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Nontimber Forest Product Opportunities in Alaska

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The **Forest Service** of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

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Cover

Birch tree bole carved into a drinking mug. One of a multitude of carved products made from the wood of Alaska trees.

Abstract

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Nontimber forest products from southern Alaska (also called special forest products) have been used for millennia as resources vital to the livelihoods and culture of Alaska Natives and, more recently, as subsistence resources for the welfare of all citizens. Many of these products are now being sold, and Alaskans seek additional income opportunities through sustainable harvest and manufacture of such forest resources. We discuss the unique legal, regulatory, land tenure, geographic, vegetation, and climatic context that southern Alaska presents for marketing nontimber forest products; summarize the various species and types of products being harvested; and consider the marketing challenges and opportunities new entrepreneurs will encounter. The information and resources we provide are intended to enhance income opportunities for all Alaskans, while sustaining the organisms harvested, respecting traditional activities, and ensuring equitable access to resources.

Keywords: Nontimber forest products, special forest products, Alaska, marketing opportunities.

Summary

This publication is intended to provide people with a synopsis of the nontimber forest product (NTFP) industry in southeastern and south-central Alaska and to enhance marketing opportunities. The biotic resources (excluding timber and animals) that are used to make such products have been used by Alaska Natives for millennia to provide the necessities of life and rich cultural traditions. Many current citizens of Alaska now supplement their livelihoods with subsistence harvesting of the same resources. Gathering NTFPs for income entails unique challenges and opportunities in Alaska owing to its remote geography, expensive transportation, land tenure patterns, traditional harvest rights, and distinctive ecosystems.

The term "subsistence" is used in many ways, but one constant is that subsistence harvesting is important to all Alaskans. Subsistence harvesting provides a vehicle for expressing or manifesting native identity. Current laws and organizational directives shape management policies and agency regulations that affect people and natural resources in the state. A broad array of NTFPs produced in Alaska are sold, traded, given as gifts, and used for household consumption.

Numerous resources for businesses and new entrepreneurs are provided by various agencies and groups. Our intent is to provide a representative list of potential products that individuals or businesses can pursue for fun or profit. Ideally, all individuals, businesses, tribes, agencies, and organizations that have a stake in the sustainable harvest of NTFPs can use this information to devise equitable and effective management strategies, as well as personally or economically profitable enterprises.

Contents

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Introduction

This publication provides individuals interested in nontimber forest products (NTFPs) with information about resources, products, processing methods, and marketing. Our goal is to provide information that will help potential entrepreneurs start businesses based on species harvested from local forests. It also provides a synopsis of the NTFP industry in southeast and south-central Alaska.

For the purposes of this document, we use the terms NTFP (a common international acronym) and SFP (special forest products, used by the federal government) interchangeably. The definition we employ is found in the Alaska Region Interim Special Forest Products Resource Management Policy, effective March 10, 2000 (http://www.fs.fed.us/r10/ro/policy-reports/).

> Special forest products (SFPs) are defined as products derived from non-timber biological resources that are used for personal, educational, commercial, and scientific use. SFP resources include, but are not limited to: mushrooms, boughs, Christmas trees, bark, ferns, moss, burls, berries, cones, conks, herbs, roots, and wildflowers. Also included are cuttings (such as of willow [*Salix* species] used for restoration) and transplants (as for landscaping purposes). SFP resources exclude saw-timber, pulpwood, cull logs, small round-wood, house logs, utility poles, minerals, animals, animal parts, rocks, water and soil.

The broad array of NTFPs already being produced in Alaska includes crafts, artwork, dyes, floral greenery, berries and other wild fruits, syrups, teas, flavorings, edible and medicinal plants, native seeds, edible mushrooms, and medicinal fungi. For each category we include information on products, traditional Native and subsistence use, processing or production methods, and marketing. Throughout these chapters we provide selected sources of further information with Web site addresses and useful references. Appendix 1 lists the most recently accepted scientific names (along with the common names we use) for the species included in our text. Appendix 2 gives contact information for agencies, organizations, and businesses we mention.

It is difficult to address all products or resources being used to make NTFPs in Alaska. Our intent is to provide a broad range of potential products that individuals or businesses can pursue for fun or profit. We encourage

individuals that are interested in starting or expanding NTFP enterprises to use the resources in this publication to gather more information or to simply experiment with their own ideas.

Alaska has geographic and climatic constraints on travel, transportation, and shipping. This publication offers suggestions about existing and potential marketing techniques to help entrepreneurs start or expand businesses in this environment.

Although the focus of this publication is economic opportunity, business stability, success, and longevity are equally important. Nontimber forest product businesses can only exist in the long run if the resources they are based on are harvested in a sustainable manner to ensure that the organisms being harvested are able to reproduce and persist. Because so much of Alaska's forest is publicly owned, harvesters, tribes, and NTFP businesses need to be actively involved in crafting management agency guidelines and regulations that ensure equitable and sustainable harvesting opportunities for all. Collaborative methods such as public involvement processes, conferences, stakeholder meetings, community coordination, consultation with tribes, and marketing associations are all effective means to seek this common goal.

Alaska's Unique Context

Subsistence and Other Personal Use

About 62 percent of Alaska's 621,400 people are concentrated in the cities of Anchorage, Fairbanks, Juneau, and Ketchikan, the only settlements in the state with populations greater than 10,000. The remaining 38 percent of the state's population lives in 144 incorporated cities and in unincorporated areas. About 16.6 percent of the population consists of Native Americans. Yupik and Innuit constitute about 8 percent of the state's total population, Indians about 6 percent, and Aleuts about 2 percent (Alaska Department of Labor and Workplace Development 2000). Alaska has 246 federally recognized tribal governments that are similar to city governments in structure. Such tribal governments generally represent local groups of Native Americans, most of whom are located in, and maintain ties to, geographical areas that have traditionally been used for subsistence harvests of fish, wildlife, and plants. Tlingits, Haidas, Tsimshians, and Athapaskans are the main cultural groups using the temperate rain forest.

The definition of subsist is to exist, to be sustained, nourished, and to live. Subsistence is the act, state, or a means of subsisting. The term "subsistence" is used in a variety of ways, but one aspect is constant; subsistence harvesting is a very important aspect of life for all Alaskans. Subsistence harvest activities are a rich cultural tradition and have complicated and interconnected social and economic implications for the sustainability of local communities.

Subsistence harvesting is a very important aspect of life for all Alaskans.

Prior to contact with colonial powers in the 1700s, all Alaska Native cultures relied on hunting, gathering, and trade for food. The harvest and use of traditional foods provides connections to place, belief, and history that are essential to cultural identity. Subsistence harvesting provides a vehicle for expressing or manifesting Native identity. Although fish, marine and land mammals, and birds were the main calorie sources for Alaska Natives, marine and terrestrial plants accounted for an important portion of the aboriginal diet and supplied nutrition not as readily available from fish and meat sources (Moerman 1998, Schroeder 2002, Schroeder and others 1987). Plants also provide much of the Native pharmacopoeia (Smith 1973) used to treat the normal range of injuries and illness found in any human population. The use of some wild food plants has declined with the introduction of imported or cultivated foods into rural communities. For instance, rice, potatoes, or pasta have largely replaced various starchy roots. Other food plants might always have been harvested in small quantities but provided important seasonal nutrition (fig. 1), such as the spring shoots of various berry plants harvested by the Tlingits of southeast Alaska.

With a few exceptions, medicinal and spiritual use of plants by Alaska Natives has not been well documented or described (DeLaguna 1972). In many areas of the state, missionaries actively discouraged use of plants for these purposes. The activities of shamans, healers, and artisans were often suppressed. Additionally, Fortuine (1992) maintained that many Native cultures lost faith in shamanic practices and the use of some plant remedies as a consequence of epidemics in the late 1700s and throughout the 1800s that broke oral traditions of plant knowledge. As a consequence, knowledge of medicinal and spiritual plant use is fragmented, and owing to the sacredness of the information, informants do not readily share their knowledge. Lastly, the replacement of Yupik, Inupiat, and Alaska Native languages with English has caused a loss of knowledge about plants that was expressed in the original language.

Table 1 illustrates the range of plants used for subsistence in various parts of Alaska. It catalogues a variety of plants identified in subsistence activities in

Figure 1—Huckleberries.

Table 1—Plants with documented historical or contemporary subsistence use in Alaska

Scientific name[a]	Common name	Use[b]	Area	Source[c]
Achillea millefolium	yarrow	Medicinal	Southeast	6, 9
Allium schoenoprasum	chives	Edible leaves	Widely used	1
Alnus rubra	red alder	Fuel; wood articles; dye; food; medicinal	Southeast	5, 9
Anemone spp.	anemone	Burned to drive away mosquitoes; food; medicinal (with caution)	Interior	3, 9
Angelica lucida	sea-watch, wild celery	Medicinal; poultice; edible leaves or shoots	Widely used	1, 4, 5, 9
Arabis hirsuta, A. lyrata, A. holboellii	rockcress	Edible leaves or shoots	Southeast	6, 9
Arctostaphylos alpina	alpine bearberry	Edible berry	Widely used	1, 4
Arctostaphylos rubra	red fruit bearberry	Edible berry	Widely used	1
Arctostaphylos uva-ursi	kinnickinnick, bearberry	Edible berry; medicinal tea; wash; smoke mixture	Widely used	1, 9
Caltha palustris	yellow cowslip, yellow marsh marigold	Edible leaves (with caution)	Subarctic	4
Carex aquatilis	water sedge	Possible food	Southeast	5

Table 1—Plants with documented historical or contemporary subsistence use in Alaska (continued)

Scientific name[a]	Common name	Use[b]	Area	Source[c]
Chamaecyparis nootkatensis	Alaska yellow-cedar	Fuel; wood articles; clothing; baskets; bows; tea; medicinal	Southeast	5, 9
Chenopodium album	lambsquarters	Edible leaves or shoots	Widely used	1, 2, 9
Chenopodium capitatum	strawberry-blight, blite goosefoot	Edible leaves or shoots	Interior	2
Cornus canadensis and *C. suecica*	bunchberry	Edible berry	Widely used	4, 9
Dryopteris spp.	ferns	Medicinals; bedding and padding; edible fiddleheads and roots (with caution)	Widely used	4, 5, 9
Empetrum nigrum	blackberry, crowberry	Edible berry	Widely used	2, 4, 5, 9
Epilobium angustifolium = *Chamerion angustifolium*	fireweed	Cord (fishing nets); seed fluff in padding or clothes; edible leaves or shoots	Widely used	1, 2, 4, 5, 9
Epilobium latifolium = *Chamerion latifolium*	dwarf fireweed, river beauty	Seed fluff in padding or clothes; edible leaves or shoots	Widely used	1, 2, 5, 9
Equisetum spp.	horsetail, mouse food	Abrasives for polishing; basketry; possible medicinal; edible root (with caution)	Subarctic	4, 9
Eriophorum angustifolium	tall cottongrass, mouse food	Edible root	Subarctic, widely used	1, 4
Fragaria spp.	strawberry	Leaves as medicinal and tea; edible berry	Southeast	5, 9
Fritillaria camschatcensis	northern rice root, black lily, Indian rice	Edible bulbs	Southeast	5, 9
Gaultheria shallon	salal, laughing berry	Edible berries; medicinal leaves	Widely used	7, 9
Hedysarum alpinum	American sweetvetch, Eskimo potato	Edible roots	Widely used	1, 2

Table 1—Plants with documented historical or contemporary subsistence use in Alaska (continued)

Scientific name[a]	Common name	Use[b]	Area	Source[c]
Heracleum lanatum	common cowparsnip	Edible leaves or stalk; medicinal uses (with caution)	Subarctic	4, 7, 9
Hippuris vulgaris	common mare's-tail, goose grass	Edible leaves or stalk	Widely used	4, 5, 9
Juniperus communis	common juniper	Tea for colds; edible berry (with caution)	Interior, widely used	1, 2, 3, 9
Lathyrus spp.	pea	Edible leaves or seeds	Southeast	6, 9
Ledum groenlandicum	Labrador tea	Tea, infusion (in moderation)	Widely used	1, 2, 3, 4, 5, 9
Ligusticum scoticum	beach lovage	Edible leaves or stalk	Southeast	5, 9
Lysichiton americanus	American skunk-cabbage	Food preparation; famine food	Southeast	5, 9
Maianthemum dilatatum	false lilly-of-the-valley	Edible leaves, berries; medicinal	Southeast	5, 8, 9
Matricaria discoidea	pineapple weed	Tea; sachets	Widely used	2, 9
Oplopanax horridus	devil's club	Medicinal	Southeast	5, 9
Oxyria digyna	mountain sorrel, sourgrass	Edible leaves or shoots (with caution)	Widely used	1, 4, 9
Oxytropis maydelliana	yellow oxytrope	Edible root	Widely used	1
Pedicularis lanata (kanei)	wooly lousewort	Edible leaves or shoots; medicinal	Widely used	1
Petasites frigidus	coltsfoot	Food, edible leaves or shoots	Widely used	1, 4, 9
Phellinus tremulae	birch fungus	Ashes mixed with snuff or tobacco	Widely used	2
Picea sitchensis	Sitka spruce	Fuel; wood articles; food; medicinal; roots in basketry and crafts	Southeast, south-central	5, 9
Plantago maritima	sea plantain, goose tongue	Edible leaves	Southeast	5, 9
Polygonum sachalinense	giant knotweed	Edible shoots (with caution)	Wide area	1, 2, 3, 4, 5, 9
Potentilla spp.	cinquefoil, silverweed, wild sweet potato	Food (root)	Southeast	5, 9

Table 1—Plants with documented historical or contemporary subsistence use in Alaska (continued)

Scientific name[a]	Common name	Use[b]	Area	Source[c]
Pteridium aquilinum	brackenfern	Edible rhizomes, fiddleheads (carcinogenic)	Widely used	4, 5, 9
Ranunculus pallasii	Pallus' buttercup	Edible leaves	Subarctic	4
Ribes bracteosum	stink currant	Edible berry	Southeast	5, 9
Ribes divaricatum	wild gooseberry, spreading gooseberry	Edible berry	Southeast	5, 9
Ribes laxiflorum	trailing black currant	Edible berry	Southeast	5, 9
Ribes triste	red swamp currant	Edible berry	Widely used	1, 9
Rosa spp.	rose	Edible shoots and hips; medicinal use of bark and leaves	Widely used	1, 3, 9
Rubus arcticus	nagoonberry	Edible berry	Widely used	1, 4, 5, 9
Rubus chamaemorus	cloudberry	Edible berry, shoots; medicinal use of roots	Widely used	2, 4, 5, 9
Rubus idaeus	red raspberry	Edible berry	Widely used	1, 5, 9
Rubus parviflorus	thimbleberry	Edible sprouts, berry	Southeast	5, 9
Rubus spectabilis	salmonberry	Edible berry	Southeast	5, 9
Rumex arcticus	sourdock	Edible leaves	Widely used	1, 4, 5
Salicornia virginica	American glasswort, sea asparagus	Edible shoots	Southeast	5, 9
Salix spp.	willow	Edible leaves; medicinal use; basketry; dye; nets; rope	Widely used	1, 9
Sambucus spp.	elderberry	Edible berry (use caution with red berry species)	Southeast	1, 9
Saxifraga punctata	brook saxifrage	Edible leaves or shoots	Widely used	1
Sedum roseum = *Rhodiola rosea*	roseroot	Edible leaves, roots, shoots; medicinal use	Widely used	1, 9
Shepherdia canadensis	soopolallie, soapberry	Edible berry	Widely used	1, 5, 9
Sphagnum spp.	sphagnum moss	Bedding; diapers; packing; cabin chinking	Widely used	2, 9

Table 1—Plants with documented historical or contemporary subsistence use in Alaska (continued)

Scientific name[a]	Common name	Use[b]	Area	Source[c]
Streptopus amplexifolius	clasping twistedstalk, watermelon berry	Edible leaves, berries; medicinal use	Southeast	5, 9
Taxus brevifolia	Pacific yew, western yew	Wood items; fuel; bows; smoke; trade item	Southeast	7, 9
Thuja plicata	western redcedar	Wood items; fuel; bark and roots in clothing and basketry	Southeast	5, 9
Tsuga heterophylla	western hemlock	Wood items; fuel; tanning agent; dye; bedding; substrate for herring eggs	Southeast	5, 9
Urtica spp.	nettles	Edible shoots, leaves; fiber; tonic	Southeast	5, 9
Vaccinium oxycoccos = *Oxycoccus oxycoccos*	bog cranberry	Edible berries	Widely used	1, 4, 5, 9
Vaccinium uliginosum, *V. caespitosum*, *V. alaskensis*	blueberry	Edible berries, shoots	Widely used	1, 2, 3, 4, 5, 9
Vaccinium vitis-idaea	lowbush cranberry, lingonberry	Edible berry	Widely used	1, 2, 3, 4, 5, 9
Viburnum edule	highbush cranberry	Edible berry	Widely used	1, 2, 5, 9

[a] The scientific names listed in this table derive from the information sources we cite. Accepted scientific names for some of these species have since changed. Current names and authorities are listed in appendix 1.

