

**THIMBLBERRY JAM PRODUCTION IN HOUGHTON AND
KEWEENAW COUNTIES, MICHIGAN**

By

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Submitted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE IN FORESTRY MICHIGAN TECHNOLOGICAL
UNIVERSITY 2003

The project paper: “Thimbleberry Jam Production in Houghton and Keweenaw Counties, Michigan” is hereby approved in partial fulfillment of the requirements for the Degree of MASTER OF SCIENCE IN FORESTRY.

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ACKNOWLEDGMENTS

Without funding from the MacIntire-Stennis Fund and Michigan Technological University's School of Forest Resource and Environmental Science this work would not have been possible. I am grateful for the support of my parents, who loaned me their truck so that I could travel to and from Houghton, Michigan. Without Blair Orr's support of the research, valuable advice, and extensive editing, the paper would not have materialized in its present form. I would like to thank the friends that I have made here in Houghton, at my church, and at school for their support during my time at Michigan Tech. I would also like to thank the people who participated in the research for their graciousness with my inexperienced interviewing attempts.

PREFACE

Coming to Michigan Technological University has been a transition time in my life. Tucson, Arizona is the place where I grew up and it is still the place that I call home. Growing up in a large desert city so close to the border of Mexico gave me a unique perspective on the world. I attended private, Christian schools throughout my elementary years, and so continued in that vein in college. LeTourneau University received me with open arms out in Longview, Texas (northeast side of Texas, which is noticeably different from any other part of Texas). I became involved with leadership opportunities and talked for long periods of time with missionary kids from far away places. Summer jobs have been a source of inspiration and personal growth for me. My summer opportunities have included three months as a cashier working in the Grand Canyon, three months as a forest technician fighting wildland fires started by on-base troop activities at Fort Lewis, Washington, and three months taking vegetative samples in Sleeping Bear Sand Dunes National Lakeshore. It was through talking with others at LeTourneau University that I became aware of the wider world around me, and I hope that it will be through Michigan Technological University that I will get the chance to explore that world. I came to Michigan Tech to get an advanced degree and to stay in school long enough to go into the Peace Corps before my large school loans caught up with me. Though Peace Corps has not yet come to pass, my time at Michigan Tech gave me many of the experiences I may have if I go to another country.

My first encounter with thimbleberries was by a request made by a native of the Upper Peninsula (UP) working in Tucson at my mother's place of work. She requested that I send home a jar of the jam in return for a contact with a relative of hers who lived in Houghton and could transport me to the school when I arrived. When Blair Orr offered me the chance to study the jam making process more extensively, I accepted with gusto. Through my research I had the chance to get to know the people that make the UP so unique. I am grateful for my time here because I am sure that it has prepared me adequately for wherever life will take me. God is ultimately in control, but I hope he will direct me along this path, a tour with the Peace Corps in a Latin American Country, a rewarding career as a land manager or forester, and then to settle down in a reclusive spot conserving what is left of the Nation's National Parks. Wherever I end up, I know now that God is ever in control.

ABSTRACT

The thimbleberry plant (*Rubus parviflorus* Nuttall) is harvested as a non-timber forestry product in Houghton and Keweenaw Counties, Michigan. It is made into a tart, flavorful jam unique to the area. Thimbleberries are harvested in much the same way as other non-timber forest products, though the production and sale can be said to be in transition from an informal economic setting to a more formalized system. The average jam production business is small and family oriented. The average method of sale for thimbleberry jam is to small businesses or individuals through close-knit buyer-seller relationships. Though there is a ready supply of berries and high demand for thimbleberry jam, lack of cultivation, initial investment costs and the perspectives of producers about the business constrain the production of thimbleberry jam. So, thimbleberry jam remains a small, stable business venture for those living in Houghton and Keweenaw Counties.

Chapter One: Introduction

Michigan's Upper Peninsula is located between 47 and 45 degrees North and between 90 and 83 degrees West. The region was rich in timber and minerals in the early 1900s, and keeps that reputation to this day. The people are a mixture of immigrant workers from European and Scandinavian countries who came to work in the mines or in the logging business and settlers who came west looking for farmstead opportunities. Much of the land was cleared during the time of initial settlement. Forest canopies are only now closing back over old roads, railroad tracks, and farmers' fields.

Today, heavily forested landscapes and rural communities dominate the landscape, and people living in the area are more likely to be outdoor enthusiasts than farmers. The farms that were built early this century have been largely abandoned. There were five farms registered in Keweenaw County in 1997 and 128 registered in Houghton County in the 1997 census done by the United States Department of Agriculture (USDA, 1997). Popular activities within the region include photography, hunting, snowmobiling, snowshoeing, crosscountry skiing, backpacking, canoeing, and fishing.

The subject of non-timber forestry products (NTFPs) has received much attention recently due to the international interest in mushroom products from the Pacific Northwest. In a broad sense, NTFPs are those products that grow in a forest setting and are harvested for use commercially or for purposeful home use. NTFP harvesting is a part of many people's yearly activities in Michigan's Upper Peninsula (the UP) and make up a significant pastime among full-time residents.

Emery (1998) found 138 NTFPs being extracted out of the woods in the UP. Examples of these products include wild edibles like mushrooms, maple syrup, or wild fruits, Christmas Ornaments, and medicinal plants like American ginseng (*Panax quinquefolium* L.). Thimbleberries (*Rubus parviflorus* Nuttall) fall under the wild edible category of NTFPs. Thimbleberries are regularly harvested along with the other berries that grow within the region such as blueberries, raspberries, blackberries, and wild strawberries.

The non-timber forestry product industry, also called the Special Forest Products industry, contains the most pertinent similarities to thimbleberry jam production in Houghton and Keweenaw Counties. Unlike thimbleberry harvesting, some areas where NTFPs are extracted have experienced destructive over harvesting. Research is being focused in such areas on ways to integrate NTFP with the timber production that was the primary focus of land managers in the past and ways to properly analyze NTFP systems (Gautam, 2002; Perez, 1999). NTFPs in the Pacific Northwest include floral greens, Christmas ornaments, mushrooms and other wild edible plant species. The people involved in the industry are typically employed in other full-time occupations including logging, homemaking, commercial fishing and wildfire suppression. Harvesters are generally self-employed and work independently, often using NTFP profits to supplement their income during periods of financial difficulty (Schlosser, 1995b). A great deal remains unknown about the NTFP industry. Its small scale, and entrepreneurial character make analysis and predictions difficult (Blatner, 1998).

This paper intends to show how thimbleberries fall into the context of NTFPs as they are harvested across the country. Thimbleberry picking happens solely in forest setting and is an unregulated activity in Houghton and Keweenaw Counties. The lack of restraints on who may pick allows thimbleberry to continue as an NTFP as it has been since people first came to Michigan's Upper Peninsula. A second objective of this paper is to show how production of jam has modified significantly from its NTFP roots to the informal economic setting in which it is sold today. There is significant evidence to show that the market for thimbleberry jam is in transition from informal small-scale production to more formalized large-scale economics. The transition point started with licensing restrictions implemented by Michigan's Department of Agriculture in the mid-1980s. The restriction forced small-scale producers to modify their production to meet industry standards, and created a fissure between harvesting and producing. Anyone may harvest thimbleberries, but because of state restrictions only licensed jam producers may sell thimbleberry jam publicly.

Informal economics is a topic of much debate, especially as it refers to those economic activities that are done in urban settings that are unregulated and unrecorded. There seems not to be any consensus on a specific definition for informal economic activities, though work is currently being done to isolate the nuances of informal economic settings (Tickamyer, 1998; Nelson, 1999). For the purpose of this paper, informal economic activities are defined as Brown (1998) defines them:

In other words, in informal economies, non-wage activities are ultimately geared toward economic ends even if they are maintained or practiced through overtly social relationships, which may deliver positive social and cultural benefits to their participants. (Brown, 1998)

Furthermore, thimbleberry jam production meets two criteria for informal economic settings as defined by Morales (1995): 1) entrepreneurial activities, and 2) unrestricted, non-contractual labor. The legalist approach to informal economies stresses that governmental regulations force entrepreneurs with less capital into an informal economy, helping only those with more resources to profit from the formal economy (Morales, 1995). This paper will show how the thimbleberry market in Houghton and Keweenaw Counties falls clearly into an informal economic setting.

Chapter Two: *Rubus Parviflorus*

Taxonomy

Rubus parviflorus Nuttall (thimbleberry) is a member of the Rosaceae family, genus *Rubus*, subgenus *Anoplobatus* (the Flowering Raspberries). Other species in this subgenus include *R. odoratus* (purpleflowering raspberry), *R. deliciosus*, (delicious raspberry), and *R. neomexicanus* (New Mexico Raspberry). Red raspberries (*Rubus Ideaus*), salmonberries (*Rubus spectabilis*) and black raspberries (*R. occidentalis*) fall under the subgenus *Ideobatus*.

Though red raspberries (*Rubus ideaus*) are similar in color, texture and shape to thimbleberries, the plant is quite different. Thimbleberry bushes are perennial, standing one to two meters (2 to 8 feet) tall with pubescent, palmate, acutely lobed, maple shaped leaves. The leaves are large, between ten and twenty centimeters long and have three to five lobes. They are simple, alternate and soft in texture (Bailey, 1945) (Figure 1).



Figure 1: Thimbleberry Leaf with berry.

Due to the size of the leaf, the leaf area index is high and light penetration below the bush is low. Stems have a life span of two to three years, are woody, thornless, and stand erect with few branches. Though bark on young shoots is green, the bark is generally gray, peeling with age. Flowers are continuously produced from June to July so there is a time of overlap with flowers, unripe and ripe berries all present on the same bush. The flowers are white, insect-pollinated, perfect, and found at terminal inflorescences of two to nine flowers. The flowers are relatively large when compared with other species of *Rubus*, 2.5 to 6 centimeters in diameter, with five petals (15 to 30 mm in length) (Bailey, 1945; Billington, 1949).

