Minnesota Harvester Handbook

SUSTAINABLE | LIVELIHOODS | LIFESTYLES | ENTERPRISE

University of Minnesota
Extension

Minnesota Harvester Handbook

Additional information about this resource can be found at **www.myminnesotawoods.umn.edu**.

University of Minnesota Extension shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

In accordance with the Americans with Disabilities Act, this publication/material is available in alternative formats upon request.
Direct requests to the Extension Regional Office, Cloquet at 218-726-6464.

The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by University of Minnesota Extension is implied.

University of Minnesota
Extension

Acknowledgements

Financial and other support for the Harvester Handbook came from **University of Minnesota Extension**, through the **Extension Center for Food, Agricultural and Natural Resource Sciences** (EFANS) and the **Northeast Regional Sustainable Development Partnership** (RSDP).

Many individuals generously contributed to the development of the Handbook through original research, authorship of content, review of content, design and editing. Special thanks to Wendy Cocksedge and the Centre for Livelihoods and Ecology at Royal Roads University for their generosity with the Harvester Handbook concept. A special thanks to Trudy Fredericks for her tremendous overall efforts on this project.

PROJECT DEVELOPMENT, RESEARCH AND MANAGEMENT

Dave Wilsey, Extension Educator, University of Minnesota Extension, dwilsey@umn.edu

Julie Miedtke, Extension Educator, University of Minnesota Extension, miedt001@umn.edu

CONTENT CONTRIBUTORS AND REVIEWERS (LISTED ALPHABETICALLY)

Mimi Barzen, Forester, Minnesota Department of Natural Resources

Tim Brigham, Coordinator, Centre for Livelihoods and Ecology, Royal Roads University

Bob Carls, Wood Turner, Ripple River Gallery

Elise Diederich, Policy Fellows Program (2011-12), H.H. Humphrey Center for the Study of Politics and Governance, University of Minnesota

Annette Drewes, Instructor, Forestry Natural Science , Leech Lake Tribal College

Carly Eichorst, Policy Fellows Program (2011-12), H.H. Humphrey Center for the Study of Politics and Governance, University of Minnesota

Ralph Fideldy, Proprietor, Timber Sweet Maple Syrup

Dave Fuller, Agriculture and Non-Timber Forest Products Professional, University of Maine Cooperative Extension

Anna Gerenday, Scientist (Retired), University of Minnesota; Past-President, Minnesota Mycological Society

Tom Howes, Manager, Fond du Lac Resource Management Division

Bill Jaeger, Traditional Scandinavian Wood Carver

Eric Jones, Courtesy Faculty, Anthropology, Oregon State University

Mike Kempenich, Proprietor, The Mikeology Store

John Krantz, Utilization and Marketing Specialist (Retired), Minnesota Department of Natural Resources

Fred Livesay, Woodcarver, North House Folk School

Jim Lutgen, Forestry Technician (Retired), Minnesota Department of Natural Resources

Julie Miedtke, Extension Educator, University of Minnesota Extension

L. Leonard Moose, Ojibwe Language Educator

Mary Moose, Ojibwe Language Educator

Erika Mork, Policy Fellows Program (2011-12), H.H. Humphrey Center for the Study of Politics and Governance, University of Minnesota

Elizabeth Nauertz, Forester, United States Forest Service

Steve Netzman, Past-President, Minnesota Mycological Society

Harlan D. Peterson, Assistant Extension Professor (Retired), University of Minnesota Extension
Carrie Pike, Research Fellow and Interim Director of Operations, University of Minnesota Cloquet Forestry Center
Raymond Porter, Research Associate - Wild Rice, University of Minnesota North Central Research and Outreach Center
Mike Reichenbach, Extension Educator, University of Minnesota Extension
Jon Strom, Wood Carver, North House Folk School, Grand Marias, Minnesota
Craig Van Sickle, Supervisor, State Forest Nurseries, Minnesota Department of Natural Resources
Carl Vogt, Extension Professor (Retired), University of Minnesota Extension
Steve Vongroven, Wood Product Utilization and Marketing, Minnesota Department of Natural Resources
Dave Wilsey, Extension Educator, University of Minnesota Extension
Gary Wyatt, Extension Educator, University of Minnesota Extension
John Zasada, Research Silviculturist (Retired), United States Forest Service

PHOTOGRAPHS AND OTHER GRAPHICS (LISTED ALPHABETICALLY)
Chris Evans, Illinois Wildlife Action Plan, Bugwood.org
Dave Fuller, Extension Educator, Maine Cooperative Extension
Anna Gerenday, Professor Emeritus, University of Minnesota
Diana Goemann, Executive Office and Administrative Specialist, University of Minnesota Extension
Mary Ellen (Mel) Harte, Bugwood.org
George Hornik, Goods from the Woods
Gary Johnson, Assistant Extension Specialist, Urban and Community Forestry, University of Minnesota
Mike Kempenich, Proprietor, The Mikeology Store
Ken Korczak, Writer and Blogger (Living Off the Land: Foraging, Organic Gardening, Nature)
John Krantz, Utilization and Marketing Specialist (Retired), Minnesota Department of Natural Resources
Julie Miedtke, Extension Educator, University of Minnesota Extension
Gary Mourin, Craftsperson
John Peterson, Landowner and Maple Syrup Producer
Carrie Pike, Research Fellow and Interim Director of Operations, University of Minnesota Cloquet Forestry Center
Rob Routledge, Sault College, Bugwood.org
Eli Sagor, Extension Educator, University of Minnesota Extension
Dave Wilsey, Extension Educator, University of Minnesota Extension
John Zasada, Research Silviculturist (Retired), United States Forest Service

DESIGN, LAYOUT, EDITING AND PRINTING
Dave Wilsey, Extension Educator, University of Minnesota Extension
Julie Miedtke, Extension Educator, University of Minnesota Extension
Trudy Fredericks, Executive Office and Administrative Specialist, University of Minnesota Extension
Kathleen Preece, independent contractor
B. Jim Boyd, independent contractor
Pro Print, Inc., Duluth, Minnesota

Introduction

Welcome to the Minnesota Harvester Handbook!

This resource – developed by the University of Minnesota Extension, with the help of a broad network of contributors – demonstrates the breadth and diversity of useful natural resources found in and around the state's woodlands and forests throughout the year.

The "Land of 10,000 Lakes" is known for its abundant water ways, flora and fauna. The state's resources and the products derived from them help define Minnesota in more ways than one. Consider, for example, balsam boughs, maple syrup and morel mushrooms. Though found elsewhere, these products are commonly associated with the north woods and Minnesota, in particular. Annual retail sales for balsam wreaths typically exceed $20 million and the industry provides seasonal employment and income opportunities for wholesale nursery operations, local bough buyers, bough harvesters and wreath makers. Minnesota's maple syrup producers are part of a roughly $100 million dollar industry that produces around 2 million gallons of syrup annually. Here, Minnesota remains a small player with vast untapped potential in a growing international market. This is to say nothing of the number of producers whose syrup is destined only for their kitchen tables and those of family and friends. Each spring, thousands of enthusiastic foragers comb the forests and woodlands of Minnesota in search of morel mushrooms. Not only are these individuals seeking one of nature's prized edibles, which can sell for up to $20 per pound at farmers' markets, they regularly observe and interact with large tracts of forested landscapes.

Minnesota's abundant natural resources also help define the people of Minnesota. The state's original inhabitants, more recently established communities of varied ancestry and the many new cultures that increasingly characterize the changing face of Minnesota all rely on the state's natural resources in various and often shared ways. In this regard, natural resources are common elements to otherwise different identities and livelihoods. Minnesota's woodlands provide important meeting spaces for these diverse cultures and the knowledge and practices associated with these spaces offer opportunities to build cultural bridges between the region's people. Gathering represents a potential venue for sharing knowledge about specific plants, products, practices and people.

This first edition of the Minnesota Harvester Handbook is only a modest starting point to presenting the wealth of resources and products available in the region. It includes some well-known favorites, like maple syrup and morels; lesser-known products often overlooked, like juneberries and ramps (wild leeks); and a few novel items, like chaga (a medicinal fungus). Many of the products have commercial potential, like balsam boughs and character wood. We hope that readers will explore new and different ways to incorporate natural resources into their lifestyles and livelihoods, and will learn more about the region's products and people in the process.

University of Minnesota Extension believes the information within to be accurate at the time of publication. All content was developed in collaboration with knowledgeable practitioners and harvesters, and every page was reviewed for accuracy and quality. The sector is dynamic, however, and information about product availability, policy and markets may change quickly. Consequently, University of Minnesota Extension is not responsible for any costs or damages that may be incurred as a result of the use of the information in this handbook.

Using the Harvester Handbook

The Minnesota Harvester Handbook contains two, complementary main elements. The first, the *basic tenets* of harvesting – biology & ecology, social, markets, and policy – apply to all of the products covered in this version and to the many others that are not. In other words, the basic tenets are core content common to all products and explain the basic concepts associated with resource claims, access and sustainable uses.

The second, *fact sheets,* address a selection of important and interesting natural resources and present the specifics of the basic tenets within the context of a single product. We intend to continue developing fact sheets so that the resource continues to grow and better reflect the full breadth of harvesting activities across the state and region.

The Handbook is organized to facilitate ease of use. Two tables of contents provide different means to access product information, or points of entry. The *seasonal* approach organizes products by their approximate availability throughout the year. As exact harvest times vary by region and even location, as well as by year, weather and market conditions, product availability may span across seasons. The addition of a ' + ' before or after the seasonal notation indicates extension of harvest time in either direction. For example, [FALL +] means that fall harvest may extend into early winter.

The second table of contents is organized around *product clusters*, which group products based on their category of use, such as edible mushrooms or décor. The intent is to highlight related products so that users might become familiar with new or different products used in a similar way. A single product may be included in multiple clusters. For example, pine cones harvested for seeds differ from cones harvested for use as holiday décor.

The header of each fact sheet contains coding that alerts the user to a product's main season and primary product cluster. The header codes serve as another tool to direct readers from one product to others related by season or use.

Each product fact sheet contains the relevant life form and part used, for example tree and sap. Fact sheets also include the scientific name(s), common name(s) and, whenever possible, the name of the product in Ojibwe, Spanish and Hmong. Naming represents a considerable challenge, particularly when it concerns edible products with potentially dangerous look-alikes or relatives. Harvesters must exercise utmost caution around the use of names as a means to identify products.

The Harvester Handbook provides a point of entry to the world of natural resource gathering and should be used in conjunction with other plant identification resources. Many of the fact sheets include references for just such companion publications. Regardless of the resource employed, only those individuals capable of making a positive identification should harvest and use natural resource products, particularly wild edibles.

The editors and contributors wish the users of this Handbook the best in their efforts to learn more about some of Minnesota's wonderful natural resources and products, and to advance along the path toward making sustainable resource use an integral part of their lives and livelihoods.

TABLE OF CONTENTS | SEASONS

Spring

Summer

Basic Tenets

Anytime

Fall

Winter

Notes

TABLE OF CONTENTS | PRODUCT CLUSTERS

Edible Mushrooms [ED-M]

Bark, Sticks & Woods [BS&W]

Basic Tenets

Other

Saps & Syrups [S&S]

Edible Greens & Berries [EG&B]

Holiday Décor [HD]

Notes

BIOLOGY & ECOLOGY

Natural resource harvesting enhances Minnesotans' lifestyles and livelihoods. Examples include gathering, hunting and trapping. It is through such activities that many individuals, families and friends recreate and experience the outdoors and the region's natural settings. In addition, these activities can offset expenses by gathering and hunting food and other useful materials. They can also generate income through sale of gathered materials or value-added products made from them. This handbook encourages responsible, sustainable harvest practices. *Responsible* harvest begins with a basic understanding of the biology and ecology of harvested plants and animals.

What are you harvesting?

It is usual to think of harvested plants and animals as products: wreaths, baskets, jam . . . or dinner! Yet, responsible harvest requires that we recognize exactly what we are taking, biologically speaking, and how our harvest affects the health/growth of the individual plant/animal and the broader population and community of which it is a part. In short, responsible harvest requires that we understand not only what we get, but also what we take. For this, harvesters should consider four basic categories.

REPRODUCTIVE PARTS

This category refers to plant parts associated with reproduction of the plant population: fruits, nuts and cones, all of which are seeds or seed vessels or, in the case of mushrooms, spore vessels. Often these parts have high nutritional value in the form of oils, proteins and sugars. Simply put, some of the things that humans most appreciate, such as sugars, fats and even beauty, are the incentives that plants, which cannot move, offer to get animals (including humans) to distribute their seeds to new locations. Our fruit and nut harvests are actually seed harvests. Also, these fruits and nuts are often important food sources for non-human animals. Fruit and seed availability often influences the presence of certain animal species.

VEGETATIVE STRUCTURES

This category refers to non-reproductive plant parts such as buds, leaves, stems, bark and roots. Because the category is broad, careful consideration must be given to exactly what is harvested and how harvest might affect present and future plant condition. For example, collecting the apical buds may substantially influence future plant growth and structure. Cutting stems triggers new growth in certain plant species, but in others it may kill the plant. Some tree species, such as paper birch, can easily survive a properly done bark harvest, while other trees will not. In all plants, roots provide structure and function, but in some, roots also represent an important mechanism for new growth.

SAPS

This term refers to various substances se-

Above: Frozen maple sap. Photo by J. Peterson.

Biology: **Pertaining to living organisms.**

Ecology: **Pertaining to living and non-living elements of the system as well as their interrelation.**

Individual: **One of a particular species.**

Population: **A group of organisms of the same species that occupy the same area.**

Community: **Any grouping of populations of different organisms living together.**

Apical: **The bud from which new growth occurs.**

BIOLOGY & ECOLOGY

Habitat: **The living place of an organism, characterized by its living (biotic) and physical (abiotic) properties.**

creted by plants. In Minnesota, maple and birch produce the saps most likely to be of interest to harvesters. Tree sap flows most heavily in spring months when trees are coming out of winter dormancy. The sap brings stored sugar, other compounds and water to areas of new growth. Historically, certain pine trees were also tapped for their saps, which were distilled into various products such as turpentine.

WHOLE PLANTS OR ANIMALS

Sometimes, harvesting means taking the whole plant or animal. In such cases, understanding what you are taking is just as important: male or female, adult or juvenile, rare or abundant. In some cases, it may be advantageous to only harvest females to manage population growth, as in the case of deer. Likewise, it may be beneficial for the population to harvest only juveniles so that strong adult plants may continue to reseed the area.

When are you harvesting?

Plants and animals are living things that respond to seasonal changes and develop over time. For these reasons, *when* we harvest can be as important as *what* we harvest. Important considerations include periods of growth and dormancy, periods of reproduction, and life stages and cycles. For example, you might want to know when certain pine cones release their nuts/seeds so that you can properly time your decorative cone harvest.

Above: This cone is ready for a wreath. Photo by D. Wilsey.

How are you harvesting?

Technique refers to how a plant or animal is harvested and is another important consideration for responsible harvest. One aspect of technique relates to the actual harvest method. For example, bough pickers might break or snip them from the branch. Collection of whole plants might involve cutting at the base of the stem or pulling out the plant with its roots. Different techniques yield different results, both in terms of product quality and effect on the plant and plant habitat.

Another aspect of technique is disturbance, which refers to the harvester's influence on plant habitat, the local environment in which the plant or animal lives. Disturbance is not necessarily negative, and some level of dis-

Above: Watch your step in the spring! Blueberries are flowering. Photo by D. Wilsey.

turbance is unavoidable. At its worst, substantial disturbance can limit future viability of a population in a particular locale, either by impeding new growth or favoring growth of another species, including invasive species that might like disturbed soil.

Harvesters who recognize the importance and potential effects of technique and disturbance can, and often do, act to minimize negative or undesirable outcomes. Harvesters learn about, develop and share best practices through word of mouth and publications such as this one. Examples of good harvesting practices that help reduce negative impacts include, but are not limited to:

- encouraging loose seed to fall to soil
- tamping the soil after harvest
- using an open basket to allow mushroom spores to spread
- leaving a proportion of harvestable material behind
- avoiding harvesting in some areas
- replanting.

HARVEST INTENSITY

Responsible harvest requires consideration of harvest intensity, which includes three different aspects:

How much?

Understanding harvest intensity in a particular location begins with understanding how much you are taking when you gather. This might be measured in pounds, gallons, bushels or some other measure. It also relates to how much is actually present at the site.

How often?

The second component of harvest intensity in a particular location is how often you gather in that area. (How much) X (How often) is the simplest way to determine your own harvest intensity for a given area.

Other harvesters?

The third element of intensity is the recognition that, although we often gather in solitude, we typically share natural resources with other beings, human and non-human, who may have similar interests. A clear understanding of harvest intensity requires consideration of the actions of other harvesters we may never see, but whose actions combine with our own to influence the condition and abundance of the resource we gather.

Concluding thoughts

The practice of harvesting is as old as humanity, and you don't need to be a biologist or ecologist to do it right! Sustaining your preferred harvest activities over time and space, however, requires some consideration of plant biology and ecology, even if called by some other name. Take some time to reflect on what you are harvesting and to learn about the techniques and practices that have been developed over time to ensure the ecological, economic and social sustainability of harvest.

Harvest only what you need and think about those who will follow.

Notes

SOCIAL

Much like our abundant lakes, forests and forest resources help define Minnesota and its people. While Minnesota has but one forest resource, its large and diverse human population collectively stewards that resource's value and continuously challenges its limits, by showcasing different and new uses. This handbook provides an opportunity for natural resource harvesters and gatherers, regardless of their particular interests, to achieve a better understanding of the countless and emerging uses of our shared forest resource. In doing so, readers have the opportunity to further develop individual and shared identities and livelihoods that feature and celebrate the products that are special to our region.

Above: Family traditions. Photo by D. Wilsey.

Connections to the land form at individual and societal levels. In many cases, people use natural resource activities such as gathering and hunting to create and demonstrate individual identities. Many of us know someone who identifies him or herself as a hunter, a forager, a wild crafter, or some other similar type of natural resource user or consumer. These identities are demonstrated and reinforced through actions, such as taking deer or grouse, seeking morels, gathering boughs to make holiday wreaths. These actions represent critical interactions between individuals and their environment. They have tremendous value to the individuals involved, often symbolizing independence, skill, traditional knowledge, and long-standing connections to place.

Forests and forest resources also contribute to Minnesota's social fabric through creation of shared identities, such as family, community or culture. Just as an individual would have difficulty claiming the title of forager without actually foraging, a social group would have difficulty claiming such identities without the ability of its members to practice certain activities on at least on some level. It is essential to bear in mind the importance that particular groups place on the ability and/or rights to practice those natural resource activities that help to define, at least in part, who they are.

Shared connections to natural resources represent potential cultural bridges between Native American communities, more recently established communities of varied ancestry, and the many new cultures that increasingly characterize the changing face of Minnesota. Often, interest in resources and resource related activities overlap, a fact that can lead to cooperation in the best instances, or conflict in the worst. A better understanding of some of the social issues related to natural resource harvest can strengthen the social fabric that bonds the state's diverse inhabitants. In contrast, challenges or threats to access and harvest rights are often met with dramatic responses. Ignoring these issues has the potential to weaken and undermine these ties between groups and to the land. For these reasons, it is essential to understand the ways that nat-

SOCIAL

Livelihood: **The capabilities, resources, and activities required to create a for a means of living.**

Contemporary subsistence: **The incorporation of subsistence-oriented activities into contemporary livelihood strategies, which may include activities and resources not viewed as traditional.**

REFERENCES

Pierce, A.R. (2002). Social Issues. In P. Shanley, A.R. Pierce, S.A. Laird, & A. Guillen (Eds.). ***Tapping the green market: Certification and management of non–timber forest products*****. London, UK: Earthscan, Ltd.**

Jones, E.T., McLain, R.J., & Weigand, J. (Eds.). (2002). ***Nontimber Forest Products in the United States*****. Lawrence, KS: University Press of Kansas.**

ural resources and related activities contribute to our own individual and social identities as well as those of others.

Livelihood can be an important component of both individual and social identity. Threats to livelihoods, therefore, represent a substantial social challenge. Although timber and non-timber resource harvest can be compatible, issues such as liability, incidental damage to valuable resources or high transaction costs often make it easier to limit resource access and use as a means to retain the economic viability of important livelihood activities. Respectful communication, sharing of knowledge and patience are tools that can lead to more diverse and sustainable natural resources uses.

A related concept—contemporary subsistence—may be unfamiliar to many readers. The term refers to the use of one or several natural resource activities to support broader livelihood strategies. Contemporary subsistence might describe approaches taken, willingly or out of need, by many rural residents and members of culturally defined communities, such as the Anishinabe. In contemporary subsistence livelihoods, natural resource use is not a means to make a living, so to speak, but it is a practice that may contribute substantially to a person's life or livelihood, economically, socially and/or spiritually. In such cases it is less often a question of how much (product, money) than of intentionally acting in a way that reinforces identity or culture. Some recognizable examples in Minnesota might include members of immigrant or established Hmong communities fishing urban rivers, Tribal Band members spearing and netting walleye and the proliferation of raised-bed gardens on urban lots.