[b] Before consuming organisms listed in this table, further research should be done to determine if recent studies have found problems with the edibility or safety of use or consumption.

[c] 1. Anderson and others 1977, Jones 1983.
2. Caulfield 1983, Martin 1983.
3. Nelson 1973.
4. Stickney 1984.
5. Schroeder and Kookesh 1990a.
6. DeLaguna 1972.
7. Turner and Szczawinski 1991.
8. Turner 1995
9. Pojar and MacKinnon 1994

rural communities. The list includes edible plants, medicinal plants, and other species harvested for craft and home uses. This list is by no means complete, but gives the reader an idea of the wide range of plants harvested for subsistence use in Alaska today. Research documenting Native use of plants is particularly good for those plants that continue to be used in large quantities. It is less complete for edible green plants that are collected in small quantities, roots and tubers whose use has declined, or species with medicinal, spiritual, craft, or construction applications. In southeast and south-central Alaska, for example, aboriginal use of mushrooms appears to have been limited to a few species with medicinal or spiritual use, and was not noted in the sources for table 1.

Plant uses other than for food or medicine also merit mention. Both bark and roots are used for crafts and artwork. People cut long strips of cedar (*Thuja*) bark from living trees. The bark is cleaned, softened, and separated into smaller strips used for weaving and basketry. Culturally modified trees—cedar trees showing scars from bark stripping—are good markers of historical and prehistoric camp locations in southeast Alaska (Mobley and Eldridge 1992). Spruce (*Picea*) roots are gathered for basketry. Weavers claim that forest edge situations with sandy soils produce the best roots for weaving because in such soils, spruce trees send out long, straight surface roots with little branching. The collected roots are cleaned and split for weaving (Schroeder 2002).

On the west coast of Prince of Wales Island, near Sitka, and elsewhere in southeast Alaska, there are major Pacific herring (*Clupea pallasi*) spawning areas. Hemlock (*Tsuga*) branches are used to collect the spawn. The Tlingit and Haida recognize two varieties of hemlock, one with smooth bark and one with more variegated bark. The smooth-bark variety is used in the herring egg harvest. Before the herring begin spawning, subsistence gatherers cut hemlock boughs and small hemlock trees to use as depositional substrate, and bring them to saltwater bays where herring are likely to spawn. The hemlock branches or trees are weighted so that they are suspended in the water column just below the surface at midtide. A fishing float or tag line leading to the beach may be used to help locate the hemlock sets. After herring spawn, layers of herring eggs become attached to the suspended hemlock boughs or trees. When the spawn encasing the boughs is thick enough, the harvester removes the boughs or trees. The boughs or trees, now encased in herring spawn, are then cut up into usable pieces for immediate consumption, distribution to other people, or storing in a freezer for later use.

Schroeder and Kookesh (1990b) estimated that about 100,000 pounds of herring eggs were harvested in this manner from Sitka alone in a typical year. Large quantities of herring eggs are shipped to other Native communities where herring do not spawn in abundance.

People still use plants for medicinal purposes.

The ethnographic literature on southeast Alaska societies includes some interesting material on Native medicial uses of plants. DeLaguna (1972), Emmons (1991), Suttles (1990), and Turner (1982, 1998) provided descriptions of numerous plant remedies believed to have been used in the region. Although recent field research in Native communities in the region has not focused on medicinal use of plants, interview and participant observation data indicate that people still use plants for medicinal purposes. The use of devil's club (*Oplopanax horridus*) (fig. 2) is openly discussed (Turner 1982) and its use both as a topical treatment and as a tonic is well known.

Cultural sensitivity and respect for prior harvest rights are especially useful for avoiding conflicts when the commercial harvest of NTFPs is promoted in areas of traditional Native American use. Turner (2001) explored these issues for the First Peoples of British Columbia and provided a summary table, "Principles of Sustainable Harvesting of Non-Timber Forest Products." This table provides a comprehensive checklist of recommendations for designing NTFP harvest policies that are biologically sustainable, culturally sensitive, and economically equitable.

Figure 2—Devil's club.

Alaska's Land Ownership Patterns and Laws

Alaska's 586,412 square miles or about 375 million acres include large areas of temperate and boreal rain forest, expanses of boreal forest or taiga, and riparian forests. An estimated 119 million acres are forested with 32 native tree species (Viereck 1974, Viereck and Little 1972). Most of this (106 million acres) consists of interior boreal forest with little commercial value. Almost all forest land suitable for timber production is found in coastal southern Alaska, primarily in the Tongass and Chugach National Forests. Tree species of the coastal and boreal rain forests consist of Sitka spruce (*Picea sitchensis*), mountain hemlock (*Tsuga mertensiana*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and Alaska yellow-cedar (*Chamaecyparis nootkatensis*). Boreal forests consist principally of black spruce (*Picea mariana*), white spruce (*Picea glauca*), birch (*Betula* species) and aspen (*Populus* species). Riparian forests consist of willow (*Salix*) species.

About 44 million acres, including productive timber lands, belong to Alaska Natives under Native corporation ownership. These lands were part of the Alaska Native Claims Settlement Act (ANSCA 1971), which was passed to resolve aboriginal claims in the state so that development of North Slope oil resources could proceed. The 12 Native regional and more than 200 Native village corporations that were established by ANSCA had the opportunity to select lands that were in or near traditional-use tribal territories, and that were economically productive or important for subsistence harvests (Berger 1985). Anyone contemplating developing a business centered on Alaska common property NTFPs should work with Native and tribal interests if they wish to be successful. The three regional Native corporations in south-central Alaska—Cook Inlet Region, Inc.; Ahtna, Inc.; and Chugach Alaska Corp.—all have excellent Web sites. Sealaska is the regional Native corporation of southeast Alaska, and it also has an excellent Web site with many links.

The act left about 322 million acres in public ownership, and the state of Alaska had the option to select 124 million acres of this total. About 197 million acres, about 52 percent of the total land in Alaska, remained under federal jurisdiction. The bulk of these federal lands are managed as parks by the U.S. Department of the Interior (USDI) National Park Service, as wildlife refuges by the USDI Fish and Wildlife Service, as national forests and monuments by the U.S. Department of Agriculture, Forest Service (USFS), and as petroleum reserves and other land statuses by the USDI Bureau of Land Management. Apart from Native corporation land, less than 1 percent of Alaska land is privately owned.

Issues surrounding the harvest and use of NTFPs are not unique to Alaska. Many areas throughout the world have worked to develop policies that address sustainable NTFP harvest practices while taking into consideration the need for communities to provide economic opportunities for themselves. The complex issues of subsistence, economic sustainability, and local traditions play a large part in how policies are established and harvesters regulated. It has been shown that local knowledge coupled with active multistakeholder partnerships is an effective means of assisting government agencies to establish fair and equitable policies and programs.

Federal Lands

Subsistence Use of Nontimber Forest Products

In Alaska, "subsistence" has a set of special legal meanings.

In Alaska, "subsistence" has a set of special legal meanings. The ANSCA settlement of aboriginal land claims did not resolve issues of recognizing, continuing, or restricting Native subsistence hunting, fishing, and gathering. Because subsistence was still a pending issue, provisions to provide protection for subsistence activities were included in the Alaska National Interest Land Conservation Act (ANILCA 1980). Although the main import of this act was to put more Alaska land in protected status through creating new national parks and national refuges and adding to existing conservation units, ANILCA also provided strong provisions for continued subsistence harvesting. The act stipulated that, for all rural residents on public lands and for Alaska Natives on tribal lands, the opportunity for subsistence harvesting is essential to continued physical, economic, traditional, and cultural (Native) or social (non-Native) existence (ANILCA 1980, Title VIII, Sec. 801 or 16 USC 3111).

ANILCA therefore established a priority use for subsistence (ANILCA 1980, Title VIII, Sec. 804 or 16 USC 3114). In times of resource scarcity or when demand exceeds biologically sound harvest levels, subsistence would have a priority over other consumptive uses of resources. In practice, this means that commercial, sport, or other harvests would be curtailed by state or federal fish and wildlife management authorities before subsistence harvests would be limited. ANILCA and the resulting federal management involves the federal government more closely in subsistence resource harvesting and use in Alaska than would otherwise be the case.

A second important provision of ANILCA establishes special procedures to be followed when federal land use actions might restrict subsistence use (ANILCA 1980, Title VIII, Sec. 810 or 16 USC 3120). These procedures somewhat mirror National Environmental Policy Act (NEPA 1969) provisions.

They require the federal agency to document how planned actions might affect subsistence uses and to hold public hearings for input on the proposed action. This provision, along with associated rights to appeal land management decisions, has resulted in close examination of many proposed large-scale uses of federal land in Alaska.

Although ANILCA has not been applied to the subsistence use of plants as thoroughly as to subsistence uses of fish and wildlife, its implementation over the past 20 years has set the main rules of operation for government agencies in dealing with subsistence issues. ANILCA defines subsistence uses as "the customary and traditional uses….of wild renewable resources for direct or family consumption as food, shelter, fuel, clothing, tools, or transportation" (ANILCA 1980, Sec. VIII, Sec. 803). However, the act is less clear or legally tested on the mechanisms for protecting plant or mushroom use than it is for use of fish and wildlife. The USDA Forest Service worked with a Special Forest Products Task Group, comprising primarily Native subsistence users and their tribal representatives, to develop a policy for commercial use of NTFPs in the Chugach and Tongass National Forests. This group consisted of representatives of the 22 federally recognized tribal governments whose members use plants in the Chugach and Tongass National Forests. An interim policy was developed and can be revised as new national policies dictate.

Commercial Harvest and Regulations

The USDA Forest Service Alaska Region (10) implemented an Interim Special Forest Products Resource Management Policy in 2000, developed with collaboration from Forest Service personnel, federally recognized Alaska Native Tribes, and the public (http://www.fs.fed.us/r10/tongass/projects/sfp/r10_sfp_intirim_policy_2000.pdf). The policy defines noncommercial and commercial use and establishes permitting requirements. Commercial harvest guidelines are described, as are inventory and monitoring strategies. Guidelines for valuation of special forest products are outlined and include direction to take into account harvester costs and market factors in setting consistent and standard pricing rates. The Tongass National Forest then wrote an Interim Special Forest Products Resource Management Policy (http://www.fs.fed.us/r10/tongass/projects/sfp/tnfinterimpolicy.pdf), as certain key SFP management issues could not be addressed at the regional level. The Tongass document goes into detail regarding definitions and guidelines for defined management areas, permitting processes, and inventory and monitoring. Special concerns

for commercial harvest of red and yellow cedar bark, burls, moss and lichens, and for bioprospecting of medicinal plants are outlined, and special circumstances regarding their harvest are described. Commercial harvest of devil's club is not allowed on the Tongass National Forest because of its cultural and spiritual significance to Alaska Natives. The Chugach National Forest does not have a SFP policy specific to the forest, but follows the Alaska Region interim policy, and SFPs are mentioned extensively in the forest plan.

In 2000, U.S. Public Law 106-113, [Sec. 339] (amended in 2003) Pilot Program of Charges and Fees for Harvest of Forest Botanical Products (U.S. Laws, Statutes, etc. 1999, 2003) set the stage for the development of regulations for the commercial harvest and sale of SFPs on national forest lands. The legislation directs the Secretary of Agriculture to develop and implement a pilot program to charge for forest botanical products through the establishment of appraisal methods and bidding procedures. It requires analysis regarding the sustainability of harvest levels, and exempts personal use from fees. A notice published in May 2004 in the *Federal Register* (Federal Register 2004) stated that the Forest Service planned to publish regulations for managing SFPs and forest botanical products in the *Federal Register* in the fall of 2004, and the public comment period would be 60 days. As of the end of 2005, the regulations have not yet been published in the *Federal Register*. The regulations will guide the Forest Service in the administration of special forest products.

The USDA Forest Service Alaska Region has adopted a SFP appraisal system developed by Forest Resource Enterprises for the Pacific Northwest Region (Region 6, Oregon and Washington). The appraisal system is based on direction from Public Law 106-113, amended in 2003, which directs the Forest Service to charge fees to harvesters set by an appraisal process and designed so that at least a portion of fair market value and costs are recovered. The starting point for fair market value is 10 percent of the average wholesale price for the product (that is, the "shed price" or price paid to harvesters or their employers at the first point of sale). The appraisal tables, an example of which can be viewed at the Forest Resource Enterprises Web site (http://www.fs.fed.us/fre/products/sfp/index.shtml), include berries, birch products, burls, spruce tips, conks, willow, fireweed blossoms, rose hips, mushrooms, seeds, and syrup.

The Alaska Region of the USDA Forest Service currently receives a relatively low volume of requests for SFP harvesting permits. Table 2 lists

Table 2—List of nontimber forest products that customers have inquired about for commercial harvest at ranger districts of the Chugach or Tongass National Forests since 1995

Scientific name[a]	Common name[b]	Intended use/parts harvested
Abies lasiocarpa	subalpine fir	Transplants
Aconitum delphiniifolium	mountain monkshood	Foliage
Actaea rubra	baneberry	Foliage
Adiantum pedatum	maidenhair fern	Transplants
Alnus rubra	red alder	Transplants
Andromeda polifolia	bog rosemary	Whole plant
Aquilegia formosa	western columbine	Foliage, seeds
Aruncus dioicus	goatsbeard	Whole plant
Asplenium trichomanes	green spleenwort	Whole plant
Athyrium filix-femina	ladyfern	Transplants
Boletus edulis	king bolete mushroom	Edible
Cantharellus spp.	chanterelle mushroom	Edible
Carex spp.	sedges	Seeds, transplants
Chamaecyparis nootkatensis	Alaska yellow-cedar	Bark
Chamerion angustifolium, C. latifolium	fireweed	Blossoms, leaves
Frageria spp.	strawberry	Berries
Gaultheria shallon	salal	Berries
Gentiana platypetala	broadpetal gentian	Whole plant
Geum macrophyllum	large leaved avens	Whole plant
Hydnum spp.	hedgehog mushroom	Edible
Iris setosa	blue flag iris	Foliage
Juncus spp.	rush	Seeds, transplants
Juniperus communis	common juniper	Transplants, boughs, seeds
Kalmia polifolia	bog laurel	Whole plant
Ledum groenlandicum	Labrador tea	Foliage
Lobaria oregana	lettuce lung lichen	Whole plant
Lobaria pulmonaria	lungwort lichen	Whole plant
Lonicera involucrata	bearberry honeysuckle	Transplants
Lupinus nootkatensis	Nootka lupine	Seeds
Lycopodium alpinum	alpine clubmoss	Whole plant
Lycopodium annotinum	stiff clubmoss	Whole plant
Lycopodium clavatum	running clubmoss	Whole plant
Lycopodium dendroideum	groundpine clubmoss	Whole plant
Morchella spp.	morel mushroom	Edible
Nuphar lutea	yellow pond-lilly	Whole plant
Oplopanax horridus	devil's club	Root[c]
Picea sitchensis	Sitka spruce	Cones
Pinus contorta	shore pine	Christmas trees, seeds, transplants
Platanthera dilatata	white bog orchid	Whole plant
Polystichum spp.	hollyfern	Transplants
Populus balsamifera	black cottonwood	Buds and bark
Potentilla spp.	marsh cinquefoil	Whole plant, seeds
Potentilla elegans	silverweed	Transplants
Potentilla villosa	villous cinquefoil	Seeds
Pyrola asarifolia	pink wintergreen	Whole plant
Ranunculus repens	creeping buttercup	Whole plant
Ribes spp.	gooseberry	Berries
Ribes laxiflorum	black currant	Berries

Table 2—List of nontimber forest products that customers have inquired about for commercial harvest at ranger districts of the Chugach or Tongass National Forests since 1995 (continued)

Scientific name[a]	Common name[b]	Intended use/parts harvested
Ribes triste	red currant	Berries
Rosa spp.	rose	Rosehips, leaves
Rubus idaeus	raspberry	Berries
Rubus spectabilis	salmonberry	Berries
Salix spp.	willow	Transplants, cuttings, seeds
Sambucus spp.	elderberry	Berries, cuttings
Sanguisorba canadensis	Sitka burnet	Whole plant
Sorbus sitchensis	Sitka mountain ash	Seeds, transplants
Streptopus amplexifolius	watermelon berry	Berries
Symphoricarpos albus	snowberry	Transplants
Thuja plicata	western redcedar	Bark
Tsuga heterophylla	western hemlock	Boughs
Urtica spp.	stinging nettle	Foliage
Vaccinium spp.	blueberry	Transplants, berries
Vaccinium oxycoccos	bog cranberry, mossberry	Berries
Vaccinium parvifolium	red huckleberry	Berries
Vaccinium vitis-idaea	lowbush cranberry	Berries
Valeriana sitchensis	Sitka valerian	Whole plant
Viburnum edule	highbush cranberry	Berries
various	undetermined moss spp.	Floral, ornamental
various	undetermined tree spp.	Fuelwood

[a] Organisms are listed alphabetically by scientific name because many species have more than one common name. The full citation for the scientific name can be found in appendix 1.