Nomenclature

The original description of *Rubus parviflorus* dates back to 1818, when Nuttall found it on Michilimackinac Island in Lake Huron. Nuttall described the plant as:

**parviflorus. Shrubby and unarmed, leaves simple, palmately lobed; peduncles 2 or 3-flowered; flowers small; segments of the calix villous, ovate, abruptly acuminate; petals oblong-ovate, white. Hab. On the island of Michilimackinac, lake Huron. - Nutt. Gen. i. 308 (1818) (Fernald, 1935).*

Fernald notes, however, that the specimen Nuttall used to classify *R. parviflorus* is extremely rare, having only one specimen on record by 1935. Therefore, the species gets the uncharacteristic species name *parviflorus*, meaning small flowered, when, in reality, it has one of the larger flowers of the *Rubus*

genus. The misnomer was never corrected because it was much better than the alternative. The name, *R. nutkanus*, was used until 1929, when it was discovered that the original descriptions by Mocino and Sesse in 1825 used to give the alternate title were made from examinations of hastily made copies of original drawings done by a Spanish student and not from real specimens (Fernald, 1935).

Numerous varieties and subspecies have been described and proposed, and the matter is of some controversy. Fernald (1935) seems to be the first to try to organize the varieties within *R. parviflorus*. Baily (1945) could not make Fernald's classifications "work." Billington (1949) names five varieties of *parviflorus*, but notes the controversy over their classification. Several other notable authors of taxonomy and flora authors since the 1940s have tried to define the varieties of the species, but few agree with one another. *Rubus* species in general are highly variable, especially in degree of pubescence and glandularity (Soper, 1982).

Reproduction

The flowers are self-infertile, so reproduction happens through cross-fertilization by pollen transfer. The plant does reproduce asexually through vegetative shoots from an extensive rhizome network. Thimbleberries tend to grow in clumps, close enough together to intertwine their root systems and effectively force out other space competitors. Their closely stacked leaves block much of the sunlight from hitting the soil surface to effectively add to their competitive advantage (Lepage, 1991). Thimbleberries spread locally through

vegetative sprouts and spread into new areas through seed dispersal (Maxwell, 1990). In fact, their competitive advantages have made them a weedy species in many places in British Columbia and have thwarted regeneration efforts of spruce and other conifers (Oleskevich, 1996; Haeussler, 1990). Researchers have not found evidence of allelopathic properties for thimbleberries in the wild, though *Rubus parviflorus* has shown inhibitory effects in the laboratory (Del Moral, 1971).

Fruit matures continuously between June and mid-September. *Rubus parviflorus* produces an aggregate of drupelets, each containing a small seed. When plucked ripe from the plant, the aggregate fruit will easily separate from its fleshy receptacle making for a soft, hollow berry that can easily fit on the tip of an extended finger like a thimble.

Seedbanking represents one important reproductive strategy for the thimbleberry plant. Each drupelet in the aggregate fruit contains one complete seed with a hard, long-lasting outer coat. Wildlife that eat the fruit disperse seeds throughout the forest where they accumulate in the seed bank. Seeds are long lived in the soil and are easily released upon disturbance. For this reason, thick patches of thimbleberry bushes are found within clear cuts, in recently burned areas, and along roadsides (Figure 2). Seedbanking is the principle method for the plant to spread to new areas. Patch expansion occurs through vegetative propagation from an extensive rhizome network (Maxwell, 1990).



Figure 2: Thimbleberries along the edge of a parking lot

Those trying to artificially germinate seeds have found a mixture of scarification, cold, and heat treatment work best at producing sprouts. Prescribed burning and manual cutting often stimulate growth in forest settings (Lepage, 1988; Haeussler, 1990). The thimbleberry bush is resistant to fire because of its rhizome network and prolific, long lasting seeds. Fire affects berry patches differently according to the depth of the seeds and roots in the soil, and the duration and intensity of the fire (Morgan, 1988). Once established the plant is tolerant of a number of soil types, though it prefers moist, well-drained sites (De Waal, 1974). No mycorrhizal associations have been reported (Oleskevich, 1996).

Range

Growing conditions for thimbleberry are diverse, though the plant does favor recently disturbed sites. One study found the highest thimbleberry presence under an overstory of quaking aspen and white birch; quaking aspen being the more significant indicator species. The same study, done on Isle Royale, found thimbleberry to prefer moist, well-drained sites, slopes of six to fifteen degrees, Northwest aspects, low position on the landform, and a preference for sites in an early successional stage (De Waal, 1974). Though thimbleberry seems selective about its growing conditions around the Great Lakes region, it grows prolifically in British Columbia, Washington and Oregon.

Present day distribution of thimbleberry (*Rubus parviflorus*) is a result of the cross continental extent of this north American native species previous to the Wisconsinian glaciation some 10,000 years ago. After the glaciers' retreat, the aridity of the Great Plains prevented *R. parviflorus* from reintegrating itself in the landscape, bisecting its range between the west and the favorable habitats found in a small portion of South Dakota and the Great Lake States (Figure 3). Thimbleberry is considered a western disjunct species (Marquis, 1981). The western range extends from the southern tip of Alaska south to the northern border of Mexico. It extends eastward through into Oregon, Utah, parts of Colorado and New Mexico. There is a small population in the southwestern tip of South Dakota. The plant is then abundant along the shores of the northern Great Lakes. The black portion of figure three shows the distribution of *R. parviflorus* as Fernald recorded it in 1935.

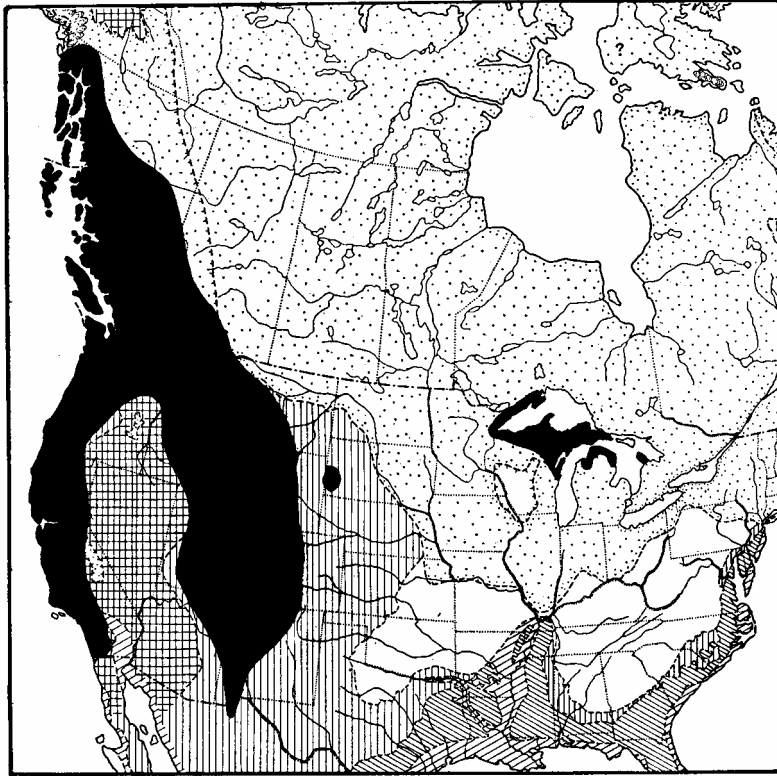


Figure 3: Range of *Rubus parviflorus* marked in black (Fernald, 1935).

Today's range may be more extensive than has been previously recorded. The USDA plant database records a much more extensive present range, including parts of Minnesota, Wisconsin, and Massachusetts (USDA NRCS, 2002). In British Columbia, thimbleberry is tolerant of a number of soil and climatic factors but is limited in its northern extent by extreme cold, short growing seasons, and moisture stress (Haeussler, 1990). The thimbleberry plant tolerates a large number of conditions, but is limited by cold winters, summer moisture stress, and short growing seasons (Oleskevich 1996, Haeussler 1990).

Thimbleberry as a weed species

Rubus parviflorus is considered a weed species in Washington, Oregon and in all of British Columbia. Its dense foliage and quick spread over recently disturbed ground may out compete or over-shade valuable timber species such as Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), hybrid spruce (*Picea glauca x sitchensis*), and lodgepole pine (*Pinus contorta*) on forest revegetation sites. Growing in moist areas of the southern interior of British Columbia, *Rubus parviflorus* may reach maximum leaf area indexes of $10 \text{ m}^2 \text{ m}^{-2}$ in as little as five or six years (Comeau, 1989). A low level of vegetation cover, may prevent frost damage to frost prone timber types during revegetation by seedlings. However, a high percentage of vegetative covering, like thick thimbleberry growth, prevents light from hitting the ground and may shade out valuable timber species (LePage, 1994). Papers written about the control of thimbleberry far exceed the numbers written on the species' benefits.

Glyphosate applied late in the growing season seemed to be the best herbicide method used on thimbleberry patches in British Columbia (LePage, 1991). In Oregon, midsummer applications of low volatile esters of 2,4,5-T were found to be effective and did not harm young Douglas-fir trees (Gratkowski, 1971). Manual cutting alone has little effect on thimbleberry, and may cause prolific shoot resprouting (Oleskevich, 1996; LePage, 1994).

The problem of thimbleberry as a weed species went so far as to support research to find biological control agents. Fungus like *Fusarium avenaceum* (Oleskevich, 1998) show much promise, though other control agents such as

Hainesia Lythri, (Shamoun, 1992), and *Phomopsis* species (Shamoun, 2000) are also being studied.

Other Uses of Thimbleberry

Rubus parviflorus, like most *Rubus* species is an important wildlife plant. Though the plant is not a large part of the diet for wild ungulates, deer and others eat young sprouts in the spring. Many types of birds, bears and other animals eat the fruit. The broad leaves may help shelter young seedlings from frost damage in winter months (LePage, 1994), and the rhizome structure may help to stabilize loose banks along streams and steep road cuts. The plant placed sixth most successful out of 18 species in stabilizing banks along new road cuts in Montana (Hungerford, 1984).

