

For the past year, the Society of Ethnobiology has been actively recruiting new members. I'd like to extend a special welcome to all those who are reading their first issue of the *Journal*. It seems a good time to say a few words about how the papers you will be reading came to be published.

The **Journal** publishes three types of refereed manuscripts: articles, short communications, and comments. An article describes original **research** in any area of ethnobiology. Length is variable: you must present enough background infor**mation**, detail on methodology, and basic data for an educated reader to evaluate the validity of the conclusions you have drawn, while avoiding wordiness, repetition, and jargon. English, Spanish, and French abstracts are required for articles. A short communication is a brief presentation of the results of limited or preliminary research. No abstracts are required. A comment is a **discussion** of an article or short communication previously published in the *Journal*. **Like** articles and short communications, all comments are sent out for peer review. If the comment is accepted for publication, the author of the original article is invited to write a response and comment and response are published together.

After a manuscript is submitted (original and two copies), the editor sends it to an editorial board member, who chooses two reviewers. (Send me your name, address, phone/FAX/EMail numbers, and a description of yow expertise in ethnobiology if you would like to review manuscripts.) After all reviews are back, a process that takes 8-12 weeks, the editor makes the final decision and informs the author that the manuscript (1) is accepted, (2) is accepted with minor revisions, (3) should be revised and resubmitted, or (4) is rejected. A great many manuscripts go through the "revise and resubmit" stage and are ultimately published: revise and resubmit is *nat* rejection. The final stages of the process are copyediting, **typesetting**, and proofing, proofing, and more proofing.

The style guide for the **Journal** is published in issue 10(2); you may **also** write me for a copy. A few reminders for new and experienced submitters alike:

- French, Spanish, and English abstracts *are* required for article-length submissions. If translating your original abstract is a real problem, we'll help you out, but there is Simply not the time or the money for the *Journal* staff to do everyone's translations.
- Double spaced means doubled spaced *everywhere* in the manuscript: abstracts, **text**, quotations, tables, bibliography, notes, and **figure** captions. Reviewers often write comments on the manuscript; the editor must copyedit for the

typesetter. These tasks **are** made very difficult if sections of the text are not doubled spaced.

- Word processors **are** wonderful, but resist the temptation to use fancy typeunderline species and genus names and foreign words (no italic type, please); bold face may be used for foreign words for special emphasis (e.g., in an English text with both Spanish and Quechua common names, you may use bold face for Quechua), but is not required.
- You must provide page numbers for all quotations, long or short, and in an English text translations of any quotes not in English.
- Double check all scientific and foreign words for accuracy of speUing and accenting-the editors cannot do this for you.
- Double check the bibliography: most queries to authors during the copyediting process have to do with missing first names for authors and editors, missing publication locations, and the spelling out of abbreviations.

My thanks to all the board members and reviewers who assisted with **manu**scripts for issue 12(1). And special thanks to Chris Pulliam, who filled in for two issues as interim News and Comments editor. Gary Martin now takes over this job.

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EDIBLE WOOD FERN ROOTSTOCKS OF WESTERN NORTH AMERICA: SOLVING AN ETHNOBOTANICAL PUZZLE

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ABSIRACf.-Many ethnographic reports refer to a large. "pineapple-like" fem rootstock which was an important native root vegetable in northwestern North America. It is suggested here that the primary, most commonly used edible type is Dryopteris expansa, with other, related species having been used in some localities and under some circumstances. The rootstocks were cooked in pits, often in winter when food was scarce. They are seldom eaten today and are known primarily by native elders. Several botanical identifications for this food have been suggested in Dryopteris, Athyrium, and other fem genera. Species verification has been complicated by lack of botanical expertise among early reporters, difficulty in recalling the fern characters by elders, and taxonomic complexities of the ferns. Rootstocks of D. expansa were harvested by the Nuxalk at Bella Coola, cooked, and prepared for nutrient analyses. Proximate composition and energy are similar to that of the common potato, but Ca, Mg, Zn, Cu, and Mn were present in levels several-fold higher than that of potato.

RESUMEN.-Varios informes etnográficos se refieren a un rizoma grande, "semejante a una piña," de un helecho, que era una importante raiz alimenticia nativa en el noroeste de Norteamérica. Se sugiere aquí que el tipo comestible primario, más comunmente usado, es Dryopteris expansa, habiéndose empleado otras especies emparentadas en algunas localidades y en ciertas circunstancias. Los rizomas se cocían en cavidades en el suelo, con frecuencia en el invierno cuando escaseaba la comida. En la actualidad se comen muy poco, y son principalmente los ancianos indígenas quienes los conocen. Para este alimento se han sugerido varias identificaciones botánicas en Dryopteris, Athyrium y otros géneros de helechos. La verificación de la especie se ha complicado por la falta de pericia botánica entre los primeros observadores, la dificultad en recordar las características de los helechos por parte de los andanos, y la complejidad taxonomica de los helechos. Colaboradores Nuxalk cosecharon rizomas de D. *expansa* en Bella Coola, que se **cocieron** y **prepararon** para **análisis** nutricional. Los **análisis** bromatol&gicos **básicos** arrojaron resultados **similares** a los de la papa **común**, incluyendo su valor **energético**, pero se encontraron niveles de calcio, magnesia, cine, cobre, y manganeso varias veces **más** altos que los de la papa.

RESUME.-De nombreux rapports ethnographiques font référence à de grosses racines de fougère, semblables à un ananas, qui étaient un important légume local en Amerique du Nord. L'hypothese est émise que le type comestible primaire et le plus utilisé est la Dryopteris expansa alors que d'autres espèces proches etaient utilisées dans certaines localités et dans certaines circonstances. Les racines étaient cuites dans des trous, souvent en hiver, lorsque la nourriture se faisait rare. Elles sont rarement **consommées** aujourd'hui et sont surtout connues des personnes âgées, Différentes identifications botaniques pour cet aliment ont été suggerées dans Dryopteris, Alhyrium et d'autres genres de fougeres. La verification botanique a été rendue difficile par le manque d'expertise botanique des premières sources, par la mauvaise mémoire des anciens à propos des caracteristiques des fougeres, et par leur complexite taxonomique. Les racines de D. expansa furent recoltées par les Nuxalk a Bella Coola, cuites et preparées pour être analysées. La composition "proximate" et l'energie sont similaires à celles de la pomme de terre commune mais le Ca, Mg, Zn, Cu, et Mn y sont presents en plus grande quantite.

INTRODUCTION

Ferns are an important component of northwestern North American flora. The moist, mild coastal climate is ideal for the growth of many Pteridophyte species, and the diversity of habitats and **microclimates** is reflected in the 'diversity of species of **ferns**. Many reports have been published concerning the edibility of certain ferns by native peoples of the region (d. Gunther 1973; Turner 1975). The use of the rhizomes of western bracken **fern** (*Pteridium aquilinum* (L.) Kuhn) as food by Northwest Coast peoples has been well documented (d. Norton 1979). The rhizomes of licorice fern (*Polypodium glycyrrhiza* D.C. Eat.) are also well known, even today, as a mouth sweetener and **appetizer**, although they were seldom eaten in any quantity (d. Turner and Bell 1973; Turner 1973, 1975).