[b] Common names are from the lists of inquiries at USDA Forest Service ranger districts in Alaska. Other common names can be found in appendix 1.

[c] There is no commercial harvest of devil's club permitted on the Tongass National Forest.

products that have been requested for purchase or availability for harvest by customers or interested parties from the ranger districts of the Chugach and Tongass National Forests since 1995. Few of these products were actually sold, but this partial list of potential products highlights the potential usefulness of proactive management on the part of federal land management agencies.

Although no major SFP industries are currently operating on national forest lands in Alaska, Alaska Natives and others are concerned that increased commercial harvest will decrease their access to customary and traditional plants, lead to inappropriate use of spiritually significant plants, or compromise their intellectual property rights. Consultation with tribes is an important part of USDA Forest Service policy in Alaska.

Consultation with tribes is an important part of USDA Forest Service policy in Alaska.

USFS Forest Management Plans

The USDA Forest Service Tongass Land and Resource Management Plan of 1997 (USDA FS 1997a, 1997b) mentions SFPs in the objectives of three land use designations—scenic viewsheds, modified landscape, and timber production. In each one, the objective for SFP management is to identify opportunities for diversifying rural economies. The standards and guidelines for free use of traditionally harvested SFPs (such as berries, mushrooms, sphagnum moss, cones, bark, Christmas trees, boughs, trolling poles, spruce roots, cedar bark, and transplants) is to make them available consistent with the management objectives of a given land use designation and in a manner similar to their historical use. The guidelines for commercial sales of SFPs state that harvest should be allowed in ways that assure the continued integrity of the forest stand. Permits are required for commercial harvest and shall only be granted where there are adequate quantities. The guidelines also direct that the units (measures of quantity) used for selling specific SFPs shall be consistent across the forest.

The Chugach National Forest *Revised Land and Resource Management Plan* (USDA FS 2002) outlines two objectives for forest product production on the forest. One is to provide personal-use timber for cabin logs, lumber saw logs, poles, and firewood. The other is to provide SFPs for personal and commercial use on a case-by-case basis. Commercial harvest of SFPs is allowed on 11 out of 21 land allocations (portions of the national forest that have different management prescriptions), or about 66 percent of the forest. Most of the excluded area is the recommended wilderness area around Prince

William Sound. Personal-use harvest is allowed on the entire forest except areas managed as research natural areas. The emphases listed in the forest plan for resource production include road-accessible personal-use/free-use forest products, small-scale commercial harvest, and SFPs.

State Lands

Subsistence Use of Nontimber Forest Products

The Alaska National Interest Land Conservation Act of 1980, as mentioned earlier, allowed the state of Alaska to manage subsistence harvests on federal land as long as it maintained this priority use in law and regulation and, by so doing, was in compliance with ANILCA. The state of Alaska complied with ANILCA until 1990 when the Alaska Supreme Court found that providing a priority for rural subsistence conflicted with the state constitution. Since that time, the federal government has assumed management of subsistence on federal lands. The conflict between the state's constitution and ANILCA has created a continuing dispute between Alaska's Natives who rely on ANILCA protections and other Alaska groups who oppose federal management or Native subsistence protections. State of Alaska regulations currently cover subsistence uses on state and private land only, but include all Alaskan citizens, not just rural residents as with the federal regulations.

Commercial Harvest and Regulations

On many Alaska state lands, including land managed by the Alaska Department of Natural Resources (DNR) Division of Mining, Land and Water, and state parks such as the Chugach State Park, the Kenai State Park, and Independence Mine State Historical Park, harvesting small amounts of wild plants, mushrooms, berries, and other plant material for personal and noncommercial use is allowed without a permit. Generally in state parks, SFPs may not be collected for sale. On state lands that do allow commercial harvesting, a land use permit can be obtained from the Alaska DNR Division of Mining, Land and Water for prices set by Alaska Administrative Code 11 AAC 05.010 "Fees for Department Services" (Alaska Statues and Regulations 1986). These state regulations list specific prices for willow cuttings, alder (*Alnus* species) stems, shrubs and perennials, bark and vegetative mats, berries, taps for birch syrup, cones, seeds, medicinal plants, mushrooms, moss and lichens, burls, foliage and greenery, conks, and nonmedicinal roots. The director can adjust the listed prices under certain conditions.

In Alaska, a small business owner who prepares and sells homemade jam, jelly, fruit syrup, vinegars, dried herbs, or dried tea leaves directly to the consumer at a farmers market, a roadside stand, or a seasonal event, such as a fair, is exempt from state food regulations. They do not need to have an inspected kitchen. If they sell or produce any products outside this rather narrowly defined scope, such as sales to other states or hiring employees, they need to check the Alaska food code regulations (Alaska Food Code 1997) to determine the requirements.

Community Economic Development

There are numerous programs and services available for economic development assistance for Alaska communities, individuals, businesses, nonprofits, and native organizations.

There are numerous programs and services available for economic development assistance for Alaska communities, individuals, businesses, nonprofits, and native organizations. The Alaska Department of Commerce (http://www.commerce.state.ak.us/home.htm) has several divisions and programs that focus on community development. The Office of Economic Development (http://www.commerce.state.ak.us/oed/home.htm) was established in 2004, and offers assistance in tourism, fisheries, and minerals development. They have programs in small business development and forest products, among others. The Division of Community Advocacy (http://www.commerce.state.ak.us/dca/home.htm) has a mini-grant program to encourage projects that have the potential to improve a community's economy. The Alaska Division of Community Advocacy Alaska Product Preference Program (http://www.commerce.state.ak.us/dca/prodpref/prodpref.htm) gives Alaska businesses preference consideration when the businesses respond to bids or proposals for state contracts. Any Alaskan business that manufactures a product with at least 25-percent value added in Alaska may apply for certification in the preference programs. The Community Advocacy Made in Alaska Program (http://www.commerce.state.ak.us/dca/mia/) identifies and promotes the purchase of products manufactured and crafted in Alaska (fig. 3). Numerous Alaska special forest products businesses are certified as Made in Alaska. Over 120 financial and technical assistance resources for Alaskan communities and businesses are summarized in the Alaska Economic Development Resource Guide (Alaska Department of Community and Economic Development 2003). The guide has an inventory of programs and services that can provide economic development assistance to Alaska communities and businesses.

Figure 3—"Made in Alaska" emblem.

Several economic development councils in Alaska are members of the International Economic Development Council (http://www.commerce.state.ak.us/home.htm). The Juneau Economic Development Council (http://www.jedc.org/) is one of eight members in Alaska. They assist businesses throughout the state with counseling and a revolving loan program, as well as serving as the overall economic and development planning agency for the city and borough of Juneau. The goal of the Sitka Economic Development Association (http://www.sitka.net/), another member of the international council, is to strengthen and diversify Sitka's economy. The Skagway Development Corporation (http://www.skagwaydevelopment.org/) serves the business community of Skagway as an advisory, administrative, and technical resource for the purpose of creating ideas, developing initiatives, or enhancing existing business activities that benefit the economic environment in Skagway.

Private landowners can receive assistance with developing stewardship programs and management plans from the Alaska Department of Natural Resources Forest Stewardship/Landowner Assistance Program (http://www.dnr.state.ak.us/forestry/foreststewardship.htm). Limited cost-share assistance and grants are available. The Forest Stewardship Program is a federally funded service to assist landowners with forest management, keep lands productive, and increase economic and environmental benefits. Small landowners can also seek technical assistance and advice from the Alaska

Association of Conservation Districts and the 12 Alaska soil and water conservation districts (http://www.alaskaswcds.org/-Districtspage.html). Districts work on a voluntary basis with landowners to address issues such as erosion control, water conservation and use, wetlands, and community development. A small woodland owner interested, for example, in birch syrup production can seek technical assistance from both the Forest Stewardship Program and the local Soil and Water Conservation District.

Marketing

Types of Markets

Trading and bartering are the most basic forms of direct marketing for NTFPs.

Trading and bartering—
These are the most basic forms of direct marketing for NTFPs. Often connected with subsistence-style livelihoods, they provide the means to obtain other items without cash. Trading and bartering are most effective when dealing with individuals who live nearby. Fresh produce, home-preserved foods, or other hand-crafted items are examples of items that can be traded. Good interpersonal skills are useful for bartering because face-to-face communication is necessary. Many individuals enjoy the socializing and the game of "dickering" as much as the benefits they obtain from the products traded. Barter and trade are integral parts of subsistence in Alaska. Some individuals and families gather quantities of plants and berries and process them. These may be given, bartered, or traded through traditional networks and at fairs and meetings of various sorts.

Local retail markets—
There are a plethora of local marketing opportunities in any community. In Alaska, these markets were and are essential to the well-being and cohesiveness of local communities. Local markets provide the greatest opportunities for marketing many NTFPs owing to the long distances to other sales outlets.

Farmers markets or local festivals are excellent examples of direct retail markets that are highly conducive to selling NTFPs. Such local direct markets are often designed to be festive or social in nature, and thus they attract large crowds of people and provide the producer with easy access to many buyers. Often such markets are coordinated with other producers through a marketing cooperative or association. Some sellers also retail processed products to

consumers at ongoing, fixed-place, producer-direct markets. Canned, dried, salted, and cooked merchandise is often sold at these more permanent venues to extend the market season and to sell products that do not meet quality criteria for fresh sales. In areas where traffic is adequate (and slow enough), roadside markets provide another form of opportunity for direct sales.

Direct retail marketing by producers requires appropriate skills. To be successful, the producer must make a good first impression and be able to communicate well with the public about the virtues of their products. Clean attractive displays and friendly sales staff enhance success.

Portable retail marketing—
These opportunities are similar to the fixed-place markets but differ in that the producer goes to where the people are rather than waiting for customers to visit. A good portable display is important. For instance, a trailer that is designed to look like a log cabin is a great portable display for NTFPs.

A variety of portable marketing venues are possible. In the workplace, producers can gain permission to set up a marketing and demonstration display in the employee break area or in the parking lot. Specialty foods, Christmas greenery, art, and crafts are good types of products to sell at such locations. Producers can travel to craft shows, festivals, or home and garden shows. Providing raw materials (evergreen boughs, willow stems, twigs, moss, lichens, and cones) that shoppers can use to make their own finished products has been a successful marketing approach in these locations. Displayed finished products provide inspiration for the buyers who wish to make their own, or can be sold to those who do not. Park-and-ride lots offer access to consumers before they get in their cars to go home. Alternately, the producer can take orders in the morning as commuters go to work and then have the fresh products ready for them when they return. Packaging that has your contact information on it is a great way to advertise.

Local wholesale marketing—
Selling NTFPs wholesale to local businesses is a marketing method that does not involve the time, skills, or effort required for retail marketing. Examples of businesses to target include restaurants, grocery stores, pet stores, and nurseries.

Restaurants are interested in berries, wild greens, nuts, root crops, fruit, culinary herbs, and floral products for table decorations. Grocery stores buy

wild fresh produce such as vegetables, fruits, nuts, packaged wild green mixes, wildflowers, Christmas greenery, potted plants, bottled tree waters, syrups, fresh and dehydrated mushrooms, dried herbs, fresh and canned fruits, and pet care products. Pet stores are interested in bark, needles, and wood shavings for bedding; oils, cedar foliage, chips, and bark products that can be used to control fleas and ticks; seed mixes for bird feeders; nesting boxes and kits for making them; and stumps, hollow logs, and whole tree snags for wildlife perches and homes. Nurseries purchase cut flowers; live native plants for landscaping or for restoration work in forests, stream areas, roadsides, and wetlands; dried plants for interior decorations; live Christmas trees and Christmas greenery; and landscaping materials such as stumps, logs, snags, and rocks.

This form of marketing is driven by the needs of the buyer rather than what the producer has to sell, so NTFP harvesters and producers that plan to market wholesale to local businesses must investigate their needs first. Doing so tends to be more of a job than a way to make quick cash while having fun.

Tourist and recreational markets—
Marketing NTFPs to tourists covers a wide range of products, activities, and marketing venues. A critical factor is making contact with people who already work with the tourist industry. Many small NTFP company owners do not have the skills, time, or money to develop a targeted marketing approach for tourists.

Products intended for sale to tourists must be small, relatively light-weight, portable, and well sealed if they could make a mess in a person's luggage (fig. 4). Providing taste samples is an excellent sales approach for edible goods. Larger containers or products can be mailed directly to the buyer's home where they will greet the returning visitor. Packets of wild culinary items that can be used as stuffing for fresh fish, wild duck, or wild game provides the sportsman with a uniquely flavored local product. Packets of dried produce with sauce mixes can make great gifts that allow quick, tasty, and unique meals. Providing contact information for future purchases is important for subsequent catalogue or Internet sales if the producer is prepared to ship products.

Festivals with themes or activities that revolve around local products can be profitable and fun.

Festivals with themes or activities that revolve around local products can be profitable and fun. For instance, a festival based on a spring harvest of birch syrup could provide opportunities for producers as well as local chefs

Figure 4—Wild berry products.

and cooks. Such festivals can be scheduled to coincide with hunting and fishing seasons when many people visit Alaska. They can also be timed to match the arrival of cruise ships.

For entrepreneurs who truly enjoy interacting with visitors and educating them about local customs and the natural environment, guided wildcrafting tours are a unique marketing activity. Guided wildcrafting excursions can vary from pre-arranged 3- to 5-day trips for groups with special interests to spontaneous half-day adventures for visitors arriving on a cruise ship.

Nontimber forest products can be marketed to tourists in a variety of places. Local motels, hotels, and resorts can distribute flyers to potential guests or display literature or products in their lobbies. A list of activities promoted as side events for a convention is a great way to promote NTFP activities or products. Convention bureaus and tourism centers commonly develop packages of promotional literature that advertise activities of local interest. Local school districts, community colleges, universities, church organizations, fraternal organizations, and governmental agencies also promote products or activities that give a special local flavor to their events. The directors of cruise lines constantly seek new events that give their participants a chance to soak up local color. These venues give value-added producers a captive audience for selling their finished products.

Internet markets—
Producers of NTFPs can find Internet sales difficult because their products have special smells, textures, colors, and tastes that are integral to why people buy them. Although remote viewing does not provide a means for customers to directly experience these special characteristics, Internet sales can provide opportunities for direct marketing otherwise unavailable to producers in remote locations. Internet sales can be particularly effective for products the purchaser is somewhat familiar with, such as native crafts. The Internet is proving to be a significant marketing tool for craftspeople in remote locations who can improve their profit margins considerably with online direct sales.

The Internet is a significant marketing tool for craftspeople in remote locations.

The Internet also can be used for followup sales after a person has purchased a specialty forest product, when they have participated in an event that featured the products, or when the product has been shown or recommended by the original customer. Providing detailed contact information with the product is essential. Such information can be displayed prominently on business cards, tags, leaflets, or brochures that accompany the product. Combinations of these promotional items, or multiple copies thereof, allow the customer to file the information in several locations for easy retrieval, or to distribute copies to friends.

A good Web site can be hard to keep fresh and enticing with just a few products. Marketing cooperatives can afford to maintain more dynamic and exciting Web sites, as well as hire professionals to design and manage the site.

Commodity markets—
When NTFP species or plant parts are harvested in large volumes and sold wholesale to buyers for national or international distribution, we refer to the commerce as commodity marketing. Often such markets are very large scale and involve harvesting and sales around the globe. Typically buyers deal in hundreds of tons of raw materials. For example, a Korean buyer might want 600 metric tons of fern fiddle heads (the young leaf sprouts of various fern species) each spring. Large buyers control these markets; therefore, prices reflect the wholesale price in areas of greatest availability and lowest wages. Consequently, profit margins for local buyers are typically pennies per pound, if they can compete at all. These low profit margins all too often translate into marginal wages and poor working conditions for local harvesters.