In Michigan's Upper Peninsula, jam is made from the fruit of the thimbleberry plant. The large number of seeds in each aggregate fruit reduces its use as a jelly product. There is a unique taste to the thimbleberry that is used infrequently to flavor other products. The most common uses of thimbleberries other than jam include jelly, mixed jams, and as a flavoring for some baked goods (eg. cookies). The soft berry does not last long in storage, because of easy susceptibility to mold. Jam makers generally freeze berries to preserve the freshness of the flavor.

Parasites

Kraft (1990) notes the presence of a parasitic wasp in Houghton and Keweenaw counties. The wasp (Hymenoptera: Cynipidae) *Diastrophus kincaidii* Gill. greatly decreased the height and productivity of infected thimbleberry patches in the mid-1980s. An early study done by Wangberg (1973) reveals the biology of *D. kincaidii* in northern California.

The life cycle is similar to that of other parasitic wasps. *Diastrophus kincaidii* is host specific to *Rubus parviflorus* and has only one generation per year. The adult female is between 2 to 2.5 mm in length while the male is 1.75 mm. The body is black and the extremities are usually brownish in color. The antennae are thirteen segmented in the female and fourteen segmented in the male (Wangberg, 1975). The adult is short lived, and rarely flies; captive wasps lived for a period of seven to ten days. Accordingly, the adults will mate soon after emergence and the female will oviposit quickly (Wangberg, 1973). Adults emerge in the spring to lay eggs. Oviposition, which consists of thirty to fifty eggs, will generally occur in the vascular tissue, though some larvae have been found in the pith and cortex. Larvae go through five larval instars before overwintering within the stem (Wangberg, 1975). The longest stage in the life cycle is the prepupa stage, which can be found for seven months out of the year. The prepupa will pupate for the final time in the spring to emerge as an adult completing its univoltine life cycle (Wangberg, 1975).

The gall (figure 4) that emerges three to four weeks after oviposition by *D. kincaidii* is produced by the activity of the parasitic larvae. Galls are formed by feeding activities as the larvae mature within the stem. Their irritation causes the thimbleberry stem to form excessive parenchyma tissue that eventually forms a gall (Wangberg, 1975).



Figure 4: Parasitic Wasp Gall

The activity within the gall may be quite complex due to the presence of secondary, and even hyper-parasites that feed on the larvae of *D. kincaidii*. Wangberg (1976) was able to identify ten species representing seven families of hymenoptera and at least two other hyper parasitoids living within a single

thimbleberry gall in the redwood forests of northern California. The average mortality rate for *D. kincaidii* due to parasites was 73 percent (Jones, 1983). The relationship between the species may be represented by its own food web, with as many as three trophic levels (Wangberg 1976). A similar study done by Kraft (1990) in Houghton and Keweenaw counties was able to isolate and rear only three types of primary parasites from field collected *D. kincaidii*. In addition to parasites, *D. kincaidii* may be eaten by black-capped chickadees, and possibly a woodpecker species (Knowe, 1997).

The galls created by the parasitic wasp may grow to a large size, up to 78.3 mm in length, or as small as 7.7 mm in length. The average gall was found to be 26.5 mm in length (Wangberg, 1973). Kraft (1990) found similar galls, ranging from 90 mm long to 10 mm long within Michigan's Upper Peninsula. The galls are not always centered on the thimbleberry cane, and often produce a weakness at that point along the stem (Kraft, 1990). The galls generally stop growing two months after oviposition (Wangberg, 1973).

D. kincaidii is not thimbleberry's only parasite. Three aphid species, *Amphorophora parviflori* Hill, *Masonaphis (Oestlundia) maxima* (Mason), and *Masonaphis (Oestlundia) davidsoni* (Mason) occur regularly on thimbleberry bushes in British Columbia, Canada. *M. maxima* is the most prevalent. Though aphid species have not been reported on thimbleberry bushes in Michigan, the aphid was reported as a potential disease vector within its range (Stace-Smith, 1987). *Rubus parviflorus* is *M. maxima*'s only known host for its entire life cycle. The aphid's range extends 1800 kilometers inland along the West coast from

Vancouver Island to Santa Cruz in California (Gilbert, 1980). Aphid sexual types include parthenogens (unfertilized females able to reproduce) of two types, gynoparae (producing only sexual females), and virginoparae (able to produce parthenogens or males). Males are red and have wings, females are wingless and are white and parthenogens are green (Gilbert, 1973). Females have a body length of 2.69 to 4.70 mm, and an antennae length of 0.6 to 0.8 times the length of their bodies (Frazer, 1968). This insect lives on the young leaves and growing terminal shoots of the thimbleberry bush. *M. maxima* is unusual due to its abbreviated life cycle and the fact that it lays its eggs on the ground near the host rather than the underside of leaves and stems like most aphids (Frazer, 1968). In Vancouver the aphid goes through five discrete generations from March to July (Gilbert, 1980). The aphid's most significant predator is the syrphid larva (a type of fly). In the field, no aphid infestation was observed to cause visible damage to infected thimbleberry plants (Frazer, 1968).

Pathology

Recently it has been discovered that thimbleberry may harbor diseases affecting other *Rubus* species such as apple mosaic, thimbleberry ringspot, and raspberry bushy dwarf viruses (Oleskevich, 1996). Though *R. parviflorus* shows little damage from these diseases, they may be transferred to nearby plants by aphids. Thimbleberries have been found to be resistant to the raspberry cane midge *Resseliella theobaldi* (McNicol, 1983) and to the veinbanding mosaic virus (Moore, 1990).

Thimbleberry ringspot was first identified near Vancouver in 1953.

Though *R. parviflorus* is its only known natural host, the disease has been transferred artificially to three other *Rubus* species, *R. idaeus* L. cv. 'Washington', *R. occidentalis* L. cv. 'Munger', and *R. henryi* Hemsl. Symptoms include irregular ringspot markings and oak leaf markings on leaves with considerable variation in symptoms (Stace-Smith, 1987). Though three aphids, *Amphorophora parviflori* Hill, *Macrosiphum davidsoni* Mason, and *Masonaphis maxima* Mason, transmitted the disease between thimbleberry bushes, all three are inefficient vectors (Stace-Smith, 1970). The inefficiency of vector transmission and the failure of all mechanical attempts to transmit the virus appear to confine thimbleberry ringspot to *R. parviflorus* (Stace-Smith, 1987).

Thimbleberry ringspot is related to raspberry bushy dwarf virus (RBDV). Results from a biological survey done by Shier (1986), indicated that the virus had been a part of a host-parasite relationship for quite some time. The close proximity to raspberry cultivars was a concern at the time of the study.

A strain of the apple mosaic virus was found on a single patch of thimbleberry within the Fraser Valley in British Columbia. Infected plants displayed few symptoms. It appears to be a rare occurrence and has not spread to nearby red raspberry cultivars (Stace-Smith, 1989).

Chapter Three: Methods

The project area was limited to Houghton and Keweenaw counties of Michigan's Upper Peninsula. Though a number of activities are involved in the jam making process, jam production was artificially divided into three areas of interest; harvesting, producing and selling. Pickers have been defined as those who harvest thimbleberries for a monetary profit. Producers were defined as anyone who processed raw thimbleberries for the production of jam for monetary profit. Secondary businesses were defined as those who limited themselves to the sale of jam produced from berries harvested and processed by others. Secondary businesses as a whole were not included in the research, nor were producers of jam that solely made jam for household consumption. Data collection extended from the end of August to the end of October in the year 2003.

The work done to find, interview, and analyze the market for thimbleberries in Houghton and Keweenaw counties was characterized by many personal communications and semistructured-interviews. A networking strategy called snowball sampling was employed to find pickers and producers. Snowball sampling asks each participant to name others within their group until the list of names becomes "saturated," a time when new names are no longer suggested (Bernard, 2002).

Interviews were conducted in a semi-structured manner. A set of questions was used to structure the interview but the talk was allowed to flow like a regular conversation. The interview questions were used more as a guide to demonstrate

that the interviewer is in full control, but is free to follow new leads (Bernard, 2002). Many active listening skills were used during the interview process.

Though selling thimbleberry jam is a public occupation, the gathering and processing of berries is more private. Many pickers and processors were hesitant to speak openly about their businesses. During an interview, there are three keys to eliciting sensitive information: trust, phased questions and consistency checks (Devereux, 1993). Indeed, much of proper interviewing style comes from using best judgment according to the situation, and using active listening skills. Interviews with producers were done in two phases. The first phase included general questions designed to get to know and establish trust with the producer. The second phase included more specific questions designed to gather information about the jam making business. No consistency checks were done due to limited previously published resources about the subject prior to the interview process. There were few papers written on thimbleberry's economic value in general, and no research has been done in Houghton and Keweenaw Counties on thimbleberry economics.

Dress for the interviewer included blue-jeans and a blank, solid-color T-shirt, or a blank button-down shirt. This dress, along with the carriage of a clipboard was designed to have the appearance of professionalism, but casual enough to put the participant at ease. Before any interview started it would be explained to the participant the volunteer nature of their answers and the confidentiality established by the terms dictating human subject research. Once begun, any participant could skip any question for any reason, or stop the

interview process at any time. The set of questions made for jam producers covered the basics of their business: how they became interested in jam making, the processing of berries, market changes over the years, challenges faced in the business, why they make jam, the future of the business and other contacts (Table 1).

Table 1: Initial Producer Interview Questions

1. What made you interested in selling thimbleberry jam?
2. When do you pick and sell the jam?
3. Could you tell me a little of the process of making the jam, and how much time it takes?
4. How long have you been selling jam? How has the market changed over that time?
5. What are your most difficult challenges while producing jam?
6. What keeps you processing berries year after year?
7. What do you see as the future of the thimbleberry business?
8. Who else may I talk with to find out more about thimleberries?
9. If I need to, may I return for a more formal follow-up interview?