In reality, scarcity likely represents the greatest underlying challenge to harmonious and cooperative behavior in the natural resources realm. Scarcity refers to limited resources, of course, but also to limited access to abundant resources, which results, in part, from things like land ownership, management priorities and regulations on public lands, limited knowledge and other informal barriers to access and use of natural resources. Throughout, this handbook advocates positive actions like education, respectful communication and sharing of knowledge as strategies to overcome some of these actual and perceived barriers.

In conclusion, this handbook provides an opportunity for natural resource harvesters and gatherers, regardless of their particular interests, to achieve a better understanding of the lifestyle and livelihood motivations that may drive themselves and others to act and react in certain ways. Minnesota's natural resources are abundant and offer a means to develop compatible identities and livelihoods that feature and celebrate the products that are special to our region.

MARKETS

Minnesota lifestyles and livelihoods are enriched by the harvesting of natural resources – including gathering, hunting and trapping. Livelihood benefits accrue directly, though use and consumption of harvested products, and indirectly, through the exchange and sale of harvested products, in raw or processed forms. There is no reason to assume that sustainable harvesting and market-oriented harvesting are incompatible. However, sustainable market-oriented harvesting requires basic understanding of market considerations.

Above: A buyer solicits balsam boughs on a public thoroughfare. Photo by D. Wilsey.

Issue areas

Four general issues influence the success of markets for natural resources and natural resource-based products. Should you decide to pursue market-oriented harvesting, you will most likely encounter one or all of these issues, at least to some extent. In practice, many of these issues are interconnected.

ECOLOGICAL ISSUES

Ecological issues relate to the potential consequences of commercial harvesting activities on plant or animal populations, the broader biotic community and the greater ecosystem. Effects can be direct, as would be the case over time if a plant were harvested faster than it can reproduce, such as was the case with American ginseng. They can also be indirect. One example might be that poor harvest techniques make plant populations more susceptible to predatory insects or diseases, such as in the case of birch bark.

ECONOMIC ISSUES

Economic issues relate to potential setbacks or failures of commercial strategies relating to factors such as supply and demand or economies of scale, to name a couple. For example, a buyer may refuse to do business with you because you cannot provide sufficient product to justify a pickup. Likewise, you may find that you cannot foresee enough sales to justify the cost of permits and harvesting equipment.

SOCIAL AND POLITICAL ISSUES

Social and political issues relate to written and unwritten claims to particular resources and associated customs. A recreational mushroom gatherer in a public space, for example, might receive a much different reception from park officials or other gatherers should his or her gathering become commercial. Cultural and ethnic differences in resource harvest and use might also lead to misunderstanding and challenges. One of the most important social/political considerations (and misunderstandings) in Minnesota pertains to Native American gathering rights on ceded territories around the state (see image next page) and treaty rights associated with these territories.

MANAGEMENT COMPATIBILITY

Finally, it is important to consider the compatibility of management of public and pri-

CAUTIONS

Minnesota statutes often allow for harvest of certain forest products for personal use but do not allow collection for commercial uses.

Biotic: **Pertaining to living things.**

Ecosystem: **A community of living and nonliving things.**

Ceded territory: **Lands ceded to the United States government by Native American nations, through various Treaties, in exchange for certain rights to hunt, fish and gather on ceded lands.**

MARKETS

Formal markets: **Markets governed by regulation in which participants report transactions, pay taxes and generally adhere to legal requirements.**

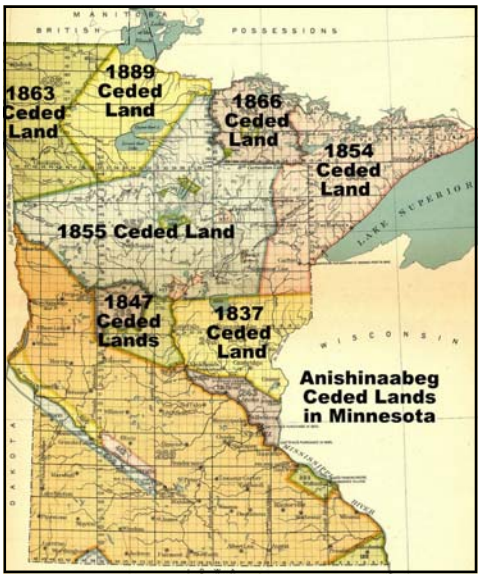
Informal markets: **Markets that are unregulated or that operate in spite of regulations.**

Market: **A market is one of a variety of systems, institutions, social relations, procedures and infrastructures through which goods and services are exchanged.**

Structure: **The physical arrangement of the market that results from interactions and relationships.**

Scale: **The volume of product bought or sold for a given period of time.**

Value-added: **Physical or other transformations to raw materials that increase their value.**



Above: Ceded territories in Minnesota, Source: keepersofthewater.org.

vate lands with commercial harvest and gathering. While resource management goals and gathering objectives may be mutually beneficial in some cases, incompatibility may undermine commercial harvest ventures. For example, habitat restoration areas with valuable products might be highly vulnerable to disturbances caused by harvest.

Markets decoded

We directly and indirectly encounter markets every day: the grocery store, a farmers market, online shopping or at the gas pump. What exactly is a market? Rather than as a place, think about a market as a variety of systems, institutions, relationships, procedures and infrastructures through which goods and services are exchanged.

Sometimes we just come across an opportunity to sell raw materials or value-added products. Someone notices that you make beautiful holiday greens arrangements and offers to buy 20 for a community event. You might do it, and that is that; or, you might think, "I should consider doing this to make some money every year." In the latter case, it pays to do some basic market research.

Market research - four basic questions

There are lots of materials and guides available to help with business planning and market research. One goal of this publication is to keep it simple, to give you an easy way to start thinking about topics that might seem complicated at first. Market research essentially boils down to asking four questions.

1. WHAT DO I SELL?

Is it a raw material (like berries)? A value-added product (like jam)? Think seriously about what your product is to the end-customer. Is it really just jam, or is it northern Minnesota in a jar? Is it forest stewardship through sustainable harvest? Is it a local job? Is it the Minnesota lifestyle? Knowing what you sell can help you decide how best to sell it and, therefore, create demand for your product.

2. HOW DO I CONNECT TO THE MARKET?

It is important to understand market structure and how you connect to the final consumer. Do you sell directly? To an intermediary? Online? Knowing how you connect is important because it influences costs, market access and price. Selling to an intermediary may result in a lower price but likely takes far less time than making many individual sales. On the other hand, telling your or your product's story may be far more difficult through an intermediary.

A related consideration is market formality. Laws and regulations govern formal markets, where transactions are reported in some manner. In contrast, social understandings and agreements typically govern informal markets, and transactions are less likely to be reported. Consider the degree of formali-

ty for your market, why it may be the way it is, and the potential social, economic and ecological implications of the way the market functions. For example, product buyers and other important intermediaries may not call specific attention to their existence if the market is informal.

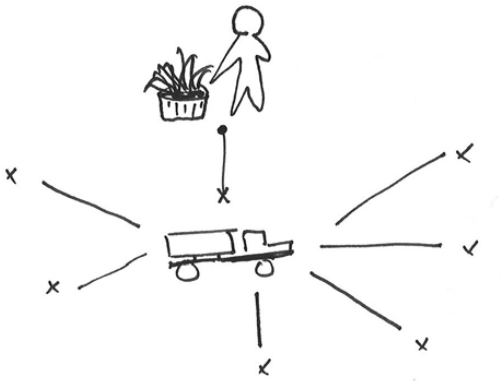
3. HOW DO I FIT IT?
Likewise, you should understand how what you sell and how you connect fit within the larger market system. Market scope refers to the geographic extent – both for supply and demand - of the market: local, regional, national, international. Scale refers to the amount (or volume) that is sold in a given period of time. Time is another consideration. Is the market seasonal? Is it growing or shrinking over time? Does anyone else do what you do? To put it simply: Understand the big picture but operate at your specific level.

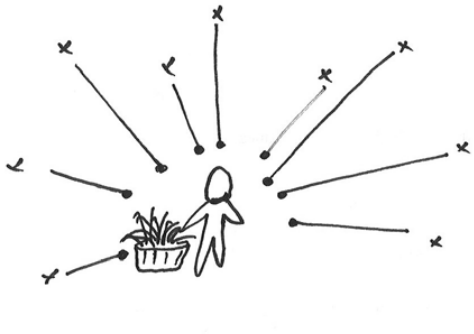
4. IS IT WORTH DOING?
In the end, you will need to determine if the activity is worth doing, whether for financial or other reasons. Making money is not the only reason to harvest wild products; for many harvesters, it's not their main motivation.

There are many different ways to begin to answer the above questions:

TALK
Talk to harvesters, growers, brokers, buyers, vendors, store owners and employees, foresters, neighbors, friends and anyone else who has potentially useful information on how markets for your product(s) work and why.

USE
Use phone calls, personal visits, libraries, the Internet, the Chamber of Commerce, universities and local businesses. Buy similar products and make samples of your own to show potential buyers and others who can provide constructive feedback.





Selling to a wholesaler (above) versus selling directly to end consumers (below) involves fewer transactions, but typically entails a lower price.

INVESTIGATE
Investigate competitors, challenges faced by others in the business, competing products (substitutes), prices (at all stages of the market chain), year-to-year trends, seasonality, value added options, production and quality standards, common and unexpected problems.

Concluding thoughts

Market-oriented or commercial harvesting is not for everyone. Many livelihood benefits

Scope: **The geographic extent of the market, both in terms of obtaining supply and meeting demand.**

MARKETS

accrue to harvesters of wild goods without them ever entering the market. However, for some harvesters, markets represent an appealing option for generating income or even offsetting the expenses associated with their favorite gathering activities. Whenever you harvest natural resources, but especially when you do so commercially, it is important to understand the market and the potential that market demands might have to positively or negatively influence good harvesting practices.

Notes

What do I sell or want to sell?

How do I connect to the market?

How do I fit into the market system?

Is it worth doing?

Advantages:

Disadvantages:

REFERENCES

Neumann, R. P., & Hirsch, E. (2000). *Commercialization of non-timber forest products: Review and analysis of research.* Bogor, Indonesia: CIFOR.

Wilsey, D.S., & Miedtke, J. (2009). Management and marketing of non-timber forest products. In M. J. Baughman, C. R. Blinn, J. G. DuPlissis, E. Sagor, A. S. Gupta, D. Drake, . . . G. Wyatt. (Eds.). *Woodland stewardship: A practical guide for Midwestern landowners*. Saint Paul, MN: University of Minnesota Extension.

POLICY

There are many places, urban and rural, open to the public, but one must determine if harvesting plants is legal before collecting on these lands (or be ready to run and hide).

- Sam Thayer in Foragers' Harvest (2006: p.19)

Be certain that you have permission before you harvest. It sounds simple but, in practice, this maxim can be quite complex.

Permission to harvest begins with a clear understanding of ***where you intend to harvest*** or, more to the point, on whose land. Land ownership and use rights are sometimes referred to as land tenure. At the simplest level, is the land private or public? Within these designations exist numerous additional categories that influence access and harvest rights. Those categories will be addressed in greater detail below.

Another important thing to understand is that permission to harvest is a function of ***what you intend to harvest***. Different ownerships and even management units within ownerships typically have different management objectives and, consequently, rules and regulations for harvesting. And even if a landowner gives you a written authorization to harvest on her land, you still cannot gather bird nests, to offer one example, as most Minnesota birds are migratory and therefore fall under the United State's Fish and Wildlife Services Migratory Bird Treaty Act. The same is true for rare or endangered plant and animal species.

In some cases, ***when you harvest*** represents a third consideration. For many natural products, fixed periods of time appropriate for harvest are codified in formal or informal regulations. They may relate to biology, as in growth or reproduction, as well as social considerations, such as safety and accessibility.

Image courtesy of Minnesota Department of Natural Resources.

Finally, permission to harvest, with or without a permit, often depends on the ***intended use*** of harvested material. In the case of fruits, berries, and mushrooms, harvest is often allowed without a permit, so long as the intended use is personal consumption. Policies often change once harvest becomes a commercial endeavor. Changes in intended use may dictate need for a free or fee permit or may lead to outright prohibition. Harvest for educational use is sometimes permitted within published regulations.

Land tenure

Complexity lies in identifying and understanding whose land you are on, harvest policies for that ownership, and determining whom to ask for clarification and, ultimately, permission.

PRIVATE LANDS

Over 75 percent of Minnesota's land is privately owned, according to the Minnesota Department of Natural Resources. Regardless of ownership, it is necessary to obtain permission before entering private lands. Trespassing is a misdemeanor; all conservation and peace officers enforce trespass laws.

The process for obtaining permission to harvesting on private land is straightforward and essentially the same whether you see an area that you'd like to explore or see a resource that you'd like to gather.

CAUTIONS

Get permission — and sometimes a permit — before you harvest.

Minnesota statutes often allow for harvest of certain forest products for personal use but do not allow collection for commercial uses.

Land tenure: **Land ownership and use rights as defined by law or other accepted social institutions.**

Personal consumption: **Use of a product or products by the individual harvester, his or her family, or similar uses not income-oriented.**

Commercial endeavor: **Use of a product or products for the purpose of income generation or some other market-based benefit.**

POLICY

Plat map: ***A scale map showing legal divisions and subdivisions of land.***

Private land: **Land deeded to an individual or other legal entity.**

Public ownership: **Public resources held and managed in trust by a government agency — federal, state, county — for the benefit of the public.**

First, identify the property owner. This might be done through direct inquiry, asking around town, consulting local land departments or by checking plat maps. Private land includes ownership by individuals as well as non-government legal entities and businesses. Large private industrial landowners control substantial acreage and it may be of value to learn more about their specific rules for access and resource use. In any case, contact the land owner in person or in some other way, such as by phone or email. Regardless of method, you should approach the individual respectfully and prepared to share information about *who* you are, *what* you are doing and *why*.

There is a chance they will not know what the product is or how it is used. You have an opportunity to educate that landowner about a valuable resource that they own. Understand that obtaining permission often depends on quickly developing a rapport with the landowner such that they don't feel taken advantage of, vulnerable or threatened. You might offer to share some of what you collect or, if the product is of substantial economic value, an amount of money. For example, if you are asking for permission to tap a sugar maple stand, you might offer a quart or two of maple syrup.

Ideally, you should get permission in writing. This formality is especially important if you plan to return at a later time or another day when the landowner might not be there. Written permission is also important if you intend to sell certain products. For example, licensed balsam bough buyers are required to see and record a seller's permit (for public lands) or written permission from a private landowner before transacting. If you harvest regularly on private lands, it might be a good idea to develop and bring a basic form that can be brought along. The document should include your name, a description of the property, products to be harvested, a timeframe for harvest permission and the landowners name, phone number and signature.

PUBLIC LANDS

Around one-quarter (12.8 million acres) of land in Minnesota is held in public ownership status. Most federal land (3.4 million acres) falls within the boundaries of the Chippewa and Superior National Forests in north central and northeast Minnesota and are managed by the United States Forest Service. State land (8.4 million acres) is primarily managed by the Department of Natural Resources and is distributed among various management units. The remaining public acreage is held by county and local land management agencies.

Though straightforward, the federal, state and local designations for public land "ownership" are likely insufficient for harvester needs. Each public ownership category contains within it numerous management categories that typically have different management objectives, strategies and, consequently, guidelines for use.

Federal lands include:

- national forests
- national parks
- national monuments
- wildlife management areas, and
- Indian Reservations.

Land designations have their own regulations for harvest of non-timber and other forest resources. For example, gathering of edible fruits and nuts for personal consumption is allowed in national forests, but tapping maple trees is not allowed without a permit. Indian Reservation lands have their own management objectives and regulations in place, typically excluding activities of non-Band members. Check with local management contacts to get specific information for federal land use rights and regulations.

POLICY

Bough Permit
Minnesota DNR - Forestry

Permit Number	Permittee

PERMIT EXPIRES: _____

Permission to harvest boughs on the following described State lands _____

Forest Officer	Date

Signature of Permittee	Date

Post This Permit In Your Vehicle Window When Harvesting Boughs.

Above: State balsam bough permit, $48 for up to 4 tons in 2012. Image courtesy of Minn. Department of Natural Resources.

State lands include:

- state forests
- state parks
- state trails
- wildlife management areas, and
- scientific and natural areas.

State parks, forests and trails generally allow personal-use harvest of fruits and mushrooms but prohibit commercial harvest and harvest of plants and plant parts, such as foliage. Scientific and natural areas are the most sensitive units within the state outdoor recreation system and don't permit harvest as expressed by this DNR statement: *Leave wildflowers, plants, animals, rocks, and other elements in place to fulfill their life cycle and role in the environment*.

County lands include:

- county forests
- county parks
- county trails
- forest roads
- fee lands
- tax forfeit lands, and
- waysides.

Often, counties adopt state statutes in management of these resources.

City lands include:

- city parks and trails, and
- roadways.

Other lands include consolidated management districts, such as the Three Rivers Park District in the western metropolitan area. The Three Rivers Park system manages almost 27,000 acres of regional parks, trails and facilities, including land under the jurisdiction of counties and cities within the area. Three Rivers does not permit any type of harvesting on district lands.

Recommendations

Learn the regulations for the types of products that interest you at each management level applicable to your harvest region.

Relationships, relationships, relationships! Invest in building relationships with both private landowners and public land managers.

When interacting with private landowners, let them know who you are, what you are doing, and which resources are available. Recognize that in your role as a harvester you may become a teacher — embrace it within your level of confidence and experience. Remember to seek and carry written permission whenever you are able.

When dealing with public land managers, understand that many may not be familiar with what you are doing nor the specific rules and regulations associated with your interests. Do your homework. Ask questions. Bring information and printed regulations. Rather than declare access rights, ask for assistance understanding and interpreting known rules. As with private landowners, you may be educating public land managers about little known or obscure regulations that address infrequently encountered activities. Understand that, like anyone, managers are likely to be most familiar with the needs and demands of the majority of resource users or visitors and less likely to know the intricacies of uncommon user needs.

POLICY

REFERENCES

Helland, J. (2002). *State owned land in Minnesota.* House Research: Short Subjects. Saint Paul, MN: Minnesota House of Representatives Research Department.

Thayer, S. (2006). *The forager's harvest: A guide to identifying, harvesting, and preparing edible wild plants.* Ogema, WI: Forager's Harvest.

Wilsey, D.S., & Miedtke, J. (2009). Management and marketing of non-timber forest products. In M. J. Baughman, C. R. Blinn, J. G. DuPlissis, E. Sagor, A. S. Gupta, D. Drake, . . . G. Wyatt. (Eds.). *Woodland stewardship: A practical guide for Midwestern landowners*. Saint Paul, MN: University of Minnesota Extension.

Policy Notes

	Management Designation: *Ex. State forest*	Management Designation:	Management Designation:	Management Designation:
Product: *Ex. Balsam boughs*	*Ex. Permit, $ / tons*			
Product:				
Product:				
Product:				
Product:				
Product:				
Product:				

MAPLE SYRUP

SPRING

S & S

Above: Sugar bush, family style. Below left: Unfiltered and filtered syrup. Below right: Boiling maple syrup in the traditional kettle. Photos by D. Wilsey.

LIFE FORM
Tree

PART USED
Sap

SCIENTIFIC NAME
Acer saccharum (sugar)
Acer saccharinum (silver)
Acer rubrum (red)
Acer negundo (box elder)

COMMON
Maple syrup

OJIBWE
Ziiwaagamizigan

HMONG
Not available

SPANISH
Jarabe de arce

MAPLE SYRUP

SPRING | S & S

Key Characteristics

PRODUCT

- **Maple syrup is produced in four Canadian provinces and 14 northern U.S. states, with the largest U.S. producers being Vermont, New York, Maine, Wisconsin and Pennsylvania.**
- **Maple sap is used to produce syrup, cream and sugar.**

HARVEST

- **Harvest maple sap when the night temperatures are below freezing and the day temperatures are above freezing.**
- **Sap harvest ends when leaf buds emerge and open.**

SOCIO-ECONOMIC

- **It is generally agreed that Minnesota's maple resource is an untapped commercial resource.**

REGULATORY

- **Permits are required to tap maple on public lands.**

***Crown*: The part of a tree bearing the live branches and/or foliage; often referred to as the top of the tree.**

Location

DISTRIBUTION

Maple syrup is produced in 14 northern U.S. states and four Canadian provinces, with Quebec producing approximately 70 percent of all maple syrup in the world. In the United States, Vermont, New York, Maine, Wisconsin and Pennsylvania produce the most maple syrup. It is generally agreed that Minnesota's maple resource is an 'untapped' resource.