Reliable supplies of high-quality raw materials must be readily available for purchasers to consider buying in a given location. Buyers control the quality standards for the resources they purchase and maintain the right to

refuse materials that do not meet their standards. Sellers can sometimes wait as long as 90 days to be paid for deliveries. Very little value-added production is conducted in the communities where NTFP materials are harvested for commodity markets. Often the most important local activity is harvesting and minimal processing for shipment.

Large-scale harvesting has the greatest potential to be nonsustainable. To withstand extensive or intensive harvesting, the harvested species must be abundant, capable of regenerating quickly, or both. To date we know of no large-scale harvesting of NTFPs in southern Alaska, but if the quality or quantity of harvested material declines elsewhere from overharvesting, introduced disease, or any other reason, items such as moss or floral greenery might be sought by international buyers. Landowners, land managers, the business community, harvesters, and the residents of Alaska will benefit from their preparations for this contingency.

Marketing Challenges and Opportunities in Alaska

Transportation—
Distance is the greatest obstacle to marketing NTFPs outside the state because shipping is expensive. Transportation distance makes it almost impossible to access national and international markets for fresh fruit, vegetables, and mushrooms. Investment in processing equipment and facilities is required to overcome this hurdle. Flash freezing, vacuum packing, drying, or canning are several methods to maintain quality during lengthy shipping. Combining SFPs with shipments of seafood to wholesale buyers is another method of cutting transportation cost. Mixed loads help shippers fill their containers and provide wholesale buyers with compatible products for resale to their customers.

Climate and seasons—
The short growing seasons of northern latitudes and seasonal markets are additional marketing challenges. Businesses can address these difficulties by targeting several types of markets. For instance, they can sell high-quality fresh products to local markets in season and process their excess raw materials into frozen, dehydrated, or canned products for later sales or shipping.

Products for seasonal markets must be planned in advance. For example, contracts for seasonal items like Christmas greens are often negotiated in May and June. Harvesting and production of the products must be completed

before Thanksgiving. Making arrangements to supply seasonal markets can take 2 or 3 years of preparation and requires a thorough knowledge of the industry.

Labor force—
A factor in many NTFP company failures is an unstable labor force. Weather and difficult forest conditions make work tiring and potentially dangerous. The work season is often short and pay is typically low compared to other forest jobs. Harvesting NTFPs also does not typically provide jobs with standardized pay and benefits, such as worker's compensation and unemployment insurance, as do many jobs in forestry, mining, tourism, and fishing. Lastly, the NTFP harvest season can also conflict with other activities such as hunting and fishing.

Alaska's great expanses of wild and pristine natural areas is perhaps its greatest marketing advantage.

Allure of Alaskan products—
Alaska's image as a state with great expanses of wild and pristine natural areas is perhaps its greatest marketing advantage. Products produced and sold by Native Americans also have significant marketing advantages, especially in other regions and nations. Feelings evoked by these images and marketing approaches are very important for enhancing the sales of food products, herbal medicines, hand-made crafts, and wildcrafting adventures. Customers do not need to be convinced of the value of such attributes, but they will expect the products they purchase to live up to expectations. The emblems "Made in Alaska" and "Silver Hand" are tremendous marketing tools. To receive a permit to use the Made in Alaska emblem on a product or handicraft, an application must be submitted to a Made in Alaska agent or the Division of Community Advocacy (http://www.commerce.state.ak.us/dca/home.htm). Authentic Alaska Native arts and crafts items may display the Silver Hand symbol, with the words "Authentic Native Handicraft from Alaska." Native Alaskans wishing to use the Silver Hand logo can apply for certification through the Alaska Department of Education and Early Development, Alaska State Council on the Arts (http://www.eed.state.ak.us/aksca/).

Large, lightly harvested resource base—
Alaska's largely small-business-focused NTFP industry and its extensive forests have, to date, resulted in only light harvest pressure on the species that are used to create products. Because harvesters are not competing internationally, there has been little pressure to use unsustainable harvesting

practices to reduce costs. An opportunity exists for Alaskans to develop certification processes to market products as "green" or sustainably-harvested. Certification, Made in Alaska emblems, and the Silver Hand logo are all powerful tools for adding product value. Using approaches that add value and income, while harvesting sustainably, will help ensure that Native Alaskan and subsistence harvester rights will be protected.

Product Categories

Art, Crafts, Dyes, and Floral Greenery

Products—

A wide variety of craft and art products are produced from native Alaska species. Sources for raw materials range from trees to grasses to fungi. The wood of tree species such as birch, aspen, juniper, hemlock, and cedar, and their byproducts such as bark, limbs, roots, cones, berries, and boughs, provide material for an unbelievable number of arts and crafts products. Various plants provide leaves, berries, stems, and roots for displays or dyes. Many species of fungi can also be used for natural dyes. Examples of products include walking sticks, carvings, statues, ornamental and floral arrangements, wreaths, baskets, bowls, paintings, ornaments, clothing, fabric, and many other products.

Native and subsistence use—

Likely all of the species used today have been used for centuries by the Alaska Natives to provide the necessities and amenities of life. These organisms have provided warmth, housing, clothing, medicine, transportation, tools, utensils, and cultural connection to the natural world. Art and crafts produced from wild plant species are integral to Alaska Native cultures and have provided them with a means to convey their ancient culture and history to more recent immigrants and citizens. Native art and crafts also express the wonder of Alaska lands and the rich customs of their people. Discussing the vast array of Alaska Native art and crafts is beyond the scope of this publication, but one can get a flavor for the painted artistry of Northwest Natives in the compilation of beautiful artwork entitled *The Transforming Image: Painted Arts of Northwest Coast First Nations* (McLennan and Duffek 2000).

Harvested species and materials—
The "diamond willow" is a form of the Bebb willow (*Salix bebbiana*) that has been infected at the branch nodes by one or more of several fungi resulting in peculiar diamond-shaped depressions in the main bole. The unique wood grain patterns make it one of the more unique willow species in the world for crafts. When carved or finished properly, indentations appear as highly recognizable diamond patterns. The wood is used for ornate walking sticks, canes, lampposts, furniture, and candlestick holders (figs. 5 and 6).

Sitka spruce is also used for many craft and art items. Its wood is very light colored and nicely grained, so it is often used in the building of musical instruments such as violins, fiddles, guitars, and other stringed instruments. The wood also is prized for lathe-turned bowls made in a variety of shapes and sizes and that have culinary or ornamental use. Spruce carvings, such as statues or wall-hangings that depict wildlife (fig. 7), are popular with tourists. Spruce roots are used for basketry, which is enjoying a revival in many parts of Alaska. The black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) also can be carved and turned in a similar fashion, but is not as widely used.

Likewise, a variety of products can be made from common juniper (*Juniperus communis*), although it is not prevalent in southeast Alaska. The wood has an ornate and highly colorful grain pattern and is used for such items as carvings, picture frames, mugs, and cabinetry framing. The boughs (with berries attached) are attractive in holiday wreaths and ornamental displays. The berries also have medicinal qualities and are used to flavor beverages.


Figure 5—Harvested diamond willows.

Figure 6— Diamond willow walking sticks.

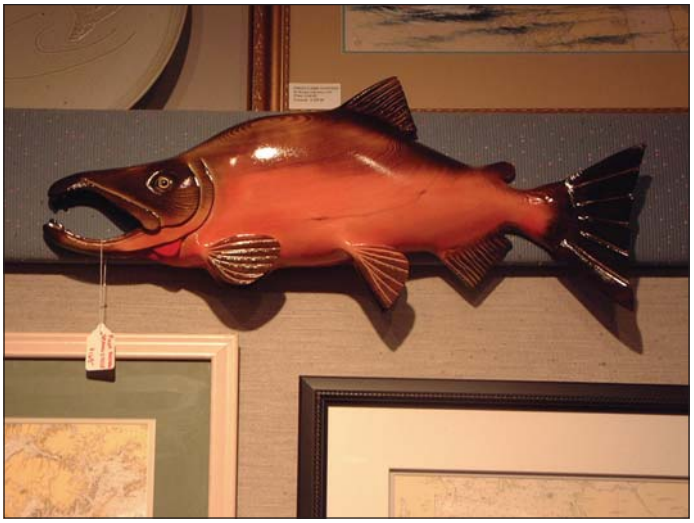

Figure 7— Carved salmon.

Western redcedar is ideal for making aromatic wreaths during the holiday season. Natives throughout the Pacific Northwest traditionally used the soft wood of western redcedar and Alaska yellow-cedar for dugout canoes. Cedar species are carved into a variety of bowls, mugs, totems, and other historical Native artifacts. The bark and roots of these species are useful in basket making (see previous section, "Subsistence and Other Personal Use," for additional information).

The paper birch (*Betula papyrifera*) and the quaking aspen (*Populus tremuloides*) are recognized as "white-bark" trees in the Pacific Northwest and Alaska. They are often made into bowls, cups, and mugs with words such as "Made in Alaska" or "Alaska" engraved (cover photo).

Other plant species, such as salal (*Gaultheria shallon*), serve in the craft or floral industry as visual fillers for wreaths, floral arrangements, and ornamental displays. Native grasses have been used in basket making for millennia, and Alaskan basket quality and designs are known throughout the world. Various mosses, lichens, and liverworts also are harvested for use in hand-crafted ornamental and floral displays.

Virtually all parts of most plants, berries, lichens, and mushrooms can be used for natural dyes, although some species, or their parts, produce richer (and often unexpected) colors than others. For instance, the Tlingits used hemlock bark for black colors and wolf moss (a lichen, *Letharia vulpine*) for yellows (Feder 1969). Alder bark and cones, willow and cottonwood leaves, birch twigs, Pacific yew (*Taxus brevifolia*) wood, salal leaves and berries, nettles (*Urtica* species), lupine (*Lupinus*), fireweed, Labrador tea (*Ledum* species), horsetail rush (*Equisetum hyemale*), western brackenfern (*Pteridium aquilinum*), and clubmoss (probably *Lycopodium* species) are all examples of native plants whose various parts can be used for dyes (Cannon and others 2003, Green and Green 1975, Krochmal and Krochmal 1974). Most plant parts produce darker shades if harvested in spring around the time they flower and when used immediately (Bliss 1981). Berry dyes, especially blueberries, are used for clothing, crafts, and other Native arts, including restoration of old Native craft goods such as baskets. Almost all lichens can be used for dyes if boiled long enough (Kramer 1972). The number of mushroom species used for dyeing are numerous and many occur in Alaska. The Institute for Culture and Ecology (http://www.ifcae.org/ntfp/) maintains an extensive list of such fungal species in the United States (that can be sorted by state). Individuals interested in using mushrooms for natural dyes are encouraged to become acquainted with the biennial International Fungi & Fiber Symposia originally organized by the author of *Mushrooms for Color* (Rice and Beebee 1980).

Production—

Quality is more important than quantity for marketing most crafts. Most such products require time, labor, skill, and dedication to produce. Shops are often home-based, and long winter months provide ample time to prepare items for sale, but raw materials and tools must be acquired before winter weather makes transportation difficult. Cash-flow must be managed on an annual basis because sales will fluctuate widely with the seasons.

Quality is more important than quantity for marketing most crafts.

Marketing—

Often the effort put into production is obvious, but tags, brochures, or salespeople can elaborate on the process that makes each item special. Some products can be mass produced, but stamping or adding some form of identification will provide a certification of uniqueness. Regardless of whether a product is formally certified and carries a guarantee of uniqueness, such as in the Made in Alaska or Silver Hand programs, customers are attuned to buying hand-made artisan products whose price reflects the labor put into their manufacture. Local shops in Alaska towns or cities provide a primary outlet, and those that cater to cruise ships are particularly lucrative owing to the high number of customers shopping for souvenirs. Advertisement and sales on the Internet can also provide access to international customers.

Unlike native species harvested elsewhere, there is, to date, little mass harvesting of Alaska native species for international commodity markets. For instance, in compiling data for a recent report on moss harvesting for international floral markets, Muir (2004a) found little evidence of commodity moss harvesting in Alaska, unlike elsewhere in the United States (Muir 2004b). This situation could change. If moss or other ornamental plant species eventually become overharvested elsewhere, harvesters and brokers could move into Alaska, and issues of sustainable harvesting might become more salient.

As long as the harvest of native species for the crafts, arts, dyes, and floral greenery trades are used for local production and value-added products, there remains little danger of local species being overharvested because most of the income is derived from labor, not raw products. If international markets for commodity products harvested from Alaska lands do eventually become a reality, all concerned parties should reevaluate how sustainable the harvest of each affected species will be.

Berries and Wild Fruits

Products—

Wild berries harvested in Alaska are important to people for personal consumption and for commercial sales. Wild berries are used to make jams, jellies, sauces, syrups, teas, and toppings. Alaska berries have a widespread reputation for their high quality and good taste. Many berries, particularly blueberries (*Vaccinium* species), are also used for dyes.

Native and subsistence use—
Alaskans have a long cultural tradition of subsistence use of wild berries. They were very important to Alaska Natives and to early settlers, and are still an important part of many people's diets (Alaska Magazine 1982, Pojar and MacKinnon 1994). Berries that continue to be important for personal use, but not so much for commercial sale, include scattered or easily crushed fruits such as nagoon berry (*Rubus arcticus*), thimbleberries (*Rubus parvifolius*), and bog cranberries (*Vaccinium microcarpus*) to name a few.

Harvested species and materials—
Several species of blueberries are harvested for processing into commercial jams, jellies, and other products, most notably the bog blueberry (*Vaccinium uliginosum*) in south-central Alaska. Other significant commercially harvested species include lowbush cranberry or lingonberry (*Vaccinium vitas-idaea*), highbush cranberry (*Viburnum edule*), salmonberry (*Rubus spectabilis*), raspberries (*Rubus idaeus*), currants and gooseberries (*Ribes* species), and watermelon berry (*Streptopus amplexiflius*). Fireweed blossoms (*Chamerion angustifolium*) are harvested and steeped to make fireweed jelly (fig. 8). Most of these species occur throughout Alaska, although each one has specific habitats it prefers and may be more common in some geographic areas than others.

Production—
Wild berry products are a significant source of income to many people, and, according to our interviews, the majority of harvesters are women. Many of the names of commercial producers of berry products in Alaska can be found on the Alaska Department of Economic Development Made in Alaska Web site, http://www.dced.state.ak.us/dca/mia/home.htm. Some producers buy berries both from British Columbia and from Alaska sources. Most commercial harvesting in Alaska is on private and state land in south-central and central Alaska. So far, access to berry producing areas is not reported to be an issue, although production varies each year and can be unpredictable.

Berries that are not processed into the final product quickly must be cleaned, packed, and frozen to retain quality. Many types of berries must be frozen within 24 hours after harvest to retain the taste and visual quality required for sale.

Figure 8—Wild berry jam.

Berry products are among the most popular items purchased by tourists visiting Alaska.

Marketing—

Berry products are among the most popular items purchased by tourists visiting Alaska. Local retail outlets with access to the onslaught of cruise ship visitors do brisk sales in the peak months. Shops have beautiful displays with syrups, jams, jellies, and tea products that are very enticing to such visitors. Berry products are examples of ideal holiday gifts because the purchaser can share the joys of their visit with others, and because they are small in size, relatively inexpensive, and appropriate for almost anyone. Many Alaska businesses are getting additional orders through their Web sites because people receiving such gifts enjoyed them so much.

Many small producers, particularly those who are exempt from Alaska Food Code regulations (Alaska Food Code 1997), sell products directly in retail outlets such as farmers markets and fairs. Other small businesses, who did their initial marketing and sales at venues such as fairs and farmers markets, have streamlined and enlarged their businesses because their products were in such demand.

Larger businesses sell at retail outlets and wholesale to other distributors. For the international market, organic certification is an important marketing tool, especially in Europe. Getting wild-harvested products certified as organic can be time-consuming and expensive, but such certification fits nicely with promotion of the product as sustainably harvested or produced by Native Americans.

Syrups, Teas, and Flavorings

Products—

Birch syrup and wild berry syrups are the two primary syrup products produced in Alaska. Sitka spruce bud tips are also used to make syrup. Spruce tips, native berries, and the leaves, flowers, and fruits of edible and medicinal plants are used extensively to make teas (fig. 9).

Figure 9—Raspberry tea.

Native and subsistence use—
Labrador tea is used as well as infusions from other plant species. Pitch was and is used for art and crafts, and may still be used medicinally.