The second set of questions was more directed and specific. They covered the specifics of cultivation, sales, advertisement, yearly earnings and business size estimate numbers (Table 2).

Table 2: Secondary Producer Interview

1. Have you tried to cultivate thimbleberry?
2. If you could cultivate it, would you?
3. What percentage of your business is local vs tourist?
4. What percentage of your sales is to individuals or businesses?
5. Do you advertise? If yes: where, how much; If no: why?
6. Are you on the internet? If yes: what percentage of business is done online?
if no: why?
7. What percentage of your income is from the sale of thimbleberry jam?
8. Does it vary from year to year?
9. How many people do you sell to? for how much? -- No names, just numbers.

The conversation generated during the semi-structured interview was directed at gathering a number of qualitative and quantitative facts about the industry. These numbers and assessments were the ones used to describe the marketing of thimbleberry jam. The quantitative numbers that were gathered included price for one eight-ounce jar of jam, age, size, and production numbers for the business. The qualitative questions were about cultivation attempts, consumption by local residents vs. tourists, typical problems while producing, and opinions on the history and future of the business (Table 3). Table three describes and lists the numbers and opinions gathered from the interviews. It may be seen from a look at Table three, that the amount of specific information gathered from the interviews was much greater than the general questionnaires allow. Most interviews were more like discussions and could be molded easily. Not every person answered every question, nor were all the questions appropriate for given situations. Accordingly, not all the data was useful in describing thimbleberry jam production due to incomplete or vague answers to the questionnaires. Data used in

the final analysis were chosen carefully to give the most accurate and complete description of thimbleberry jam production in Houghton and Keweenaw Counties.

Table 3: Numbers and opinions extracted from interviews

Numbers:

From Producers:

- Price per jar of jam.-
- Amount (lbs) berries per jar
- Production per season (cases)
- Age of business
- Size of business by # people
- Advertising (Y/N)
- Use of internet (Y/N)

From pickers:

- Time spent picking berries this season
- Pounds of berries picked this season

Opinions:

From Producers:

- Cultivation attempts :
- Consumption by locals vs tourists:
- Problems faced while producing
- Advertising: Why/why not
- Internet Use: Why/why not
- Competition
- Reasons for staying in business
- Future of jam production:
- History of jam production

From Pickers:

- Problems faced while picking
- Conditions producing quality berries
- Land ownership of land harvesting from (public vs private)
- Distance of patches from roads:
- Competition
- Reasons for picking
- Future of berry harvesting
- History of berry harvesting

According to the response of the producers to interview inquiries and as the interviewer became more comfortable with the material, second interviews

may or may not have been necessary. Second interviews were designed to gather more specific information. If the participant gave these numbers initially, or a second interview would not have been likely or possible, second interviews were not done. All interviews were conducted in a manner approved by Michigan Technological University's Internal Review Board as appropriate for human subject research.

Finding pickers and producers was a long process including phone-calls, legwork to visit various businesses and networking with long-term residents. Phone calling developed into a significant part of the networking process. All initial contacts were made over the telephone. In total, one producer was interviewed over the telephone, two secondary interviews were done by phone, and seven pickers were interviewed over a telephone. Participants who were interviewed using the telephone were mailed the human subject research form, a return envelope and a short thank you letter for being a part of the research. Interviews were generally conducted in people's homes, but a few occurred at their place of work. Phone calls were generally made after the dinner hour, generally between 7-7:30pm, or at a convenient time named by family members.

Pickers were treated a little differently than producers in that their interview was shorter and less intensive. This group as a general rule is less apparent in the community and not easily separated from casual pickers that harvest for home-consumption. Pickers were interviewed only once, generally over the phone, though one picker was interviewed in person at their place of work. The questions asked of pickers included information concerning conditions

producing quality berries, berry patch ownership (public vs private), distance walked off roads while harvesting, pounds harvested this season, how many people they sell to, their challenges while harvesting, competition, and the history and future of the business (Table 4). Pickers that did not have phones, or had unlisted numbers were contacted through the mail.

Table 4: Berry Picker Questionnaire

1. How much time do you spend in the woods during a typical thimbleberry season?
 2. How many berries (in pounds) do you pick in an hour? If this is difficult to estimate, how about a typical day?
 3. How many pounds of berries did you pick this season?
 4. What conditions in terrain or weather produce better berries or healthier plants?
 5. Does the crop vary from year to year? -
 If Yes; What is the general trend (circle one)
 No Trend Stable (cyclic pattern) Better (more berries) Worse (fewer berries)
 6. What problems do you face while picking?
 7. Is competition a problem while picking or selling berries?
 If Yes: How so?
 8. Why do you pick year after year?
 9. What percentage of your time spent picking is on public versus private land?
 10. How far do you typically walk to get to your berry patches from your vehicle? (in miles)
 11. When selling berries, do you sell to more than one person?
 If yes, How many?
 12. Have you tried to grow thimbleberry in your yard or on your property?
 If yes: were you successful?
 13. What do you see as the history of thimbleberry picking?
 14. What do you see as the future of thimbleberry picking in Houghton and Keweenaw Counties?
 15. Who else may I speak with to find out more about thimbleberries?
- Additional Comments: (Use the reverse side of this page for additional comments, or for more answering space)

Mailed surveys were treated with care, because the wording and format of the introductory letter and the survey questions can greatly influence the response rate and accuracy of responses by participants. Many of the wording problems

were solved through common sense and careful wording. Bernard (2002) recommends a number of "well-understood rules" for survey questions. Those that were followed for this survey were to have a clear purpose for every question, be unambiguous, and to keep unthreatening questions short. Each envelope mailed to pickers contained an introductory letter, a questionnaire, a human subject research form (Appendix), and a return envelope. Though a pretest for the interview questions and surveys is recommended (Bernard, 2002), the sample size and limited previous knowledge about the industry precluded it. Out of the five surveys mailed, four were filled out properly and returned.

In addition to the groundwork, a literature search was also made on *Rubus parviflorus*. Literature works came from a variety of sources including master's theses, published journal articles, newspaper articles, and web sites designed by jam producers, scientists and other jam enthusiasts.

Chapter Four: Results and Discussion

Jam making is an important business in Houghton and Keweenaw Counties not only because of the extra revenue it generates for those involved, but also for the social benefits of the activity. Thimbleberries have been harvested in a highly social, informal setting typical of non-timber forestry products for as long as those interviewed can recall. Recently thimbleberry jam producers have started to transition from their informal roots to more formalized business methods. The transition can be seen clearly when the process of thimbleberry jam making is divided into its three basic components, harvesting, producing, and selling.

Thimbleberries have been harvested like any other non-timber forestry product, especially like the ones described in Washington (Blatner, 1998; Schlosser, 1995a; Schlosser, 1995b). Many non-timber forest products are harvested each year in Houghton and Keweenaw Counties. In fact, thimbleberries (*Rubus parviflorus*) are just one of 138 such species harvested from the woods in Michigan's Upper Peninsula each year (Emery, 1998). Harvesters work in a social, informal setting to collect berries within the region. It was not until thimbleberry's popularity peaked in 1979 with the introduction of the Thimbleberry Blossom Festival that the production of thimbleberry jam came to government notice. On January 22, 1980, regulation number 557 of Public Act 328 took effect to ensure that canned goods were being prepared properly. The regulation required the formal registration of jam producers through a yearly renewable license approved by a kitchen inspector (Sherman, 1987). Licensed kitchens must contain two stainless steel sinks, an oven, must be separate from the

home kitchen (where food for home-consumption is made), and must meet several other small industry and sanitary standards. The implementation of licensing is a key transition point when businesses producing jam from wild thimbleberries were pushed from non-timber forestry production into a more formal economic setting.

A distinction must be made between the harvesting, producing and selling of thimbleberry jam. Harvesting is still done like any other non-timber forestry product. It is the production and sale that have moved towards more formal methods. The informal economic activities found in Houghton and Keweenaw Counties meet two of the defining characteristics of informal economic settings as described by Morales (1995): 1) entrepreneurial activities, and 2) unrestricted, non-contractual labor. Jam producers are entrepreneurs in their field, and they keep no track of their labor inputs to make jam, nor do they require formalized contracts with the people they buy from or sell to. Other examples of informal economic settings include swap meets, flea markets, open-air markets, periodic markets or trading fairs (Morales, 1995). There is a transition happening in jam production from informal economics towards more formal, large-scale production. As the market for thimbleberry products extends into the formal economy, there will be an influx of people that specialize in harvesting, production or sales. Presently, a few businesses may specialize but the majority are involved at some level with all three steps in jam production.

Twenty-six people (twelve pickers and fourteen producers) completed the interview process in Houghton and Keweenaw Counties, with the exception of

one jam producer who lives in northern Baraga County. One producer was interviewed partially due to time constraints. Four jam producers refused to take part in the interview process and three could not be contacted within the research time frame. In total this study could account for twenty-two jam producers as they have been defined for the research. Pickers were more difficult to locate. One refused to participate in the interview process, while two others were not able to be contacted. This study can account for fifteen pickers as they have been defined for the research.

Married individuals involved in jam production would often share the work responsibilities with their spouses and their children would help out from time to time. All participants were Caucasian, but were representative of Houghton and Keweenaw County, even though there is a large Native American community just south of Houghton County in Baraga County. No direct involvement by young adults, ages nineteen to twenty-five, was found. This could be due to many factors, the most significant being that young people find other activities they deem more profitable. Children were reported by one producer in Keweenaw County to account for ten percent of the number of people that brought berries for sale during the season. They contributed a much smaller percentage in terms of total weight brought for sale.

If one pound of berries was to be traced from the time they ripen on the bush to the time they are set on the table, the process would include three basic steps: 1) Berries are harvested from the woods; 2) Berries are processed into jam; 3) Jam is sold to consumers.

