels that taxonomic systems can be based on morphology and habitat information but culture can also determine the selection of taxonomic characters. This is shown by the classification of the cassowary (*Casuarius bennetti*) which is relegated to its own taxon separate from all other animals. The cassowary is a large, wingless bird, but Bulmer (1967) argues that it is not these morphological differences that separate cassowaries from other animals; it is the high cultural significance of the cassowary that is shown by the elaborate rituals associated with hunting the cassowary.

Fowler and Leland (1967) proposed a classification where the plant kingdom is not the initial focus. The classification structure of the Northern Paiute (in the Uto-Aztecan language family, not related to the Athapaskan language family) universe was determined by asking "What is everything on or above the earth?" (Fowler and Leland, 1967: 394). The three initial primary classes were found to be "Things that are eaten", "Things that are used" and

"Things that are not used". Within each of these classes two subdivisions were found: "Things that grow in place" and "Things that move". This initial division is based on utilitarian groupings and, therefore, would support the utilitarian view.

External Factors Affecting Plant Taxonomies

Turner (1974) has found that linguistic origin and floristic diversity are the fundamental bases in which the ultimate structure and composition of the taxonomy are formed. Brown (1984) also suggests that linguistic origin affects plant taxonomies. These observations support the view that taxonomic systems are neither entirely intellectually nor utilitarian based.

Criteria For Taxonomic Categories

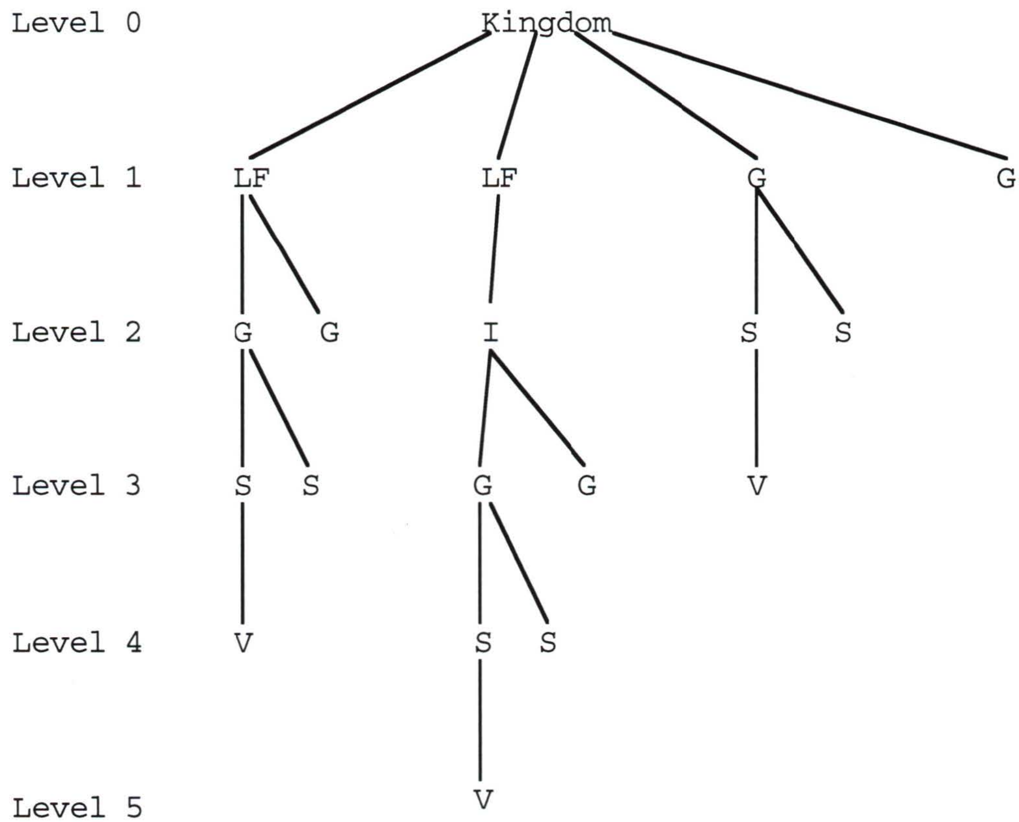
Generally, hierarchical systems of grouping organisms are evident for plant taxonomies (Berlin, 1992; Turner, 1974). Berlin differentiates between rank and level within the hierarchical system; rank relates to the characteristics of the ethnobotanical taxa (ranks, though implying hierarchy, are actually conceptual categories) and level denotes the hierarchical position of taxa within the taxonomy (Berlin, 1992) (Figure 5.1). In scientific taxonomy the ranks of taxa have distinct levels in the hierarchy but in folk taxonomies, taxa of different ranks can occur at the same level (e.g. life-form taxa and some generic taxa are both found at level 1 in Figure 5.1) and taxa of the same rank can occur at different levels (e.g. generic taxa found at levels 1, 2 and 3 in Figure 5.1). Turner elected to show level and rank of a taxon as corresponding (except for mid-level taxa which can be found at more than one level); therefore, generic taxa that do not fall within a life-form taxon are still placed at the same level as generic taxa that are affiliated to a life-form taxon (Figure 5.2).

Internal Factors And Taxonomic Categories

Life-form taxa are only distinguished by morphological and ecological features according to Berlin (1992). Hunn (1982) states that the 'tree' life-form taxon is universally recognized because of its universal practical value (e.g. used for burning), whereas Berlin claims that trees are universal because of their perceptual salience (i.e. obvious morphological characteristics) (e.g. tall woody plant). Additionally, Berlin argues that life-form taxa that have been identified by economic characteristics (e.g. edible berries) are actually part of another kind of taxonomy (e.g. taxonomy of food) and not part of the general taxonomy of plants. Hunn (1982) and Turner (1990) disagree; Hunn suggests that all life-form taxa are defined by economic characteristics whereas Turner suggests that only some are [e.g. the life-form taxon 'berry' is based on a utilitarian feature and is found in Nuxalk, Haida, Fraser River Lillooet (Turner, 1974) and

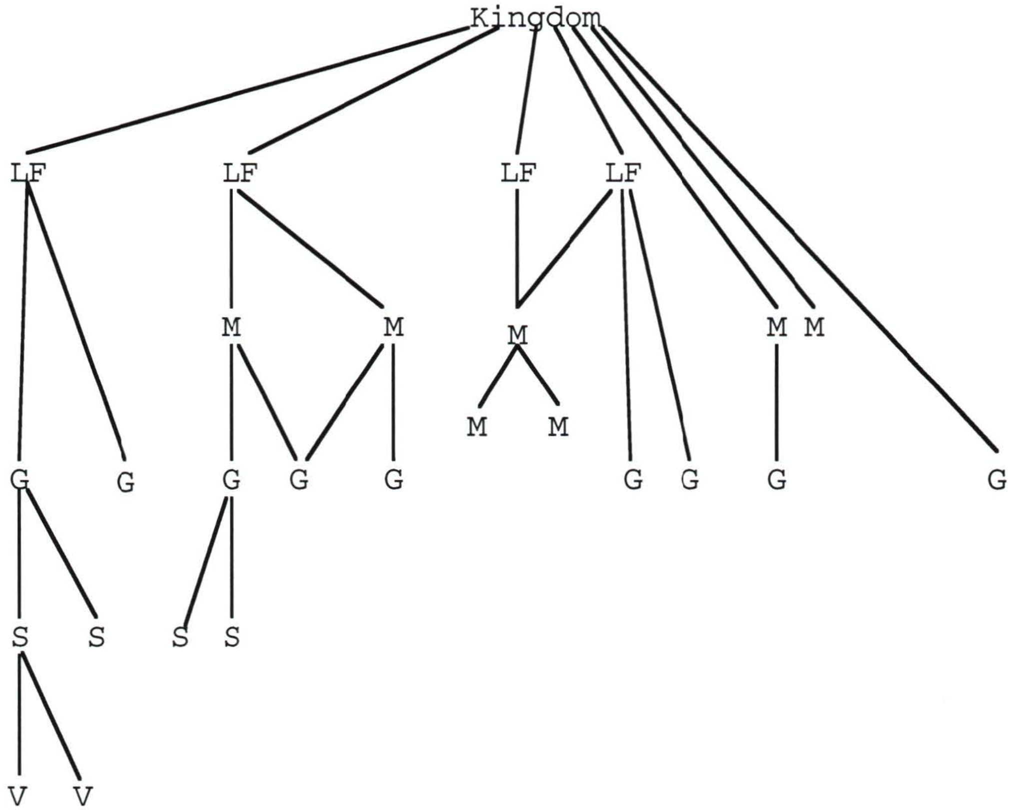
Figure 5.1: Berlin's Schematic Relationship Of Folk Taxonomic Classes
(Adapted from Berlin et al., 1973B; Berlin, 1992)

Position in Hierarchy — Hierarchical Distribution of 'Ranks'



LF = Life form rank
I = Intermediate rank
G = Generic rank
S = Specific rank
V = Varietal rank

Figure 5.2: Turner's Schematic Relationships Of Folk Taxonomic Classes
(Adapted from Turner 1985; Turner et al., 1990)



LF = Life form rank
M = Mid-level rank
G = Generic rank
S = Specific rank
V = Varietal rank

Nlaka'pamux (Thompson) (Turner et al., 1990)]. Turner (1974) was the first to describe "empty" life-form taxa. These life-form taxa contain few or no named subordinate taxa but represent a broad group of plants that all have one name (e.g. 'mosses').

Turner (1989) described cognitive criteria for recognizing intermediate taxa identified in Nlaka'pamux

(Thompson) and Fraser River Lillooet plant taxonomies. A selection of these characteristics includes both intellectual and utilitarian characteristics: similar function (e.g. medicines); similar morphology (e.g. evergreen low shrubs); and a combination of morphology and function (e.g. thorny plants).

Berlin (1992) states that generic taxa are distinguished easily because they are perceptually salient. Hunn (1982) states that generic taxa are recognized at least partly because of their utility.

Specific taxa may be distinguished by morphology but are recognized because of utility (Berlin, 1992). Turner (1980) also found that specific taxa can be based on economic values. Generally specific taxa occur in contrasting sets of two within a generic taxon. It is unusual for a generic taxon to contain more than six specific taxa; however, when this does occur the specific taxa are of major cultural importance (e.g. used in agriculture) (Berlin, 1976; Berlin, 1992).

External Factors And Taxonomic Categories

Turner (1974) concluded that linguistic origin is the primary factor in determining the nature of life-form taxa. Once life-form taxa are established they tend to be lexically and semantically stable (Turner, 1974). Therefore, languages originating within the same language family (i.e. from the same proto-language) will have life-form taxa that are cognate and that represent similar morphological groupings. Brown (1984) also felt that ancestral language imposes a lower limit of life-form taxa possessed by the related language.

Generic taxa reflect the floristic diversity and cultural interaction among neighbors; generic taxa are not defined in the most part by linguistic origin (Turner, 1974).

Patterns Of Taxonomic Ranks

Berlin suggests that patterns can be described within folk taxonomies. Berlin's observations are mostly based on Aguaruna (Berlin, 1976) and Tzeltal (Berlin et al., 1974) plant taxonomies. Turner's (Turner, 1974; Turner et al., 1990) observations are also incorporated into this discussion and are based on Haida, Nuxalk, Fraser River Lillooet and Nlaka'pamux (Thompson).

Kingdom Rank

The kingdom rank is the most inclusive level and consists of a single member (Berlin, 1992). The kingdom taxon is not usually named, but if it is named the name is often polysemous with a taxon of subordinate rank (i.e. the term is often identical to the term used for a taxon of a different rank; therefore, the term represents taxa at more than one rank) or is a compound term resulting from the combination of two or more life-form taxa names (Berlin, 1992). If a kingdom taxon is "covert" the existence of it is confirmed by specialized vocabulary that could only be used with plants (e.g. leaf, root and bark) (Berlin, 1992; Turner, 1974) Another piece of evidence that Berlin (1992) uses for the existence of a plant kingdom taxon is the employment of descriptive phrases such as 'those (elements) which germinate and grow in place' or 'those which don't move' (Berlin, 1992: 191). These phrases are defined by Berlin as 'linguistic circumlocution'.

Life-form Rank

The life-form rank represents general, comprehensive groupings. Life-form taxa are small in number (Berlin, 1992). Berlin (1992) asserts that there are usually a small number of characteristics defining a life-form taxon and the boundaries of a life-form taxon are not fuzzy (i.e. life-form taxa are mutually exclusive). Turner (Turner, 1974; Turner et al., 1990) states that life-form taxa are usually but not always mutually exclusive.

"Covert (i.e. implied)" life-form taxa were first described by Turner and are 'unnamed and defined only by conversational associations' (Turner,1974:33). Berlin accepts that "covert" life-forms occur, but not frequently (Berlin, 1992).

Intermediate or Mid-level Rank

Cognitively, intermediate taxa are defined as more restricted in their application than life-form taxa and more general than generic taxa (Turner, 1989). Turner (1974, 1989) found this rank to include many taxa, but that these are variable and loosely defined.

Turner elected to use the term "mid-level" to describe these taxa since they do not necessarily conform to Berlin's intermediate rank. A mid-level taxon does not have to belong to a life-form taxon or it can belong to more than one life-form taxon and therefore is not mutally exclusive (Turner, 1974; Turner, 1989) (Figure 5.2). Mid-level taxa are not all of equivalent level and a mid-level taxon can incorporate two or more subordinate mid-level taxa (Turner, 1989).

Berlin (1992) states that intermediate taxa are not usually named, whereas Turner (1989) states that many are named. Both Berlin and Turner found that if an intermediate taxon is named, the name is often polysemous with a name of a taxon of subordinate rank (e.g. generic taxon).

Generic Rank

The generic rank represents the "smallest fundamental biological discontinuities easily recognized in any particular habitat" (Berlin, 1992;53) or, simply, generic taxa are the most fundamental type of folk category (Turner et al., 1990). The majority of plant names are for generic taxa, and generic taxa are the most numerous taxa (Berlin et al, 1974; Berlin, 1976; Berlin, 1992; Turner, 1974; Turner 1990).

Berlin (Berlin et al., 1974; Berlin 1976) and Turner (1974) have found many examples of unaffiliated generic taxa. These taxa are not incorporated into any life-form taxa or possibly into any intermediate taxa within a language.

Some generic taxa can also be ambiguously affiliated, meaning that they potentially fall into more than one life-form taxon. The taxa therefore are not mutually exclusive (Berlin 1992; Turner, 1974). Berlin et al. (1974) states that some of these generic taxa have characteristics that are found in at least two life-form taxa.

The majority of generic taxa are monotypic (i.e. include no specific taxa) (Berlin et al., 1974; Berlin, 1976; Berlin 1992; Turner, 1974).

Specific And Varietal Ranks

A set of specific taxa within a generic taxon are contrastive to each other because they differ in a singular way from each other but not in many ways (Berlin, 1992). Specific taxa are fewer in number than generic taxa (Berlin et al., 1974; Berlin, 1976; Berlin 1992; Turner, 1974). Turner et al. (1990) found very few named specific taxa in the languages they studied; many specific taxa were recognized but not named (i.e. were "covert").

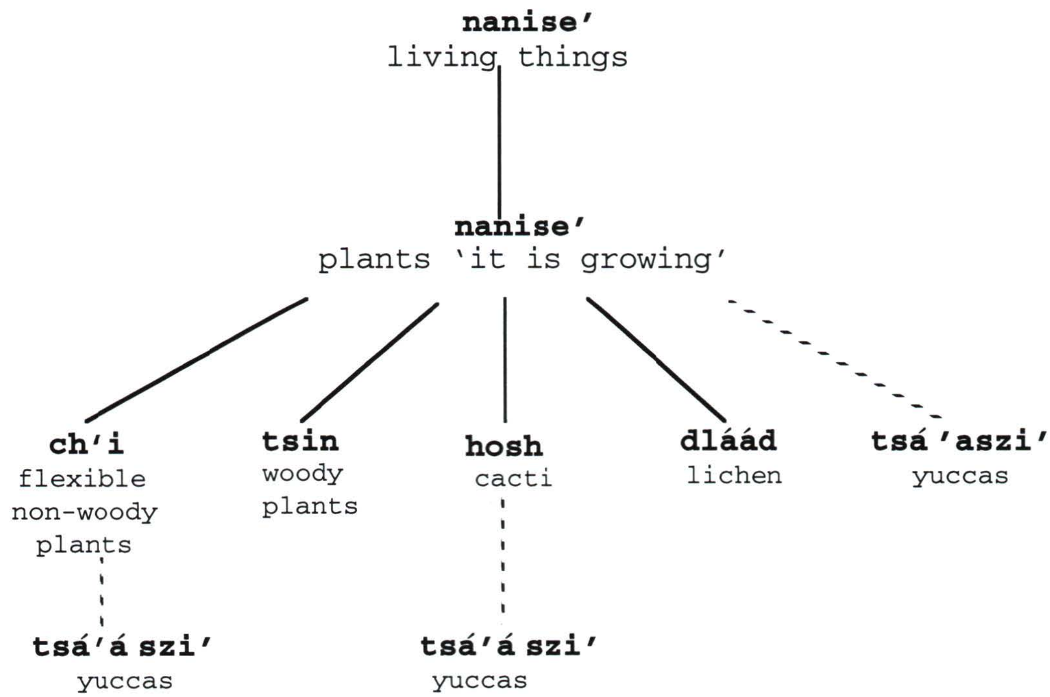
In some specific taxon sets, there might be a plant that is the ideal representative for the other specific taxa in the set; this is termed a "type specific" (Berlin et al., 1974; Berlin, 1976; Berlin 1992). A "type specific" in a set of specific taxa can have the same name as its inclusive generic taxon. This is an example of polysemy.

The varietal rank occurs at the lowest level in a plant taxonomy. They were not found by Turner (1974) and were found infrequently by Berlin (Berlin et al., 1974; Berlin, 1976; Berlin 1992). Apparently varietal taxa are associated only with domesticated plants (Berlin, 1976).

Previous Descriptions Of Dine (Navajo) Plant Taxonomy

Werner et al. (1983) described the Dine (Navajo) taxonomic view of the universe. This taxonomy was comprised of 'things that were put on the surface of the earth', which included a category of 'living things', which was further divided into 'plants' and 'animals'. The major plant groups were described (Figure 5.3.); they were based only on morphological differences, not economic differences.

Figure 5.3: Schematic Representation Of Dine (Navajo) Life-form Taxa As Described By Werner et al. (1983)
A dotted line represents unsure placement of taxon by Werner et al. (1983).



Wyman and Harris's (1941) Navajo Indian Medical Ethnobotany is the first example where the concepts of folk taxa are employed (Berlin et al., 1973). Wyman and Harris (1941) described a classification of large categories of plants grouped according to their use. These were classified as "Dine (Navajo) families". The name given to a "Dine (Navajo) family" reflects its use: a ceremony in which the plants are used; type of disease treated with the plants; the pharmacological effect of the plants; method of preparing the plants; method of administering the treatment; or a combination of these factors. A plant may belong to more than one "Dine (Navajo) family"; therefore, these groupings are not mutually exclusive. The number of "Dine (Navajo) families" is not stable nor is the composition of these "families". Wyman and Harris (1941) identified 56 "family" names; however, a complete list was not obtained because of the variable nature of the "Dine (Navajo) families". "Dine (Navajo) form genera" are described by Wyman and Harris (1941) as a group of plants that are superficially similar. The species in a "Dine (Navajo) form genus" can be found in other "Dine (Navajo) form genera" but Wyman and Harris did not classify "Dine (Navajo) form genera" as "Dine (Navajo) families" because they were more limited than "Dine (Navajo) families". "Dine (Navajo) species" represent a single botanical species or small group of similar plants (Wyman and Harris, 1941). "Dine (Navajo) species" can be further delineated by additional qualifying terms; Wyman and Harris (1941) labeled these terms as "Dine (Navajo) varieties". A "Dine (Navajo) genus" is the combination of a "Dine (Navajo) species" and its "Dine (Navajo) varieties".

Materials And Methods

In the following comparison of Ulkatcho and Dine (Navajo) plant taxonomies, information is drawn from personal interviews in the case of Ulkatcho and literature reviews for Dine (Navajo).

Method Used To Describe Ulkatcho Plant Taxonomy

The Ulkatcho plant taxonomy is described using the information from interviews during September, 1992 and July, 1993. After the second field season (July-August, 1992) it become apparent to me that there were Ulkatcho terms that could represent large groups of plants. Fresh plant specimens or pictures were shown to the consultants. The questions asked included "Could this be called an X?" and "Is this an X?". "X" represents the Ulkatcho lexemes for the large groups of plants. Ulkatcho plant names were also used without plant specimens: "Is **chundo** an X?". This type of questioning could potentially lead the consultant to unintended answers; however, the responses were a combination of positive and negative replies (e.g. of a negative reply, "No one would call it that." Maddie Jack).

Method Used To Describe Dine (Navajo) Taxonomy

The plant taxonomies described by Wyman and Harris (1941) and Werner et al. (1983) were used as a starting point to describe Dine (Navajo) plant taxonomy.

Werner et al. (1983) provided the basis of kingdom taxon and life-form taxa; however, changes have been made regarding definition of these taxa. Additional life-form taxa were also found compared to Werner et al. (1983). The changes are discussed in the following section.

Wyman and Harris (1941) only collected data on medicinal plants, but many of these plants were also used in non-medicinal ways. Therefore, I feel that these data can provide valuable information about Dine (Navajo) plant taxonomy. Wyman and Harris' (1941) terminology can be compared to Turner's ethnosystematic terminology: "Dine (Navajo) families" represent mid-level taxa; "Dine (Navajo) form genera" represent the mid-level taxa; "Dine (Navajo) species" are equivalent to generic taxa; and "Dine (Navajo) varieties" are equivalent to specific taxa.

The list of 210 'Dine (Navajo) species' from Wyman and Harris (1941) provided the basis for the generic taxa; however, changes have been made regarding rank in the hierarchy (i.e. not all of the 'Dine (Navajo) species' can be constructed as generic taxa). The changes are discussed in the following section. The generic taxa were assigned to an inclusive life-form taxon on the basis of linguistic markers (i.e. generic taxon name incorporating life-form taxon name) and/or definition of life-form taxon.

Results

Ulkatcho Kingdom Taxon

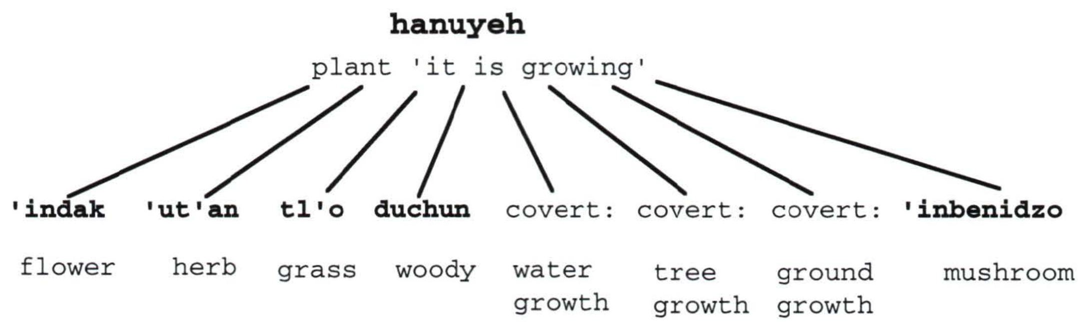
The kingdom of plants is called **hanuyeh**, which incorporates the verb stem "to grow". Three Elders

(Maddie Jack, Eliza Leon and Mack Squinas) defined this word as "growing from the ground". It is interesting to note, that in Ulkatcho speech, the term for plant is seldom employed.

Ulkatcho Life-form Taxa

Eight life-form taxa were identified in Ulkatcho plant taxonomy (Figure 5.4).

Figure 5.4: Ulkatcho Life-form Taxa



'Indak is an "empty" life-form taxon; all the individuals within this taxon are called only **'indak**. Other plants such as **chusli mai**, *Cornus canadensis* (bunchberry), have **'indak** (flowers) but would not be called this. This category represents a grouping of plants that have flowers and no other name or use [only one **'indak** according to Maddie Jack has a use; this is the introduced daisy, *Chrysanthemum leucanthemum* (oxeye daisy)]. It is not a category representing all showy flowers since many showy flowers have generic names and are found within the **'ut'an** life-form. It is possible that **'indak** is a mid-level taxon found in the **'ut'an** life-form taxon; however, **'indak** represents a very large general group of plants and appears to be semantically equivalent to other taxa of the life-form rank. Plants included within the flower life-form taxon have "**'ut'an**" but are only called "**'indak**" (Maddie Jack and Eliza Leon).

'Ut'an can be used to describe any leaf or leafy plant and is employed as a life-form name for herbaceous plants including ferns. This life-form taxon contains many named Ulkatcho generic taxa. Two species were not given generic names: *Sanguisorba sitchensis* (Sitka burnet) and *Spiraea douglasii* (hardhack) were only called **'ut'an** or **'indak.** These species could be ambiguously affiliated with both the 'herb' life-form taxon and the 'flower' life-form taxon. Quite often, **'ut'an** was used by Ulkatcho Elders to represent all leafy plants including deciduous trees. Most plants included within this life-form taxon (except ferns) have **'indak** but are not called **'indak**.

The life-form taxon **tl'o** 'grass' includes all Poaceae, Cyperaceae as well as all of the species I collected in Juncaceae, Sparganiaceae and Typhaceae. This life-form taxon represents plants that are grass-like: slender stems with long slender leaves and with 'some bundle' (Maddie Jack) on top of the stem that is not quite flower-like. *Allium cernuum* (nodding onion) incorporates **tl'o** into its name, **tl'oo tsun**, which can be glossed as 'smelly grass'. *A. cernuum* (nodding onion) most likely belongs in the **'ut'an** life-form taxon because it has an **'indak**, whereas **tl'o** taxa does not have **'indak**.

Duchun incorporates both trees and shrubs and could be described as the 'woody' life-form taxon since there is no Ulkatcho word that differentiates between trees and shrubs.

The 'small water plant' life-form taxon is "covert". All small water plants are called **tehdlat**, with the exception of two species. *Lemna trisulca* (ivy leaved duckweed), **teheyen**, and *Hippuris montana* (mountain mare's tail), **tehtl'o**, both incorporate the 'underwater' stem **teh** (Kari, 1990). The life-form taxon for small water plants is "covert" because **teh** does not represent plants. Most likely large water plants belong to other life-form taxa: *Nuphar polysepalum* (yellow water lily), **khoolht'al,** is included in the **'ut'an** life-form taxon because of its large leaves and *Typha latifolia* (cat-tail), **tl'odazoolh**, in the **tl'o** life-form taxon because it does not have flowers.

Lichens that grow on trees are represented by a "covert" life-form taxon whereas lichens that grow on the ground comprise a separate "covert" life-form taxon. The ground lichen life-form taxon also includes mosses and some mat-forming vascular plants that have no berries [e.g.*Silene acaulis*, (moss campion)]. *Arctostaphylos uva-ursi* (kinnikinnick), however is not included in this life-form taxon. Therefore, the life-form is defined by plants that are low growing, mat-forming with no berries, 'ground moss-like and lichen-like'.

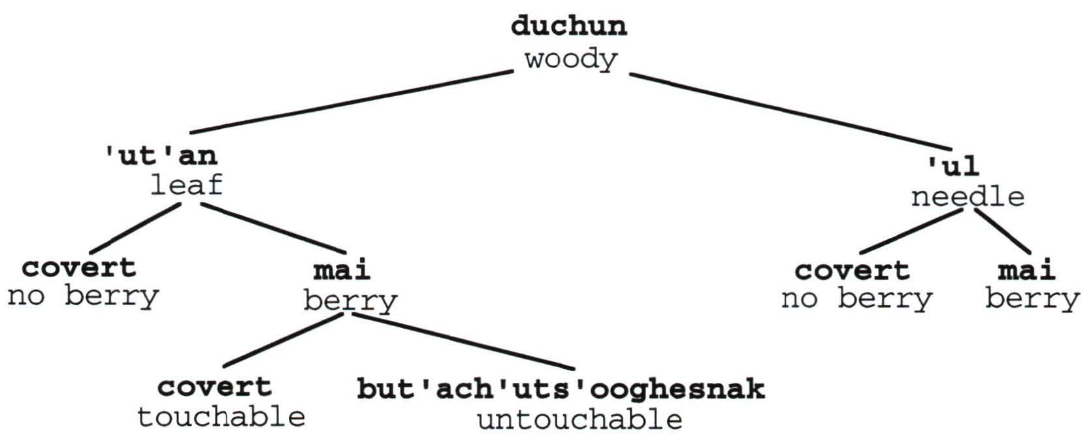
The final life-form taxon, **'inbenidzo**, is an "empty" life-form that incorporates all mushroom-like fungi.

Ulkatcho Mid-level Taxa

The "covert" life-form taxon for 'ground moss-like and lichen-like' includes an "empty" mid-level taxon, **yenjat**. **Yenjat** represents all mosses [except for *Sphagnum* spp. (sphagnum moss) which has its own generic name], a lichen [*Stereocaulon* sp. (coral lichen)] and three vascular mat-forming mountain plants: *Dryas octopetala* (white mountain avens), *Silene acaulis* (moss campion) and *Saxifraga bronchialis* (prickly saxifrage). This mid-level taxon represents low-growing, mat-forming, soft plants (as opposed to the 'hard' lichens).

The **duchun** life-form taxon comprises a hierarchical taxonomy consisting of three different levels of mid-level taxa (Figure 5.5).

Figure 5.5: Schematic Representation of Mid-Level Taxa In The Ulkatcho <u>Duchun</u> Life-Form Taxon



All generic taxa that belong to the **duchun** life-form taxon can be divided into two groups [with the exception of *Thuja plicata* (west red cedar)]: woody plants with leaves, **'ut'an**, and woody plants with needles, **'ul**. *T. plicata* (west red cedar) has neither leaves nor needles and therefore does not fit into either group. The **'ut'an** mid-level taxon is polysemous with the **'ut'an** life-form taxon; they both represent plants with leaves. However, the **'ut'an** mid-level taxon is subordinate to the **duchun** life-form taxon. **'Ut'an** is an example of a polysemous taxon.

Both the **'ut'an** and **'ul** mid-level taxa can be divided into 'plants with berries' (hereafter 'berry'), **mai**, and 'plants without berries' (hereafter 'no berry'), "covert". Many generic names of plants with berries incorporate **mai** into their names. **Mai** can be further divided into berries that are used by humans and berries that are used only by animals, called **but'ach'uts'ooghesnak**, or as Maddie Jack defined them, 'untouchable berries'. This mid-level taxon is very flexible and is related to an individual's plant knowledge. Thus, one person may find a plant useless and would call it **but'ach'uts'ooghesnak**, but another person could recognize a use for the plant, and would therefore not call it **but'ach'uts'ooghesnak**. Incidentally, this category reflects the respect the Ulkatcho people have for their environment since plants that were considered **but'ach'uts'ooghesnak** were left alone. Children were told not to play with these plants because some animal might need the plant for food (Maddie Jack and Eliza Leon).

There are three species [*Juniperus communis* (juniper), *Empetrum nigrum* (crowberry) and unknown plant #4) that are classed both as **mai** and **'ul**, and since the berries are used from all three plants they would not be considered **but'ach'uts'ooghesnak**. Therefore as far as my observations suggest, the **but'ach'uts'ooghesnak** mid-level taxon is not incorporated within the **'ul** mid-level taxon.

Plants in the **'ut'an** life-form taxon can also be classified as **mai** ('berry') or 'no berries' ("covert"). Therefore, the **mai** and "covert" mid-level taxa are included simultaneously within two life-form taxa: **'ut'an** and **duchun**. The **but'ach'uts'ooghesnak** mid-level taxon also overlaps between two life-form taxa since all **mai** plants can be categorized as either **but'ach'uts'ooghesnak** or not **but'ach'uts'ooghesnak**.

There are other examples of a mid-level taxon overlapping between two life-form taxa. The mid-level taxon of 'thorny plants', **whus**, apparently includes **whus**, *Rosa* spp. (rose); **whus cho**, *Oplopanax horridum* (devil's club); '**indawus**, *Ribes* spp. (gooseberry); and **whusts'ik**, *Urtica dioica* (stinging nettle) (Maddie Jack). **Whus**, **whus cho** and **indawus** are incorporated within the **duchun** life-form taxon whereas **whusts'ik** is classed in the **'ut'an** life-form taxon; furthermore **whus cho** and **indawus** are included in the 'berry' mid-level taxon whereas **whus** is included in the 'no berry' mid-level taxon. There is also a 'string' mid-level taxon, indicated by the incorporation of **tl'ool**, consisting of **dahtl'ool**, *Ribes lacustre* (black gooseberry), *Thalictrum occidentale* (meadow rue), *Galium* spp. (bedstraw); **yuntl'ool**, *Linnaea borealis* (twin flower); and **'indzo**

tl'ool, *Fragaria virginiana* (strawberry). This mid-level taxon overlaps between the **'ut'an** life-form taxon and the **duchun** life-form taxon.

Another possible mid-level taxon, indicated by lexical marking, that overlaps with two life-form taxa is one consisting of **'ilhtsul**, *Vaccinium caespitosum* (dwarf blueberry); **'ilhchul cho**, *Vaccinium ? alaskaense or V. ovalifolium* (Alaskan or oval leaved blueberry); and **'ilhkal**, *Fritillaria camschatcensis* (rice root). The prefix **'ilh** may provide a relation as of yet unknown property.

One mid-level taxon is defined by habitat. **Dzulh**, krummholz form of *Abies lasiocarpa* (subalpine fir); **dzulhk'ut k'idlih**, *Salix arctica* (arctic willow); and **dzulhk'ut tl'o**, *Luzula piperi* (Piper's woodrush) are grouped together to form a 'mountain growth' mid-level rank. All of these species can be found growing in alpine tundra.

Six other mid-level taxa were identified: **ts'oo**, 'spruce-like'; **k'i**, 'birch-willow'; **k'en**, 'service berry-dogwood'; **dunih**, 'kinnikinnick-falsebox'; **'ilhchul**, 'blueberry' and **'ah**, 'fern'. Perceptually, they all are positioned just above the generic rank in the taxonomic hierarchy and therefore I have labeled them as suprageneric taxa. A linguistic association is found since all of the generic names share a linguistic element;

this element forms the name for the suprageneric taxon. Therefore, each suprageneric taxon includes a type generic taxon. See Table 5.6 for distribution of suprageneric taxa within the life-form taxa. **Duchun** has the highest number of suprageneric taxa.

Ulkatcho Generic Taxa

Table 5.6 shows the distribution of generic taxa for each life-form taxon. **'Ut'an** and **duchun** have the highest number of generic taxa. Tree generic names comprise 16.67 percent of the total generic names. Taxa of generic rank are more numerous than taxa of any other rank. The majority of the generic taxa (98.03 percent) are monotypic.

The number of unaffiliated generic taxa comprises 3.92 percent of the total generic taxa. The unaffiliated generic taxa are **khahdai**, *Equisetum* spp. (horsetail); **naodloh lhuk** or **datsan lhuk**, *Bovista pila* (puffball); and **busts'ah**, *Arceuthobium americanum* (american dwarf mistletoe) and **tsego mai**, *Sedum divergens* (spreading stonecrop). These taxa are unaffiliated because their unique morphology excludes them from the described life-form taxa. A term for shelf fungi was not obtained; however, if named they would probably form an unaffiliated generic taxon.

Table 5.1: Distribution Of Named Ulkatcho Suprageneric, Generic and Specific Taxa Among Life-form Taxa

Life-form Taxon	No. of Named Suprageneric Taxa	No. of Named Generic Taxa	No. of Named Specific Taxa
'indak 'flower'	0	0	0
'ut'an 'herb'	0	34	0
tl'o 'grass'	0	6	0
duchun 'woody'	5	41	3
"covert" 'water growth'	0	3	0
"covert" 'tree growth'	0	5	0
"covert" 'ground growth'	0	4	0
'inbenidzo 'mushroom'	0	0	0
unaffiliated	0	4	0
ambiguous	1	5	0
Total	6	102	3

Five generic taxa **chusdli mai**, *Cornus canadensis* (bunchberry), *Comandra livida* (bastard toad flax) and *Streptopus amplexifolius* (twisted stalk); **lhimai**, *Actaea rubra* (baneberry), *Malus fusca* (western crabapple), *Rubus pedatus* (trailing raspberry) and *Symphoricarpos albus* (snowberry); **dihiyi**, *Pyrola asarifolia* (pink wintergreen), *Pyrola secunda* (one-sided wintergreen) and *Chimaphila umbellata* (prince's pine); **'ah**, *Athyrium filix-femina* (lady fern), *Dryopteris carthusiana* (wood fern) and *Gymnocarpium dryopteris* (oak fern); and **datsan 'ah**, *Athyrium filix-femina* (lady fern) were ambiguously affiliated with the **'ut'an** and the **duchun** life-form taxa. Three of these generic taxa included three or more different species each.

Ulkatcho Specific And Varietal Taxa

Table 5.1 shows that all 3 specific taxa occur within the **duchun** life-form taxon. Only two generic taxa incorporate specific taxa: the **ts'oochun**, *Abies lasiocarpa* (subalpine fir), generic taxon includes one named specific taxon whereas the **k'idlih**, *Salix* spp., (willow), generic taxon includes two named specific taxa. None of the specific taxa are polysemous with their generic taxa. The term for the krummholz form of *Abies lasiocarpa* (subalpine fir), **dzulh**, 'mountain' is the named specific taxon which occurs in a contrasting set: **dzulh** and "covert" (i.e. 'non-mountain'). The other two specific taxa are **k'idlih dulhk'un** 'red willow', *Salix* sp. (willow), and **dzulhk'ut k'idlih** 'mountain area willow', *Salix arctica* (arctic willow).

Other, "covert" specific taxa are also implied in Ulkatcho plant taxonomy, although the extent of these has not been established. When Mack Squinas was talking about **k'idlih**, *Salix* spp. (willow) he said that there are many different types of **k'idlih**.

I did not find any varietal taxa in Ulkatcho plant taxonomy.

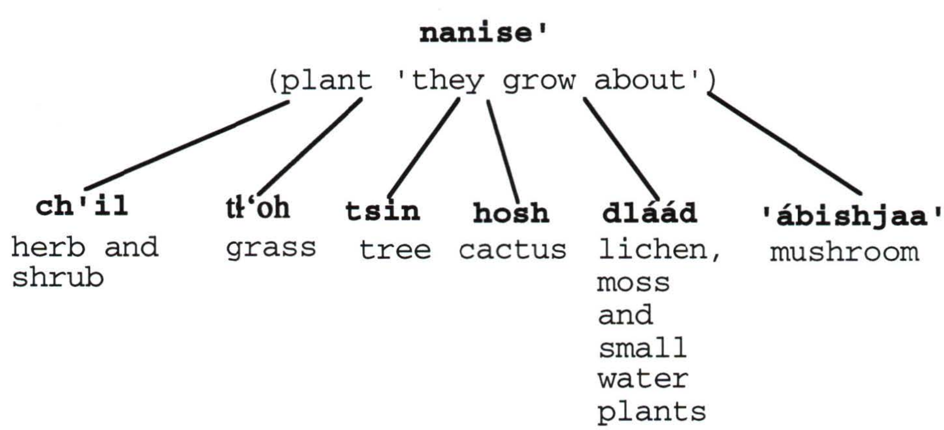
Dine (Navajo) Plant Kingdom Taxon

The plant kingdom taxon is identified as **nanise'** in Dine (Navajo) plant taxonomy and it is an all-inclusive term applied exclusively to plants. Figure 5.3 shows that Werner et al. (1983) labeled "living things" and plants with the same lexeme; however, Young and Morgan (1992) did not identify an inclusive term for plants and animals. Young and Morgan (1992) define animal life as **naaldeehii**, glossed as 'they move about', and plants as **nanise'**, glossed as 'they grow around about'. Therefore, the plant kingdom name is not polysemous with a term for all life.

Dine (Navajo) Life-form Taxa

There are six life-form taxa in Dine (Navajo) according to my interpretation (Figure 5.6).