Perhaps the most intriguing and puzzling "fern food" is the rootstock recalled by many contemporary native elders and widely cited in the literature as a large, "pineapple-like," or "banana-like" clump of **''fingers''** which was **cooked** and eaten traditionally, both as a regular part of the diet and as emergency rations, along the coast from Oregon to Alaska and inland in British Columbia. There is probably more confusion about the identity of this edible fern rootstock, hereinafter called wood fern in a general context, than about any other traditional food plant in northwestern North America.

One of the earliest literature references to edible wood fern is by Gorman (1896), who identified it as **Dryopteris spinulosa** ["Aspidium spinulosum var. dilatatum (Wood-fern)"] and provided the following account of its **use** by the Coast Tsimshian of southeastern Alaska (Gorman 1896:78-79):

[Wood-fern] . . . is abundant in rich open woods near sea level, and the rootstock or caudex is highly relished by the natives, who cook and eat it in large quantities, it being the first vegetable food which they obtain in early spring. [It] . . . is called "*Ahh*," by the Tsimsians, who inform me that it is larger, sweeter, and of better flavor when grown under or in the vicinity of salmon berry bushes . . .

-Ethnographers without botanical knowledge described the fern in the most general of terms. For example, J.P. Hanington, in his unpublished ethnographic notes, **referred** to it under a Suquamish place name for a creek at Miller Bay **("Miller's** Inlet") on the Port Madison Indian Reservation in Washington:

du ts'kweb Means:- **ts'akwe'** = root used to eat long ago. Grows in marshy place. Have heavy roots like a ball. Grass [Fronds] like feathers. 1 ft high. Black on surface & white inside. Grow up like fingers in bunches}

Barbara Lane (personal communication to NJT, 1984) described the same Suquamish fern in more detail, based on deSCriptions by Native people she consulted:

It(ts'Ekwi] is styled variously the "fossil fern," "evergreen fern," and "Indian banana." It is a tall plant, and grows on logs in damp places. A cluster of edible pods is found at the bottom of the stalks, looking like one's hands placed palm to palm. The Indians gathered these **pods** and baked them as they did dams, burying them in a pit with hot stones. The existence of these plants on the **west** side of the bay gave the place its name . . . Miller Bay used to be called Squaib Bay, dearly a rendering of the native term for the fern.

Edible wood fern rootstocks, all having more-or-Iess similar descriptions and methods of gathering and preparation, have been described and identified as **Dryopteris austriaca** (Turner 1975; Heller 1976; Oswalt 1957), D. flUx-mas (Turner 1m, 1975), D. dilatata (Kari 1987-"D. dilata," [sic]), D.expansa (cl. Lepofskyet al. 1985), D. spinulosa (Gorman 1896—"Aspidium spinulosum var. dilatatum;" Harlan Smith, unpublished notes, 1920-1921L "Aspidium spinulosum"), Thelypteris limbosperma (Norton 1981), Cystopteris bulbifera ('Ksan, People of 1980), Athyrium {ilixfemina (Kari 1987; Harlan Smith, unpublished notes, 1920-21-"Asplenium cyclosorum"), and Polystichum munitum (Turner 1975; Turner and Bell 1973; Nancy Turner unpublished notes on Haida, 1971).3D. spinulosa, D. dilatala, D. austriaca, and D. expansa are considered to be in the same taxonomic complex, as explained later. In most, if not all cases, the identifications were made on the basis of selection and information provided by Native elders.

Potentially all of these **species** were used but, logically, some citations result from confused or mistaken identifications. In this paper, we present evidence to indicate that the "real" wood fern rootstock-the one normally used as foodis that of *Dryopteris expansa*, but that on occasion other, similar types of **fern** rootstocks were also consumed.

The confusion surrounding the identification of the edible wood fern is exemplified in the unpublished notes of Harlan t. Smith on plant use by the Nuxalk (Bella Coola) and Carrier Indians of central British Columbia. Smith referred in several places to an edible fern called **sa'walm** ("squalum"), which had **a**"..., part like a pineapple at the base [that was] used for food." In his Carrier ethnobotany notes, he identified it as Athyrium filix-femina⁴ and noted, "Leaves coarser and less **bifurcated** than the shield fern." In his Bella Coola ethnobotany notes, he identified squalum as Dryopteris expansas and also attributes the name "Kala" to this species. Then, he notes: "Trouble. Same species given two different Bellacoola names, one useful for food only, the other used for medicine." His native DeUa Coola consultant evidently applied the two native terms to different **specimens** of the same species. Adding further confusion, a third term, "kamatz," was applied by Smith's Native consultants to the tops (fronds) of Dryopteris expansa (see previous footnote) and Athyrium filix-femina⁶ with a note under the latter: "Trouble. Joshua [Moody] calls this the same as Shield Fern 7 (54M) with which it was coUected; yet that is the same species as 7 (77M) which **he** calls squalum [both of these are actually Dryopteris expansa]."

Elsewhere in his unpublished notes, Smith mentioned two other fern species which were sometimes **mistaken** for the **real** *squalum*. Under *Polystichum munitum*, sword fern, he noted: "... This plant was not used for food , , , but was [sometimes] mistaken. , , for another fern called *squalum*, The two forms were distinguished by the leaves as the banana-like parts appear the same and both are easy to pull up, The leaves of the sword fem , , , do not die in winter "Under an unidentified fern "See el i tana,"⁷ he noted that this one **was** ". a little **different** from *squalum*. Sometimes people ... mistake it for *squalum*. It is not good food. *Squalum* is [a good food] ... Roots same and top same as *squalum*. I think *squalum* has no spores and *See el i tana* has." Smith's Carrier notes **are** equ'ally confusing.⁸

As will be seen, research within the last two decades at Bella Coola has resulted in clarification of some of the confusion **surrounding** *sq*^{*w*}*wâlm*, but the problems that faced Harlan Smith and the Native people he worked with **seem** to have been repeated in virtually every area where wood fern was eaten. Furthermore, plant taxonomists have also been confounded in the scientific classification of wood ferns, and the many synonyms and nomenclatural discrepancies for various *Dryopteris* species have made the problem of identification especially difficult.⁹

The aim of this paper is to resolve, as much as possible, the questions arising from the bewildering and sometimes conflicting array of botanical and ethnobotanical information on the edible wood fern in northwestern North America, and to document the traditional importance of this food in Native cultures. We will summarize the botanical and taxonomic features of the wood fern complex in northwestern North America, and relate the **botanical** characteristics to the utility of the plant. Then we will review the Native terminology, descriptions, and use of the edible wood fern, using information derived both from literature sources and from interviews with contemporary Native consultants in various speech communities of the region. Nuhient data from specimens collected and prepared at Bella Coola are provided, as well as use frequency and taste appreciation data. Information on non-food uses and the importance of wood fern in mythology and traditional beliefs is also given.