HABITAT

Sugar maple is a common tree throughout the forested regions of Minnesota, except in the extreme western counties. It is most abundant in the eastern and northern portions of the state. On better soils, sugar maple will reach heights of 60 to 100 feet, with trunk diameters in excess of three feet.

When sugar maple is growing in a dense forest, it develops a clean or limb-free trunk. If it grows in the open, allowing branches and tree crowns to receive sunlight, it will form a dense, round-topped crown, which is a very desirable tree for sap production.

Identification

DESCRIPTION

There are at least 100 species of maple in the world. Four species of maple found in Minnesota can be used for sap production. With a sugar content of 2 percent, sugar maple or hard maple (*Acer saccharum*) are generally preferred by commercial producers as they produce the sweetest sap. Because sap from other maple species is usually lower in sugar content, it takes approximately twice as much sap to yield the same amount of finished syrup.

MAPLE SYRUP

SPRING | S & S

Above: Direct sap consumption. Photo by D. Wilsey.

If processed carefully, syrup from any of the maples described will have good flavor, including sap gathered from red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), and box elder (*Acer negundo*).

Yard trees, street trees and open-grown trees in pastures or woodlands can be used for maple sap production. Maples are easy to identify because of their opposite branching leaf shape and unique fruit or samaras.

The four maples have leaves of similar shape - a single leaf blade with the characteristic maple shape. The leaves, buds and twigs of all maple species are arranged in pairs opposite each other along the branches. All four produce samaras.

CAUTION (LOOK-ALIKES)

There are ornamental maples, such as the Norway maple and the Schwedler maple, that have a milky sap and generally cannot be used for syrup production.

Uses

GENERAL

Maple syrup is the primary product created from maple sap. Maple syrup may be converted into other products, including maple candy, maple cream (also referred to as maple butter or maple spread) and maple fudge. Basically, these are produced by concentrating finished syrup to a greater density and stirring the highly concentrated syrup. There is also some interest in using pure maple sap as a natural beverage.

SOCIO-CULTURAL

Maple sugar stands were an important component of the Ojibwe seasonal migration and remain a culturally significant food crop for these communities.

ECONOMIC

Established markets exist for maple syrup, maple cream, maple candy and other confections prepared with maple sweeteners, such as coated nuts. It is believed that supply falls well short of demand.

Harvest

WHEN TO HARVEST

To obtain the earliest runs of sap, tapping should be completed by mid-February in central and southern Minnesota, and by the second week in March in the northern part of the state. One longtime maple tapper says that when the crows return to his sugar bush, he knows that his maple are running.

Sap does not flow from maple trees every day throughout the tapping season. It flows on days when a rapid warming trend in early to midmorning follows a night when the temperature drops near or below freezing. Thus, the amount of sap produced varies from day to day. Normally, a single tap hole produces from one quart to one gallon of sap per flow period, with a seasonal accu-

***Opposite branching*:** **Refers to growth habit of leaves and branches on a tree when they occur directly across from one another. This is in contrast to 'alternate' branching.**

***Samaras*: A fruit type characterized by a seed encased by a papery wing, which enables the seed to disperse from the source more broadly.**

MAPLE SYRUP

SPRING

S & S

DBH: **Diameter at breast height. A common forestry term measuring the diameter of a tree at four feet above ground.**

Bole: **The trunk of a tree.**

Spile: **A small peg used to draw sap from the tree. Historically spiles were notched wood but today they tend to be made from hollow metal or plastic.**

Maple "cookie" - a cross section of a tree that has been tapped numerous times. Photo by D. Wilsey.

mulation of 10 to 12 gallons. Sap runs for a few hours to a day or more.

A tree suitable for tapping should have a trunk diameter no smaller than 8 to 10 inches measured at four feet above ground level. This measurement is known as "DBH" or diameter at breast height. Use of one tap is typical and recent studies suggest that no more than two taps should be placed in any tree greater than 20 inches in diameter. For the best sap production, a tree should have a short bole topped with abundant foliage.

HOW TO HARVEST

Maple sap is harvested by tapping the trunk of mature maple trees and collecting the sap in containers. Harvest technique has developed from the use of wooden spiles, often carved from sumac, and birch bark buckets to use of metal and, more recently, plastic spiles and food-grade plastic buckets and bags.

Commercial operations sometimes employ vacuum tubing that allows for more efficient collection at a central location. Taps are set by drilling holes in the tree to reach the sapwood. New taps must be set each collection season to access active sap wood, as the tree produces new cell growth to compartmentalize previous tap wounds.

Handling

STORAGE, PREPARATIONS AND PROCESSING

Sap is perishable and should be collected and boiled down as soon as possible to produce high quality syrup. When this is not possible, sap should be collected at least every two to three days. When temperatures are low and storage conditions are favorable, sap may be kept one to two days

MAPLE SYRUP

SPRING | S & S

Above: Sap frozen in the early morning before the thaw. Photo by J. Peterson.

with minimal reduction in quality. If sap is allowed to become warm before boiling, a darker, off-flavor syrup of poor quality may result.

TOOLS

Maple syrup can be produced with minimal equipment. A few standard items, such as those listed below, will increase efficiency of the operation and quality of the product:

- Drill with 5/16" bit.
- Collection spouts (5/16" tree saver spiles, taps) for each tap hole.
- Collection container (bucket or plastic bag) or tubing line for each tap hole—use food grade material only!
- Metal cans with plastic liners (food grade) for sap storage.
- Large food grade stainless steel boiling container and heat source for boiling down the sap.
- Large-scale thermometer calibrated at least 15 degrees above the boiling point of water (candy thermometer).
- Wool, orlon or other type of filters for filtering finished syrup while it is hot.
- Storage facilities and containers for the finished syrup (use metal, glass or plastic food grade only).

Producing Maple Syrup: The process of making maple syrup is essentially one of concentrating the sap to a pre-determined level by boiling it. The heat applied in the process develops the characteristic color and flavor that makes maple syrup highly desirable. The average sugar concentration of sap is 2 percent. At that concentration, 43 gallons of sap are required to produce one gallon of syrup. You will need less sap when the sugar concentration is high.

Boiling the Sap to Make Syrup: Fill the evaporating container with sap. A large pan (food grade stainless steel) with high sides is preferred. Begin heating the sap. As the level of sap in the pan is reduced through evaporation, add more sap. Occasionally skim the surface of the boiling liquid to remove surface foam and other materials. Boiling should be done outdoors or in a well-ventilated area to allow large amounts of steam to escape.

Continue the process until the sap changes color and the boiling point begins to rise above the boiling point of water. Finished syrup boils at 7 degrees Fahrenheit above the boiling point of water. As the temperature of the boiling sap approaches this point, boiling should be carefully controlled to prevent burning and overheating. The process may take several hours to complete.

Once the desired boiling point has been reached, the syrup is ready for filtering and packaging. The hot syrup should be poured through a suitable pre-filter paper and a wool or orlon filter designed for maple syrup. Filtering will remove most suspended particles, some sugar sand, and will improve the appearance of the syrup. After filtering, the syrup should be packaged at a tempera-

REFERENCES

Koelling, M.R., & Heiligmann, R.B. (2006). *North American maple syrup producers manual.* Bulletin 856. Ohio State University Extension.

Vogt, C. (1994). *Identifying maple trees for syrup production.* In University of Minnesota's Minnesota maple series. Retrieved from http://www.extension.umn.edu/distribution/naturalresources/DD6286.html

Vogt, C. (2008). *Homemade maple syrup.* In University of Minnesota's Minnesota maple series. Retrieved from http://www.extension.umn.edu/distribution/naturalresources/DD1067.html

ture above 185 degrees Fahrenheit so that the heat sterilizes the container. The preferred temperature is 190 degrees Fahrenheit. Lay filled and capped containers on one side so the hot syrup sterilizes the cap. After cooling, store in a cool, dry place.

CAUTION

Take necessary steps to minimize the time between sap collection and processing, and ensure that sap remains cold during delays.

Markets

There is a growing interest in specialization within the maple industry. Examples include specializing in sap collection or in the processing of large volumes of sap consolidated from various sap collectors within a network.

CAUTION

As with any natural-resource-based enterprise, the availability of raw materials, in this case sap, varies with annual weather and other conditions. Larger syrup operations tend to require substantial capital investments, and yearly profitability can be highly vulnerable to variations in annual sap runs.

Regulations

Permits are required to tap maple on public lands. Check with the appropriate land manager (city, county, state, federal) for details.

Multiple sap lines running from the sugar bush into the Timber Sweet pump house, a vacuum-tap commercial operation. Photo by D. Wilsey.

OSTRICH FERN FIDDLEHEADS

SPRING

EG&B

Above (L): Fiddleheads just bursting from their crown in springtime. Above (R): Ferns ready for harvest. Photos by D. Wilsey. Below: Fiddleheads at market fetch a nice price! Photo by D. Fuller.

LIFE FORM
Fern

PART USED
Immature fern frond

SCIENTIFIC NAME
Matteucia struthiopteris

COMMON
Ostrich fern fiddlehead

OJIBWE
Wewaagaagin

HMONG
Suab

SPANISH
Helechos de áquila

OSTRICH FERN FIDDLEHEADS

SPRING

EG&B

CAUTIONS

There are numerous types of ferns, and most begin growth as fiddleheads. It is important to be able to recognize the following key characteristics of the ostrich fern:
- U-shaped groove
- Papery scales on early growth
- Groove on fertile frond.

Crown: **The clump from which fiddleheads emerge each spring. The crowns remain after the delicate green ferns die back.**

Alluvial: **Fine grain soil that results from rivers—past or present—flowing over flood plains.**

Perennial: **A plant for which growth recurs yearly from the same root stock, as compared to plants that reseed and begin anew each spring.**

UNIVERSITY OF MINNESOTA EXTENSION

Key Characteristics

PRODUCT

- **Look for ostrich ferns in floodplains and in soils with high organic matter.**

HARVEST

- **Fiddleheads emerge in early spring; the timing of their emergence varies by site.**

SOCIO-ECONOMIC

- **In some places, fiddleheads are much appreciated by market consumers.**
- **Fiddlehead consumption is quite popular among certain populations of Asian descent and in immigrant communities, particularly in the Pacific Northwest.**

REGULATORY

- **Get landowner permission before picking fiddleheads.**

CAUTIONS

- **While a toxin has not been identified in the fiddleheads of the ostrich fern, it is recommended that fiddleheads be cooked thoroughly before eating.**

Location

DISTRIBUTION

Ostrich fern is widely distributed across the United States from Maine to Virginia and northwestward to Washington. Likewise, ostrich ferns can be found throughout Minnesota, but only where site conditions are appropriate. Cold temperatures can kill exposed crowns that do not have adequate snow cover.

HABITAT

Ostrich fern prefers moist - not wet - sites with alluvial soils in floodplains of rivers and streams in association with silver and red maples and brown ash. They will also grow successfully on upland soils with high levels of organic matter in light to medium shade.

Identification

DESCRIPTION

Ostrich fern is a perennial fern that grows in a clump called a crown that dies back to the ground each fall. The fern produces both sterile and fertile fronds, though the latter is not produced on all crowns. Mature sterile frond height is 3-5 feet tall and the fertile frond is 1-2 feet tall. The fertile frond turns brown later in the season and can persist for one year or more. There are three ways to identify ostrich fern fiddleheads in spring:

- The deep, u-shaped groove on the inside of the stem (see image next page).
- The thin, brown, paper-like scales that cover the newly emerging fiddleheads. The scales fall off as the fiddlehead grows and elongates.
- The fertile frond that bears spores is distinctive in shape and also has a

OSTRICH FERN FIDDLEHEADS

SPRING | EG&B

Above: The U-shaped groove and remnant of the papery scale of a harvested ostrich fern fiddlehead. Photo by D. Wilsey.

groove on the inside of the stem. When present during harvest time, the previous year's fertile frond will be dark brown in color. Not all ostrich fern crowns will have fertile fronds.

Later in the season, fully grown ostrich ferns have other identifying features. With the help of a field guide, you can better identify mature ostrich ferns for future harvest.

CAUTION (LOOK-ALIKES)
It is important to properly identify ostrich ferns. Bracken ferns, for example, can cause cancer and other problems in livestock. Not enough is known about other ferns to recommend eating them. Ostrich fern fiddleheads are neither toxic nor carcinogenic. Bracken fern fiddleheads are fuzzy, lack the brown paper-like covering and U-shaped groove on the inside of the stem.

Uses

GENERAL
Fiddlehead ferns are typically eaten as a cooked vegetable.

SOCIO-CULTURAL
Fiddleheads long have been important to North America's indigenous peoples. They use fiddleheads for food and some use them as medicine for backaches.

ECONOMIC
Although the market for fiddleheads in Minnesota is not well developed, fiddleheads are an important source of income for harvesters and woodlot owners in other states, particularly in the northeastern United States. Retail prices vary from a low of $2.50/pound roadside in Maine to $15/pound at upscale markets in Oregon.

Harvest

WHAT TO HARVEST
Fiddleheads are harvested just as they begin to grow from the crowns. The tightly coiled fern and 2-6 inches of stem are the edible portion.

WHEN TO HARVEST
Fiddleheads emerge in early spring. Often the only green visible in the early spring woods is from the emerging ramps and fiddleheads.

HOW TO HARVEST
Fiddleheads can be picked either by snapping them off or by cutting them. Be careful not to cut remaining fiddleheads, which will produce food for the next year's crop.

CAUTION
Research by the University of Maine suggests that picking all the fiddleheads on a crown over a series of four years results in the decline and often death of the fern. Pick-

OSTRICH FERN FIDDLEHEADS

SPRING

EG&B

REFERENCES

Bolton, J., Bushway, A., Fuller, D., & El-Begearmi, M. (2012). *Bulletin #4198, Facts on Fiddleheads*. University of Maine Cooperative Extension Publications. Retrieved from http://umaine.edu/publications/4198e/

Fuller, D. (2012). *Bulletin #2540. Ostrich Fern Fiddleheads*. University of Maine Cooperative Extension Publications. Retrieved from http://umaine.edu/publications/2540e/

ing up to one-half of the emerged fiddleheads, with no follow up harvest of later-emerging fiddleheads, appears to be sustainable. It is further suggested harvesting from crowns having at least four fiddleheads. The harvest impact on young or weak crowns having fewer fiddleheads is not known.

Handling

STORAGE AND TRANSPORT

Quality is best when fiddleheads are kept dry and cool. Make sure to harvest into clean containers. Use potable water to wash fiddleheads, never stream or river water. Fiddleheads can be stored under refrigeration for up to one week.

PREPARATIONS AND PROCESSING

Fiddleheads can be blanched and frozen. They can also be pickled. For preparation instructions and food safety information, please refer to University of Maine Cooperative Extension's Bulletin #4198, "Facts on Fiddleheads".

The papery covering on fiddleheads is most easily removed when it is dry. Small amounts of fiddleheads can be cleaned by rubbing the covering loose. Larger amounts can be winnowed in front of a fan which helps blow the papery covering off.

CAUTION

The Centers for Disease Control has investigated a number of food-borne illness outbreaks associated with fiddleheads. The implicated ferns were eaten either raw or lightly cooked (sautéed, parboiled or microwaved). Although a toxin has not been identified, the findings suggest that you should cook fiddleheads thoroughly before eating (boil them for at least 10 minutes).

Markets

Market fiddleheads through farmers markets, restaurants, roadside stands, supermarkets and mail order. Sellers can charge higher prices for dry - not dried - fiddleheads whose papery covering has been removed. Include cooking directions when marketing directly to the consumer.

Regulations

As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Fiddleheads may not legally be gathered from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited." Likewise, Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all edibles in scientific and natural areas (SNA). "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit, fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships. Many landowners, if asked, would be happy to allow foraging on their lands. Consider offering the landowner a price per pound or some cleaned fiddleheads in exchange for access.

YELLOW MOREL

SPRING

ED-M

Above: Morel among leaf litter. Right: Morel emerging from mossy growth. Below: A stately pair of yellow morels. Photos by M. Kempenich.

LIFE FORM
Fungus

PART USED
Mushroom fruiting body

SCIENTIFIC NAME
Morchella esculenta

COMMON
Yellow morel

OJIBWE
Genwaakizid
waazashkwedowin

HMONG
Nceb
(Mushroom, general)

SPANISH
Colmenilla

YELLOW MOREL

SPRING

ED-M

CAUTIONS
Raw and undercooked morels will cause severe gastro-intestinal distress.

Morel lookalikes:

False morel
Gyromitra esculenta

Early morel
Verpa bohemica

Half-free morel
Morchella semilibera

Key Characteristics

PRODUCT

- **Look for yellow morels in hardwood forests; occasionally found with conifers.**
- **Most frequently associated with elms.**

HARVEST

- **Blooming lilacs and dandelions often signal the start of morel season.**

SOCIO-ECONOMIC

- **Hard to find and with a short season, morel mushrooms fetch excellent prices at farmers' markets and cooperatives.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **Though generally easily identified, yellow morels are sometimes confused with other mushroom species.**
- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT
Morels are found throughout Minnesota in hardwood forests and occasionally in conifer woods. They are most frequently found around elms when the bark is sloughing off the tree. Sometimes they are found around dying cottonwood trees along rivers. Note: The black morel is more prevalent under aspen trees and, in the northern part of the state, in conifer woods.

Identification

DESCRIPTION
Morels are conical, oval or pinecone shaped. Their surfaces are covered with pits that are irregular in shape, giving it a honeycomb appearance. They are up to 6 inches or more in height, larger during the latter part of the season. Their colors are variable: yellow, yellow brown or darker, sometimes grayish.

There is no separation between the cap and the stem portions, and the entire fruiting body is hollow inside.

The stem is off-white to buff and sometimes covered with short, fine hairs giving it a velvety appearance.

CAUTION (LOOK-ALIKES)
The ability to recognize morel look-alikes is essential when collecting morels for food.

Gyromitra esculenta, false morel, is sometimes confused with morels. This mushroom contains a toxin that accumulates in the body, and may eventually cause severe gastrointestinal distress requiring hospitaliza-

YELLOW MOREL

SPRING | ED-M

Above: False morel, Gyromitra escueleta*. Photo by D.Wilsey.*

tion. It is also known to cause death. The convoluted surface gives this mushroom a brain-like appearance. In contrast to morels that are completely hollow inside, this mushroom shows multiple chambers when cut in half. *Gyromitra's* very irregular shape contrasts with the generally uniform shape of a true morel.

Verpa bohemica is a small morel that has a cap not larger than one inch. The surface is ridged and somewhat folded. When cut in half the inside appears to contain a soft, cotton-like stuffing. This species may cause mild gastrointestinal distress and should therefore be avoided.

Morchella semilibera, the half-free morel, is another small morel with a cap barely, if at all, larger than one inch. The cap is conical, and has a pitted surface not unlike the yellow morel. In contrast to the yellow morel, the cap is fused to the stem only along its upper half. In addition, the stem of *M. semilibera* is relatively longer than that in *M. esculenta*. While this species is edible, it is of lesser quality than the yellow morel.

Uses

GENERAL

Morels are prized for culinary uses.

SOCIO-CULTURAL

Difficult to find and with a short gathering season, morels are legendary among mushroom appreciators. Their arrival is eagerly awaited and celebrated with forays, festivals and feasts.

ECONOMIC

Markets are well-established for wild gathered morels, which are difficult to cultivate.

Harvest

WHAT TO HARVEST

Harvest the caps and stems above the ground. Do not pick fruiting bodies below 1.5 inches high; allow them to mature. Do not harvest fruiting bodies that are brown or reddish and crumbly, as they are past their prime and not usable. Morels should not be collected in or near areas where chemical pesticides may have been used, such as golf courses and agricultural lands.

WHEN TO HARVEST

Reports of fruiting morels range from late April through the end of May. The farther north you go, the later the fruiting. The blooming of lilacs and dandelions is sometimes used as a cue that conditions are right for morel fruiting to begin.

HOW TO HARVEST

Use a plain sharp knife, such as a pocketknife. Cut the stem cleanly above ground level. Lacking a knife, pinch off at the bottom of the stems, but using a knife is preferable.

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

(Continued)

YELLOW MOREL

SPRING | ED-M

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Ithaca, NY: Comstock Publishing Associates, Cornell University Press.

CAUTION
Older mushrooms can be wormy.

Handling

STORAGE
Morels may be brushed with a soft brush to remove surface debris. You must also check the mushrooms for insects, especially inside the cap. Store in a well ventilated, cool and dry location such as a refrigerator. Morels should not be wet before storage. Allow them to air-dry, but do not dehydrate. Refrigerated storage can extend their shelf life one or two days and help retain their flavor.