Figure 5.6: Revised Dine (Navajo) Life-form Taxa



The life-form taxon called **ch'il** represents 'herb and shrub'. This is an extension of Werner et al.'s (1983) interpretation. They suggest the term **tsin** applies to all woody plants and does not differentiate between trees and shrubs. They maintain that shrub is depicted by the generic term for sagebrush, **ts'ah**. However, Young and Morgan (1992) defines **ch'il** as 'plant and shrub'. Five of the 28 generic shrub taxa incorporate **ch'il** in their names. Additionally, Wyman and Harris (1941) found two names for *Cowania stansburiana* (cliff rose), which can grow as a shrub or tree: **'awéc'ál** is the name used for the tree while **ch'áshch'il** is used for the shrub. Note that the shrub form incorporates **ch'il**.

Tł'oh depicts a life-form taxon of 'grass' plants that includes plants from Poaceae, Cyperaceae and Juncaceae. As in Ulkatcho, *Allium cernuum* var. *neomexicanum* (nodding onion) incorporates **tł'oh** into its name, **tł'ohchin**, and probably is included in the **ch'il** life-form taxon.

I suggest that **tsin** represents only 'tree' as a life-form taxon since **ch'il** represents 'herb and shrub'. Young and Morgan (1992) defined **tsin** as 'tree, stick, pole and wood'. Wood is used only in wooden products and the rest of the meanings seem to relate to tall slender objects. These meanings appear to exclude shrubs.

Hosh is identified by Werner et al. (1983) as the life-form name for 'cactus'. Furthermore, Young and Morgan (1992) define the noun stem, **hosh**, as 'thorn' and 'cactus'. In Berlin's (1976) Aguaruna plant data it was found that the only species of cactus belonged to an unaffiliated generic taxon due to its unique morphology. The Dine (Navajo)'s environment is filled with many species of cacti. Thus, it would be reasonable that the term represents a life-form taxon.

Werner et al. (1983) defined the **dláád** life-form taxon as representing lichens; however, I have interpreted the boundaries of this life-form to include lichens, mosses and small water plants. This is shown by the incorporation of the life-form name into the generic names [e.g. **nihadláád** for earth moss (Young and Morgan, 1992) and **txótláát** for *Spirogyra* sp. (pond scum), an algae (Elmore, 1943)]. Young and Morgan (1992) define this noun stem as representing 'moss and lichen'. I would interpret this life-form as 'small plants that have a growth pattern that covers a surface' (see Ch. 6 for further discussion).

Werner et al. (1983) did not conclude whether *Yucca* spp. (yuccas), **tsá'ászi'**, formed a separate life-form taxon or whether they where ambiguously affiliated generic taxa between **ch'il** and **hosh** life-form taxa. Yuccas are herbaceous plants that have sharp leaves so I suspect that yuccas are ambiguously affiliated, belonging to a **hosh** mid-level taxon that overlaps between the **ch'il** and **hosh** life-form taxa and is polysemous with the **hosh** life-form taxon.

Werner et al. (1983) did not describe any life-form taxon for fungus and I found no general term for fungus.

However, there are three categories of named fungus: mushroom, shelf fungus and puffball. I suggest that the term for 'mushroom', **'ábishjaa'**, represents a life-form taxon because of its perceptual salience and its occurrence as a life-form name in two Athapaskan languages: Chipewyan and Dena'ina (Marles, 1984; Kari, 1991). Shelf fungi and puffballs are probably unaffiliated generic taxa because of their unique morphology that does not fit into that of the known life-form taxa.

Dine (Navajo) Mid-level Taxa

A comparison of the plant species found in many "Dine (Navajo) form genera" (Wyman and Harris, 1941) shows that the species are not morphologically similar but are grouped together because of cultural knowledge (e.g. poisonous and 'coyote medicine'). Plants that Wyman and Harris (1941) placed in many of the "Dine (Navajo) form genera" are also given unique and different names (most likely generic taxon names) by Elmore (1943). Therefore, I have considered "Dine (Navajo) form genera" as more restricted mid-level taxa compared to "Dine (Navajo) families".

There are many other examples of mid-level taxa that I have found. Elmore (1943) lists two possible mid-level taxa: **ch'ilnaaskhaadíih** (any vine) and **tc'il bináa'** (seed bearing plant).

'Azee' is a lexeme that occurs in 27 generic taxa and 17 "Dine (Navajo) form genera". These taxa all occur within the **ch'il** life-form taxon. Young and Morgan (1992) define it as 'medicine herb', whereas Wyman and Harris (1941) defined it as 'herb' when it is embodied in a plant name and 'medicine' when not in a plant name. Not all medicinal herbs are marked with this lexeme, but I think that **'azee'** is a valid mid-level taxon representing 'medicine herb'.

Hosh can be incorporated into generic taxon names belonging within the 'herb and shrub' life-form taxon as well as in the 'cactus' life-form taxon. I suggest that in these cases **hosh** signifies a mid-level taxon. Three generic taxa are found in Wyman and Harris (1941); **hosh bee yildélhé**, *Senecio* spp. (groundsel); **ch'il 'awoshí,** *Franseria acanthicarpa* (ragweed); and **'azee' hosh,** *Ribes pinetorum* (orange gooseberry). Young and Morgan (1992) also listed: **dah woozh**, *Rubus strigosus* (wild red raspberry); **díwózhii**, *Atriplex canescens* (fourwing saltbush); and **bilasáana diwozhígíí**, *Ananas comosus* (pineapple). Note that **hosh** and **wozh** are forms of the same word but the authors choose different orthographic systems. In this usage **hosh** means 'thorny' and groups together plants that are similar in morphology. I also contend that the Yucca generic taxon belongs within this mid-level taxon even though the plant names do not incorporate **hosh**. This is because yuccas have been placed into two life-form taxa, one of which is the 'cactus' life-form taxon (Werner et al., 1983). The occurrence of **hosh** in both life-form and mid-level taxa (in a different life-form) is an example of polysemy.

The stem **'ilt'ą'i**, 'resembling', is used in the names of 12 generic taxa (one shrub, 11 herbs). Four of the names incorporate non-plant objects [e.g. **hazeilt'ą'í**, 'resembling a squirrel' for *Aquilegia elegantula* (columbine)] whereas eight of the names are derived from other plant names [e.g. **nadą́ 'ilt'ą'**, 'resembling corn' for *Smilacina amplexicaulis* (false Solomon's seal)]. Each of the eight plant names belongs to a mid-level taxon that groups the resembling plant with the real plant. One example would be the 'oak-resembles' mid-level taxon that would consists of two generic taxa **čéč'il 'ilt'ą'í**, 'resembling oak', *Berberis repens* (Oregon grape); and **čéč'il**, the oak genus (Wyman and Harris, 1941) as well as two specific taxa: **čéč'il**, *Quercus utahensis* (oak); and **čéč'il ńitłzí**, *Q. undulata* (wavyleaf oak).

In Dine (Navajo) there are terms for 'leaf', 'needle' and 'berry': **'at'ąąn**, **'ił** and **dizidzé**. Therefore, it is possible that in Dine (Navajo) plant taxonomy there occur similar named mid-level taxa to those in the **duchun** (**'ul, 'ut'an** and **mai** mid-level taxa) and **'ut'an** (**mai** mid-level taxon) Ulkatcho life-form taxa.

No evidence for suprageneric mid-level taxa is provided in the Dine (Navajo) taxonomy.

Dine (Navajo) Generic Taxa

Of the 210 generic taxa recorded by Wyman and Harris (1941), I identified 209 as having obvious validity. **Dóɣʷóži**, *Atriplex canescens* (fourwing saltbush); and **dóɣʷóži žin**, *Sarcobatus vermiculatus* (black greasewood) were also classified as separate generic taxa but I labeled them as specific taxa. These bushes are both in the Chenopodiaceae and have similar morphology. Also they share the term **dóɣʷóži**. The Dine (Navajo) plant name **K'oh desk'idi'**, *Amaranthus retroflexus* (green amaranth) belongs within the **K'oh de** generic rank that consists of *Chenopodium album* (lamb's quarters), *C. leptophyllum* (narrow-leaved lamb's quarters), *C. capitatum* (strawberry blight), *A. retroflexus* (green amaranth) and *Monolepis nuttalliana* (Nuttall's monolepsis). Three cactus species were classified as specific taxa; however, since cactus apparently represents a life-form taxon these species were elevated to generic rank.

Table 5.2 shows the distribution of generic taxa for each life-form taxon. **Ch'il** has the highest number of generic taxa. Taxa of generic rank are more numerous than taxa of any other rank. The majority of the generic taxa, 79.71 percent, are monotypic.

Table 5.2: Distribution Of Named Dine (Navajo) Generic and Specific Taxa Among Life-form Taxa

Life-form Taxon	No. of Named Generic Taxa	No. of Named Specific Taxa
ch'il 'herb and shrub'	178	78
tł'oh 'grass'	8	0
tsin 'tree'	9	10
hosh 'cactus'	3	0
dlą́ą́d 'lichen etc.'	1	0
'abishjaa' 'mushroom'	0	0
unaffiliated	10	7
Total	209	95

It appears that the number of unaffiliated generic taxa is low. I calculated 4.8 percent of the total generic taxa are unaffiliated in the Dine (Navajo) plant taxonomy. This is mainly the result of the broad definition of the **ch'il** life-form taxon. Berlin (1976) found in Aguaruna taxonomy that agaves, *Agave* spp., and tobacco, *Nicotiana* sp., were unaffiliated because of their unique morphology. This situation might occur in Dine (Navajo). The possible examples of unaffiliated generic taxa are listed in Table 5.3. These taxa were chosen by myself because of their unique morphology and lack of linguistic marker indicating inclusion in a known life-form taxon. A term for shelf fungus was not given by Wyman and Harris (1941) therefore it was not included in the calculations. **Tshin pizęs** is the name given to an unidentified tree lichen by Elmore (1943). This generic

Table 5.3: Possible Unaffiliated Generic Taxa In Dine (Navajo) Plant Taxonomy
(Adapted from Wyman and Harris, 1941)

Generic Name	Specific Name	Translation	Species
táłtl'áh ch'ó		water spruce	*Berula erecta, Chara* sp.
lók'a'		reed	
	lók'a'	reed	*Phragmites communis*
	lók'a' coh	big reed	*Arundo donax*
hogishi		beargrass	*Nolina microcarpa*
tei		cat-tail	
	tei	cat-tail	*Typha latifolia*
	tei łakani	sweet cat-tail	*Iris missouriensis*
	tei niɣizí	round cat-tail	*Juncus balticus, Juncus* sp., *Eleocharis palustris*
ná t'oh		tobacco	
	ʒiłn ná t'oh	mountain tobacco	*Nicotiana attenuata*
'ałtį' jik'áší		horsetail	
	'ałtį' jik'áší	smooth horsetail	*Equisetum kansanum*
	'ałtį' jik'áší 'ałc'ósígí	smooth, slender horsetail	*E. arvense*
ná'ádi'		puffball	Lycoperdaceae (all species)

taxon is probably also unaffiliated because of its unique morphology.

Werner et al. (1983) indicate that *Yucca* spp. (yuccas) is an ambiguously affiliated generic taxon since yuccas could fit in the **ch'il** or **hosh** life-form taxa as well as being unaffiliated. There might be more examples of ambiguously affiliated generic taxa but I cannot determine this through the available data.

Dine (Navajo) Specific And Varietal Taxa

The majority of specific taxa are included within the **ch'il** life-form taxon (Table 5.4). The specific taxa are from Wyman and Harris's (1941) category 'Dine (Navajo) variety' plus previously described generic taxa that I reclassified as specific taxa. Wyman and Harris (1941) did not recognize polysemy occurring between generic taxa and specific taxa. Of the 97 specific taxa, 36 are polysemous with the superordinate generic taxon; or in other words, there are at least 36 type specific taxa. The majority of specific taxa belong within generic taxa that consist of sets of two specific taxa each (Table 5.4).

Table 5.4: Distribution Of Dine (Navajo) Specific And Type Specific Taxa Among Generic Taxa

	No. of Specific Taxa per Generic Taxon				
	0	2	3	4	7
Total No. of Generic Taxa	165	33	7	1	1
No. of Generic Taxa with a Type Specific	0	27	7	1	1

There are no varietal taxa reported for Dine (Navajo).

Discussion

Patterns In Ulkatcho And Dine (Navajo) Plant Taxonomies

Some patterns described by Berlin and Turner (Berlin et al., 1974; Berlin, 1976; Berlin, 1992; Turner, 1974) are also evident in Ulkatcho and Dine (Navajo) plant taxonomies; however some are not.

Kingdom Rank

The plant kingdom category is named in Dine (Navajo) and Ulkatcho, unlike the situation found by Berlin (Berlin 1992; Berlin, 1976; Berlin et al., 1974) in Aguaruna and Tzeltal or by Turner (1974) in Haida, Nuxalk and Fraser River Lillooet. The terms used for 'plant' are also not polysemous with the terms used for taxa of subordinate rank nor are they compound terms resulting from the combination of two or more life-form taxon names. Both of these characteristics are contrary to the pattern described by Berlin (1992) .

Berlin might classify the terms used for 'plant' in Ulkatcho and Dine (Navajo) as 'linguistic circumlocution' since the terms incorporate the verb stem 'to grow' (Ch. 6); however, I disagree with Berlin's assertion that a named plant kingdom taxon cannot be a descriptive phrase and that "things that grow" is an unnecessarily large number of words. Other researchers have identified a named plant kingdom taxon that incorporate the verb stem 'to grow'. A general term for 'plant' in the Athapaskan language Dena'ina has been identified (Kari, 1991). Compton (1993) has found a named plant kingdom in four languages: Oweekeno, Hanakialam and Haisla (North Wakashan language family) and Kitasoo (Southern Tsimshian language family).

Life-form Rank

The number of life-form taxa in Ulkatcho and Dine (Navajo) is small and the taxa represent general groupings of plants. This situation is also found in Aguaruna, Tzeltal, Haida, Nuxalk and Fraser River Lillooet (Berlin, 1976; Berlin et al., 1974; Turner, 1974).

Berlin suggests that life-form taxa can be defined by a limited number of characteristics and the boundaries are not fuzzy. All of the life-form taxa discussed in the analysis can be defined by a few characteristics but these characteristics can encompass morphological (e.g. 'cactus' life-form taxon in Dine (Navajo)), ecological (e.g. 'small water plant' life-form taxon in Ulkatcho) and utilitarian (e.g. 'flower' "empty" life-form taxon in Ulkatcho) features.

"Covert" life-form taxa are usually few but in the Ulkatcho taxonomy three of the eight taxa are "covert" according to my interpretation. No "covert" life-form taxa were noted in the Dine (Navajo) plant taxonomy. This could be an artifact of how the data was collected (through ethnographic records). "covert" life-form taxa are also described in Haida, Nuxalk, Fraser River Lillooet and Dena'ina (Turner, 1974; Kari, 1991).

Mid-level Rank

In both Ulkatcho and Dine (Navajo) plant taxonomies there are many examples of mid-level taxa. Some taxon types occur in both Ulkatcho and Dine (Navajo) but many do not. The mid-level taxa based on general use, the 'medicine' taxon, and the 'resemble' taxa that were found in the Dine (Navajo) taxonomy were not found in the Ulkatcho taxonomy. Likewise the 'moss-like' and 'mountain' mid-level taxa that were found in Ulkatcho were not found in Dine (Navajo). The hierarchical mid-level taxa found within the Ulkatcho 'woody' life-form taxon and the Ulkatcho suprageneric taxa might occur within the Dine (Navajo) taxonomy but this could not be determined because of lack of data. A 'thorny' mid-level taxon, which Turner

(1989) characterizes as a combination of morphology and function, was found both in Ulkatcho and Dine (Navajo).

Berlin (1992) suggests that intermediate taxa are not usually named. This is not the case in the language groups I examined. All of the mid-level taxa identified in both Ulkatcho and Dine (Navajo) were named and most were polysemous with a subordinate generic taxon name.

The characteristics observed by Turner (1974, 1989) for mid-level taxa apply to Ulkatcho and Dine (Navajo) mid-level taxa. There are numerous mid-level taxa. Mid-level taxa are not always defined or of a definite composition. Some mid-level taxon have subordinate mid-level taxa. The main characteristic used to define mid-level taxa is not based on morphology alone.

Generic Rank

The Ulkatcho and Dine (Navajo) data support Berlin's (Berlin et al., 1974; Berlin, 1976; Berlin, 1992) and Turner's (1974) observations that taxa of the generic rank are the fundamental units in a plant taxonomy and are the most numerous taxa.

The number of unaffiliated generic taxa in both Ulkatcho and Dine (Navajo) plant taxonomies is very low. The unaffiliated generic taxa, in Ulkatcho and Dine (Navajo), could not be classified into any of the known life-form taxa because of their unique morphology. Haida (Turner, 1974) and Aguaruna (Berlin, 1976) also have a low number of unaffiliated generic taxa; however, Nuxalk, Fraser River Lillooet (Turner, 1974) and Tzeltal (Berlin et al., 1974) have a large number of unaffiliated generic taxa. The proportion of unaffiliated generic taxa is not a universal pattern but depends on the nature of life-form taxa (i.e. broad, encompassing life-form taxa versus narrow, restricted life-form taxa); the number of morphologically or culturally unique plants; and whether "covert" life-form taxa are recognized.

The Dine (Navajo) *Yucca* spp. (yucca) generic taxon is ambiguously affiliated because of the plant's unique morphology including characters of at least two life-form taxa. A similar situation was found by Berlin et al. (1974) in Tzeltal. In Ulkatcho another situation was described for three ambiguously affiliated generic taxa. These taxa were composed of three or more different species of which some were woody and others were non-woody; therefore, these taxa could be ambiguously affiliated with the 'woody' or 'herb' life-form taxa.

The majority of generic taxa are monotypic in Ulkatcho and Dine (Navajo) taxonomies, the same situation is found in Aguaruna, Tzeltal, Nuxalk, Haida and Fraser River Lillooet (Berlin, 1976; Berlin et al., 1974; Turner, 1974).

Specific And Varietal Ranks

Very few specific taxa, whether "covert" or named, are found in Ulkatcho. Turner (1974) similarly identified few specific taxa in Haida, Nuxalk and Fraser River Lillooet. Many specific taxa were found in Dine (Navajo), Aguaruna and Tzeltal (Berlin, 1976; Berlin et al., 1974). "Covert" specific taxa were described in Ulkatcho, Haida, Nuxalk and Fraser River Lillooet but were not found in Dine (Navajo) or by Berlin in Aguaruna and Tzeltal (Berlin et al., 1974; Berlin, 1976); however, "covert" specific taxa were apparently not looked for by the researchers. I found that specific taxa occur less frequently than generic taxa in Ulkatcho and Dine (Navajo) plant taxonomies. This observation agrees with Turner's and Berlin's observations for their languages (Turner, 1974; Berlin et al, 1974; Berlin, 1976; Berlin, 1992).

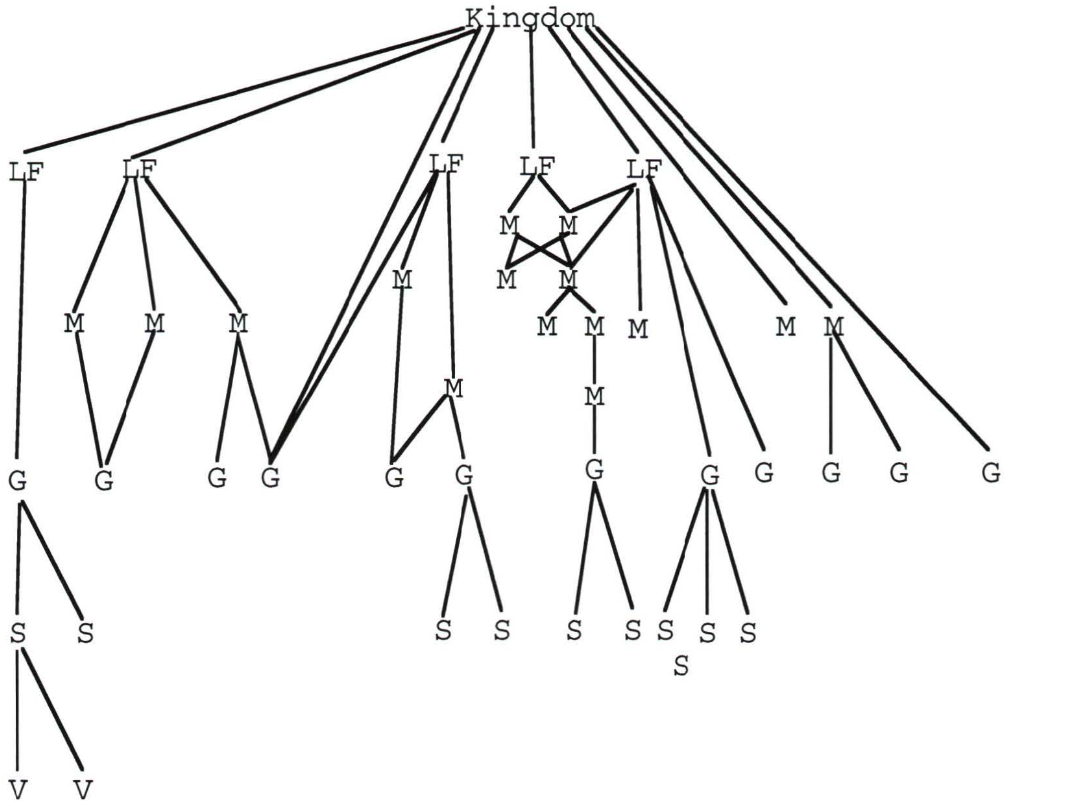
Many specific taxon names are polysemous with generic taxon names in Dine (Navajo). This situation also occurs in Aguaruna and Tzeltal (Berlin, 1976; Berlin et al., 1974) resulting in specific taxa that are a 'type specific' for a specific taxon set.

Varietal taxa are not found in Ulkatcho, Dine (Navajo) or Tzeltal (Berlin et al., 1976), Nuxalk, Haida or Fraser River Lillooet (Turner, 1974). Varietal taxa are associated with cultigens (Berlin, 1992); therefore they might occur in Dine (Navajo) plant taxonomy. However, they apparently do not. The lack of varietal taxa in Dine (Navajo) may be a result of incomplete data; as not all plant species used by the Dine (Navajo) are included in this study. Another explanation is that agriculture is a recent introduction that was learned from a neighboring non-Athapaskan culture (Brugge, 1983) and agriculture is not a major component of Dine (Navajo) life (Elmore, 1943).

Lattice Hierarchy

In the language groups I have examined, hierarchical taxonomies exist, but these are not strict hierarchies because the taxa are often not mutually exclusive. I would term the taxonomies as having "lattice hierarchies". It is important to note that the resulting taxa are empirical and systematic. 'Systematic' does not imply that the taxa are mutually exclusive. This is one of the main differences between folk and scientific taxonomic systems: folk taxonomic systems can produce lattice hierarchies based on complex relationships (Figure 5.7), whereas scientific taxonomic systems produce strict hierarchies based solely on perceived evolutionary relationships.

Figure 5.7: Schematic Representation Of A Idealized Folk Taxonomy Based On Lattice Hierarchy



LF = Life form rank
M = Mid-level rank
G = Generic rank
S = Specific rank
V = Varietal rank

External Factors Affecting Ulkatcho And Dine (Navajo) Plant taxonomies

Factors that are external to a culture's plant taxonomy can greatly affect the nature of taxa and their characteristics. Comparison between Ulkatcho and Dine (Navajo) provides insights into these factors.

Although there are similarities, the majority of life-form taxa found in Dine (Navajo) and Ulkatcho are different. These similarities and differences can be explained by linguistic, environmental and cultural factors.

Dine (Navajo) and Ulkatcho plant taxonomies have two similar life-form taxa: 'grass' and 'mushroom'. Both taxa are named. The 'grass' life-form taxon includes named generic taxa while the 'mushroom' life-form taxon is "empty". These similarities are most likely the result of common linguistic origin since mushrooms and 'grasses' are found in many different environments but these life-form taxa are not always recognized (Berlin et al., 1974; Berlin, 1976; Berlin 1992).

The 'cactus' life-form taxon is found in Dine (Navajo) and not in Ulkatcho clearly because there are floristic and environmental differences between the Dine (Navajo) environment and Ulkatcho environment. The Ulkatcho environment contains no cacti while the Dine (Navajo) environment contains many species of cacti; therefore, it is not surprising that the Dine (Navajo) have a life-form taxon for this distinctive group of plants.

The life-form taxa for 'small water plant', 'tree lichen' and 'ground moss-like and lichen-like' are differentiated and "covert" in Ulkatcho as opposed to Dine (Navajo) where they are all included within one named taxon. 'Small water plants' and moss-like plants would be poorly represented in Navajo country due to the semi-arid conditions, therefore, affecting the presence of these life-form taxa.

Berlin (1976) states that tree, vine and herb are the three major 'classical' plant taxa and have been represented in many folk taxonomic systems; however, these folk taxonomic systems were from cultures of tropical areas. In the tropics, vines are an important component of the ecosystems; this is not the case in temperate climates. Thus, it is not surprising that vines are not recognized by a life-form taxon in temperate folk taxonomic systems.

Life-form taxa can represent groups of plants with obvious physiognomic differences (e.g. trees, vines, shrubs and herbs). But obvious physiognomic differences are not the only external factor used to recognize these categories. Recognition of life-form taxa also depends on linguistic origin.

There are more named Dine (Navajo) generic taxa than Ulkatcho generic taxa. There are many possible explanations for this difference. First, the Dine (Navajo) environment has a greater floristic diversity than the Ulkatcho environment since the desert and mountain areas of the Dine (Navajo) territory include many plants not occurring in the north (e.g. cacti, yuccas and agaves). Second, the Dine (Navajo) taxonomic research is derived from a larger sampling of people and, therefore, allows for more plant knowledge to be recorded. Third, the Dine (Navajo) data was collected in the 1940's whereas the Ulkatcho data was collected in the 1990's and perhaps there is a greater loss of information due to acculturation. The real explanation may be a combination of these factors.

The greatest numbers of named generic taxa are herbs and shrubs in both Ulkatcho and Dine (Navajo) cultures. This feature is probably a result of floristic composition because there are many species of herbs and shrubs found in both regions but few tree species. Turner (1974) also found that numbers of generic taxa reflect the floristic diversity of physiognomic categories.

The number of specific taxa recognized may not be directly related to utility as suggested by Berlin (1992). Rather, an environmental factor seems to affect the number of specific taxa. Cultures from temperate environments (e.g. Ulkatcho, Haida, Nuxalk and Fraser River Lillooet) have lower numbers of specific taxa than peoples of tropical environments (e.g. Aguaruna and Tzeltal) or desert environments [e.g. Dine (Navajo)]. The number of specific taxa might be related to floristic diversity; increasing floristic diversity may increase the likelihood of developing specific taxa.

Internal Factors Affecting Ulkatcho And Dine (Navajo) Plant Taxonomies

Both languages have a life-form taxon for 'herbaceous plant' but these life-form taxa are not equivalent semantically since the Dine (Navajo) term also includes shrubs whereas the Ulkatcho term excludes showy, useless flowers (showy, useless flowers have their own "empty" Ulkatcho life-form taxon). The Ulkatcho 'woody' life-form taxon includes both trees and shrubs but the Dine (Navajo) do not have a woody life-form taxon; instead the Dine (Navajo) have a 'tree' life-form taxon. These examples show that linguistic origin is not necessarily a primary factor in determining life-form taxa in Ulkatcho and Dine (Navajo) as Turner had found (1974). The inherited cultural framework (perhaps a cognitive factor) has influenced the basic structure (i.e. the life-form taxa) of these two plant taxonomies.

The greater number of Dine (Navajo) generic taxa than Ulkatcho generic taxa could also be related to inherited cultural framework. The Dine (Navajo) people may "like to classify things" more than the Ulkatcho people (implied from Reichard (1948) stating that the Dine (Navajo) people have a fondness for classifying things) resulting in more plants being classified.

Both Ulkatcho and Dine (Navajo) plant taxonomies have life-form taxa based on gross morphology of the plants [(e.g. 'woody' life-form taxon in Ulkatcho and 'cactus' life-form taxon in Dine (Navajo)]. Some life-form taxa are based on a combination of ecological and morphological features (e.g. 'tree lichen' life-form taxon in Ulkatcho and 'lichen, moss and small water plant' life-form taxon in Dine (Navajo)). These life-form taxa fit into Berlin's (1992) observations that life-form taxa are distinguished by morphological and/or ecological characteristics. However, not all life-form taxa can be characterized this way.

"Empty" life-form taxa (e.g. 'flower' in Ulkatcho) are primarily based on a utilitarian feature. "Empty" life-form taxa may include plants having little economic value as suggested by the Ulkatcho data. In other words, they can be recognized but since they have no practical value they are not further distinguished. This agrees with Hunn's (1982) and Turner's (1974) observation that life-form taxa can be defined by economic characteristics. Berlin (1992) does not provide an explanation for "empty" life-form taxa.

An obvious life-form taxon based wholly on cultural significance as described by Bulmer (1967) is not evident in the life-form taxa considered in this study. All of the life-form taxa in Ulkatcho and Dine (Navajo) fit Turner's (1974) observation that some life-form taxa are based on utilitarian characteristics (e.g. 'flower' in

Ulkatcho) whereas other life-form taxa are based on intellectual characteristics [e.g. 'grass' in Ulkatcho and Dine (Navajo)].

The Ulkatcho mid-level taxa found within the 'woody' life-form taxon are defined by morphology ('leaf' and 'needle'), morphology and function ('berry' and 'no berry') and by function ('untouchable' and 'touchable'). A similar pattern was found by Turner (1989) in Nlaka'pamux (Thompson) and Fraser River Lillooet; a mid-level taxon can be defined by characteristics other than morphology.

The Ulkatcho and Dine (Navajo) data support Berlin's (Berlin et al., 1974; Berlin, 1976; Berlin 1992) and Turner's (1974) observations that generic taxa are perceptually salient. The generic taxa represent morphological groupings, even though generic taxon names might include utilitarian factors or more species from more than one scientific genus. For example in Ulkatcho **susmai**, *Lonicera involucrata* (black twin berry), is glossed as 'bear berry'; however, there are many other species of plants that bears eat. These other species have different morphology and different generic taxon names. In Dine (Navajo), some of the generic taxa incorporate more than one scientific genus however the species are morphologically similar. **'Awéc'ál** includes *Cowania stansburiana* (cliff rose) and *Purshia tridentata* (greasewood); both of these species belong in Rosaceae, grow from shrub form to that of a low tree and have leaves that are divided and revolute (Elmore, 1976).

The Dine (Navajo) specific rank distribution among the generic taxa has a similar pattern to that found by Berlin (1976) in Aguaruna. The majority of generic taxa that are further categorized into specific taxa include only two specific taxa. Only one generic taxon has more than six specific taxa. The six specific taxa correspond to six similar species: *Chenopodium leptophyllum* (narrow-leaved lamb's quarters), *C. incanum* (lamb's quarters), *C. album* (lamb's quarters), *C. capitatum* (strawberry blight), *Amaranthus retroflexus* (green amaranth) and *Monolepis nuttalliana* (Nuttall's monolepsis) (Wyman and Harris, 1941) These species were used for medicine, food and in chants (Wyman and Harris, 1941 and Elmore, 1943). *C. album* (lamb's quarters) was used in large quantities and both the seeds and leaves were consumed (Elmore, 1943). The leaves and seeds were also eaten of *A. retroflexus* (green amaranth) (Elmore, 1943). Although these species do not belong to the Dine (Navajo) agricultural complex (Opler, 1972; Bailey, 1940; Goldfrank, 1946; Kelly, 1986) they could be regarded as having 'major cultural importance' as described by Berlin (1976).

If a classification system were entirely based on intellectual principles then taxa could only be defined by the morphology of the plants incorporated and different cultural groups in similar environments would have similar taxonomies. Even Berlin cannot find clear examples of strictly intellectual taxonomies. Berlin (1992) also states that specific taxa are recognized because of their utility.

The selection process that creates a plant taxonomy is also not based entirely on utility. If a classification system were wholly based on utilitarian principles then all classifications could be described like Northern Paiute Native categories (Fowler and Leland, 1967) mentioned at the beginning of this chapter; however, most classifications cannot be. It has been argued by Berlin (1992) and Waddy (1982) that the Northern Paiute system (Fowler and Leland, 1967) is not the true complete taxonomy based on morphology but is simply one taxonomy based on use.

A culture may have several types of plant classification system (Berlin, 1992). Werner et al. (1983) state that the Dine (Navajo) have two classifications of plants: taxonomy based on morphology and taxonomy based on use. However, three types of plant classification that can be used in combination were recognized by Wyman and Harris (1941) for the Dine (Navajo): general taxonomy (i.e. can be compared with

Berlin's hierarchy); gender classification and use classification.

Gender classification of Dine (Navajo) plants usually relates to size (i.e. female plant is smaller than male plant) (Wyman and Harris, 1941). Designation of plants as female and male is also found in the Athapaskan language Dena'ina, although it is not clear whether the concept is applied in only some taxa (Kari, 1991). Gender classification also occurs in other cultures [e.g. Fraser River Lillooet (Turner, 1974); Nlaka'pamux (Thompson) (Turner et al., 1990); Okanagan-Colville (Turner et al., 1980) and Hesquiat (Turner et al., 1982)]. Gender classification in all of these cultures occurs within the general taxonomy.

The Ulkatcho and Dine (Navajo) data also shows that use classification can occur within a general taxonomy. Therefore, even if different classification systems of plants occur within a culture, they are never entirely divorced from each other.

Environmental, Cultural And Linguistic Factors Affecting Plant Taxonomies

Commonly the factors that affect plant taxonomies are divided into external and internal. However, another arrangement can be used: environmental, cultural and linguistic factors.

Internal factors include how a language group recognizes taxa (either intellectual or utilitarian view), how the taxa are defined by the language group and if the language group likes to classify things. The internal factors can be classified as cultural or linguistic factors. Intellectual or utilitarian characteristics of a taxonomy as well as if the language group like to classify things are considered cultural factors and represent cognitive patterns. The definition or gloss of the taxa is a linguistic factor.

External factors include floristic diversity, obvious physiognomic patterns, linguistic origin, intercultural exchange, and acculturation. The external factors can be classified as environmental, cultural or linguistic factors. The environmental factors consist of floristic diversity and obvious physiognomic patterns. Linguistic origin is a linguistic factor. Intercultural exchange and acculturation are examples of cultural factors.

Summary And Conclusions

Some patterns described by Berlin (Berlin et al., 1974; Berlin, 1976; Berlin, 1992) and Turner (Turner, 1974; Turner et al., 1990) are also seen in Ulkatcho and Dine (Navajo) plant taxonomies. Life-form taxa are small in number and are defined by a small number of characteristics. Generic taxa are the most numerous taxa, are generally monotypic and are the fundamental unit in a plant taxonomy. Specific taxon names show a high degree of polysemy with generic taxa names.

Other patterns described only by Turner (Turner, 1974; Turner, 1989; Turner et al., 1990) are also evident in Ulkatcho and Dine (Navajo) plant taxonomies. Taxa are not necessarily mutually exclusive. Life-form taxa and specific taxa can be "covert". Mid-level taxa are numerous, not all of equivalent level and are often named. Varietal taxa were not found.

The naming of the plant kingdom taxon is not a universal pattern; Ulkatcho and Dine (Navajo) plant taxonomies both have a named plant kingdom taxon unlike the situation found by Berlin (Berlin et al., 1974; Berlin, 1976; Berlin, 1992) and Turner (Turner, 1974; Turner et al., 1990).

Plant taxonomies are best represented by a lattice hierarchy which allows for taxa that are not necessarily mutually exclusive. Both folk and scientific taxonomies produce 'systematic' hierarchies but scientific taxonomies are strict (i.e. a subordinate taxon cannot be included in more than one superordinate rank), because they are based solely on evolutionary relationships.

Plant taxonomies are determined by both internal and external factors. However, internal and external factors can be divided into environmental, cultural and linguistic factors. The relative role of these factors between plant taxonomies and within a plant taxonomy is not always the same. The cultural factors include a combination of intellectual and utilitarian views. Life-form, mid-level and specific taxa can be defined by morphology and/or utility whereas generic taxa seem to be defined by morphology alone and are perceptually salient. Other cultural factors include whether a language group likes to classify, intercultural exchange and acculturation. The obvious physiognomic features of plants, an environmental factor, can affect the presence of life-form taxa. Increasing floristic diversity, another environmental factor, appears to have a direct relationship with increasing numbers of generic and specific taxa. Linguistic origin and the definition of the taxa, both linguistic factors, are important factors affecting life-form taxa.

CHAPTER 6: ATHAPASKAN BOTANICAL TERMINOLOGY

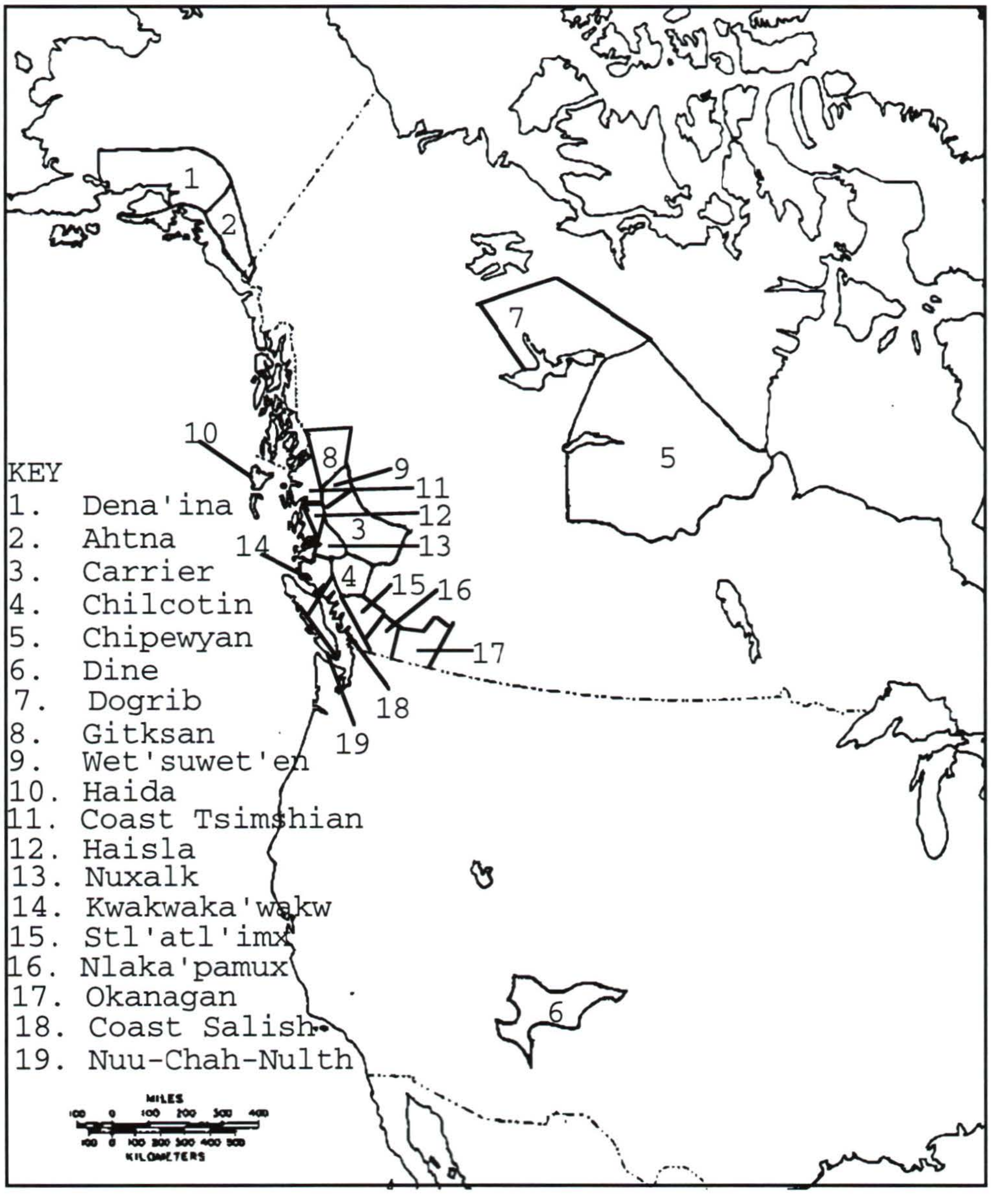
Introduction

Linguistic analysis is an important tool in the study of ethnobotany. Primarily it allows for accurate transcriptions of native botanical terms; however, the terms can provide additional ethnobotanical data. The linguistic structure of the terms can be described and patterns looked for. The glosses (i.e. literal translations) can provide insight into the plant taxonomies of the languages. Related languages can also yield botanical cognates which are sets of words (or morphemes) which descend from a common source in the ancestral language (i.e. proto-language) through the processes of linguistic evolution.