Harvesting

Pickers may be separated into two general groups, those that harvest for themselves (i.e. for their own jam production) and those that harvest for others. Pickers who harvest for others may be separated into those harvesting to supplement their income, and those that harvest occasionally for extra spending money. An example of an occasional picker would be someone who harvests on weekends to earn extra spending money or children who harvest to earn a little extra money.

Nine pickers were interviewed that specialized or occasionally harvested thimbleberries. An additional ten pickers were interviewed who harvested for their own jam production. A large age range was represented (except young adults), at a variety of economic levels, so the sample set is representative of pickers as a whole. It is estimated by a few pickers that there are hundreds like themselves harvesting at least some thimbleberries each year. One producer said that he bought fruit from seventy-five individual pickers this season, though they did not all have thimbleberries for sale.

The location where pickers harvested berries depended greatly on the amount of time they were willing to spend on harvesting and how valuable their efforts were to them. Location, general weather patterns, and daily weather conditions are the three main factors in deciding where a berry picker will harvest on any given day. Location is a significant factor in how many pounds of thimbleberries are harvested in the season because not every berry patch produces

a large number of berries year after year. In general, the weather affects the crop as a whole in that warm springs allow for a good berry crop but a late frost will destroy much of the harvest. Daily weather conditions affect what patches will be ripe at any given time throughout the season. In hot periods patches deeper in the shade or along riparian areas will have ripe berries, whereas in cooler periods patches in more direct sunlight will have ripe berries.

Conditions for good berry production noticed by those interviewed included shade, enough rain, hilly conditions, riparian areas, warm weather, and forest edges (Table 5). Those harvesting along roads were the ones who did not notice any one condition over another that helped to produce a better berry. Most roadsides look alike in terms of terrain. Interviews taken as a whole revealed that edge habitat is where thimbleberry plants grow most prolifically. They grow well along the old railroad tracks, along new and old roads, along snowmobile tracks, or within the woods along clearing edges, along riverbanks, or in recently disturbed areas.

Table 5: Twenty-two participant's responses to the question, "What conditions in terrain or weather produce better berries or healthier plants?"

<u>Response</u>	<u>Number of times mentioned</u>
Partial Shade	6
None noticed	6
Enough rain	5
Hilly	4
Riparian areas	4
Warm weather	2
Edges	2
High soil mineral content	2

n = 22

High soil mineral content was mentioned twice by producers interviewed, but should be addressed separately. One producer said that where copper is found in the ground, that is where thimbleberries grow. A second producer reasoned that berries produced in Houghton and Keweenaw Counties taste better than berries found elsewhere. He associated the better taste with the high mineral content in the soils. A botanist interviewed made the same association between the high mineral content and thimbleberry growth. Most likely the thought that minerals are associated with thimbleberries came from the fact that old mining sites had the most thimbleberries growing around their edges. However, the recently disturbed soil and the partially open canopies above mining sites probably were the more significant factors in the presence of thimbleberries at those sites. The importance of proper minerals to the growth and taste of thimbleberries cannot be easily dismissed. The only producer found able to cultivate thimbleberries considered

proper trace elements essential to good growth and berry production of the thimbleberry bush (*Rubus parviflorus*).

Pickers know where to go to harvest berries through extensive scouting early in the picking season. The majority of pickers harvest along the roadsides wherever they can get vehicle access, but a few will make agreements with landowners to harvest on their property. There are no regulations on who may harvest berries, no specialized equipment needed, no contracts to sign or quotas to be met when harvesting thimbleberries. The majority of harvesting occurs along roads or in other areas open to the public so that each person has an equal opportunity to harvest wild berries. The only constraints are personal constraints (e.g. disabilities) and time constraints.

Thimbleberries are solely harvested from forest settings making it an NTFP. Though one picker was found able to cultivate thimbleberries, cultivation was done by a modification of *Rubus parviflorus*' native forest habitat. No evidence was found in Houghton and Keweenaw Counties of thimbleberries growing in commercial production settings, nor in highly controlled settings like personal gardens. In fact, all reported attempts at controlled cultivation in commercial or garden settings were unsuccessful. Thimbleberry remains a forest species in Houghton and Keweenaw Counties, even though it is cultivated as an addition to native plant gardens or as landscape ground cover in the Pacific Northwest.

Though pickers knew the places to go each year to find berries, they seldom had a good grasp on the type of land on which they were harvesting,

public versus private property. Land ownership of patch locations was often misunderstood. The majority of berries are harvested from the sides of roads or railroad grades. Technically, the state or federal government owns the land along public roads, so it may be classified as public land. Other harvesting locations include under power lines, along snowmobile trails, on hillsides and clearings within the forest, along riparian areas, and along hiking trails. There is a common misconception among Michigan residents that all land without trespassing signs must be open for use by the public. Private land may be set aside specifically as a Commercial Forest Reserve (CFR) under the Commercial Forest Act. CFR land gives landowners a tax break for keeping the land undeveloped and allowing for public use by hunters and fishermen during their respective seasons. This land is not open for all public activities. Technically, there are no provisions made for pickers on CFR land, though the land is effectively open to berry harvesting in practice. When asked specifically who owns the land utilized for berry harvesting, large private corporation's land such as Lake Superior Land Company or Mead Westvaco were often considered "public" land.

As is common to other NTFPs, thimbleberry pickers harvest in such a manner that harvesting berries is a sustainable practice. Berries ripen continuously through the season making for only a few ripe berries present on any given bush at any one time. Since pickers only harvest ripe berries, they will visit the same patch repeatedly throughout the season, allowing for a short ripening period between visits. One patch may yield fruit throughout the three-month picking season, and may be harvested from year to year sustainably, so pickers keep the

most productive patches secret. Berry patches are likened to favorite hunting or fishing spots in this regard. A dedicated picker will try to find as many spots as possible where berries are growing, or have a diversity of spots to choose from depending on the day's weather conditions.

On average, an individual picker spent 45 hours during the summer of 2003 (stdev 32; n = 16) harvesting berries. Each picker harvested an average of 75 pounds of thimbleberries from the woods (stdev 55.4; n = 21). From these estimates, a typical picker may harvest one and a half pounds of berries out of the woods per hour, if they knew when and where to pick. It is important to remember that these estimates are rough estimates of the actual amount harvested from the woods, and the actual amount of time spent in the woods harvesting. Pickers may be involved in a diversity of activities while out harvesting. They may take the dog for a walk, go out with the children to pick, pick other berries or wild fruits, scout for good hunting sites, or hike. Collecting thimbleberries may come very low on the list of activities. As a result, many people had very little idea of how much cumulative time they spent concentrating on thimbleberry harvesting. This is especially true because there are a number of different fruits that are ripe at the same time including sugarplum, raspberries, currants, and cherries. People seldom collect or sell large quantities of berries at one time, and only one picker was found to keep any sort of written notes about patch conditions, time spent picking or amount harvested. Many, especially those out for a little extra cash, collect berries and sell them the same day. This makes a correct estimate of the total pounds gathered or total time spent picking difficult

to assess. Analysis of the thimbleberry business shares with the NTFP industry the difficulty in quantitative assessments. What is clear from the entire data set is that the amount of berries and amount of time spent picking will vary greatly with the prevailing weather conditions.

Weather conditions are not the only problem that pickers encounter while harvesting berries. All pickers were asked what problems they encountered while picking (Table 6). Not surprisingly, bug stings topped the list by being mentioned in thirteen times out of twenty-two responses (fifty-nine percent). Bug pests mentioned most often included bees, mosquitoes, hornets and wasps.

Table 6: Twenty-two participant's responses to the question, "What problems do you face while picking?"

<u>Response</u>	<u>Number of times mentioned</u>
Bug stings	13
Picking on slopes	5
Gall wasp	4
Competition by people	3
Terrain	3
Finding patches	2
Finding time to pick	2
Hidden material	2
Rocky ground	1
Getting to patches	1
Competition by animals	1
Thorns	1
Bears	1
Watching kids	1
Tall grass	1

n=22

The gall wasp was mentioned four times and should be addressed separately. The gall wasp, *Diastrophus kincaidii* (Hymenoptera: Cynipidae) would have been the most significant problem faced by pickers in the late 1980s. At that time, the wasps invaded Michigan's Upper Peninsula. Their activities reduced not only the productivity of berry patches, but also their height. The galls they produced on the stems of the thimbleberry weakened them, reducing some stands that once stood six feet high, to a knee-high level. Many of those interviewed said that the wasp has been a problem, but few found it to be a significant current problem. There is no evidence pointing to the removal of the wasp from its new home in the Upper Peninsula, indeed the last professional report about *D. kincaidii* thought it a significant issue (Kraft, 1990). Either people have come to accept the reduced production of thimbleberries in the wild, or the wasp has been controlled, but not eliminated, by natural factors.

A discussion of problems faced by pickers would not be complete without discussing competition. When asked to think of significant problems on their own, three out of twenty-two people interviewed mentioned competition with others. When asked specifically about competition, fourteen out of twenty-two people (sixty-one percent) said that competition with others is a problem while picking. Either competition is such a common problem that it was overlooked initially, or it is an inconvenience rather than a significant problem. Patches with the most competition are those along roads or in well-known locations like the old railroad grades or public highways. Pickers who did not have any problems with

competition harvested on private land, traveled to difficult to access locations, or picked on sites of which few others were aware.

Pickers harvest berries for a variety of reasons (Table 7). The most common reason was for the money. The question, “Why do you pick year after year?” (not thimbleberry specifically) was asked of twenty people. Twelve (sixty percent) mentioned money in their response. Money was cited often because picking is a quick way to earn money, a way to earn extra income, or a reasonable way to supplement yearly wages.

Table 7: Twenty participant's responses to the question, "Why do you pick year after year?"