TRANSPORT
Transport during harvest in a flat-bottomed basket so as not to compact or break morels. Baskets should be porous even on the bottom to allow for spore dispersal, which promotes mushroom establishment and future supply. Although less desirable, you may use paper bags. Never use plastic bags as they promote condensation.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Morel and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, “Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use.”

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. “It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . .”

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, “A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant.”

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

BIRCH BARK

SUMMER

BS&W

Above: Birch stand in winter. Right: Birch bark harvest. Photos by J. Zasada.
Below: Birch bark winnowing baskets. Artist: J. Northrup. Photo by D.Wilsey.

LIFE FORM
Tree

PART USED
Bark

SCIENTIFIC NAME
Betula papyrifera Marsh

COMMON NAME
Paper birch

OJIBWE
Wiigwaas

HMONG
Not available

SPANISH
Abedul americano

BIRCH BARK

SUMMER | BS&W

CAUTIONS

Properly done, birch bark can be harvested without damage to the tree. Done improperly, harvest can weaken or kill the tree.

***Early successional*: As environmental conditions change over time, so do the types of plants that make up the forest. Birch are 'early successional'; that is, they may be the first plants to begin to inhabit an area that has been disturbed by such events as logging or windstorms.**

***Deciduous*: Plants that lose all foliage seasonally or during a particular season, typically autumn.**

Key Characteristics

PRODUCT

- **There are 18 species of the birch genus *Betula* in North America, with five species growing in Minnesota.**
- **Look for paper birch in northeastern Minnesota.**

HARVEST

- **Bark is best harvested between late June and early July when trees are actively growing.**

SOCIO-ECONOMIC

- **Ojibwe birch bark canoes are displayed at the Fond du Lac Cultural Center and Museum in Cloquet, MN, and at the National Museum of the American Indian in Washington, D.C.**

REGULATORY

- **There is no uniform set of regulations regarding the harvesting of bark.**

CAUTIONS

- **Before harvesting bark, consider its use today as well as its potential future use. Minnesota's once plentiful "canoe" trees are now scarce.**

Location

DISTRIBUTION

There are 18 species of the birch genus *Betula* in North America. Five species grow in Minnesota, including yellow birch, heart-leaved birch, river birch, paper birch and bog birch (bog birch is a shrub).

HABITAT

Paper birch trees have the ability to grow in a wide range of soil conditions, such as sandy, rocky or loamy soils, and organic peat. Birch may be found growing in stands, but it is commonly mixed with other tree species. It prefers full sun and is an early-successional species, readily occupying land disturbed by wind events, forest fires or logging.

Identification

DESCRIPTION

Paper birch are deciduous trees with single or multiple stems with a narrow crown. As young trees, paper birch have the ability to grow rapidly and display a reddish-brown colored bark. As trees mature, the bark transitions to a chalky white color when the trees are approximately 15 to 20 years old. In Minnesota, mature trees stand 60 to 70 feet tall.

Leaves of the paper birch are oval shaped with doubly serrated margins that are arranged alternately along the branches. Paper birch have shallow rooting systems, leaving them prone to drought.

BIRCH BARK

SUMMER | BS&W

Uses

GENERAL

The bark grows along with the tree and is made up of several thin layers. The powdery substance found on the outer bark is called betulin.

SOCIO-CULTURAL

Birch bark has been gathered and used by people across its native range for centuries. In Minnesota, Ojibwe people use birch bark to make lodges, eating and drinking vessels, winnowing baskets to prepare rice, and as buckets to collect maple sap in the spring. Birch bark canoes provided transportation and required the highest quality of bark. A contemporary Ojibwe birch bark canoe can be seen at the Fond du Lac Cultural Museum near Cloquet, MN.

ECONOMIC

Birch bark contains a complex blend of chemical substances (xylitol, betulin and suberin) that make the bark resistant to decay and water. The chemicals are the subject of several research projects. Companies are learning to extract the bark's complex compounds for use in medicines, lubricants and seed coatings to protect agricultural crops.

Harvest

WHAT TO HARVEST

Mature, healthy trees are preferred. Mature birch frequently display dieback in the crown area due to environmental stress or from disease. This health condition may make the bark difficult to remove.

WHEN TO HARVEST

Summer bark, which is generally lighter in color, is gathered during the most traditional time of harvest from mid-June to early July, when the trees are most actively growing. In contrast, winter bark, which has a deep brown tone to it, is harvested when the tree is not active. This can be during winter, but is more likely to occur during the months of April or May before the leaves are fully developed or in later summer or early autumn when the leaves begin to die.

HOW TO HARVEST

Above: Testing bark thickness and readiness before harvest. Photo by D. Wilsey.

Tools: A knife or box cutter is commonly used to remove bark. Other simple tools, like a putty knife or a spud, will help gently pry off more stubborn bark.

Techniques: Initially, harvesters should test the bark by making a small incision, a slit or the shape of a "T", to determine if the individual tree is ready to readily release its bark. Once you have determined the tree is ready, make a long slit down the trunk, being careful not to cut any deeper than the outer bark layers. During the peak season, you will notice an immediate separation of bark, and in some cases a popping noise as the inner and outer bark separates. Ambitious harvesters frequently use ladders to

***Betulin*: A chemical substance that appears in powdery form in the bark of birch trees. It has been extracted from bark and used in some medications.**

***Dieback*: The progressive dying from the extremity of any part of a plant, in this case usually the top of the tree or the 'crown'. Dieback may or may not result in the death of the entire tree.**

REFERENCES

Minnesota Department of Natural Resources and University of Minnesota Extension. (2005). *Careful harvest fact sheet*. Retrieved from http://files.dnr.state.mn.us/forestry/um/carefulharvest_brochure.pdf

Demchik, M., Miedtke, J., Preece, K., & Zasada, J. (2005). *Careful harvest fact sheet.* Saint Paul, MN. Minnesota Department of Natural Resources and University of Minnesota Extension.

(Continued)

BIRCH BARK

SUMMER | BS&W

North House Folk School. (2007). *Celebrating birch: The lore, art and craft of an ancient tree*. East Petersburg, PA: Fox Chapel Publishing.

Smith, W. R. (2008). *Trees and shrubs of Minnesota (The complete guide to species identification)*. Minneapolis, MN: University of Minnesota Press.

Yarish, V., Hoppe, F., & Widess, J. (2009). *Plaited basketry with birch bark*. New York, NY: Sterling Publishing Company, Inc.

Burns, R.M., & Honkala, B.H. (1990). *Silvics of North America, Vol. 2.* Washington D.C.: United States Department of Agriculture, Forest Service.

UNIVERSITY OF MINNESOTA EXTENSION

optimize harvest. Harvesting tips include:

- Get permission prior to harvesting, and be sure you know your location.
- Ask an experienced harvester to assist you if you have no experience harvesting bark.
- Removing birch bark *may* kill the tree, making best harvesting practices a must.
- Consider the location of harvest area and distance to road both for aesthetics and because carrying bark out of the woods requires effort.
- Refrain from indiscriminate harvesting. DO NOT remove birch bark in parks, wayside rests or along roadsides.

CAUTION

Removing the bark may affect the tree's lumber quality. Therefore, if the trees are being grown for paneling or veneer, it is important to coordinate removing bark with the timing of the timber harvest.

Handling

STORAGE

Many birch bark harvesters store bark for extended periods of time by flattening sheets using a sheet of plywood and weights. The bark may be kept outside in a cool, dry space like a shed or garage. Other harvesters prefer to leave the bark outdoors, allowing it to absorb moisture from the ground. Bark can be kept for years if stored in a dry place out of direct sunlight.

Markets

There is strong interest in using birch bark for crafts, artistry and architectural design. Additionally, there is a strong cultural interest in bark. The internet and local farmers markets and craft shows represent potential market outlets for raw and finished products. Advertising products in local newspapers may also be effective.

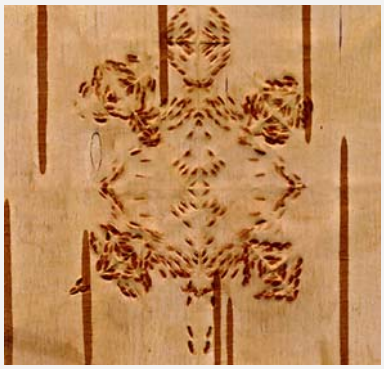
Regulations

There is no uniform set of regulations regarding the harvesting of bark. It is important to respect the wishes and requirements of landowners. Some public land agencies require permits prior to harvesting. Others prefer harvesters to connect directly with loggers. It is very important to obtain permission prior to harvesting and to follow all applicable rules. If properly coordinated, bark can be harvested from living trees before or after they are scheduled for final harvest.

Mazinibaganjigan

Mazinibaganjigan (plural: mazinibaganjiganan) is an ancient folk art made by the Ojibwe (Anishinaabe), Cree and other Algonquian peoples who use birch bark, by biting down on small pieces of birch bark to form intricate designs.

Source: Wikipedia.org.



Contemporary bark biting by Kelly Church. Photo taken from Wikipedia.org.

OYSTER MUSHROOM

+SUMMER+

ED-M

Above: Oyster from below. Below left: Oysters from above. Photos by M. Kempenich. Below right: Oysters nestled within a tree deformity. Photo by A. Gerenday.

LIFE FORM
Fungus

PART USED
Fruiting body—the fans above the stems

SCIENTIFIC NAME
Pleurotus ostreatus

COMMON
Oyster mushroom

OJIBWE
Mitigo-pikwajish

HMONG
Not available

SPANISH
Champiñónes ostra

OYSTER MUSHROOM

+SUMMER+

ED-M

CAUTIONS

Possible look-alikes include:

Orange mock oyster *Phyllotopsis nidulans*

Bear lentinus *Lentinellus ursinus* and *Lentinellus vulpinus*, *Crepidotus applanatus* and *Panellus serotinous*

Key Characteristics

PRODUCT

- **Look for oyster mushrooms in hardwood forests, especially on dead trees in low, damp woodlands.**

HARVEST

- **Multi-season. Oysters fruit from early spring through late fall.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **Oysters have some look-alikes, but none that are reported poisonous.**
- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

Oyster mushrooms can be found throughout Minnesota, mostly in hardwood forests, and especially in low-land, damp woods of maple, oak, birch, poplar, willow, cottonwood and basswood. Oyster mushrooms are often found on downed trees, logs or stumps. They are found less frequently on live trees.

Identification

DESCRIPTION

The oyster mushroom cap is 3-12 inches across, oyster-shell shaped, convex, becoming flat, more or less depressed near the point of attachment. The margin is down curved, becoming straight, undulate or lobed, sometimes splitting on the edge. The surface is smooth and somewhat velvety near the point of attachment. It is white to silver gray, tan or brownish in color.

The oyster mushroom may not have a stem. The stem, when present, is short, frequently less than one inch. It is firm, tough and colored like the cap. The gills are thin, white to cream in color, and they run down the stem.

The spore print is white to pale lilac and never dark colors. The spore deposit sometimes can be seen on individual caps growing in the lower layers of the cluster.

CAUTION (LOOK-ALIKES)

Angel wing (*Pleurocybella porrigens*) is a small white-gilled mushroom without stem growing on conifers. It is frequently collected for food, but recently it was found to cause serious poisonings and death. Avoid all mushrooms that grow on conifers and resemble Oyster mushrooms.

Possible other look-alikes are the orange mock oyster (*Phyllotopsis nidulans*) and the bear lentinus (*Lentinellus ursinus* as well as *L. vulpinus*). The orange mock oyster has orange gills and a fuzzy, light-orange cap. It also has a rather unpleasant odor. Bear lentinus is white, but has dark hairs especially near the point of attachment. *L. vulpinus*

OYSTER MUSHROOM

+SUMMER+

ED-M

Above: Oyster mushrooms (left) alongside a giant puffball (Calvatia gigantean) harvested in August. Photo by D. Wilsey

looks more like the true oyster mushroom. It lacks the dark hairs of *L. ursinus*. Both *Lentinellus* species have gills with saw-tooth-like (serrated) edges. They are extremely spicy tasting and not edible.

Two other possible look-alikes are *Crepidotus applanatus* (as well as other *Crepidotus* species) and *Panellus serotinus*. *C. applanatus* is a small, white, thin fleshed, stem less mushroom growing as overlapping individual caps. A brown spore deposit can occasionally be seen on caps in the lower layers. It lacks the pleasant odor usually associated with oyster mushrooms. *P. serotinus* is a late fall mushroom and can be distinguished from true oyster mushrooms by its colors - greenish tints in the cap and yellowish gills.

Uses

GENERAL

The oyster mushroom is a good edible, and health benefits associated with consumption have been reported.

Harvest

WHAT TO HARVEST

Harvest the fruiting mushroom body.

WHEN TO HARVEST

The harvest season for oyster mushrooms runs from early spring to late fall, depending on weather conditions. Even early snowfalls seem not to discourage fruiting, but successive hard frosts will likely end their season.

HOW TO HARVEST

Cut oyster clusters just above the point of juncture with the wood, leaving behind the very young mushrooms. Harvested this way, the young oysters will continue to grow, producing a new crop. Harvest should not be done on clusters having only small fans (less than 1 inch across).

CAUTION

Examine caps for presence of insects. A tiny fungus beetle is specific to this mushroom. When the mushroom is held gill side up the beetles come to the surface and may be brushed off or blown off. When infestation is heavy, damage to the caps may be substantial. Damaged caps should be discarded. Oysters are somewhat tolerant of drought and do quite well in chilly temperatures, but do not do well in freezing temperatures. Excessive heat or cold may cause them to deteriorate.

Handling

STORAGE

Clean adhering debris from cap with a soft brush. Cut away any insect-damaged part. Do not dehydrate. Fresh oyster mushrooms may be frozen (preferably pre-sliced), but do not thaw prior to cooking. This mushroom must be added to the pan while still frozen.

TRANSPORT

Transport in a large flat-bottomed box or basket. Oyster mushrooms do not pack well because of their fragility.

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

(Continued)

OYSTER MUSHROOM

+SUMMER+ ED-M

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Ithaca, NY: Comstock Publishing Associates, Cornell University Press.

PREPARATIONS AND PROCESSING

Oyster mushrooms release substantial moisture when cooked. It may be a good idea to sauté the mushrooms briefly to release some of the stored moisture prior to adding them to recipes.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Oyster and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

Notes

KING BOLETE

SUMMER

ED-M

Above: King bolete. Photo by M. Kempenich. Below: A cluster of varied sizes. Photo by A. Gerenday at Lee and Rose Warner Nature Center.

LIFE FORM
Mushroom fruiting body

PART USED
Caps and stem

SCIENTIFIC NAME
Boletus edulis

COMMON
King bolete or
Porcini

OJIBWE
Ogimaawikwaan
wazaashkwedoowin

HMONG
Not available

SPANISH
Not available

KING BOLETE

SUMMER

ED-M

CAUTIONS

Some other boletes closely resemble the king bolete and some may be poisonous.

Avoid boletes that bruise blue.

Key Characteristics

PRODUCT

- **Look for king boletes throughout Minnesota in conifer forests and beneath oak in hardwoods.**

HARVEST

- **In Minnesota, boletes emerge in early August through September.**

SOCIO-ECONOMIC

- **This species is an excellent edible. It can be sliced and dried and retains flavor in dried form.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

King boletes may be found throughout Minnesota. They usually grow singly on the ground in conifer forests and under oak in hardwood forests.

Identification

DESCRIPTION

Cap is 2-8 inches across. Its color is brown, reddish brown, yellow brown or beige, brownish orange or reddish brown. Its shape is convex with margin rolled under in young specimens, straight in mature ones. The undersurface of the cap has pores that may appear as tubes. The pore surface is white to cream colored in young specimens, but turns greenish olive with maturity. Flesh is firm, white and unchanging. The entire mushroom may be 5-8 inches tall when mature.

Stem is 3-6 inches long, club shaped or straight with a bulbous base. The stem is firm and solid, light tan to brown, and is overlaid with light colored netting at least at the top of the stem or along its entire length.

Spore print is yellowish brown to dark olive.

CAUTION (LOOK-ALIKES)

Some other boletes closely resemble the King bolete. Avoid boletes that bruise blue on flesh or tubes as some of them may be poisonous. Make sure that the netting is present on the stem and that it is light in color.

One look-alike, the bitter bolete (*Tylopilus felleus*), has dark, black or almost black netting on its stem. In this species the young tubes have a pinkish color that gradually becomes reddish brown as they mature. The bitter bolete is not poisonous, but it is extremely bitter.

KING BOLETE

SUMMER

ED-M

Above: So good they made a hat. Steve Netzman, past-president of the Minnesota Mycological Society, shows off a nice king bolete.

Uses

GENERAL
This mushroom may be used as a meat substitute or as flavoring and is excellent when used in soups.

SOCIO-CULTURAL
Because it dries without losing its flavor, you can enjoy it during any season.

ECONOMIC
This is another highly priced edible and is sought after by high-end restaurants.

CAUTION
Examine each individual mushroom to avoid inadvertently mixing in a bitter bolete, its closest lookalike. A single specimen could ruin the pot.

Harvest

WHAT TO HARVEST
Entire fruiting body.

WHEN TO HARVEST
This mushroom generally fruits from late July through late September, depending on weather conditions. Picking is best under dry weather conditions. Moisture from rain or humidity in the air is easily absorbed by this mushroom.

HOW TO HARVEST
With a knife, cut the stems cleanly just above ground level. Pulling the mushroom up by hand is not recommended as it may cause the cap to separate from the stem.

Handling

STORAGE
Store in a well ventilated, cool and dry location, such as a refrigerator. King boletes should not be wet. Refrigeration can extend the shelf life one or two days at the most, but these mushrooms are more perishable than many others, and storage time should be limited. Dehydrating this mushroom after slicing is the best option for lengthier storage.

TRANSPORT
Transport during harvest in a flat-bottomed basket. Caps of king boletes are not strongly attached to their stems and easily detach. They must be handled and transported somewhat delicately to keep them intact. Do not use plastic bags.

PREPARATIONS AND PROCESSING
King boletes may be gently brushed to remove surface debris. Care must be taken when brushing the underside of the cap to not damage the tubes, especially in mature specimens. Check the surface and the cut end of the stem for signs of insect infesta-

REFERENCES

Lincoff, G. (Ed.). (1984). *National Audubon Society field guide to North American mushrooms*. New York, NY: Chanticleer Press.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Bessette, A. E., Bessette, A. R., & Fischer, D.W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

(Continued)

KING BOLETE

SUMMER

ED-M

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

tion. Another indication of insect infestation is that the mushroom feels light, or that it is not firm. When insect infestation is slight, parts of the mushroom may still be used.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Boletes and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

Notes

JUNEBERRY

SUMMER

EG&B

Above: Juneberry in flower. Photo by C. Evans, Illinois Wildlife Action Plan, Bugwood.org. Right: Juneberry bearing fruit of varied maturity. Photo by M.E. Harte, Bugwood.org. Below right: A loaded juneberry tree. Photo by G. Johnson. Below left: Juneberry pie. Photo by K. Korczak, Motherminnesota.blogspot.com.

LIFE FORM
Tree

PART USED
Fruit

SCIENTIFIC NAME
Amelanchier spp.

COMMON
Juneberry
Serviceberry
Saskatoon

OJIBWE
Aniibiimin

HMONG
Not available

SPANISH
Not available

JUNEBERRY

SUMMER

EG&B

Deciduous: **Plants that lose their leaves seasonally, typically in autumn.**

Key Characteristics

PRODUCT

- **Look for juneberries in mixed forests.**

HARVEST

- **Juneberries are usually ready to harvest from early to late summer, depending on the location and site.**

SOCIO-ECONOMIC

- **Juneberries are reputed to make excellent pies.**

REGULATORY

- **Minnesota statute allows harvest of edible fruits for personal consumption on most state lands.**

Location

DISTRIBUTION and HABITAT

Juneberry varieties can be found throughout Minnesota and the region. All varieties produce edible fruits, though quality of flavor varies by variety and site conditions.

Identification

DESCRIPTION

Juneberry plants grow as small trees or shrubs. They have showy white flower clusters in the spring. The leaves are simple, oval to oblong, grow alternately and are deciduous. Fruit is rose-colored when ripening and red to purple at maturity. Juneberry fruits are small — about the size of a blueberry — and taste sweet, though not as sweet as a blueberry.

Ripe fruit can be found and collected in early summer through late August, though actual timing depends on species and location.

Uses

GENERAL

Juneberries are excellent when eaten fresh, and when they can be found in sufficient quantity, they are ideal for jams, preserves, syrups and in baked goods. The fruit also can be frozen.

SOCIO-CULTURAL

Juneberry wood is hard and heavy, and has been used historically for tool handles, arrow shafts and other wood crafts.

Some juneberry varieties are used as ornamentals in landscaping, as they are cold hardy, have showy flowers and provide food for wildlife.