BOTANICAL AND TAXONOMIC ASPECTS OF THE WOOD FERN PUZZLE

Narrowing down the species.-The fern species reported in this study to have edible, "pineapple-like" rootstocks fall into five genera. These are annotated and evaluated as follows (see also descriptions in Scoggan 1978 and Taylor and MacBryde 1977):

Cystopteris - C. *bulbifera* ('Ksan, People of 1980); does not occur in British Columbia (Scoggan 1978); concluded to be erroneous identification;

Thelypteris - *T. limbosperma* (Norton 1981); voucher specimen (613 WTU) examined by Adolf Ceska in 1989 and found to be *Athyrium filix-femina*;

Athyrium - only A. filix-femina (L.) Roth (lady fern) has rootstocks large enough and distribution wide enough to "qualify;" has been identified on occasion as the edible type (see previous entry), but usually rejected;

Polystichum - only P. *munitum* (Kaulf.) Presl (sword fern) has large enough rootstocks to be the edible type, and has occasionally been suggested as such in literature citations, 10 P. *braunii* (Spenner) **Fée** (Braun's holly fern) has rootstocks **large** enough, but has never been cited in ethnobotanical or ethnographic literature as having been eaten; 11

Dryopteris - most frequently cited as having edible rootstocks; taxonomic treatments for the genus widely variable (d. **Hultén** 1968; Calder and Taylor 1968; Scoggan 1978); some species ruled. out because of size or range, 12 leaving D. *flUx-mas* (L.) Schott (male fern) and two species of the "Dryopteris expansa complex:" D. carthusiana (Villars) H.P. Fuchs13 and D. expansa (K.B. Presl) Fraser-Jenkins and Jermy; (see Walker 1955, 1%1; Britton **1962**, 1968, **19**n; and Widen and Britton **1**m for detailed discussions of the taxonomy of this complex).

Of the Dryopteris species mentioned, D. fiUx-mas was identified in one case (Turner 1973) but the Dryopteris expansa complex has been more consistently recognized. The two species from this complex are similar, but D. carthusiana (syn. D. spinulosa [O.F. Müller] Watt) has fronds with more or less parallel sides at their lower part and has a chromosome count of 2n = 164, whereas D. expansa (syn. D. assimilis S. Walker, D. dilatata [Hoffm.] A. Gray var. alpina Moore) has fronds more or less triangular in outline, with a chromosome count of 2n = 82. The latter is common in northwestern North America; the former is less frequent, but where it occurs, it may grow side by side with D. expansa (e.g., in Exchamsiks River Provincial Park in northem British Columbia). Of all the species mentioned, the one most frequently and consistently cited as THE edible wood fem of northwestern Indigenous Peoples, when synonymy is considered, is Dryopteris expansa.

Native perceptions. - Given the complex situation of so many, widely variable fem species and genera sharing at least some characteristics, it is not surprising that

Native people have often provided varying and confusing identifications and descriptions of the edible wood fern and others they consider to be related.

McDwraith (1948, in his Appendix C), in discussing folk classification of the Nuxalk (Bella eoola) adds another perspective to the problem: "In regard to plants, a difficulty lies in the fact that Bella eoola nomenclature is not always strictly botanical. Two or more distinct ferns, for example, may be grouped together on **account** of their similar use as food and one name applied to them **indiscriminantly** ..." A Haida Native elder, the late George Young, stated the same concept in discussing several ferns given the same Haida names¹⁴: "One word can mean so many names. It's all in the way the sentence or the subject is brought up. You can have one word for two completely different kinds of plants . . .,"

The close perceptual relationship among various ferns is shown in the Nuxalk area by the term *aixmats*, mentioned previously in the introductory discussion of Harlan Smith's unpublished notes, which is sometimes applied to the fronds of Athvrium, Dryopteris, Polystichum, and Pteridium¹⁵ although the rhizomes are usually given different names. The identification of the true edible wood fern, sq'walm, must be made from the appearance of the rootstock, not the aerial parts. Nuxalk elder Felicity Walkus once applied the name to specimens of both **Druopteris expansa** and Athyrium filix-femina growing side by side¹⁶, but when she examined the rootstocks after they were dug up, she stated that only the Dryopteris was the true sq'walm. This identification was confirmed by Margaret Siwallace and two other Nuxalk elders. The Athyrium rootstock, they said, was the one *calledxala*, which was like that of the edible fern, but smaller, blacker, and covered with dark hairs. **Grizzly bears** are said to like to *eatxala*, but it makes them cranky (Nancy J. Turner, unpublished notes on Nuxalk, 1981). Margaret Siwallace later stated that there were four types of fem that were almost alike. The one with fleshy, round "fingers" (leaf bases) was sq'Walm, the "flat one," xala, was poisonous, **and** two other kinds are similar to sq'WRlm, and edible, but not quite as good (Nancy J. Turner, unpublished notes on Nuxalk, 1983).

Lillooet consultants definitely excluded *Athyrium* as the edible wood fern, although one elder called it **"a** kind **of"c'äkwa?(Dryopteris)**. Its **big**, black "roots" are said to be so tough that even a plough cannot go through them (Randy Bouchard, personal communication to NIT, 1974). One **specimen** collected with LiUooet elders and said to be the edible kind was identified as D. *carthusiana*¹⁷

In the Skeena drainage of northern British Columbia, a number of different identifications have been made of $a\dot{x}$, the plant with edible rootstocks. Athyrium filix-femina and Dryopteris filix-mas plants in leaf were pointed out as $a\dot{x}$ by David Green, a knowledgeable Gitksan elder (Leslie M.J. Gottesfeld, unpublished notes, 1988).¹⁸ Later in the season, however, he identified Dryopteris expansa as $a\dot{x}$, and excluded Athyrium. Another Gitksan consultant, Jeff Harris Sr. of Kispiox, who as a child had frequently collected edible fern rootstocks with his grandmother, pointed out that the edible type was recognized from the rootstock, rather than from the tops. The fern was sought and dug up after the fronds had withered. Ferns with a small rootstock, or ones with small or flattened leaf bases, were called dumtx, a term signifying " non-edible fern." During a field trip specifi-

cally undertaken to identify and collect $a\dot{x}$, plants of Athyrium filix-femina and **Dryopteris** fiUx-mas, and a small specimen of D. expansa were all classified as dumtx by Jeff Harris. The last was described as being almost like $a\dot{x}$, but too small. Its broken "fingers" or leaf bases had the distinctive pea green colour of $a\dot{x}$. It was collected in a small organic soil pocket in the hemlock forest, not in the snowbed or avalanche chute habitat preferred by the Gitksan in their interior geographic location. Larger, more robust specimens of D. expansa, found in the snowbed locality, were dug up and pronounced to be $a\dot{x}$, because of the relatively large size of the rootstock, the diameter of the "fingers," and their green color (Leslie M.J. Gottesfeld, unpublished notes, **1988**.¹⁹

Additional insight into native perception and classification of ferns comes from Gordon Robinson, a Haisla elder from Kitamaat Village. When shown a specimen *ofDryopteris expansa* and asked if it was the edible fern root, he commented, "You can tell if it is the right fem if the 'fingers' are round [in cross section], pale green inside, and brittle. It grows in the forest on top of fallen logs and on stumps. It grows at the base of slide areas ... You can kick it out of the ground or pull it out easily. Other **ferns**, you need a pick [to dig up] ... "(Leslie M.J. Gottesfeld, unpublished notes, 1988).20 It is significant that when one collects a fresh rootstock of *Athyrium filix-femina*, the "fingers" are tan inside, woody textwed, and triangular in cross-section. In addition, the large, fibrous root system is very hard to pry out of the soil (Leslie M.J. Gottesfeld, unpublished notes, 1988).