<u>Response</u>	<u>Number of times mentioned</u>
Money	12
Enjoy picking	5
Enjoy outdoors	4
Peace of mind	2
To get away	1
Useful as gift	1
For the experience	1

n = 20

The love of the outdoors and the enjoyment of picking as an activity are the next most important reasons people pick berries. The enjoyment of the activity is what makes picking closer to what is described as non-timber forestry product harvesting. Non-timber forest products are harvested to supplement household income, but the activity is closely intertwined with the cultural value of gathering from the woods and the enjoyment of such an activity (Emery, 1998). One picker

noted that picking is one of his favorite activities because he gets paid for having fun.

Producing

Finding producers of thimbleberry jam was more easily done than finding pickers, because producers are more visible in the community. Through government regulation they have been forced into a semi-formal economy. Licensing sets producing apart from picking as an activity because of the specialized equipment and initial investment needed to produce jam. The initial overhead that producers must pay in license fees and in the creation and upkeep of a licensed kitchen is the formality that government regulation forced on what used to be a completely informal system. Before licensing, the only costs to produce jam came from the jars and the sugar. Now, there is an initial investment that prevents some from producing jam at all and forces others to produce more jam to compensate for the start-up costs than they would otherwise have produced. Producers as a whole are more serious about their work with the jam business as a result of licensing.

Fourteen producers were interviewed covering a range of ages and income levels, once again noticeably lacking the teenage to young adult age group. Eight others were found in the community that sold thimbleberry jam, though they were not interviewed either because of time constraints or because of unwillingness to participate in the interview process. The sample may be a high percentage of the total, because no new names were mentioned using the snowball sampling method

towards the end of the interview process. In large populations well known people are more likely to be found through snowball sampling, so the sample set may be biased toward the larger or more well known thimbleberry producers (Bernard, 2002).

Though berry harvesting is still done in a manner common to NTFPs, the sale of thimbleberry jam falls into the category of informal economics. The average jam producer has a small, family oriented business. The typical size is 2.8 people (stdev 1.8; min 1; max 7; n=12). This number excludes the one business with more than ten people, which catered to tourists exclusively and made and sold jam on the side. Family participation is valued and common among producers. Thirty percent (four of fourteen interviewed) of producers said that their children helped out from time to time. Through the interview process it was apparent that eight of the fourteen business owners (fifty-seven percent) shared the business responsibilities with their spouses.

Once harvested, berries must be cleaned by hand to rid the fruit of debris or insects. Since thimbleberries are soft, they are susceptible to a large number of insect species and mold easily if stored fresh for longer than a few days. One producer said that as much time is spent picking out bugs as is spent picking berries.

Thimbleberry jam needs only two ingredients, thimbleberries and sugar. Some will add a small amount of pectin to help thicken the jam, but others say adding pectin is unnecessary because the berry contains plenty of natural pectin. Regardless, the methods and exact amounts of sugar, thimbleberries, and pectin

vary according to the taste of the producer. Nine pickers revealed that an average of 0.35 pounds of berries are used to make one eight-ounce jar of jam (stdev 0.16; n = 9). Depending on how thick a producer will make their jam, the actual weight of thimbleberry jam that may fit in a jar designed to hold eight ounces may vary. Some may have concentrated mixtures with weights up to 10 ounces per jar.

Since the process is simple, the problems with producing jam come not usually from the cooking process itself, but from the picking process, the cleaning process or the selling process (Table 8). The question about problems while producing was asked in a general way so as to reflect those problems encountered during the entire process of producing jam. For most people the entire process includes picking berries. Two people mentioned trouble with buying berries. One producer said that there are few young people willing to harvest berries. His response fits what the interviews as a whole revealed that jam production attracts not young people, but rather people with extra time on their hands (either unemployed or retired), people who have grown up picking berries as a social or cultural event, outdoor sportsmen who wish to make a little extra cash while they are out in the woods, or children who help their parents pick or produce jam.

Table 8: Fourteen participants responses to the question, "What are your most difficult challenges while producing jam?"

<u>Response</u>	<u>Number of times mentioned</u>
Picking	6
Cleaning berries	4
Selling	2
Buying berries	2
Cooking berries	2
Competition while selling	1
Getting older	1

n= 14

People stay in the jam business for a variety of reasons (Table 9).

Responses to the question, “What keeps you processing berries year after year?” reflect why producers stay involved in their jam business as a whole, not necessarily why they produce thimbleberry jam. The results are categorized according to number of times mentioned. Fifty percent of the people questioned (six out of twelve interviewed) mentioned money when speaking of why they stay in the jam business. Money is a blanket response that should be broken down further to reflect the importance that people place on the money that they earn from jam sales. Money may be divided into three categories; as a person’s primary income source, as a supplement to yearly earnings, or simply for extra spending money. Question number seven of the secondary producer interview, “What percentage of your income is from the sale of thimbleberry jam?” (Table 2) tried to address how important thimbleberry jam sales were to producer’s total income. When asked directly few participants were willing to speak openly about

their incomes, or money matters in general. What can be said is that jam sales are a very important income source to a few producers. Some need the extra money to get them through winter unemployment months. One producer said that the money made from the jam business keeps the household off of unemployment. For others, jam production may be just a hobby.

There are many income-generating activities in the area. The choice to spend time producing jam reveals the cultural side of jam production. The enjoyment of the activity is the second most important reason people processed berries. When pressed for extra money some may turn to activities they know well, like jam production, instead of turning to other, more structured temporary work. One jam producer said that producing jam increases the quality of life because of the jam business's relaxed time schedule.

Table 9: Twelve participant's responses to the question, "What keeps you processing berries year after year?"

<u>Response</u>	<u>Number of times mentioned</u>
Money	6
Enjoys the process	2
Supplements income	1
Primary occupation	1
Useful as gift	1
Hobby	1
Necessity	1
Quality of life	1
Trying it out, 1st year	1

n=12

The reasons why people make thimbleberry jam specifically are much more varied than the reasons people stay in business. Few jam producers make a significant portion of their living from thimbleberry jam sales. Rather, thimbleberry jam is frequently a valued addition to jam production businesses that make other types of jams and jellies, specialty products (like antipasto or chow-chow), or arts and crafts. Only one producer was found to specialize in thimbleberry jam production, though there may be others present in the sample area. This is despite the large profit margin associated with thimbleberry jam. One producer with a wide range of other jams, jellies and baked goods said that thimbleberry jam is the business's bestseller. Other people grew up picking and making thimbleberry jam as a regular activity. When they started their jam business, thimbleberry jam was included as a matter of course. Through the interview process it became apparent that a few people did not consider making thimbleberry jam a discrete occupation. It has always been part of their lives.

Producers balanced their time and resources between picking, buying from others and producing jam according to the value they put on the social aspects of picking, the amount of storage space for frozen or canned berries, and the amount of time they were willing to spend producing jam. Producers seem to be involved in three levels of transition from informal to formal settings. The levels are divided according to how they obtained thimbleberries for jam production. They could collect berries themselves, buy berries from pickers, or combine the two activities. Six producers did not buy any berries from pickers, four producers bought at least some berries from pickers, and three producers bought all the

berries used in jam production from pickers. All three of the producers that bought all their berries from pickers started their businesses after licensing went into effect, and they have the highest thimbleberry jam production in terms of number of cases produced. The larger producers are more formal and have more formal methods of sale than do their smaller counterparts.

The two criteria for informal settings, entrepreneurial activities and unrestricted, non-contractual labor are met in those producers who were found to harvest all their own berries for jam production. Each business was started by an individual working independently within the system. Their work to harvest berries is not constricted, their labor is not regulated or contracted, and they may sell to anyone willing to buy as long as they meet state restrictions on the sanitary conditions of jam production. Those picking all their own thimbleberries are generally the smaller jam businesses, or those with larger businesses that produce a small amount of thimbleberry jam on the side. Their sales are established through long-term buyer-seller relationships and few, if any, records are kept. Their methods of sale are informal and may include sales to relatives, friends, neighbors, wholesale, mail order, order over the phone, roadside stands, craft shows or farmers markets (not all inclusive). Those that pick all their own thimbleberries for jam production represent the informal economic base to the jam industry in Houghton and Keweenaw Counties.

The next level of formality comes for those who mix harvesting for themselves and buying berries from pickers. There is a limited time frame when berries may be harvested and each producer has a restricted amount of storage

space. The more time spent by producers harvesting berries, the less time they have to produce and market jam. Four producers were interviewed that bought at least some berries during the season to combine them with berries they harvested on their own.

As thimbleberry jam making moves more into a formalized system, specialization into harvesting or producing will become more common. Three producers were found to specialize in jam production, in that they spent no time harvesting berries on their own. Those specializing in jam production produced more jam than all the producers who spent at least some time harvesting berries combined. The three specialized businesses produced 810 cases of jam total, whereas the ten producers who spent at least some of their time picking berries produced a total of 628 reported cases of thimbleberry jam. One of the three that only bought berries is a new business with the majority of sales channeled through online and wholesale orders. This producer keeps a type of informal contract with buyers and keeps some records on jam production numbers. There is a slow movement towards specialization as the sale of jam becomes more formal. Presently, jam production is still in transition between formal and informal activities. Even the more formalized businesses rely on informal sales for at least part of their total sales each year.

Selling

Selling thimbleberry jam is not as straight forward as many specialty products, because of the partially formalized structure of jam production. Most sales before the mid-1980s were done between family and friends or at roadside stands, craft sales, bake sales, quilt shows, church functions, school fundraisers, or other informal economic settings. Currently, jam sold in informal settings is still a significant part of selling in general. The persistence of sales done through long-term relationships shows the persistence of informality within the system. Through the transition process more sales are likely done with secondary businesses than has been done in the past. Secondary businesses are those business that buy and sell thimbleberry jam but do not produce it. Secondary businesses include grocery stores, restaurants, souvenir shops, gift stores, and cafes.