ECONOMY

In the United States, juneberries are seldom, if at all, encountered in markets, though numerous efforts have been made to commercialize the fruit. Canada, however, hosts commercial production.

JUNEBERRY

SUMMER

EG&B

*Above: Potential **look-alike**, chokecherry fruit, grows on racemes. Photo by R. Routledge, Sault College, Bugwood.org.*

CAUTION
Chokecherry has similar leaves, but its fruit grows on racemes.

Harvest

Harvest ripe fruit from early summer through late August, depending on region, seasonal weather conditions and site conditions, such as aspect and shade. Collect ripe fruit by hand using a blickey or bowl.

Handling

STORAGE, TRANSPORT and PROCESSING
Cool berries shortly after picking to maintain quality. Do not wash prior to refrigeration or freezing. If you plan to make preserves, freeze berries first to promote breakdown of the cells.

Markets

Most commercial production occurs in Canada, but efforts continue to establish markets in the United States.

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Juneberries and other fruits may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging in scientific and natural areas (SNA). "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas . . . . "

Minnesota trespass laws prohibit individuals from foraging fruits on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit, fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for edible fruits on their lands.

Blickey: **A container, fastened to the waist or belt, that facilitates harvest by freeing use of both hands.**

Racemes: **Long clusters of fruit attached to a single, un-branched axis that connects to main branch at a single point.**

REFERENCES

Cocksedge, W., & Schroeder, M. (2006). *A Harvester's handbook: A guide to commercial non-timber forest products in British Columbia.* Victoria, BC. Royal Roads University Center for Non-Timber Resources.

Nelson, G. (2006). *Downy serviceberry.* Baton Rouge, LA. USDA NRCS National Plant Data Center.

Strang, J. (2009). *Juneberry.* Lawrence, KS. University of Kansas Cooperative Extension Service.

Marone, T. (2009). *Wild berries and fruits: Field guide.* Cambridge, MN. Adventure Publications, Inc.

Notes

THIMBLEBERRY

SUMMER

EG&B

Above: A thimbleberry thicket. Below left: Fruits extending above the foliage. Below right: Ripe fruit (foreground) exhibits deep, bright red color versus an unripe and underdeveloped specimen in the background. Photos by D. Wilsey.

LIFE FORM
Shrub

PART USED
Fruit

SCIENTIFIC NAME
Rubus parviflorus

COMMON
Thimbleberry

OJIBWE
Odatagaagomin

HMONG
Not available

SPANISH
Not available

THIMBLEBERRY

SUMMER

EG&B

Aspect: **The direction toward which a slope faces.**

Key Characteristics

PRODUCT

- **Look for thimbleberries along trails in wooded areas, particularly in damp areas with rich soil.**

HARVEST

- **Thimbleberries are usually ready to harvest in late July into early August.**

SOCIO-ECONOMIC

- **It can be challenging to find a large quantity of ripe berries in one outing.**

REGULATORY

- **Minnesota statute allows harvest of edible fruits for personal consumption on most state lands.**

CAUTIONS

- **Thimbleberries are quite delicate.**

Location

DISTRIBUTION and HABITAT

Thimbleberries are found in northeastern Minnesota in wooded openings and along many rivers and trails. Thimbleberries typically grow in patches or thickets.

Identification

DESCRIPTION

The plant's large leaves resemble giant maple leaves and are soft, fuzzy and appear wrinkled. The flowers are white. Like strawberries and raspberries, the fruit begins light green and hard and progressively takes on a rose colored hue before becoming deep red, soft and quite delicate. Ripe fruit can be found and collected near the end of July and early August, though actual time depends on weather and location.

Uses

GENERAL

Eat thimbleberries fresh, just as you would eat raspberries. When they can be found in sufficient quantity, the berries have good potential for use in preserves.

ECONOMY

There is no well established market for thimbleberries, probably due to the delicate nature of the fruit and the difficulty of finding fruit in quantity.

CAUTION

Fruit is extremely delicate and becomes mushy quickly, particularly if piled up in a container.

Harvest

Harvest ripe fruits in late July into early August, depending on region, seasonal weather conditions and site conditions such as aspect

THIMBLEBERRY

SUMMER | EG&B

Above: Berries in various stages of ripening. Photo by D. Wilsey.

and shading.

Collect the berries gently by hand and place them into a wide blickey or bowl, spreading - not piling - the berries. Do not shake the bushes, as the ripe berries are very loosely attached and can fall off easily.

Handling

STORAGE, TRANSPORT AND PROCESSING

Cool berries shortly after picking to maintain quality. Do not wash prior to refrigeration or freezing. If you plan to make preserves, freeze berries first to promote breakdown of the cells.

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Fruits may be legally gathered for non-commercial use from state forests, parks, recreation areas, or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging in scientific and natural areas (SNA). "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas . . . ."

Minnesota trespass laws prohibit individuals from foraging fruit on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit, fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for edible fruits on their lands.

Blickey: **A container, fastened to the waist or belt, that facilitates harvest by freeing use of both hands.**

REFERENCES

Cocksedge, W., & Schroeder, M. (2006). *A harvester's handbook: A guide to commercial non-timber forest products in British Columbia.* Victoria, BC. Royal Roads University Center for Non-Timber Resources.

Marone, T. (2009). *Wild berries and fruits: Field guide.* Cambridge, MN. Adventure Publications, Inc.

Notes

WILD RICE

SUMMER

EG&B

Above: View of a rice field from a canoe. Photo by E. Sagor. Below: Parched rice displaying varying degrees of ripeness. Photo by D. Wilsey.

LIFE FORM
Grass, aquatic

PART USED
Seed

SCIENTIFIC NAME
Zizania palustris

COMMON
Wild rice

OJIBWE
Manoomin

HMONG
Not available

SPANISH
Arroz silvestre

WILD RICE

SUMMER | EG&B

CAUTIONS

Wild rice ripens gradually. When harvesting, take care to ensure the plants' well-being so that unripe rice has the chance to mature for future harvest.

Push poles: **Long poles, often young tree stems, with a natural or artificial forked end used to propel canoes through rice fields, thereby minimizing the damage that might be sustained by paddle use.**

Knockers (or flails): **These smooth, tapered wooden sticks are used to draw rice over canoe and knock ripe grain from the seed head. Knocker dimensions are regulated by the Department of Natural Resources and may not exceed 30 inches length and one pound.**

Watershed: **All of the land having in common drainage into a particular body of water.**
(Continued)

UNIVERSITY OF MINNESOTA EXTENSION

Key Characteristics

PRODUCT

- **Wild rice is found across central and northern Minnesota and northern Wisconsin.**

HARVEST

- **Rice is harvested by canoe, using push poles and knockers.**

SOCIO-ECONOMIC

- **The Ojibwe name for wild rice, *manoomin*, translates as "the good berry".**

REGULATORY

- **Minnesota requires a license to harvest wild rice on public waters; the harvest of green (unripe) rice is unlawful.**
- **Rice harvest within tribal boundaries is regulated by the respective departments of natural resources.**

CAUTIONS

- **Ripeness varies by location. Do not harvest rice before it is ripe.**

Location

DISTRIBUTION

Wild rice is found primarily across central and northern Minnesota, northern Wisconsin (see map) and extending north into Canada. Small pockets of wild rice can also be found in the Upper Peninsula of Michigan. Note that while watersheds may contain rice, individual bodies of water may not. The Minnesota Department of Natural Resources maintains a list of Minnesota lakes with wild rice on their website: www.dnr.state.mn.us.

HABITAT

Naturally occurring wild rice grows in shallow waters across the state, especially in areas with flowing water such as inlets and outlets of lakes, rivers and slow moving streams. Shallow lakes may be covered in wild rice as optimum depth for growth is typically 0.5 to 3 feet of water. Wild rice is an annual plant and grows from seed dropped in previous years. Changing water levels, weather and the previous year's growth can influence annual wild rice production.

Above: Watersheds containing wild rice depicted in blue. Map by A. Drewes.

WILD RICE

SUMMER

EG&B

Above: Harvested rice in a canoe. Photo by D. Wilsey.

Identification

DESCRIPTION

In late May and early June, wild rice appears as ribbons of green floating on the water surface. This floating leaf stage is a time when the rice is very susceptible to uprooting from waves, disturbance or quick changes in water levels. Beginning in late June wild rice stems emerge and start to flower. Since they are on the top of the emerging stalk, the female flowers emerge first and are recognizable by small white tufts protruding from them. Once fertilized, these will develop into the wild rice grains or seeds. Wild rice plants have both male and female flowers, with the male flowers being much showier and developing on the stalk after and below the female flowers.

CAUTION (LOOK-ALIKES)

Wild rice may be difficult to distinguish from other grasses in its early growth stages. Mature stems range in height from one to several feet above the water level.

Uses

GENERAL

Wild rice is an edible grain enjoyed by both humans and wildlife, notably birds.

SOCIO-CULTURAL

Human use of wild rice as a food dates back several thousand years, with a long history of stewardship and use by various Native American cultures. For example, oral traditions within the Ojibwe culture describe an historic migration of the people westward to where "food grows on the water". This food, *manoomin*, or wild rice, is considered a gift from the creator and continues to be an important element in traditional ceremonies and customs today. Wild rice is also an iconic symbol of northern Minnesota, offered at many restaurants in products, like soups and breads.

ECONOMIC

Naturally occurring wild rice is either sold right after the harvest (green) to buyers or rice processors or kept and processed for personal use or later sale.

CAUTION

The name wild rice is misleading. Originally, the name referred to naturally occurring rice found in the region's water bodies. As the product became popular commercially, wild rice came to include paddy-cultivated agricultural product. While so called paddy rice originates from the same genetic stock, it is not truly wild.

Harvest

WHAT TO HARVEST

Only harvest ripe wild rice seeds. This is not as easy as it seems. Wild rice seeds ripen at different times on the same stalk and fall off the stalk easily when they are ripe. This shattering trait helps disperse seeds over a wide time frame, ensuring greater success in re-seeding. This trait is also what allows wild rice to be harvested on the same lake multiple times over an average two-week period.

WHEN TO HARVEST

Wild rice seeds mature at different times on different lakes and even within a lake. Just

Watersheds are typically nested, in that several smaller watersheds comprise one large watershed. Also referred to as basins.

Shattering: **The process by which grains and grasses disperse seed. Non-shattering varieties are favored in cultivation because seeds ripen synchronously and are retained by the plant.**

WILD RICE

SUMMER

EG&B

Hulled: **Removal of the chaff from the seeds. Traditionally done by "dancing" on parched rice while wearing moccasins.**

Parched: **Dried by a process that removes residual moisture from the grain, typically done by wood or natural gas fire.**

Winnowing: **Separation of the chaff from the seeds once it has been removed. Traditionally done with broad, shallow birch bark baskets.**

REFERENCES

Vennum, T. (1988). *Wild rice and the Ojibway people*. St. Paul, MN: Minnesota Historical Society Press.

UNIVERSITY OF MINNESOTA EXTENSION

because seeds are ripe on one lake does not mean they are ready to harvest on another lake. Running your hand up the stalk and seeing if any grains come off easily is one assessment. If the grains sink in the water, they are usually ripe. The early turning of maple leaves is a sign that the rice is ripening. Unripe rice seeds are milky inside and soft when broken open, while a ripe seed will be firm and will snap in half cleanly.

HOW TO HARVEST

Tools for harvesting wild rice include a canoe, knocking sticks (hand-held wooden flails) and a push pole. Check state regulations for specifics on weight and length restrictions for equipment.

Rice harvest is best learned from an experienced harvester. Basically, the wild rice stalks are drawn over the canoe with one stick, while the other stick is used to knock (using a sweeping motion) ripe seeds into the boat. The push pole propels the canoe. Ripe wild rice comes easily off the stalks. Damage (such as bending and breaking stalks) is frowned upon as it prevents further ripening of the seed.

CAUTION

Wild rice ripens gradually. When harvesting, take care to ensure the plants' well-being so that unripe rice has the chance to mature for future harvest.

Handling

STORAGE AND TRANSPORT

Use seed bags to transport wild rice. If keeping unprocessed rice for more than a few days, dry it by simply spreading it on a tarp in the sun. Maintain good air circulation. Keep the seeds cool if hauling it to sell: freshly harvested wild rice can heat up and begin to mold if left bagged too long.

Above: Ricing push pole. Sketch by D. Wilsey.

PREPARATIONS AND PROCESSING

Typically, wild rice is air dried, parched, hulled and then cleaned by a process of winnowing. Processed wild rice keeps for a year or more. Rice can be processed by hand. Finished wild rice can exhibit a variety of colorations and can be almost black to a light brown/tan. Mechanized processors typically require a minimum amount of unprocessed rice, around 300 pounds. Plan your processing strategy before harvesting! It is best to talk to a processor early to determine storage and weight requirements.

Markets

Clean, unbroken wild rice grain sells at a premium at farmers markets. The higher the percentage of broken grains in the package, the lower the price. Preference and also premium pricing are sometimes given to wood parched wild rice over wild rice parched using gas.

Regulations

Minnesota requires a state license to harvest wild rice on public lakes. Harvest of lakes within Ojibwe Reservations are set and regulated by tribal natural resource departments. License requirements vary by Bands, so members should check with tribal resource managers.

SWEET TOOTH MUSHROOM

SUMMER+

ED-M

Above: Sweet tooth or hedgehog mushroom. Left: Characteristic shag on the mushrooms underside. Photos by M. Kempenich.

LIFE FORM
Fungus

PART USED
Mushroom fruiting body

SCIENTIFIC NAME
Hydnum repandum
(Dentinum repandum)

COMMON
Sweet tooth mushroom
Hedgehog mushroom

OJIBWE
Pikojish

HMONG
Not available

SPANISH
Not available

SWEET TOOTH MUSHROOM

SUMMER+ ED-M

Key Characteristics

PRODUCT

- **Look for sweet tooth mushrooms, also known as hedgehog mushrooms, on the ground in hardwood and mixed forests.**

HARVEST

- **Gather sweet tooth mushrooms from July through October.**
- **If you find one, there are likely others located nearby.**

SOCIO-ECONOMIC

- **Hedgehog mushrooms are not commonly encountered and therefore not well known.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

May be found throughout Minnesota on the ground in deciduous and mixed conifer and deciduous forests. Appears to prefer oak and younger growth forests.

Identification

DESCRIPTION

Cap is 1-6 inches across, convex to flat, and at times somewhat depressed. Surface becomes uneven and pitted with age. It is dry and felt-like to the touch. Its color is varying degrees of orange hue, such as pale orange-buff, orange-tan, apricot-orange or ruddy orange. It stains dark orange when bruised. Its margin becomes wavy or sometimes lobed as the cap expands. The cap's underside has spines or teeth that are the same color as the cap, but lighter. The spines are very fragile.

The stem is 1-4 inches long, 0.5-1 inch thick, and equal in width along its length. It is similar to cap in color, but lighter. The flesh is firm, white and bruises darker. The spore print is white.

CAUTION (LOOK-ALIKES)

A closely related species, *H. umbilicatum,* has the same common name as *H. repandum,* but is smaller in size (cap at most 2.5 inches), has a thinner stem, and its cap has a deep, navel-like depression in the center. It is also a good edible. Occasionally, it is reported to have a slight peppery taste. It is found in conifer woods.

The sweet tooth may resemble a chanterelle, a choice edible, to which it is related. However, the undersides of the caps readily distinguish the two: chanterelles have gill-like structures and sweet tooth mushrooms have spines.

SWEET TOOTH MUSHROOM

SUMMER+ | ED-M

Above: Sweet tooth specimen. Photo by M. Kempenich.

There are other fleshy mushrooms with spines on the underside of the cap that also grow on the ground in similar habitats. Their colors are darker and usually some shades of brown. These are inedible or of poor culinary quality, but none are known to be poisonous.

Uses

GENERAL

The sweet tooth mushroom has a firm texture and is an excellent edible.

SOCIO-CULTURAL

This mushroom is not as frequently encountered as other edibles and is therefore less well known.

CAUTION

This mushroom is very distinct because of its overall coloration and the teeth under the cap — thus "sweet tooth".

Harvest

WHAT TO HARVEST

Harvest the entire fruiting body.

WHEN TO HARVEST

The sweet tooth mushroom can be found from July through October. They are found in groups or scattered. When one is found, the surrounding area should be carefully checked for others.

HOW TO HARVEST

Cut at the base just above ground level or push the fruit over from its stem until it breaks cleanly.

CAUTION

Insect damage is not a problem with this mushroom early in the season, but as the season progresses, check for damage more diligently, especially at the center of the cap and base of the stem.

Handling

STORAGE

Store harvested mushrooms in a rigid container in the refrigerator.

TRANSPORT

Transport in a flat-bottomed container, arranged individually to prevent transfer of debris from one individual to another. Sweet tooth mushrooms are unusually fragile. They should be handled individually for storing and should never be stacked very deep in order to avoid breaking those at the bottom.

PREPARATIONS AND PROCESSING

Clean individual mushrooms as soon as picked to avoid getting dirt among the spines from contact with the other specimens during transport. The teeth are extremely fragile and hard to clean. If necessary, clean dirt caught among the teeth by

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

(Continued)

SWEET TOOTH MUSHROOM

SUMMER+ ED-M

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Ithaca, NY: Comstock Publishing Associates, Cornell University Press.

blowing on it.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Sweet tooth and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

Notes

LOBSTER MUSHROOM

SUMMER+ | ED-M

*Above left: Short-stemmed russula (*Russula brevipes*) — the host species for* Hypomyces lactifluorum*. Photo by D. Wilsey. Above right and below: The parasitized* R. brevipes *becomes the lobster mushroom, displaying the distinct orange hue and deformed appearance. Photos by M. Kempenich.*

LIFE FORM
Fungus

PART USED
Parasitized fruiting body

SCIENTIFIC NAME
Hypomyces lactifluorum

COMMON
Lobster mushroom

OJIBWE
Ozhawe-wazashkwedi

HMONG
Not available

SPANISH
Not available

LOBSTER MUSHROOM

SUMMER+ ED-M

Key Characteristics

PRODUCT

- **Look for lobster mushrooms growing on the ground throughout Minnesota.**

HARVEST

- **Lobster mushrooms emerge around mid-July through the end of September.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

Lobster mushrooms are found throughout Minnesota growing on the ground scattered over small open areas, occasionally singly, under conifers and deciduous trees.

Identification

DESCRIPTION

The lobster mushroom's size ranges from 2-6 inches or more. The mushroom's orange-red to deep vermillion color results from the fruiting bodies of the maturing parasite, *H. lactifluorum*, that completely encases the host, forming an orange shell around it. The host is a gilled mushroom, but the parasite obscures the shape of the gills, and they may be discerned only as low ridges on the underside.

Mycologists who have succeeded in determining the host species of some fruiting bodies have so far identified only *Russula brevipes* as host, but the presence of non-parasitized *Lactarius piperatus* is frequently present near mature lobster mushrooms, raising the possibility that it too may serve as the host. The lobster mushroom has a solid, crisp consistency. When cut in half, the white inside contrasts sharply with the orange shell around it (see image on next page).

CAUTION (LOOK-ALIKES)

The lobster mushroom does not have a look-alike. Since the identity of the parasitized mushroom is hidden by the parasite, some authorities caution against using it as food. However, it is well known that *H. lactifluorum* parasitizes a white *Russula* and, possibly, some *Lactarius* species that are not poisonous and lack culinary value without the parasite. They do not present a health hazard.

Uses

GENERAL

This mushroom is an edible.

Harvest

WHAT TO HARVEST

Harvest the entire parasitized fruiting body.

WHEN TO HARVEST

Harvest mid-July through the end of September, depending on weather conditions. The firm texture and durable skin make this

LOBSTER MUSHROOM

SUMMER+ ED-M

Above: A piece of lobster mushroom with the stem cut away. Photo by D. Wilsey.

mushroom somewhat waterproof, and it may be collected soon after rain.

HOW TO HARVEST

Use a plain sharp knife, such as a pocketknife to cut the fruiting body cleanly above ground level. If the cap feels solid enough, it may sometimes be broken off cleanly by bending or twisting until it separates. The lobster has the tendency to accumulate dirt and debris, and it needs to be cleaned in the field.

Handling

STORAGE

Store in a well-ventilated, cool and dry location, such as a refrigerator. Lobster mushrooms should not be wet, but allowed to air-dry before storage. Refrigerated storage can extend their shelf life to around two weeks, depending on how solid and clean the mushrooms are. However, storing mushrooms longer than a week is not recommended.

TRANSPORT

Transport after harvest in a flat-bottomed box or basket is recommended, but lobster mushrooms will not be significantly damaged if carried in any type of container for a short time. Special handling should be employed in the case of large specimens to keep them intact.