Botanical terminology has not been compared among Athapaskan languages and in general botanical cognates have not been widely studied. Usually plant names are simply compared (Berlin et al., 1973; Turner et al., 1993; Fowler, 1983). No one has studied in detail how botanical cognates compare among Athapaskan languages or how they contrast with non-botanical cognates within the languages.

The botanical terms used by six Athapaskan languages: Ahtna, Central Carrier, Ulkatcho Carrier, Chilcotin, Chipewyan, Dena'ina and Dine (Navajo) are described (Figure 6.1). Dictionaries and the ethnobotanical literature are used to provide the botanical terms, except in the case of

Figure 6.1: Distribution Of Athapaskan Languages Under Investigation And Other Languages Discussed In This Study
(Adapted from Goodwin, 1988; Krauss and Golla, 1981; Turner, 1992)



Ulkatcho where ethnobotanical fieldwork was undertaken. The linguistic structure of the terms are summarized to give a general picture of Athapaskan botanical term formation. The glosses are described and show whether the terms have undergone semantic shifts. Any semantic shifts that are reflected in the languages' plant taxonomies are discussed. A list of botanical terms is used to determine the percentage of botanical cognates between languages. These values are compared to percentages of non-botanical cognates, when there is available data, to determine which set of cognates is more stable (i.e. change less rapidly in the evolution of a language). Percentages of botanical cognates among the languages as well as individual cognate botanical terms are compared to help determine what factors might affect botanical cognates.

Background

Athapaskan Languages

The Carrier language belongs to the Athapaskan language family, which is one of the many native North American language families (Cook and Rice, 1989). Athapaskan languages have been grouped into three divisions based on their distribution: Northern Athapaskan, consisting of 23 languages spoken in Alaska and northwestern Canada; Pacific Coast Athapaskan, consisting of 8 languages found along the Oregon and California coast; and the Apachean Athapaskan consisting of 8 languages, including Dine (Navajo), centered around New Mexico (Cook and Rice, 1989).

It has been proposed that Athapaskan is a dialect continuum (Cook and Rice, 1989). Perhaps the geographically isolated groups (Pacific Coast and Apachean Athapaskan languages) can each be treated as a historical unit; however, the Northern Athapaskan languages cannot be subgrouped (Krauss and Golla, 1981). This is because Northern Athapaskan languages have never been completely isolated from one another for any length of time.

The origin of the Athapaskan languages was probably in what is now Alaska (Cook, 1992; Krauss and Golla, 1981). Evidence for a northern origin is provided by the distribution of Athapaskan languages since the greatest differentiation of the languages is found in the north (Sapir, 1936; Krauss and Golla, 1981). Additionally, Sapir (1936) has supplied excellent internal linguistic evidence that the Navajo had a northern origin. This was done by looking at the etymologies of some Navajo words.

Southeastern Alaska is thought to be the homeland because only languages in northwestern Alaska that are located near languages of the Eskimo-Aleut family show an influence from these languages. Eskimo-Aleut influences are absent in other Athapaskan languages, a finding which would be unexpected if the homeland was located in northwestern Alaska (Krauss and Golla, 1981).

Proto-Athapaskan (PA) is the hypothetical language that was spoken in the homeland. PA has been reconstructed by making comparisons among many currently spoken or documented Athapaskan languages.

The differentiation of PA began around 500 B.C. as the languages spread with the migration of people westward into Alaska into the present location of Ahtna and Dena'ina and southward into central and southern British Columbia where Central Carrier, Ulkatcho Carrier and Chilcotin are spoken today (Krauss and Golla, 1981). Around 1000 A.D. two other Athapaskan migrations occurred: one eastward toward the Hudson Bay resulting in the development of many languages including Chipewyan, and the other into the southwest U.S.A. where the Apachean languages underwent their differentiation from other languages in the family (Krauss and Golla, 1981). The date of the arrival of the Apachean-speaking people into their present location is unknown, but is estimated to be between 1300 and 1525 A.D. (Brugge, 1983).

Athapaskan Nouns

To describe the linguistic structure of botanical terms a basic knowledge of Athapaskan nouns is required. In Athapaskan languages, the minimal words are composed of a single stem. Noun stems are formed from roots which have undergone a morphological process to establish their part-of-speech (Cook and Rice, 1989). Almost all Athapaskan roots are one syllable long and stems are either one or two syllables long (Krauss and Golla, 1981).

The noun stem can be of two types: independent or dependent. The independent stem can exist alone as a word. The dependent stem cannot occur as a word alone but must form part of a complex word. Either type of stems forms complex nouns by binding to a prefix, suffix, or another stem (Young and Morgan, 1987). "Compound noun" is the term used when two or more stems combine to form a word. Nouns in Athapaskan languages can also be formed from verbs with or without the use of a nominalizing (i.e. noun forming) suffix (Young and Morgan, 1987). The combination of a descriptive verb stem with a noun stem is labeled a "relative noun".

Cognates

Many stems in Athapaskan languages can be traced back to a PA stem. Because the time depth between languages is not too great it is not hard to recognize cognates. The recognition of cognates depends on the recognition of constant patterns of similarity among languages; thus the underlined consonants in Carrier **chan** 'rain', -**cho** 'big, **'uche** 'tail' compared with Ahtna **caan** 'rain', -**cogh** 'big', **c'ece** 'tail' reflect PA ***k**.

Calculations based on cognate words have been used to measure the degree of historical separation between languages (for Athapaskan see Story, 1984 and Hoijer, 1956). This has been done by comparing the ratio of cognates between related languages. Percentage of cognates is calculated based on a list of 100 words that "express universal and essentially non-cultural meanings" (Hoijer:219, 1956) such as body parts or physical elements. I will label these cognates as basic cognates according to Hymes (1960). The number of basic cognates shared between two languages is divided by 100 (Hoijer, 1956). There is an indirect relationship between percentage of cognates and historical separation; the larger the percentage of cognate the smaller the amount of time of separation (however, this method is controversial because the rate of change of vocabulary might not be constant).

Materials and Methods

Literature

Six Athapaskan languages, Ahtna (AH), Central Carrier (CA), Ulkatcho Carrier (UL), Chilcotin (CHIL), Chipewyan (CHIP), Dena'ina (DE) and Dine (NA, Navajo), were chosen because botanical lexical data was available for them and the languages represent a wide geographical distribution. AH has a comprehensive dictionary [J. Kari, 1990 (K90)] that provided plant names as well as PA reconstructed roots. A dictionary in CA [Antoine et al., 1974 (A74)] and a small book about CA plants [Carrier Linguistic Committee, 1973 (C73)] supplied information about the CA plant names. Additional CA words are from Morice [1932 (M32)]. UL data was transcribed from fieldnotes and tape recordings of Ulkatcho Elders obtained during ethnographic fieldwork from 1992 to 1993 (K92). All of the spellings of UL plant names were corrected by Dr. Leslie Saxon. The orthography for the UL terms is found in Appendix B. The only sources available for CHIL vocabulary [King, 1979 (K79)] and plant names [Tyhurst, 1976 (T76)] are limited and unreliable. Cook (1983a) criticized King's (1979) work as having "phonetically inconsistent data" and Tyhurst (1976) was not a trained linguist. A small dictionary [Elford and Elford, 1981 (E81)], stem list [Li, 1931 (L31)] and ethnobotanical study (Marles, 1984) are available for CHIP. An excellent ethnobotanical study [P. Kari, 1991 (K91)] and noun dictionary [J. Kari, 1977 (K77)] provided the plant names for DE. The NA dictionary [Young and Morgan, 1987 (Y87); Young and Morgan, 1992 (Y92)] and the <u>Ethnobotany of the Navaho</u> [Elmore, 1943 (E43)] supplied the plant names for this study. [Note; the spelling systems used by Young and Morgan (1987, 1992) and Elmore (1943) are not consistent.]

The words that were included in this comparison were plant categories (e.g. plant, tree and algae), plant structures (e.g. berry and thorn) and plant names (e.g. birch and willow). These words I have termed botanical terminology. The plant categories cannot be given a biological definition since these words were chosen by the authors from the associated literature sources. Each author translated the words into an English term and a definition of what the plant categories represented was not given.

Botanical Term Structure And Glosses

Linguistic analysis aided by the use of the dictionaries cited above provided information about the structure of the botanical terms under discussion. The terms are classified as either independent stem, dependent stem, compound noun or relative noun. The stems are also classified as either botanical (i.e. stems glossed as a botanical item) or non-botanical.

The glosses are sometimes given in the above cited dictionaries. If not, the glosses are determined with the use of the stem(s) found in the terms. Many PA stems can be found in Kari (1990) and help to provide a gloss. According to the standard linguistic convention PA stems are marked with an '*'.

Determining Botanical Cognates

Given the centrality of cognates to this study, it is important to have a sound methodology for recognizing cognates. When looking for cognate stems between languages, the phonological changes from PA that make these languages distinct must be taken into account. The major sound correspondences for the stem initial consonants and vowels can be found in Krauss and Golla (1981) for all of the languages under discussion except for NA, for which parallel information can be found in Young and Morgan (1987; 1992). Some information on consonants can also be found in Krauss and Leer (1981) for all of the languages under investigation. There are also many other phonological changes that can occur in stems and they will be discussed when they occur. Most important among these are processes which simplify or delete stem-final consonants.

The botanical terms that were found were used to calculate percentage of botanical cognates between languages. All of the botanical terms were used except for lichen terms since no general terms were found in common among the languages.

The percentage of botanical cognates was calculated by totaling the number of cognate terms found between two languages and dividing by the total number of words (i.e. cognate and non-cognate botanical terms). Not all of the botanical terms were found in all of the languages; therefore, a list of identical botanical terms could not be used for all of the languages. If a term was not found in a language then the term was omitted from the list of comparable botanical terms.

A value of one was given to each cognate pair if each language had one word for the botanical term; however, not all languages had only one word per botanical term. If more than one word was given to a botanical entity then the number of cognate words would be divided by the total number of words. For example language A has two words for one English translation and language B has one word for the same English translation, with the languages sharing one cognate word. The number of cognate words (2) would be divided by the total number of words (3) equaling two-thirds; that term was given a cognate value of two-thirds and a non-cognate value of one-third.

Whenever possible the percentage of botanical cognate values was compared with the basic percentage of cognate values found by Hoijer (1956).

Results

Plant Categories

Table 6.1 shows the majority of stem cognates found throughout the six languages for plant categories. The following discussion summarizes all cognates and the phonological changes that occurred in some of the cognates. The analysis and glosses of the terms are also provided.

Plant

'Plant' is found in all of the Athapaskan languages studied excluding CHIL for which there are no data. Each word is built upon the cognate verb stem 'grow', *** y^a** (J. Kari, 1990). In NA the initial **s** is an ordinary contraction of **ł** (a morpheme which indicates vegetative growth with this stem) and **y**. All of the words can be translated roughly as 'that which grows (vegetatively)' and

Table 6.1: Plant Category Terms For Six Athapaskan Languages Showing Cognate Elements

The bold highlighted areas indicate that the elements are cognate when reading left to right. Only elements that are cognate in three or more languages are highlighted. No data is represented by 'nd'. Each term is followed by the abbreviated reference source which can be found in the 'Materials and Methods' section.

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Plant	hwtne**ɫya**exi (K90)	hden**ɫyah**i (K91)	hanúlh**ye**h (M32) hanu**ye**h (A74)	hanu**yeh** (K92) hanalh**yi**i (K92)	nd	nónɛs**ye** (E81)	nán**sé'** (E43) nani**se'** (Y87)
Herb	c'e**t'aan'** (K90)	k**'t'un** (K91)	nd	**'ut'an** (K92)	nd	nd	ch'il (Y87) tc'il (E43)
Shrub	c'e**t'aan'** (K90)	ch'etl' (K91) k**'t'un** (K91)	dilh**t'an** -i (C73)	nd	nd	dɛcɛnazɛ dɛ́?ą (E81)	ch'il (Y87)
Tree	ts'abaeli (K90)	ch'bala (K91)	du**chun** (A74)	du**chun** (K92)	**tšɛn** (T75) ɛl (K79)	d**ɛcɛn** (E81) de**chẽn** (M84)	**tshin** (E43)
Algae	**dlaat'** (K90) teh**dlaad**e' (K90)	**dlut**' (K91) tah**dlud**a (K77)	**dlat** (A74)	teh**dlat** (K92)	nd	te**dlaré** (M84) **dlar** (L32)	txá**tláát** (E43)
Moss	**naen**' (K90)	**nan** (K91)	**yi**mba (A74)	**yen**jat (K92) 'e**yen**jat (K92)	**nən**tsəs (T75)	**nún**chusé (M84)	tsindláád (Y87)
Lichen	nd	nd	nd	nd	nd	nd	dláád (Y87) tláat (E43)

Table 6.1 cont.: Plant Category Terms For Six Athapaskan Languages Showing Cognate Elements

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Ground Lichen	c'adyu' (K90) **udzih** daane' (K90) c'egholde' (K90) nin'de (K90)	k'udyi (K91)	oñqo (M32)	**wudzih**yuyi (K92) yenjat (K92)	nd	tsa^{n}jú (M84) ts'ɛnjúh (E81)	dlááď (Y87) tláat (E43)
Rock Lichen	**tse**t'uudze (K90)	qałnigi k'udyi (K91)	nd	**tse**t'ooz (K92)	nd	nd	**tshé**tláat (E43) **tsé**dlááď (Y87)
Tree Lichen	**da**ts'iisi (K90) dadyuuts'i (K90) latsigha' (K90)	**deh**tsighu (K91)	**doh**gha (A74)	**dah**gha (K92) **dah**tl'uz (K92)	**ta**xa (T75)	nd	tc'óh pitGaa' (E43) tshin pąahtláat (E43)
Fungus	nd	nd	nd	nd	nd	nd	nd
Mushroom	c'eniye' (K90) nela' ts'enłgiidi (K90)	k'ghetneghełyay **jil**'u (K91) ełnen iłgida (K91)	impiñ-**dzu** (M32)	'inbeni**dzo** (K92)	səba**dza** (T75)	eba^{n}**dzaghé** (M84) ɛbą́**dzaghé**jɛrɛ́ (E81)	'abish**jaa**' (Y 87)
Shelf Fungus	łts'iis (K90)	ełch'ix (K91)	nd	nd	dItšɛnlizbe (T75)	nd	tshin pizęs (E43)
Puffball	saghani **tsiige'** (K90)	delgga **chisha** (K91) chulyin dasgedi (K91)	natnił-ke^spu (M32)	naodlih lhuk (K92) datsun lhuk (K92)	nd	datsá^{n}**tsíé** (M84)	náá'adįįh (Y87)
Grass	**tł'ogh** (K90)	**tl'egh** (K77) k'echan (K91)	**tl'o** (A74)	**tl'o**	**tł'o** (T75)	**tł'ogh** (E81)	**tł'oh** (E43)

are examples of a relative noun that does not have a botanical stem.

There is a difference between 'plant' and 'animal' in the Athapaskan languages under investigation. Some words used in AH (**nkohnesi**, J. Kari, 1990) and CA (**khina-i**, Antoine, 1974) for 'animal' translate as 'that which is alive'. NA has a number of terms: **hináanii**, 'moving thing', **naagháii** 'walking things', **naaldeehii** 'going-about things' and **náhididziihii** 'breathing things' (Werner et al., 1983). None of these is based on the stem 'grow'. One word for tamed animals in AH is made of the verb stem 'grow', **nelyaexi**, and is glossed 'that which is raised' (J. Kari, 1990).

Herb

AH, UL, DE and NA have a term for herbaceous plants. The 'leaf' stem (***t'an'**) is incorporated into the term in AH, UL and DE. A better gloss for the term for herb is 'leaves'; however, herbaceous plants are defined by Brown (1984) as green, non-woody, leafy plants. The stem is dependent in AH, UL and DE; it is prefixed with the indefinite possessive form (**c'**, **'u** and **k'** respectively), yielding words meaning 'leaves [of something]'.

The NA term for 'herb' is composed of an independent stem that is not used in any of the other languages for 'herb'. It is derived from the PA ***tsh'^{w}i'tł'** stem meaning 'contract into distorted shape, become shriveled'

(Young and Morgan, 1992). The same PA stem is used in AH but does not represent any botanical terms. In NA the independent stem is used in botanical terms as well as verbs that deal with 'curl, shrivel, contract into distorted shape' (Young and Morgan, 1992).

Shrub

It was found that UL and CHIL do not have a word for 'shrub'. 'Shrub' in AH, CA and DE have cognate dependent stems that refer to 'leaf'.

The AH, DE and NA word for 'herb' or 'leaves' is also used for 'shrub'. However, in DE **k't'un** refers only to small shrubs. **Ch'etl'** is used in DE for large shrubs and is also the name used for *Salix* spp. (Willow) in DE. **Ch'etl'** is cognate with the Navajo term for shrub and herb.

Shrub in CA, **dilht'ani**, has an unusual form; built on the noun stem -**t'an** 'leaves', it contains the prefix **lh**-, the gender prefix for 'wood' **di**- and the nominalizing suffix -**i** which are more typically used with a verb stem. When people were asked about the Ulkatcho word for 'shrub' no answer was ever given. When examples of shrubs were shown, specific names for each shrub were given, but no general word was ever mentioned. The CA term for shrub was not recognized by the UL Elders (Janie Jack, Mack Squinas, Leona Tony).

The CHIP word for 'shrub' is comprised of the dependent stem used for 'tree' or 'stick' combined with a stem for 'small' or 'low'. This is the only language with a compound 'shrub' noun.

Tree

CA, UL, CHIL, CHIP and NA words for 'tree' are all cognate forms of the noun stem for 'stick'. CA, UL and CHIP all have the inherent prefix **dɛ**- described by Li (1946), therefore, in these languages the stem is dependent. This inherent prefix is identical to the plant gender prefix found in verbs. The CHIL and NA stem both occur as independent nouns.

CHIL has a second term for tree, ɛl. This stem is not used for tree in any of the other languages but is cognate with the terms used for '(coniferous) needle'.

In AH and DE the terms for tree are cognate. The AH and DE word for tree is also the term for spruce. The gloss for both stems is 'spruce' (J. Kari, 1990; Kari 1991).

Algae

The term for algae is cognate in all the languages, PA ***dlat'**. A phonological change that has occurred in CA and CHIP is the loss of glottalization of the final consonant. This is a commonly occurring change affecting stem-final consonants in AH (J. Kari, 1990) and throughout all

Athapaskan languages. Weakening of **t** to **d** to **r** has also occurred in the CHIP stem (Li, 1946).

The 'algae' stem occurs as an independent stem in all of the languages except in UL and NA. In both UL and NA the 'algae' stem is only found bound to the 'water' stem. In AH, CHIP and DE the algae stem can also be bound to the water stem (**teh**, **te**, **tah**, respectively). In CHIP, AH and DE there is the addition of the possessive suffix -**é** (Li, 1946), **e** and **a** respectively. For these Athapaskan languages the 'algae' term can be a independent stem or compound noun that has a botanical stem.

Moss

The general term for moss is made of the stem ***n^{y}en** which is found to be cognate in all the languages but NA. In CA and UL the ***n^{y}** became a **y**.

The 'moss' stem is found to be an independent stem in AH and DE but is a dependent stem in CA, UL, CHIL and CHIP. The final element in CA and UL could not be interpreted, although **ba** might be glossed as 'edge' (Antoine et al., 1974). The gloss of the final element in CHIL is unknown. In CHIP the 'moss' stem is bound to another stem described by Li (1931) as 'bird down'; the gloss is 'ground fluff'. For these Athapaskan languages the 'moss' term can be a dependent stem or compound noun that has a botanical stem.

The NA term for moss is glossed as 'tree covering' (Elmore, 1943). The final element of the compound noun used for moss in NA is **dláád** which is the stem used for 'algae' in all of the languages.

Lichen

NA has the only clear example of a word that represents all lichens. It is used to make compound nouns to represent different types of lichens (e.g. rock and tree lichens). The stem is cognate (with a weakening of **t** to **d**) with the stems used in all of the other languages for algae. Elmore (1943) glosses this term as 'covering', which seems appropriate when looking at plant names in NA that use this stem; however, this is not the case when comparing all of the other languages.

In the remaining languages lichens can be divided into separate categories based on their habitat: ground, rock and tree lichens. None of the compound nouns used includes a 'lichen' stem except possibly the term used for ground lichen in DE and its cognate form in AH.

There is not a single general term for ground lichens in AH, UL or CHIP. The analysis is uncertain for the terms **c'adyu'** in AH, **oñqo** in CA, **tsa^{n}jú** and **ts'ɛnjúh** in CHIP and **k'udyi** in DE; however, the AH and DE terms are cognate. **Udzih daane'** in AH and **wudzih yuyi** in UL are both glossed as 'caribou feed'; the word for caribou is cognate. **Yenjat** in UL is parallel with the term used for moss and **nin' de'** in AH includes a reduced form of the 'moss' stem and is glossed as 'moss horn' (J. Kari, 1990).

When a term is known for rock lichen, such as in AH, UL, DE and NA, the initial element of the compound noun is 'rock'. The 'rock' stem is cognate in all of these examples except DE. In AH and UL the final element is 'bark' so the gloss is 'rock bark' (J. Kari, 1990). The term for rock lichen in DE is glossed as 'rock lichen' (P. Kari, 1991). 'Rock covering' is the gloss of the NA term (Elmore, 1943).

A general pattern is found in AH, CA, UL, CHIL, and DE for the term used for tree lichen; the compound noun is composed of the prefix for 'up', **da**, which is the initial element and the final element represents 'hair', **gha**, so the gloss is roughly 'raised hair'. In NA the final element is also 'hair'; although the gloss is 'spruce's hair'. All of these names used for tree lichen are not really a general term, since there are many species of lichens that grow in trees that are not hair-like. The second term given in NA, **tshin pąahtl'aat**, is glossed as 'tree covering' (Elmore, 1943) and appears to be a general name for tree lichen. In UL the other term used, **dahtl'uz**, is not a general term for tree lichen but represents another kind of tree lichen. It is glossed as 'raised yellow'.

Fungus

There is no general term for fungus in any of the languages compared. The fungus kingdom can be divided into three categories within these Athapaskan languages: mushroom, shelf fungus and puffball.

The mushroom category has one general name in CA, UL, CHIL, CHIP and NA. All of these terms have the cognate stem ***jagh** which is translated as 'ear'. Another general name for mushroom in DE is transcribed as 'ground it rots' (P. Kari, 1991). One of the general names for mushroom in AH is transcribed as 'that which rots our hand' (J. Kari, 1990). The stem for 'rot', ***get**, is cognate in AH and DE. AH also has a term for mushroom that is composed of the stem 'mushroom', **niy** (J. Kari, 1990). The term for mushroom in all of the languages is a compound noun made without a botanical stem except in AH.

Terms for shelf fungus in CA, UL and CHIP were not found. The AH and DE terms are cognate. P. Kari (1991) transcribes the DE word for shelf fungus as 'burning taste' whereas J. Kari (1990) glosses it as 'pungent' in AH. The name reflects the AH and DE usage of mixing burned ashes of species of shelf fungus with chewing tobacco, which results in a burning taste (J. Kari, 1990; P. Kari, 1991). Both NA and CHIL have the cognate 'tree' stem incorporated into the name for shelf fungus. The NA word is glossed as 'tree wart' (Elmore, 1943) whereas the gloss of the CHIL word is uncertain. For these Athapaskan languages the shelf fungus term can be a compound noun that might or might not have a botanical stem.

No 'puffball' stem was found in any of the languages. The compound nouns used among the languages to describe puffballs are glossed as 'raven's ochre' in AH (J. Kari, 1990) DE (P. Kari, 1991) and CHIP; 'raven's smoke' in UL and DE (J. Kari, 1990); 'ghost's smoke' in UL and 'eye blinding' in NA (Young and Morgan, 1992). The analysis of the CA term is uncertain. The term for 'raven' in UL and CHIP is cognate. Also the term for 'ochre' is cognate in AH, DE and CHIP.

Grass

The 'grass' category, ***tl'√gh**, is cognate in all the languages with one phonological irregularity. A weakening of **gh** has occurred in CA, UL and CHIL words by the fact that this consonant has disappeared. The stem for grass is an independent noun in all the languages.

Grass-like plants form a major class of plants in DE; however, this category is called **k'echan** (P. Kari, 1991). Kari (1991) states that there are very few specific names using **k'echan**. **Tl'egh** represents sedges (which are grass-like) and there are a number of specific names that use the cognate 'grass' stem: **tl'egh gguya** (unknown sedge), 'small sedge'; **tl'egh denets** (unknown sedge), 'a sedge with sharp edges'; **tl'egh lits'a** (*Eriophorum* spp.), 'fluffy sedge' and one species of Poaceae (grass) is called **tl'egh** (*Elymus arenarius*).

Plant Parts

Table 6.2 shows the majority of cognate stems found throughout the six languages for plant parts. The following discussion summarizes all cognates and the phonological changes that occurred in some of the cognates. The structure and glosses of the terms are also provided.

Leaf

All of the languages studied were found to have cognate stems for 'leaf'. The CHIP stem has undergone nasalization in which the vowel assimilates the **n** sound causing the **n** to be deleted (Cook, 1983b). The indefinite possessor prefix occurs with the 'leaf' stem in all of the languages studied. The occurrence of an indefinite possessor agrees with the fact that a leaf had to be possessed by something. It is interesting to note that all of the stems for 'leaf' are dependent.

The AH, DE and UL word for 'leaf' can also be used for 'herb' (J. Kari, 1990; P. Kari, 1991) (Table 6.1). The CHIP word for 'leaf' is almost identical to the CHIP word used for 'flower'.

Flower

AH, CHIP and DE have the cognate 'leaf' stem incorporated into the compound noun for flower. The gloss of the AH term for flower is 'leaves that are loved' (J. Kari, 1990). In DE the gloss is 'beautiful leaves' (Jim Kari, 1995, Personal Communication, University of Alaska).

Table 6.2: Plant Part Terms For Six Athapaskan Languages Showing Cognate Elements
The bold highlighted areas indicates that the elements are cognate when reading from left to right. Only elements that are cognate in three or more languages are highlighted. No data is 'nd'. Each term is followed by the abbreviated reference source which can be found in the 'Materials and Methods' section.

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Leaf	c'e**t'aan'** (K90)	k'**t'un** (K77)	e**tan** (M32) 'u**t'an** (A74)	'u**t'an** (K92)	ʔæ**t'æn** (T75) ɛ**t'ǽn** (K79)	ɛ**t'ą́**cáahɛ (E81) 'į**t'ą́**tcáyɛ́ (L31)	'a**t'ąąn** (Y87) 'Aa**t'ąa**' (E43)
Flower	c'e**t'aan'** 'unetniigi (K90)	k'**t'un** dendashuni (K77)	'indai (A74)	‘indak (K92)	ɛlagi (T75) aelaegis (K79)	**t'á**ⁿchay (M84) **t'ą́**caghɛ (E81)	tc'illátxah (E43) ch'illátah hózhóón (Y87)
Berry	**gigi** (K90)	**gega** (K77)	nit'ay (M32) -mai (A74)	mai (K92)	nɛzt'æn (T75) nadt'ą́ (K79) -mæl (T75)	**jié** (M84) **jîɛ** (E81) **djï**yɛ́ (L31)	**dzidzé** (Y87)
Root	-**ghah**de' (K90)	dken**ggas** (K77)	'u**ghih** (A74)	bu**ghogh**a (K92)	'ə**ɣət** (T75) ɛ**ɣát** (K79)	ɛcį**ghay**ɛ́ (E81)	pe**xet**ł'óol (E43) 'akétł'óól (Y87)
Thorn	**xos** (K90)	**hesh** (K77)	**rhwes** (M32) **whus** (A74)	**whus** (K92)	nd	gał**ghoz**i (E81) **x^{w}os** (L31)	**ywoc** (E43) **hosh** (Y87)

Table 6.2 cont.: Plant Part Terms For Six Athapaskan Languages Showing Cognate Elements

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Stick	de**cen** (K90)	ch'ik'a (K77)	t**cen** (M32)	du**chun** (K92)	**tšɛn** (T75)	dɛ**cɛn** (E81)	**tshin** (E43)
Branch	-zu**cene**' (k90)	k'ezi**ken**a (K77)	'uzis**chum** (A74)	du**chun** (K92) loos**chun** (K92) 'ul (K92)	azo**tšɛn**	dɛcɛn**cɛnɛ́** (E81)	**tsin** bigaan (Y87) 'idadii'a' (Y87) 'ats'áoz'a' (Y87)
Wood (dry)	**tsets** (K90)	**chech** (K77)	**tsuz** (A74)	dessul (K92)	nd	**tsɛz** E81)	**tchi̋c** (E43) **chizh** (Y87)
Bark	-la**t'uudz**e' (K90)	k'elu**t'ich'**a (K77)	'ula**t'ooz** (A74)	la**t'ooz** (K92)	**t'uz** (T75)	dɛla**t'uzɛ́** (E81)	'akásh**t'óózh** (Y87)
Cone	lay'duuy (K90)	k'eludiys (K91)	añ**ķwel** (M32)	'an**gwul** (K92)	ʔæs**gwąɬ** (75)	nąjúlɛ́ (E81) jul (E81)	ch'ó bineest'ą' (Y87)
Needle	'**eł**ggade' (K90)	**el**udegga (K77)	**el** (M32)	'**ul** (K90) tel (K90)	ʔ**ɛl** (T75) ʔɛy**ɛl** (T75)	-garɛ́ (E81)	'**ił** (Y87)
Pitch	**dzaex** (K90)	**jah** (K77)	**dzeh** (A74)	**dzeh** (K90)	**dzəx** (T75)	**dzéh** (E81)	**jeeh** (Y87)

It appears that the 'leaf' stem in CHIP is attached to the stem meaning something like 'wavy-edge'. In Dogrib, an Athapaskan language neighbouring CHIP, 'flower' is cognate with the term used in CHIP (Leslie Saxon, 1995, Personal Communication, University of Victoria). The final element in the Dogrib word is glossed as 'wavy edge' (Leslie Saxon, 1995, Personal Communication, University of Victoria) and the cognate stem in CHIP, **chá**, is glossed as 'skirt' by Li (1931).

The NA compound noun for flower also incorporates the stem used for 'herb'. The gloss of the NA word is 'top of the leafy plant' (Elmore, 1943).

CA and UL have cognate terms for flower. The analysis of the stems is uncertain.

There does not appear to be a botanical stem representing 'flower' in the languages under investigation. Most of the languages derive the word from the 'leaf' or 'herb' stem.

Berry

The word for 'berry' is cognate in AH, CHIP, DE and NA. 'Berry' is an independent stem in these languages.

CA and CHIL have two different nouns for berry. The first word does not relate to the other languages and does not appear in compound names for berry plants within CA and CHIL. The initial element in CA and CHIL could be the 'small berry-like object' morpheme (J. Kari, 1990). The **z** which is found in the CHIL term could have been lost in CA through the common process of syllable final consonant lost. The final element in CHIL is the 'leaf' stem. The terms could be cognate with each other.

The dependent stems in CA and CHIL and the independent stem in UL are very similar to one another but they are very different from the other Athapaskan languages. The initial consonant, **m**, found in these stems is a phoneme that occurs infrequently in CA (Story, 1984). A neighboring language family, Tsimshian, is found along the northern border of CA. The southern Tsimshian word for berry is **mai maʔi** (Compton, 1992). The first syllable of this Tsimshian word is the noun borrowed in CA and UL for the meaning 'berry'. The CHIL noun seems to be derived from Tsimshian also but has the addition of the stem final **l** of unknown etymology.

Root

There are cognate stems occurring in all of the languages for 'root'. In AH the stem has an unknown origin (J. Kari, 1990), but in CHIP Li (1931) defines the stem (**xài**) as 'root'. In all of these cases the stem is dependent. The CHIP compound noun also has the stem 'at the foot, base of' (-**tcį̂ʸɛ̨́**) (Li, 1931); therefore the gloss would be 'its roots at the bottom'. The NA term is glossed by Elmore (1943) as 'its string' since the stem for 'rope' is incorporated into the term for root. However, according to Young and Morgan (1987) the gloss is 'its foot rope' with the stem for 'foot' **ké** being incorporated into the term instead of the 'root' stem **xe**. The stem for 'stick' is found in the DE term for root. Perhaps the gloss is 'tree root'. In AH there is an attached stem that has uncertain analysis (J. Kari, 1990).

Thorn

'Thorn' is a botanical independent stem found to be cognate in all of the languages except CHIL, in which the term for 'thorn' is not known. Weakening has occurred in the initial consonant for CA, UL and DE. In CHIP, Elford and Elford (1981) found the 'thorn' stem bound to an unknown initial element and a final prefix that is probably the relative suffix -**i** (Li, 1946).

Stick

The terms for 'stick' have a cognate stem in all of the languages except in DE. The wood gender prefix is found in AH, CA, UL and CHIP, whereas the stem is independent in CHIL and NA. The analysis of the term for 'stick' in DE is not known.

The terms used for 'stick' in CA, UL, CHIL, CHIP and NA are also the same terms used for 'tree' in these languages (Table 6.1).

Branch

All of the languages have at least one word for the term branch that is made from the PA stem ***ken**. Kari

(1990) found two stems ***ken**[1] glossed as 'base, stalk, handle' and ***ken**[2] glossed as 'stick'. Perhaps 'branch' is built up from the stem that represents 'base, stalk, handle', although there is no easy way in knowing. The word for 'branch' is a compound noun in all of the languages. AH, DE and CHIP have the possessed suffix incorporated into this word. AH, CA, CHIL and DE also share another cognate stem (**zu**, **zi**, **zo** and **zi** respectively) that is found in the term for branch; this stem is glossed as 'branch' in AH (J. Kari, 1990). In UL the wood gender prefix is attached to the ***ken** stem in the first UL word; however the initial element in the second word for branch is unknown. The CHIP term incorporates the wood gender prefix, the possessive suffix and the ***ken** stem twice, perhaps ***ken**[1] and ***ken**[2] are both incorporated. In NA the ***ken** stem is used with the 'arm' stem (Elmore, 1943) and the word means 'arm of the tree'.

Other words for branch are found in UL and NA. In UL the independent 'needle' stem is also used for branch. In NA the two words are glossed as 'against it' and 'protrudes away from something' (Young and Morgan, 1987).

Wood (dry)

AH, CA, CHIP, DE and NA share a cognate independent stem for 'dry wood'. The final consonant has undergone changes in CA and CHIP due to the limited set of final consonants found in both languages.

A term for 'dry wood' is not recorded in CHIL. The UL term is not cognate with the other languages and the structure and gloss of this word is unknown, although the prefix **de-** in this word can be assumed to be the 'wood' gender prefix.

Bark

The stem for 'bark' is found to be cognate in all of the languages under investigation. The PA stem ***t'uch'** is glossed as 'peel, bark or rind' (J. Kari, 1990). The final consonant of this root has undergone a change in all of the languages. It is very common in Athapaskan languages for the inventory of stem final consonants to be much smaller than the inventory of stem initial consonants (Li, 1946). The AH and CHIP noun contains a possessive suffix **-e'** and **-ɛ́** (Li, 1946). The 'bark' stem is found as an independent noun only in CHIL; the others use it as a dependent stem.

An additional cognate stem, **la**, is found in the terms for bark for all the languages except CHIL and NA. In CA **'ula' ts'i** is glossed as 'spruce bark canoe' (Antoine et al., 1974) and in AH **laats'** is glossed as 'peeled spruce bark' (J. Kari, 1990); therefore, **la** might mean 'spruce bark'.

Cone

A cognate stem was found in the terms for cone in CA, UL and CHIL. The stem is dependent in these languages;

however, the gloss of this stem in not known. The gloss of the initial element in CA, UL and CHIL is not known.

AH and DE share a cognate stem (**duuy** and **diy**, respectively) that is glossed as 'spruce cone' (P. Kari, 1991). In both languages the stem is dependent. It appears the cognate stem **la** in AH and **lu** in DE is also found in the term for 'bark' (see above). The possessive prefix, **k'**, is found in the term used in DE.

The term for 'cone' in CHIP is not used in any of the other languages. The stem is independent and Li (1931) glosses the stem as 'pine cone'.

The NA compound noun for cone does not have a stem for 'cone' incorporated into the term. The gloss is 'spruce's fruit' (Elmore, 1943).

Needle

There is cognate stem in the term for 'needle' for all of the languages, except CHIP. However, this stem has two different meanings. In AH and DE the stem (**'eł** in AH) means 'spruce bough' (P. Kari, 1991). In CA, UL, CHIL and NA the same cognate independent stem is glossed as 'needle'. The cognate stem is found in CHIP but is not used for needle but is glossed as 'spruce'; **ɛl nąjúlɛ́** 'spruce cone' (Elford and Elford, 1981).

The stem used in CHIP for needle is cognate with stems **ggad** in AH and **gga** in DE that are used in the term for needle. There is a weakening of a **d** to a **r** to a lost consonant in the stem. The AH noun contains a possessive suffix **-e'** and the DE noun contains the wood gender prefix **de**. This stem ***Gat** is glossed as 'needles' by Kari (1990).

Pitch

Pitch is cognate in all of the languages. There is a weakening of the final consonant in all of the languages except AH; **x** to **h**. The root in AH, **dzaek'**, is defined as 'pitch'. 'Pitch' is an independent noun in all of the languages.

Plant Names

Table 6.3 shows the majority of cognate stems for plant names found throughout the six languages. The following discussion summarizes all cognates and the phonological changes that occurred in some of the cognates. The structure and glosses of the terms are also provided.

***Alnus* spp. (Alder)**

The name for 'alder' is cognate in all of the languages except CHIP. Kari (1990) glossed the stem in AH as 'skin is exposed' and archaically 'red'. However, Elmore (1943) glossed the stem as 'alder'. I would gloss the stem as 'alder' since it is cognate in five languages and is similar semantically since it is employed for alder in all cases. Perhaps the stem has expanded its meaning in AH or, 'red' is the underlying "original" meaning. The term for 'alder' is an independent botanical stem.

Table 6.3: Plant Names For Six Athapaskan Languages Showing Cognate Elements
The bold highlighted areas indicates that the elements are cognate when reading left to right. Only elements that are cognate in three or more languages are highlighted. No data is represented by 'nd'. Each term is followed by the abbreviated reference source which can be found in the 'Materials and Methods' section.