Habitat considerations.-Locations where the edible fern rootstock grows in **ade**quate abundance and **quality** for harvesting in British Columbia are generally scattered and infrequent. It is a slow-growing perennial fern and hence may be several years old before it is big enough to harvest. Following are some notations on the best habitats or localities observed for edible wood fern **growth** andlor harvesting (Native group and literature citation given in parentheses):

-near salmonberry bushes (Rubus spectabilis) (Tsimshian; Gorman 18%);

-hillsides and under cottonwood trees (*Populus balsamifera*) and alders (*Alnus rubra*); wooded locations up to 800 m (Tanaina; Karl 1987; Ray ca. 1980);

-"half way up the mountains" in "meadows" or "ravines" (avalanche tracks), open snowbed communities; best locations had ownership harvesting claims (Gitksan, Wet'suwet'en; Jeff Harris, Sr., Beverley Anderson, personal communication to LMJG, 1988);

-plentiful around Kuldo (deserted Gitksan village about 90 kmnorth of Hazelton) and around other, modem Gitksan villages; Kuldo people were teased in song about their consumption of the fern rootstocks (Gitksan; **'Ksan**, People of 1980);

-at the base of big cliffs in avalanche paths; areas frequented by mountain goats, who survive on wood fern rootstocks during the winter (Haisla; Gordon Robinson, n.d.; see note 20);

-higher elevations at the base of snow banks and rockslides (Nuxalk; Turner 1973);

-swampy areas (Mainland Comox; Randy Bouchard, personal communication to NJT from 1973 research); TURNER et at

-Fountain Valley, about 1.6 km past Rusty Creek, *calledsts'ets'kwll7* after wood fern (Lillooet; Randy Bouchard, personal communication to **NJT** from 1974 research);

Because it is so **infrequent** and because harvesting eliminates an entire plant, care must be taken by those harvesting this food to leave sufficient plants behind in each locality for any future harvests, or entire populations of this historically important food plant could be eliminated.

Native food use of wood fern rootstocks. - A summary of ethnographic reports and native nomenclature for edible wood fern rootstocks is provided in Table 1. As shown in this table, edible wood fern rootstocks were used by virtually all Northwest Coast Native peoples of British Columbia, as well as by the Lower **Thomp**son, UUooet, Nishga, Gitksan, and Wet'suwel'en, by the southeast Alaskan and western Washington Indian groups, and even by some Eskimo peoples of Alaska. In all, folk names for this food were used in over 25 different Native languages in the region. Fig. 1 shows the extent of former wood fern use in northwestern North America.

Language (Family)	Native Name ¹	Identification; Notes; Reference
NuxaIk (Bella Coola, Salish)	sq'wâlm (rhiz.); sq'wâlm-iixw, sq'walq'wâlm- iixw (plant)	Dryopteris expansa (most people), D. fiUx-mas (some people), and Athyrium filix-femina (some people, but probably mistaken) (Nancy J. Turner, unpub- lished notes, 1981, in possession of NJT; Turner 1973; Harlan I. Smith, unpublished notes, ca. 1920-22, National Museum of Civilization, Ottawa)
Lillooet (Salish, Interior)	c'6kwa?	Dryopteris spp. (Nancy J. Turner, Randy Bouchard, Dorothy Kennedy, Jan Van Eijk, unpublished notes, 1974-86, in possession of NJT); Athyrium filix-femina said by some to be "a kind of c'śkwa?," but not the kind with edible rootstocks (d. coll. V 88,796, 88,798-9, N. Turner; D. carthusiana).

TABLE **1.—Summary** of ethnographic reports and native nomenclature for edible wood fern rootstocks.

Language (Family)	Native Name ¹	Identification; Notes; Reference
Thompson (Salish, Interior)	not recalled	Dryopteris spp. (Turner et al. 1990); eating of pit-cooked fern rootstocks recalled, but not identity; c'úkwi7 , the term cognate with wood fern rootstocks in other languages, applied to fresh rhizomes of <i>Pteridium</i> <i>aquilinum</i> by Annie York
Comox (Salish, Coast)	th'ékwa	Athyrium filix-femina (Randy Bouchard, unpublished notes on Mainland Comox, 1973-76); identified from specimens by Bill and Rose Mitchell (Randy Bouchard Coll. Nos. 44, 4, V)
Sechelt (Salish, Coast)	stsawch	unidentified fern (<i>Athyrium</i> or <i>Dryop-teris</i>) whose rootstocks with finger-like appendages were pit-eooked and eaten (Nancy Turner and Jan Timmers, unpublished notes on Sechelt ethnobotany, 1972, in possession of NJT)
Sechelt (Salish, Coast)	ằwûlhqw′at	unidentified "type of fern, something like a turnip," with a texture "some- thing like garlic," which grows in the mountains, especially at a place called <i>šénichen â.</i> Joe, personal communica- cation to Randy Bouchard, 1978)
Squamish (Salish, Coast)	ts'ékwa7	"Dryopteris austriaca'' and, by some, Polystichum munitum also (rootstocks) (Bouchard and Turner 1976)
Halkomelem (Upriver) (Salish, Coast)	th'ékwa	"mountain fern with wide top" (Galloway 1982)
Oallam (Salish, Coast)	tsa'qwa	"Dryopteris dilatata" (Gunther 1973)

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Language (Family)	Native Name ¹	Identification; Notes; Reference
Straits (Northern) (Salish, Coast)	tsō'kwī	(Kinkade 1989) ²
Straits (Lummi) (Salish, Coast)	tsuk'kwa	" small brake fern'' (Kinkade 1989; original, George Gibbs 1863)
Lushootseed (Suquamish) (Salish, Coast)	ts'E'kwi	unidentified fern (Barbara Lane, personal communication to NJT, 1985; from unpublished notes of T.T. Waterman ca. 1920 and J.P. Harring- ton ca. 1910)
Lushootseed (Green River)	tso'kwī	"Dryopteris dilatata" (Gunther 1973)
Lower Chehalis (Salish, Tsamosan)	c'qw{?	"fern sp." (Kinkade 1989, original from J.P. Harrington field notes, 1948)
Upper Chehalis (Salish, Tsamosan)	c'aqwe?	" tiger-lily root'' (Kinkade 1989)
Sahaptin (Taidnapam, Upper Cowlitz, or Yakima dialect) (Sahaplin)	ts'kwai	"Dryopteris dilatata" (Gunther 1973, who calls this language "Cowlitz;" M. Dale Kinkade, personal communica- cation to NIT, 1989)
QuiIeute (Chimakuan)	ts'ikwí; c'iq ^w ó pat	"fern roots" a.V. Powell and F. Woodruff in Gunther 1973; Powell and Woodruff, Quileute Dictionary,