PREPARATIONS AND PROCESSING

Only solid, firm fruiting bodies should be kept. To clean, they may be brushed with a soft brush. Check the entire mushroom for the presence of insects. Molds may also be present in crevices on the lower part of the mushroom, and these would have to be cut away.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Lobster and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, noncommercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific

REFERENCES

Lincoff, G. (Ed.). (1984). *National Audubon Society field guide to North American mushrooms*. New York, NY: Chanticleer Press.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Bessette, A. E., Bessette, A. R., & Fischer, D.W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

(Continued)

LOBSTER MUSHROOM

SUMMER+ ED-M

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

Notes

CHICKEN-OF-THE-WOODS

SUMMER+ | ED-M

Above: Chicken-of-the-woods growing on a standing tree. Below: Close up of the sulfur shelf mushroom. Photos by A. Gerenday at Lee and Rose Warner Nature Center.

LIFE FORM
Fungus

PART USED
Mushroom fruiting body

SCIENTIFIC NAME
Laetiporus sulphureus
Laetiporus cincinnatus

COMMON
Chicken-of-the-woods
Sulfur shelf

OJIBWE
Ojishtad (a general term)

HMONG
Not available

SPANISH
Not available

CHICKEN-OF-THE-WOODS

SUMMER+ ED-M

CAUTIONS

Do not gather from conifers (pine trees); may cause gastric upset when growing on this substrate.

Key Characteristics

PRODUCT

- **Chicken-of-the-woods is a bright orange and yellow mushroom growing on toppled trunks or still standing live trees.**
- **Most often associated with oak trees.**

HARVEST

- **Chicken-of-the-woods is found following wet periods from late spring to fall.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **Chicken-of-the-woods is easy to identify but should not be collected from conifers (pines) due to potential for gastric upset.**
- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

Chicken-of-the-woods can be found throughout Minnesota in hardwood forests and occasionally in conifer forests on downed or still standing dead wood or on trunks and larger branches of live trees.

Identification

DESCRIPTION

Chicken-of-the-woods (sometimes referred to as a chicken mushroom) is a bright, colorful mushroom that grows in large clusters or as single fans. A single cluster may weigh as much as 10 pounds. The top portion is orange, and the lower part is bright lemon yellow. Occasionally, rosettes in which the underside is white or cream colored (*L. cincinnatus*) may be found at the base of trees. Young specimens are soft. As the mushroom ages it becomes firmer: first still pliable but then turning tough and woody. Eventually, the mushroom becomes white and crumbly.

CAUTION (LOOK-ALIKES)

Chicken-of-the-woods collected from conifer woods should be avoided. Do not use for food if mushroom is old and breaks easily.

Uses

SOCIO-CULTURAL

This mushroom is popular as a meat substitute.

Harvest

WHAT TO HARVEST

Harvest individual fans or clusters while still brightly colored and still fresh and pliable.

WHEN TO HARVEST

The harvest season for chicken-of-the-woods runs from mid-May through early October, depending on exact location and weather conditions. Since it is a sturdy and firm mushroom, it is less affected by precipitation and may be picked soon after rainfall. In addition, the mushroom gets moisture from

CHICKEN-OF-THE-WOODS

SUMMER+ ED-M

Above: Chicken-of-the-woods in its glory! Photo by M. Kempenich.

the damp wood on which it grows and is therefore less affected by drought than mushrooms growing on soils.

HOW TO HARVEST

Use a sharp, heavy duty blade to cut clusters just above the attachment to the wood. Chicken-of-the-woods do not break cleanly; attempts to break them may cause damage.

CAUTION

Older mushrooms become tough and eventually turn white and powdery. Older mushrooms may be difficult to digest and may cause gastro-intestinal problems.

Handling

STORAGE

Store in a well-ventilated, cool, dry place. Refrigerated storage can extend shelf life up to a week. Chicken-of-the-woods should be wet, but allowed to air-dry to remove excess moisture.

TRANSPORT

Transport during harvest in a large, flat-bottomed box or basket.

PREPARATIONS AND PROCESSING

The top surface of the brackets may be gently brushed with a soft brush. Occasional embedded twigs and leaves may be removed with a knife. Although insect infestation is rare, the entire cluster should be checked. Trimming insect damaged parts with a knife may be possible. Chicken-of-the-woods does not break cleanly, use a knife.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Chicken-of-the-woods and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A per-

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

(Continued)

CHICKEN-OF-THE-WOODS

SUMMER+ ED-M

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Ithaca, NY: Comstock Publishing Associates, Cornell University Press.

son is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

Notes

CHANTERELLE

SUMMER+ | ED-M

Above: Chanterelles among the leaf litter. Below left: Harvested chanterelle. Photos by A. Gerenday at Lee and Rose Warner Nature Center. Below right: Chanterelle before harvest. Photo by M. Kempenich.

LIFE FORM
Fungus

PART USED
Mushroom fruiting body, caps and stem

SCIENTIFIC NAME
Cantharellus cibarius

COMMON
Chanterelle

OJIBWE
Not available

HMONG
Not available

SPANISH
Hongo chanterelle
Rebozuelo

CHANTERELLE

SUMMER+ ED-M

CAUTIONS

Chanterelles have at least three look-alikes that need to be avoided:

Jack-o-lantern (*Omphalatus illudens*),

False chanterelle (*Hygrophoropsis aurantiacum*) and

Woolly chanterelle (*Gomphus floccosus*).

All three may cause mild to severe gastric upset when eaten.

Key Characteristics

PRODUCT

- **Look for chanterelles throughout Minnesota in both hardwood and conifer forests.**

HARVEST

- **Chanterelles emerge between July and September.**

SOCIO-ECONOMIC

- **Chanterelles are known to be some of the finest edible mushrooms.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **Chanterelles have at least three look-alikes that need to be avoided!**

Location

DISTRIBUTION and HABITAT

Chanterelles grow throughout Minnesota on the ground in both hardwood and conifer forests. They grow singly, in loose groups or widely scattered. In deciduous woods, they prefer oak; in conifer woods they grow in moss or near water.

Identification

DESCRIPTION

Cap is 1-6 inches in diameter, convex or plane, becoming depressed and funnel shaped in age. The margin is in-rolled at first, then straight, becoming wavy or lobed. It has a smooth surface and has dull, egg yolk yellow, yellow orange or lighter color. The undersurface has ridges that descend on the stem and that resemble gills.

Gills are colored like the cap. They may fork, and, frequently, they will have cross walls between them.

Stem ranges from 1-3 three inches in length. It is equal or narrower at the base, solid, firm, smooth and either the same color as the cap or paler.

The flesh of chanterelles tends to be thick, firm, yellowish or white. Odor is fragrant, fruity and often described as apricot. Spore print white or cream.

CAUTION (LOOK-ALIKES)

Chanterelles have at least three lookalikes that need to be avoided: Jack-o-lantern (*Omphalatus illudens*), false chanterelle (*Hygrophoropsis aurantiacum*) and woolly chanterelle (*Gomphus floccosus*). All three may cause mild to severe gastric upset when eaten. To avoid mistakes, read carefully the description of each below.

Chanterelles always grow on the ground and the stems are not fused. In addition, the fragrant fruity odor is an important character in distinguishing it from its three lookalikes. However, note that chanterelles are not edi-

CHANTERELLE

SUMMER+ ED-M

Above: ***Poisonous Look-alike****: Jack-o-lantern mushroom (*Omphalatus illudens*). Photo by A. Gerenday.*

ble raw; in this state they can cause **serious** gastrointestinal problems.

Jack-o-lantern is usually found under oak trees, growing in clusters on wood that may be buried and not readily noticed. The entire mushroom is dark orange, darker than a chanterelle. The cap has a regular round shape, and it has a depression in the center. The gills are thin and run down the stem. The stems are much longer than on a chanterelle, and they taper toward the base where they are usually fused together.

False chanterelle is found in conifer woods, rarely with hardwoods. It grows on stumps and rotting wood. It is dark orange to orange-brown. The gills are bright orange, very close together, thin and run down the stem. This mushroom does not have a distinctive odor or taste.

Woolly chanterelles are usually found in conifer forests. These funnel-shaped mushrooms are about the same size as the chanterelle, but differ in the presence of scales on the cap, i.e., inside the cone. The outside of the funnel has whitish ridges, and the stem is hollow.

Uses

GENERAL

Chanterelles are used in sauces served over pasta or cooked in gravy served over chicken or beef. Parsley, garlic and onion are the most common culinary companions.

SOCIO-CULTURAL

Because of its delicate flavor, chanterelles lend themselves well to experimentation in different culinary forms. They have been used as flavorings in ice cream and cake cream filling.

ECONOMIC

Chanterelles fetch a good price. Those found in supermarkets in Minnesota are primarily imported from other states, likely due to barriers to commercialization of wild-harvested mushrooms in Minnesota.

CAUTION

Do not eat raw.

Harvest

WHAT TO HARVEST

Harvest fresh, firm, fruiting bodies only.

WHEN TO HARVEST

Generally, chanterelles fruit mid-July through mid-September, depending on weather conditions. Picking is best if mushrooms are not wet.

HOW TO HARVEST

Cut stems above ground level using a plain, sharp knife.

CAUTION

Older mushrooms can be wormy.

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

(Continued)

CHANTERELLE

SUMMER+ ED-M

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Ithaca, NY: Comstock Publishing Associates, Cornell University Press.

Handling

STORAGE

Store in a well-ventilated, cool, dry location such as a refrigerator. Chanterelles should not be wet; allow to air-dry before storage. Refrigeration will extend their shelf life three or four days, and will help to preserve the flavor. Chanterelles store well refrigerated, but may dry at the margins under extended storage. To extend shelf life during refrigeration, you may cover the container with a damp paper or cloth towel.

TRANSPORT

Transport preferably in a flat-bottomed basket, but may be transported in a paper bag. Take care not to stack the mushrooms in too many layers; the weight could damage those on the bottom. Do not use plastic bags.

PREPARATIONS AND PROCESSING

Remove surface debris with a soft brush. The mushroom should feel firm throughout; if it does not, inspect more closely for the presence of insects at the base of the stem and in the center of the cap. Do not dehydrate chanterelles; they do not reconstitute well.

Markets

Consider farmers markets and restaurants, but recognize that mushroom commercialization is regulated by Minnesota Food Code (Chapter 4626.0155 Wild Mushrooms).

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Chanterelles and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas (SNA). "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

The Pacific golden chanterelle is the official state mushroom of Oregon. Minnesota's is the morel.

BALSAM BOUGHS

FALL

HD

Above left: Balsam stand. Photo by J. Miedtke. Above right: Balsam needles and node. Photo by D. Wilsey. Below: Balsam wreath. Photo by D. Fuller.

LIFE FORM
Tree

PART USED
Foliage

SCIENTIFIC NAME
Abies balsamea

COMMON
Balsam fir

OJIBWE
Zhingob

HMONG
Not available

SPANISH
Abeto balsámico or
Abeto de navidad

BALSAM BOUGHS

FALL

HD

Key Characteristics

PRODUCT

- **Look for balsam in the shaded understory of forests in northeast and southeast Minnesota.**

HARVEST

- **To ensure needle retention, bough harvest begins after the second hard frost.**

SOCIO-ECONOMIC

- **Minnesota is a national leader in balsam wreath production, generating $20 million per year, with most sales outside Minnesota.**
- **Seasonal bough harvest and wreath production provides income and employment for hundreds of people throughout the state.**

REGULATORY

- **Minnesota statutes regulate the harvest, transport and bulk purchase of balsam boughs.**

CAUTIONS

- **A properly harvested tree will continue to grow and produce harvestable boughs.**

Location

DISTRIBUTION

Native to Minnesota, balsam fir is found in the northeast and southeastern regions of the state.

HABITAT

Balsam fir grows in shady conditions — a characteristic referred to as "shade tolerant". It can be found growing on a variety of soil conditions, including sandy, rocky or loamy soils, and in peat. Balsam fir grows in pure stands or mixed with other tree species. It is commonly associated with white spruce (*Picea glauca*) and northern white cedar (*Thuja occidentalis*).

Identification

DESCRIPTION

Balsam fir is a small to medium-sized tree, typically 50-60 feet high. It has a distinctive pyramidal or conical shape. Its bark is smooth and silvery-gray. The needles are flat with smooth margins. A distinguishing characteristic on the lower surface of the balsam fir needle is a prominent midrib and two rows of white colored bands. These are called "stomata," and they serve as pores for the needles. The needles remain on the branches for 8-13 years. Its cones are erect and stand upright on the branches.

CAUTION (LOOK-ALIKES)

Spruce is commonly mistaken for balsam. One way to tell balsam fir from the similar looking spruce is that the balsam fir needles

BALSAM BOUGHS

FALL HD

Above: Roadside sign placed by a local bough buyer. Photo by D. Wilsey.

are fixed directly on the branch, while spruce needles fasten with a peg-like base.

Uses

GENERAL

Balsam fir is used for pulpwood and lumber, and is chipped for woody biomass. Some companies extract oils from the boughs for use in cosmetics. Needles can be used as a room fragrance by simmering them in hot water.

SOCIO-CULTURAL

Historically, people used balsam fir resin (found in the blisters on tree trunks) as a salve prized for its antiseptic and analgesic qualities that keep small wounds from festering.

In the northeastern United States, particularly in Maine, dried balsam fir needles are used as stuffing for small pillows used as fragrant decorations and drawer sachets.

Because the harvest of boughs became so pervasive over the years, and concerns about the sustainability of the resource arose, Minnesota established the Balsam Bough Partnership. This is a cooperative group of public and private agencies and industry focused on ensuring the sustainability of the resource and strengthening the industry.

ECONOMIC

In Minnesota, there is a long heritage of harvesting boughs for personal use or for supplemental income. Balsam is preferred for wreath making because of its strong and persistent fragrance. Gathering balsam boughs for the production of holiday wreaths has become a cottage industry in the state.

- Minnesota is one of the nation's leaders in wreath production.
- Boughs and wreaths are a $20 million per year industry, with most of the sales going outside of Minnesota.
- Bough harvest and wreath making provide seasonal income and employment to hundreds of Minnesotans.

Harvest

WHAT TO HARVEST

A quality wreath is dependent on quality boughs.

- Boughs should be dense with needles that are dark green in color.
- Harvest from the bottom half of the tree. Boughs at the top of mature trees are considered unsuitable by many wreath makers.
- Harvest flat or semi-rounded boughs.

WHEN TO HARVEST

Boughs cannot be collected until there are two hard frosts that firmly 'set' the needles onto the branch. Generally, in northern Minnesota, boughs are harvested from late Sep-

BALSAM BOUGHS

FALL HD

REFERENCES

Minnesota Department of Natural Resources and University of Minnesota Extension. (2005). *Careful harvest fact sheet.* Retrieved from http://files.dnr.state.mn.us/forestry/um/carefulharvest_brochure.pdf

Smith, W. R. (2008). *Trees and shrubs of Minnesota*. Minneapolis, MN: University of Minnesota Press.

Wilsey, D.S., & Miedtke, J. (2009). Management and marketing of non-timber forest products. In M. J. Baughman, C. R. Blinn, J. G. DuPlissis, E. Sagor, A. S. Gupta, D. Drake, . . . G. Wyatt. (Eds.). Woodland stewardship: A practical guide for Midwestern landowners. Saint Paul, MN: University of Minnesota Extension.

UNIVERSITY OF MINNESOTA EXTENSION

tember/early October through the beginning of December.

HOW TO HARVEST

Boughs can be snipped with pruners or, when colder, snapped off the branch. The Balsam Bough Partnership established the following recommended guidelines for sustainable harvest:

- Harvest boughs from trees that are over 7 feet tall.
- When harvesting from smaller, young trees, leave at least 50 percent of the limbs intact in the upper portion of the tree.
- Harvest branches that are no larger than the diameter of a pencil.
- Only harvest a portion of the branch. Do not remove the entire branch.

Handling

STORAGE

Once collected, boughs need to be kept cool and out of direct sunlight and wind to retain color and prevent drying. Garages or outbuildings provide good storage areas.

TRANSPORT

Many harvesters bundle boughs in roughly 25-pound bundles to bring them out of the woods.

PREPARATIONS AND PROCESSING

Boughs are formed into wreaths by clipping to the appropriate length and either wrapping by hand around a hoop or by using a machine called a crimper. Adding decorations like a bow, pine cones or other embellishments is the final step.

CAUTION

Keep harvested boughs cool and out of sunlight.

Markets

Prices offered for boughs often depend on bough quality and the relationship between the buyer and harvester. As with most businesses, bough buyers appreciate good quality, consistent quantity and reliability. It is also a good idea to identify a buyer before harvesting.

Minnesota's balsam resource is ample and allows for growth in markets for wreaths and other value-added products, including mixed-species wreaths, swags, garlands, etc.

Regulations

Minnesota statutes regulate the harvest, transport and bulk purchase of balsam boughs.

- Harvest (88.642.1): "*No person shall cut, harvest, remove, transport, or possess for decorative purposes or for sale more than three decorative trees, more than 100 pounds of decorative boughs, or more than 100 pounds of any other decorative materials without the written consent of the owner or authorized agent of the private or public land on which the decorative materials were cut or harvested.*"
- *"Written consent . . . must be carried by every person cutting, harvesting, removing, possessing, or transporting any decorative materials. . . ."*
- Transport (88.642.3): "*No person, common carrier, bough buyer, or authorized agent shall purchase or otherwise receive for shipment or transportation any decorative materials without recording the seller's or consignor's name and address and the written consent on a form furnished or otherwise approved by the commissioner of natural resources.*"

HEN-OF-THE-WOODS

+FALL

ED-M

Above: Hen-of-the-woods close up on open ground. Below: Hen-of-the-woods nestled within the base of a tree. Photos by M. Kempenich.

LIFE FORM
Mushroom fruiting body

PART USED
Caps and stems

SCIENTIFIC NAME
Grifola frondosa

COMMON
Hen-of-the-woods

OJIBWE
Wapun ojishtad

HMONG
Not available

SPANISH
Not available

HEN-OF-THE-WOODS

+FALL

ED-M

CAUTIONS
Two possible look-alikes:

***Meripilus giganteus* and *Polyporus umbellatus*.**

Key Characteristics

PRODUCT

- **Look for hen-of-the-woods in the hardwood forests of central and southern Minnesota.**

HARVEST

- **Hen-of-the-woods begins emerging in August and persists through mid-November.**

REGULATORY

- **Minnesota statute regulates commercial mushroom harvest.**

CAUTIONS

- **Hen-of-the-woods has two edible look-alikes.**
- **DO NOT EAT any mushroom unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT
Hen-of-the-woods is found mostly in the lower two-thirds of the state in hardwood forests, mostly with mature oak. Hen-of-the-woods clusters are found at the foot of large, mature oaks and appear to favor white oaks.

Identification

DESCRIPTION
The hen-of-the-woods mushroom grows on the ground as a cluster and, occasionally, on exposed tree roots. It is 8-25 or more inches in diameter, arising from a single short, trunk-like base that branches repeatedly. The tip of each branch opens up into a spatula, or leaf-shaped cap. The mushroom's common name is derived from its visual similarity to the feathered body of a sitting hen.

Caps are 1-3.5 inches in diameter and are firm but supple. The upper surface is rough or finely fibrillose and is light tan to dark grayish brown in color. The underside is white or cream colored with rounded or angular pores that run down the stem. Stems and branches are white with firm, slightly fibrous consistency. The mushroom's odor is mealy, and it tastes somewhat peppery, but pleasant.

CAUTION (LOOK-ALIKES)
There are two possible look-alikes: *Meripilus giganteus* and *Polyporus umbellatus*. *Meripilus* is larger overall and has larger caps than hen-of-the-woods. The under surface of its cap bruises distinctly black. *P. umbellatus*, as its name suggests, has umbrella-shaped caps that are centrally positioned on the tips of branches. These two mushrooms are also edible and present no threat of poisoning.

Uses

GENERAL
The hen-of-the-woods is an excellent edible and is reputed to have health benefits.

SOCIO-CULTURAL
This mushroom is used as a side or main dish

HEN-OF-THE-WOODS

+FALL

ED-M

Above: Hen-of-the-woods at the base of a standing tree. Photo by M. Kempenich.

as a meat substitute. Occasionally, it is pickled.

ECONOMIC
This mushroom has potential market value.

CAUTION
The known look-alikes of this mushroom pose no threat to human health.

Harvest

WHAT TO HARVEST
The entire cluster, including the base, is edible and can be harvested. Although the base is somewhat tough, it has a crisp quality that some consumers find desirable.

WHEN TO HARVEST
The harvest season for hen-of-the-woods is August to mid-November, depending on weather conditions. Since the caps of the hen-of-the-woods do not absorb moisture readily, it may be harvested soon after rain. However, be on the lookout for sand and grit that may have splashed onto the underside of the mushroom and lodged in the pores. Ideally, you should harvest this mushroom 2-4 days after a rainfall in order to allow some of the grit to fall away naturally as the fruiting body expands in size.