Harvested species and materials—
Birch syrup, one of many widely recognized Alaska products, is made from sap harvested from birch trees. There are three varieties of birch used for syrup production in Alaska. Paper birch grows in interior Alaska and the Anchorage area. It is the most widely abundant birch tree in Alaska. The syrup from this tree normally has very high sugar content and produces amber-colored syrup. A variety of the paper birch, the Kenai birch (*Betula papyrifera* var. *kenaica*), is the smallest of the three varieties and grows on the Kenai Peninsula. Whereas the bark of the paper birch is usually smooth and very white, the Kenai variety bark is reddish brown and relatively dark. This birch produces very flavorful and dark syrup. The third birch, western paper birch (*Betula papyrifera* var. *commutata*), grows in southeast Alaska primarily from Juneau to Haines and Skagway. The bark is copper-colored and produces dark and intensely flavorful syrup. Syrup from this tree is ideal for making syrup and flavorings for other products.

Betulin is an active component in chaga, a medicinal fungus that is also harvested from birch trees (see following section on medicinal fungi). The compound is found in birch bark, so syrups made from birch trees might be considered "nutraceutical," a health-enhancing product derived from nature, a

possibility that the birch syrup industry could explore. Birch World is a company in Russia that specializes in harvesting this and related compounds (http://www.birchworld.ru/eng/index.html).

Although berry-producing businesses located in southern Alaska produce a variety of products such as jams and jellies, syrups seem to be a consistent staple of these facilities. The berries and plants they primarily use are the highbush cranberry, the lingonberry or lowbush cranberry, the Alaska blueberry, strawberries (*Fragaria* species), raspberries, thimbleberries, the watermelon berry, rhubarb (*Rheum* species), serviceberries (*Amelanchier* species), black currants (*Ribes laxiflorum*), and red currants (*Ribes triste*). Spruce tips also are used to flavor specialty syrups. The tender young branch tips are individually selected, are normally harvested in late spring, and have a lemony flavor.

A variety of berry species are blended with native herbs to produce exceptional teas. Blueberries, cranberries, and raspberries are used, in addition to rosehips (*Rosa* species), rose leaves, yarrow flowers (*Achillea* species), fireweed, and pineapple weed (*Matricaria discoidea*), to name a few. Tender young Sitka spruce tips are also a favorite ingredient in teas and are an excellent source of vitamin C.

Birch syrup has been commercially manufactured for many years in areas where birches are numerous.

Production—

Birch syrup has been commercially manufactured for many years in areas where birches are numerous. In Alaska, it was first attempted by early settlers and miners during sugar shortages. Although many dabbled in the process, a high percentage of those quit because it was difficult and costly. Innovations in equipment have solved many of the production problems, but equipment modifications and new sugar-making techniques are still being tested by many of the pioneers in this business.

One can derive an average of 1.5 to 2.0 gallons of sap per tree tapped during peak production periods. Approximately 100 gallons of sap are needed to make one gallon of syrup, but quantities vary by the species of birch. For instance, 80 gallons of paper birch sap are needed to produce a gallon of syrup, and 130 gallons of Kenai birch sap are needed.

The average tapping season only lasts 2 to 3 weeks and starts in early April. Topography plays an important role in selection of a harvest area. If the terrain is too steep, then transporting the sap can be difficult, but variation in terrain allows certain trees to begin running earlier than others (Humphrey and Humphrey 2003).

Tap locations on the bole, the diameter of the tree, and the depth and tapping angle are all important considerations. Debris must be removed from the bark at the tap site to prevent contamination. A 7/16-inch wood bit and a hand drill are typically used for drilling the tapping holes. A spout is then inserted into the hole with a light mallet. Spouts come in a variety of designs and materials for supporting buckets and protecting the sap from airborne contaminants.

A good delivery system is also needed for transporting sap from the tapping area back to the "syrup shack." Some harvesters carry the sap by hand in buckets. Piping systems can use gravity or pump-driven suction. Another potential approach consists of a small-diameter wood yarding system called the zig-zag yarder (Watts and Ward 1989). A cable is attached to pulleys on trees, wound through a site, and returned or routed back to the yarder engine. Hooks or hangers attached to the line could then carry sealed containers of sap. This system might be a useful process in large collection areas, but would entail relining the cable when moving to new locations.

Collected sap should be quickly processed, kept cool, and not mixed with sap that is already being concentrated. Keeping the sap clean and free of contaminants is necessary to prevent the growth of micro-organisms and thus maintain quality. Birch sap is easily scorched, so great care must be taken while cooking it. Many birch syrup makers use a specially designed stainless steel, double-boiler. This equipment comes with a low-temperature evaporator that moderates temperatures to minimize the potential for scorching the syrup. Sap should be processed in a day or two, and owing to the high volumes of evaporation, should be processed outside. For an excellent "how to" reference, see Backlund and Backlund (2004), or go to www.island.net/~maple.

Marketing—

Alaska syrups are predominantly marketed through local stores, but are also a popular souvenir that visitors to Alaska frequently take home to share with their families and friends. Internet sales might eventually capture a greater market share than local sales as people outside the state become more familiar with the product through souvenir purchases.

Edible and Medicinal Plants

Products—
A wide variety of plants are edible or have medicinal value, but most of the ones that are currently and widely harvested as NTFPs are discussed in other sections of this document. Here we provide information that will allow the reader to investigate other possible products or markets.

Native and subsistence use—
Edible and medicinal plants (fig. 10) were and are still widely used by Alaska Natives. Moerman (1998) listed both edible and medicinal plants in his comprehensive *Native American Ethnobotany*. Traditional uses for food and medicine are described in this book with extensive cross-referenced indices to plants, uses, and tribes. Smith (1973) discussed a variety of medicinal plants used by Natives in Alaska. Kari (1987) offered a guide to hundreds of plants used by the Dena'ina people of south-central Alaska. Garibaldi (1999) provided the most comprehensive source of information on medicinal plants used by Alaskan Natives. It is organized by plant species, and for each species she listed the tribes that use it, the types of use, and cited references. In each publication, the species discussed are too numerous to list here, but some are noted in table 1. Given the extensive shorelines in southern Alaska, it makes sense that Natives eat seaweed too (Turner 2003).

Devil's club is the most common and widely used medicinal plant in the herbal lore of Northwest coast Natives. The Tlingit, Haida, and others use it as a veritable medicine chest. Among the many reported uses are treatment of coughs, colds, tuberculosis, stomach ulcers, hypoglycemia, skin rashes, gynecological problems, arthritis, and rheumatism, and as an analgesic, purgative, laxative, and poultice. It is also used as a snuff and is considered to have spiritual properties such as use in charms to ward against supernatural powers (Levine 2004, Moerman 1998).

Harvested species and materials—
The list of edible and medicinal species that can be harvested from the wild in Alaska are documented in a number of excellent reference books and field guides (Biggs 1999; Brill and Dean 1994; Foster and Hobbs 2002; Heller 1993; Moore 1993; Schofield 1989, 1993; Tilford 1997, 1998). Some seaweeds and tidal zone plants also are good edibles (Chapman and Chapman 1980, Lewallen and Lewallen 1996, Madlener 1977, McConnaughey 1985).

Figure 10—Yarrow.

Collection of edible and medicinal plants and herbs is often referred to as wildcrafting.

Production—

Collection of edible and medicinal plants and herbs is often referred to as wildcrafting. Because wild harvested plants can be misidentified or handled improperly and quality is always a consideration in product value and marketability, good wildcrafting practices have repeatedly been addressed. Wild Food Adventures in Portland, Oregon, publishes a Wild Food Primer (Kallas 2004) that outlines the basic considerations of collecting wild edibles. The European Agency for the Evaluation of Medicinal Products (EMEA 2002), the European Herb Growers Association (Europam 2003), and the World Health Organization (WHO 2004) have all produced guides for good harvesting, identification, and manufacturing practices for wild-harvested plants. Closer to Alaska, Agriculture and Agri-Foods Canada convened interested parties and organizations to develop the guide *Good Practices for Plant Identification for the Herbal Industry* (Brigham and others 2004).

Marketing—

Businesses that market products made from wild edible plants typically follow the pattern of local production and sale. For instance, restaurants that cater to the tourist trade would be an excellent market for local wild edibles that

literally and figuratively give a "taste of Alaska." Medicinal plants can also be marketed in this manner. Herbal teas are an excellent example. Local community stores commonly carry a variety of herbal medicinal products, and supplying them with local bulk supplies might well be feasible.

Globally, the medicinal plant market is huge. Supplying continuous large quantities of consistently high-quality raw material from the wild, however, can be quite challenging, especially when climatic conditions dramatically limit the harvest season. Successful sales to this market would require access to large populations of the target species, sufficient labor to collect a year's supply during the harvest season, adequate facilities to process and store the materials, and a species that is unique to Alaska's climates or for which customers place high value on clean environmental sources or traditional Native manufacture. We are unaware of plants harvested in Alaska for international commodity markets, but direct Internet sales on a smaller scale are certainly feasible. For individuals who wish to pursue this product line, the Non-Timber Forest Products Medicinal Web site (http://www.sfp.forprod.vt.edu/sfp_link/medicinal.htm) and the online membership organization, Herbal-Medicine.org (http://www.herbal-medicine.org/), have many links to markets and vendors. The American Herbal Products Association also has many useful resource links on its Web site (http://www.ahpa.org/index.htm).

Native Seeds

Products—

The seeds of almost any wild plant can be collected, but the ease or difficulty of collection, cleaning, testing, storing, germinating, and propagation varies widely. Products can range from large seedlots collected on contract for revegetation projects, to smaller seedlots intended for wholesale to nurseries or seed supply companies, to small seed packets for retail sale in souvenir shops.

Native and subsistence use—

Historically, Alaska Natives likely did not conduct much commerce in seeds for propagation, but they undoubtedly spread seeds around to enhance populations of useful plants, and some of these might have been traded. Similarly, we know of no subsistence use of collections of native seeds. Although native seeds are infrequently considered a trade item in societies based on local resources, the plants from which such seeds are harvested are

widely used and highly valued by all Native peoples. As such, the same stipulations about respect for native plant resources apply as with harvesting these plants for other purposes (medicinal, edible, and decorative). Harvesting seed often entails less damage to perennial plants than harvesting its growing parts, but widespread or intense seed harvesting could impair plant reproduction. The natural abundance, reproductive biology, and traditional uses of native plants are so diverse that each species must be considered individually when determining appropriate levels and methods of seed collection from local plant populations.

Harvested species and materials—
The Northern Latitude Plant Materials Center, operated by the Alaska Department of Natural Resources, Department of Agriculture in Palmer, Alaska, is an essential first source of information when deciding which native species to harvest. Some plants that reproduce naturally in Alaska are considered noxious weeds. Not only should harvest of their seed be avoided, but legal tolerances exist for contamination of other seedlots by seed of these species. The Plant Materials Center Web site (http://www.dnr.state.ak.us/ag/NEWnative_directory.htm) also maintains an exhaustive directory (Moore and others 2004) of information about Alaska native plants. A list of species whose seed is commonly collected (section 1 of the directory) is followed by businesses that supply seed of each species (section 2) and the addresses of Growers and Suppliers in Alaska (section 3). Section 4 of this directory, "Agency Addresses and Contacts" lists individuals who are instrumental in arranging larger contractual seedlot collections for revegetation projects.

In most of southeast and south-central Alaska, natural tree regeneration is adequate to meet state and federal reforestation standards in a timely manner, so large-scale planting for reforestation is less commonly practiced than in the lower 48 states. Tree planting, and the consequent need for tree seed, is usually implemented on sites where the soil has been degraded by urban development, road construction, or mining. Large-scale tree planting has also been implemented to reforest large deforested areas where seed sources are lacking because of wildfires or spruce beetle infestations. The Alaska Division of Forestry also runs a community forestry program (http://www.dnr.state.ak.us/forestry/community/) that encourages tree planting in and around villages and cities. As with other native seeds, collection of large seedlots for growing trees should be tailored to reforestation needs identified by a coordinating agency. Such collections are typically conducted by contract.

Another resource for individuals interested in collecting seeds of native plants is a multiagency Web site called the Native Plants Network (http://www.nativeplantnetwork.org/). It has a searchable database of species and journal articles on native plants. Collectors should take care that their seed collection activities do not harm or diminish the reproductive capacity of rare or endangered plants. The Alaska Native Plant Society would be a good organization to contact if propagating rare plants from seed is of interest. The Alaska Natural Heritage Program (http://aknhp.uaa.alaska.edu/) has extensive information on native plants and publishes the *Alaska Rare Plant Field Guide* (Lipkin and Murray 1997).

Producing quality seed requires detailed understanding of the biology of each species and appropriate harvest, cleaning, and storage methods.

Production—

Regardless of the intended use or market, producing quality seed requires detailed understanding of the biology of each species and appropriate harvest, cleaning, and storage methods (fig. 11). Close attention to quality control during each step of seed processing is essential to maintaining seed viability. Propagation from seed to successful out-planting is viewed as a chain by nursery specialists. Breaking any one link in the process by lack of attention to detail and quality control will result in poor quality or loss of the plants.

Often unique equipment is needed to efficiently clean each type or size of seed, especially when cleaning large batches of seeds. Many suppliers of seed-cleaning equipment concentrate on agricultural seed, but Hoffman Manufacturing, Inc. (http://www.hoffmanmfg.com) and U.S. Global Resources (http://www.seed-processing.usgr.com/) are two suppliers in the Pacific Northwest that have a wide range of equipment in their catalogues. Prairie Habitats (http://www.prairiehabitats.com/) sells harvesting equipment specifically designed for collecting mixed native grass seeds. The Plant Materials Center is the Alaska source for seed testing (viability, cleanliness) services.

Baldwin (1997) has self-published a how-to manual, called *Growing Alaskan Natives*, for propagating Alaska native plants from seed. This handbook includes information about collection, storage, and germination treatments of various commonly harvested species. Chapter 1 of *Practical Woody Plant Propagation for Nursery Growers* (MacDonald 1986) covers general seed collection, handling, processing, storage, and germination principles. More complete information about native seeds can be found in two books that are now out of print but available in used book stores and on the Internet.

Figure 11—Pacific yew seeds.

Collecting, Processing, and Germinating Seeds of Wildland Plants (Young and Young 1986) discusses how to collect and handle a wide variety of native plant seed types. The revised edition of *Seeds of Woody Plants in North America* (Young and Young 1992) is a comprehensive resource on woody plant seeds. This manual is undergoing yet further revision by a team of USDA Forest Service researchers for eventual publication in both book and CD formats. Several sections of the revised version, entitled *Woody Plant Seed Manual*, are currently available online (http://www.ntsl.fs.fed.us/wpsm/index.html) at the Web site of the National Tree Seed Laboratory (http://www.ntsl.fs.fed.us/). Anyone considering collection of tree seeds for reforestation projects would likely benefit from consulting this manual.

Marketing—

Markets for large seedlots are largely driven by demand, such as for revegetation projects. If the seed is collected on contract, then marketing is not an issue, although meeting quality specifications will be. If your target markets are nurseries or seed supply companies, you should contact the intended purchasers first and discuss their needs and what you can offer. The Lady Bird Johnson Wildflower Center in Texas maintains a native plant information

network with extensive databases of information relating to native species, including nurseries (http://www.wildflower2.org/NPIN/Suppliers/Nursery/Nursery.html) and seed suppliers (http://www.wildflower2.org/NPIN/Suppliers/suppliers.html) that specialize in native plants.

Third-party certification of seed source and quality enhances the value of seed that is collected speculatively, in hopes of selling to seed supply companies, nurseries, or retail. Check with your intended customers first because certification can be prohibitively expensive for small seedlots. Chapter 6 of the *Woody Plants Seed Manual* (www.ntsl.fs.fed.us/wpsm/index.html) describes federal seed certification standards. Section 6 of the Plant Materials Center directory of native plants describes "Standards for Production and Certification of Seedlots" in Alaska. Alaska Seed Growers, Inc. (http://www.alaskaseedgrowers.org) is the official seed certification agency in Alaska. Although they concentrate predominantly on certifying potatoes and grain varieties bred for Alaska's climate, they would be the agency to contact if a purchaser requests certified seed. If seed is intended for export to other countries, one should be prepared for lengthy and laborious efforts to comply with the customs regulations of the intended country.

Because Alaska plants are adapted to the day-length patterns and weather conditions of high latitudes, they are, in general, relatively less suited for sale to the continental United States or other low-latitude countries than to Alaska or other high-latitude countries. Nevertheless, nurseries and individuals still might be interested in growing Alaska natives elsewhere. For instance, seed packets of Alaska plants are a wonderful way for garden-loving tourists to bring home a living memento of their visit. Explicit information about growing requirements should be provided with the product, and research into which plants are broadly adapted would help build a company's reputation as a provider of plant seeds that do well elsewhere. If the target market is seed suppliers or nurseries, expect the purchaser to be knowledgeable about the species you are selling. They may also make arrangements with you to purchase hard-to-obtain seed.