TABLE I.-Summary of ethnographic reports and native nomenclature for edible wood fern rootstocks. (continued)

Language (Family)	Native Name ¹	Identification; Notes; Reference	
Kwakwala (Wakashan)	<i>tsákus</i> (rhizome); <i>tságanu</i> (leaves); <i>tsákusmes</i> (plant)	from M. Dale Kinkade, personal com- munication to NIT, 1989) <i>"Dryopteris spinulosa dilatata,"</i> D, <i>austriaca</i> and <i>Polystichum munitum</i> both types of which were eaten (Boas 1921, 1934; Curtis 1915, "wood-fern roots;" C. F. Newcombe3; Turner and Bell 1973)	
Haisla (Wakashan)	t'ibàm (rhizome); t'ipàs (plant)	Lincoln and Rath 1986 - "edible fern root;" " plant, leaves" (d. t'ipa " to step, tread on something"); Curtis 1907, " wood fern"	
Heiltsuk (Wakashan)	t'ibàm (rhizome);	Brian Compton, personal communica- tion to NIT, 1988 ⁴ (d, <i>t'ipa ''to</i> step, tread onto something; to find fern roots or cockles by feeling with the feet"); Boas 1928 " <i>tfe'bEm"-root</i> of <i>Dryopteris</i> austriaca	
Oowekyala (Wakashan)	teí-pùm	"fern-roots (wood fern)" (Curtis 1915)	
Nuu-chah-nuulh (Hesquiat) (Wakashan)	t'ipao	unidentified fern closely resembling Dryopteris austriaca and Pteridium aquilinum but not the same, whose rootstocks were eaten long ago (Turner and Efrat 1982)	
NUU-chah-nuuIh (Oayoquot)	ți-pa	"fern-roots (wood fern)" (Curtis 1916)	
Ditidaht (Wakashan)	t'it'efsapt	<i>Polystichum munitum</i> (Turner et al, 1983); (d. <i>t'it'ers</i> "crouching" for	

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Language (Family)	Native Name ¹	Identification; Notes; Reference
		fiddlehead shoots); rootstocks pit- cooked and eaten.
Quileute (Chimakuan)	ts'ikwi	<i>Polystichum munitum</i> (roots) (Gunther 1973); Quileute said to bake rhizome in a pit and eat with salmon eggs.
	tseqwē*	Athyrium filix-femina (root) (Gunther 1973); Quileute said to eat roasted, peeled rhizomes
Coast Tsimshian (Tsimshian)	"ahh"; aa (1)	<i>"Aspidium spinulosum</i> var. <i>dilatatum"</i> (Gorman 18%); "an edible root; a root medicine" (Dunn 1978)
Nishga (Tsimshian)	ax	"? <i>A/hyrium filix-femina'' (McNeary 1974)</i>
Gitksan (T.imshian)	ax	"Cystapteris bulbifera'' ('Ksan, People of 1980); "Dryopteris filix-mas'' (Gitanyow Summer Student Research Program 1984); Dryopteris expansa (Leslie <i>M.I.</i> Gottesfeld, unpublished notes, 1987, 1988)
TIingit (Tlingit)	k'wálž, klwA l x	Dryopteris expansa (Leslie M.J. Gottes- feld, unpublished notes 1987, 1988); "Dryapteris spinulosa'' (Swanton 1909)
Chilcotin (Athapaskan)	?ax ⁵	Nancy J. Turner (unpublished notes, 1988); Teit (1909:780) noted that "fem_ root" was eaten by the Chilcotin; Morice (1893) stated that ", ah " was not found in Chilcotin country

TABLE I.-Summary of ethnographic reports and native nomenclature for edible wood fern rootstocks. (continued)

Language (Family)	Native Name ¹	Identification; Notes; Reference	
Carrier (Athapaskan)	" 'ah", or ah chun	Morice (1893); second term from Smith (unpublished notes on Carrier, ca. 192D-22)-identified as "Shield Fern" (see note in text)	
Wet'suwet'en (Athapaskan)	<i>di</i> yii'n	Dryopleris expansa (Leslie M.J. Gotts- feld, unpublished notes 1987, 1988)	
Tanaina (Athapaskan)	uh	Dryopleris dilalala (Kari 1987)	
Haida (Skidegate) (Haida)	ts'agwl; djagwal; skyaw ("tail")	applied variously to large, edible rootstocks of <i>Dryopleris auslriaca, Poly-</i> <i>slichum munilum, Athyrium JiUx-Iemina</i> (Turner, unpublished notes on Haida, ca. 1971; see Note 3 in text)	
Haida (Masset) (Haida)	ts'ágwl; tanskyaw ("black-bear's tail"); snán-djang	applied variously to large, edible rootstocks of <i>Dryopteris</i> austriaca , <i>Polyslichum munitum</i> , <i>Athyrium filix-</i> femina (Turner, unpublished notes on Haida, ca. 1971; see Note 3 in text)	
Haida (Kaigani) Haida)	sk'yáaw (rhizome)	"Thelypleris limbospenna" (Norton 1981); specimen later reidentified by Adolf Ceska as Athyrium filix-femina	
Western Eskimo (Inuit)	wing{suk	Dryopteris dilatata (Oswalt 1957)	

1 Orthography used in original source is given, except $\underline{k} - q; \underline{x} - \underline{x} _ \underline{x}$. For simplicity, not all reported terms for Afhyrium filix-femina or Polystichum mutlitum are included in this table, only those cognate with terms applied to Dryopferis spp. or directly associated with reports of edible rootstocks.

2M. Dale Kinkade (personal communication to NJT, 1989) notes that the name for spiny wood fern is **reconstructable** in Proto-Salish, and hence provides evidence for coastal origins for Salish (d. Kinkade 1989).

- 3C.F. Newcombe gives several variations of the term *tsakos* in various parts of his unpublished notes and manuscripts (Newcombe Coli. Vol. 43, File 36, ca. 1922, Provincial **Archives** of British Columbia); at least two were confirmed by Kwakwala speaker and linguist George Hunt; all refer to "**Dryopteris** dilatata" or its synonyms.
- 48rian Compton compiled a comprehensive list of fern names for Kwakwala and related languages, entitled "North Wakashan Pteriodophyte Nomenclature & Terminology" (1988), which contains a much more complete list of fern species and related terminology in Kwakwala, Haisla, Heiltsuk, and Oowekyala (Rivers Inlet) (ms. in possession of Brian Compton, Department of Botany, University of British Columbia, Vancouver, SQ.
- SThis name was given by Robert Tyhurst (1975-76, unpublished notes on Chilcotin ethnobotany, in possession of RT, Victoria, British Columbia) as bracken fern (*Pteridium aquilinum*), but recent **evidence** suggests a *Dryopteris* species, from the descriptions of the clustered rootstocks.