HOW TO HARVEST
Harvesting hen-of-the-woods requires a sharp knife. Cut clusters low at the base, just above the ground or near the point of attachment when it is growing on wood. It is not recommended to pull or twist off the cluster, because it is likely to fracture, and it would not separate from the substrate intact.

Handling

STORAGE
Hen-of-the-woods store well refrigerated and may be safely kept for a week or slightly longer. To extend their shelf life during refrigeration, you may cover them with a damp paper or cloth towel that has been wetted with clean water. You may also store them in a rigid container with a cover.

TRANSPORT
Transport during harvest in a large, flat-bottomed box or basket. Do not stack mushrooms on top of one another.

PREPARATIONS AND PROCESSING
With reasonable care, the top surface of the caps may be brushed fairly vigorously with a soft brush. Some people use a spoon to scrape the under-sides of individual caps to eliminate the chance of leaving grit in the pores.

Because hen-of-the-woods frequently grow on the ground, they often embed twigs, leaves and other debris into the caps as they grow. These areas should be cut away, but sometimes this will result in the loss of a large portion of the cluster. The entire cluster must be checked for insect damage, and these areas should be cut away as well. Be

REFERENCES

Lincoff, G. (Ed.). (1984). *National Audubon Society field guide to North American mushrooms*. New York, NY: Chanticleer Press.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Bessette, A. E., Bessette, A. R., & Fischer, D.W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

(Continued)

HEN-OF-THE-WOODS

+FALL

ED-M

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Notes

on the lookout for earwigs, in particular, as they like to nestle around the base.

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Hen-of-the-woods and other mushrooms may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for mushrooms on their lands.

PRINCESS PINE

FALL

HD

Above: Princess pine with spring growth on the forest floor. Photo by D. Wilsey. Left: A princess pine holiday wreath, on an ash hoop tied with bass-wood inner bark made by E. Nauertz. Photo by J. Miedtke.

LIFE FORM
Forest ground cover

PART USED
Mature aerial stems

SCIENTIFIC NAMES
Lycopodium dendroideum

Lycopodium obscurum

COMMON
Princess pine
Ground pine
Club moss
Lycopodium

OJIBWE
Gaagigebag, -oon (evergreen, princess pine)

HMONG
Not available

SPANISH
Not available

PRINCESS PINE

FALL | HD

CAUTIONS
There is great concern about the effects of harvest on population size, diversity and sustainability.

Aerial stems: **Erect or vertical stem growth.**

Rhizomes: **A plant stem that grows outward from the plant, frequently on or underground, that is capable of producing new plants by a process known as vegetative reproduction.**

Strobili**: A plant's structure that contains the reproductive organs of non-flowering plants.**

UNIVERSITY OF MINNESOTA EXTENSION

Key Characteristics

PRODUCT

- **Look for princess pine in northeastern Minnesota.**

HARVEST

- **Ground pines are most frequently harvested in the fall.**

SOCIO-ECONOMIC

- **The first photographers used *Lycopodium* spores for flash powders.**

CAUTIONS

- **There is great concern about the effects of harvest on population size, diversity and sustainability.**
- **Any abrupt or intensive alteration of growing conditions can make it difficult for the survival of any type of existing ground vegetation.**

Location

DISTRIBUTION
Princess or ground pines are common throughout Canada and the eastern United States, extending southward to Alabama. In Minnesota, princess pine can be found in northeastern counties, with a few outlier populations located in southeast Minnesota.

HABITAT
Lycopodium species are typically found in cool, moist conditions. They can tolerate a range of nutrient availability and can withstand a wide range of light conditions. Often, they are found under stands of maple and basswood or under mixed pine and hardwoods. They are associated with balsam fir.

Identification

DESCRIPTION
Lycopodium comes from the Greek words "*luko*" (wolf) and "*podos*" (foot). Although commonly called club moss, *Lycopodium* species are not related to mosses, but rather to ferns as they reproduce through spores.

There are a variety of *Lycopodium* species encountered in the northern forests of the Great Lakes region. The two most commonly harvested are *Lycopodium dendroideum* (round-branched ground pine) and *Lycopodium obscurum* (flat-branched ground pine). This publication focuses on these two species.

Ground pine species have rhizomes that commonly grow 4-6 inches below ground. Mature stems that are between 4-6 years and may produce strobili, or cones, that in turn form spores that are necessary in the sexual reproductive cycle of the plant.

Several of the *Lycopodium* species have a characteristic "tree-like" branching that resembles a small pine tree (see photo on first page of this fact sheet), hence the common name of princess pine or ground pine.

CAUTION (LOOK-ALIKES)
Other species not addressed in this publica-

PRINCESS PINE

FALL

HD

Above: Princess pine wreath and garland decorating an entry. Photo by J. Miedtke.

tion include running club moss (*Lycopodium clavatum),* stiff club moss (*Lycopodium annotinum*) and ground cedar (*Diphasiastrum complanatum*). Note: These species are not typically permitted for harvest on public lands, although private landowners may consent.

Uses

GENERAL

Lycopodium species are used in seasonal decorations, in the floral industry, in medicinal and homeopathic remedies and naturalizing of landscapes.

SOCIO-CULTURAL

The spores, when mature, are highly flammable and have historically been used for pyrotechnics and for special effects. The first photographers used *Lycopodium* spores for flash powders, and one of the first photocopy machines used *Lycopodium* spores as a carbon source. In addition, due to their very fine texture, the spores were used in toilet powders, makeup and pill coatings.

ECONOMIC

Princess pine wreaths and décor fetch a premium price relative to more common fir wreaths.

CAUTION

Carefully consider harvest sustainability before planning market endeavors requiring princess pine species.

Harvest

WHAT TO HARVEST

Harvest aerial growth of ground pines. Do not harvest or uproot through harvest the below-ground components of the plant.

WHEN TO HARVEST

Ground pines are most frequently harvested in the fall, beginning around September, which is also when the *Lycopodium* spores are mature and ready for dispersal. Harvest season ends with snowfall.

HOW TO HARVEST

Take only the mature aerial stems, recognizable by the strobili, or cones. Leave the immature stems for a future harvest.

The most efficient way to harvest princess ground pine is to pluck or clip the mature aerial stem near the base at ground level, leaving the below-ground portion of the plant undisturbed. Because it has not yet been determined whether it is less stressful to the plant to have the aerial stem plucked, it is recommended that they be clipped with a sharp instrument such as a scissors or sharp hand-held pruners.

Harvesting the individual mature aerial stems without disturbing the underground rhizome may enhance the survival of the

PRINCESS PINE

FALL

HD

REFERENCES

Demchik, M., Miedtke, J., Preece, K., & Zasada, J. (2005). *Careful harvest fact sheet.* Saint Paul, MN. Minnesota Department of Natural Resources and University of Minnesota Extension.

Nauertz, E., & Matula, C. (2002). Lycopodium management. In M. Reichenbach, J. Krantz, & K. Preece (Eds.), *Non-timber forest products and implications for forest managers.* Saint Paul, MN: University of Minnesota Extension. Retrieved from http://www.extension.umn.edu/specializations/environment/ntfp.html

plant and may increase or even stimulate below ground rhizome branching, creating the increased potential for future harvest opportunities.

CAUTION

Any abrupt or intensive alteration of growing conditions can make it difficult for the survival of any type of ground vegetation.

At least two years should be allotted between harvests in the same area to allow enough time without disturbance for possible spore germination to occur and for an increase in ground cover.

When considering whether to gather any forest product, it is important to consider taking moderate quantities.

Handling

STORAGE

Harvested princess pine should be stored in a cool place out of direct sunlight.

TRANSPORT

Harvesters generally use burlap bags or containers that are well ventilated to contain harvested product for transport.

Markets

Princess pine most often enters the market as a raw material for decorative greens or as part of value added products such as wreaths and garlands.

Regulations

Throughout the Lake States region a permit is required if you plan to harvest *Lycopodium* species on public lands. Minnesota statutes regulate the harvest , transport and bulk purchase of decorative materials.

Harvest (88.642.1): “No person shall cut, harvest, remove, transport, or possess for decorative purposes or for sale more than three decorative trees, more than 100 pounds of decorative boughs, or more than 100 pounds of any other decorative materials without the written consent of the owner or authorized agent of the private or public land on which the decorative materials were cut or harvested.”

“Written consent . . . must be carried by every person cutting, harvesting, removing, possessing, or transporting any decorative materials. . . .”

Transport (88.642.3): “No person, common carrier, bough buyer, or authorized agent shall purchase or otherwise receive for shipment or transportation any decorative materials without recording the seller's or consignor's name and address and the written consent on a form furnished or otherwise approved by the commissioner of natural resources.”

RED OSIER DOGWOOD

FALL

BS&W

Above: Flowering dogwood. Right: Red bark and recently emerged leaves. Photos at Wikimedia.org. Below: Red osier creates a captivating center in this holiday decorative piece. Photo by J. Miedtke.

LIFE FORM
Shrub

PART USED
Stems

SCIENTIFIC NAME
Cornus sericea L.
Cornus stolinifera

COMMON
Red osier dogwood
Red "willow"

OJIBWE
Miskwaabiiminzh(iig)

HMONG
Not available

SPANISH
Cornejo (dogwood)

RED OSIER DOGWOOD

FALL

BS&W

CAUTIONS

The oils or sap produced by the dogwood species may cause a skin rash.

Key Characteristics

PRODUCT

- **Red osier dogwood is found in nearly every region of Minnesota.**

HARVEST

- **It is said that one should not harvest red osier until you can see your breath in the fall.**

SOCIO-ECONOMIC

- **The "osier" in red osier dogwood is derived from the French language; it means "willow-like".**

CAUTIONS

- **The oils or sap produced by the dogwood species may cause a skin rash.**

Location

DISTRIBUTION

Red osier dogwood is found in nearly every region of Minnesota – from the brush and forested lands in the north to its native ground in southern Minnesota. This shrub is native to most of North America, with wide distribution from California to Alaska and throughout the country to the East Coast and south to Mexico. It is generally found growing at elevations below 8,200 feet (2,500 meters).

HABITAT

Red osier dogwood grows in soils that are saturated with water for at least a portion of the growing season. That is why you commonly find this shrub growing within wetlands and at the edges of lakes, streams and ponds. It tolerates fluctuating water tables, thus making it adaptable to these wet areas.

Identification

DESCRIPTION

The word "osier" is derived from the French language and means "willow-like". The red color of the stems of red willow gives it its name. The branches and twigs are red to purple in color, although in a shaded area it sometimes will lack this coloration. After the leaves have fallen off, the deep burgundy branches add color to winter landscapes.

The leaves are opposite to one another and are commonly bright red to purple in the autumn. Cluster of small white flowers occur from June to August. The flowers change to white berries with smooth faces and furrows on the side.

Uses

GENERAL

Thickets of red osier provide food, cover and nesting habitat for many birds and wildlife. Many songbirds and ruffed grouse eat red osier berries, while deer and rabbits browse the twigs and buds. Dogwoods provide food for mammals such as raccoon, woodchuck and beaver.

In agricultural areas, many dogwood species are used in agroforestry plantings to serve as

RED OSIER DOGWOOD

FALL

BS&W

Above: Decorated tepee stake carved from red osier dogwood. Made by J. Peterson. Photo by D. Wilsey.

windbreaks and living snow fences.

SOCIO-CULTURAL

Red osier dogwood's long slim stems were used by Native Americans for basket weaving and are still used by present-day crafters. Dream catchers, originating with the Potawatomi, are made with the stems of the sacred red osier dogwood. The Ojibwe use red osier dogwood bark as a dye. The inner bark was mixed with other plants or minerals and used to make a red dye, a light red dye, a black dye and an ecru or khaki colored dye. An extract from red osier was used for treating fevers and coughs. Some Native Americans smoked the inner bark of red osier. Smoking mixtures, often known as *kinnikinnick*, blended the inner bark with tobacco and other plants. More western tribes added it to the bearberry leaf to improve taste.

Red osier dogwood was a useful species to many different tribes. Some tribes ate the white, sour berries. Others used the branches and shoots to make arrows, stakes and other tools. Peeled twigs were used as toothbrushes because of their whitening effect and the inner bark was used for tanning or drying animal hides.

ECONOMIC

Red osier dogwood and many other species of shrubs are used in decorative floral arrangements. Dogwood stems are a familiar and common component of winter indoor and outdoor landscape arrangements.

CAUTION

The oils or sap produced by the dogwood species may cause a skin rash.

Harvest

WHAT TO HARVEST

Cut stems approximately 2-3 inches (5-8 cm) from the base before growth begins in spring or harvest in late fall.

WHEN TO HARVEST

It is often said that one should not harvest red osier until you can see your breath in the fall! Red osier dogwood is often coppiced in late fall after the leaves turn brown and fall off the stem. Coppicing means cutting stems near the ground so that new stems will be produced from the stump or roots. In order to harvest sustainably, do not cut all of the shrubs in one area.

It is a good idea to replant stems to start new plants for future years. To plant stems, cut a 10-12 inch stem, about ½ inch in diameter, and push in the ground so the top bud (bud pointing up, not down) is just above the ground.

HOW TO HARVEST

Cut, do not break, the stems. They should be cut using sharp tools, pruning shears or loppers.

***Kinnikinnick*: The term refers generally to various smoking mixtures created by Native American tribes.**

***Coppice*: The practice of cutting woody plants, both trees and shrubs, to the near ground in order to stimulate new growth or suckering.**

RED OSIER DOGWOOD

FALL

BS&W

***Woody floral*: Any woody plant with decorative characteristics such as color, interesting shape and unique flowers or leaves. Some examples include dogwood, willows, birch and forsythia.**

***Bundle:* A grouping of individual products such as sticks or twigs.**

***Bunch:* A grouping of bundles.**

Handling

STORAGE AND TRANSPORT

Harvested woody floral stems should be stored in clean water or in a 10 percent water and bleach solution at 34-40 degrees Fahrenheit.

Keep the stems cool and in water. Make sure that they are not compressed. In this way, the stems can be stored for up to three to four months (until early spring) in a barn or garage under ambient conditions. Maintain the water at an adequate level.

PREPARATIONS AND PROCESSING

Process harvested stems to meet buyers' quality criteria. This is the most labor-intensive stage in a woody floral enterprise. Buyer criteria will include quantity, length ("tips," "mediums" and "longs," with the length of each varying by buyer requirements for each species or cultivar) and condition (color and lack of defects). Defects might be browse damage, dead tips, scarred stems and/or excessive branching. The most desirable stems are usually young, one or two year old stems, which are small in diameter for easy pruning. Longer stems are usually most desirable.

The quality of the stem is of key importance with species that are sold to the fresh and dried floral industries. For fresh floral markets, stems must be alive, flexible, full of color, have no broken or dead tips and must lack insect or animal damage.

Processed stems are bundled by quantity, length and variety, and are either shipped or stored. A commercial bundle typically consists of between 5-20 stems gathered and tied together with string or rubber bands. For example, stems that are five feet or longer are typically bundled in fives, and stems that are 3-5 feet long are typically bundled in tens. In contrast, a bunch is a number of bundles gathered together. The number of bundles per bunch varies according to buyer and stem size requirements.

Markets

In the Midwest, opportunities exist to market decorative woody florals. Retail floral shops, wholesale distributors and consumers at farmers markets and craft shows typically buy fresh stems. Commercial establishments also purchase stems for potted window displays, urban landscaping and other high-end uses.

Regulations

Minnesota statutes regulate the harvest, transport, and bulk purchase of red osier as a decorative product.

Harvest (88.642.1): "No person shall cut, harvest, remove, transport, or possess for decorative purposes or for sale more than three decorative trees, more than 100 pounds of decorative boughs, or more than 100 pounds of any other decorative materials without the written consent of the owner or authorized agent of the private or public land on which the decorative materials were cut or harvested."

"Written consent . . . must be carried by every person cutting, harvesting, removing, possessing, or transporting any decorative materials. . . ."

Transport (88.642.3): "No person, common carrier, bough buyer, or authorized agent shall purchase or otherwise receive for shipment or transportation any decorative materials without recording the seller's or consignor's name and address and the written consent on a form furnished or otherwise approved by the commissioner of natural resources."

TREE SEEDS AND CONES

FALL

HD

Above: First-year red pine cones (small, purple) require a second growing season while the larger cones are mature. Right: White pine cones not quite ready for collection. Photos by C. Pike. Below: A fallen cone ready for a wreath. Photo by D. Wilsey.

LIFE FORM
Conifer and hardwood trees and shrubs

PART USED
Seeds and cones

SCIENTIFIC NAME
Various

COMMON
Pine cones
Pine nuts
Acorns
Seeds

OJIBWE
Shingwaakominag
(Pine cone)

HMONG
Not available

SPANISH
Piña
(Pine cone)

TREE SEEDS AND CONES

FALL

HD

CAUTIONS

Cones and seeds should not be collected nor stored in plastic or other non-breathable bags.

Key Characteristics

PRODUCT

- **Tree seeds and cones can easily be found and collected throughout Minnesota.**

HARVEST

- **For seed collection, only harvest unopened cones.**

SOCIO-ECONOMIC

- **Seed and cone collection provides many Minnesotans with important seasonal income and is an important means of maintaining the quality and diversity of Minnesota forests.**

CAUTIONS

- **Do not collect, transport or store cones and seeds in plastic bags, as this promotes decomposition and decreases seed viability.**

Location

DISTRIBUTION

Tree seeds and cones can be found in productive forested areas of Minnesota but also anywhere that trees have an opportunity to grow in a healthy environment, such as a boulevard, yard or city park.

Minnesota's forested regions include the northeast and the diagonal hardwood forest band that runs from the northwest to southeast. Still, most landscapes in Minnesota will produce seed and cones, some with more abundance than others.

Identification

DESCRIPTION

Seed and cones are the fruiting structure of trees and shrubs. Cones come from evergreen trees and nuts, and seeds from hardwood trees and shrubs.

Uses

GENERAL

Public and private land managers depend on nursery stock created from harvested tree seeds to enhance and restock forested landscapes.

Open cones, those that have dropped their seed, serve as a raw material for wild crafters. They are used to make and adorn wreaths and for other craft projects.

ECONOMIC

Cones and the nuts and seeds of hardwood trees are collected and sold to nurseries or seed brokers.

Harvest

WHAT TO HARVEST

Both seed and cone buyers typically specify which species they are interested in purchasing. It is wise to check with a buyer before beginning to collect. For seeds, collect only mature, unopened cones, nuts and seeds.

TREE SEEDS AND CONES

FALL HD

Above: Bouquet made with greens and dyed pine cones, unknown artist. Photo by J. Miedtke.

For other buyers, such as wreath makers, open and fallen cones may be appropriate.

WHEN TO HARVEST

Most tree species will mature and be ready for collection in the early fall. However, some tree species develop and ripen their seed in the springtime. Each year can be different so expect adjustments in timing. The cues for determining when cones, nuts and seeds are ripe also vary. Some research and learning will be required to become familiar with these characteristics. The crafting market does not require such attention to detail, although there will still be standards about what makes a good cone.

HOW TO HARVEST

Most collection is done by hand picking. Some species have cones that fall to the ground. These can be collected using tarps or rakes. Collector should become aware of buyers' standards for clean seeds. It is good practice to note the county in which cones and seeds were harvested.

Collection tools include buckets and sacks, usually made of burlap because its breathability minimizes composting of the seed, cones or nuts. There are some specialized nut collection tools, such as the Nut Wizard™, that can be useful for collecting nuts.

Handling

STORAGE

Recently collected cones, nuts and seeds often contain a high amount of moisture and are susceptible to molds and composting. Heat destroys seed viability and reduces germination. It is also important to keep products cool to prevent molding. Store cones, nuts and seeds in a single layer until ready to transport. It is good practice to bring products to the point of sale as often as possible, rather than saving up for one large trip. Most buyers have the proper facilities and conditions for maintaining and preserving the viability of seed.

Acorns lose viability if they become dehydrated. Collect them soon after they drop and consider immersing harvested acorns in a water bath for 24 hours after collection. Allow them to drain for 30 minutes then store in a cool, dark place.

CAUTION

Do not use plastic bags or plastic pails with lids for storage or transportation of seeds, nuts or cones as they promote composting and mold growth.

TRANSPORT

Products can be bagged, boxed or placed in other suitable containers. Again, the preference is for breathable containers, such as those with an open weave.

PREPARATIONS AND PROCESSING

Most often, cones and seeds are delivered unprocessed to buyers. However, cones intended for the craft market may fetch

TREE SEEDS AND CONES

FALL HD

REFERENCES

Minnesota Department of Natural Resources. (2005). *A citizens' guide to DNR forestry*. Saint Paul, MN: Department of Natural Resources.