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Alnus spp. (Alder)	**k'es** (K90)	**q'esh** (K91) qenq'eya (K91)	**k'es** (M32) **k'u**<u>**s**</u> (C73)	**k'us** (K92)	**tš'ɛs** (T75)	k'ailisen̈ (M84)	**k'ic** (E43) **k'ish** (Y87)
Betula spp. (Birch)	**k'ey** (K90)	**q'ey** (K91)	**k'i** (A74)	**k'i** (K92)	**tš'i**(K79)	**k'i** (E81)	k'icłtchii' (E43) k'ishchĭĭ' (Y92)
Salix spp. (Willow)	**k'ay'** (K90)	q'eylish (K91) ch'etl' (K91)	k'edlih (A74)	k'idlih (K92)	**k'i** (T75) **k'í**	**k'aí** (M84)	**k'ai'** (E43) & (Y87)
Arctostaphylos uva-ursi (Kinnikinnick)	**denes** (K90)	**dnes** (K91)	**dunih** (A74)	**dunih** (K92)	**dɛnix** (T75)	**dé(lh)ni** (M84)	**dinas** (Y92)
Athyrium filix-femina or Dryopteris spp. (Fern)	**'aax** (K90)	**uh** (K91)	**ah** (M32)	**'ah** (K92)	**?ax** (T75)	ts'elidher (M84)	nd
Populus spp. (Cottonwood)	**t'aghes** (K90)	**t'eghes** (K91)	**t'ughu**<u>**s**</u> (C73)	**t'ughus** (K92)	**t'as** (K79)	k'es (M84)	**t'iis** (Y87)

Table 6.3 cont.: Plant Names For Six Athapaskan Languages Showing Cognate Elements

	Ahtna	Dena'ina	Central Carrier	Ulkatcho Carrier	Chilcotin	Chipewyan	Navajo
Picea spp. (Spruce)	ta**ts'uu'** (K90) ts'abael (K90)	ch'bala (K91)	**ts'oo** (A74)	**ts'oo** (K92)	**ts'u** (T75) ts'uɣ (K79)	**ts'ù** (L31) ɛl (E81)	**ch'ó** (Y87)
Rubus spp. (Raspberry)	n**kaał** (K90)	n**quł** (K91)	'ut'an**kal** (C73) dukding**kal** (C73)	dani̹i̹**kut** (K92)	ta**xal**tsɛl (T75) tahaltsɛl (K79)	tthe**kálh**jíɛ́ (M84) tthe**kál**ɛjíɛ́ (E81)	taxwooj (E43)
Rosa spp. (Rose)	**xos** t'aan' (K90)	**hesh** (K91)	**whus** (C73)	**whus** (K92)	**xwəs** (T75)	í^{n}tsólé (M84)	tc'ą' (E43) chǫǫh (Y87)
Vaccinium spp. (Blueberry)	**gigi** gheli (K90)	**giga** gheli (K91)	du**je** (C73)	mai (K92)	seɬtšo (T75)	**jiɛ** sułíné (E81)	nd
Allium spp. (Wild Onion)	c'edzic (K90) hwnigiłghaegi (K90)	hdenłghik'i (K91)	**tł'o** tsen (M32)	**tl'o-** tsun (K92)	**tł'ə**tsən (T75)	**tlh'ogh-** ts'ïaze (M84)	**tlh'oh**tchin (E43) **tl'oh**chin (Y87)
Juniperus spp. (Juniper)	dzeł gige' (K90) saghani gige' (K90)	chint'una (K91) tsuni ela (K91)	**datsan-** 'angut (A74)	**datsan-** 'angut (K92)	**dætsen-** k'á (K79) **dætsæn-** k'atšił (T75)	**datsá^{n}**jíɛ́ (M84)	gad (Y87) kat (E43)
Sphagnum spp. (Moss)	**ts'aatl'** tsele' (K90)	nan dasdeli (K91)	**ts'al** (C73)	tsaal (K92)	nəntsəs (T75)	**tth'al** (E81) tthal (M84)	nd

The first consonant in the CHIL term has undergone palatalization. Palatalization is a change of a sound into a palatal sound, one formed when the tongue is near the palate (Young and Morgan, 1987). Palatalization is typically triggered by vowels **i** or **e** occurring in the PA stem (Young and Morgan, 1987).

The CHIP term for 'alder' is composed of the stem which represents 'willow'. I could not establish the complete gloss for this term.

***Betula* spp. (Birch)**

The term for birch is found to be cognate in all but NA. The final consonant was dropped in CA, UL, CHIL and CHIP. This final consonant deletion is a common phonological process. In CHIL the first consonant has undergone palatalization. The AH stem is glossed as 'birch' and all of these stems are found as independent nouns.

The term for the only known birch plant in NA is derived from the stem for 'alder' and is glossed as 'red alder' (Young and Morgan, 1992); there is no separate stem for birch.

***Salix* spp. (Willow)**

The independent stem for 'willow' ***qαy'** (J. Kari, 1990) is found to be cognate in all the languages except CA, UL and DE. It appears that in CHIP and NA the ***αy** are interacting to form an **ai** diphthong.

DE has a second term for 'willow' that is not cognate with terms in the other languages except for the NA term for 'herb/shrub'.

The stem for 'birch' common to all of the languages under discussion is found in the term for willow in CA and UL. CA shows an unexplained vowel shift from **i** > **e** in this use of the stem for 'birch'. The gloss of the CA and UL terms is unknown since the final stem is unknown. Both CA and UL have a term for string made of willow bark: **k'altai** in CA and **k'ultai** in UL. It is possible that the initial stem in these words is cognate with the stem for 'willow' found in the other languages.

Arctostaphylos uva-ursi **(Kinnikinnick)**

This one species has cognate names in all the languages and Kari (1990) glossed the root as 'kinnikinnick'. There has been a final consonant change in CA, CHIL and CHIP. A vowel deletion has occurred in DE. Although this word has two syllables, it is considered to be a simple lexeme because it only has one meaningful part (i.e. it is monomorphemic) (J. Kari, 1990). Kinnikinnick occurs as an independent botanical stem in all of the languages under examination.

Athyrium filix-femina **or** ***Dryopteris*** **spp. (Fern)**

AH, CA, UL, CHIL and DE all have a cognate independent stem for the botanical term for fern. In AH and DE the root is glossed as 'fern root' (J. Kari, 1990; P. Kari, 1991). There is no known term for 'fern' in NA (Elmore, 1943; Young and Morgan, 1992).

The term used in CHIP is a compound noun that is of unknown origin.

The term for 'fern' in AH, CA, UL, CHIL and DE is very similar or identical to that found in the Tsimshian language family; **ahh** (Coast Tsimshian), **ax̆** (Nishga) and **ax̆** (Gitksan) (Turner et al., 1992). Due to the structure of the stem and the fact that it is cognate in four widely separated Athapaskan languages it could be that the term for fern may have been borrowed from Athapaskan into the Tsimshian languages.

***Populus* spp. (Cottonwood)**

Cottonwood has cognate independent stems in all of the languages except CHIP. The name for cottonwood is monomorphemic (J. Kari, 1990). There is a weakening of the **gh** in CHIL and NA as well as a vowel deletion.

Li (1931) glosses the CHIP stem **k'es** as 'poplar' (poplar and cottonwood are both common English names for *Populus* spp.), although this stem is cognate with the terms used for alder in the other languages.

***Picea* spp. (Spruce)**

The term for spruce is found to be cognate in all the languages but DE. The stem, **ts'uu'**, of the AH term **tats'uu'** is glossed as 'spruce' but the common term used by the Ahtna people for 'spruce' is **ts'abaeli** (J. Kari, 1990). The common 'spruce' stem occurs as an independent stem in CA, UL, CHIL, CHIP and NA. In AH it is bound to the 'water' stem and represents spruce that grows in a wet area (J. Kari, 1990).

The AH term **ts'abaeli**, noted above, is cognate with the term used in DE **ch'bala**. Kari (1990) identifies the root of this word in AH as meaning 'spruce'; otherwise little is known about its etymology.

In CHIP **ɛl** is also used to mean 'spruce'. This term is cognate with a stem in AH and DE which is used in words that deal with spruce and is glossed as 'spruce bough' in both AH and DE (J. Kari, 1990; P. Kari, 1991). CA, UL, CHIL and NA also use this cognate stem in their botanical terminology inventory but it is glossed as 'needle'.

***Rubus* spp. (Raspberry)**

The terms for raspberry contain a cognate stem, reconstructible as PA ***qał**, in all of the languages except NA. The gloss for this stem in AH and DE is 'cloudberry' (J. Kari, 1990; P. Kari, 1991) which is in the same genus as raspberry. The final consonant in the stem in UL has changed from **l** to **t**. This could be called a strengthening in the consonant; however, Story (1984) does not have **t** as part of the set of final consonants in Carrier.

In AH and DE the 'raspberry' stem is attached to a prefix. Of the two terms in CA, **'ut'ankal** would be glossed as 'leaf raspberry'. The other, **dukdingkal**, is possibly cognate with the term used in UL **daniįkat**; however in both cases the initial elements of the term could not be analyzed. The 'raspberry' stem in CHIL is part of a compound noun that is made up of the 'water' stem, **ta**, and the moist stem, **tsel**. In CHIP the compound noun for raspberry includes the PA stem but is based on the stem for 'berry': **tthekálhjíé**. This word has an initial element which is not analyzed. The NA compound noun for raspberry is glossed as 'thorny fruit' (Elmore, 1943).

***Rosa* spp. (Rose)**

The name for rose is cognate in all of the languages except CHIP and NA. The root is glossed as 'thorn' in AH and DE (J. Kari, 1990; P. Kari, 1991) and the same stem is used for thorn in all of the languages. This term for rose is an independent stem in all of these languages except AH which is a compound noun glossed as 'thorn plant' (J. Kari, 1990).

The independent noun stem used in NA for rose is not cognate with the other languages. The CHIP term for rose is not analyzable.

***Vaccinium* spp. (Blueberry)**

The terms used for *Vaccinium* spp. (blueberry) have the cognate 'berry' stem in AH, CA, CHIP and DE. AH and DE terms are complex, formed using the cognate stem for 'real', **gheli**. CHIL and CHIP also use the cognate stem for 'real' but this stem is not cognate with the AH and DE stem. In CA the term is a dependent stem attached to the wood gender prefix.

UL uses the Tsimshian loanword for 'berry' to represent *Vaccinium* spp. (blueberry). The term is an independent stem.

In NA no term was given for any *Vaccinium* spp., but the independent 'berry' term **dzidzé** is used for the species *Prunus virginiana ssp. melanocarpa* (a kind of choke cherry).

***Allium* spp. (Wild Onion)**

In CA, UL, CHIL, CHIP and NA the cognate stem for 'grass' is one of the stems that make up the compound nouns for *Allium* spp. CA, UL, CHIL and NA also share the cognate stem for 'smelly'; therefore, the gloss would be 'smelly grass'. The gloss in CHIP would be 'grass that causes a sharp stinging' since the final stem is 'to smart' (Li, 1931).

AH has two terms for 'wild onion'; the first term contains the bound stem **dzic** which Kari (1990) glosses as 'wild chive'. The second term has an uncertain analysis. The gloss is also unknown in the DE term (P. Kari, 1991). It is possible that these two terms are cognate.

***Juniperus* spp. (Juniper)**

The initial stem within the complex noun for 'juniper' is cognate in CA, UL, CHIL and CHIP. This stem means 'crow' or 'raven' in all three languages: **datsan**, CA

(Antoine et al., 1974)and UL; **dætsǽn**, CHIL and **datsą́**, CHIP. The gloss for juniper in CHIP is 'crow berry'. The final stem in CA, UL and CHIL is unknown.

Both AH and DE have two terms for juniper. The AH term **saghani gige'** is glossed as 'raven's berry' (J. Kari, 1990); however the stem for 'raven' in not cognate with the word in the other languages. The AH name **dzeł gige'** is translated as 'mountain berry' (J. Kari, 1990). **Chint'una**, in DE, is glossed as 'unknown leaf' (J. Kari, 1990). The first stem is unknown. The second stem is 'leaf' with an attached possessive suffix. The other DE term, **tsuni ela**, is glossed as 'brown bear's spruce bough' (P. Kari, 1991).

The stem for juniper in NA is an independent noun stem that only represents 'juniper' (Young and Morgan, 1987). This is the only language with a botanical stem for juniper; the other languages use a compound noun that does not have a botanical stem. The NA term for juniper seems to be cognate with the AH root **ggat** which is glossed as 'needle' (J. Kari, 1990). As noted above, this cognate root is also used for needle in CHIP and DE.

***Sphagnum* spp. (Sphagnum Moss)**

The term used in AH for sphagnum moss is glossed as 'cradle moist' (J. Kari, 1990). In CA and CHIP only the cognate 'cradle' stem is used. The glosses evidently relate to the use of this plant for diapering.

The second term used in CHIP, **tthal**, is cognate with the term used in UL. The PA stem would be ***tsal**, however, a gloss of this stem is unknown.

The terms used in CHIL and DE are compound nouns that use the stem for 'moss'. The gloss of the CHIL term is unknown. The DE term for sphagnum moss is glossed as 'moss that is red' (P. Kari, 1991).

Percentage Of Botanical Cognates

The percentage of botanical cognates was determined for each language pair. For example the numbers of cognates and non-cognates were enumerated between AH and CA. Twenty-three and two thirds cognates were found: plant 1, shrub 1, algae 1, moss 1, grass 1, bark 1, branch 1, leaf 1, needle 1, pitch 1, root 1, stick 1, thorn 1, wood 1, alder 1, kinnikinnick 1, fern 1, birch 1, spruce 2/3, cottonwood 1, rose 1, raspberry 1, sphagnum moss 1 and blueberry 1. Ten and one third non-cognates were found: tree 1, mushroom 1, shelf fungus 1, puffball 1, berry 1, cone 1, flower 1, wild onion 1, juniper 1, willow 1, and spruce 1/3. The total number of cognates were divided by the total number of words: $\frac{23\frac{2}{3}}{34} = 69.62\%$

Table 6.4: Percentages Of Botanical Cognates Between Athapaskan Languages
AH = Ahtna; CA = Central Carrier; UL = Ulkatcho Carrier; CHIL = Chilcotin; DE = Dena'ina; NA = Dine (Navajo)
n = the number of botanical terms compared

	CA	UL	CHIL	CHIP	DE	NA
AH	69.62 n=34	61.62 n=33	63.10 n=28	67.17 n=33	80.89 n=34	48.89 n=30
CA		83.90 n=29	83.33 n=26	65.63 n=32	65.67 n=33	60.06 n=30
UL			79.71 n=23	62.50 n=32	59.59 n=33	56.89 n=30
CHIL				64.18 n=27	58.32 n=28	63.33 n=25
CHIP					58.58 n=33	59.43 n=30
DE						50.00 n=31

Table 6.5: Ranking Of Percentages Of Botanical Cognates
AH = Ahtna; CA = Central Carrier; UL = Ulkatcho Carrier; CHIL = Chilcotin; CHIP = Chipewyan DE = Dena'ina; NA = Navajo

Percentage of Botanical Cognates			
48.89-56.89	58.32-64.18	65.67-69.62	79.71-83.90
AH-NA	DE-CHIL	CA-DE	UL-CHIL
DE-NA	DE-CHIP	AH-CHIP	AH-DE
UL-NA	CHIP-NA	AH-CA	CA-CHIL
	UL-DE		CA-UL
	CA-NA		
	AH-UL		
	UL-CHIP		
	AH-CHIL		
	CHIL-NA		
	CA-CHIP		
	CHIL-CHIP		

The percentages of botanical cognate values among the languages under discussion range from 48.89 percent to 83.90 percent (Table 6.4). The majority of values are between 60.75 percent and 69.32 percent (Table 6.5).

Discussion

Linguistic Structure Of Athapaskan Botanical Terms

Athapaskan plant categories do not have a common linguistic structure. Independent and dependent botanical stems are used as well as compound nouns that might or might not have a botanical stem. The 'plant' term was the only example of a relative noun. Terms glossed as 'herb', 'tree', 'algae', 'moss' and 'grass' were the only plant categories found to have unanalyzable stems.

Plant parts are generally named with dependent or independent botanical stems, although compound nouns based on a botanical stem are used for 'flower', 'bark' and 'branch'. It was suggested by Morice (1891-1892) that 'flower' should be cognate in all Athapaskan languages since it is found in all environments; however, this is not the case. The only pattern found with respect to 'flower' was that the 'leaf' stem is sometimes incorporated in the 'flower' term.

It is interesting that the PA 'berry' stem has been replaced with a loan word in CA, UL and CHIL. It is usually difficult for a common word, like berry, to be replaced with a loan word (Hymes, 1960). Goldman (1941) found that the CA and UL showed cultural influence from the Tsimshian and since the Tsimshian and CA occupy areas next to each other these cultural and linguistic shared similarities can be explained through intercultural exchange and linguistic assimilation. CHIL, located just south of UL country, has interactions with the UL and in this example may have derived its bound 'berry' stem from UL.

The plant names compared in this study are generally independent botanical stems or compound nouns with a botanical stem. Many plant names had unanalyzable stems: alder, kinnikinnick, fern, birch, spruce, cottonwood, raspberry and willow. The high number of independent stems found for plant names is not a general pattern found for all plant names in the Athapaskan languages but is due to the selection method used in this study (i.e. cognate plant names were looked for).

Spruce was found to be represented by five different PA roots: spruce bough, spruce bark, spruce cone and two for spruce. The occurrence of five PA roots and the importance of spruce in DE (P. Kari, 1991) suggests that spruce was also a very important plant in PA.

The 'berry' stem has been used alone or with the addition of 'real' to represent a specific plant throughout the languages. In the majority of the languages this is a *Vaccinium* spp. but in all of the languages it is a species that is greatly utilized (Marles, 1984; P. Kari, 1991; Bailey, 1940)

Turner found a 'plant' suffix marked many plant names in Thompson (Turner et al., 1990), Coast Salish (Turner and

Bell, 1971), Southern Kwakiutl (Turner and Bell, 1973), Nitinaht (Turner et al, 1983), Nuxalk (Turner, 1974) and Lillooet (Turner, 1974). A 'plant' prefix or suffix was not found in any of the Athapaskan botanical terms; a wood gender prefix and a berry gender prefix were found but these showed limited occurrence on plant terms themselves.

Ten types of linguistic structure can be distinguished for Athapaskan botanical terminology: 1. independent botanical stem, e.g. **tł'oh** 'grass' (NA); 2. wood gender prefix (**du**) (or berry prefix) + dependent botanical stem (**chun**), e.g. **duchun** 'tree' (UL); 3. indefinite possessor prefix (**k'**)+ dependent botanical stem (**t'un**), e.g. **k't'un** 'leaf' (DE); 4. dependent botanical stem (**gar**) + possessor suffix (**ɛ́**), e.g. **garɛ́** 'needle' (CHIP); 5. botanical stem (**tł'o**) + descriptive stem (**tsen**), e.g. **tł'o tsen** 'wild onion' (CA); 6. non-botanical stem (**ts'aatl'**)+ descriptive stem (**tsele'**), e.g. **ts'aatl' tsele'** 'sphagnum moss' (AH); 7. descriptive stem (**teh**) + botanical stem (**dlat**), e.g. **tehdlat** 'algae' (UL); 8. non-botanical stem (**wudzih**) + non-botanical stem (**yuyi**), eg. **wudzih yuyi** 'ground lichen' (UL); 9. verb stem (**yae**) + nominalizing suffix (**i**), e.g. **hwtnełyaexi** 'plant' (AH) and 10. loanword, e.g. **mai** 'berry' (UL).

The majority of Athapaskan botanical glosses can be divided into two broad categories: unique or descriptive. Turner (1974) defined plant names that could not be analyzed into smaller semantic units (i.e. unanalyzable independent stems) as unique; however, I will expand this definition to included unanalyzable dependent stems. The affixes associated with dependent stems make minimal semantic contribution. The first four types (types 1. through 4.) of linguistic structure described above have unique glosses. Descriptive glosses used in these Athapaskan languages either describe the plant or describe a use associated with the plant. Botanical terms with linguistic structure, types 5. through 9., described above, have descriptive glosses.

Some of the stems used in unique glosses have undergone changes in meaning. Three stems have more than one meaning each: PA ***-t'an**, means both 'leaf' and 'herb'; PA ***-ken**, means both 'stick' and 'tree'; PA ***x̩ʋsh^{w}** means both 'thorn' and 'rose'. In all three examples the structural meanings represent prominent morphological features for the second meanings: herbs are leafy, trees are made of sticks and roses have thorns. In English plant taxonomy there is a similar situation; all plants have 'roots' but 'root crops' are plants with large edible roots. The 'spruce bough' stem, ***eɬ** as defined by Kari (1990), has changed to represent 'needle', 'branch', 'spruce' or 'tree' among the Athapaskan languages under investigation. This could be summarized as an expansion of reference accompanied by a semantic shift. A similar event occurred with the Proto-

Interior-Salish term for 'cottonwood' which became 'stick' and 'bush' in extant languages (Turner et al., 1993). Another change includes the PA stem for 'needle' representing 'juniper' in NA.

Nin' de' is an example of a descriptive term that describes the appearance of the plant. It is the AH term for a lichen (*Cladonia* spp.) and the gloss 'moss horn' describes the hard protruding stems of these species. AH and UL have a lichen term that is glossed as 'caribou feed' which describes the use of the species. *Juniper* spp. in AH, CA, UL, CHIL and CHIP is glossed as 'raven's X'. The significance of this descriptive term is not yet known.

Athapaskan Botanical Terms And Plant Taxonomy

Terms for Athapaskan plant categories are not necessarily equivalent to kingdom or life form names. Kingdom and life form taxa can only be determined through ethnographic fieldwork (see Ch. 5). However, plant categories can provide possible named kingdom and life form taxa and glosses of plant categories and names can show possible expansion of taxonomic hierarchies.

Athapaskan Plant Kingdom And Life Form Taxa

All of the Athapaskan languages under investigation, except CHIL, have a word for 'plant'. (The lack of a word for 'plant' in CHIL is perhaps due to incomplete data.) The plant category appears to have high perceptual salience among Athapaskan languages since it is named in at least five out of the six languages. Therefore it possibly represents a named plant kingdom taxon. Also, since the cognate stem 'grow' is found in all of the terms for 'plant' from five geographically dispersed Athapaskan languages, it suggests that the languages have a similar cognitive category for plants; plants are classified as 'things that grow'.

Unlike the terms for 'plant' the terms used for 'animal' do not incorporate the stem 'grow'. One exception is the word for 'tamed animal' in AH which includes the stem for 'cause to grow'. This term places an emphasis on the human agency involved in domestication. Animals do obviously grow, yet this does not seem to be the most important characteristic in describing animals. This distinction between plants and animals further supports the idea that a named cognitive category for plants exists among Athapaskan speakers.

Turner (1992, Personal Communication, University of Victoria) found that several languages in British Columbia [Haida, Kwakwaka'wakw (Southern Kwakiutl), Nuu-Chah-Nulth (Nootka), Nuxalk, Halkomelem, Straits Saliash, Stl'átl'imx (Lillooet), Nlaka'pamux (Thompson) and Okanagan], none of which is an Athapaskan language, have words that were initially thought to be all-inclusive terms for 'plant'. It turned out that the words actually only represent leafy (i.e. herbaceous) and/or household plants. This is not the case for the Athapaskan languages in this study. AH, UL, DE and NA have a separate term for herbaceous plants built on the 'leaf' stem. Therefore, the occurrence of two separate terms, one using the 'leaf' stem and the other using the 'grow' stem, seems to suggest that the term with the 'grow' stem is an all inclusive term.

The presence of the 'herb', 'shrub', 'shelf fungus' and 'puffball' categories is not constant throughout the Athapaskan languages; therefore, the validity of these categories representing life form taxa would depend on ethnographic work. (Note in Ch. 5 'shelf fungus' and 'puffball' are not described as life form taxa in UL or NA.) The 'tree', 'algae', 'moss', 'mushroom' and 'grass' categories are named consistently throughout the languages and could therefore represent perceptually salient plant categories. This suggests that these categories could be named life form taxa. A general term for lichen or general terms for ground, rock and tree lichen are not applied consistently among the six Athapaskan languages. This suggests that if lichen were a life form taxon, it would be covert.

Expansion Of Athapaskan Taxonomic Hierarchies

Expansion of taxonomic hierarchies can be vertical or horizontal. Horizontal expansion refers to a taxon's expansion to encompass more taxa of the same rank (Turner et al., 1990). A vertical expansion refers to a taxon's expansion to encompass more taxa of a different rank (Turner et al., 1990). Both types of expansion can be determined when one taxon's name is incorporated into another taxon's name (i.e. lexical marking).

Horizontal expansion has occurred within the 'algae' category in NA compared to the other Athapaskan languages. It appears that in the NA language the meaning of ***dlat'** has expanded from 'small water plants (i.e. algae)' to 'small plants that have a growth pattern that covers a surface (i.e. covering)'; therefore, algae, moss and lichen are grouped together. This expansion has not occurred in the other Athapaskan languages, although in AH and UL some ground lichen names have the 'moss' stem incorporated into the term which could suggest a smaller horizontal expansion.

There are other examples of horizontal expansion occurring within the plant taxonomies. CHIP does not have the cognate stem for 'alder' found in the other languages. Instead a compound noun using the 'willow' cognate stem is used; therefore, willow has expanded to include alder. In NA the cognate 'alder' stem is used in a compound noun for birch; no 'birch' stem is found. Alder has expanded to include birch in NA. Finally, in CA, UL and DE no 'willow' stem is used; the cognate 'birch' stem is found in compound nouns that represent willow. Birch has expanded to encompass willow in CA, UL and DE.

Vertical expansion occurred in the AH and DE 'tree' category. A 'tree' term was found to be cognate in all of the languages except AH and DE where the 'tree' term was the name given to spruce. P. Kari (1991) found frequently the DE would use the name of the most important species in a class for the name of the class in general. The term for 'willow' was also used for 'shrub' and the term for 'grass' was also used for 'grass-like plants' in DE (P. Kari, 1991). It is possible that a similar expansion occurred in NA since the term for 'herb and shrub', **ch'il**, is cognate with the DE term for 'willow' or 'shrub', **ch'etl'**; however, any record of this possible expansion has been lost since no specific plant in NA is referred to as only **ch'il**.

Factors Affecting Athapaskan Botanical Terms

Cognate botanical terms show a different pattern from that of the basic cognates. Hoijer (1956) found the percentages of basic cognates between CA and CHIP, CA and NA, and CHIP and NA to be respectively 77 percent (Story, 1984 found 83.3 percent), 72 percent and 77 percent. The percentages for botanical terminology cognates between these languages (Table 6.4) were found to be lower by roughly 10 percent [almost 20 percent for CA and CHIP if Story's (1984) value is used]. This suggests that botanical cognates are not as stable between languages compared to basic cognates and that additional factors besides those responsible for the usual role of vocabulary change are affecting the botanical terms. If these additional factors acted equally on the languages then the percentage of botanical cognate values would be in the same proportion as Hoijer's results (1956); however, this is not the case. The CA and CHIP, and CHIP and NA botanical cognate values are not equal as Hoijer (1956) had found with the basic cognates. This suggests that the additional factors responsible for vocabulary change in botanical terms do not act equally on all of the languages.

The additional factors that affect botanical terms can be categorized into two broad categories: environmental and cultural. Comparison of percentage of botanical cognates among the languages will help to show the affect of environmental and cultural factors on botanical terms.

In general NA shares the least amount of botanical cognates with all of the other languages. A comparison between NA and CHIP helps to explain why NA has low percentage of botanical cognates. Apparently both languages have been separated linguistically from the other languages for roughly the same amount of time [since 1000 A.D. (Krauss and Golla, 1981)]. Also, both NA and CHIP do not have cultural interaction with any of the other languages under investigation since they are not located near any of these languages. Therefore, it appears that the composition and diversity of the flora resulting from the arid to semi-arid NA environment (which is very different compared to the other languages' environments) is the predominant factor affecting the NA botanical terms.

The values for percentages of botanical cognates among AH and CA, AH and CHIP, and CA and DE are relatively high compared to the other percentages of botanical cognates. The relatively high percentages of botanical cognates are not due to close linguistic affiliation since botanical terms are generally not as stable as non-botanical terms. Cultural interaction cannot explain the relatively high percentages of botanical cognates since none of these pairs of languages are located near each other. Also, these pairs of languages have somewhat different environments (AH and DE are located in coastal boreal forests and CA and CHIP are located in continental boreal forests). Perhaps a cultural factor such as similar cognitive patterns for naming botanical terms is shared between the languages resulting in high percentage of botanical cognates.

The four highest percentages of botanical cognates belong to neighboring languages. These language pairs share similar environments, have intercultural exchange and linguistic assimilation. In these examples linguistic, environmental and cultural factors are all influencing the botanical cognates but it would be very difficult to determine relative importance of each factor.

Individual botanical cognates can also be used to show how environmental, cultural and linguistic factors influences botanical terms. If a botanical term is cognate between two related languages that presently have no contact, then past linguistic affiliations are taken as the explanation for the relationships (i.e. linguistic factor). Environmental and cultural factors can also affect the cognate botanical terms simultaneously. If the names are not cognate then environmental and/or cultural elements have become involved in the naming of plants.

The verb stem in 'plant' is shown in this study to be cognate in five geographically dispersed Athapaskan languages. Linguistic affiliation is the essence of this relationship. However, I also feel that there is evidence of a similar cultural factor which is possibly a similar cognitive pattern (i.e. inherited cultural framework) among the languages in this study. They share an underlying concept of 'plants' as 'things that grow', reflected in the analysis of their names for the plant kingdom taxon.

It is interesting that there is not a common or related term for 'tree' among all of the languages since trees are prominent within the environment and used frequently by all of the different cultures. Although four of the languages have a cognate term for tree, clearly derived from their linguistic affiliation, perhaps not all of the cultures have the same cognitive pattern (a cultural factor) for its application, since the term can incorporate shrubs and trees in some languages and only trees in other languages. Also, some languages use a generic taxon name to represent all trees.

Past linguistic affiliations explain the cognate terms for moss in the Athapaskan languages, except in Dine (Navajo). In Dine (Navajo) the dry environment (i.e. scarcity of moss species) has probably caused the loss of the cognate stem used for 'moss'; therefore the composition and diversity of the flora has affected the botanical terms. Additionally, a cultural factor, perhaps inherited cultural framework, has apparently determined that the cognate 'small water plant' stem be used for 'mosses', 'lichens' and 'small water plants' in Dine (Navajo).

The Athapaskan languages show a pattern in the naming of *Rosa* spp. (Rose); the majority use the cognate 'thorn' stem. This example shows how the physical properties of a plant, which I consider to be an environmental factor, can also affect the botanical terms.

Summary And Conclusions

Athapaskan botanical terms are represented by independent stems, dependent stems, compound nouns, relative nouns or loan words. The glosses of the terms can be unique or descriptive.

Athapaskan languages appear to have a named 'plant' kingdom taxon as well as named 'tree', 'algae', 'moss', 'mushroom' and 'grass' life form taxa; however, ethnobotanical fieldwork would be needed for confirmation. The glosses of plant categories and names have shown that vertical and horizontal taxonomic expansions have probably occurred within Athapaskan plant taxonomies. These expansions suggest that different general classifications occur among the Athapaskan languages (e.g. NA is the only language that grouped algae, moss and lichen together).

Botanical cognates are not as stable as basic cognates suggesting that additional factors besides those responsible for the usual role of vocabulary change are affecting the botanical terms.

There are at least three broad factors, which are not mutually exclusive, that affect botanical terms among languages: environmental, cultural and linguistic. The environmental factors include composition and diversity of flora. The cultural factors include inherited cultural framework, similar cognitive patterns and intercultural exchange. The linguistic factors include linguistic affiliation and linguistic assimilation.

CHAPTER 7: IMPORTANCE VALUES OF PLANTS IN ULKATCHO ETHNOBOTANY

Introduction

The relative importance of a plant taxon in a culture can provide valuable information. A ranking system helps to establish the relative importance of plants in a culture and results in each plant having an importance value. Combining the importance value of a plant with other data can indicate what type of plant uses are important to a culture and how important plants are distributed within a culture's territory. The importance values can also be used to demonstrate whether plant names are more often retained when a plant has a high importance value.

A modified version of the Index of Cultural Significance (ICS), as proposed by Turner (1988), is used to evaluate importance values for plants from Ulkatcho ethnobotanical data. Plant species with the ten highest ICS values are evaluated to see if these species are found in a particular BGC Zone and if they are abundant. Also the type of plant use (e.g. food, medicine, material) is examined to determine if there is a dominant use among the plant species of highest importance. Plant names between Ulkatcho Carrier and Central Carrier are compared to determine if plant names are retained more often if the plant has a high importance value.

Background

The evaluation of the relative importance of a plant has been performed by many researchers. Different methods have been summarized in Hunn (1982), Turner (1988) and Phillips and Gentry (1993). Phillips and Gentry (1993) have grouped the methods into three categories: (1) the importance value is a result of the number of times a use is mentioned, (2) the importance value is assigned by the researcher and (3) the number of uses are counted to give an importance value. Philips and Gentry (1993) classify Turner's ICS values as being assigned by the researcher (type 2); however, this is slightly misleading. The researcher does assign subjective values to different types of plant knowledge but the ethnobotanical information ultimately provide the basis for the calculation of the importance values for each plant.

Lexical retention occurs when a name for an object is cognate between two related languages. Berlin et al. (1973) proposed and showed that names of plants with high cultural significance are more likely to be retained than names of plants with low cultural significance. Cultural significance was determined using broad categories (Berlin et al., 1973): cultivated, protected, wild-useful and insignificant. To simplify the comparison related Mayan languages, Tzeltal and Tzotzil, from similar cultures and environments (i.e. similar floristic composition), were chosen.

Materials And Methods

Interviewing Ulkatcho Elders

Where possible, each fresh or pressed specimen was shown to at least three Elders. In some cases specimens could not be obtained; therefore, slides or pictures from MacKinnon et al. (1992) were used. Ideally the Elder(s) would be present during collection; however, in most cases this was not practical due to their busy schedules.

Elders willing to share their botanical knowledge were interviewed at their convenience. During the interviews, detailed records of all knowledge pertaining to the plants was documented including date, location, who was present during the interview, and information about the plant including Ulkatcho name, and its present and past use or role. Interviews were recorded on tape cassette with the Elder's permission. Each plant specimen and tape cassette was given a collection number, which can be found in the fieldnotes.

Typed fieldnotes were sent to each Elder so that changes could be made to the information. These changes could be deletions and or additions, although no changes were specifically requested. A copy of the rough fieldnotes and the typed fieldnotes was given to the Ulkatcho Band.

Determining Ulkatcho ICS Values

The ICS was calculated employing the Ulkatcho ethnobotanical data for each plant species using the formula:

$$ICS = \sum_{i=1}^{n} (q \times i \times e)_{u_i}$$

where q equals quality value, i equals intensity value and e equals exclusivity value (Turner, 1988). The values are determined by a specified ranking system that provides a numerical value (Turner, 1988). The multiplication of these values represents the importance of a described "use" of a plant and any additional uses can be calculated and added together to represent the ICS for a given plant.

The ICS values were determine by using a modified version of Turner's (1988) ICS method. Each use category was assigned a unique number for easy identification and each number is assigned a quality value ranging from 1 through 5. The use category numbers and their associated quality value are the same as in Turner (1988) with the addition of three new use categories (nos. 55, 56 and 57) (Table 7.1). The use categories include 'toxic plants'(#11) and 'animal food' (#13); therefore, use was viewed in a broad cultural sense and was not restricted to economic use.

Table 7.1: Use Categories And Quality Values For Plant Taxa
(Adapted from Turner, 1988)

Use Category No.	Use Description	Quality Value (q)
0	Plant not used	0
	Primary foods:	
01	Roots, rhizomes, bulbs, tubers, corms eaten	5
02	Stems, leaves, sprouts, shoots eaten	5
03	Fruit, nuts, seeds eaten	5
	Secondary foods:	
04	Cambium, secondary phloem (inner bark) eaten	4
05	Mushroom or fungus eaten	4
06	Emergency food or hunger suppressant	4
07	Beverage	4
	Other food-related uses:	
08	Flavoring, sweetening, chewing substance, casual nibble	3
09	Food preparation, cooking pits, food covering, wrapping	3
10	Smoking (i.e., as tobacco)	2
11	Highly toxic if consumed	5
12	Harmful in some way with contact or consumption	4
13	Animal food: known forage or fodder for animal species or Animal use (e.g. marmot hay)	3
	Primary materials:	
14	Wood for implements, containers, construction	4
15	Wood or other product for fuel, fire start	4
16	Fibrous tissue for cordage, weaving, clothing, snares	4
17	Bark sheets for construction, containers	4
	Secondary materials:	
18	Tanning, curing, dyeing on objects	3
19	Pigment, stain, tattooing, decoration, cosmetic on humans	2
20	Scent, incense, deodorant, cleansing agent	3
21	Cement, binding, waterproofing or filling substance	3
22	Bedding, stuffing, bandaging, toweling, diapers	3
23	Miscellaneous useful materials (e.g. drinking straw)	3
	Medicines:	
24	Tonic, general medicine	3
25	Purgative, laxative, emetic	3
26	Medicine for colds, coughs, tuberculosis, influenza	3
27	Poultice or wash for wounds, sores, burns	3
28	Medicine for arthritis, rheumatism, muscular aches, paralysis	3
29	Medicine for kidney and/or urinary ailments	3

Table 7.1 cont.: Use Categories And Quality Values For Plant Taxa
(Adapted from Turner, 1988)

Use Category No.	Use Description	Quality Value (q)
30	Medicine for venereal diseases	3
31	Eye medicine	3
32	Medicine for women, obstetric or gynecological	3
33	Medicine for babies and/or young children specifically	3
34	Medicine for cancer, or what is perceived as cancer	3
35	Medicine for heart, circulatory system, blood pressure	3
36	Counter-irritant	3
37	Analgesic or anesthetic	3
38	Antidote for poisoning	3
39	Medicine for stomach and/or digestive tract	3
40	Medicine: miscellaneous or unspecified	3
	Ritual or spiritual uses:	
41	Birth rites	2
42	Puberty rites	2
43	Death or bereavement	2
44	Shaman's ceremonies, "training", "witchcraft", protection against "witchcraft"	2
45	Hunting or fishing rituals	2
46	First foods ceremony	2
47	Specific taboo or superstition	2
48	Charm for luck, wealth, love, gambling, weather modification, bless yourself or a place	2
	Mythology:	
49	Supernatural role in myth as culture hero	2
50	Supernatural role in myth as magical object	2
51	Natural role in myth or story	2
52	Crest, totem, dance symbol	2
53	Mythical or traditional association with animal	2
	Miscellaneous:	
54	Recreation use, environmental indicator, naming of person or village	2
55	Used in trade	5
56	Indicates good hunting	4
57	Keep mosquitoes away	3
58	Plant not "used" specifically, but known for some outstanding feature or similarity to other plant	2
59	Plant recognized but not "used" specifically or considered exceptional in any way; given unique name (not life form or mid-level name, must be generic or specific name)	1

The intensity of values range from 1 to 5 as in Turner (1988); however, the descriptions of the intensity of use values are slightly different from those in Turner. Turner did not include a separate category for agriculture since agriculture is not found in the cultures of the First Nations peoples in British Columbia. However, if the Ulkatcho ICS values were to be compared to cultures that have agriculture [e.g. Dine (Navajo)] a separate intensity category for agriculture would be needed. Agriculture is a complex process that consumes more time and energy than gathering plants (Harlan, 1985); therefore, agriculture deserves a separate intensity value compared to gathered plants even if the gathered plants have a high use intensity. Plants that have a name but have no use were given an intensity value of 1 so that these named plants with no known use were included in the analysis. The intensity descriptions and values can be found in Table 7.2.

Table 7.2: Intensity Categories And Values For Plant Taxa
(Adapted from Turner, 1988)

Intensity Description	Intensity Value (i)
Species used in agriculture	5
Species used almost daily; can be collected daily or collected seasonally and stored	4
Species only used seasonally	3
Species used in trading or used occasionally	2
Species not used	1

I also changed the exclusivity values and descriptions used by Turner (1988). The values range from 1 to 3 with a new category for plant species that are the only known one used for a specific purpose. Turner (1988) did not include this category; however I felt that this was an important aspect to determine exclusivity. Table 7.3 shows the exclusivity descriptions and values.

Table 7.3: Exclusivity Categories And Values For Plant Taxa
(Adapted from Turner, 1988)

Exclusivity Description	Exclusivity Value (e)
The only species used for a purpose	3
Preferred species used for a purpose	2
One of several species used for a purpose	1

There are rules that I used in the application of ICS analysis. If there was an overlap in uses (e.g. dye for materials and dye used for humans) then the use category with the highest quality value was assigned. If there was a variation in knowledge among consultants then I would use all of the data except when a consultant was not sure and I could not confirm the application using Smith (1920-23, 1929) or Carrier Linguistic Committee (1973). If the species had a generic taxon name (see Ch. 5) but had no use, an ICS value of 1 (1x1x1) was assigned. Medicines were usually given an intensity value of 2 unless the consultant said it was good for you to eat. (In that case then these species got an intensity value of 3) Animal food (use category no. 13) always had an exclusivity value of 1 and either an intensity value of 2 if horses ate the plant (because horses are very important to the Ulkatcho people) or 1 for any other animal. Toxic and harmful plants (use category nos. 11 and 12) were both given an intensity value of 3 and an exclusivity value of 2 and 1, respectively.