Many descriptions exist of the edible wood fern and its use. The rootstocks with their attached leaf bases have been variously described as **''like** 2 hands clasped together" (Norton 1981; B. Lane, personal communication, 1984), **''like** a woody sweet potato" ('Ksan, People of 1980), "resembling a bunch of bananas" (*d*. Kari 1987; Ray ca. 1980; Turner 1973), "like a pineapple" (Harlan I. Smith, unpublished notes ca. 1920; Turner 1973), a **''big** root with little fingers" (Willie Matthews, Haida elder, tape transcript by Nancy J. Turner, ca. 1970), or having many brown **''fingers''** growing around it (Turner 1973). **The ''good''** fingers are succulent. Figures **2–4** show the characteristics of the edible wood fern (i.e., *Dryopteris expansa*).

Gitksan elder Jeff Harris Sr. described the edible fern rootstock as being about as big as his hand (fist), and noted, "... when you take them out the root tapers down to the bottom, when you dig it out, and crooked. You have to take the little piece of the bottom part out because it's small ... that (leaf base] would be about the **size** of your little finger ... the banana-like root. You take them off and peel it with your finger" (Leslie **M.J.** Gottesfeld, unpublished notes, 1987). The fern rootstock is described as being greenish inside when raw, but turning to yellowish or orange when cooked Oeff Harris, David Green, Lizette Naziel, personal communications to LMJG, 1987).

Harvesting.—The rootstocks were usually dug in spring or fall (d. 'Ksan, People of 1980). The Nuxalk name for the fourth moon after the summer solstice is called **siqaalxmanm** (lit."time to get **sq'wálm'')**. At this time, many of the "fingers" on the rootstock are plump and round, whereas earlier many are flat and no good for eating. Potatoes are dug at this time too, according to Margaret Siwallace (Turner 1973). However, the wood fern rootstocks could be dug out even in December if it was a mild winter, and could be dug from under the snow if necessary. Wet'suwet'en consultants stated that wood fern rootstocks should be gathered in fall after the leaves wither or in the winter Oosephine Michell 1987, Madeline Alfred 1988, Lizette Nazie11987, Sara Tait 1988, all personal communications to LMJG). It was stated that the rootstocks are not damaged by freezing and could be dug from under the snow. A special wooden snow shovel was



FIG. I.-Extent of former use of edible wood fern (mainly *Dryopteris expansa*) in northwestern North America. (The heavy dotted line shows the approximate distribution of *Dryopteris expansa* over the same area.)



FIG. 2.-Rootstock of *Dryopteris* expansa, showing "finger" formation of leaf bases from previous years' fronds.

used to uncover the plants (Madeline Alfred, personal communication to LMJG, 1988). **Gitksan** consultants stated that **fern** rootstocks were gathered in fall, winter, or spring before the fronds begin to uncurl. Plants were located by the "whitish stick sticking up" or the "curly leaf" (fiddlehead). Digging the rootstocks out of frozen ground was laborious, but their availability in the winter season made them a valuable food. Some Tanaina people say they can be dug at any time of the year, but others say that they are dry and unpalatable during the summer months. Some say the rootstocks are juiciest and most palatable in the **fall**, others in the spring (Karl 1987).

Since the rootstocks were usually sought after the tops had died down, finding them was sometimes difficult. The Haisla and Heiltsuk people evidently had a unique way of locating them with their feet, as alluded to in their term, **t'ipa**, meaning **''to** step, tread onto something; to find fern roots or cockles by feeling with the feet" (Heiltsuk), and in **t'ips**, meaning "one's feet touching the ground (as when feeling for fern roots)" (Heiltsuk) (Brian Compton, personal communication to NJT, 1988; terms given to him by Kitlope elder, Gordon Robertson; see also Lincoln and Rath 1986 for Haisla). It is not clear whether the actual names for the edible wood fern are derived from these terms, or vice versa.²¹ According to Gordon Robertson (Brian Compton, personal communication, 1988), a special digging stick was used to dig up wood fern rootstocks. It was similar



FIG. **3.**—*Dryopteris expansa,* **rootstock** and fronds, taken at Bella Coola, and identified by several Nuxalk elders as the edible type of wood fern (left). FIG. **4.**—**Cross-section** of *Dryopteris expansa* rootstock (right).

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to the stick used for other edible "**roots**," but shorter (about **30–45** em long) and with a flattened point and a round portion on the upper end similar to a nail head. The stick, called **cagàyu** in Haisla, was pushed into the ground with the foot and then pressed down like a lever to remove the root from the soiL Recently, a shovel would be used for this purpose. Boas (1921) also reports the use of a digging-stick, of yew-wood, for prying up the fern rootstocks, which were then placed into a large basket. The Tanaina generally obtain wood fern rootstocks by chopping them out of the ground with an axe (Karl 1987).

Harvesting and cooking of the wood fern rootstocks, like **the** harvesting of most plant foods, was apparently undertaken mainly by women (d. Boas 1921), but men also dug them ('Ksan, People of 1980).

Storage.-Harlan Smith (unpublished notes, ca. 1920) maintained that wood fern rootstocks"... were always cooked [by the Carrier and Nuxalk (Bella Coola)] the same day they were gathered. They were never kept." Morice (1893) noted that the rootstocks were not dried, but only eaten fresh after pit-cooking. Once cooked and mashed, the food only kept one or two days, according to Smith's Carrier consultant.

The Wet'suwet'en evidently gathered fern rootstocks for storage as well as harvesting them if needed after snow was on the ground. Elsie Tait of Hagwilget stated:

In the old days [the women} would get together and leave Hagwilget to go up to Blue Lake. Above Blue Lake ... they would dig a whole bunch [of fern rootstocks]. Then they would build fires They would put the fruit [rootstocks) under the rocks to cook it. They would preserve it for the winter. They lined cedar boxes with skunk-cabbage leaves *fLysichitum americanum*] and preserved all that fruit in there. They sealed the boxes up and dug the ground like cellars.... They would preserve all those things for winter, put them away and save them until the hungry time (late winter]. (personal communication to LMjG, 1986).

The Haisla of Kitamaat Village also formerly stored fern rootstocks for winter. Gordon Robinson recounted:

In the old days each family would pick ten sacks, or baskets of *t'ibam* [femrootstock]. They would bury it in the corner of the long house. Like a root cellar. They break the base off. It is a useless part. They pick it in the fall. . . (personal communication to LMjG, 1988).

The Kwakwaka'wakw (Southern Kwakiutl) spread wood fern rootstocks out to dry on a mat the day after they were harvested, then cleaned them using a special **red-cedar-wood** scraper, and stored them in a basket in the rear of the house, behind the fire, for 12 days before they were pit-cooked. After they were cooked, they were stored another four days before being served at a feast (Boas 1921). The Mainland Comox also stored them prior to cooking in a cool, dry place, in an open-work basket (Randy Buchard, unpublished notes, **1973**)²² The Gitksan, too, commonly store edible fem rootstocks. After they were dug, they might be left in a dry shed or cabin, covered with brush and leaves, for a long period of time, "when other food supplies ran out" ('Ksan, People of 1980,79).

In Alaska, Tanaina people are said to preserve wood fern rootstocks by placing them **in** an underground cache or by storing them in oil or lard (Kari 1987). The Yakutat people also stored them in a pit cache, and **in** general stored them in a way similar to potatoes. They also keep well for several months in a refrigerator, according to Ray (ca. 1980).