Secondary businesses sell through storefronts, mail, telephone or Internet order. Jam producers' methods of sale are much more diverse. Producers may sell to relatives, friends, neighbors, or local businesses wholesale, by mail order, by order over the phone, by sale over the internet, through their own storefront (over the counter sales), through other's storefronts (at a local cafe or restaurant with which they have an agreement), on roadside stands, at craft shows, or at farmer's markets. Some businesses even sell jam to secondary businesses out of state. It is important to keep in mind that there are very few records, none formalized, kept on the volumes of jam produced, sold, or on the percentage of sales occurring through any given method of sale.

The most common sale methods are mail order, telephone order or Internet sales. Thirteen out of fourteen producers participated in these types of sales to some extent. The most visible method of sale by the producer is through storefronts. Fifty percent (seven of fourteen interviewed) had fixed places where they were able to sell jam directly to individuals. Five of these producers owned their own storefronts, one of which was connected to the owner's place of residence. Two others had fixed places to sell directly to tourists that were utilized like storefronts. By volume, the seven with fixed places of sale produced 1029 cases of thimbleberry jam, while the seven without fixed places of sale produced 437 cases. These estimates are for thimbleberry jam production alone and were collected from the producer near the end of the formal jam season (most producers with storefronts close the shop for the winter months after the fall colors fade).

Though the majority of jam was made by businesses with fixed places of sale, the majority of sales were not necessarily done over the counter. Mail order and wholesale are significant methods of sale, though they are less apparent. Three of the seven with fixed places of sale also sold through wholesale methods. The sample may be weighted towards the larger, more visible producers in Houghton and Keweenaw Counties. The most significant sales method could not be determined with accuracy because producers keep no formal records as is common of informal economic systems.

Even though fifty percent of those interviewed have some form of a storefront, only twenty-nine percent (four of fourteen interviewed) participated in

advertising. Considering how little advertising producers do to market their product, the price and the demand for thimbleberry jam is high. The average price for one eight-ounce jar of thimbleberry jam is 8.73 dollars (stdev 1.87; min \$6.00; max \$12.00; n=13). A number of factors combine to make this price. Supply and demand sets the price paid to berry pickers throughout the berry season.

Producers are willing to pay pickers between eight and sixteen dollars per pound for fresh or frozen thimbleberries. The price varies through the season as available storage space fills up and as producers compete for the limited number of pickers.

The price is generally high at the start of the season and drops towards the end.

The more rare the berries are in the woods, the more expensive the jam becomes.

The amount of thimbleberries producers are willing to buy is decided by the amount of space and time a producer is willing to dedicate toward thimbleberry jam production each year. Rarely do producers worry about not selling all they produce. The jam is in high enough demand that producers sell all the thimbleberry jam they make each year. A few hold back a quantity of their stock to have some jam to sell at the beginning of the following year.

Pickers have the opposite problem. The production market is not able to absorb the quantity of berries picked from the woods each year. In fact, some people have chosen to ship their berries to producers out of state, rather than deal with producers in Houghton and Keweenaw Counties. Whether this is because they can get a better price elsewhere, or if the local producers are not able or willing to process as many berries as are being taken from the woods is unclear. Several pickers say there are many berry patches that are undiscovered in

Houghton and Keweenaw Counties. One picker said that thousands of bushels of berries remain untouched each year.

Before the 1980s, the price for thimbleberry jam was comparable to other types of jams. The price increase happened in the early 1990s and never settled back down to its previously low price. Tourists are the most significant end consumer from an economic standpoint. Whether they buy directly from the producer or through secondary businesses is irrelevant. Their demand for thimbleberry jam is what keeps the price and production high. Each year jam made in Michigan's Upper Peninsula is mailed all over the United States and into Canada. One producer said that the only reason the business makes jam is because a few of the customers request it yearly.

Thimbleberries are becoming popular once again. In 1979 the Thimbleberry Blossom Festival was started to celebrate the season's thimbleberry crop. It featured events like a ball, an ethnic food fair, a Frisbee tournament, a gun show and a parade (Copper Island Sentinel, 1979). The festival died out in the mid-1980s, but was reinstated in 2000. In fact, thimbleberries may be listed among the things that represent Houghton and Keweenaw counties along with copper mining and the pasty (an Upper Peninsula version of shepherd's pie). Local shops print the leaves and flowers of the thimbleberry on all kinds of regional paraphernalia. A good example is a national chain of motels that puts the berry on the front cover of their brochure, even though their business has nothing to do with the harvesting or sale of thimbleberries. In a downtown shop one is able to buy Thimbleberry Ware; pottery with thimbleberry designs painted on the

outside. Thimbleberry jam is not a large industry, though it is a visible business for Houghton and Keweenaw Counties. If every jar in all the cases produced during the year 2003 were sold at an average price of 8.73 dollars, then 17,592 jars would be sold for just over 150,000 dollars. Around 50,000 dollars of the total would be used to pay pickers for berries harvested from the woods if pickers were given an average of nine dollars per pound for the berries used to make the total number of jars estimated as this year's production total. These numbers are included to give a rough estimate of the importance of thimbleberry jam to the local economy. Since few records are kept on expenses involved in the jam business, there were too many unrecorded variables to make a more precise estimate of thimbleberry's total value for those involved.

Constraints

The potential for the growth of the thimbleberry jam business is shown in the high demand and the ready supply of wild thimbleberries. Even though thimbleberry jam production shows much growth potential as a business venture, the lack of cultivation, the initial investment, and the perspectives of producers about the business keep it from rapid growth. The jam industry seems to have been stable since the mid-1980s. Twenty-four businesses were reported in Houghton and Keweenaw County in 1987 (Sherman, 1987). Today's numbers are fairly similar, though accurate numbers have not been kept on how many businesses are registered with Michigan's Department of Agriculture at any one

time. This research found evidence for twenty-two businesses producing jam commercially.

Though thimbleberry's economics have developed over the years, the plant has always been wild. *Rubus parviflorus* is not cultivated commercially, though it is grown in nurseries in the western United States for ground cover and for native plant gardens. There have been some attempts at interbreeding thimbleberry with other *Rubus* species, but none of the breeding options have been considered commercially valuable. Hybrid specimens resulting from the cross of *R. ideaus* and *R. parviflorus* have been found to be nearly sterile (Jennings, 1983). A few polyploid varieties set fruit well in cool temperatures, but do not retain this quality after a few generations (Janick, 1996). The difficulty of producing hybrids, low fruit productivity, multiple pests, and harbored diseases are the most likely reasons that thimbleberry has not been used in commercial production. Even if berries were produced on a large scale, higher producing varieties would need to be bred to reduce the amount of space taken up by this woody species. Lack of cultivated varieties has limited the production of thimbleberry jam to the few people who are willing to harvest the berries from the wild.

Cultivation is feasible for the area, though it is underutilized. Only one producer was found to have successfully cultivated thimbleberries in their native habitat and successfully managed thimbleberry plant growth on private property. Nobody interviewed had successfully cultivated thimbleberry in a controlled setting such as a garden or farm field; though several had tried. Thimbleberry

remains a wild product matching the conditions necessary to make thimbleberry jam a non-timber forestry product.

Though the initial investment to produce thimbleberry jam is not great, it is just large enough to deter people from entering the business. The legalist description of informal economic systems stresses that governmental regulation has forced business entrepreneurs with less capital into informal economic systems (Morales, 1995). This seems to be the case with thimbleberry jam production. Those small producers who do not have the capacity for large-scale jam production are deterred from entering the business because of initial investments in a licensed jam kitchen, licensing fees and yearly inspections. Those who are involved with formal sale of jam products are generally more serious about their businesses and produce larger quantities.

Most people would like to keep their jam production small. When asked about advertising, only four people out of fourteen interviewed (twenty-nine percent) said that they participated in some form of advertising in the year 2003 (Table 10). Three people said that the reason they do not advertise is because they wish to keep their business small. They referred to the things that they were doing, like keeping a sign on the roadside, having a roadside stand or spreading the word through friends, as enough. Some of these same people say that they value the extra income generated through jam sales.

Table 10: Fourteen participant's responses to the question, "Do you advertise?"

<u>Response</u>	<u>Number of times mentioned</u>	<u>Response</u>	<u>Number of times mentioned</u>
No	10	Yes	4
<u>Why not?</u>		<u>How?</u>	
Sign on road	2	Radio	2
Want to keep small	3	Brochures	2
Roadside stand	1	Newspaper	3
		Local magazine	1
		Internet	1
		Television	1

n=14

It is the perception of the jam business as a small, side-job that keeps thimbleberry jam production from expanding. Only one person was found to specialize in thimbleberry jam sales. People may not be making their living from thimbleberry jam sales because of the short season. Ripe berries may only be found for approximately three months out of the year, so it would require a full time operation to store enough thimbleberries to have plenty to sell throughout the rest of the year. Few people are willing to concentrate on thimbleberries during the summer months, a period of time when many other profitable business activities are available.

It is this same perception of the business as a small, side-line enterprise that may account for the longevity of the average thimbleberry jam business. An average of fourteen businesses shows that the average age of their businesses is fifteen years (stdev 19.2; n=14). There were more young businesses than older businesses, but a few of the older businesses were thinking about shutting down fairly soon. Older businesses going out while new come in could show a cycling

of people involved with thimbleberry jam. The cycling, when combined with the high average life-span of thimbleberry businesses could be evidence that thimbleberry production is a sustainable, stable enterprise. The lack of young adults found in the system may keep the business from rapid growth or change, since young people often bring new ideas and vigor to business ventures.

Here again the transition may be seen because few businesses have gone over completely to formal systems. Most people are not in business to maximize profits or to expand. Only one or two businesses were found to have formalized systems in place. One of the newer producers kept semi-formal records and made contracts with businesses for wholesale transactions. The rest may value their long-term buyer-seller relationships, trusting friends and family to buy most of the jam made each year. Taking this into account it makes sense that the Internet is underutilized as a resource. Only three producers were found to be online with their sales. One of these said that the Internet is hardly worth the effort. This producer's online sales are less than the business's over-the-counter sales from the small storefront. Another does not keep track of the sales done online, considering them one more method of mail ordering.