The ICS was calculated for each scientific species, with the result that only data acquired for clearly recognized species was used to calculate the ICS. Sometimes species belonging to one genus would be grouped together if the species were morphologically similar and the data indicated that the uses were associated with more than one species. The individual ICS values of the species were not added together to form a new ICS value for the genus because repetition of a use category could occur. Therefore, all of the unique use category importance values (i.e. $(q \times i \times e)_{u_i}$) occurring among the species were added together to form the ICS value for the genus.

Determining Distribution And Use Class For Plants With High ICS Values

The "top ten" species with the highest ICS values were tabulated and their distribution among the BGC zones within Ulkatcho territory was recorded. The BGC zones were determined for each species using my collection data and Meidinger and Pojar (1991). The use categories were summarized for all ten species to determine if a particular use category was prevalent.

Determining Cognate Generic Plant Names Between Ulkatcho And Central Carrier

Generic plant names between Ulkatcho and Central Carrier were compared to determine which names were cognate. Only names between corresponding species were compared. Plant names were only considered cognate if they shared a cognate botanical linguistic element; therefore, if only a non-botanical cognate linguistic element was found in the plant name (e.g. an element glossed as 'ear') then the name was classified as non-cognate. Species could be found in both the cognate and non-cognate group if more than one name was given for the species. The percentage of cognates between Ulkatcho and Central Carrier was calculated as described in Ch. 6.

Determining A Relationship Between ICS Values And Cognate Generic Plant Names

A Mann-Whitney test (Zar, 1984) was performed between cognate and non-cognate plant names. The null hypothesis was rejected at the five percent level (i.e. level of significance .05). The null hypothesis was that there was no difference between the ICS values for cognate plant names and the ICS values for non-cognate plant names. The alternative hypothesis was that there was a difference between the ICS values for cognate plant names and the ICS values for non-cognate plant names, therefore the set of plant names (either cognate or non-cognate) with the higher mean rank would have higher ICS values.

Results

Ulkatcho ICS Values

A list of species arranged by descending ICS values can be found in Appendix E. All of the use category numbers, quality values, intensity values and exclusivity values are included in the list for each species. Here is an example ICS calculation using *Pinus contorta:*

$(4x3x2)_{u4}$ + $(3x1x1)_{u13}$ + $(4x3x2)_{u14}$ + $(4x4x3)_{u15}$ + $(4x2x1)_{u16}$ + $(3x3x1)_{u18}$ + $(3x2x1)_{u26}$ + $(3x2x1)_{u27}$ + $(2x2x1)_{u48}$ = 132.

In total, ICS values were calculated for 293 species. One hundred and twenty-eight species were given an ICS value of 0. The majority of species with ICS values above 0, 76.97 percent (127 species), have ICS values below 20. Thirty-seven species (22.43 percent of species with ICS values over 0) have ICS values ranging from 20 to 99. Only one species, *Pinus contorta* (lodgepole pine), has a value over 100 (.61 percent of species with ICS values over 0).

BGC Zones For Species With Highest ICS Values

The ten species with the highest ICS values and their distribution among BGC zones that are found within

Ulkatcho territory are summarized in Table 7.4. The species include six trees, three shrubs and one herb. The majority of species occur in more than four of the eight BGC zones found within traditional Ulkatcho territory. All eight BGC zones are represented by the ten species; however, the ESSF zone has 100 percent, the MS and SBS zones have 90 percent, the SBPS and IDF zones have 70 percent, the CWH zone has 50 percent, the MH zone has 40 percent and the AT zone has 40 percent of the "top ten" species.

Table 7.4: Plant Species With The Ten Highest Ulkatcho ICS Values And Their Distribution Among BGC Zones That Are Found Within Ulkatcho Territory Data on BGC Zones were obtained from Meidinger and Pojar (1991) unless otherwise indicated. BGC Zones followed by a '*' indicate that the species was collected in the zones by MK. BGC Zones followed by a '^' indicate that the species was collected in the zone by MK but was not reported by Meidinger and Pojar (1991).

Species	ICS	BGC Zones
Pinus contorta	132	CWH*, ESSF*, IDF, MH, MS, SBPS*, SBS*
Shepherdia canadensis	97	ESSF, IDF, MS, SBPS*, SBS*
Picea spp.	81	ESSF, IDF, MS, SBPS*, SBS*
Thuja plicata	60	CWH*, ESSF*, IDF, MH, MS
Heracleum lanatum	56	AT, ESSF*, SBS*
Abies lasiocarpa	55	AT*, ESSF*, MH, MS, SBPS, SBS*
Alnus spp.	54	ESSF, MH*, MS, SBS*
Arctostaphylos uva-ursi	53	CWH, ESSF, IDF, MS, SBPS*, SBS*
Salix spp.	53	CWH, ESSF*, IDF, MH^, MS, SBPS*, SBS*
Populus balsamifera	48	CWH, ESSF*, IDF, MS, SBPS*, SBS*

Use Class For Species With Highest ICS Values

The "top ten" species have a total of 44 uses (Appendix E). The uses can be divided into four use classes: food, taking in nine uses; materials, taking in 18 uses; medicine, taking in ten uses; and "other" taking in seven uses. Animal food (use category no. 13) dominates the food class. Wood for construction (use category no. 14) dominates the material class. Cold treatment (use category no. 26) and poultices for wounds (use category no. 27) dominate the medicine class. Use as an environmental indicator and use in trading dominates the "other" class (use category no. 54 and 55).

Cognate And Non-Cognate Generic Plant Names Between Ulkatcho And Central Carrier

Table 7.5 lists all of the cognate and similar loan generic plant names for the comparable species shared between Ulkatcho and Central Carrier. (Loan words cannot be cognate since the words did not descend from a common source in the ancestral language, but loan words can have similar linguistic structure) The Ulkatcho ICS value associated with the species is also included in Table 7.5. Table 7.6 lists all of the non-cognate generic plant names found for comparable species in Ulkatcho and Central Carrier. The Ulkatcho ICS value associated with the species is also included in Table 7.6. There is a total of 46 comparable species, 14 species have non-cognate names, 25 species have cognate names and 7 species have both cognate and non-cognate names because the plants have two or more names in either Ulkatcho or Central Carrier. The percentage of cognates is 64.50 percent between Ulkatcho and Central Carrier.

The French loan words were identified using Prunet (1990). The origin of the Ulkatcho word for *Populus balsamifera* ssp. *trichocarpa* (black cottonwood), **landooz**, is uncertain. It is not used in Carrier, Chilcotin, or Wet'suwet'en (Athapaskan languages neighboring Ulkatcho) nor is it borrowed from Nuxalk nor Gitksan (non-Athapaskan languages neighboring Ulkatcho). The term might be borrowed from Haisla (part of the Wakashan language family) which uses the term **ꝁ^{w}'l̩ùn̩n̓as** for the same species (Compton, 1993).

Table 7.5: Cognate And Similar Loan Generic Plant Names Between Ulkatcho And Central Carrier With Associated Ulkatcho ICS Values

If a name is followed by a '~' this indicates that the language has another name for the plant that is not cognate. If a name is followed by a '#' this indicates that this is a loan word.

Species	Ulkatcho	Central	ICS (UL)
Abies lasiocarpa Subalpine Fir	**ts'ootsun** **ts'oochun**	**ts'ootsun**	55
Alnus incana & *A. sinuata* Speckled & Sitka Alder	**k'us**	**k'us**	54
Amelanchier alnifolia Saskatoon Berry	**k'en mai** **k'e mai**	**k'en mai ~**	35
Arctostaphylos uva-ursi Kinnikinnick	**dunih**	**dunih**	53
Betula glandulosa Dwarf Birch	**k'i**	**k'i**	24
Carex ?sitchensis Sitka Sedge	**tl'otel**	**tl'otel**	6
Castilleja miniata Common Red Paintbrush	**ditnikwun** **ditnik t'an**	**ditnikwun ~**	18
Cornus stolonifera Red Osier Dogwood	**k'en dulk'un**	**k'en tsi ~**	9
Epilobium angustifolium and *E. hornemannii* Fireweed and Hornemann's Willowherb	**kah t'an** **kas t'an** **khas t'an** **kus t'an**	**kha<u>s</u>**	13
Equisetum spp. Horsetail	**khohdai** **khahdai**	**khohdai**	15
Fragaria virginiana Wild Strawberry	**'indzi** **'inji**	**'indzi**	26
Heracleum lanatum Cow Parsnip	**dagoos** **dugoos**	**gwas** **goos**	56
Juniperus communis Juniper	**datsan 'angut**	**datsan 'angut ~**	34
Ledum groenlandicum Labrador Tea	**ludi ~ #**	**ludi musjek #**	38
Lonicera involucrata Black Twin Berry	**sus mai**	**sus mai**	15
Nuphar polysepalum Yellow Water Lily	**khilht'az** **k'alht'az** **khalht'az**	**khelht'a<u>z</u>** **khelhdaz**	9
Picea engelmannii Engelmann Spruce	**ts'oo**	**ts'oo**	77
Picea mariana Black Spruce	**ts'oo bez**	**ts'oo biz**	6

Table 7.5 cont.: Cognate And Similar Loan Generic Plant Names Between Ulkatcho And Central Carrier With Associated Ulkatcho ICS Values

Species	Ulkatcho	Central	ICS (UL)
Pinus contorta Lodgepole Pine	**chundoo**	**chundoo**	132
Populus tremuloides Trembling Aspen	**t'ughus**	**t'ughus**	42
Pseudotsuga menziesii Douglas Fir	**chuntsi** **tsuntsi**	**chuntsi**	39
Pyrola asarifolia and *P. secunda* Pink Wintergreen and One Sided Wintergreen	**tsadzo**	**tsadzo ~**	12
Ribes oxyacanthoides Gooseberry	**indawuz** **indawus**	**dangwuz** **'ut'angwuz**	15
Rosa spp. Rose	**whus**	**whus ~**	26
Rubus parviflorus Thimbleberry	**danįįkut** **danįhkat** **danįkat** **danįįkat** **ilhdanįkut** **sdanįkut**	**dukdingkal**	42
Salix spp. Willow	**k'idlih** **k'idli** **k'ihdlih**	**k'edlih**	53
Shepherdia canadensis Soapberry	**nowus #**	**ningwus #**	97
Typha latifolia Cat-tail	**tlh'odazoolh** **'oodazoolh**	**tl'oghaz̲ilh**	1
Urtica diocia Stinging Nettle	**whusts'ik** **hoolht'ik** **'ilh ts'ilh**	**hoolhts'i**	12
Vaccinium caespitosum Dwarf Blueberry	**'ilhchul** **'ilhtsul**	**yalhtsul**	20
Vaccinium oxycoccos Bog Cranberry	**eyak'emai** **eyak'utmai**	**'uyak'umai'**	1
Viburnum edule Highbush Cranbery	**tsalhtsee** **chalhtsel** **chalhtse** **tsulhtse chun**	**tsalhtsee**	20

Table 7.6: Non-Cognate Generic Plant Names Between Ulkatcho And Central Carrier With Associated Ulkatcho ICS Values
If a name is followed by a '*' this indicates that the language has another name for the plant that is cognate. If a name is followed by a '#' this indicates that this is a loan word.

Species	Ulkatcho	Central	ICS (UL)
Achillea millefolium Yarrow	**dlukche** **gagisdlache** **khagistl'ache**	**latalba #**	21
Allium cernuum Nodding Onion	**tl'oo tsun** **tl'o tsun**	**lizanyo #**	15
Amelanchier alnifolia Saskatoon Berry	**k'en mai** **k'e mai**	**maidunulhgus ***	35
Aquilegia formosa Red Columbine	**ditnik yikwun** **ditnik 'indak** **ditnik kikwun** **ditnik nikwun**	**whulecho** **whuleyaz**	1
Castilleja miniata Common Red Paintbrush	**'indak** **ditnikwun** **ditnik t'an**	**beuk'enlhtsih ***	18
Chenopodium album Lamb's Quarters	**'indak**	**'ut'antsi'**	0
Chenopodium capitatum Strawberry Blight	**chusdli mai** **dudeninliyunudu k'un** **buziduk'un (?)**	**koonk'etshih**	12
Cornus canadensis Bunchberry	**chusli mai** **ts'etmai**	**goozih mai'**	18
Cornus stolonifera Red Osier Dogwood	**k'endulk'un**	**damba ***	9
Juniperus communis Juniper	**datsan 'angut**	**goh lh'ool ***	34
Ledum groenlandicum Labrador Tea	**'uyak'unilh'a** **yak'umas'aa** **yuk'unilh'a ***	**ludi musjek #**	38
Linnaea borealis Twin Flower	**yuntl'ool**	**dunih tsul mai'**	1
Oplopanax horridum Devil's Club	**whuscho**	**hoolh ghulh**	15
Plantago major Common Plantain	**'indak**	**'utan chischo**	0
Populus balsamifera ssp. *trichocarpa* Black Cottonwood	**landooz #?**	**ts'itel**	48
Solanum tuberosum Potato	**hanaalhyii** **hanulhyeh**	**lubudak #**	20
Pyrola asarifolia and *P. secunda* Pink Wintergreen and One Sided Wintergreen	**tsadzo**	**whuledzo ***	12

Table 7.6 cont.: Non-cognate Generic Plant Names Between Ulkatcho and Central Carrier With Associated Ulkatcho ICS Values

Species	Ulkatcho	Central	ICS (UL)
Rosa spp. Rose	**whus**	**'inchooh'isdai ***	26
Sphagnum spp. Sphagnum Moss	**yenjat tsaal**	**ts'al**	18
Taraxacum officinale Dandelion	**'indak**	**ditnikwun**	0
Trifolium spp. Clover	**'indak**	**nedo chunalhduz**	2
Vaccinium membranaceum Black Huckleberry	**mai #**	**duje**	17

Relationship Between ICS Values And Cognate Generic Plant Names

Using the ICS values from Table 7.5 and 7.6 the Mann-Whitney was calculated. The probability that the null hypothesis occurred is equal to .0219; therefore, since the probability is below the level of significance (.05) the null hypothesis was rejected. The plants with cognate names have a higher mean rank (31.56) than those with non-cognate names (21.59) so the plants with cognate names have higher ICS values than those with non-cognate names.

Discussion

ICS Pattern For Ulkatcho Plants

The majority of species have ICS values below 20 in Ulkatcho. Turner (1988) also found that the majority of species have ICS values below 20 in Nlaka'pamux (Thompson) (64.83 percent) and Stl'ált'imx (Lillooet) (57.53 percent). However, Ulkatcho has a higher proportion of species with low ICS values than both Nlaka'pamux (Thompson) and Stl'ált'imx (Lillooet), and Stl'ált'imx (Lillooet) has a higher proportion of species with lower ICS values than Nlaka'pamux (Thompson). Turner (1988) suggested that the greater number of lower ICS values for Stl'ált'imx (Lillooet) results from Nlaka'pamux (Thompson) data being more complete. This is a plausible explanation for the Ulkatcho data as well because not all Ulkatcho Elders were interviewed so the data are not complete. Also, Turner suggested that plants are more widely used in Nlaka'pamux (Thompson) because of a greater ecological and floristic diversity within Nlaka'pamux (Thompson) territory compared to Stl'ált'imx (Lillooet) territory. On close inspection though the Nlaka'pamux (Thompson) does not have a wider ecological or greater floristic diversity than the Ulkatcho territory. The Nlaka'pamux (Thompson) territory includes six BGC zones that include AT, CWH, IDF, ESSF, MH and PP, of which five of these zones are found in Ulkatcho territory. Perhaps the importance of plants within a culture is not entirely related to the environment but to the inherited cultural framework. For example, during the development of the culture the degree of emphasis on plants could result from characteristics of the people, regardless of the environment. Possibly during the evolution of the culture the individuals who were plant specialists did not get a chance to pass on all of their knowledge. Another possibility is that acculturation has had a greater effect on Ulkatcho plant knowledge than Nlaka'pamux (Thompson). However, a great deal of acculturation has also occurred within the Nlaka'pamux (Thompson) community (Turner et al., 1990).

One problem comparing among Ulkatcho, Nlaka'pamux (Thompson) and Stl'ált'imx (Lillooet) is that the ICS values were calculated with different intensity and exclusivity values. For example, an intensity value of 5 was never used in the Ulkatcho data, whereas it was used in Nlaka'pamux (Thompson) and Stl'ált'imx (Lillooet). This occurs because of the different descriptions for intensity values employed by myself and Turner. (I defined an intensity value of 5 as species being used in agriculture and Turner defined it as species with very high intensity of use.)

Distribution And Use Class For Plants With High ICS Values

The ten species with the highest ICS values are considered to have high perceptual salience because of their distinctive morphology. This observation is consistent with Turner's (1988) observations that almost all highly visible trees and shrubs are recognized by Nlaka'pamux (Thompson) and Stl'ált'imx (Lillooet).

The abundance and distribution of species within the Ulkatcho territory have a direct relationship to high ICS values as observed in other regions by Turner (1988). Most of the ten species are common and abundant throughout the Ulkatcho territory. *Thuja plicata* and *Heracleum lanatum* are more restricted in distribution, although, *Heracleum lanatum* can be locally abundant. The majority of species within the "top ten" ICS values are found in more than half of the BGC zones within the Ulkatcho territory; none is restricted to a specific BGC zone. All eight BGC zones are represented by the ten species; however, some zones include more of the "top ten" plants than other zones. Generally there is a pattern that the larger the extent of the zone, the greater the proportion of "top ten" species occurring in that zone. The zones (SBS and MS) which contain 90 percent of the "top ten" species also occupy the largest proportion of Ulkatcho territory, whereas zones that occupy the least proportion of Ulkatcho territory (AT, CWH and MH) have the smallest proportion of "top ten" species. This pattern suggests that the larger the area the more frequently encountered are the species, and the more likely they are to be available and used. One exception to this pattern is that the ESSF zone occupies a small extent of territory but all "top ten" species are found in this zone. One explanation for this occurrence is that the ESSF zone, which is located at elevations above the SBS zone, incorporates many of the species found in the SBS zone (Meidinger and Pojar, 1991).

There is not a pattern among the "top ten" species for a use category except that the dominant use class is material. However, "material" is not the dominant use class if all of the plants with recorded uses are compared. Therefore, the dominance of the material use class in the "top ten" plants does not reflect the overall use pattern for all plants. Perhaps plant species which can provide "materials" can also possess many other types of useful characteristics as opposed to plants species that cannot be used for materials.

Generally it seems that the ICS values are an accurate representation of the relative importance a plant has within Ulkatcho culture based on intuitive observations. Quite often species with the highest ICS values were mentioned voluntarily during conversations about other plants by the consultants. However, some species have unexpectedly low ICS values.

One reason for unexpectedly low ICS values for some species may result from the way ICS values are calculated. *Vaccinium membranaceum* probably was one of the most picked berries and could still be but this was not apparent in the data. In other cultures the "real berries" (identified lexically) are collected in masses (Chipewyan Marles, 1984; Dena'ina Kari, 1990; Navajo Bailey, 1940).

The exclusivity of use value could be underestimated and might have been 2 (preferred species) instead of 1, resulting in a ICS of 32 instead of 17. The low ICS could also reflect a problem with the ICS formula, perhaps quantity should be integrated into the formula:

$$ICS = \sum_{i=1}^{n} (q \times i \times e \times x)_{u_i}$$

where x equals quantity. The quantity values could be low (x = 1), medium (x = 2) or high (x = 3). Quantity is not parallel to intensity. Berries of many plant species in Ulkatcho are collected and made into berry cakes so *Vaccinium membranaceum* would still have an exclusivity value of 1 and an intensity value of 3 but the large quantities due to local abundance would be accounted for by using a quantity value of 3, resulting in an ICS of 47.

Lexical Retention Between Ulkatcho And Central Carrier

The comparison of cognate and non-cognate plant names between Ulkatcho and Central Carrier shows that there is a general pattern that plant names of plants with higher ICS values are more likely to be cognate than plant names of plants with lower ICS values. That is, plants with higher cultural significance have names that are more stable and tend to be retained over time while plants with lower cultural significance have names that more readily change over time. This was statistically proven using the Mann-Whitney test. The sample (46 species) does not represent all species, but the size is large enough to use a statistical test and to give a general pattern. Berlin et al. (1973) also found the same pattern, although it was not proved statistically, for two Mayan languages.

The cognate names had some low ICS values (under 20). Some of the low ICS values resulted from incomplete ethnobotanical data (e.g. *Picea mariana*, *Typha latifolia*, *Vaccinium oxycoccos*). One species (*Cornus stolonifera*) appears to be more important historically since Smith (1920-23) recorded additional uses to those I recorded. Perhaps the other plants with low ICS values, but having names that are cognate, were more important in the distant past but due to acculturation, or other changes within the culture, the plants experienced a decrease in importance before Smith collected the data. It is possible that there is a 'lag time' between relative importance and lexical retention. As a plant decreases in relative importance the name can still be retained initially but over time the likelihood of retention diminishes.

Likewise, there are some high ICS values (above 19) for non-cognate plant names. In all but three cases there was more than one Ulkatcho or Central Carrier name for the species and a pair of the names were cognate. Therefore, the cognate terms have not been lost but new terms have been added. The other three cases involve loan words that were used in either Ulkatcho or Central Carrier. These terms could be affected by lexical and cultural exchange between Ulkatcho and Central Carrier.

Berlin et al. (1973) used the Tzeltal-Tzotzil comparison because lexical and cultural exchange did not occur between the two languages; therefore, these two factors could be ruled out as affecting the cognate plant names. The researchers wanted to show that high cultural significance could be the sole factor for lexical retention because at the time historical linguists proposed that culturally significant items would have names that changed rapidly. The Ulkatcho and Central Carrier comparison shows that cultural significance is an important factor influencing plant name retention even though linguistic and cultural exchange is occurring.

The procedure used to compare lexical retention between Ulkatcho and Central Carrier assumed that the species would have similar ICS values in both cultures. If the ICS values were calculated for both dialects then a Wilcoxon paired-sample test could be performed using the ICS values for all species in Ulkatcho and Central Carrier. This is a non-parametric test that is used when each observation in a sample is correlated with an observation in the other sample (Zar, 1984). This test would show whether the ICS values for each species are similar in Ulkatcho and Central Carrier.

It is interesting that the percentage of botanical cognates is below 65 percent between the two dialects; this is even with cultural interaction between the dialects. Cook (1992) states that Ulkatcho has 90 percent lexical similarity with Central Carrier. Therefore, the low cognate percentage suggests that plant names are not as stable as other lexemes within a language. Turner et al., (1993) found that Interior Salish tree names were less stable than other lexemes in the languages. This observation further supports the idea that botanical terms are not only affected by linguistic factors but by environmental and cultural factors as well.

Summary and Conclusions

The ICS values calculated from Ulkatcho botanical data shows that most species have low ICS values (below 20). The low values could reflect incomplete data, inherited cultural framework or loss via acculturation. They do not appear to be the result of low floristic diversity which is rich in Ulkatcho territory compared to the rich floristic diversity in Nlaka'pamux (Thompson) territory.

The ten species with the highest ICS values are found in over half of the BGC Zones within Ulkatcho territory. The species have high perceptual salience and are usually locally abundant. This pattern suggests that the more frequently encountered the species is, the more likely that it is used. "Material" is the dominant use class shared among the "top ten" species which suggests that plants that can be used for "material" may also possess other useful characteristics.

The plant names of Ulkatcho Carrier and Central Carrier were compared to determine whether plant names were retained more often if the plant had a high ICS value. ICS values belonging to plants with cognate names were compared to ICS values belonging to plants with non-cognate names, using a non-parametric Mann-Whitney test. Plants with cognate plant names have higher ICS values than plants with non-cognate plant names; an important plant is more likely to have its name retained than one that is not as important. However, other factors affect lexical retention: lexical exchange, cultural exchange and environmental factors. Plant names in Ulkatcho and Central Carrier are apparently not as stable (i.e. change more rapidly in the evolution of a language) as other words in the languages.

The ICS concept provides an accurate representation of the relative importance of a plant within a culture and supplies the researcher with many new opportunities to analyze ethnobotanical data.

CHAPTER 8: COMPARISON BETWEEN HISTORICAL AND CURRENT ULKATCHO ETHNOBOTANICAL INVENTORIES

Introduction

Cultures are not static but evolve over time and since plant knowledge belongs within the framework of culture it too can change over time. Ethnobotanical data with accurate plant identification have been collected since the late nineteenth century within North America (Ford, 1978). Therefore, historical data can be compared to current data to see if changes have taken place. Changes may be explained by cultural processes like acculturation or intercultural exchange, although these processes might not affect all components of an ethnobotanical inventory the same way. Certain uses may be greatly affected by these processes. On the other hand the relative cultural importance of a plant species may influence the impact of such processes.

Historical comparisons of ethnobotanical data have not been performed often by other researchers. This might be the result of the lack of an appropriate method. With the use of ICS analysis a simple method is available to carry out historical comparisons. ICS analysis can also be used to show if the changes that occurred are related to a particular use category or cultural importance of the species.

The historical Ulkatcho ethnobotanical data collected by Harlan Smith in 1920-1922 is compared with the current Ulkatcho data collected in 1992-1993 to determine if any changes in status and knowledge of ethnobotanical information have occurred. Because of the acculturation of Ulkatcho culture into Western culture including the restriction of the seasonal rounds, I suspect that there will be an overall decline in all plant knowledge. In order to determine whether a particular use class (e.g. food, medicine, materials and other uses) undergoes more change than other use classes, the use categories are enumerated for each comparable species for both historic and current ethnobotanical data. This provides a basis for comparison of losses and gains. Plants with high ICS values might not show a change in knowledge or less change compared to plants with low ICS values. Therefore, Ulkatcho percentage of change values and ICS values are examined to determine if there is a relationship.

Background

From 1920 to 1922 Harlan Smith, working for the Geological Survey of Canada, collected Ulkatcho ethnobotanical data. Smith obtained most of the data from Charlie West, an Ulkatcho Elder. Smith (1928) published some information about medicinal plants. However, the majority of the data remained in an unpublished manuscript (Smith, 1920-22) in the possession of the Canadian Museum of Civilization. These notes are being edited and annotated by Drs. Brian Compton, Bruce Rigsby and Marie-Lucie Tarpent, and will be published in the near future by the Canadian Museum of Civilization. The handwritten notes are not always legible; collection numbers are not always given and the data is hard to read at some points. Nevertheless, the manuscript provides a basis for an historical comparison of Ulkatcho ethnobotanical data.

Smith used plant specimens in his interviews and the bulk of specimens are housed at the Canadian Museum of Nature (CMN). The plant identifications were recently revised by the CMN no later than 1988 (Personal communication, Peter Frank, Canadian Museum of Nature, 1993). I received a database of 225 specimens that had 66 changes in identifications. This database does not contain all of Smith's collections (for example 26 species in Smith's (1928) article are not found in the CMN database). Therefore, not all of Smith's identifications could be confirmed.

Materials And Methods

Deriving A Percentage Of Change

I employed use category numbers (Table 7.1 in Ch. 7) from the ICS analysis to tabulate the historical and current Ulkatcho ethnobotanical data. This approach allows for a simplified comparison between historical and current data since only numbers are compared.

In order to show the degree of change in ethnobotanical data the percentage of change (PC) was calculated using the formula:

$$PC = \left(\frac{l}{h} + \frac{g}{c}\right)_{S_x} \times 50$$

where S_x equals a species (or group of species); l equals the total number of 'lost uses'; h equals the total number of historical uses; g equals the total number of 'gained uses'; c equals the total number of current uses. 'Lost and gained uses' are determined by comparing the historical and current ethnobotanical data. If the current data for a species had a use category that did not occur in the historical data for the same species then this is called a "gain" (i.e. current data gained a use category). If the historical data for a species had a use category that did not occur in the current data for the same species then this is called a 'loss (i.e. current data lost a use category). The equation is multiplied by 50 instead of 100 because two ratios have been added together, totaling 100 percent.

In cases where an unspecified medicine (use category number 40) was recorded for a species in one set of data and there was a specified medicinal use (use category numbers 24 through 39) use in the other set of data it was assumed that the specified medicinal use represented the unspecified medicinal use. For example if a species in the current data had a unspecified medicinal use and the same species in the historical data had a specified medicinal use, then it was assumed that there was only a lost use category in the data (even though it was a partial loss), not a lost and a gained use category in the data.

Whenever possible, updated contemporary species names were used for the historical data, based on the identifications provided by the Canadian Museum of Nature. Comparisons between identical species collected in 1920-22 and 1992-93 were not always possible; sometimes species were grouped together [e.g. Poaceae (grass)] or similar species compared [e.g. *Scirpus* spp.(bulrush)]. All of these species make up a comparable species group. Therefore, both the historical and current ethnobotanical inventory contain data about species that could not be used in this study.

Deriving A Relationship Between Percentage Of Change And Use Classes

Each use number was evaluated among all of the species considered in the comparison. This analysis was applied separately for historical and current data. Each use category that underwent a "loss" or a "gain" per species was also enumerated among all of the comparable species.

The use categories were grouped into four general use classes: food and food related uses (use category numbers 1 through 13), materials (use category numbers 14 through

23), medicines (use category numbers 24 though 40) and "other" uses (use category numbers 41 through 59). The use category numbers were enumerated for each of the use classes for historical data, current data, "lost"' data and "gained" data. The PC was calculated for each use class using the above formula except that U_X replaces S_X where U_X equals a selected range of Use Category numbers that represents a use class.

Deriving A Relationship Between PC Values And ICS Values

A Spearman's rank correlation (Zar, 1984), a nonparametric test, was performed on the PC values and ICS values. The correlation was performed on species with ICS values greater than 0. At the 5 percent level (i.e. level of significance is 0.05) this test rejects the null hypothesis that there is no correlation between PC values and ICS values. The alternative hypothesis is that there is a correlation between PC values and ICS values.

Results

Percentage Of Change Values For Ulkatcho Plant Species

Table 8.1 shows that the majority of species, 63.70 percent, have undergone a change of knowledge and of these most apparently show increase in knowledge rather than a decrease: 136 comparisons were performed, 40 comparisons had only gains, 22 had only losses, and 25 had both gains and losses. Forty-nine comparisons showed no change, of which 34 had no use.

Table 8.1: Comparisons Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

If a species is followed by an 'H' this indicates that the name represents an historical identification. If a species is followed by a 'C' this indicates that the name represents a current identification. If no letter follows the species name then the names were both the same for the historical and current identifications. The numbers found in the historical and current use category number columns correspond to the use category numbers found in Table 7.1. PC represents the calculated percentage of change. The ICS values are based on current Ulkatcho data.

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Abies spp. Fir	14 40	23 24 27	75.00	55
Achillea millefolium Yarrow	26	26 27 57	33.33	21
Actaea rubra Baneberry	0	13	50.00	3
Allium cernuum Nodding Onion	1	1	0.00	15
Alnus spp. Alder	18 27	9 15 27 40	75.00	54
Amelanchier alnifolia Saskatoon Berry	3 14	3 13 14	16.67	35
Anaphalis margaritacea Pearly Everlasting	0	0	0.00	0
Anemone multifida Pacific Anemone	24 26	0	50.00	0
Angelica spp. Angelica	0	0	0.00	0
Antennaria neglecta Pussytoes	0	0	0.00	0
Apocynum androsaemifolium Spreading Dogbane	59	0	50.00	0
Aquilegia formosa Red Columbine	0	59	50.00	1

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Arceuthobium americanum American Dwarf Mistletoe	26	13 15	100.00	11
Arctostaphylos uva-ursi Kinnikinnick	3 10	3 10 13 26	25.00	53
Arnica cordifolia Heart Leaved Arnica	0	0	0.00	0
Artemisia michauxiana Michaux's Wormwood	27	0	50.00	0
Aster foliaceus Leafy Bracted Aster	0	0	0.00	0
Athyrium filix-femina Lady Fern	1	1	0.00	15
Betula papyrifera Paper Birch	14 17 ?23	17	33.33	36
Bryophyta (All) Mosses	21 22 40	21 22 51	33.00	26
Bryoria fremontii Black Hair Lichen	15	13 15 23 54	37.50	25
Caltha leptosepala Alpine White Marshmarigold	13	0	50.00	0
Campanula spp. Harebell	0	0	0.00	0
Capsella bursa-pastoris Shepard's Purse	0	59	50.00	1
Carex spp. Sedge	0	13 16	100.00	14
Castilleja miniata Common Red Paintbrush	0	8 48	100.00	18
Cerastium spp. Chickweed	0	0	0.00	0
Chenopodium capitatum Strawberry Blight	2	19	100.00	12
Chimaphila umbellata Prince's Pine	0	24	50.00	24

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Chrysanthemum leucanthemum Oxeye Daisy	0	40	50.00	6
Cicuta douglasii Water Hemlock	11 27?	11	25.00	30
Cirsium spp. Thistle	59	12	50.00	12
Cladonia spp. Lichen	0	13	50.00	3
Claytonia lanceolata Western Springbeauty	1	1	0.00	15
Clintonia uniflora Queen's Cup	0	0	0.00	0
Cornus canadensis Bunchberry	3 31	31	25.00	18
Cornus stolonifera Red Osier Dogwood	13 14 16 54	13 27	62.50	9
Cryptogramma crispa Rock-brake	0	0	0.00	0
Dryas octopetala White Mountain Avens	0	?0	0.00	0
Dryopteris carthusiana, D. campyloptera, D. expansa Wood Fern	1	1 13 40	33.33	27
Elaeagnus commutata Silverberry	0	0	0.00	0
Epilobium adenocaulon (H) *Epilobium hornemannii (C)* Willowherb	0	13	50.00	3
Epilobium angustifolium Fireweed	2	10 13 57?	100.00	13
Epilobium latifolium River Beauty	0	0	0.00	0
Equisetum hyemale Common Scouring Rush	23	13 40	100.00	9
Erigeron spp. Fleabane	0	0	0.00	0

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Erythronium grandiflorum Trout Lily	1	1	0.00	10
Fomes spp. Shelf Fungus	25	40	50.00	6
Fragaria virginiana Wild Strawberry	3	3 35	25.00	26
Fritillaria camschatcensis Rice Root	1	1	0.00	15
Galium spp. Bedstraw	0	13 57	100.00	9
Geum macrophyllum	24 27	0	100.00	0
Gymnocarpium dryopteris Oak Fern	0	0	0.00	0
Heracleum lanatum	2 57	2 13 54	58.33	56
Heuchera spp. Alumroot	0	0	0.00	0
Hieracium spp. Hawkweed	0	0	0.00	0
Hippuris spp. Mare's Tail	0	59	50.00	1
Juniperus communis Juniper	35 40	24 26 48 57	100.00	34
Lathyrus spp. Peavine	0	0	0.00	0
Ledum groenlandicum Labrador Tea	7	7 26	25.00	38
Lichens (All)	13 15 19 55	6 13 15 23 26 39 40 59	62.50	52
Linnaea borealis Twin Flower	0	59	50.00	1

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Lonicera involucrata Black Twin Berry	13 31	13 27 31	16.67	15
Lupinus arcticus Arctic Lupine	59	13	50.00	3
Lycoperdales Puffballs	59	59	0.00	1
Lycopodium annotinum (C) *Lycopodium clavatum (H)* Clubmoss	40	54	100.00	4
Malus fusca Western Crabapple	0	59	50.00	1
Mentha arvensis Field Mint	24	28	100.00	6
Mimulus guttatus Yellow Monkey Flower	0	0	0.00	0
Montia spp. Miner's Lettuce	0	0	0.00	0
Mushrooms	5	5 12 13 55	37.50	68
Nuphar polysepalum Yellow Water Lily	13	13 40	25.00	9
Oplopanax horridum Devil's Club	32	13 26 27	100.00	15
Osmorhiza spp. Sweet Cicely	1	0	50.00	0
Pachistima myrsinites Falsebox	59	25 32	100.00	12
Penstemon diffusus (Could be *P. davidsonii*) (H) *Penstemon fruiticosus* (C) Penstemon	0	40	50.00	6

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Picea spp. Spruce	13 14 15 16 18 21 23 31 39	14 18 22 26 27 41 48	74.39	81
Pinus albicaulis Whitebark Pine	3 4 15?	3	33.33	30
Pinus contorta Lodgepole Pine	4 13 14 15 16 17 18 21 39	4 13 14 15 16 18 26 27 48	33.33	132
Plantago major Common Plantain	0	0	0.00	0
Poaceae (All) Grass	9 22 23 57	12 13 59	100.00	19
Populus balsamifera Black Cottonwood	14 19 22 26 57	14 19 27	46.50	48
Populus tremuloides Trembling Aspen	14 15 39	15 40 56	67.00	42
Porphyra spp. Seaweed	2 ?18	2	25.00	40
Prunus spp. Cherry	3 19	3	25.00	15
Pseudotsuga menziesii Douglas-Fir	4 15	14 15 24 27	62.50	39
Pyrola asarifolia Pink Wintergreen	31	26	100.00	6
Pyrola secunda One-Sided Wintergreen	31	27	100.00	6

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Ranunculus cymbalaria Shore Buttercup	0	0	0.00	0
Ranunculus acris (H), R. repens (C), R. uncinatus (H) Buttercup	0	0	0.00	0
Rhododendron albiflorum White Mountain Rhododendron	10	10 23	25.00	10
Ribes lacustre Black Gooseberry	0	3 13	100.00	18
Ribes bracteosum (H), R. glandulosum (C), R. laxiflorum (H) Currant	3	3	0.00	15
Ribes oxyacanthoides (C) *Ribes divaricatum (H)* Gooseberry	3	3	0.00	15
Rosa spp. (All) Rose	59	32	50.00	26
Rubus idaeus Raspberry	3	3	0.00	15
Rubus leucodermis Blackcap	3	3	0.00	15
Rubus parviflorus Thimbleberry	3 9 54	3 9	16.67	42
Rumex acetosella Sheep Sorrel	0	0	0.00	0
Rumex occidentalis Western Dock	0	2	50.00	15
Teliomycete (class) Rust	0	0	0.00	0
Salix spp. (All) Willow	13 14 16	13 14 16 23 31 48 56	57.14	80
Sambucus racemosa Red Elderberry	3 25 54	3	33.33	20

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Sanguisorba sitchensis Sitka Burnet	0	0	0.00	0
Saxifraga spp. Saxifrage	0	0	0.00	0
Scirpus spp. Bulrush	59	13 23	100.00	24
Sedum divergens Spreading Stonecrop	0	2	50.00	10
Sedum spp. Stonecrop	0	0	0.00	0
Senecio triangularis Arrow Leaved Groundsel	0	13	50.00	3
Shepherdia canadensis Soapberry	3	3 25 31 55	37.50	97
Sium suave Water Parsnip	1	1	0.00	15
Smilacina racemosa False Solomon's Seal	0	0	0.00	0
Smilacina stellata Star Flowered False Solomon's Seal	0	0	0.00	0
Solidago spp. Goldenrod	0	0	0.00	0
Sorbus spp. Mountain Ash	26	0	50.00	0
Sphagnum spp. Sphagnum	22	21 22	25.00	18
Spiraea betulifolia Flat Top Spirea	0	0	0.00	0
Spiraea douglasii Spirea	0	0	0.00	0
Streptopus amplexifolius Twisted Stalk	9?	0	50.00	0
Symphoricarpos albus Snowberry	14 31	0	100.00	0
Thuja plicata Western Red Cedar	14 16 22 45	14 16 22	12.50	60
Trifolium pratense Red Clover	0	0	0.00	0

Table 8.1 cont.: Comparisions Between Use Categories Numbers For Plant Species Arranged Alphabetically In Historical And Current Ulkatcho Ethnobotanical Inventories

Species	Historical Use Category No.	Current Use Category No.	PC	ICS
Trifolium repens White Clover	0	54	50.00	2
Tsuga heterophylla Hemlock	22	23	100.00	6
Typha latifolia Cat-tail	0	59	50.00	1
Urtica dioica Stinging Nettle	16	12	100.00	12
Vaccinium alaskaense Alaskan Blueberry	3?	3	0.00	15
Vaccinium caespitosum Dwarf Blueberry	3	3	0.00	20
Vaccinium membranaceum Black Huckleberry	3	3 54	25.00	17
Vaccinium ovalifolium Oval Leaved Blueberry	3	3	0.00	15
Vaccinium parvifolium Red Huckleberry	3	3	0.00	15
Valeriana sitchensis Sitka Valerian	20	0	50.00	0
Veratrum viride Indian Hellebore	9 25	11 27	100.00	36
Veronica spp. Speedwell	0	0	0.00	0
Viburnum edule Highbush Cranberry	3 14	3	25.00	20
Viola adunca Early Blue Violet	39	0	50.00	0

Relationship Between Ulkatcho PC And Use Classes

Table 8.2 details the enumeration for each use category number for both historical and current data and shows that the overall distribution of historical and present occurrences is similar for most use category numbers. Use category numbers 12, 13, 14, 26, 27, 40, and 48 have the greatest difference in occurrence between historical and current species with use 14 being the only use category number that has a greater occurrence in the historical data. The losses and gains show that the species use data collected historically differ greatly from data collected today.