Edible Mushrooms

Products—

Although edible mushrooms have been consumed and traded by people around the world since time immemorial, only in the last several decades have they moved beyond local use and commerce into national and international

commodity markets (Pilz and Molina 2002, Schlosser and Blatner 1995). There are now local, regional, national, and international markets for both fresh and preserved edible wild mushrooms. The types of products sold, and whether they are sold fresh, dried, or canned, depends on transportation networks and the texture, moisture content, durability, rehydration characteristics, and culinary characteristics of each species.

Native and subsistence use—

Other than the few examples listed below, little evidence exists that Native Americans ate many mushrooms. Although it is possible that ethnographers simply neglected to ask about mushrooms, or tribes were reluctant to reveal all their cultural traditions and foods, many North American tribes (referred to as First Nations or Aboriginals in Canada) seem to ignore, disdain, or regard mushrooms as unimportant food (Kuhnlein and Turner 1991). Turner and others (1987, 1990) did, however, document the consumption of chanterelles (*Cantharellus* species) (fig. 12), pine mushrooms (American matsutake–*Tricholoma magnivelare*), and the cottonwood mushroom (*Tricholoma populinum*) among the Thompson Indians, a Salish-speaking tribe of interior British Columbia. Goodrich and others (1980) also reported that the Kashaya Pomo, whose homelands were in northern Sonoma County, California, baked chanterelles on hot rocks. Richards (1997) described the traditional use of American matsutake mushrooms by the Karuk tribe of northern California. Nearby tribes such as the Yurok and Hupa consumed them too. Richards (1997) also listed 10 additional examples of Native American groups consuming edible mushrooms. Edible mushrooms can also be used for medicinal purposes, for instance puffballs (*Lycoperdon* species) are edible when they are young, but the Athabascan used the spore powder of mature specimens as salve for cuts, sores, and eye irritations (Garibaldi 1999).

Regardless of whether consumption of edible mushrooms by Alaskan Natives was documented in western literature, mushroom harvesting on traditional territories can present potential opportunities or conflicts for tribes. For instance, The Nisga'a, in the Nass Valley of coastal northern British Columbia, have adopted a land use plan that regulates commercial harvesting of American matsutake in their territories (Lands Department Directorate of Lands and Resources 2002).

Unlike Native tribes, more recent Russian and European immigrants to Alaska brought with them long traditions of collecting and consuming edible mushrooms. Throughout Alaska, household economies are supplemented by

Figure 12—Pacific golden chanterelle.

Throughout Alaska, household economies are supplemented by the harvest, preservation, and consumption of edible mushrooms.

the harvest, preservation, and consumption of edible mushrooms that fruit abundantly in the local area. Through a long tradition of visiting the same mushroom patches, individuals often feel they have priority rights to harvesting in that particular location or area, and thus resent newcomers or competitors. Although this is true wherever mushrooms are harvested in the wild, Alaska's subsistence laws provide a legal context within which the promotion of commercial harvesting should be considered.

Harvested species and materials—

There are numerous mushrooms with commercial harvest potential. Tedder and others (2000) listed 19 species that they believed had commercial potential in the Queen Charlotte Islands of British Columbia, and Ehlers and others (2004) listed 5 spring-fruiting species and 24 autumn-fruiting species (some were medicinal conks) found in the Robson Valley of east-central British Columbia. More to the point, Berch and Cocksedge (2003) listed 52 species of wild fungi that buyers in British Columbia actually reported having purchased from harvesters in British Columbia. Three of these species, the false early or spring morel (*Verpa bohemica*), the snowbank

false morel (*Gyromitra gigas*), and the brain mushroom (*Gyromitra esculenta*) are potentially poisonous if eaten in quantity or prepared incorrectly. Berch and Cocksedge further reported that 14 of the species were problematic insofar as they were misidentified, several species were lumped together, or they did not grow in British Columbia and therefore were likely imported. Another six were reported as no longer being purchased. These examples illustrate the difficulty of creating comprehensive or definitive lists for a particular region.

The mushroom species that are selected for harvest also depend greatly on the forest habitat where one collects. Any one location will only have some commercial species and, among these, only a few may be abundant enough to bother harvesting for sale. Scouting and mushroom identification are essential prerequisites to deciding which mushrooms are most cost-effective, fruit reliably, and are marketable in a particular location. When deciding which mushrooms to harvest and sell, one should note that even among species that are generally considered edible, some people can have unpleasant individual or allergic reactions. Although the authors know of no documented mushroom poisonings from commercially harvested and sold mushrooms, the potential exists. For this reason, harvesters would do well to stick with species that are already widely marketed.

Molina and others (1993) and Vance and others (2001) discussed some of the more commonly harvested and relatively safe commercial species in the Pacific Northwest. Excellent guidebooks (Arora 1986, 1991; Bossenmaier 1997; Parker 1994; Schalkwijk-Barendsen 1991) exist for identifying mushrooms with commercial harvest potential in different Alaska habitats. Hosford and others (1997) and Pilz and others (2003) discussed in greater detail the harvest and management of American matsutake and chanterelle mushrooms in the Pacific Northwest. Novices at identifying mushrooms should always confirm their conclusions with an expert. Mushroom buyers might not be versed in the most recently accepted taxonomic names for the mushrooms they buy, but they are skilled at identifying the mushrooms they purchase.

Production—

Producing high-quality mushrooms for sale starts with collecting them properly. Young specimens should be left to mature and are not worth bending your back or getting on your knees to pick. Very old specimens should be left to spread their spores for future crops and are likely to decay or lose quality before you can preserve them or get them to market. Mushrooms can

be either plucked from the ground or cut off at the base, but if they are plucked, the dirty bases should either be cleaned or cut off before putting them in the collection container, or else the mushrooms will get each other dirty. One exception is the American matsutake, which must be kept whole and **not** cut or it will lose substantial commercial value. Whatever method is used, avoid disturbing the ground more than necessary as that is where the body of the fungus (mycelium) lives, and its health is vital to future crops. Covering the holes not only protects the mycelium, but also hides harvesting activities from competing harvesters. Collection containers vary from plastic buckets to wicker baskets to mesh bags, but should allow ventilation to prevent the mushrooms from becoming moldy or slimy. Holes in the bottom of the container also allow rainwater to drain, and might enhance the spread of spores as you walk around. Stiff containers prevent physical damage to the mushrooms.

Fleshy mushrooms are all perishable, some more than others. For instance, the shaggy mane or lawyer's wig (*Coprinus comatus*) has a high moisture content and delicate flesh that naturally deliquesces (turns into a black ink-like liquid) within a day or two. This natural degradation makes it difficult to dry, but it is preserved well by canning. On the other end of the spectrum, the American matsutake has firm fibrous flesh and a relatively low moisture content, so that it can be maintained fresh in a cool environment for a week or more. Other species fall between these extremes, and harvesters must become familiar with the characters of each.

Mushrooms also vary in how well they rehydrate for culinary purposes after being dried. For instance, drying morels (*Morchella* species) seems to concentrate their flavor, and they rehydrate quickly and easily for kitchen use. Chanterelles, on the other hand, tend to be rubbery and bitter when rehydrated, hence they are typically canned for sale on international markets when they cannot be sold fresh. Most boletes (*Boletus*, *Suillus*, and *Leccinum* species) also dry and rehydrate nicely, so are easy to preserve for later sale. Matsutake mushrooms dry and rehydrate well, but Japanese consumers insist on fresh specimens. To dry mushrooms properly, constantly-flowing warm dry air is necessary. Electric driers for household food preservation (with airflow and temperature controls) are widely available and work very well. Stoves or solar radiation also work if there is airflow and the temperature does not exceed 145 ºF. Morels dry so easily that spreading them on screens during

warm sunny days can work adequately if electricity or stoves are not available, say at remote harvest locations. Some mushrooms, such as puffballs (a variety of genera and species) or slippery jacks (*Suillus luteus*) dry easily but have rubbery or slimy textures when rehydrated. If these mushrooms are thoroughly dried and then powdered in a blender, the unpleasant texture is circumvented, and they make an excellent flavor and thickening addition to soup bases.

An ideal way to preserve most fleshy mushrooms (other than matsutake, which is best cooked with water or steam) is to sauté them in butter or oil, and then freeze them. This method preserves both flavor and texture, but complicates marketing them as a commercial product. If agreed upon in advance, restaurants could easily use mushrooms preserved this way.

Most mushroom books discuss the preservation and culinary use of edible species, but when in doubt about how well preservation methods will work with a particular species, experiment yourself. Fischer and Bessette (1992) wrote a comprehensive *Field-to-Kitchen Guide* for edible wild mushrooms of North America.

Marketing—

To date, the authors are not aware of any consistent edible mushroom "hot spots" in southeast or south-central Alaska where large numbers of commercial harvesters converge to pick and export fresh mushrooms internationally. Commodity harvesting of large quantities of fresh mushrooms for international markets has not developed in Alaska because many harvest locations are remote, mushrooms have relatively low value per fresh weight, and wage expectations are high. Nor are such markets likely to develop in the near future owing to formidable competition from Asia, Russia, and Eastern Europe where mushroom crops are abundant, transportation networks are relatively well-developed, and wage expectations are lower. However, large fires in Alaska can provide opportunities for morel harvests, as described by Wurtz and others (2005).

Commodity harvesting of large quantities of fresh mushrooms for international markets has not developed in Alaska.

Local and regional marketing options include local markets and grocery stores, restaurants (especially ones targeting the tourist trade), and value-added dried mushroom products. One caution about dried mushrooms: discerning customers can tell if low-quality mushrooms are included in dried batches by the range of shades from light (originally fresh mushrooms that were properly dried) to dark (old, partially decayed, or improperly dried specimens). Dried

mushrooms that are sold with powdered soup or sauce mixes are popular for creating quick and tasty meals. Most commercially available sauce mixes have a very high salt content, and customers might preferentially purchase lower sodium mixes if this can be arranged and is advertised on the label. Batches of mixed species of dried mushrooms are unlikely to sell as well as single species because consumers might be leery of trying so many types together, or they may feel they are buying lumped left-overs. The value of dried mushroom packets is always enhanced by labels that are artistic, colorful, humorous, and informative about the mushroom, its collection location, its quality, its tradition, and its preparation and use. Such value-added preserved mushroom products keep well, are light-weight, and can be easily marketed to tourists, retailers, or through the Internet.

Medicinal Fungi

Products—

Other than consumption as food, forest fungi are also used medicinally. Medicinal fungi found in Alaska are mostly perennial conks of wood-decay fungi that typically fruit on infected mature trees.

Native and subsistence use—

Although published documentation of the consumption of edible fungi by native peoples of the Pacific Northwest remains sparse, some woody conks have reportedly been used for medicinal and spiritual purposes. The most complete, informative, and current summary of the use of medicinal woody fungi by Native Americans and other aboriginal peoples around the Northern hemisphere is the treatise published by Paul Stamets (Stamets and Yao 2002). Stamets (2002) explored the role of "Fungus-man" in the Haida story of Raven and the origin of women, and identified *Fomitopsis officinalis* (quinine conk) as the likely fungus species. His discussion is based on argillite plate artwork by the famous Haida artist Charles Edenshaw (McLennan and Duffek 2000). These same conks were carved and placed on the graves of shamans (Blanchette and others 1992).

Similarly, *Fomes fomentarius*, the tinder conk, was not only used for fire-starting owing to its punky, well-aerated properties, but was used to treat arthritis by the Okanagan-Colville Indians of British Columbia and Washington (Turner and others 1980). Although less well documented in western literature, woody sporocarps of other wood decay fungi might also be valued

for medicinal or spiritual purposes by Native Americans because such use is common among aboriginal societies throughout the Northern Hemisphere and stretches back in time prior to written history (Stamets and Yao 2002). For instance, a strong tea of the "chew ash fungus" (*Phellinus* [*Fomes*] *igniarius*) was used by the Yupik for constipation and stomach troubles (Garibaldi 1999), and, although birch fungus (*Phellinus tremulae*) that grows on trembling aspen is not reported to have medicinal value, its ashes are mixed with tobacco or snuff (Schroeder 2002).

Although the original inhabitants of our continent should not be expected to divulge sensitive information regarding the use of native flora and mycota in their spiritual traditions, when evidence exists of this link, it is incumbent upon government agencies that wish to promote harvest of these products to consult thoroughly with Native Americans about such plans. At the very least, tribes can define areas that should not be harvested for certain species, and this information should be kept confidential.

Another issue that government agencies need to address with regard to using this resource is the likelihood that maintaining endemic populations of these fungi in various places will allow for more genetic diversity required to isolate strains with superior medicinal properties for subsequent propagation. Proper compensation to native peoples for bioprospecting on their traditional lands is a very salient issue, as major pharmaceutical companies may some day wish to produce compounds derived from cultivating these species.

Harvested species and materials—
In southeast and south-central Alaska, at least 12 species of wood decay fungi have varied potential for commercial harvesting as medicinal fungi. We discuss another one, *Schizophyllum commune* (split gill polypore), as a caution. Benjamin (1995), Hobbs (1995), and Stamets and Yao (2002) thoroughly documented the medicinal value and uses of these fungi. Tedder and others (2000) listed some 1999 prices for five medicinal (nutraceutical) fungi that they obtained from a Web site that is no longer online. Most of the fungi we discuss occur on one or several specific host tree species. Their collection is therefore limited to areas where these trees grow. In the USDA Handbook *Insects and Diseases of Alaskan Forests*, Holsten and others (2001) described the host trees and range of these fungal species, along with color photographs and guides to identification. Range maps of the host trees are illustrated by Viereck and Little (1972) and Fowells (1965). Arora (1986)

provided detailed descriptions of the fungi. Stamets (2000) discussed artificial propagation of wood decay fungi and means to inoculate trees. A brief description of each species follows.

Fomes fomentarius—The "tinder conk" has one of the most ancient documented histories of use, both for starting fires, and as a valued medicinal. It is one of the fungi found in the pouch of the 5,300 year-old "Ice Man" of the Italian/Swiss Alps. It grows on birch and fir (*Abies* species) trees throughout the Northern Hemisphere.

Fomitopsis officinalis—This conk is commonly called the "quinine conk" because it is bitter, not because it contains quinine. In addition to its spiritual use among north Pacific coast tribes, it has antimicrobial and anti-inflammatory properties. It is now uncommon in Europe and Asia because it predominantly inhabits old forests. It grows on larch (*Larix* species), Sitka spruce, shore pine (*Pinus contorta* v. *contorta*), Douglas-fir (*Pseudotsuga menziesii*) and hemlock (*Tsuga* species).

The National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health and the U.S. Army Medical Research Institute of Infectious Diseases, in their joint biodefense antiviral screening program, have found that extracts of *Fomitopsis officinalis* (cultivated under specific proprietary conditions) are highly effective (in preliminary nonanimal trials) against various strains of pox viruses, including smallpox (Stern 2005). If these results are confirmed, such a product might be the first effective oral treatment for smallpox infections. Significantly, the conks contain very small quantities, if any, of the active ingredients, so harvesting them for medicinal use would likely be ineffective. On the other hand, the genetically diverse populations of this fungus that are found in southeast Alaska old-growth temperate rain forests could represent an important source of superior strains for cultivation, thus raising bioprospecting issues.

Ganoderma applanatum—The "artist conk" is commonly used as a medium for sketched artwork because the soft white underside of the conk (the spore-bearing layer called the hymenium) permanently stains dark when scratched. The conk is frequently used to inscribe nature scenes from the local area, and examples can be found in local markets wherever this fungus fruits. As this conk is harvested for its medicinal properties also, and because it is slow-growing and fruits on old decaying trees, demand might eventually exceed

supply, making this species a prime candidate for artificial inoculation in conveniently located forests that are not slated for timber harvest. It grows on both conifers and hardwoods.

G. oregonense* and *G. tsugae—The "varnished conks" are two closely related species that are also closely related to the prized medicinal fungus of Asia, *Ganoderma lucidum*, or "Reishi." Along with the larger *G. applanatum*, they are currently being evaluated for comparable medicinal use. In growth form, *G. tsugae* more closely resembles *G. lucidum*, but *G. oregonense* is bigger. Although the varnished conks are not common, their potential for artificial inoculation is especially pertinent in southeastern Alaska because they are able to grow on conifers, including hemlock.

Hericium abietis—The "conifer coral fungus" not only has medicinal properties, but is a delicious and safe edible mushroom. It must be collected, handled, and preserved like other fleshy mushrooms because it is not a woody conk, although it is often found growing on the boles of snags. Although it is not common and is difficult to artificially propagate in growth chambers, it is one of the few edible mushrooms that decay conifers. It therefore has potential in southeast Alaska for inoculating hemlock stands where it would be convenient to collect.