Traditional cooking and **serving** methods. -Wood fern rootstocks were hardly ever eaten raw, although the Nuxalk people sometimes ate them raw as an antidote for shellfish poisoning.²³ Baking or steaming the rootstocks in a pit was by **far** the most common traditional method of preparation. Detailed published **accounts** of pit-cooking them **are** provided in Gorman (18%:78-79) and Boas (1921:518-523). In the former description, the Coast Tsimshian of southeastern Alaska placed the rootstocks in cooking pits interspersed with damp moss or kelp and cooked them overnight (about 14 or 15 hours). In Boas's Kwakwaka'wakw (Southern Kwakiutl) account, seaweed and hemlock branches (*Tsuga heterophylla*) were used to surround the rootstocks, which were also cooked overnight. Members of the household were asked abstain from sexual intercourse during the cooking time.

Similar descriptions of pit--cooking wood fern rootstocks are provided by many others (d. Morice 1893; Boas 1921; Harlan 1 Smith, unpublished notes on Carrier and Bella Coola, ca. 1920-22; Nancy J. Turner, unpublished notes on Haida, 1970, 1971; 'Ksan, People of 1980; Leslie M.J. Gottesfeld, unpublished notes on Gitksan, Wet'suwet'en, and Haisla, 1987, 1988; Jacobs and Jacobs 1982; Karl 1987). Gitksan elder Jeff Harris Sr. said that the rootstocks were arranged in the pit "... Just like putting apples" [placed upright, in growth position] and were covered with hemlock boughs (personal communication to LMJG, 1987). The Wet'suwet'en covered them with birch bark (Leslie M.J. Gottesfeld, unpublished notes 1987). The Tanaina sometimes wrapped them in birch bark for baking and covered them with hot sand (Karl 1987). Haisla people used to cover the rootstocks with hot embers of a fire and leave them to bake overnight (Gordon Robinson, personal communication to LMJG, 1988). The Haida used to line their steaming pits with skunk-cabbage leaves. The Carrier were said to use alder bark chips in the steaming pit (Morice 1893). The Mainland Comox cooked the rootstocks they call th'ékwa (identified as Athyrium filix-femina; R. Bouchard Call. No. 44 and No. 004; May 1975, May 1976 V) in a pit, but simply by throwing them directly into a bed of glowing hot coals and ashes from a fire and covering them with several inches of ashes (Randy Bouchard, unpublished notes on Mainland Comox ethnobotany, personal communication 1973, 1975 to NIT). In recent times, people have boiled the rootstocks in water for a long time, until they are tender; sometimes the water is changed during boiling (Kari 1987). One Hydaburg woman suggested pressure cooking them to reduce the cooking time (Ray ca. 1980). In Bella Coola today, pressure cooking is the method of choice for preparing wood fern rootstocks for feasts. The use of the rhizomes as a soup thickener was suggested by Ray (ca. 1980). Some Gitksan people now preserve the rhizomes by canning ('Ksan, People of 1980). When not properly cooked, the rootstocks are described as rubbery and hard (Mark Jacobs Jr. of Sitka, personal communication to LM}G, 1988).

Boas (1921:523-524) provides a detailed description of the serving of wood fern rootstocks at a Kwakwaka'wakw (Southern Kwakiutl) feast, which was held four days after the fern roots had been in the house and had been cooked. The roots were considered a "really valuable food," and were often served with oil and dry silver-salmon spawn to the chiefs of the tribes. A chief could peel and eat the outer fern roots, but was supposed to give away the inner part of the fern root, not to eat it himself, or "he will always waver in his mind about giving away blankets ..." After the feast, each guest was given two fern roots to take home to his wife.

There are many other reports of the rootstocks being cleaned, the leaf bases being removed, peeled, and eaten one at a time. Similarly, many reports refer to the eating of the rootstocks with oil, grease, lard, and/or salmon roe (d. Nancy J. Turner, unpublished notes on Haida, 1m; Turner 1973; Randy Bouchard, personal communication to NIT. 1973 for Mainland Comox; 'Ksan, People of 1980; Kari 1987: Brian Compton, personal communication to NIT, 1988, for Haisla: Leslie M.J. Gottesfeld, unpublished notes on Gitksan, Haisla 1987, 1988). The Haisla, for example, ate them mixed with *ooUgan* grease in a big bowl (Brian Compton, personal communication to NJT, 1988, from Gordon Robertson), or ate them with fermented or dried salmon roe (Gordon Robinson, personal communication to LMJG, 1988). The leaf bases, once removed from the main rootstock, were usually peeled with the fingers before being eaten, then dipped into the oil. The Mainland Comox dipped them into seal oil and ate them with dried salmon eggs (Randy Bouchard, unpublished notes on Mainland Comox ethnobotany, personal communication to NJT 1973, 1975). The Nuxalk ate them with grease or fermented salmon roe (McDwraith 1948: Turner 1973). In modem times, the Gitksan ate them with sugar ('Ksan, People of 1980).

Karl (1987) notes that some Tanaina people state that only the "stem" portion of the underground part is eaten, others that only the "leaf bases" are eaten, and still others that both parts of the rootstock are eaten. Gitksan consultants say both "stem," and "leaf bases" can be eaten.

The Carrier, after pit-cooking the rootstocks, pounded them up with two stones, the upper one apparently a pestle, and the lower one flat (Harlan I. Smith, unpublished notes on Carrier and Bella Coola, ca. 1920-22). Smith noted that "Sometimes the **Ulkatcho** Carrier Indians went to Bella Coola and traded moccasins for pestles and other kinds of goods ..."

Oswalt (1957) reported that the rootstocks of "Dryopteris austriaca" were occasionally collected, boiled in water, and added to **agutuk**, or "Eskimo ice **cream.**"²⁴

Sometimes the rootstocks were simply roasted in the fire, covered with a hot stone, if there were not enough to pit-cook ('Ksan, People of 1980).

Other food uses. - The Tanaina and other southeast Alaskan natives eat the young croziers, or "fiddleheads" of wood fern (uh), cooked or steamed, as an early spring

vegetable, and many southeast Alaskans can them for **winter** use (Karl 1987; Heller 1976). The Kaigani Haida are said to boil and eat the "fiddleheads" (of *'Thelypteris";* see Table 1) as a vegetable at present (Norton 1981). According to Ray (ca. 1980), fern fiddleheads, commonly eaten among many Native peoples of Alaska today, are not known to be a traditional food. He provides recipes and suggested methods for canning and freezing these greens. Some Tanaina people also used wood fern rootstocks for making beer, a practice they probably learned from the Russians, according to Kari (1987).25

Survival and famine food. - As recounted by Peter Kalifomsky of the Outer Inlet Tanaina (Karl 1987:130), the rootstocks were formerly regarded as a good survival or starvation food:

In the early spring one year, the people ran out of food. They divided into two groups, one moving up into the higher country to dig *uh* [Tanaina name for edible wood fern; see Table 1], and the other to dig clams. Those people who lived on ferns received back their strength and gained weight, while those that lived on clams barely survived.