Table 8.2: Enumeration Of Use Category Numbers For Plant Species In Historical And Current Ulkatcho Ethnobotanical Inventories

Use Category Number	Total No. of Historical Uses Per Use Category	Total No. of Current Uses Per Use Category	Total No. of "Lost" Uses Per Use Category	Total No. of "Gained" Uses Per Use Category
01 Roots etc. eaten	8	7	1	0
02 Stems etc. eaten	4	4	2	2
03 Fruit etc. eaten	19	19	1	1
04 Cambium etc. eaten	3	1	2	0
05 Mushroom eaten	1	1	0	0
06 Emergency food	0	1	0	1
07 Beverage	1	1	0	0
08 Add flavour to food	0	1	0	1
09 Food preparation	4	2	3	1
10 Smoked	2	3	0	1
11 Toxic	1	2	0	1
12 Harmful	0	4	0	4
13 Animal food	8	26	2	20
14 Wood for construction	12	7	6	1
15 Wood for fuel	7	7	2	2
16 Fibrous tissue for cordage	6	4	3	1
17 Bark sheets for construction	2	1	1	0
18 Tanning etc.	4	2	2	0
19 Pigment etc.	3	2	2	1
20 Incense etc.	1	0	1	0
21 Cement etc.	3	2	2	1
22 Bedding etc.	6	4	3	1
23 Misc. useful materials	4	7	4	7
24 General medicine	3	4	3	4
25 Purgative etc.	3	2	3	2
26 Cold medicine	5	9	4	8
27 Poultice for wounds etc.	4	12	3	11
28 Arthritis etc. medicine	0	1	0	1

Table 8.2 cont.: Enumeration Of Use Category Numbers For Plant Species In Historical And Current Ulkatcho Ethnobotanical Inventories

Use Category Number	Total No. of Historical Uses Per Use Category	Total No. of Current Uses Per Use Category	Total No. of Lost Uses Per Use Category	Total No. of Gained Uses Per Use Category
31 Eye medicine	6	4	4	2
32 Medicine for women	1	2	1	2
35 Heart etc. medicine	1	1	1	1
39 Stomach etc. medicine	4	1	4	1
40 Misc. medicine	4	9	3	8
41 Birth rites	0	1	0	1
45 Hunting etc. rituals	1	0	1	0
48 Charm	0	5	0	5
51 Natural role in myth	0	1	0	1
54 Recreation use etc.	3	5	3	5
55 Used in trade	1	2	1	2
56 Indicates good hunting	0	2	0	2
57 Keeps mosquitoes away	3	4	3	4
59 Recognized but no use	7	10	1	8

The percentage of change was calculated for each use class (Table 8.3). For example the PC for food and related food uses:

$$PC = \left(\frac{11}{51} + \frac{32}{72}\right)_{U_x} \times 50 = 33.01\%$$

Medicinal uses underwent the highest percentage of change followed by "other" uses.

Table 8.3: Ulkatcho PC Values For Each General Use Class

Use Class	Range of Use Category No.	Total No. of Historical Uses Per Use Class	Total No. of Current Uses Per Use Class	Total No. of Lost Uses Per Use Class	Total No. Of Gained Uses Per Use Class	PC Per Use Class
Food and Food Related	1-13	51	72	11	32	33.01
Material	14-23	48	36	26	14	46.53
Medicine	24-40	31	45	26	40	86.38
Other	41-59	15	30	9	28	76.67
All Uses	1-59	145	183	72	114	56.15

Relationship Between Ulkatcho PC Values And ICS Values

Using the ICS and PC values from table 8.1, the Spearman rank correlation equals -.149. The critical value at a level of significance of .05 for the sample size of 91 was 0.206; therefore, the null hypothesis was accepted and there is no significant relationship between PC values and ICS values.

Discussion

Changes And Stability In Ulkatcho Ethnobotanical Data

I suspected that there would be an overall decline in all Ulkatcho plant knowledge. Marles (1984) also expected to find a decline of plant knowledge for the Chipewyan data. However, this was not the case in either Chipewyan or Ulkatcho. Marles (1984) found the Chipewyan ethnobotanical data was evolving in response to acculturation. A great deal of change over the past 70 years was found in the Ulkatcho study but the changes include both losses and gains in ethnobotanical knowledge. Surprisingly most of the changes were gains. There are several possible explanations for these significant changes.

Some of the "gains" could be the result of intercultural exchange. Goldman (nd, approximately 1940) observed that originally the Ulkatcho did not have much interaction with the Upper Carrier Villages or Fraser River communities. These interactions may have increased over the past decades because of easier transportation and an intentional exchange of traditional knowledge. Today Elders visit different communities within the Carrier language area as well as outside it. For example Sophie Thomas, who is a Central Carrier herbal specialist, gives talks in different communities about traditional medicinal knowledge. While I was carrying out this study, the Ulkatcho were visited by a medicine man from Montana, Buster Yellowkidney, during a cultural gathering. Also, Ulkatcho people attend large Powwows in the U.S.A. and in other provinces. This provides possibilities for cultural exchange with peoples of other language groups.

Another reason for "gains" in ethnobotanical data may be that the historical data are incomplete. One consultant, the number of consultants employed by Harlan Smith, cannot provide all of the botanical data for a culture even though in Ulkatcho culture there was little specialization of skills for everyday life (Goldman, nd, approximately 1940). [It seems that shamans specialized in singing to provide cures as opposed to herbal remedies (Goldman, nd approximately 1940).] Likely, each individual had a set of practical skills which included medicinal knowledge (McClellan and Denniston, 1981). However, the set of practical skills was likely not the same from person to person. Elders in the current study said that different Carrier people know different information especially relating to medicines; therefore, individuals can have different medicinal plant knowledge depending on their background. Goldman (nd, approximately 1940) pointed out that women's health issues would be known mainly by women. Therefore, it is important to talk to as many consultants as possible to obtain a comprehensive representation of the culture's plant knowledge. Also, Smith's analysis was not as systematic as ours is.

The ethnobotanical "losses" are a result of acculturation and incomplete collecting of current data. Acculturation, in the form of restriction of seasonal rounds and the introduction of western products, is a serious factor affecting ethnobotanical inventories. Today traditional plant are employed less and less. When Elders talk of traditional plant uses they are usually referring to uses that were employed during their childhood. Although an attempt was made to interview as many Elders as possible, the current data certainly does not reflect all Ulkatcho plant knowledge.

My historical comparison also showed that data on some plant species did not undergo a change over time. Most of the species in this case have no use. So, it appears that new uses are not being developed for plants with no previous uses. However, the "losses" and "gains" show that the data for useful species have changed. Perhaps useful plants tend to possess many useful characteristics, whereas unused plants may not.

Relationship Between Ulkatcho PC And Use Classes

The use categories showing the greatest change are found in all general use classes. As with other types of changes differences could be a result of incomplete historical data, increased intercultural exchange and acculturation. However, there may be more specific explanations.

Medicinal uses have undergone the highest percentage of change. This high PC value is a result of two factors. The higher current number of medicinal uses is mainly due to a gain in cold and wound medicines (26 and 27) which could be the result of changes in Ulkatcho medicinal uses. One Elder said that western health practitioners had said not to use traditional medicines for serious ailments. A cold or a small wound may not be considered a serious problem and can be treated easily with traditional medicines; consequently the relative use of these types of medicines may appear to have increased. The medicinal uses have apparently also shifted to different species.

"Other" uses, dominated by ritual and mythology, show the second highest percentage of change. In this case the higher current number is probably due to incomplete historical information. Perhaps Smith did not record plant information relating to ritual and mythology (e.g. charms, use category number 48). These types of uses were possibly not recognized by a researcher without training in anthropological methods.

Food and related food uses have undergone the lowest percentage of change, perhaps indicating that this type of plant knowledge is the most stable within the Ulkatcho culture.

Although it is difficult to determine what is most affected by acculturation since the historical data are not complete, perhaps everyday uses (e.g. food, food related uses, and materials) are affected less by acculturation than non-everyday uses (e.g. medicines, rituals and myths).

It is possible that a culture could be characterized by its use category distribution. For instance the Ulkatcho ethnobotanical inventory, both historical and current, contains little data relating to mythology and ritual. The Ulkatcho people have been exposed to Catholicism since 1880 (Goldman, nd approximately 1940); and historical and current ethnobotanical data relating to mythology and traditional beliefs may have both been affected. Since the Catholic church discourages non-catholic myths and rituals, the Ulkatcho myths and rituals may have been affected greatly by this intrusive agent of change.

The PC formula takes into account "losses" and "gains" in ethnobotanical data as well as their relative occurrence in historical and current data. The number of "losses" for material and medicinal categories are equal; however, the historical data contain more information about materials than medicines. Therefore, the relative occurrence must be taken into account in order to obtain an accurate representation of change. A disadvantage of the PC method is that it does not distinguish between "losses" and "gains"; the original data must be consulted for these.

Relationship Between Ulkatcho PC Values And ICS Values

The Ulkatcho ethnobotanical data show little correlation between ICS values and PC values; species with high ICS values undergo change as often and as much as species with low ICS values. Perhaps if the data were complete there might be a correlation found in the Ulkatcho ethnobotanical data between ICS values and PC values and specifically that species with low ICS values experience a loss in knowledge more often than species with high ICS values. However, it would not be possible to make the historical data complete unless additional unknown sources were discovered.

Future Research: Relationship Between Ulkatcho PC Values And Environment

Changes in plant use could be related to the environment. Species that are predominately found in an environment that is not visited often could undergo a greater degree of change, specifically loss of associated use or knowledge, compared to species found in environments that are visited often. For example, in Ulkatcho culture species found in BGC zones that are still part of a limited seasonal round may undergo fewer losses than species found in BGC zones located near the reserve. This could occur because store-bought food and medicine are within easy access on the Ulkatcho reserve and traditional hard-to-get species are not generally used. In order to make this comparison an accurate species list would be needed for the appropriate BGC zones. The comparison would show whether all plant species exhibit a loss of knowledge or plant species confined to a specific BGC zone undergo more "losses".

Summary and Conclusions

A percentage of change (PC) formula was developed to determine the amount of change in plant knowledge that occurs over time and was applied to historical and current Ulkatcho botanical knowledge. Using the PC formula and a component of ICS analysis, comparisons between historical and current ethnobotanical data are simplified. The types of plant utilization are summarized by the use category numbers from the ICS analysis and are applied to historical and current data. The enumerations of the use categories can be grouped per species or per use class.

Overall, the Ulkatcho plant knowledge has undergone much change during the past 70 years, showing that an ethnobotanical inventory changes with time. These differences include losses and gains in current Ulkatcho botanical knowledge and are the result of intercultural exchange and acculturation as well as incomplete historical and current data. In general, species that are used are more likely to show a change in plant knowledge than species that are not used; however, use classes that are employed everyday (e.g. food and material) appear to be affected less by change in plant knowlege than use classes that are not used everyday (e.g. medicine and other). A non-parametric Spearman's Rank correlation test was performed on ICS values and PC values. The ICS values do not correlate with PC values; therefore, for the

Ulkatcho data, change in plant knowledge is evidently not affected by relative importance of a plant.

CHAPTER 9: SUMMARY AND CONCLUSIONS

General habitat descriptions from sites visited in traditional Ulkatcho territory demonstrated that the range of available ecosystems and plant species is great for the Ulkatcho people.

The plant taxonomic systems for two Athapaskan cultures, Ulkatcho and Dine (Navajo), were described and compared to Berlin's (Berlin et al., 1974; Berlin, 1976; Berlin, 1992) and Turner's (Turner, 1974; Turner et al., 1990) observations. Some patterns described by Berlin and Turner are seen in Ulkatcho and Dine (Navajo) plant taxonomies. Life-form taxa are few and are defined by a small number of characteristics. Generic taxa are the most numerous, are generally monotypic and are the fundamental unit in a plant taxonomy. Specific taxon names show a high degree of polysemy with generic taxon names. Other patterns described only by Turner are also evident in Ulkatcho and Dine (Navajo) plant taxonomies. Taxa are not necessarily mutually exclusive. Life-form taxa and specific taxa can be "covert" (implied). Mid-level taxa are numerous, are not all of equivalent level and are often named. Varietal taxa are not found.

The naming of the plant kingdom taxon is not a universal pattern; Ulkatcho and Dine (Navajo) plant taxonomies both have a named plant kingdom taxon unlike the situation found by Berlin (Berlin et al., 1974;

Berlin, 1976; Berlin, 1992) and Turner (Turner, 1974; Turner et al., 1990).

Folk plant taxonomies are best represented by a "lattice hierarchy" which allows for taxa that are not necessarily mutually exclusive. Both folk and scientific taxonomies produce 'systematic' hierarchies but scientific taxonomies are strict (i.e. a subordinate taxon cannot be included in more than one superordinate rank), because they are based solely on evolutionary relationships.

The botanical terms used by six Athapaskan languages, Ahtna, Central Carrier, Ulkatcho Carrier, Chilcotin, Chipewyan, Dena'ina and Dine (Navajo), were described. Athapaskan botanical terms are represented by independent stems, dependent stems, compound nouns, relative nouns or loan words. The glosses of the terms can be unique or descriptive. Athapaskan languages appear to have a named 'plant' kingdom taxon as well as named 'tree', 'algae', 'moss', 'mushroom' and 'grass' life form taxa; however, further ethnographic fieldwork is needed for confirmation. The glosses of plant category terms and plant names show that vertical and horizontal taxonomic expansions have probably occurred within Athapaskan plant taxonomies. These expansions suggest that different classifications occur among the Athapaskan languages [e.g. Dine (Navajo) is the only language that grouped 'small water plant', 'moss' and 'lichen' together].

A modified version of the Index of Cultural Significance (ICS), as proposed by Turner (1988), was used to evaluate importance values for plants from Ulkatcho ethnobotanical data. In total, ICS values were calculated for 293 species. One hundred and sixty-five species are given an ICS value above 0; most species (127) have low ICS values (below 20). The low values could reflect incomplete data, inherited cultural framework or loss via acculturation. They do not appear to be the result of low floristic diversity which is rich in Ulkatcho territory compared to the rich floristic diversity in Nlaka'pamux (Thompson) territory.

The ten species with the highest ICS values are found in over half of the BGC Zones occurring within Ulkatcho territory. These species have high perceptual salience and are usually locally abundant. This pattern suggests that the more frequently encountered the species is the more likely that it is used. Material is the dominant use class shared among the "top ten" species which suggests that plants that can be used for materials may also be exploited for other useful characteristics.

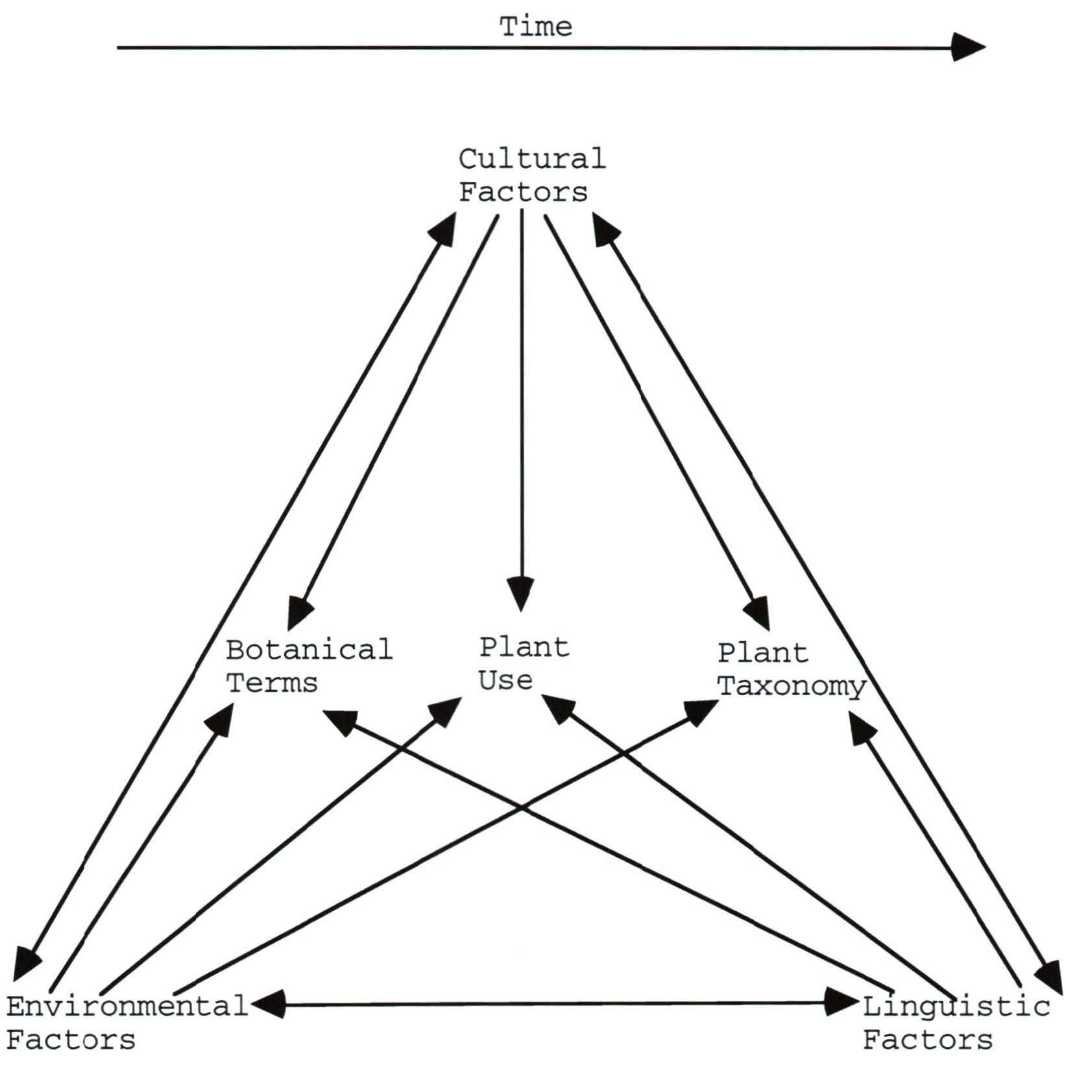
The plant names of Ulkatcho Carrier and Central Carrier were compared to determine whether plant names were retained more often if the plant had a high ICS value. ICS values belonging to plants with cognate names were compared to ICS values belonging to plants with non-cognate names, using a non-parametric Mann-Whitney test. Plants with cognate plant names have higher ICS values than plants with non-cognate plant names; an important plant is more likely to have its name retained than one that is not as important.

A percentage of change (PC) formula was developed to determine the amount of change in knowledge that occurs over time and was applied to historical and current Ulkatcho plant knowledge. Using the PC formula and a component of ICS analysis, comparisons between historical and current ethnobotanical data were simplified. The historical Ulkatcho ethnobotanical data was collected by Harlan Smith in 1920-1922; whereas, the current Ulkatcho data was collected in 1992-1993.

Overall, Ulkatcho plant knowledge has undergone much change during the past 70 years, showing that an ethnobotanical inventory changes with time. These changes include losses and gains in current Ulkatcho botanical knowledge and are the result of intercultural exchange and acculturation as well as incomplete historical and current data. In general, species that are used are more likely to show a change in plant knowledge than species that are not used; however, use classes that are employed everyday (e.g. food and material) appear to be affected less by change in plant knowledge than use classes that are not used everyday (e.g. medicine and "other"). A non-parametric Spearman's Rank correlation test was performed on ICS values and PC values. The ICS values do not correlate with PC values; therefore, for the Ulkatcho data, change in plant knowledge is evidently not affected by relative importance of a plant.

The data summarized in this thesis provide insight about environmental, cultural and linguistic factors affecting plant knowledge (Figure 9.1).

Figure 9.1: Factors Affecting Plant Knowledge



Plant taxonomies are affected by environmental, cultural and linguistic factors (Figure 9.1). The relative role of these factors from one plant taxonomy to another and within a plant taxonomy is not always the same.

The obvious physiognomic features of plants provide the basis for life-form taxa but linguistic affiliation and inherited cultural framework may also affect naming and recognition of these taxa. The 'cactus' life-form taxon is found in Dine (Navajo) and not in Ulkatcho clearly because there are environmental and therefore, floristic differences. The Ulkatcho environment contains no cacti while the Dine (Navajo) environment contains many species of cacti; therefore, it is not surprising that the Dine (Navajo) have a life-form taxon for this distinctive group of plants. Dine (Navajo) and Ulkatcho plant taxonomies have two similar life-form taxa: 'grass' and 'mushroom'. Both taxa have cognate names and the 'grass' life-form taxon includes named generic taxa whereas the 'mushroom' life-form taxon is "empty". These similarities are most likely the result of common linguistic origin since mushroom and grass species are found in many different environments but are not always recognized (Berlin (Berlin et al., 1974; Berlin, 1976; Berlin, 1992) did not find similar life-form taxa). Both Ulkatcho and Dine (Navajo) have a life-form taxon for 'herbaceous plant' but these life-form taxa are not equivalent semantically since the Dine (Navajo) term also includes shrubs whereas the Ulkatcho term excludes showy, useless flowers (showy, useless flowers have their own "empty" Ulkatcho life-form taxon). The inherited cultural framework (perhaps a cognitive factor) has influenced the basic structure (i.e. the life-form taxa) of these two plant taxonomies.

Increasing floristic diversity, which is another environmental factor, appears to have a direct relationship with increasing numbers of generic taxa since the Dine (Navajo) plant taxonomy includes a greater number of generic taxa than the Ulkatcho plant taxonomy. However, a cultural factor may also affect the number of generic taxa in the Dine (Navajo) taxonomy; the Dine (Navajo) people "like to classify things" more than the Ulkatcho people [implied form Reichard (1948) stating that the Dine (Navajo) people have a fondness for classifying things], resulting in more plants being classified.

Cultural factors affecting Ulkatcho and Dine (Navajo) plant taxonomies also include a combination of intellectual and utilitarian views. Life-form, mid-level and specific taxa can be defined by morphology and/or utility whereas generic taxa seem to be defined by morphology alone and are perceptually salient.

Berlin defines "ethnobiological nomenclature" as the "patterns that underlie the naming of plants and animals in systems of ethnobiological classification" (1992:26). Berlin describes the patterns using only linguistic data. However, I found that there are three general forces that affect the application of botanical terms. These can be broadly defined as linguistic, cultural and environmental (Figure 9.1).

Botanical cognates can be used to show whether a linguistic factor influences a botanical term. If a botanical term is cognate between two related languages that presently have no contact, then past linguistic affiliations are taken as the explanation for the relationships (i.e. linguistic factor). Environmental and cultural factors can also affect the cognate botanical terms simultaneously. If the names are not cognate then environmental and/or cultural elements have become involved in the naming of plants.

The verb stem in 'plant' is shown in this study to be cognate in five geographically dispersed Athapaskan languages. Linguistic affiliation is the essence of this relationship. However, I also feel that there is evidence of a similar cultural factor which is possibly a similar cognitive pattern (i.e. inherited cultural framework) among the languages in this study. They share an underlying concept of 'plants' as 'things that grow', reflected in the analysis of their names for the plant kingdom taxon.

Past linguistic affiliations explain the cognate terms for moss in the Athapaskan languages, except in Dine (Navajo). In Dine (Navajo) the dry environment (resulting in a scarcity of moss species) has probably caused the loss of the cognate stem used for 'moss' therefore, the composition and diversity of the flora has affected the botanical terms. Additionally, an unknown cultural factor has apparently determined that the cognate 'small water plant' stem be used for 'mosses', 'lichens' and 'small water plants' in Dine (Navajo).

The Athapaskan languages show a pattern in the naming of *Rosa* spp. (Rose); the majority use the cognate 'thorn' stem. This example shows how the physical properties of a plant, which I consider to be an environmental factor, can also affect the botanical terms.

Percentage of botanical cognates can also show that botanical terms are affected by environmental and cultural factors. A list of botanical terms was used to determine the percentage of botanical cognates among six Athapaskan languages. These values were compared to percentage of non-botanical cognates, and were discovered to be not as stable (i.e. change more rapidly in the evolution of a language) indicating additional factors besides those responsible for the usual role of vocabulary change influence botanical terms. The percentage of botanical cognates among the six Athapaskan languages can also be compared among one another providing insight about the effect of environmental and cultural factors on botanical terms. In general Dine (Navajo) shares the least number of botanical cognates with the other languages. Apparently the length of linguistic separation and lack of cultural exchange with other Athapaskan languages does not totally explain the low percentages of botanical cognates. Therefore, it appears that the arid to semi-arid Dine (Navajo) environment, which is very different compared to the other language groups' environments, may be a predominant factor affecting the Dine (Navajo) botanical terms. The four highest percentages of botanical cognates belong to neighboring languages clearly indicating that similar environments, intercultural exchange and close linguistic assimilation produce similar botanical terms. Similar cognitive patterns, a cultural factor, also affect the naming of botanical terms because some of the languages have a relatively high percentage of botanical cognates but do not share similar environments, undergo cultural exchange and have a short length of linguistic separation.

In Ulkatcho and Central Carrier lexical retention of a plant name is associated with the cultural importance of the plant. This is another example of how a cultural factor can affect botanical terms.

Plant use is also affected by environmental, cultural and linguistic factors (Figure 9.1). Cultural processes such as acculturation and intercultural exchange are examples of cultural factors. On the one hand western health practitioners have discouraged the use of traditional Ulkatcho medicines, causing a decrease in the treatment of serious ailments. On the other hand, cultural exchange has increased the knowledge relating to the treatment of less serious ailments (e.g. colds). The distribution of the plants within the Ulkatcho territory, an environmental factor, also appears to affect the amount of use; high ICS values are associated with common, frequently occurring plants. The glosses of plant names, a linguistic factor, can also be related to plant use whether by humans or animals. Many examples were found in Dine (Navajo) relating plant name to plant use (e.g. name indicates what type of medicine the plant provides). In Ulkatcho, plant names could indicate whether the plant 'belongs' to an animal (in other words is eaten by an animal) or if the plant had no use at all, as indicated by the term employed for 'flower'. Linguistic affiliation can also indicate the use of a plant. The cognate linguistic element 'cradle' is used in the name for *Sphagnum* spp. (sphagnum moss) in some Athapaskan languages and appears to be related to the general use of the plant (used in diapering).

Plant use changes with time as the historical comparison of Ulkatcho ethnobotanical data demonstrated; plant knowledge is dynamic, constantly evolving. Therefore, botanical terms, taxonomies and uses are not constant over time (Figure 9.1).

The Ulkatcho plant data along with comparison with that of other Athapaskan and non-Athapaskan groups demonstrates the complex nature of plant knowledge. Environmental, cultural and linguistics factors strongly affect all aspects of plant use, classification and application of botanical terms. Interdisciplinary studies of linguistically related peoples occupying similar and dissimilar environments are needed to shed more light on these complex relationships.

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APPENDIX A: PLANT SPECIES DISCUSSED IN THIS STUDY ARRANGED ALPHABETICALLY WITH AUTHORITIES

Abies lasiocarpa (Hook.) Nutt.
Achillea millefolium L. ssp. *lanulosa* (Nutt.) Piper
Actaea rubra (Ait.) Willd.
Agaricus sp.
Agoseris glauca (Pursh) Raf.var *dasycephala* (Torrey & Gray) Jespson
Agrostis scabra Willd.
Agrostis ? stolonifera L.
? Alectoria sarmentosa (Ach.) Ach.
Allium cernuum Roth in Roemer
Allium cernuum var. *neomexicanum* Roth., var. neomexicanum (Rydb.) Macbr.
Alnus incana (L.) Moench
Alnus sinuata (Reg.) Rydb.
Alopecurus aequalis Sobol.
Amanita muscaria (Fr.) S.F. Gray
Amanita pantherina (D.C. ex Fr.) Schumm.
Amaranthus retroflexus L.
Amelanchier alnifolia Nutt.
Ananas comosus L.
Anaphalis margaritacea (L.) B.&H.
Anemone multifida Poir. var. *multifida*
Angelica ? genuflexa Nutt.
Antennaria neglecta Greene var. *attenuata* (Fern.) Cronq.
Antennaria rosea Green, Pitt.
Apocynum androsaemifolium L.
Aquilegia elegantula Greene
Aquilegia formosa Fisch.
Arceuthobium americanum Nutt. ex Engelm. in Gray
Arceuthobium cyanocarpum A. Nels.
Arctostaphylos uva-ursi (L.) Spreng.
Armillaria ? mellea Fries
Armillaria ponderosa (PK.) Sacc.
Arnica amplexicaulis Nutt.
Arnica chamissonis Less.
Arnica cordifolia Hook.
Arnica mollis Hook.
Arnica parryi Gray
Artemisia biennis Willd.
Artemisia michauxiana Bess. in Hook.
Artemisia norvegica Fries
Arundo donax L.
Aster ascendens Lindl.
Aster borealis (T. & G.) Prov.
Aster ciliolatus Lindl.
Aster foliaceus Lindl. in DC
Aster modestus Lindl.
Athyrium filix-femina (L.) Roth.
Atriplex canescens (Pursh) Nutt.
Beckmannia syzigachne (Steud.) Fern.
Berberis repens Lindl.
Berula erecta (Huds.) Coville
Betula glandulosa Michx.
Betula papyrifera Marsh.

Boletus edulis Bull. ex Fr.
Bovista pila Berk. & Curt.
Bryoria fremontii (Tuck.) Brodo & Hawks
Calamagrostis canadensis (Michx.) Beauv.
Caltha leptosepala DC. var. *leptosepala*
Caltha leptosepala DC. var. *biflora* (DC.) Laws
Campanula lasiocarpa Cham.
Capsella bursa-pastoris (L.) Medic.
Carex chordorrhiza Ehrh. ex L.f.
Carex crawfordii Fern
Carex diandra Schrank
Carex interior Bailey
Carex macloviana D'urv
Carex rostrata Stokes
Carex sitchensis Prescott
Carex spectabilis Dewey
Carex utriculata Boott in Hook.
Cassiope mertensiana (Bonqard) G. Don
Castilleja miniata Dougl. ex Hook.
Castilleja parviflora Bong.
Ceanothus sanguineus Pursh
Ceanothus velutinus Dougl. ex Hook.
Cerastium beeringianum Cham. & Schlecht. ssp. *beeringianum*
Cetraria canadensis (Raes.) Raes.
Chenopodium album L.
Chenopodium capitatum (L.) Asch.
Chenopodium leptophyllum (Moq.) Nutt.
Chimaphila umbellata (L.) Bart.
Chrysanthemum leucanthemum L.
Cicuta bulbifera L.
Cicuta douglasii (DC.) Coult. & Rose
Cirsium foliosum (Hook.) DC
Cirsium vulgare (Savi) Airy-Shaw
Cladina mitis (Sandst.) Hustich
Cladonia borealis
Cladonia cariosa (Ach.) Spreng.
Cladonia ? ecmocyna Leight
? Clavulinopsis laeticolor (Berk. & Curt.) Peterson
Claytonia lanceolata Pursh
Clintonia uniflora (Schult.) Kunth.
Clitocybe ? dealbata (Sow. ex Fr.) Kummer
Collomia linearis Nutt.
Comandra livida Richards
Conyza canadensis (L.) Cronq.
Cornus canadensis L.
Cornus stolonifera Michx.
Cowania stansburiana Torr.
Cryptogramma crispa (L.) R.Br. ex Hook.
Deschampsia atropurpurea (Wahlenb.) Scheele
Descurainia sophia (L.) Webb ex. Prantl.
? Dicranum fuscescens Sm.
Dryas octopetala L. ssp. *hookeriana* (Juz.) Hult
Dryopteris carthusiana (Vil.) H.P. Fucks
Elaeagnus commutata Bernh. in Allg.
Eleocharis palustris (L.) R.&S.
Elymus elymoides (Raf.) Sweczy
Elymus trachycaulus (Link) Gould in Shinners

Empetrum nigrum L.
? *Entoloma abortivum* (Berk. & Curt.) Donk
Epilobium anagallidifolium Lam.
Epilobium angustifolium L.
Epilobium cf. lactiflorum Hausskn.
Epilobium hornemannii Reichenb.
Epilobium latifolium L.
Equisetum arvense L.
Equisetum fluviatile L.em Ehrh.
Equisetum hyemale L.
Equisetum kansanum J.H. Schaffn.
Equisetum scirpoides Michx.
Erigeron peregrinus (Pursh) Greene var. *callianthemus*
Eriophorum chamissonis C.A. Mey. in Ledeb.
Erythronium grandiflorum Pursh
Fomes ? pinicola (Swartz ex Fr.) Cooke
Fontinalis antipyretica Hedw.
Fragaria virginiana Duch.
Franseria acanthicarpa (Hook.) Coville
Fritillaria camschatcensis (L.) Ker-Gawl
? *Fuscoboletinus* sp.
Galeopsis tetrahit L. var. *bifida* (Boenn.) Le J. & Court
Galium boreale L.
Galium trifidum L.
Galium triflorum Michx.
Gaultheria shallon Pursh
Gentianella amarella (L.) Borner
Geranium richardsonii Fisch. & Trautr.
Geum macrophyllum Willd
Gymnocarpium dryopteris (L.) Newm.
Heracleum lanatum Michx.
Heuchera glabra Willd. ex R.&S.
Hieracium gracile Hook.
Hieracium triste Willd. ex Spreng.
Hieracium umbellatum Hook.
Hippuris montana Ledeb.
Hordeum brachyantherum Nevski
Hordeum jubatum L.
? *Hydenellum diabolus* Banker
Hylocomium splendens (Hedw.)B.S.G.
Hypopitys monotropa Crantz
Iris missouriensis Nutt.
Juncus balticus Willd.
Juncus castaneus Sm.
Juncus parryi Engelm.
Juniperus communis L. var. *alpina* L.
Juniperus communis L. var. ? *depressa* Pursh
Koeleria macrantha (Ledeb.) Schult. f.
? *Laricifomes pinicola*
Lathyrus ochroleucus Hook.
Ledum groenlandicum Oeder.
Lemna minor L.
Lemna trisulca L.
Letharia vulpina (L.) Hue
Linnaea borealis L.
Lonicera involucrata (Rich.) Banks
Lonicera utahensis Wats.

Lupinus arcticus S.Wats. ssp. *subalpine* (Piper & B.L. Robins.) Dunn
Lupinus sericeus Pursh
Luzula piperi (Cov.) M.E. Jones
Luzula spicata (L.) DC
Lycopodium annotinum L.
Lycopodium complanatum L.
Malus fusca (Raf.) Schneider
Matricaria matricarioides (Less.) Porter
Medicago sativa L.
Mentha arvensis L. var. *arvensis*
Menyanthes trifoliata L.
Mimulus guttatus DC.
Mimulus tilingii Regel var. *caespitosus* (Greene) Grant
Mitella ? pentandra Hook. in Curtis
Moneses uniflora (L.) A. Gray
Monolepis nuttalliana (R. & S.) Wats.
Montia linearis (Dougl.) Greene
Myosotis alpestris Schm.
Nephroma resupinatum
Nicotiana attenuata Torr.
Nicotiana tabacum L.
Nolina microcarpa Wats.
Nuphar polysepalum Engelm.
Oplopanax horridum (Smith) Miq.
Osmorhiza chilensis H. & A.
Oxyria digyna (L.) Hill
Pachistima myrsinites (Pursh) Raf.
Parnassia fimbriata Konig. var. *fimbriata*
Parnassia palustris L. var. *neogaea* Fern.
Pedicularis bracteosa Benth. in Hook. var. *bracteosa*
Pedicularis langsdorfii Fisch. ex Steven
Pedicularis ornithorhyncha Benth. in Hook.
Peltigera aphthosa (L.) Willd.
Penstemon fruiticosus (Pursh) Greene
Penstemon procerus Dougl. ex R. Grah.
Penstemon serrulatus Menzies ex Smith
Petasites frigidus (L.) Fries var. *palmatus* (Ait.) Cronq.
Petasites sagittatus (Banks) Gray
Phacelia sericea (Grah.) Gray var. *sericea*
Phleum alpinum L.
Phleum pratense L.
Phlox caespitosa Nutt.
Phoradendron juniperinum Engelm.
Phragmites communis Trin.
Picea engelmannii Parry ex Engelm.
Picea glauca (Moench) Voss
Picea ? mariana (Mill.) B.S.P.
Pinus albicaulis Engelm.
Pinus contorta Dougl. ex Loud var. *latifolia* Engelm.
Plagiobothrys scouleri (H. & A.) Johnst. var. *penicillatus* (Greene) Cronq.
Plantago major L.
Platanthera dilatata (Pursh) Lindl.
Pleurozium schreberi (Brid.) Mitt.
Poa leptocoma Trin.
Poa paulustris L.
Poa secunda J.S. Presl. ssp. *secunda*

? *Pohlia nutans* (Hedw.) Lindb.
Polemonium pulcherrimum Hook. var. *pulcherrimum*
Polygonum douglasii Greene spp. *douglasii*
Polytrichum piliferum Hedw.
Populus balsamifera L. ssp. *trichocarpa* (Torrey & Gary) Brayshaw
Populus tremuloides Michx.
Potentilla diversifolia Lehm.
Potentilla drummondii Lehm.
Potentilla glandulosa Lindl. var. *glandulosa*
Potentilla gracilis Dougl.
Potentilla palustris (L.) Scop.
Prunus pensylvanica L.f.
Pseudotsuga menziesii (Mirbel) Franco var. *menziesii*
Pterospora andromedea Nutt.
Purshia tridentata (Pursh.) DC.
Pyrola asarifolia Michx.
Pyrola secunda L.
Quercus utahensis (A. DC.) Rydb.
Quercus undulata Torr.
Ranunculus aquatilis L.
Ranunculus cymbalaria Pursh var. *cymbalaria*
Ranunculus macounii Britton
Ranunculus repens L.
Ranunculus uncinatus D. Don
Rhinanthus crista-galli L.
Rhizocarpon geographicum (L.) Ramond ex DC.
Rhododendron albiflorum Hook.
Rhytidiadelphus loreus (Hedw.) Warnst.
Ribes glandulosum Grauer
Ribes lacustre (Pers.) Poir.
Ribes oxyacanthoides L.
Ribes pinetorum Greene
Rorippa islandica (Oeder) Borbas
Rosa acicularis Lindl.
Rosa woodsii Lindl. x nutkana Crepin
Rosa woodsii Lindl.
Rubus arcticus L.
Rubus idaeus L.
Rubus leucodermis Dougl.
Rubus parviflorus Nutt
Rubus pedatus J.E. Smith
Rubus pubescens Raf.
Rubus strigosus Michx.
Rumex acetosa L. ssp. *alpestris* (Scop.) A. Love
Rumex acetosella L.
Rumex occidentalis S. Wats.
Rumex salicifolius Weinm.
Russula ? cascadensis
Russula ? emetica or alutacea (Fr.) Pers. or (Fr.) Fr.
Salix arctica Pall.
Salix arctica Pallas
Salix barclai Anderss.
Salix commutata Bebb
Salix drummondiana Barratt
Salix glauca L.
Salix pedicellaris Pursh
Salix ? pseudomonticola Ball

Salix scouleriana Barratt in Hooker
Sambucus racemosa var. *arborescens* (T. & G.) Gray
Sanguisorba sitchensis C.A. Meyer
Sarcobatus vermiculatus (Hook.) Torr.
Sarcodon ? imbricatus (L. Fr.) Karst.
Saxifraga bronchialis L. ssp. *austromontana* (Wieg.) Piper
Saxifraga caespitosa L.
Saxifraga lyallii Engl.
Saxifraga tolmiei T. & G. var. *tolmiei*
? *Schistidium apocarpum* (Hedw.) B.&S. in B.S.G.
Scirpus acutus Muhl. in Bigel
Scutellaria galericulata L.
Sedum divergens Wats.
Sedum lanceolatum Torr. var. *lanceolatum*
Sedum roseum (L.) Scop.
Senecio angularis
Senecio plattensis Nutt.
Senecio triangularis Hook.
Shepherdia canadensis (L.) Nutt.
Sibbaldia procumbens L.
Silene acaulis L.
Sium suave Walt.
Smilacina amplexicaulis Nutt.
Smilacina racemosa (L.) Desf. var. *racemosa*
Smilacina stellata (L.) Desf.
Solanum tuberosum L.
Solidago multiradiata Ait. var. *scopulorum* Gray
Solidago spathulata DC. ssp. *spathulata* var. *neomexicana* (Gray) Cronq.
Sorbus scopulina Greene
Sparganium emersum Rehm. ssp. *emersum*
Sphagnum capillifolium (Ehrh.) Hedw.
Spiraea betulifolia Pall.
Spiraea douglasii Hook.
Spirodela polyrhiza (L.) Schleid.
Stereocaulon paschale (L.) Hoffm.
Streptopus amplexifolius (L.) DC. var. *chalazatus* Fassett
Symphoricarpos albus (L.) Blake
Taraxacum officinale Weber
Thalictrum occidentale Gray
Thuja plicata Donn.
Tremella mesenterica Fr.
? *Tricholoma columbetta* Fries
Trifolium pratense L.
Trifolium repens L.
Trisetum spicatum (L.) Richter
Triticum aestivum L.
Trollius laxus Salisb.
Tsuga heterophylla (Raf.) Sarg.
Typha latifolia L.
Urtica diocia L.
? *Usnea lapponica* Vain.
Vaccinium alaskaense Howell
Vaccinium caespitosum Michx.
Vaccinium membranaceum Dougl. ex Hook.
Vaccinium ovalifolium Smith in Rees
Vaccinium oxycoccos L.