Inonotus obliquus—"Chaga" (fig. 13) is produced by this wood decay fungus that grows on paper birch in Alaska, and other birch species throughout the boreal forests of the Northern Hemisphere. It produces a dense growth of fungal tissue that breaks through the defenses of the host tree each year. This fungal growth is technically called a "sclerotium" because it has none of the features of a reproductive fruiting body, but it is commonly referred to as a "sterile conk" in the literature. It has long been harvested for its medicinal properties, especially in the taiga of Russia. Significant export markets are currently developing in Asia for medicinal teas made from ground chaga. Unlike other medicinal wood decay fungi, where the fruiting body is harvested in cultivation, the development of chaga requires live birch trees. The mycelium of the cultivated fungus may lack pharmaceutical compounds that are derived from birch bark and that get incorporated into the chaga as it grows. Pilz (2004) authored a report on chaga harvesting in the Russian Far East that is available on the Web site of the FOREST Project sponsored by U.S.-Agency for International Development and Winrock International.

Figure 13—Chaga fungus.

Phellinus igniarius* and *P. tremulae—The "false tinder polypore" and the "tinder conk" are bole-rotting fungi. *Phellinus igniarius* grows on a variety of hardwood species, but *P. tremulae* is found exclusively on quaking aspen. To date, *P. igniarius* is the only medicinal fungus that we know has been marketed from Alaska to Asia.

Piptoporus betulinus—The birch polypore was another of the fungi found in the Ice Man's pouch and has been used for its antibacterial properties since prehistory throughout the Northern Hemisphere where it grows on birch.

Pleurotus ostreatus—The "oyster mushroom," like *Hericium abietis*, is a premier edible mushroom with medicinal properties. It grows on alder, aspen, cottonwood, and birch, often fruiting in large flushes for some years after the tree has died. As with *Hericium* and all flesh fungi, it is perishable and must either be sold quickly or preserved soon after harvest (commonly by drying).

Schizophyllum commune—The "split-gilled polypore" is one of the most common and widely distributed mushrooms in the world. It grows on the stems, branches, stumps, and logs of hardwood species. It is mentioned here, not because of its potential value as an NTFP, but by way of caution. In its heat-sterilized form it has documented medicinal properties, but harvesting

and marketing wild material could be hazardous. It has been shown capable of producing lung and brain infections (mycoses) when large concentrations of spores or fragments of the fungus are inhaled (Stamets and Yao 2002).

Trametes versicolor—The "turkey tail" is a common, globally-distributed fungus with potent anticancer properties. It grows in dense overlapping clusters on the stems and branches of many hardwood species. Cultivated to extract pharmacologically active compounds, wild strains exhibit aggressive growth in artificial culture, hence this species might be a target for bioprospecting.

Harvest Timing and Cultivation—
Among these fungi, the woody conks can be harvested any time of the year because they are slow growing and persist for many years. The edible wood-decay fungi with medicinal value (*Hericium* and *Pleurotus*) fruit predominantly during the warmer months of spring and summer. They must not only be harvested in season, but preferably when they are fresh and at their peak of development.

Sustainable harvest levels have not been analyzed for any of these fungi, but their abundance and resistance to harvest pressures are related to the prevalence of their habitat, namely, the host tree species. In areas managed for timber production, ensuring the persistence of bole-rot fungi such as *Fomes*, *Ganoderma*, *Hericium*, *Phellinus,* and *Pleurotus* depends on long rotations and leaving coarse woody debris and snags during timber harvest. In south-central Alaska, some birch or aspen forests might also be slated for timber harvest. The fungi that grow on these trees (*Fomes fomentarius*, *Inonotus obliquus*, *Phellinus tremulae*, and *Piptoporus betulinus*) likewise require mature trees to decay.

The remote nature of Alaska suggests that viable populations of fungi are unlikely to be impaired by human harvesting.

The remote nature of much habitat in Alaska suggests that viable populations of these fungi are unlikely to be impaired by human harvesting of their fruiting bodies. Many of these conks and mushrooms fruit sparsely across the landscape, so harvesting large quantities of naturally breeding populations often entails walking long distances. The development of mass marketing or commodity production of these fungi would require a much more accessible and reliable supply than could be readily obtained from wild populations. In the case of wood decay fungi, the opportunity exists to increase the abundance of these fungi through inoculation of trees. Most wood decay fungi can

be readily cultivated and harvested artificially in growth chambers (Stamets 2000), but some customers value the (semi-) natural production of conks grown on trees in the forest. Such agroforestry production of medicinal conks could also fit into forest management plans very nicely if inoculation methods (Stamets 2000) focused on suppressed trees or occurred in areas where timber harvesting is not planned. Although many of these wood decay species are considered forest "pathogens" by foresters (insofar as they reduce the value of timber), the abundance of fungal spores is likely not a factor in infection rates because their spores are ubiquitous anyway. Tree health, and wounds that allow infection to occur, are the more probable drivers of infection rates. Therefore, the greater number of spores originating in areas that are inoculated are unlikely to result in higher infection rates in adjacent forests. Hence artificial inoculation of trees in stands that are readily accessible offers the best opportunity for developing these NTFPs. The long timeframe between inoculation and harvest and the relatively low value of the product imply that for inoculation efforts to be worthwhile, the individuals, groups, tribes, or landowners doing such inoculation would need to have a long-term commitment to managing a particular site and exclusive access to harvesting.

Production—

Woody conks can be harvested any time of year, dried, and stored for long periods. As with any product, fresh, high-quality material fetches a premium. Conks that are insect ridden or colonized by other fungi are not worth harvesting and should be left for spore dispersal. Similarly, very young conks should be left for later harvest because they will grow for several more years, increasing in weight and value and distributing spores. Even though woody conks can be dried and stored, all natural products lose potency over time when exposed to air, moisture, and warm temperatures; hence, it is advisable to store such products in dry cool conditions and sell them as soon as possible. As an example, chaga that is harvested in the Russian Far East is often dried to a precise moisture content and then vacuum packed if it cannot be sold soon after harvesting. To our knowledge, such procedures have not been developed for other woody medicinal fungi harvested from natural areas, but the same principles likely apply. Buyers often want to see the original product intact to ensure the correct species is being sold and the original product was in good condition.

Marketing—

In spite of the aforementioned obstacles to large-scale product development, international demand for medicinal fungi is large and growing. This is especially true in Asia where long traditions of using natural products now coincides with rapidly-expanding disposable incomes and degraded local habitats. Cultivated products are currently filling a very large fraction of this market, but wild-harvested products might also find a substantial market niche, especially where artificial cultivation might not yield a comparable product (chaga) or where buyers wish to promote wild-harvested products in contrast to cultivated sources or pharmaceutical extracts. As with any such venture, promotion based on quality, naturalness, certifiably sustainable harvest, or Native traditions could have a significant marketing advantage.

International demand for medicinal fungi is large and growing.

Although Asian countries are currently the largest and most promising market for such natural medicinal fungus products, wealthy consumers in Europe and North America constitute promising markets as well. Competition for marketing the species that grow on birch throughout the Northern Hemisphere might be challenging as the sources of raw material are abundant and expected wages are often lower elsewhere. The species of fungi that grow on the boles of old trees in the temperate rain forest of southeast Alaska, however, likely will find no better remaining habitat in the world for their harvest in the wild or seminatural (inoculation) cultivation.

Laboratory research on the medicinal properties of fungi and pharmacological compounds derived from such fungi is a rapidly advancing area of science. Much of the research entails how the human immune system can be enhanced with foods considered “nutraceuticals” (Benjamin 1995; Hobbs 1995; Stamets 2000, 2002). Wood decay fungi produce unique compounds that have very promising modes of activity for human health.

Closing Remarks

The authors have found working on this project to be very rewarding. We have especially enjoyed the opportunity to meet and talk with so many successful entrepreneurs actively participating in NTFP businesses throughout Alaska. Alaska is full of independent, free-thinking, and creative people; all of us have been extremely impressed by the innovation, business savvy, and creativity shown by our contacts.

Although much of this publication addresses economic opportunity, other equally important issues are business stability, success, and longevity. Businesses cannot persist unless the resources they are based on are harvested in a

sustainable manner with techniques that ensure that the organisms being harvested are able to reproduce and persist. Because so much of Alaska's forest is publicly owned, harvesters, tribes, and NTFP businesses should be actively involved in crafting management agency guidelines and regulations that ensure equitable and sustainable harvesting opportunities for all. Collaborative methods such as public involvement processes, conferences, stakeholder meetings, community coordination, consultation with tribes, and marketing associations are all effective means to seek this common goal without having to resort to enforcement or unpopular regulations.

Alaska is a land of abundant resources. From its wealth of ocean species to land resources, Alaska is truly a land of opportunity and will remain so for a long time to come. We honor the many citizens who enrich the culture and economic well-being of Alaska with their creative endeavors and respect for nature.

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Metric Equivalents

When you know:	Multiply by:	To find:
Inches	2.54	Centimeters
Miles	1.609	Kilometers
Square miles	2.59	Square kilometers
Acres	.405	Hectares
Tons	907	Kilograms
Gallons	3.78	Liters
Degrees Fahrenheit	.556 (F-32)	Degrees Celsius

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Appendix 1: Scientific[a] and Common[b] Names of Species

Scientific name	Common name
Trees[c]	
Abies P. Mill.	(true) fir
Abies lasiocarpa (Hook.) Nutt.	subalpine fir
Alnus P. Mill.	alder
Alnus rubra Bong.	red alder
Betula L.	birch
Betula papyrifera Marsh.	paper birch
Betula papyrifera var. *commutata* (Regel) Fern.	western paper birch
Betula papyrifera var. *kenaica* (W.H. Evans) A. Henry	Kenai birch
Chamaecyparis nootkatensis (D. Don) Spach	Alaska yellow-cedar
Juniperus communis L.	common juniper
Larix P. Mill.	larch
Picea glauca (Moench) Voss	white spruce
Picea mariana (P. Mill.) B.S.P.	black spruce
Picea sitchensis (Bong.) Carr.	Sitka spruce
Pinus contorta Dougl. ex Loud. var. *contorta*	shore pine
Populus L.	cottonwood and aspen
Populus balsamifera L. ssp. *trichocarpa* (Torr. & Gray ex Hook.) Brayshaw	black cottonwood
Populus tremuloides Michx.	quaking aspen
Pseudotsuga menziesii (Mirbel) Franco	Douglas-fir
Salix L.	willow
Salix alaxensis (Anderss.) Coville	big willow, feltleaf willow
Salix bebbiana Sarg.	Bebb willow, diamond willow
Salix pulchra Cham.	sura willow, tealeaf willow
Sorbus sitchensis M. Roemer var. *sitchensis*	Sitka mountain ash
Taxus brevifolia Nutt.	Pacific yew
Thuja plicata Donn ex D. Don	western redcedar
Tsuga Carr.	hemlock
Tsuga heterophylla (Raf.) Sarg.	western hemlock
Tsuga mertensiana (Bong.) Carr.	mountain hemlock
Shrubby, climbing, or prostrate woody plants	
Andromeda polifolia L.	bog rosemary
Arctostaphylos alpina (L.) Spreng.	alpine bearberry

Scientific name	Common name
Arctostaphylos rubra (Rehd. & Wilson) Fern.	red fruit bearberry
Arctostaphylos uva-ursi (L.) Spreng.	kinnickinnick, bearberry
Empetrum nigrum L.	mossberry, black crowberry
Gaultheria shallon Pursh	salal, laughing berry
Kalmia polifolia Wangenh.	bog laurel
Lonicera involucrata Banks ex Spreng.	bearberry or twinberry honeysuckle
Oplopanax horridus Miq.	devil's club
Ribes L.	gooseberry, currant
Ribes bracteosum Dougl. ex Hook.	blue currant, stink currant
Ribes divaricatum Dougl.	spreading gooseberry, wild gooseberry
Ribes laxiflorum Pursh	trailing black currant
Ribes triste Pallas	northern currant, red swamp currant
Rosa L.	rose (hips)
Rosa acicularis Lindl.	prickly rose
Rubus articus L.	nagoonberry, arctic blackberry
Rubus chamaemorus L.	cloudberry
Rubus idaeus L.	American red raspberry
Rubus parviflorus Nutt.	thimbleberry
Rubus spectabilis Pursh	salmonberry
Sambucus L.	elderberry
Sambucus racemosa L. var. *racemosa* = *Sambucus callicarpa* Greene	red elderberry, red elder
Symphoricarpos albus (L.) Blake	(common) snowberry
Vaccinium L.	blueberry
Vaccinium caespitosum Michx.	dwarf bilberry
Vaccinium ovalifolium Sm. = *Vaccinium alaskensis* T.J. Howell	oval-leaf blueberry
Vaccinium ovalifolium Sm.	early or oval-leaf blueberry
Vaccinium oxycoccos L. (= *Oxycoccus oxycoccos*)	bog cranberry, small cranberry
Vaccinium parvifolium Sm.	red huckleberry
Vaccinium uliginosum L.	bog blueberry
Vaccinium vitis-idaea L.	lowbush cranberry, lingonberry
Viburnum edule (Michx.) Raf.	highbush cranberry, squashberry
Nonwoody vascular plants	
Achillea millefolium L.	common yarrow
Actaea rubra (Ait.) Willd.	(red) baneberry
Aconitum delphiniifolium DC.	mountain monkshood, larkspurleaf monkshood
Adiantum pedatum L.	maidenhair fern
Allium schoenoprasum L.	wild chive
Amelanchier Medik.	Saskatoon serviceberry
Anemone L.	anemone

Scientific name	Common name
Angelica lucida L.	sea-watch, wild celery, seacoast angelica
Aquilegia formosa Fisch. ex DC	western columbine
Arabis hirsuta (L.) Scop.	hairy rockcress
Arabis lyrata L.	lyrate rockcress
Arabis holboellii Hornem.	Holboell's rockcress
Argentina anserina (L.) Rydb.	silverweed, silverweed cinquefoil
Argentina egedii (Wormsk.) Rydb. ssp. *egedii* = *Potentilla pacifica* T.J. Howell	wild sweet potato, Pacific silverweed
Aruncus dioicus (Walt.) Fern.	goatsbeard, bride's feathers
Asplenium trichomanes L.	green or maidenhair spleenwort
Athyrium filix-femina (L.) Roth	ladyfern, common ladyfern
Caltha palustris L.	yellow marsh marigold, cowslip
Carex L.	sedges
Carex aquatilis Wahlenb.	water sedge
Chamerion angustifolium (L.) Holub ssp. *angustifolium* = *Epilobium angustifolium* L.	fireweed
Chamerion latifolium (L.) Holub = *Epilobium latifolium* L.	dwarf fireweed
Chenopodium album L.	lambsquarters
Chenopodium capitatum (L.) Ambrosi	strawberry spinach, blite goosefoot, strawberry blight
Comarum palustre L.	marsh cinquefoil or purple marshlocks
Cornus canadensis L.	bunchberry
Cornus suecica L.	bunchberry, Lapland cornel
Dryopteris expansa (K. Presl) Fraser-Jenkins & Jermy = *Dryopteris dilatata* auct. non (Hoffmann) Gray	spreading woodfern
Empetrum nigrum L.	black crowberry, mountain blueberry
Equisetum arvense L.	mouse food, field horsetail
Equisetum hyemale L.	horsetail rush, scouring rush
Equisetum sylvaticum L.	mouse food, woodland horsetail
Eriophorum angustifolium Honckeny	mouse food, tall cottongrass
Fragaria L.	strawberry
Fragaria chiloensis (L.) P. Mill.	beach strawberry
Fritillaria camschatcensis (L.) Ker-Gawl.	Indian rice, chocolate lily, northern rice root, black lily
Gentiana platypetala Griseb.	broadpetal gentian
Geum macrophyllum Willd.	large leaved or largeleaf avens
Hedysarum alpinum L.	Eskimo potato, alpine sweetvetch, American sweetvetch
Heracleum lanatum Bartr.	common cowparsnip
Hippuris vulgaris L.	goose grass, common mare's-tail