The reason for the small online sales may be that others do not appreciate thimbleberry jam like long-term residents of Houghton and Keweenaw Counties to whom thimbleberry has always been a part of their lives. One producer said:

I feel the Thimbleberry is a personal food....it means something to mainly the people who live here or have lived here. It is something they grew up with from their childhood. Just like sushi means something to those who grew up eating sushi. It does not mean much to Americans from where I'm sitting. The Thimbleberry brings back memories. I don't see it as being very popular outside of the U.P....

The above quote reveals some of the social value that thimbleberry has to those who pick the berries, or produce jam every year. The cultural aspects of thimbleberry jam cannot be set aside when considering its market value. Even though the data gathered points toward money as the most significant factor keeping pickers and producers producing jam, there is a cultural side of jam production that could not be easily measured. For many people, thimbleberries are more important socially for the family time it takes to harvest berries and produce jam than the extra income that such activities generate. These cultural aspects of jam production are significant constraints to thimbleberry's future success as a primary business venture because the jam may not be very popular outside of its context and because current producers may not be attracted to the changes that come with large-scale production. The average consumer may not be interested in paying the extra cost without marketing and advertising to show why the jam is priced higher than other wild berry jams.

So, what is the future of thimbleberry jam? Twelve producers answered this question (Table 11). The point of common agreement on the future of the jam business is that prices will go up through a combination of higher demand and fewer berries in the woods. Those two who answered that there will be fewer

berries in the woods in the future were concerned about the closure of the forest canopy over the most widely known harvesting locations such as old logging or mining roads and old railroad tracks. None interviewed could see the business decreasing, though some anticipated that fewer pickers would be present in the future. This worry probably stems from the lack of young adults as pickers within the system.

Table 11: Twelve participant's responses to the question, "What do you see as the future of the thimbleberry jam business?"

<u>Response</u>	<u>Number of times mentioned</u>
Higher demand	4
Higher prices	2
Fewer berries	2
Business growth	2
Less picking	2
Same	2
More competition	1
Cultivation	1

n = 12

Though cultivation was only mentioned once, it should be addressed separately, because it shows one of the potential futures of the thimbleberry plant. The question, "Have you tried to cultivate thimbleberry?" was asked of twenty three pickers or producers during the study. Of the five that said they had tried, only one was found who had successfully cultivated productive thimbleberry plants. This producer was not able to grow the plant in highly controlled settings, but was only able to propagate the plant in its forest setting on private property.

That success shows a potential for future cultivation by proper management of private property with a significant thimbleberry understory component. Currently, many pickers harvest primarily or to some extent from private property. As the forest canopies close over popular picking locations, private property will most likely receive more harvesting pressure by thimbleberry pickers. One picker and producer said that the future of the thimbleberry plant lies in logging and conservation efforts to thin the forest and keep roads and trails clear.

The thimbleberry business seems to be a stable industry with growth potential. The history of jam sales, the perspective of producers and pickers, and the current market structure indicate that the business has been stable and sustainable. The increasing demand and large stock available in the woods indicate that the thimbleberry jam business has growth potential.

Chapter Five: Conclusions

Thimbleberries grow in common places, alongside roads, along stream banks, under telephone poles, along hiking trails, along snowmobile trails, or on old railroad tracks. Anybody is free to collect them at will. Harvesting is often seen as a social activity, so pickers may harvest with their family or combine harvesting with a variety of other activities like hiking, four-wheeling, family outings, or taking the dogs out to run. Not all the berries harvested each year go to thimbleberry jam production because some are used for home consumption and some is used for gifts. Thimbleberry harvesting falls easily into the category of NTFP activities, because they are harvested solely from forest settings and the manner of harvest is very close to that of other NTFPs. Everyone has an opportunity to harvest at least some thimbleberries each year because thimbleberries grow frequently in public places and there are no initial fees or special equipment needed to harvest berries.

Producers may harvest berries, buy berries from pickers or combine the two activities. Those producers picking all their own berries sell their products in the accepted manner of informal economic enterprises. The businesses are entrepreneurial in nature and business activities are unregulated and non-contractual. They are generally the smaller producers who rely on long-term buyer-seller relationships for the majority of their sales each year. Those buying at least some berries from pickers fall progressively into more formal economic categories as they spend less time personally picking berries from the woods. As

producers specialize in production they also increase their business productivity and shift to more formal economic methods to produce and sell their stock.

Not all the jam producers make each year goes toward commercial sales. Producers may eat it at home or give jam away as gifts. Sale methods vary widely depending on whether the sale is to individuals or secondary businesses. Sales to secondary businesses such as tourist shops, restaurants, grocery stores, gift shops, cafes, or specialty stores are done as wholesale transactions. Sales to individuals are much more varied including sales through craft shows, bake sales, mail orders, telephone orders, Internet orders, storefronts, or personal communications with friends.

Though there is much value in thimbleberries, a high demand, and a ready supply, the business as a whole is stable, not growing. The commercial boom happening in the NTFP market in the Pacific Northwest has not yet reached Michigan's Upper Peninsula. As a result, all labor, capital and ownership continue to be isolated to the region and not spreading quickly to national or global markets (Emery, 2001). The lack of young adults involved with thimbleberry jam production may be slowing the growth of the business, because young people often bring change and energy to established business systems.

People are drawn to thimbleberry jam production or thimbleberry harvesting because of the money involved with the berry. Though the total amount spent on all aspects of thimbleberry jam production is not overly large as a commercial product, the money earned by those involved in the business is significant to them. Some rely heavily on earnings made from jam production

activities. People are attracted to thimbleberries not only for the money involved but also for the social aspects of jam production. A jam producer may spend more time with family and friends through picking or selling, and have a freer time schedule than could be managed through other employment opportunities. The social aspects of thimbleberry are significant and should not be left out of the analysis of thimbleberry jam production as a whole, even if these values can not be quantified.

In the specific case of the thimbleberry market, growth does not seem to be hindered as much as it is unrealized. There is potential for large-scale production as evidenced by the high demand and ready supply of berries in the forests and the fact that the entrepreneurial character of the NTFP industry draws those looking to make extra money. The potential also exists for cultivated thimbleberry on a large scale through properly managed forest stands with a significant thimbleberry understory component. One producer was found to be actively managing private property in this manner. Many were found to harvest thimbleberries exclusively or to some extent from private property. The potential for improved production exists on private property if landowners have the knowledge base and the motivation to actively manage their stands for thimbleberry growth.

Most businesses specializing in jam production in general have realized the potential of thimbleberry jam as a luxury item, but have not fully capitalized on it. They do not advertise their business, nor do they promote thimbleberry jam as the specialty product that it is becoming. The problem is that the transition has

not been made fully into a formal economic setting. Informal settings have a much more significant social aspect to consider, and large-scale production would mean much change for the current infrastructure.

As the thimbleberry market is found currently, pickers are still harvesting berries as an NTFP. They work in a variety of other jobs and primarily harvest for the extra money involved or the cultural value of the activity. The majority of producers still function in informal economic settings. They harvest their own berries and have family involvement in their jam businesses. Thimbleberry jam production seems to be wrapped more in tradition (picking is a part of their lives) and personality type (the outdoor enthusiast) than it is in marketing hype and advertising campaigns.

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Appendix

Cover letter for mailed Picker Questionnaires

October 21, 2003

Dear _____,

Hello, my name is Jason Anderson. I am a student at Michigan Technological University working on a Master's project for the department of Forestry about the economics of thimbleberry jam production in Houghton and Keweenaw Counties. I got your name and address from the Jampot.

I am trying to speak with as many commercial thimbleberry pickers or processors as possible to gain a good understanding of the local thimbleberry market. Though I would prefer to talk with or meet with you in person, I have been unable to find your phone number. Feel free to call me if you would like to speak/meet with me in person to answer the enclosed questionnaire.

Be assured that I will hold any information that you give me as confidential. Your name or address will not appear in my final work if you do not wish it to be published along with my project paper. You may elect to skip any question that you dislike for any reason and starting the questionnaire does not mean that you must finish it. Incomplete questionnaires may be used as well as complete ones, so answer as you see fit.

If you wish to be a part of the research:

1. Please answer the fifteen enclosed questions and return the questionnaire using the return envelope.

2. Please sign the permission waiver and return it along with the questionnaire.

Note: For legal reasons, I may not use any of your responses without the form signed. It states that you understand that you are a volunteer in the research and are guaranteed confidentiality as such.

If you have any questions about who I am or the nature of my research; please contact me, my supervisor, or the Internal Review Board:

Jason Anderson: (906) 487-3021; e-mail: jaaander@mtu.edu;
My supervisor: Blair Orr: MTU Forestry; 1400 Townsend Dr. Houghton,
Mi 49931; (906) 487-2291; bdorr@mtu.edu;
IRB: Joanne Polzien: (906) 487-3043; jpolzien@mtu.edu

Human Subject Research Form

Michigan Tech is conducting a study of the thimbleberry market in the Keweenaw Peninsula. The information I gather from you will be used in a report for my work towards a Master's degree and may also be published. I will not identify you in any of the written material or material I present as part of my research. Starting the interview does not require you to complete the interview. You may stop the interview at any point or elect to not answer specific questions. Confidentiality will be assured unless you give specific written permission that your name can be used.

If you have any questions or concerns about this project you may contact Blair Orr (research supervisor for this project) at (906) 487-2291 or Joanne Polzien MTU-IRB at (906)487-3043 or jpolzien@mtu.edu.

Signature

Date

Printed Name

Written Consent

I grant permission to Jason Anderson and the School of Forest Resources and Environmental Science to use photographs taken during this interview in the research reports and publications based on this interview.

Signature

Date

I grant permission to Jason Anderson and the School of Forest Resources and Environmental Science to use my name in the research reports and publications based on this interview.

Signature

Date