Vaccinium parvifolium Smith in Rees
Vahlodea atropurpurea Scheele (Wahlenb.) Fries in Hartm.
Valeriana sitchensis Bong. ssp. *sitchensis*
Veratrum viride Ait. Hort.
?Verbascum thapsus L.
Veronica wormskjoldii Roem. & Schult.
Viburnum edule (Michx.) Raf.
Viola adunca Sm. in Rees var. adunca
? Xanthoria candelaria

APPENDIX B: HIERARCHICAL ARRANGEMENT OF ULKATCHO PLANT TAXA WITH ULKATCHO, SCIENTIFIC AND ENGLISH COMMON NAMES

A question mark following an Ulkatcho name indicates that the Ulkatcho name was uncertain. A question mark preceding a species name indicates that the species identification could not be confirmed. All Ulktacho names were transcribed by Dr. Leslie Saxon. The following is an account of the practical orthography, which is used in Ulkatcho schools, as described by Dr. Leslie Saxon (1992):

> Every attempt has been made to keep to the standard Carrier orthographic system, for instance as in the Central Carrier Bilingual Dictionary. In this system **u** = schwa, **oo** = [u], **o** + [o], **i** = [i]. See CLC for more information. Double vowels (except for **oo**) represent long vowels. Ulkatcho Carrier has some nasal vowels, which don't seem to exist in Central Carrier. A nasal vowel is represented as a vowel with a hook under it. Many thanks to Leona Toney for her help with this system, especially in the interview on 23 July 1992. In this interview, we took as our starting place the alphabet list is that dictionary, p343-345. Except in this interview, the **ts** and the **<u>ts</u>** series unfortunately are not distinguished, since for the most part I wasn't able to hear a difference between them. Leona Toney tells me that the distinction exists in Ulkatcho Carrier. The spellings for particular words in this list have not been standardized, since this task seems to be beyond what can be accomplished in one week of fieldwork. Thus 'willow' is spelled here **k'idli**, **k'ihdli**, and **k'idlih**.

For taxa that are not mutually exclusive (i.e. those that are ambiguously affiliated) their names are followed by "[ambiguous with **taxon name**]". Ambiguously affiliated taxa are found more than once in this list; they are located in both taxa.

<u>Key to the Ulkatcho Plant Taxonomy</u>

LIFE-FORM name (TRANSLATION)
generic name
Scientific name (English name)

mid-level name (translation)
mid-level name (translation)
mid-level name (translation)
mid-level name (translation; can be suprageneric mid-level name)
generic name
generic name
Scientific name (English name)
Scientific name (English name)
specific name
Scientific name (English name)

'INDAK (FLOWER)

Agoseris glauca (Yellow Agoseris)
Anemone multifida (Pacific anemone)
Antennaria sp. (Rosy Pussytoes)
Arnica chamissonis (Arnica)
Arnica cordifolia (Heart Leaved Arnica)
Aster ascendens (Aster)
Aster foliaceus (Leafy Bracted Aster)
Caltha leptosepala (Two Flowered White Marsh Marigold)
Campanula lasiocarpa (Mountain Harebell)
Castilleja parviflora (Small Flowered Paintbrush)
Cerastium beeringianum (Bering Chickweed)
Chenopodium album (Lamb's Quarters)
Chrysanthemum leucanthemum (Oxeye Daisy)
Collomia linearis (Narrow Leaved Collomia)
Descurainia sophia (Flixweed)
Epilobium hornemannii (Hornemann's Willowherb)
Epilobium latifolium (River Beauty)
Erigeron peregrinus (Subalpine Daisy)
Erigeron sp. (Fleabane)
Galium boreale (Northern Bedstraw)
Gentianella amarella (Northern Gentian)
Geranium richardsonii (White Geranium)
Heuchera glabra (Smooth Alumroot)
Hieracium gracile (Slender Hawkweed)
Matricaria matricarioides (Pineapple Weed)
Medicago sativa (Alfalfa)
Mimulus guttatus (Yellow Monkey Flower)
Mimulus tilingii (Large Mountain Monkey

Flower)
Moneses uniflora (Single Delight)
Montia linearis (Miner's Lettuce)
Myosotis alpestris (Mountain Forget-me-not)
Pedicularis bracteosa (Bracted Lousewort)
Pedicularis langsdorfii (Langsdorf's Losewort)
Pedicularis ornithorhyncha (Bird's Beak Lousewort)
Phacelia sericea (Silky Phacelia)
Plagiobothrys scouleri (Popcorn Flower)
Plantago major (Common Plantain)
Polemonium pulcherrimum (Showy Jacob's Ladder)
Potentilla sp. (Cinquefoil)
Potentilla gracilis (Graceful Cinquefoil)
Ranunculus cymbalaria (Shore Buttercup)
Ranunculus repens (Buttercup)
Rhinanthus crista-galli (Rattlebox)
Rorippa islandica (Marsh Yellowcress)
Rumex ? occidentalis (Western Dock)
Sanguisorba sitchensis (Sitka Burnet) [ambiguous with **'ut'an**]
Saxifraga bronchialis (Prickly Saxifrage)
Saxifraga lyallii (Red Stemmed Saxifrage)
Scutellaria galericulata (Marsh Skullcap)
Sedum lanceolatum (Lance Leaved Stonecrop)
Senecio angularis (Groundsel)
Senecio plattensis (Groundsel)
Senecio triangularis (Arrow Leaved Groundsel)
Smilacina stellata (Star Flowered False Solomon's Seal)
Solidago multiradiata (Northern Goldenrod)
Solidago spathulata (Spike-like Goldenrod)
Spiraea betulifolia (Flat Top Spirea)
Spiraea douglasii (Hardhack) [ambiguous with **'ut'an**]
Taraxacum officinale (Dandelion)
Trifolium (Clover)
Trifolium pratense (Red Clover)
Trollius laxus (Globeflower)
Valeriana sitchensis (Sitka Valerian)

'UT'AN (HERB)
covert (no berry)
bus la (?)
Antennaria rosea (Rosy Pussytoes)
buzi duk'un (?)
Chenopodium capitatum (Strawberry Blight)
dagoos

Heracleum lanatum (Cow Parsnip)
dek'a
Nicotiana tabacum (Tobacco)
deltum t'an
Artemisia sp.(Mugwort)
ditnik 'indak
ditnik t'an
ditniknikwun
ditnikwun
Aquilegia formosa (Red Columbine)
Castilleja miniata (Common Red Paintbrush)
dlukche
gagisdlache
khagistl'ache
tlel(?)che
Achillea millefolium (Yarrow)
gantah
Lupinus arcticus (Arctic Lupine)
hanulhyeh
Solanum tuberosum (Potato)
hulh (?)
Menyanthes trifoliata (Marsh Buckbean)
'ilhkal
Fritillaria camschatcensis (Rice Root)
kas t'an
Epilobium hornemannii (Hornemann's Willowherb)
khoolht'al
Nuphar polysepalum (Yellow Water Lily)
kus t'an
Epilobium angustifolium (Fireweed)
ludi
yak'unilh'a
Ledum groenlandicum (Laborador Tea)
nekętulhdzolh
nekenilhtsolh
Cirsium vulgare (Bull Thistle)
Cirsium foliosum (Leafy Thistle)
nooktagunut tasht'an (?)
Penstemon procerus (Small Flowered Penstemon)
sadzit'an [ambiguous with **'indak** (not used by Elders)]
Taraxacum officinale (Dandelion)
skenken
Sium suave (Water Parsnip)
soont'ih
soont'ih hooni
Claytonia lanceolata (Western Springbeauty)
swih
Erythronium grandiflorum (Trout Lily)

tl'oo tsun
Allium cernuum (Nodding Onion)
ts'olh ghigha
Potentilla palustris (*Marsh* Cinquefoil)
tsadzo
tsadzot'an
Pyrola asarifolia (Pink Wintergreen)
Parnassia fimbriata (Fringed Grass-of-Parnassus)
Pyrola secunda (One Sided Wintergreen)
tse'ul
Artemisia michauxiana (Michaux's Mugwort)
Antennaria rosea (Rosy Pussytoes)
Anaphalis margaritacea (Pearly Everlasting)
tsoont'ih
Claytonia lanceolata (Western Springbeauty)
tutsela
unknown angiosperm #11
'ulhtsun
Mentha arvensis (Field Mint)
'ut'an
Petasites sagittatus (Arrow Leaved Colt's Foot)
Thalictrum occidentale (Western Meadow Rue)
'ut'an [ambiguous with **'indak**]
Sanguisorba sitchensis (Sitka Burnet)
Spiraea douglasii (Hardhack)
whulhdulh [ambiguous with **duchun**]
Veratrum viride (Indian Hellebore)

'ah (fern) [ambiguous with duchun]
'ah
Athyrium filix-femina (Lady Fern)
Dryopteris carthusiana (Wood Fern)
Gymnocarpium dryopteris (Oak Fern)
datsan 'ah
Athyrium filix-femina (Lady Fern)
?Dryopteris carthusiana (Wood Fern)

tl'ool (stringy) [ambiguous with **duchun**]
dahtl'ool
Galium trifidum (Small Bedstraw)
Thalictrum occidentale (Western Meadow Rue)
yuntl'ool
Linnaea borealis (Twin Flower)

whus (thorny) [ambiguous with **duchun**]
'ilh ts'ilh
hoolht'ik
whusts'ik
Galeopsis tetrahit (Hemp Nettle)

Urtica dioica (Stinging Nettle)
but'ach'uts'ooghesnak (untouchable)
wanihcho
Cicuta douglasii (Water Hemlock)
mai (berry)
covert (touchable)
ch'ip
Sambucus racemosa (Red Elderberry)
dihiye [ambiguous with **duchun**]
dihiyi
dihiyii
Pyrola asarifolia (Pink Wintergreen)
Pyrola secunda (One-Sided Wintergreen)
buzi dulk'un
dudeninli yunudulk'un
Chenopodium capitatum (Strawberry Blight)
but'ach'uts'ooghesnak (untouchable)
chusdli mai [ambiguous with **duchun**]
Streptopus amplexifolius (Twisted Stalk)
lhimai [ambiguous with **duchun**]
Actaea rubra (Baneberry)

TL'O (GRASS)

duni tl'o
dutnii tl'o
dutnii tl'o dulhgi
Carex crawfordii (Crawford's Sedge)
Poa leptocoma (Bog Bluegrass)
unknown Poaceae/Cyperaceae (Grass/Sedge)
tl'o
Alopecurus aequalis (Little Meadow Foxtail)
Calamagrostis canadensis (Bluejoint)
Carex sitchensis (Sitka Sedge)
Carex spectabilis (Showy Sedge)
Carex utriculata (Sedge)
Elymus trachycaulis (Wild Rye Grass)
Eriophorum chamissonis (Chamisso's Cotton Grass)
Luzula spicata (Spike Wood Rush)
Phleum alpinum (Alpine Timothy)
Poa secunda (Bluegrass)
Trisetum spicatum (Spike Trisetum)
Triticum aestivum (Wheat)
tl'o dazoolh
daiwoolh
Carex sitchensis (*Sitka Sedge*)
Carex utriculata (*Sedge*)
Scirpus acutus (*Bulrush*)
Typha latifolia (*Cat-tail*)
tl'o k'a
tl'o kaa

Calamagrostis canadensis (Bluejoint)
Carex rostrata (Beaked Sedge)
unknown Poaceae/Cyperaceae (Grass/Sedge)
tl'o tel
Carex sitchensis (Sitka Sedge)
Eleocharis palustris (Creeping Spike Rush)
Sparganium emersum (Simple Stemmed Bur Reed)
unknown Poaceae (Grass)
tl'oo latak
unknown Poaceae (Grass)

dzulh (mountain growth) [ambiguous with **duchun**]
dzulh k'ut tl'o
Luzula piperi (Piper's Woodrush)

DUCHUN (WOODY)

chunzool
Thuja plicata (Western Red Cedar)

'ul (needle)

covert (no berry)

chundoo
Pinus contorta (Lodgepole Pine Pitch)
k'usts'iz
Pinus albicaulis (Whitebark Pine)
lhughus'ul
lhghus 'ul
Tsuga heterophylla (Hemlock)
tsuntsi
Pseudotsuga menziesii (Douglas-Fir)

ts'oo (spruce-like)

ts'oo
Picea engelmannii (Engelmann Spruce)
ts'oo bez
Picea ? mariana (Black Spruce)
ts'oochun
Abies lasiocarpa (Subalpine Fir)

dzulh (mountain growth) [ambiguous with **tl'o**]

dzulh
dzulh tah
Abies lasiocarpa (Subalpine Fir) [krummholz form]

mai (berry)

datsan 'angut
Juniperus commmunis (Juniper)
lhant'is mai
Empetrum nigrum (Crowberry)
mai ihchi
unknown plant #4

'ut'an (leaf)
covert (no berry)
deltum
dultum
nenshenel'ah
Elaeagnus commutata (Silverberry)
Rhododendron albiflorum (White Mountain Rhododendron)
hoonkwus
Alnus sinuata (Sitka Alder)
k'us
Alnus incana (Speckled Alder)
landooz
Populus balsamifera (Black Cottonwood)
t'ughus
Populus tremuloides (Trembling Aspen)
'ah (fern) [ambiguous with **'ut'an**]
'ah
Athyrium filix-femina (Lady Fern)
Dryopteris carthusiana (Wood Fern)
Gymnocarpium dryopteris (Oak Fern)
datsan 'ah
Athyrium filix-femina (Lady Fern)
?Dryopteris carthusiana (Wood Fern)
k'i (birch-willow)
k'i
Betula papyrifera (Paper Birch)
k'izi
Betula glandulosa (Dwarf Birch)
k'idli
Salix spp. (Willow)
k'idlihdulk'un
Salix sp. (Willow)
dzulh (mountain growth) [ambiguous with **tl'o**]
dzulhk'ut k'idlih
Salix arctica (Arctic Willow)
whus (thorny) [ambiguous with **'ut'an**]
whus
Rosa woodsii (Wood's Rose)
mai (berry)
but'ach'uts'ooghesnak (untouchable)
chusdli mai [ambiguous with **u't'an**]
chusli mai
Chimaphila umbellata (Prince's Pine)
Comandra livida (Bastard Toad Flax)
Cornus canadensis (Bunchberry)
unknown angiosperm #7
lhimai [ambiguous with **u't'an**]
Symphoricarpos albus (Snowberry)
sus mai

Lonicera involucrata (Black Twin Berry)
t'echo mai
Ceanothus sangiuneus (Redstem Ceanothus)
ts'etmai [ambiguous with **'indak**]
Cornus canadensis (Bunchberry)
whus (thorny) [ambiguous with **'ut'an**]
whuscho
Oplopanax horridum (Devil's Club)
covert (touchable)
daniịḳat
Rubus parviflorus (Thimbleberry)
dek'us
nk'asdla
Rubus idaeus (Raspberry)
dihiyii [ambiguous with **'ut'an**]
Chimaphila umbellata (Prince's Pine)
eyak'ut mai
Vaccinium oxycoccos (Bog Cranberry)
'indzi
Fragaria virginiana (Wild Strawberry)
lhiazke
Rubus arcticus (Dwarf Nagoonberry)
lhiketl'ahmai
?Fritillaria camschatcensis (Rice Root)
lhimai [ambiguous with **'ut'an**]
Malus fusca (Western Crabapple)
Rubus pedatus (Trailing Raspberry)
mai
Vaccinium membranaceum (Black Huckleberry)
maitsi
maichi
Ribes lacustre (Black Gooseberry)
Ribes glandulosum (Black Currant)
nowus
Shepherdia canadensis (Soapberry)
tsalhtse
Viburnum edule (Highbush Cranberry)
Prunus pensylvanica (Cherry)
tulhanlhis
tulhansis
Vaccinium parvifolium (Red Huckleberry)
dunih (kinnikinnick-falsebox)
dunih
Arctostaphylos uva-ursi (Kinnikinnick)
Pachistima myrsinites (Falsebox)
dunih cho t'an
Chimaphila umbellata (Prince's Pine)
'ilhtsul (blueberry)
'ilhchulcho
Vaccinium ? alaskaense or ovalifolium
(Alaskan or Oval Leaved Blueberry)
'ilhtsul

Vaccinium caespitosum (Dwarf Blueberry)

k’en (service berry-dogwood)

k'en mai

Amelanchier alnifolia (Saskatoon Berry)

k'endulk'un

Cornus stolonifera (Red Osier Dogwood)

tl'ool (stringy)

dahtl'ool

Ribes lacustre (Black Gooseberry)

whus (thorny)

'indawus

Ribes oxyacanthoides (Northern Smooth Gooseberry)

COVERT (WATER GROWTH)

tehdlat

Fontinalis antipyretica (Water Moss) [ambiguous with **yenjat**]

Hippuris montana (Mountain Mare’s Tail)

Ludwigia palustris (False Loosestrife)

Ranunculus aquatilis (Water Buttercup)

unknown algae #1

teheyen

Lemna trisulca (Ivy Leaved Duckweed)

tehtl'o

too ta naalhyii

tehhanaalhyii

tehanaalhyii

Hippuris montana (Mountain Mare’s Tail)

COVERT (TREE GROWTH)

dahgha

Alectoria sarmentosa (Common Witch’s Hair)

Bryoria fremontii (Black Hair Lichen)

Cetraria canadensis (Yellow Tree Lichen)

chun ts'ahanalhyii?

Letharia vulpina (Wolf Lichen)

dahtl'uz

?Cetraria canadensis [Cetraria (Yellow Tree Lichen)]

dechun degha

chun degha

Bryoria fremontii (Black Hair Lichen)

duchun ts'ahanalyii

Cetraria canadensis (Yellow Tree Lichen)

khahiyii

unknown lichen Yellow Shrub Lichen

COVERT (GROUND GROWTH)

tsaal

Sphagnum sp. (Sphagnum Moss)

tset’ooz
tthet'ooz
tset'ooz
Peltigera aphthosa (Freckled Lichen)
Rhizocarpon geographicum (Green Map Lichen)
wudzih
wudzih yuyi
wudzih dai
wudzih yuyii
wudzihye
Cladonia borealis (Red Pixie Cup)
Cladonia cariosa (Cladonia Scale)
Nephroma resupinatum (Freckled Lichen)
Stereocaulon ? paschale (Common Coral Lichen)

yenjat (moss-like)

yenjak

Dicranum fuscescens (Curly Heron’s Bill Moss)
Dryas octopetala (White Mountain Avens)
Pleurozium schreberi (Red Stem feather Moss)
? Pohlia nutans (Moss)
Polytrichum piliferum (Awned Haircap Moss)
Saxifraga bronchialis (Prickly Saxifrage)
Silene acaulis (Moss Campion)
Sphagnum capillifolium (Common Red Sphagnum)
Stereocaulon sp. (Coral Lichen)

'INBENIDZO (MUSHROOM)

Agaricus sp. (Field Mushroom)
Amanita muscaria (Fly Agaric)
Armillaria ? mellea (Honey Mushroom)
Armillaria ponderosa (Pine Mushroom)
Boletus ? edulis (Edible Boletus)
Boletus sp. (Boletus)
Clavariadelphus ligula (Yellow Fingers) [ambiguous with **yenjat**]
Clitocybe ? dealbata (Sweat Causing Clitocybe)
Entoloma abortivum (Fungus)
Fuscoboletinus sp. (Mushroom)
Hydenellum diabolus (Teeth Fungus)
Russula ? cascadensis (Cascade Russula (Mushroom)
Russula ? emetica or alutacea (Russula mushroom)
Suillus spp. (mushroom)

Tricholoma columbetta (mushroom)
unknown fungus ? Stroma

UNAFFILIATED

busts'ah
Arceuthobium americanum (American Dwarf Mistletoe)
khahdai
khohdai
Equisetum arvense (Horsetail)
Equisetum fluviatile (Horsetail)
Equisetum hyemale (Common Scouring Rush)
naodlih lhuk
datsan lhuk
naodnilh nukuk
Bovista pila (Puffball)
tsego mai
tsemai
Sedum divergens (Stonecrop)

APPENDIX C: INVENTORY OF ALL KNOWN ULKATCHO PLANT NAMES LISTED ALPHABETICALLY ACCORDING TO SCIENTIFIC NAMES WITH ENGLISH COMMON NAMES

A question mark following a Ulkatcho name indicates that the Ulkatcho name was uncertain. A question mark preceding a species name indicates that the species identification could not be confirmed. Orthographic information for the Ulkatcho names can be found in Appendix B. Alternate spellings of the Ulkatcho names, provided by the Ulkatcho Indian Band, are enclosed in parentheses.

Abies lasiocarpa (krummholz form)	**dzulh**	Subalpine Fir
Abies lasiocarpa (krummholz form)	**dzulh tah**	Subalpine Fir
Abies lasiocarpa	**ts'oochun**	Subalpine Fir
Achillea millefolium	**dlukche**	Yarrow
Achillea millefolium	**gagisdlache (nagistl'ah che)**	Yarrow
Achillea millefolium	**khagistl'ache**	Yarrow
Achillea millefolium	**tlel(?)che**	Yarrow
Actaea rubra	**lhimai**	Baneberry
Agaricus sp.	**'inbenidzo**	Field Mushroom
Agoseris glauca	**'indak**	Yellow Agoseris
? *Alectoria sarmentosa*	**dahgha**	Common Witch's Hair
? *Alectoria sarmentosa*	**chun ts'ahanalhyii**	Common Witch's Hair
Allium cernuum	**tl'oo tsun (tl'otsun)**	Nodding Onion
Alnus incana	**k'us**	Speckled Alder
Alnus sinuata	**hoonkwus**	Sitka Alder
Alopecurus aequalis	**tl'o**	Little Meadow Foxtail
Amanita muscaria	**'inbenidzo**	Fly Agaric
Amelanchier alnifolia	**k'en mai**	Saskatoon Berry
Anaphalis margaritacea	**tse'ul**	Pearly Everlasting
Anemone multifida	**'indak**	Pacific anemone
Antennaria rosea	**bus la (?)**	Rosy Pussytoes
Antennaria rosea	**tse'ul**	Rosy Pussytoes
Antennaria sp.	**'indak**	Rosy Pussytoes
Aquilegia formosa	**ditnik 'indak**	Red Columbine
Aquilegia formosa	**ditniknikwun**	Red Columbine

Arceuthobium americanum	**busts'ah**	American Dwarf Mistletoe
Arctostaphylos uva-ursi	**dunih**	Kinnikinnick
Armillaria ? mellea	**'inbenidzo**	Honey Mushroom
Armillaria ponderosa	**'inbenidzo**	Pine Mushroom
Arnica chamissonis	**'indak**	Arnica
Arnica cordifolia	**'indak**	Heart Leaved Arnica
Artemisia michauxiana	**tse'ul**	Michaux's Mugwort
Artemisia sp.	**deltum t'an**	Mugwort
Aster ascendenus	**'indak**	Aster
Aster foliaceus	**'indak**	Leafy Bracted Aster
Athyrium filix-femina	**'ah**	Lady Fern
Athyrium filix-femina	**datsan 'ah**	Lady Fern
? Athyrium filix-femina	**datsan 'ah chun**	Lady Fern
Betula glandulosa	**k'izi**	Dwarf Birch
Betula papyrifera	**k'i**	Paper Birch
Boletus ? edulis	**'inbenidzo**	Edible Boletus
Boletus sp.	**'inbenidzo**	Boletus
Bovista pila	**datsan lhuk**	Puffball
Bovista pila	**naodlih lhuk**	Puffball
Bovista pila	**naodnilh nukuk**	Puffball
Bryoria fremontii	**dahgha**	Black Hair Lichen
Bryoria fremontii	**dechun degha**	Black Hair Lichen
Bryoria fremontii	**chun degha**	Black Hair Lichen
Calamagrostis canadensis	**tl'o**	Bluejoint
Calamagrostis canadensis	**tl'ok'a**	Bluejoint
Caltha leptosepala	**'indak**	Two Flowered White Marsh Marigold
Campanula lasiocarpa	**'indak**	Mountain Harebell
Carex crawfordii	**duni tl'o**	Crawford's Sedge
Carex rostrata	**tl'o k'a**	Beaked Sedge
Carex sitchensis	**tl'o**	Sitka Sedge
Carex sitchensis	**tl'o dazoolh**	Sitka Sedge
Carex sitchensis	**tl'otel**	Sitka Sedge
Carex spectabilis	**tl'o**	Showy Sedge
Carex utriculata	**tl'o**	Sedge
Carex utriculata	**tl'o dazoolh**	Sedge
Castilleja miniata	**ditnik t'an**	Common Red Paintbrush
Castilleja miniata	**ditnikwun**	Common Red Paintbrush
Castilleja parviflora	**'indak**	Small Flowered Paintbrush
Ceanothus sanguineus	**t'echo mai**	Redstem Ceanothus
Cerastium beeringianum	**'indak**	Bering Chickweed
Cetraria canadensis	**dahgha**	Cetraria (Yellow Tree Lichen)
Cetraria canadensis	**duchun ts'ahanalyii**	Cetraria (Yellow Tree Lichen)
? Cetraria canadensis	**dahtl'uz**	Cetraria (Yellow Tree Lichen)
Chenopodium album	**'indak**	Lamb's Quarters
Chenopodium capitatum	**buzi dulk'un (?)**	Strawberry Blight

Chenopodium capitatum	**dudeninli yunudulk'un**	Strawberry Blight
Chimaphila umbellata	**chusdli mai**	Prince's Pine
Chimaphila umbellata	**dihiyii**	Prince's Pine
Chimaphila umbellata	**dunih cho t'an**	Prince's Pine
Chrysanthemum leucanthemum	**'indak**	Oxeye Daisy
Cicuta douglasii	**wanihcho (wanicho)**	Water Hemlock
Cirsium foliosum	**nekenilhtsolh**	Leafy Thistle
Cirsium vulgare	**nekętulhdzolh**	Bull Thistle
Cladonia borealis	**wudzih yuyi**	Red Pixie Cup
Cladonia borealis	**wudzih dai**	Red Pixie Cup
Cladonia cariosa	**wudzih yuyii**	Cladonia Scale
Clavariadelphus ligula	**'inbenidzo**	Yellow Fingers
Claytonia lanceolata	**soont'ih**	Western Springbeauty
Claytonia lanceolata	**soont'ih hooni**	Western Springbeauty
Claytonia lanceolata	**tsoont'ih**	Western Springbeauty
Clitocybe ? dealbata	**'inbenidzo**	Sweat Causing Clitocybe
Collomia linearis	**'indak**	Narrow Leaved Collomia
Comandra livida	**chusdli mai**	Bastard Toad Flax
Cornus canadensis	**chusli mai**	Bunchberry
Cornus canadensis	**'indak**	Bunchberry
Cornus canadensis	**ts'etmai**	Bunchberry
Cornus stolonifera	**k'endulk'un**	Red Osier Dogwood
Descurainia sophia	**'indak**	Flixweed
? Dicranum fuscescens	**yenjat**	Curly Heron's Bill Moss
Dryas octopetala	**yinjat**	White Mountain Avens
Dryopteris carthusiana	**'ah**	Wood Fern
Dryopteris carthusiana	**'ah chun**	Wood Fern
Dryopteris carthusiana	**datsan 'ah chun**	Wood Fern
Elaeagnus commutata	**deltum**	Silverberry
Elaeagnus commutata	**dultum**	Silverberry
Eleocharis palustris	**tl'o tel**	Creeping Spike Rush
Elymus trachycaulis	**tl'o**	Wild Rye Grass
Empetrum nigrum	**lhant'is mai**	Crowberry
? Entoloma abortivum	**'inbenidzo**	Fungus
Epilobium angustifolium	**kus t'an**	Fireweed
Epilobium hornemannii	**'indak**	Hornemann's Willowherb
Epilobium hornemannii	**kas t'an**	Hornemann's Willowherb
Epilobium latifolium	**'indak**	River Beauty
Equisetum arvense	**khahdai**	Horsetail
Equisetum fluviatile	**khahdai**	Horsetail
Equisetum hyemale	**khohdai**	Common Scoring Rush
Erigeron peregrinus	**'indak**	Subalpine Daisy
Erigeron sp.	**'indak**	Fleabane

Eriophorum chamissonis	**tl'o**	Chamisso's Cotton Grass
Erythronium grandiflorum	**swih**	Trout Lily
Fontinalis antipyretica	**tehdlat**	Water Moss
Fontinalis antipyretica	**yenjat**	Water Moss
Fragaria virginiana	**'indzi**	Wild Strawberry
Fritillaria camschatcensis	**'ilhkal (ilhkal)**	Rice Root
Fritillaria camschatcensis	**lhiketl'ahmai**	Rice Root
? *Fuscoboletinus* sp.	**'inbenidzo**	Mushroom
Galeopsis tetrahit	**hoolht'ik**	Hemp Nettle
Galium boreale	**'indak**	Northern Bedstraw
Galium trifidum	**dahtl'ool**	Small Bedstraw
Gentianella amarella	**'indak**	Northern Gentian
Geranium richardsonii	**'indak**	White Geranium
Gymnocarpium dryopteris	**'ah**	Oak Fern
Heracleum lanatum	**dagoos (dugoos)**	Cow Parsnip
Heuchera glabra	**'indak**	Smooth Alumroot
Hieracium gracile	**'indak**	Slender Hawkweed
Hippuris montana	**tehdlat**	Mountain Mare's Tail
Hippuris montana	**tehtl'o**	Mountain Mare's Tail
Hippuris montana	**too ta naalhyii**	Mountain Mare's Tail
Hippuris montana	**tehhanaalhyii**	Mountain Mare's Tail
Hippuris montana	**tehanaalhyii**	Mountain Mare's Tail
? *Hydenellum diabolus*	**'inbenidzo**	Teeth Fungus
Juniperus commmunis	**datsan 'angut**	Juniper
Ledum groenlandicum	**ludi**	Laborador Tea
Ledum groenlandicum	**yak'unilh'a (yak'ut hailh'a)**	Labrador Tea
Lemna trisulca	**teheyen**	Ivy Leaved Duckweed
Letharia vulpina	**dahgha**	Wolf Lichen
Linnaea borealis	**yuntl'ool**	Twin Flower
Lonicera involucrata	**sus mai**	Black Twin Berry
Ludwigia palustris	**tehdlat**	False Loosestrife
Lupinus arcticus	**gantah**	Arctic Lupine
Luzula piperi	**dzulh k'ut tl'o**	Piper's Woodrush
Luzula spicata	**tl'o**	Spiked Woodrush
Luzula spicata	**tl'o**	Spike Wood Rush
Malus fusca	**lhimai**	Western Crabapple
Matricaria matricarioides	**'indak**	Pineapple Weed
Medicago sativa	**'indak**	Alfalfa
Mentha arvensis	**'ulhtsun (sooyaltsun)**	Field Mint
Menyanthes trifoliata	**hulh**	Marsh Buckbean
Mimulus guttatus	**'indak**	Yellow Monkey Flower
Mimulus tilingii	**'indak**	Large Mountain Monkey Flower
Moneses uniflora	**'indak**	Single Delight
Montia linearis	**'indak**	Miner's Lettuce

Myosotis alpestris	**'indak**	Mountain Forget-me-not
Nephroma resupinatum	**wudzihye**	Freckled Lichen
Nicotiana tabacum	**dek'a**	Tobacco
Nuphar polysepalum	**khoolht'al**	Yellow Water Lily
Oplopanax horridum	**whuscho**	Devil's Club
Pachistima myrsinites	**dunih**	Falsebox
Parnassia fimbriata	**tsadzot'an**	Fringed Grass-of-Parnassus
Pedicularis bracteosa	**'indak**	Bracted Lousewort
Pedicularis langsdorfii	**'indak**	Langsdorf's Losewort
Pedicularis ornithorhyncha	**'indak**	Bird's Beak Lousewort
Peltigera aphthosa	**tthet'ooz**	Freckled Lichen
Peltigera aphthosa	**tset'ooz**	Freckled Lichen
Penstemon procerus	**nooktagunut tasht'an (?)**	Small Flowered Penstemon
Petasites sagittatus	**'ut'an**	Arrow Leaved Colt's Foot
Phacelia sericea	**'indak**	Silky Phacelia
Phleum alpinum	**tl'o**	Alpine Timothy
Picea ? mariana	**ts'oo bez**	Black Spruce
Picea engelmannii	**ts'oo**	Engelmann Spruce
Pinus albicaulis	**k'usts'iz**	Whitebark Pine
Pinus contorta	**chundoo**	Lodgepole Pine Pitch
Plagiobothrys scouleri	**'indak**	Popcorn Flower
Plantago major	**'indak**	Common Plantain
Pleurosium schreberi	**yenjat**	Red Stem feather Moss
Poa leptocoma	**dutnii tl'o**	Bog Bluegrass
Poa secunda	**tl'o**	Bluegrass
? Pohlia nutans	**yenjak**	Moss
Polemonium pulcherrimum	**'indak**	Showy Jacob's Ladder
Polytrichum piliferum	**yenjat**	Awned Haircap Moss
Populus balsamifera	**landooz**	Black Cottonwood
Populus tremuloides	**t'ughus**	Trembling Aspen
Potentilla sp.	**'indak**	Cinquefoil
Potentilla gracilis	**'indak**	Graceful Cinquefoil
Potentilla palustris	**ts'olh ghigha**	Marsh Cinquefoil
Prunus pensylvanica	**tsalhtse**	Cherry
Pseudotsuga menziesii	**chuntsi**	Douglas Fir
Pseudotsuga menziesii	**tsuntsi**	Douglas Fir
Pyrola asarifolia	**dihiye (dih'ya'uyi)**	Pink Wintergreen
Pyrola asarifolia	**dihiyi**	Pink Wintergreen
Pyrola asarifolia	**tsadzo**	Pink Wintergreen
Pyrola secunda	**dihiyii (dih'ya'uyi)**	One-Sided Wintergreen
Pyrola secunda	**tsadzot'an**	One Sided Wintergreen
Ranunculus aquatilis	**tehdlat**	Water Buttercup
Ranunculus cymbalaria	**'indak**	Shore Buttercup
Ranunculus repens	**'indak**	Buttercup
Rhinanthus crista-galli	**'indak**	Rattlebox

Rhizocarpon geographicum	**tset'ooz**	Green Map Lichen
Rhododendron albiflorum	**dultum**	White Mountain Rhododendron
Rhododendron albiflorum	**nenshenel'ah**	White Mountain Rhododendron
Ribes glandulosum	**maichi**	Black Currant
Ribes glandulosum	**maitsi**	Black Currant
Ribes lacustre	**dahtl'ool**	Black Gooseberry
Ribes lacustre	**maitsi**	Black Gooseberry
Ribes oxyacanthoides	**'indawus**	Northern Smooth Gooseberry
Ribes spp.	**mai ihchi**	Gooseberry
Ribes spp.	**maitsi**	Gooseberry
Rorippa islandica	**\`indak**	Marsh Yellowcress
Rosa woodsii	**whus**	Wood's Rose
Rubus arcticus	**lhiazke**	Dwarf Nagoonberry
Rubus idaeus	**dek'us**	Raspberry
Rubus idaeus	**nk'asdla**	Raspberry
Rubus parviflorus	**danįįkat (lhulhdaninkat)**	Thimbleberry
Rubus pedatus	**lhimai**	Trailing Raspberry
Rumex ? occidentalis	**\`indak**	Western Dock
Russula ? cascadensis	**\`inbenidzo**	Cascade Russula (Mushroom)
Russula ? emetica or alutacea	**\`inbenidzo**	Russula (Mushroom)
Salix arctica	**dzulhk'ut k'idlih**	Arctic Willow
Salix scouleriana	**k'idli (k'idlih)**	Scouler's Willow
Salix sp.	**k'idlihdulk'un**	Willow
Sambucus racemosa	**ch'ip**	Red Elderberry
Sanguisorba sitchensis	**\`indak**	Sitka Burnet
Sanguisorba sitchensis	**\`ut'an**	Sitka Burnet
Saxifraga bronchialis	**\`indak**	Prickly Saxifrage
Saxifraga bronchialis	**yinjat**	Prickly Saxifrage
Saxifraga lyallii	**\`indak**	Red Stemmed Saxifrage
Scirpus acutus	**dzoolh (?)**	Bulrush
Scirpus acutus	**tl'o daiwoolh**	Bulrush
Scirpus acutus	**tl'o dazoolh**	Bulrush
Scirpus acutus	**tl'o tel**	Bulrush
Scutellaria galericulata	**\`indak**	Marsh Skullcap
Sedum lanceolatum	**\`indak**	Lance Leaved Stonecrop
Senecio angularis	**\`indak**	Groundsel
Senecio plattensis	**\`indak**	Groundsel
Senecio triangularis	**\`indak**	Arrow Leaved Groundsel
Shepherdia canadensis	**nowus (nawus)**	Soapberry
Silene acaulis	**yinjat**	Moss Campion
Sium suave	**skenken (kenken)**	Water Parsnip

Smilacina stellata	**'indak**	Star Flowered False Solomon's Seal
Solanum tuberosum	**hanulhyeh**	Potato
Solidago multiradiata	**'indak**	Northern Goldenrod
Solidago spathulata	**'indak**	Spike-like Goldenrod
Sparganium emersum	**tl'o tel**	Simple Stemmed Bur Reed
Sphagnum capillifolium	**yenjat**	Common Red Sphagnum
Sphagnum sp.	**tsaal**	Sphagnum
Spiraea betulifolia	**'indak**	Flat Top Spirea
Spiraea douglasii	**'indak**	Hardhack
Spiraea douglasii	**'ut'an**	Hardhack
Stereocaulon ? paschale	**wudzih**	Common Coral Lichen
Stereocaulon sp.	**yenjat**	Coral Lichen
Streptopus amplexifolius	**chusdli mai**	Twisted Stalk
Suillus sp.	**'inbenidzo**	Mushroom
Suillus sp.	**'inbenidzo**	Mushroom
Symphoricarpos albus	**lhimai**	Snowberry
Taraxacum officinale	**'indak**	Dandelion
Taraxacum officinale	**sadzit'an**	Dandelion
Thalictrum occidentale	**dahtl'ool**	Western Meadow Rue
Thalictrum occidentale	**'ut'an**	Western Meadow Rue
Thuja plicata	**chunzool**	Western Red Cedar
? Tricholoma columbetta	**'inbenidzo**	Fungus
Trifolium pratense	**'indak**	Red Clover
Trifolium sp.	**'indak**	Clover
Trisetum spicatum	**tl'o**	Spike Trisetum
Triticum aestivum	**tl'o**	Wheat
Trollius laxus	**'indak**	Globeflower
Tsuga heterophylla	**lhughus'ul**	Hemlock
Tsuga heterophylla	**lhghus 'ul**	Hemlock
Typha latifolia	**tl'odazoolh**	Cat-tail
unknown lichen	**khahiyii**	Yellow Shrub Lichen
unknown algae #1	**tehdlat**	Algae
unknown fungus	**'inbenidzo**	? Stroma
unknown fungus	**yent'ahneedla**	? Stroma
unknown mushroom	**'inbenidzo**	Mushroom
unknown Poaceae	**tl'o tl'us (?)**	Grass
unknown Poaceae	**tl'oo latak**	Grass
unknown Poaceae	**tl'otel**	Grass
unknown Poaceae	**tl'oladak**	Grass
unknown Poaceae/Cyperaceae	**dutnii tl'o**	Grass/Sedge
unknown Poaceae/Cyperaceae	**dutnii tl'o dulhgi**	Grass/Sedge
unknown Poaceae/Cyperaceae	**tl'o kaa**	Grass/Sedge
Urtica dioica	**hoolht'ik**	Stinging Nettle
Urtica dioica	**'ilh ts'ilh**	Stinging Nettle
Urtica dioica	**whusts'ik**	Stinging Nettle

Vaccinium ? alaskaense or ovalifolium	**'ilhchulcho ('ilhtsul cho)**	Alaskan or Oval Leaved Blueberry
Vaccinium caespitosum	**'ilhtsul**	Dwarf Blueberry
Vaccinium membranaceum	**mai (mai cho)**	Black Huckleberry
Vaccinium oxycoccos	**eyak'ut mai ('ayak'ut mai)**	Bog Cranberry
Vaccinium parvifolium	**tulhanlhis**	Red Huckleberry
Vaccinium parvifolium	**tulhansis (sulh cho)**	Red Huckleberry
Valeriana sitchensis	**'indak**	Sitka Valerian
Veratrum viride	**whulhdulh**	Indian Hellebore
Viburnum edule	**tsalhtse**	Highbush Cranberry

APPENDIX D: INVENTORY OF ALL KNOWN ULKATCHO PLANT NAMES LISTED ALPHABETICALLY ACCORDING TO ULKATCHO NAMES WITH SCIENTIFIC AND ENGLISH COMMON NAMES

See appendix C for explanation. An "*" indicates that there is an alternate Ulkatcho spelling or different Ulkatcho name for the plant species as provided by the Ulkatcho Indian Band (see appendix C).