In winter and early **spring**, the rootstocks had to be chopped out of the ground, after a fire was first built over an area where the ferns were known to grow in order to thaw the ground (Kari 1987). The Tlingit Gacobs and Jacobs 1982) and Gitksan ('Ksan, People of 1980) also state that wood fern can be a survival food: **''It** has warded off starvation more than once." ('Ksan, People of 1980:79). Mark Jacobs Jr. of Sitka (personal communication to LMJG, 1988) stated that perhaps fern rootstocks were eaten sometimes as an ordinary food, but they were mainly used as a survival food by the Tlingit. Gitksan and Wet'suwet'en stories also refer to fern rootstocks as a survival food. A woman who was banished from Moricetown survived through the winter on fern rootstocks and salmon roe according to a Wet'suwet'en story (Alfred Joseph, personal communication to LMJG, 1986). Jeff Harris Sr. mentioned a Gitksan legend about a period of starvation: "There in the famine some people eat **až** [fern rootstock]. They lived. Others go to get *x5U'U* {hemlock cambium] but they all died." (personal communication to LMJG, 1988).

Use frequency and taste **appreciation** of **wood** fern rootstocks. - An interview study of 61 adult Nuxalk women in three generations, representing the Nuxalk reserve in Bella Coola, was conducted in 1982 as part of the Nuxalk Food and Nutrition Programme. Each woman was asked for her family's use for wood fern "root" (and other traditional food species as well), and a score of her impression of her own personal taste appreciation of the cooked root "fingers." Of the 61 women, only six (all elders) reported ever tasting the root food. On a scale of 1.0 (not used) to 4.0 (used more than one time per week when available and in season), the women reported a mean use frequency today of only 1.3 (very low) but in their earlier days they used it to a greater extent, with a score of 2.8 on a scale of 1.0 to 4.0, which represents use of approximately once or twice a month. These women reported never to have preserved or stored the roots (in cellars or otherwise) for later use. The mean taste appreciation score of the **six** women was 4.3, in a **scoring** scale of 1 to 5, with 5.0 being the highest possible (best tasting food), indicating these women enjoyed this food. Details of the methodology are reported elsewhere (Kuhnlein 1989a).

Gorman (18%:79) described the taste of wood fern rootstocks as, "slightly **sweetish**" but "too smoky and tobacco-like in flavor for the average white man's palate, except under stress of hunger." He added, "... I have no doubt it is quite nutritious." The Tanaina also considered *uh* to be very nourishing, as indicated from their previously related use as a survival food (Kari 1987). Jacobs and Jacobs (1982) describe the edible portion as being "light brown like squash and tastes about the same." Haida elder Willie Matthews described the cooked "fingers" (leafstalk bases) as "just like potatoes inside" (Nancy J. Turner, unpublished notes, *1m*). Ray (ca. 1980) noted that the raw rhizomes of the wood fern ("Dryopteris dilatata") are bitter, but sweet tasting when cooked. He said they are salmon colored, with texture and taste very similar to sweet potato. The Gitksan people also describe the edible fern as having the same texture and color as a sweet potato when cooked, and believe it to have "considerable food value" ('Ksan, People of 1980:79). One LiUooet elder described the taste as "very much like coconut" (Randy Bouchard, personal communication to NIT, 1974).

Nutrient **analyses**.-During the late summer and early fall of 1982, in the course of a general series of analyses of traditional foods carried out under the Nuxalk Food and Nutrition Programme, approximately 30 wood fern rootstocks were dug with the supervision of Nuxalk elder Felicity Walkus. These were cleaned in the traditional manner by washing with water and then (for convenience) cooked by pressure cooker until soft. The cooked roots were then peeled, and 250 g were frozen together in a plastic bag and shipped to the laboratory. A similar sample was prepared in 1983.

The laboratory samples were mixed with equal weights of distilled, deionized water, blended in a glass container with stainless steel blades and processed through various nutrient analyses. The details of these methods are reported in Kuhnlein et al. (1982) .nd Kuhnlein (1989., 1989b).

Results of the nutrient analyses of the wood fem "root" samples are presented in Table 2, together with reported values for the common potato, baked in the skin. It can be seen that there is reasonably good agreement between the two foods for water, protein, ash, carbohydrates (computed by difference between total weight minus the sum of protein, fat, moisture, fiber, and ash) and approximate energy computations. In contrast, mineral values in fern "**root**" were much higher for calcium, magnesium, zinc, copper, and manganese, but higher in potato for sodium and iron. The differing values may have been in part due to contributions from the skin of the roots, since it is known that **skins** of root foods are more mineral-rich than the starchy flesh. These minerals can migrate into the flesh dUring cooking.

The proximate composition of fern "**root**" is in good agreement with that reported for *Trifolium wonnskioldii* (springbank clover rhizomes) and *Potentilia anserina* ssp. *pacifica* (Pacific silverweed roots) (Kuhnlein et al. 1982). For mineral composition, fern "root" was slightly higher in calcium, phosphorus, and

Nutrient	Fern Root.	Potato**
Water, g	68.4	71.2
Protein, g	2.5	2.3
Fat, g	1.0	0.1
N.D. Fibre, g	3.7	n.a.
Ash, g	0.8	1.2
Carbohydrate, g	23.6	25.2
Calcium, mg	56.3	10.0
Phosphorus, mg	62.6	57.0
Sodium, mg	1.4	8.0
Magnesium, mg	44.4	27.0
Iron, mg	0.8	1.4
Zinc, mg	1.5	0.3
Copper, mg	1.5	0.3
Manganese, mg	3.2	0.2

TABLE 2.-Nutrients in cooked fern root (*Dryopteris expansa*) in comparison to cooked potato, per 100 g edible portion.

*n .. 2 independent samples, analyzed in triplicate.

UWatt and Merrill (1975:106), potatoes baked, flesh and skin, n .. 12.

magnesium. However, fern root contained zinc, manganese, and copper (1.5, 3.2, and 1.5 mgfl00 g respectively) at least an order of magnitude higher than that found in silverweed roots, clover rhizomes, or potato (ranging from 0.2 to 0.8 mg for these three minerals in the three foods).

While nutritionally essential minerals are important to consider in these root foods, it must be kept in mind that the majority of minerals in the traditional diet are provided on a year round basis in fish and game. In contrast to these animal foods, the roots provide a minimal proportion of daily mineral needs.

In general, the ethnographic accounts give the impression that wood fern rootstocks were always an occasional food, used seasonally, prepared for feasts, or prepared for a taste treat. It was also quite labor-intensive for harvesting, pit-cooking, and peeling of the small "fingers" before eating. With these **con**siderations in mind, one has to assume that fern rootstocks did not contribute a major proportion of the bulk, or of the energy value of the annual diet. Rather, they contributed variety and aesthetic values, and could be relied on as a famine food, since the ferns were accessible even in winter to those who knew where to look for them.

Medicinal uses of wood fern and related types.-A signHicant use by the Nuxalk of Dryopteris expansa ("Aspidium eyclosorum"J was eating the rootstock raw to neutralize poisoning from eating several kinds of shell-fish in the early part