Scientific name	Common name
Iris setosa Pallas ex Link	beachhead iris (blue flag iris)
Juncus L.	rush
Lathyrus palustris L.	purple vetch, marsh pea
Ledum groenlandicum Oeder	Labrador tea, bog Labrador tea
Ledum palustre L.	marsh Labrador tea, Hudson's Bay tea
Ligusticum scoticum L.	wild parsley, Scottish licorice-root, beach lovage
Lupinus L.	lupines
Lupinus nootkatensis Donn ex Sims	Nootka lupine
Lysichiton americanus Hultén & St. John	American skunkcabbage
Maianthemum dilatatum (Wood) A. Nels. & J.F. Macbr.	deer cabbage, false lily-of-the-valley
Matricaria discoidea DC.	pineapple weed
Nuphar lutea (L.) Sm.	yellow pond-lily
Oxyria digyna (L.) Hill	sourgrass, alpine mountain sorrel
Oxytropis maydelliana Trautv.	yellow oxytrope, Maydell's oxytrope
Pedicularis kanei Dur. = *Pedicularis lanata* Cham. & Schlecht.	wooly lousewort
Petasites frigidus (L.) Fries	arctic sweet coltsfoot
Plantago maritima L.	goose tongue
Platanthera dilatata (Pursh) Lindl. ex Beck	white bog orchid, scentbottle
Polygonum sachalinense F. Schmidt ex. Maxim	Alaska wild rhubarb, giant knotweed
Polystichum Roth	hollyfern
Potentilla L.	cinquefoil
Potentilla elegans Cham. & Schlecht.	silverweed
Potentilla villosa Pallas ex Pursh	villous cinquefoil
Pteridium aquilinum (L.) Kuhn	western brackenfern
Pulsatilla patens (L.) P. Mill. ssp. *multifida* (Pritz.) Zamels = *Anemone patens* L.	cutleaf anemone
Pyrola asarifolia Michx. ssp. *bracteata* (Hook.) Haber	pink wintergreen
Ranunculus repens L.	creeping buttercup
Ranunculus pallasii Schlecht.	Pallas' buttercup
Rheum L.	rhubarb
Rhodiola rosea L. = *Sedum roseum* (L.) Scop.	roseroot stonecrop
Rumex arcticus Trautv.	sourdock, arctic dock
Juncus L.	rushes
Salicornia virginica L.	sea asparagus, American glasswort, Virginia glasswort
Sanguisorba canadensis L.	Sitka or Canadian burnet

Scientific name	Common name
Saxifraga nelsoniana D. Don ssp. *nelsoniana* = *Saxifraga punctata* L. p.p.	brook saxifrage, heartleaf saxifrage
Shepherdia canadensis (L.) Nutt.	soapberry, buffaloberry, russet buffaloberry
Streptopus amplexifolius (L.) DC.	clasping twistedstalk, watermelon berry, claspleaf twistedstalk
Tripleurospermum Schultz-Bip.	scentless chamomile, mayweed
Urtica L.	(stinging) nettle
Urtica dioica L. ssp. *gracilis* (Ait.) Seland. = *Urtica lyalli* S. Wats.	nettle, California nettle
Valeriana sitchensis Bong.	Sitka valerian
Mosses and liverworts	
Sphagnum L.	sphagnum moss
Huperzia Bernh.	clubmoss
Lycopodium alpinum L.	alpine clubmoss
Lycopodium annotinum L.	stiff clubmoss
Lycopodium clavatum L.	running clubmoss
Lycopodium dendroideum Michx.	tree groundpine or groundpine clubmoss
Lichens[d]	
Letharia vulpina (L.) Hue	wolf moss, wolf lichen
Lobaria oregana (Tuck.) Mull. Arg.	lettuce lung or Oregon lung lichen
Lobaria pulmonaria (L.) Hoffm.	lungwort or lung lichen
Fungi[e]	
Boletus Fr.	bolete
Boletus edulis Bull.	king bolete
Cantharellus Fr.	chanterelles
Cantharellus formosus Corner	Pacific golden chanterelle
Coprinus comatus (Müll) Gray	shaggy mane, lawyer's wig
Fomes fomentarius L.:Fr	tinder conk, hoof fungus, hoof conk, Ice Man polypore
Fomitopsis officinalis (Villars) Bondartsev & Singer	quinine conk, larch bracket mushroom, brown trunk rot
Ganoderma applanatum (Pers. ex Wallr.) Pat.	artist conk, artist fungus, shelf fungus, tree tongue, white mottled rot mushroom
Ganoderma lucidum (Wm. Curtis: Fries) Karsten	Reishi, Ling Zhi or Ling Chi, varnished conk
Ganoderma oregonense (Pers.) Pat.	varnished conk
Ganoderma tsugae Murr.	lacquer conk, varnish conk
Gyromitra gigas (Krombh.) Cooke	snowbank false morel
Gyromitra esculenta (Pers.) Fr.	brain mushroom
Hericium abietis (Weir:Hubert) K. Harrison	conifer coral fungus

Scientific name	Common name
Hydnum L.	hedgehogs
Inonotus obliquus (Pers.:Fr.) Pilat	chaga, clinker polypore, birch cinder conk
Leccinum Gray	bolete
Lycoperdon Pers.	puffballs
Morchella Dill. ex Pers.	(true) morels
Phellinus igniarius (L.:Fr.) Quel.	false tinder polypore (conk), hardwood trunk rot, chew ash fungus
Phellinus tremulae (Bond.) Bond. & Boriss.	tinder conk, aspen trunk rot, birch fungus
Piptoporus betulinus (Bull.:Fr.) Karst	birch polypore
Pleurotus ostreatus (Jacq.:Fr.) Kumm.	oyster mushroom
Schizophyllum commune Fr.	split gill polypore
Suillus Gray	jacks (related to boletes)
Suillus luteus (L.) Gray	slippery jack
Trametes versicolor (L:Fr.) Pilat	turkey tail
Tricholoma populinum J.E. Lange	cottonwood mushroom
Tricholoma magnivelare (Peck) Redhead	pine mushroom, American matsutake
Verpa bohemica (Krombh.) J. Schröt.	false early or spring morel

[a] Organisms are organized alphabetically by scientific name because many species have more than one common name.

[b] Common names are from sources noted in the text and from the databases and reference materials noted in the other footnotes to this appendix.

[c] Our source for scientific names and naming authorities for trees, shrubs, nonwoody vascular plants, mosses, liverworts, and lichens is the U.S. Department of Agriculture, Natural Resources Conservation Service, National Plant Data Center, Plants Database available for online searches at: http://plants.usda.gov/cgi_bin/.

[d] An additional source for lichen scientific names, authorities, and standardized common names is Brodo and others (2001).

[e] Our source for scientific names and naming authorities for fungal species is the IndexFungorum Database maintained by CABI Bioscience and The Centraalbureau voor Schimmelcultures, an institute of the Royal Netherlands Academy of Arts and Sciences. The database is available online at: http://www.indexfungorum.org/Names/NAMES.ASP. Our source for the authorities for genus names of fungi is Kirk and others (2001).

Appendix 2: Contact Information

Agencies, organizations, and businesses are listed alphabetically by the title used in our discussions. Some contact information is duplicated so that divisions and programs can be found easily. Mention of businesses does not imply endorsement of their services or products, but only their use as representative examples for the topics we discuss. This list is not meant to be a comprehensive list of every possible contact, but instead serves as a starting point.

Ahtna, Inc.
P.O. Box 649
Glenallen, AK 99588
www.ahtna-inc.com/

Alaska Association of Conservation Districts
1700 E Bogard Rd., Suite 203
Wasilla, AK 99654-6563
Phone: 907.373.7923
Fax: 907.373.7192
aacd@mtaonline.net
http://www.alaskaswcds.org/

Alaska Department of Commerce, Community, and Economic Development
Edgar Blatchford, Commissioner
P.O. Box 110800
Juneau, AK 99811-0800
Phone: 907.465.2500
questions@commerce.state.ak.us
http://www.commerce.state.ak.us/home.htm

Alaska Herb Tea Co., Inc.
6710 Weimer Dr.
Anchorage, AK 99502
Phone: 800.654.2764
Phone: 907.245.3499
Fax: 907.245.3499
herbtea@alaska.net
http://www.alaskaherbtea.com/

Alaska Native Plant Society
P.O. Box 141613
Anchorage, AK 99514-1613
http://www.alaskakrafts.com/pages/anps.htm

Alaska Natural Heritage Program
Environment and Natural Resources Institute
University of Alaska Anchorage
707 A Street
Anchorage, AK 99501
Phone: 907.257.2780
Fax: 907.257.2789
aknhp.uaa.alaska.edu/

Alaska Product Preference Program - Made in Alaska Program
Alaska Department of Commerce, Community, and Economic Development
Division of Community Advocacy
550 W 7th Avenue, Suite 1770
Anchorage, AK 99501-3510
Ruth St. Amour
Phone: 907.269.4527
Fax: 907.269.4539
ruth_st.amour@commerce.state.ak.us
http://www.commerce.state.ak.us/dca/prodpref/prodpref.htm
http://www.commerce.state.ak.us/dca/mia/

Alaska Region (10)
U.S. Department of Agriculture, Forest Service
Mail: P.O. Box 21628
Juneau, AK 99802-1628
Street: 709 W 9th Street
Juneau, AK 99801-1807
Phone: 907.586.8806
FAX: 907.586.7843
Email form: http://www.fs.fed.us/r10/ro/contact/
Web site: http://www.fs.fed.us/r10/

Alaska Seed Growers Association
Seed certification
Pat Mulligan, Manager
Box 895
Palmer, AK 99645
Phone: 907.745.4004
Fax: 907.745.4728

Alaska Soil and Water Conservation District
Non-Timber Forest Products Program
510 L Street, Suite 280
Anchorage, AK 99501-1949
Phone: 907.271.2424
Fax: 907.271.4099
akswcd@alaskaswcds.org
http://www.alaskaswcds.org/Alaska/

Alaska SuperNatural Teas
Erika J. Merklin
2618 Chilkat Lake Rd.
Haines, AK 99827
Phone: 907.767.5586
aksupernaturalteas@yahoo.com

American Herbal Products Association
8484 Georgia Ave., Suite 370
Silver Spring, MD 20910
Phone: 301.588.1171
Fax: 301.588.1174
ahpa@ahpa.org
http://www.ahpa.org/index.htm

Birch Boy Products
P.O. Box 637
Haines, AK 99827
Phone: 877.769.5660
Fax: 907.767.5660
http://www.birchboy.com

Birch Grove Pure Alaska Birch Syrup Products
P.O. Box 771375
Eagle River, AK 99577
Phone: 907.696.0893
http://www.birch-grove.com/

Birch World, Ltd.
125 Varshavskoe shosse Str
117405 Moscow Russia
Phone/Fax: +7.095.311.44.12
http://www.birchworld.ru/eng/index.html

Centre for Non-Timber Resources
Royal Roads University
2005 Sooke Road
Victoria, BC V9B 5Y2
Canada
Phone: 250.391.2600 ext. 4328
Fax: 250.391.2694
ntfp@royalroads.ca
http://www.royalroads.ca/cntr

Chugach Alaska Corporation
560 E 34th Ave.
Anchorage, AK 99503
Phone: 907.563.8866
Fax: 907.563.8402
www.chugach-ak.com/

Chugach National Forest
3301 C Street, Suite 300
Anchorage, AK 99503-3998
Phone: 907.743.9500
Fax: 907.743.9476
http://www.fs.fed.us/r10/chugach/

Community Forestry Program
Alaska Department of Natural Resources
Division of Forestry
550 W 7th Avenue, Suite 1450
Anchorage, AK 99501-3566
Fax: 907.269.8902
http://www.dnr.state.ak.us/forestry/community/
John See, Program Coordinator
Phone: 907.269.8466
john_see@dnr.state.ak.us
Patricia Joyner, Education Coordinator
Phone: 907.269.8465
patricia_joyner@dnr.state.ak.us

Cook Inlet Region, Inc.
P.O. Box 93330
Anchorage, AK 99509-3330
Phone: 907.274.8638
Fax: 907.263.5186
www.ciri.com/

Forest Stewardship/Landowner Assistance Program
Alaska Department of Natural Resources
Division of Forestry
101 Airport Road
Palmer, AK 99645
Jeff Graham
Forest Stewardship Coordinator
Phone: 907.761.6309
Jeff_Graham@dnr.state.ak.us
http://www.dnr.state.ak.us/forestry/foreststewardship.htm

Herbal-Medicine.org
http://www.herbal-medicine.org/

Hoffman Manufacturing, Inc.
P.O. Box 547
Albany, OR 97321
Phone: 800.692.5962
Fax: 800.343.6724
info@hoffmanmfg.com
http://www.hoffmanmfg.com

Institute for Culture and Ecology
Nontimber Forest Products Species Database
P.O. Box 6688
Portland, OR 97228-6688
Phone: 503.331.6681
http://www.ifcae.org/ntfp/

International Economic Development Council
734 15th Street NW
Suite 900
Washington, DC 20005
Phone: 202.223.7800
Fax: 202.223.4745
http://www.iedconline.org/index.html

Juneau Economic Development Council
612 W Willoughby Ave., Suite A
Juneau, AK 99801-1732
Phone: 907.463-3662
Fax: 907.463.3929
http://www.jedc.org
administrator@jedc.org

Kahiltna Birchworks
P.O. Box 2267
Palmer, AK 99645
Phone/Fax: 907.733.1309
http://www.alaskabirchsyrup.com/

Lady Bird Johnson Wildflower Center
4801 La Crosse Avenue
Austin, TX 78739
Phone: 512.292.4100
Fax: 512.292.4627
http://www.wildflower.org/

Made in Alaska Program (see Alaska Product Preference Program)

National Tree Seed Laboratory
5675 Riggins Mill Rd.
Dry Branch, GA 31020
Phone: 478.751.3551
http://www.ntsl.fs.fed.us/ntsl_fsstc.html

Native Plants Journal
Native Plants Network
USDA Forest Service, SRS
1221 South Main Street
Moscow, ID 83843–4211
Kas Dumroese, Editor
Phone: 208.883.2324
kdumroese@fs.fed.us
http://www.nativeplantnetwork.org/

Native Plants Network
USDA Forest Service, SRS
1221 South Main Street
Moscow, ID 83843–4211
http://www.nativeplantnetwork.org/

Non-Timber Forest Products–Medicinal Web Site
Sponsored by:
Department of Wood Science and Forest Products, Virginia Polytechnic Institute and State University, Blacksburg, VA
USDA Forest Service, Southern Research Station, Blacksburg, VA
Top of the Ozarks Resource Conservation and Development, Houston, MO
http://www.sfp.forprod.vt.edu/sfp_link/medicinal.htm

Northern Latitudes Plant Materials Center
Stoney Wright, Manager
HC 04 BOX 7440
Palmer, AK 99645
Phone: 907.745.4469
Fax: 907.745.1568
http://www.dnr.state.ak.us/ag/ag_pmc.htm

Office of Economic Development
Alaska Department of Commerce, Community, and Economic Development
P.O. Box 110800
Juneau, AK 99811-0800
Caryl McConkie, Economic Development Manager
Phone: 907.465.5478
Caryl_Mcconkie@commerce.state.ak.us
http://www.commerce.state.ak.us/oed/home.htm

Office of Subsistence Management
U.S. Fish and Wildlife Service
3601 C Street, Suite 1030
Anchorage, AK 99503
Phone: 800.478.1456
Phone: 907.786.3888
Fax: 907.786.3898
Subsistence@fws.gov
http://alaska.fws.gov/asm/home.html
http://www.usgr.com

Prairie Habitats
Box 10
Argyle, MB R0C 0B0
Canada
Phone: 204.467.9371
Fax: 204.467.5004
http://www.prairiehabitats.com/

Sealaska Corp.
One Sealaska Plaza, Suite 400
Juneau, AK 99801
Phone: 907.586.1512
Fax: 907.586.2304
www.sealaska.com/

Sitka Economic Development Association, Inc.
329 Harbor Drive, Suite 212
Sitka, AK 99835
Phone: 907.747.2660
Fax: 907.747.7688
inforequest@sitka.net
http://www.sitka.net/index.shtml

Skagway Development Corporation
380 5th Avenue
P.O. Box 1236
Skagway, AK 99840
Phone/Fax: 907-983-3414
info@skagwaydevelopment.org
http://www.skagwaydevelopment.org/index.html

Tongass National Forest
Federal Building
648 Mission Street
Ketchikan, AK 99901
Phone: 907.225.3101
Phone: 907.228.6222 (TTY)
Fax: 907.228.6215
http://www.fs.fed.us/r10/tongass/

U.S. Global Resources
10242 59th Ave. South
Seattle, WA 98178
Phone: 425.391.5646
Fax: 425.392.6713
usgr@usgr.com

Wild Food Adventures
John Kallas, Ph.D., Director, Educator, Researcher
4125 N Colonial Ave.
Portland, OR 97217-3338
Phone: 503.775.3828
mail@wildfoodadventures.com
http://www.wildfoodadventures.com

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