'ah	*Athyrium filix-femina*	Lady Fern
'ah	*Gymnocarpium dryopteris*	Oak Fern
'ah	*Dryopteris carthusiana*	Wood Fern
'ah chun	*Dryopteris carthusiana*	Wood Fern
'ilh ts'ilh	*Urtica dioica*	Stinging Nettle
'ilhchulcho *	*Vaccinium ? alaskaense or ovalifolium*	Alaskan or Oval Leaved Blueberry
'ilhkal *	*Fritillaria camschatcensis*	Rice Root
'ilhtsul	*Vaccinium caespitosum*	Dwarf Blueberry
'inbenidzo	*Agaricus* sp.	Field Mushroom
'inbenidzo	*Amanita muscaria*	Fly Agaric
'inbenidzo	*Armillaria ? mellea*	Honey Mushroom
'inbenidzo	*Armillaria ponderosa*	Pine Mushroom
'inbenidzo	*Boletus* sp.	Boletus
'inbenidzo	*Boletus ? edulis*	Edible Boletus
'inbenidzo	*Clavariadelphus ligula*	Yellow Fingers
'inbenidzo	*Clitocybe ? dealbata*	Sweat Causing Clitocybe
'inbenidzo	*? Entoloma abortivum*	Fungus
'inbenidzo	*? Fuscoboletinus* sp.	Mushroom
'inbenidzo	*? Hydenellum diabolus*	Teeth Fungus
'inbenidzo	*Russula ? cascadensis*	Cascade Russula (Mushroom)
'inbenidzo	*Russula ? emetica or alutacea*	Russula (Mushroom)
'inbenidzo	*Suillus* sp.	Mushroom
'inbenidzo	*? Tricholoma columbetta*	Fungus
'inbenidzo	*unknown fungus*	? Stroma
'inbenidzo	unknown mushroom	Mushroom
'indak	*Agoseris glauca*	Yellow Agoseris
'indak	*Anemone multifida*	Pacific anemone
'indak	*Antennaria* sp.	Rosy Pussytoes
'indak	*Arnica chamissonis*	Arnica
'indak	*Arnica cordifolia*	Heart Leaved Arnica
'indak	*Aster ascendens*	Aster

'indak	*Aster foliaceus*	Leafy Bracted Aster
'indak	*Caltha leptosepala*	Two Flowered White Marsh Marigold
'indak	*Campanula lasiocarpa*	Mountain Harebell
'indak	*Castilleja parviflora*	Small Flowered Paintbrush
'indak	*Cerastium beeringianum*	Bering Chickweed
'indak	*Chenopodium album*	Lamb's Quarters
'indak	*Chrysanthemum leucanthemum*	Oxeye Daisy
'indak	*Collomia linearis*	Narrow Leaved Collomia
'indak	*Cornus canadensis*	Bunchberry
'indak	*Descurainia sophia*	Flixweed
'indak	*Epilobium hornemannii*	Hornemann's Willowherb
'indak	*Epilobium latifolium*	River Beauty
'indak	*Erigeron peregrinus*	Subalpine Daisy
'indak	*Erigeron* sp.	Fleabane
'indak	*Galium boreale*	Northern Bedstraw
'indak	*Gentianella amarella*	Northern Gentian
'indak	*Geranium richardsonii*	White Geranium
'indak	*Heuchera glabra*	Smooth Alumroot
'indak	*Hieracium gracile*	Slender Hawkweed
'indak	*Matricaria matricarioides*	Pineapple Weed
'indak	*Medicago sativa*	Alfalfa
'indak	*Mimulus guttatus*	Yellow Monkey Flower
'indak	*Mimulus tilingii*	Large Mountain Monkey Flower
'indak	*Moneses uniflora*	Single Delight
'indak	*Montia linearis*	Miner's Lettuce
'indak	*Myosotis alpestris*	Mountain Forget-me-not
'indak	*Pedicularis bracteosa*	Bracted Lousewort
'indak	*Pedicularis langsdorfii*	Langsdorf's Losewort
'indak	*Pedicularis ornithorhyncha*	Bird's Beak Lousewort
'indak	*Phacelia sericea*	Silky Phacelia
'indak	*Plagiobothrys scouleri*	Popcorn Flower
'indak	*Plantago major*	Common Plantain
'indak	*Polemonium pulcherrimum*	Showy Jacob's Ladder
'indak	*Potentilla* sp.	Cinquefoil
'indak	*Potentilla gracilis*	Graceful Cinquefoil
'indak	*Ranunculus cymbalaria*	Shore Buttercup
'indak	*Ranunculus repens*	Buttercup
'indak	*Rhinanthus crista-galli*	Rattlebox
'indak	*Rorippa islandica*	Marsh Yellowcress
'indak	*Rumex ? occidentalis*	Western Dock
'indak	*Sanguisorba sitchensis*	Sitka Burnet
'indak	*Saxifraga bronchialis*	Prickly Saxifrage

'indak	*Saxifraga lyallii*	Red Stemmed Saxifrage
'indak	*Scutellaria galericulata*	Marsh Skullcap
'indak	*Sedum lanceolatum*	Lance Leaved Stonecrop
'indak	*Senecio angularis*	Groundsel
'indak	*Senecio plattensis*	Groundsel
'indak	*Senecio triangularis*	Arrow Leaved Groundsel
'indak	*Smilacina stellata*	Star Flowered False Solomon's Seal
'indak	*Solidago multiradiata*	Northern Goldenrod
'indak	*Solidago spathulata*	Spike-like Goldenrod
'indak	*Spiraea betulifolia*	Flat Top Spirea
'indak	*Spiraea douglasii*	Hardhack
'indak	*Taraxacum officinale*	Dandelion
'indak	*Trifolium* sp.	Clover
'indak	*Trifolium pratense*	Red Clover
'indak	*Trollius laxus*	Globeflower
'indak	*Valeriana sitchensis*	Sitka Valerian
'indawus	*Ribes oxyacanthoides*	Northern Smooth Gooseberry
'indzi	*Fragaria virginiana*	Wild Strawberry
'ulhtsun *	*Mentha arvensis*	Field Mint
'ut'an	*Thalictrum occidentale*	Western Meadow Rue
'ut'an	*Petasites sagittatus*	Arrow Leaved Colt's Foot
'ut'an	*Sanguisorba sitchensis*	Sitka Burnet
'ut'an	*Spiraea douglasii*	Hardhack
bus la (?)	*Antennaria rosea*	Rosy Pussytoes
busts'ah	*Arceuthobium americanum*	American Dwarf Mistletoe
buzi duk'un (?)	*Chenopodium capitatum*	Strawberry Blight
ch'ip	*Sambucus racemosa*	Red Elderberry
chun degha	*Bryoria fremontii*	Black Hair Lichen
chun ts'ahanalhyii	*? Alectoria sarmentosa*	Common Witch's Hair
chundoo	*Pinus contorta*	Lodgepole Pine Pitch
chunzool	*Thuja plicata*	Western Red Cedar
chusdli mai	*Chimaphila umbellata*	Prince's Pine
chusdli mai	*Comandra livida*	Bastard Toad Flax
chusdli mai	*Streptopus amplexifolius*	Twisted Stalk
chusli mai	*Cornus canadensis*	Bunchberry
dagoos *	*Heracleum lanatum*	Cow Parsnip
dahgha	*? Alectoria sarmentosa*	Common Witch's Hair
dahgha	*Bryoria fremontii*	Black Hair Lichen
dahgha	*Cetraria canadensis*	Yellow Tree Lichen
dahgha	*Letharia vulpina*	Wolf Lichen
dahtl'ool	*Galium trifidum*	Small Bedstraw
dahtl'ool	*Ribes lacustre*	Black Gooseberry
dahtl'ool	*Thalictrum occidentale*	Western Meadow Rue

dahtl'uz	*?Cetraria canadensis*	Cetraria (Yellow Tree Lichen)
daniịkat *	*Rubus parviflorus*	Thimbleberry
datsan 'ah chun	*?Athyrium filix-femina*	Lady Fern
datsan 'ah chun	*Dryopteris carthusiana*	Wood Fern
datsan 'ah	*Athyrium filix-femina*	Lady Fern
datsan 'angut	*Juniperus commmunis*	Juniper
datsan lhuk	*Bovista pila*	Puffball
dechun degha	*Bryoria fremontii*	Black Hair Lichen
dek'a	*Nicotiana tabacum*	Tobacco
dek'us	*Rubus idaeus*	Raspberry
deltum	*Elaeagnus commutata*	Silverberry
deltum t'an	*Artemisia sp.*	Mugwort
dihiye *	*Pyrola asarifolia*	Pink Wintergreen
dihiyi	*Pyrola asarifolia*	Pink Wintergreen
dihiyii	*Chimaphila umbellata*	Prince's Pine
dihiyii *	*Pyrola secunda*	One-Sided Wintergreen
ditnik 'indak	*Aquilegia formosa*	Red Columbine
ditnik t'an	*Castilleja miniata*	Common Red Paintbrush
ditniknikwun	*Aquilegia formosa*	Red Columbine
ditnikwun	*Castilleja miniata*	Common Red Paintbrush
dlukche	*Achillea millefolium*	Yarrow
duchun ts'ahanalyii	*Cetraria canadensis*	Yellow Tree Lichen
dudeninli yunudulk'un	*Chenopodium capitatum*	Strawberry Blight
dultum	*Elaeagnus commutata*	Silverberry
dultum	*Rhododendron albiflorum*	White Mountain Rhododendron
duni tl'o	*Carex crawfordii*	Crawford's Sedge
dunih	*Arctostaphylos uva-ursi*	Kinnikinnick
dunih	*Pachistima myrsinites*	Falsebox
dunih cho t'an	*Chimaphila umbellata*	Prince's Pine
dutnii tl'o	*Poa leptocoma*	Bog Bluegrass
dutnii tl'o	*unknown* *Poaceae/Cyperaceae*	Grass/Sedge
dutnii tl'o dulhgi	*unknown* *Poaceae/Cyperaceae*	Grass/Sedge
dzoolh (?)	*Scirpus acutus*	Bulrush
dzulh	*Abies lasiocarpa* (krummholz form)	Subalpine Fir
dzulh k'ut tl'o	*Luzula piperi*	Piper's Woodrush
dzulh tah	*Abies lasiocarpa* (krummholz form)	Subalpine Fir
dzulhk'ut k'idlih	*Salix arctica*	Arctic Willow
eyak'ut mai *	*Vaccinium oxycoccos*	Bog Cranberry
gagisdlache *	*Achillea millefolium*	Yarrow
gantah	*Lupinus arcticus*	Arctic Lupine
hanulhyeh	*Solanum tuberosum*	Potato
hoolht'ik	*Galeopsis tetrahit*	Hemp Nettle
hoolht'ik	*Urtica dioica*	Stinging Nettle
hoonkwus	*Alnus sinuata*	Sitka Alder
hulh	*Menyanthes trifoliata*	Marsh Buckbean
k'en mai	*Amelanchier alnifolia*	Saskatoon Berry

k'endulk'un	*Cornus stolonifera*	Red Osier Dogwood
k'i	*Betula papyrifera*	Paper Birch
k'idli *	*Salix scouleriana*	Scouler's Willow
k'idlihdulk'un	*Salix* sp.	Willow
k'izi	*Betula glandulosa*	Dwarf Birch
k'us	*Alnus incana*	Speckled Alder
k'usts'iz	*Pinus albicaulis*	Whitebark Pine
kas t'an	*Epilobium hornemannii*	Hornemann's Willowherb
khagistl'ache	*Achillea millefolium*	Yarrow
khahdai	*Equisetum arvense*	Horsetail
khahdai	*Equisetum fluviatile*	Horsetail
khahiyii	Unknown Lichen	Yellow Shrub Lichen
khohdai	*Equisetum hyemale*	Common Scoring Rush
khoolht'al	*Nuphar polysepalum*	Yellow Water Lily
kus t'an	*Epilobium angustifolium*	Fireweed
landooz	*Populus balsamifera*	Black Cottonwood
lhant'is mai	*Empetrum nigrum*	Crowberry
lhghus 'ul	*Tsuga heterophylla*	Hemlock
lhiazke	*Rubus arcticus*	Dwarf Nagoonberry
lhiketl'ahmai	*Fritillaria camschatcensis*	Rice Root
lhimai	*Actaea rubra*	Baneberry
lhimai	*Malus fusca*	Western Crabapple
lhimai	*Rubus pedatus*	Trailing Raspberry
lhimai	*Symphoricarpos albus*	Snowberry
lhughus'ul	*Tsuga heterophylla*	Hemlock
ludi	*Ledum groenlandicum*	Laborador Tea
mai *	*Vaccinium membranaceum*	Black Huckleberry
mai ihchi	*Ribes spp.*	Gooseberry
maichi	*Ribes glandulosum*	Black Currant
maitsi	*Ribes glandulosum*	Black Currant
maitsi	*Ribes lacustre*	Black Gooseberry
maitsi	*Ribes spp.*	Gooseberry
naodlih lhuk	*Bovista pila*	Puffball
naodnilh nukuk	*Bovista pila*	Puffball
nekętulhdzolh	*Cirsium vulgare*	Bull Thistle
nekenilhtsolh	*Cirsium foliosum*	Leafy Thistle
nenshenel'ah	*Rhododendron albiflorum*	White Mountain Rhododendron
nk'asdla	*Rubus idaeus*	Raspberry
nooktagunut tasht'an (?)	*Penstemon procerus*	Small Flowered Penstemon
nowus *	*Shepherdia canadensis*	Soapberry
sadzit'an	*Taraxacum officinale*	Dandelion
skenken *	*Sium suave*	Water Parsnip
soont'ih	*Claytonia lanceolata*	Western Springbeauty
soont'ih hooni	*Claytonia lanceolata*	Western Springbeauty
sus mai	*Lonicera involucrata*	Black Twin Berry
swih	*Erythronium grandiflorum*	Trout Lily
t'echo mai	*Ceanothus sanguineus*	Redstem Ceanothus
t'ughus	*Populus tremuloides*	Trembling Aspen
tehanaalhyii	*Hippuris montana*	Mountain Mare's Tail

tehdlat	*Fontinalis antipyretica*	Water Moss
tehdlat	*Hippuris montana*	Mountain Mare's Tail
tehdlat	*Ludwigia palustris*	False Loosestrife
tehdlat	*Ranunculus aquatilis*	Water Buttercup
tehdlat	*unknown algae #1*	Algae
teheyen	*Lemna trisulca*	Ivy Leaved Duckweed
tehhanaalhyii	*Hippuris montana*	Mountain Mare's Tail
tehtl'o	*Hippuris montana*	Mountain Mare's Tail
tl'o	*Carex sitchensis*	Sitka Sedge
tl'o	*Luzula spicata*	Spike Wood Rush
tl'o	*Trisetum spicatum*	Spike Trisetum
tl'o daiwoolh	*Scirpus acutus*	Bulrush
tl'o dazoolh	*Carex utriculata*	Sedge
tl'o dazoolh	*Scirpus acutus*	Bulrush
tl'o k'a	*Carex rostrata*	Beaked Sedge
tl'o tel	*Eleocharis palustris*	Creeping Spike Rush
tl'o tel	*Scirpus acutus*	Bulrush
tl'o tl'us (?)	*unknown Poaceae*	Grass
tl'o	*Alopecurus aequalis*	Little Meadow Foxtail
tl'o	*Calamagrostis canadensis*	Bluejoint
tl'o	*Carex spectabilis*	Showy Sedge
tl'o	*Carex utriculata*	Sedge
tl'o	*Elymus trachycaulis*	Wild Rye Grass
tl'o	*Eriophorum chamissonis*	Chamisso's Cotton Grass
tl'o	*Luzula spicata*	Spiked Woodrush
tl'o	*Phleum alpinum*	Alpine Timothy
tl'o	*Poa secunda*	Bluegrass
tl'o	*Triticum aestivum*	Wheat
tl'o kaa	*unknown Poaceae/Cyperaceae*	Grass/Sedge
tl'o tel	*Sparganium emersum*	Simple Stemmed Bur Reed
tl'o dazoolh	*Carex sitchensis*	Sitka Sedge
tl'o dazoolh	*Typha latifolia*	Cat-tail
tl'ok'a	*Calamagrostis canadensis*	Bluejoint
tl'oo latak	*unknown Poaceae*	Grass
tl'oo tsun *	*Allium cernuum*	Nodding Onion
tl'otel	*Carex sitchensis*	Sitka Sedge
tl'otel	*unknown Poaceae*	Grass
tlel(?)che	*Achillea millefolium*	Yarrow
too ta naalhyii	*Hippuris montana*	Mountain Mare's Tail
ts'etmai	*Cornus canadensis*	Bunchberry
ts'olh ghigha	*Potentilla palustris*	Marsh Cinquefoil
ts'oo	*Picea engelmannii*	Engelmann Spruce
ts'oo bez	*Picea ? mariana*	Black Spruce
ts'oochun	*Abies lasiocarpa*	Subalpine Fir
tsaal	*Sphagnum sp.*	Sphagnum
tsadzo	*Pyrola asarifolia*	Pink Wintergreen
tsadzot'an	*Parnassia fimbriata*	Fringed Grass-of-Parnassus
tsadzot'an	*Pyrola secunda*	One Sided Wintergreen
tsalhtse	*Prunus pensylvanica*	Cherry
tsalhtse	*Viburnum edule*	Highbush Cranberry

tse'ul	*Anaphalis margaritacea*	Pearly Everlasting
tse'ul	*Artemisia michauxiana*	Michaux's Mugwort
tse'ul	*Antennaria rosea*	Rosy Pussytoes
tset'ooz	*Peltigera aphthosa*	Freckled Lichen
tset'ooz	*Rhizocarpon geographicum*	Green Map Lichen
tsoont'ih	*Claytonia lanceolata*	Western Springbeauty
tsuntsi	*Pseudotsuga menziesii*	Douglas-Fir
tthet'ooz	*Peltigera aphthosa*	Freckled Lichen
tulhanlhis	*Vaccinium parvifolium*	Red Huckleberry
tulhansis *	*Vaccinium parvifolium*	Red Huckleberry
wanihcho *	*Cicuta douglasii*	Water Hemlock
whulhdulh	*Veratrum viride*	Indian Hellebore
whus	*Rosa woodsii*	Wood's Rose
whuscho	*Oplopanax horridum*	Devil's Club
whusts'ik	*Urtica dioica*	Stinging Nettle
wudzih	*Stereocaulon ? paschale*	Common Coral Lichen
wudzih dai	*Cladonia borealis*	Red Pixie Cup
wudzih yuyi	*Cladonia borealis*	Red Pixie Cup
wudzih yuyii	*Cladonia cariosa*	Cladonia Scale
wudzihye	*Nephroma resupinatum*	Freckled Lichen
yak'unilh'a *	*Ledum groenlandicum*	Labrador Tea
yenjak	*? Pohlia nutans*	Moss
yenjat	*? Dicranum fuscescens*	Curly Heron's Bill Moss
yenjat	*Fontinalis antipyretica*	Water Moss
yenjat	*Pleurozium schreberi*	Red Stem feather Moss
yenjat	*Polytrichum piliferum*	Awned Haircap Moss
yenjat	*Sphagnum capillifolium*	Common Red Sphagnum
yenjat	*Stereocaulon* sp.	Coral Lichen
yent'ahneedla	unknown fungus	? Stroma
yinjat	*Dryas octopetala*	White Mountain Avens
yinjat	*Saxifraga bronchialis*	Prickly Saxifrage
yinjat	*Silene acaulis*	Moss Campion
yuntl'ool	*Linnaea borealis*	Twin Flower

APPENDIX E: INVENTORY OF PLANT SPECIES LISTED BY DESCENDING ULKATCHO ICS VALUE WITH ASSOCIATED USE CATEGORY NUMBERS, QUALITY, INTENSITY AND EXCLUSIVITY VALUES

The scientific names of the plants are followed by the ICS value calculated, according to the formula in chapter 7, using the Ulkatcho botanical data. Beneath each species are four columns of numbers containing the data used to calculate the ICS value. The first column represents use category number. The use category numbers are defined in Table 7.1. The second category represents the quality value for the corresponding use category. The third column represents the intensity of use value. The descriptions for the intensity values can be found in Table 7.2. The fourth column represents the exclusivity of use values. The descriptions for the exclusivity values can be found in Table 7.3.

Pinus contorta 132

14	4	3	2
16	4	2	1
13	3	1	1
4	4	3	2
27	3	3	1
18	3	2	1
26	3	2	1
15	4	4	3
48	2	2	1

Shepherdia canadensis 97

3	5	4	2
55	5	3	3
31	3	2	1
25	3	2	1

Picea spp. 81

14	4	4	2
26	3	2	1
22	3	4	1
18	3	3	1
27	3	2	1
41	2	2	3
48	2	2	1

Picea engelmannii 77

14	4	4	2
26	3	2	1
22	3	4	1
18	3	3	1
27	3	2	1
41	2	2	3

Thuja plicata 60

16	4	3	2
22	3	4	2
14	4	3	1

Heracleum lanatum 56

2	5	3	3
54	2	2	2
13	3	1	1

Abies lasiocarpa 55

24	3	4	2
27	3	4	2
23	3	2	1
59	1	1	1

Alnus spp. 54

27	3	2	1
15	4	3	2
9	3	3	2
40	3	2	1

Arctostaphylos uva-ursi 53

3	5	4	2
10	2	2	1
13	3	1	1
26	3	2	1

Salix spp. 53

56	4	3	1
54	2	1	1
31	3	2	1
14	4	3	1
23	3	2	1
48	2	3	3

Alnus incana 48

27	3	2	1
15	4	3	2
9	3	3	2

Populus balsamifera 48

14	4	3	2
19	2	3	3
27	3	2	1

Armillaria ponderosa 45

55 5 3 3

Populus tremuloides 42

15 4 3 2
56 4 3 1
40 3 2 1

Rubus parviflorus 42

3 5 3 1
9 3 3 3

?Porphyra sp. 40

2 5 4 2

Pseudotsuga menziesii 39

14 4 3 1
27 3 2 1
15 4 3 1
24 3 3 1

Salix scouleriana 39

31 3 2 1
14 4 3 1
23 3 3 1
48 2 2 3

Ledum groenlandicum 38

7 4 4 2
26 3 2 1

Betula papyrifera 36

17 4 3 3

Unknown gymnosperm 36

16 4 3 3

Veratrum viride 36

11 ? 3 2
27 3 2 1

Amelanchier alnifolia 35

3 5 4 1
13 3 1 1
14 4 3 1

Juniperus communis 34

57 3 3 2
24 3 2 1
48 2 2 1
26 3 2 1

Alnus sinuata 30

40 3 2 1
15 4 3 2

Cicuta douglasii 30

11 5 3 2

Pinus albicaulis 30

3 5 3 2

Dryopteris carthusiana 27

1 5 3 1
13 3 2 1
40 3 2 1

Fragaria virginiana 26

3 5 4 1
35 3 2 1

Rosa spp. 26

6 4 2 1
32 3 2 3

Bryoria fremontii 25

54	2	1	1
13	3	1	1
23	3	2	2
15	4	2	1

Betula glandulosa 24

14	4	3	2

Chimaphila umbellata 24

24	3	4	2

Comandra livida 24

33	3	2	1
31	3	3	2

Salix sp. 24

16	4	3	2

Scirpus acutus 24

23	3	2	3
13	3	2	1

Achillea millefolium 21

27	3	2	1
57	3	3	1
26	3	2	1

Rubus arcticus 20

3	5	4	1

Sambucus racemosa 20

3	5	4	1

Solanum tuberosum 20

1	5	4	1

Vaccinium caespitosum 20

3	5	4	1

Viburnum edule 20

3	5	4	1

Castilleja miniata 18

48	2	2	3
8	3	2	1

Cornus canadensis 18

31	3	3	2

Ribes lacustre 18

3	5	3	1
13	3	1	1

Rosa sp. 18

32	3	2	3

Sphagnum capillifolium 18

21	3	2	1
22	3	2	2

Vaccinium membranaceum 17

3	5	3	1
54	2	1	1

Nicotiana tabacum 16

10	2	4	2

Allium cernuum 15

1	5	3	1

Athyrium filix-femina 15

1	5	3	1

Claytonia lanceolata				15
1	5	3	1	
Equisetum spp.				15
29	3	2	1	
13	3	1	1	
40	3	2	1	
Fritillaria camschatcensis				15
1	5	3	1	
Lonicera involucrata				15
13	3	1	1	
31	3	2	1	
27	3	2	1	
Oplopanax horridum				15
26	3	2	1	
13	3	1	1	
27	3	2	1	
Prunus pensylvanica				15
3	5	3	1	
Ribes glandulosum				15
3	5	3	1	
Ribes oxyacanthoides				15
3	5	3	1	
Rubus idaeus				15
3	5	3	1	
Rubus leucodermis				15
3	5	3	1	
Rubus pedatus				15
3	5	3	1	
Rumex occidentalis				15
2	5	3	1	
Sium suave				15
1	5	3	1	
Vaccinium alaskaense				15
3	5	3	1	
Vaccinium ovalifolium				15
3	5	3	1	
Vaccinium parvifolium				15
3	5	3	1	
Cetraria canadensis				14
26	3	2	1	
6	4	2	1	
Empetrum nigrum				13
3	5	2	1	
13	3	1	1	
Epilobium angustifolium				13
13	3	1	1	
10	2	2	1	
57?	3	2	1	
Amanita muscaria				12
12	4	3	1	
Amanita pantherina				12
12	4	3	1	

Chenopodium capitatum 12

19 2 2 3

Cirsium foliosum 12

12 4 3 1

Cirsium spp. 12

12 4 3 1

Cirsium vulgare 12

12 4 3 1

Pachistima myrsinites 12

32 3 2 1
25 3 2 1

Pyrola spp. 12

26 3 2 1
27 3 2 1

Salix drummondiana 12

14 4 3 1

Tremella mesenterica 12

5 4 3 1

unknown algae 12

51 2 2 3

unknown grass 12

12 4 3 1

Urtica diocia 12

12 4 3 1

Arceuthobium americanum 11

15 4 2 1
13 3 1 1

Matricaria matricarioides 11

13 3 1 1
7 4 2 1

Erythronium grandiflorum 10

1 5 2 1

Rhododendron albiflorum 10

10 2 2 1
23 3 2 1

Sedum divergens 10

2 5 2 1

Cornus stolonifera 9

13 3 1 1
27 3 2 1

Equisetum arvense 9

29 3 2 1
13 3 1 1

Equisetum hyemale 9

13 3 1 1
40 3 2 1

Nuphar polysepalum 9

13 3 1 1
40 3 2 1

Stereocaulon ? paschale 9

13	3	1	1
39	3	2	1

Agaricus 8

5	4	2	1

Carex rostrata 8

16	4	2	1

Opuntia sp. 8

12	4	2	1

Rosa woodsii 8

6	4	2	1

?Verbascum thapsus 8

12	4	2	1

? Alectoria sarmentosa 6

40	3	2	1

Alopecurus aequalis 6

13	3	2	1

Antennaria rosea 6

24	3	2	1

Carex sitchensis 6

13	3	2	1

Carex spectabilis 6

13	3	2	1

Carex utriculata 6

13	3	2	1

Chrysanthemum leucanthemum 6

40	3	2	1

? Dicranum fuscescens 6

21	3	2	1

Eriophorum chamissonis 6

13	3	2	1

Fomes ? pinicola 6

40	3	2	1

Galium boreale 6

57	3	2	1

Letharia vulpina 6

26	3	2	1

Lost Specimen 6

13	3	2	1

Luzula piperi 6

13	3	2	1

Mentha arvensis 6

28	3	2	1

Menyanthes trifoliata 6

27	3	2	1

Moneses uniflora 6

28	3	2	1

Penstemon fruiticosus 6

40	3	2	1

Picea ? mariana				6
22	3	2	1	
Pleurozium schreberi				6
21	3	2	1	
Potentilla palustris				6
30	3	2	1	
Pyrola asarifolia				6
26	3	2	1	
Pyrola secunda				6
27	3	2	1	
Tsuga heterophylla				6
23	3	2	1	
Lycopodium annotinum				4
54	2	2	1	
Lycopodium complanatum				4
54	2	2	1	
Picea glauca				4
48	2	2	1	
Actaea rubra				3
13	3	1	1	
Artemisia norvegica				3
13	3	1	1	
Boletus ? edulis				3
13	3	1	1	
Carex crawfordii				3
13	3	1	1	
Cladina mitis				3
13	3	1	1	
Cladonia borealis				3
13	3	1	1	
Cladonia ? ecmocyna				3
13	3	1	1	
Elymus trachycaulis				3
13	3	1	1	
Epilobium hornemannii				3
13	3	1	1	
Equisetum fluviatile				3
13	3	1	1	
Equisetum scirpoides				3
13	3	1	1	
Equisetum sp.				3
13	3	1	1	
Galium trifidum				3
13	3	1	1	
Lonicera utahensis				3
13	3	1	1	
Lupinus arcticus				3
13	3	1	1	

Lupinus sericeus 3

13 3 1 1

Luzula spicata 3

13 3 1 1

Luzula spicata 3

13 3 1 1

Peltigera aphthosa 3

13 3 1 1

Poa leptocoma 3

13 3 1 1

Ranunculus aquatilis 3

13 3 1 1

Russula ? cascadensis 3

13 3 1 1

Russula ? emetica or alutacea 3

13 3 1 1

Salix arctica 3

13 3 1 1

Senecio triangularis 3

13 3 1 1

Thalictrum occidentale 3

13 3 1 1

Trisetum spicatum 3

13 3 1 1

unknown Lichen 3

13 3 1 1

unknown mushroom 3

13 3 1 1

unknown yellow shrub lichen 3

13 3 1 1

? Usnea lapponica 3

13 3 1 1

Trifolium repens 2

54 2 1 1

unknown moss 2

51 2 1 1

Aquilegia formosa 1

59 1 1 1

Bovista pila 1

59 1 1 1

Calamagrostis canadensis 1

59 1 1 1

Capsella bursa-pastoris 1

59 1 1 1

Ceanothus sanguineus 1

59 1 1 1

Galeopsis tetrahit 1

59 1 1 1

Hippuris montana	1	59	1	1	1
Lemna trisulca	1	59	1	1	1
Linnaea borealis	1	59	1	1	1
Malus fusca	1	59	1	1	1
Nephroma resupinatum	1	59	1	1	1
Rhizocarpon geographicum	1	59	1	1	1
Typha latifolia	1	59	1	1	1
unknown fungus	1	59	1	1	1
Vaccinium oxycoccos	1	59	1	1	1
Agoseris glauca	0	0	0	0	0
Anaphalis margaritacea	0	0	0	0	0
Anemone multifida	0	0	0	0	0
Angelica ? genuflexa	0	0	0	0	0
Antennaria neglecta	0	0	0	0	0
Apocynum androsaemifolium	0	0	0	0	0
Armillaria ? mellea	0	0	0	0	0
Arnica chamissonis	0	0	0	0	0
Arnica cordifolia	0	0	0	0	0
Artemisia michauxiana	0	0	0	0	0
Aster ascendens	0	0	0	0	0
Aster foliaceus	0	0	0	0	0
Boletus	0	0	0	0	0
Boletus edulis	0	0	0	0	0
Boletus sp.	0	0	0	0	0

Caltha leptosepala	0	0	0	0	0
Campanula lasiocarpa	0	0	0	0	0
Cassiope mertensiana	0	0	0	0	0
Castilleja parviflora	0	0	0	0	0
Ceanothus velutinus	0	0	0	0	0
Cerastium beeringianum	0	0	0	0	0
Chenopodium album	0	0	0	0	0
Cicuta bulbifera	0	0	0	0	0
Cladonia cariosa	0	0	0	0	0
? Clavulinopsis laeticolor	0	0	0	0	0
Clintonia uniflora	0	0	0	0	0
Clitocybe ? dealbata	0	0	0	0	0
Collomia linearis	0	0	0	0	0
Conyza canadensis	0	0	0	0	0
Cryptogramma crispa	0	0	0	0	0
Descurainia sophia	0	0	0	0	0
Dryas ? drummondii	0	0	0	0	0
Dryas octopetala	0	0	0	0	0
Elaeagnus commutata	0	0	0	0	0
Eleocharis palustris	0	0	0	0	0
? Entoloma abortivum	0	0	0	0	0
Epilobium latifolium	0	0	0	0	0

Erigeron peregrinus	0	0	0	0	0
Fontinalis antipyretica	0	0	0	0	0
? Fuscoboletinus	0	0	0	0	0
Gentianella amarella	0	0	0	0	0
Geranium richardsonii	0	0	0	0	0
Geum macrophyllum	0	0	0	0	0
Gymnocarpium dryopteris	0	0	0	0	0
Heuchera glabra	0	0	0	0	0
Hieracium gracile	0	0	0	0	0
? Hydenellum diabolus	0	0	0	0	0
Hypopitys monotropa	0	0	0	0	0
Indeterminate	0	0	0	0	0
? Laricifomes pinicola	0	0	0	0	0
Lathyrus ochroleucus	0	0	0	0	0
Lemna minor	0	0	0	0	0
Medicago sativa	0	0	0	0	0
Mimulus guttatus	0	0	0	0	0
Mimulus tilingii	0	0	0	0	0
Mitella ? pentandra	0	0	0	0	0
Montia linearis	0	0	0	0	0
Myosotis alpestris	0	0	0	0	0
Osmorhiza chilensis	0	0	0	0	0
Oxyria digyna	0	0	0	0	0

Parnassia fimbriata	0	0	0	0	0
Parnassia palustris	0	0	0	0	0
Pedicularis bracteosa	0	0	0	0	0
Pedicularis langsdorfii	0	0	0	0	0
Pedicularis ornithorhyncha	0	0	0	0	0
Penstemon procerus	0	0	0	0	0
Petasites frigidus	0	0	0	0	0
Petasites sagittatus	0	0	0	0	0
Phacelia sericea	0	0	0	0	0
Phleum alpinum	0	0	0	0	0
Phlox caespitosa	0	0	0	0	0
Plagiobothrys scouleri	0	0	0	0	0
Plantago major	0	0	0	0	0
Platanthera dilatata	0	0	0	0	0
Poa secunda	0	0	0	0	0
? Pohlia nutans	0	0	0	0	0
Polemonium pulcherrimum	0	0	0	0	0
Polytrichum piliferum	0	0	0	0	0
Potentilla	0	0	0	0	0
Potentilla diversifolia	0	0	0	0	0
Potentilla drummondii	0	0	0	0	0
Potentilla gracilis	0	0	0	0	0

Pterospora andromedea	0	0	0	0	0
Ranunculus cymbalaria	0	0	0	0	0
Ranunculus repens	0	0	0	0	0
Rhinanthus crista-galli	0	0	0	0	0
Rorippa islandica	0	0	0	0	0
Rumex acetosa	0	0	0	0	0
Rumex acetosella	0	0	0	0	0
Rumex salicifolius	0	0	0	0	0
Salix barclai	0	0	0	0	0
Salix commutata	0	0	0	0	0
Salix glauca	0	0	0	0	0
Salix ? pseudomonticola	0	0	0	0	0
Sanguisorba sitchensis	0	0	0	0	0
Sarcodon ? imbricatus	0	0	0	0	0
Saxifraga bronchialis	0	0	0	0	0
Saxifraga lyallii	0	0	0	0	0
Scutellaria galericulata	0	0	0	0	0
Sedum lanceolatum	0	0	0	0	0
Senecio angularis	0	0	0	0	0
Senecio plattensis	0	0	0	0	0
Silene acaulis	0	0	0	0	0
Smilacina racemosa	0	0	0	0	0
Smilacina stellata	0	0	0	0	0

Solidago multiradiata	0	0	0	0	0
Solidago spathulata	0	0	0	0	0
Sorbus scopulina	0	0	0	0	0
Sparganium emersum	0	0	0	0	0
Spiraea betulifolia	0	0	0	0	0
Spiraea douglasii	0	0	0	0	0
Spirodela polyrhiza	0	0	0	0	0
Streptopus amplexifolius	0	0	0	0	0
Suillus sp.	0	0	0	0	0
Suillus sp.	0	0	0	0	0
Symphoricarpos albus	0	0	0	0	0
Taraxacum officinale	0	0	0	0	0
Teliomycetes (Class) Uredinales (Order)	0	0	0	0	0
? Tricholoma columbetta	0	0	0	0	0
Trifolium pratense	0	0	0	0	0
Trifolium sp.	0	0	0	0	0
Triticum aestivum	0	0	0	0	0
Trollius laxus	0	0	0	0	0
unknown fungus	0	0	0	0	0
Valeriana sitchensis	0	0	0	0	0
Veronica sp.	0	0	0	0	0
Viola adunca	0	0	0	0	0

? Xanthoria candelaria				0
0	0	0	0	

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Title of Thesis:

Environmental, Cultural and Linguistic Factors Affecting Ulkatcho (Carrier) Botanical Knowledge

Author [redacted]

Michèle Suzanne Kay
September 26, 1995