Olds, J. (2002). Seed collection for direct seeding. In M. Reichenbach, J. Krantz, & K. Preece (Eds.), *Non-timber forest products and implications for forest managers*. Saint Paul, MN: University of Minnesota Extension.

higher prices if cleaned, painted, dyed or otherwise altered by value-added processing.

Markets

Consider market demand first, before collecting cones, nuts and seeds. Some research will be needed to find buyers. The Minnesota Department of Natural Resources (DNR) Division of Forestry organizes a yearly seed and cone collection effort. Local DNR Forestry offices make for a good first contact. DNR Forestry staff should be able to direct collectors to preferred locations for collection, based on species representation and genetic stock of trees.

Private buyers also may be interested in purchasing cones, nuts and seeds. Use initial contact to ensure that the proper species are being collected and to learn about a buyer's specifications regarding quantities, quality, delivery and other considerations. Beyond the nursery market for seeds, other markets include cones for holiday décor, wild crafters, fire starters and more.

Above: Decorative wreath made with cones and garnished with other natural products. Artist: D. Goemann. Photo by J. Miedtke.

Regulations

Most state lands allow harvest of cones, nuts and seeds without a permit. It is always a good idea to get permission before harvesting, ideally in writing, regardless of ownership.

Table: Seed collection considerations for select species. Source: MN DNR.

Species	Collection Time	Ripeness Indicator	Bearing Age	Price (2011)
Tamarack	August	Tan	20-40 years	$120/bushel
Black spruce	September	Purple	30-40 years	$50/bushel
Jack pine	September	Tan	3-15 years	$30/bushel
White pine	September	Reddish–purple	5-10 years	N/A

BASSWOOD

WINTER | BS&W

Above: Figures carved from basswood. Artist: Bill Jaeger. Inset: Basswood leaves. Photos by J. Miedtke. The Ojibwe term memeqwesii describes the little people, or elves, above.

LIFE FORM
Tree

PART USED
Trunk and wood, inner bark, flowers and immature leaves.

SCIENTIFIC NAME
Tilia Americana L.

COMMON
American basswood
Linden

OJIBWE
Wiigob

HMONG
Zaub ntoo lab
(Tree leaves)

SPANISH
Tilo

BASSWOOD

WINTER BS&W

Mesic: **Sites with well-balanced moisture.**

Loam: **Soil composed of sand, silt and clay in balanced composition. Both fertile and well-drained.**

Alluvial: **Fine-grain soil that results from rivers– past or present– flowing over flood plains.**

Late-successional: **Describes species and species compositions that will remain relatively stable in representation as long as a site remains undisturbed, such as by timber harvest or fire.**

Key Characteristics

PRODUCT

- **Basswood can be found throughout the eastern United States and throughout most of Minnesota.**
- **According to a local basswood distributor, Itasca County basswood is prized throughout the country for its carve-ability.**

HARVEST

- **Harvest basswood in the winter when the ground is frozen and the trees are dormant.**

SOCIO-ECONOMIC

- **Basswood is a favorite among wood carvers.**
- **Basswood inner bark is a strong fiber used in Ojibwe basketry.**

REGULATORY

- **Permits to harvest basswood trees on public lands are needed and may be obtained through the land managers.**

Location

DISTRIBUTION

Basswood is distributed throughout the eastern United States and is found throughout most of Minnesota. Many communities plant linden trees as an ornamental shade tree.

HABITAT

Basswood is commonly associated with sites with balanced moisture (mesic sites) and thrives on land with rich, loamy soils and favors sites with rich, alluvial soils. Minnesota's rich forest land can produce large basswood trees.

Basswood is generally considered to be a late-successional (climax) species and commonly grows in mixed stands with sugar maple (*Acer saccharum*), northern red oak (*Quercus rubra*) and yellow birch (*Betula allengensis*). Basswood can also be associated with young forests growing with bur oak (*Quercus macrocarpa*), aspen (*Populous tremuloides*), paper birch (*Betula paperifa*) and ash species (*Fraxinus spp.*)

Identification

DESCRIPTION

Basswood is a tall tree with a small crown and upward growing branches. On quality sites it can reach 100 feet in height and may grow to be three feet in diameter. Basswood can grow as an individual tree but is frequently found growing in clusters, or with multiple stems (or suckers) growing on the base of the tree.

During the growing season, basswood has a distinctive large leaf that is positioned alternately on the stem. The leaf is heart-shaped

BASSWOOD

WINTER BS&W

Above: Basswood cut and stacked to dry. Photo by J. Miedtke.

(cordate), with serrated margins, and the base of the leaf is asymmetrical. Basswood trees produce fragrant, yellow flowers in July. After pollination the fruit becomes a gray-colored "nutlet," maturing in the fall.

The outer bark of basswood is very thin and is light gray to light brown in color. As the tree matures, the bark has narrow furrows with flattened ridges that are broken into rectangular shaped segments.

Minnesota's basswood trees are generally free of defect, and the short growing season produces tight annual growth rings. The wood from the tree is very light in color and soft, with straight grain and even-textured wood.

Uses

GENERAL

Due to its soft, straight grain and even texture, basswood is ideal for woodcarving and is commonly used to make musical instruments, piano keys, Venetian blinds and veneer. The wood does not produce splinters and is ideal for making into handles. Basswood grown in northern Minnesota is considered to be the wood of choice by experienced woodcarvers who claim that basswood "carves like butter".

SOCIO-CULTURAL

Basswood's inner bark, or bast, consists of long, tough fibers. Basswood bast can be used to produce cordage, rope, mats, fishnets and clothing, all historically significant uses of the product. The inner bark can also eaten, as was often the case during seasons of food shortage. The fiber remains prominent in basketry and in the production of high-quality, hand-tied holiday wreaths.

Some cultures, such as Hmong, eat emerging basswood leaves or shoots after steaming or sautéing.

ECONOMIC

Beekeepers seek out basswood trees because the yellow, fragrant flowers are some-

Above: Basswood inner bark hanging to dry. Photo by J. Zasada.

BASSWOOD

WINTER BS&W

REFERENCES

Haller, J.M. (1995). *Tilia Americana*, linden: A neglected jewel. *Arbor Age 15*(7), 32-33.

United States Department of Agriculture. (2008). *The woody plant seed manual*. Retrieved from http://www.nsl.fs.fed.us/nsl_wpsm.html

Rowe, B.D., & Blazich, F.A. (2008). *The woody plant seed manual*. Agricultural Handbook 727. Washington, DC: United States Department of Agriculture— Forest Service.

Smith, W.R. (2008). *Trees and shrubs of Minnesota*. Minneapolis, MN: University of Minnesota Press.

Wojtech, M. (2011). *Bark: A field guide to trees of the northeast*. Hanover, NH: University Press of New England.

UNIVERSITY OF MINNESOTA EXTENSION

times full of nectar and produce a flavorful, light-colored honey. Interestingly, the nectar of some species can be so overpowering that occasionally the bees can be found inebriated on the ground beneath the tree (Haller, 1995).

Basswood trees, or portions of the tree, may also be used for pulpwood or chipped for biomass, but these are not the highest value or best uses for this valuable tree species.

Harvest

WHEN TO HARVEST

Typically the wood of basswood is best harvested in winter when soils are frozen. Logs are generally sawn during March before the sap thaws, which helps prevent tainting or staining of the wood.

HOW TO HARVEST

The inner bark is separated from the outer bark through a process called “retting” where the bark is soaked in water, and the moisture softens and separates the fibers. The inner bark is allowed to dry prior to use and can be stored indefinitely.

Handling

PREPARATIONS AND PROCESSING

Moisture in the wood needs to be carefully removed by air or kiln drying.

Markets

The primary markets are for carving wood and value-added carved products.

Regulations

Harvesters will need permits to harvest basswood trees on public lands, which can be obtained through the land managers. Always seek permission before harvesting on private land.

Above: Basswood carving. Artist: J. Lutgen. Photo by J. Miedtke.

CHAGA (CLINKER POLYPORE)

WINTER

OTHER

Above: Chaga growing on paper birch. Photo by M. Kempenich. Below: A broken bit showcasing the inside of the chaga conk. Photo by D. Wilsey.

LIFE FORM
Sterile conk

PART USED
Conk

SCIENTIFIC NAME
Inonotus obliquus

COMMON
Clinker polypore or Chaga

OJIBWE
Wabadoo

HMONG
Not available

SPANISH
Not available

CHAGA (CLINKER POLYPORE)

WINTER | OTHER

CAUTIONS

DO NOT CONSUME unless you are certain of a positive identification.

Since, so far, the medicinal effects have been shown only from conks growing on birch, it is important that chaga be harvested only from birch trees.

***Conk*: The spore producing fruiting structure of a fungus.**

REFERENCES

Arora, D. (1979). *Mushrooms demystified*. Berkeley, CA: Ten Speed Press.

Barron, G. (1999). *Mushrooms of northeast North America*. Auburn, WA: Lone Pine Publishing.

Bessette, A. E., Bessette, A. R., & Fischer, D. W. (1997). *Mushrooms of northeastern North America*. Syracuse, NY: Syracuse University Press.

(Continued)

Key Characteristics

PRODUCT

- **Chaga occurs throughout central and northern Minnesota.**

HARVEST

- **Although present year-round, discovery and harvest is easiest in winter when trees are without leaves.**
- **Trees with chaga conks are already dying or dead.**

SOCIO-ECONOMIC

- **Chaga is a popular folk remedy for various illnesses, and chaga-derivative products are marketed in Russia and Japan as anti-cancer drugs.**

CAUTIONS

- **DO NOT CONSUME unless you are certain of a positive identification.**

Location

DISTRIBUTION and HABITAT

Clinker polypore occurs throughout central and northern Minnesota, mostly on standing birch, but also on poplar, elm and alder. The product chaga refers to the clinker polypore growth on birch trees.

Identification

DESCRIPTION

The conk is 1-30 inches long and 1-20 inches wide, convex, cracked and deeply pitted. It arises from a wound on the tree. The surface is dry, extremely hard, with coal black exterior strongly resembling burnt wood. The interior is light yellow, deep gold or reddish brown. It is practically without taste or odor.

This black, charcoal-like mass that forms on the wound of a compromised tree takes several years to develop.

There are no known look-alikes of chaga found on birch.

Uses

SOCIO-CULTURAL

Chaga is a popular folk remedy for various illnesses. Persons consuming tea prepared from it do so for medicinal purposes. So far, the medicinal effects have been shown only from conks growing on birch, making it important that chaga be harvested only from birch trees.

CAUTION

Do not consume unless you are certain of a positive identification.

Harvest

WHAT TO HARVEST

Harvest only the visible outward growth, or conk.

WHEN TO HARVEST

While chaga may be found all year, spotting and harvesting conks is easiest during the months when there is no foliage and, therefore, it is easier to see and access.

CHAGA (CLINKER POLYPORE)

WINTER

OTHER

Above: Chaga conk. Photo by D. Wilsey.

HOW TO HARVEST

Use a hatchet to chop off the visible mass or, when the Chaga extends outward enough, you may use a mallet or hammer to break it away from the tree.

Trees that have been compromised by Clinker Polypore (*I. obliquus*), the pathogen that causes the tumorous growth known as chaga, are either dead or dying. Removal of chaga does not further harm its host.

Handling

STORAGE

Store in dry environment with good airflow. Do not refrigerate, and do not dehydrate. Chaga will lose 50-70 percent of its weight during the drying process.

TRANSPORT

Due to chaga's hard exterior, it is very easy to transport; it does not require special consideration with regard to fragility or transfer of debris.

Regulations

Foraging regulations vary by land management unit. As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Chaga and other fungi may be legally gathered for non-commercial use from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 2E states that, "Collecting or possessing naturally occurring plants in a fresh state in state parks is prohibited, except that edible fruit and mushrooms may be harvested for personal, non-commercial use."

Minnesota Rule 6136.0400 Subpart 2 prohibits foraging of all mushrooms in scientific and natural areas. "It is unlawful for any person to destroy, injure, damage, molest, or remove any natural resources within scientific and natural areas. . . ."

Minnesota trespass laws prohibit individuals from foraging mushrooms on private lands. Minnesota Statute 609.605 states, "A person is guilty of a misdemeanor if [that] person intentionally . . . enters the premises of another with intent to take or injure any fruit [a mushroom would be considered a fruit], fruit trees, or vegetables growing on the premises, without the permission of the owner or occupant."

Always seek written permission of private landowners and do your part to build positive relationships with them. Many landowners, if asked, would be happy to allow foraging for fungi on their lands.

Kuo, M. (2007). *100 edible mushrooms*. Ann Arbor, MI: University of Michigan Press.

Lincoff, G. (Ed.). (1981). *National Audubon Society field guide to North American mushrooms*. New York, NY: Alfred A. Knopf.

Lincoff, G. (1984). *Mushrooms*. New York, NY: Chanticleer Press.

McFarland, J., & Mueller, G. M. (2009). *Edible wild mushrooms of Illinois and surrounding states*. Champaign, IL: University of Illinois Press.

Sinclair, W. A., & Lyon, H. H. (2005). *Diseases of trees and shrubs*. 2nd ed. Comstock Publishing Associates, Cornell University Press.

Notes

FIREWOOD

WINTER

OTHER

Above: Mounds of bucked and split firewood await processing at a firewood seller. Photo by D. Wilsey. Below: Stacking cut firewood for seasoning. Photo by J. Peterson.

LIFE FORM
Tree (primary)

PART USED
Main trunk and larger branches, usually greater than 2 inches in diameter; and tree tops, in cases such as post-logging operation.

SCIENTIFIC NAME
Various species

COMMON
Firewood
Fuelwood

OJIBWE
Misan

HMONG
Taws

SPANISH
Leña

FIREWOOD

WINTER | OTHER

CAUTIONS

Firewood should be seasoned (aged) prior to use.

The presence of new invasive species in Minnesota means you should know where your firewood comes from and where it is allowed to go.

***Cord*: Although probably the most common term associated with cut firewood, the term can be confusing in practice.**

The legal definition for a cord of wood specifies 128 cubic feet of round wood cut in four foot lengths.

If the wood is sawed, split and stacked, the cord measures 120 cubic feet.

If the sawed and split wood is piled loosely, as in a truck, the cord measures 175 cubic feet.

Source: Minnesota Statutes, Section 239.33.

UNIVERSITY OF MINNESOTA EXTENSION

Key Characteristics

PRODUCT

- **Suitable trees anywhere can be harvested for firewood.**

HARVEST

- **Winter is a great time to harvest firewood.**

SOCIO-ECONOMIC

- **The forested regions of Minnesota provide the best opportunity for a sustainable business venture.**

REGULATORY

- **Be aware of insect and disease stipulations. Quarantines might limit market haul distances or may greatly affect final product costs due to controls and processes that are intended to limit or prevent the spread of the insect or disease.**

CAUTIONS

- **Harvest firewood at least one year before use to ensure proper seasoning.**
- **Invasive species, such as Emerald Ash Borer (EAB), make firewood transport a tricky business. Know where your firewood comes from and where it is allowed to go.**

Location

DISTRIBUTION

Generally speaking, Minnesota's forested region is the two-thirds of the state that excludes the southern and western regions. That said, anywhere you find trees you have a potential source of firewood.

For a sustainable firewood business venture, the forested regions of Minnesota likely provide the best opportunity. However, firewood production, especially on a smaller scale, is possible in localized areas throughout the state.

Identification

DESCRIPTION

Firewood can come in many different forms including tree length, 100-inch lengths, and cut and split into various types of cords.

Uses

GENERAL

Firewood is arguably one of the oldest and most important forest products on the planet. Around the world, millions of people survive using firewood to prepare their daily meals. While firewood is seldom used for primary cooking in our region, it remains an important source of energy for heating homes, especially in rural areas.

SOCIO-CULTURAL

People love fires—indoors and outside. Wood burning fireplaces are common in Midwestern homes, and many people harvest or purchase firewood to burn throughout the winter. In the summer and fall, campfires and bonfires are an important part

FIREWOOD

WINTER | OTHER

of the North Woods experience. Firewood also is an integral part of the historical, regional traditions of making maple syrup and finishing wild rice. Although both products rely more on alternative energy sources in many commercial operations, home producers still use firewood because it is practical and because it imparts unique qualities to the finished products.

ECONOMIC
Both homes and business use firewood for heat. Throughout the region, firewood producers sell cordwood to homeowners and recreational users. Increasingly, restaurants are using solid wood for wood-fired cooking.

CAUTION
Environmental restrictions on wood burning may affect use in some areas, especially urban zones.

Harvest

WHAT TO HARVEST
Dense hardwoods, such as oak and maple, are the usual choice for firewood. Less dense woods are also used as available. Often firewood collection is driven by supply (a fallen tree or clearing project) rather than specific demand. For a more informed decision, consider the actual heat output, or BTUs, of various woods. Niche markets sometimes demand specific species, such as birch, because of its white bark.

WHEN TO HARVEST
Seasonal considerations: Trees can be felled as needed according to forest management prescriptions or harvested opportunistically as a result of tree death and storm disturbance. Winter affords the ideal conditions due to tree dormancy, reduced foliage and lack of insects in the woods.

Planning considerations: Harvest, buck and split wood at least one year prior to anticipated use.

HOW TO HARVEST
The basic package includes a sharp axe, a saw, a splitting maul and a partner. A chainsaw makes for a quick upgrade.

CAUTION
Working in the woods can be dangerous. Take precautions and work with a partner.

Handling

STORAGE
Protect stacked firewood from rain and snow and allow for good air movement around and through the stacked piles.

TRANSPORT
Transportation method depends upon the form and quantity of firewood needed. Also consider geographic origin of the firewood and whether insect and disease quarantines apply. For commercial activity, delivery will

***Buck / Bucking*: The process of cutting a felled tree into pieces of the desired length for firewood. Bucked logs are then *split* into what we typically think of as firewood.**

Above: The year's firewood, stacked and covered. Photo by D.Wilsey.

FIREWOOD

WINTER | OTHER

***Emerald Ash Borer (EAB)*: A beetle exotic to the United States and North America, EAB (*Agrilus planipennis*) adults feed on ash foliage while immature larvae feed on tree inner bark, disrupting transport of water and nutrients. Identified in 2002, EAB is responsible for the death of ash trees across the northeastern United States and southeastern Canadian provinces.**

REFERENCES

Minnesota Department of Agriculture. (2012). *Firewood alert! Firewood can spread pests: Help prevent the spread of invasive species.* Retrieved from www.mda.state.mn.us

Minnesota Department of Commerce. (2012). *Buying firewood.* Saint Paul, MN: Minnesota Department of Commerce. Retrieved from www.commerce.state.mn.us

UNIVERSITY OF MINNESOTA EXTENSION

Above: A felled tree that has been delimbed and bucked. Photo by D. Wilsey.

either require a pickup truck and/or trailer, or may need to be contract-hauled.

PREPARATIONS AND PROCESSING

Basic processing requires a chainsaw, splitting maul and some way to remove wood from the harvest site. Equipment variety and cost will increase considerably with mechanization.

Commercial demand varies. Some prefer to do the bucking and splitting themselves; other buyers prefer a product that is ready to use upon delivery. Conscientious vendors deliver wood that has been split and air dried for least a year. Some vendors prefer to dry firewood more quickly by using kilns. Kilning reduces problems caused by insect infestations and reduces drying time, but requires more energy and raises production costs. Wetter wood also contributes to creosote buildup in chimneys, a contributor to chimney fires.

CAUTION

Invasive species such as Emerald Ash Borer (EAB) make firewood transport a tricky business. Know where your firewood comes from and where it is allowed to go.

Markets

Firewood markets vary greatly, from the 20-odd stick bundle sold by the local gas station or campground to the commercial operation providing full logs to run a boiler. With market variation comes differences in scale, processing requirements, transport needs and profitability. While opportunities exist to generate revenue, careful consideration is needed to ensure market success and profitability.

Regulations

Commercial producers should be knowledgeable about measurements and legal definitions of firewood units such as “cord”.

Some insect and disease outbreaks trigger quarantine conditions. Quarantines might limit market haul distances or may greatly affect final product costs due to controls and processes that are intended to limit or prevent the spread of the insect or disease.

Firewood restrictions and safe handling guidelines are available in a printable format on the Minnesota Department of Agriculture website (*www.mda.state.mn.us).*

Above: Split firewood sits trailside . . . awaiting pickup? Photo by D. Wilsey.

SMALL DIAMETER WOODS

ANYTIME

BS&W

Above: Railing along a trail from small diameter wood. Photo by J. Miedtke. Right: Wreath made from small diameter sections, artist unknown. Below: A young balsam, peeled, makes a good push pole for ricing. Photos by D. Wilsey.

LIFE FORM
Trees and shrubs

PART USED
Branches and stems

COMMON NAMES OF SOME DESIRABLE SMALL DIAMETER SPECIES
Alder, green
Alder, speckled
Aspen
Basswood
Buckthorn
Diamond willow
Ironwood
Paper birch
Tamarack

OJIBWE
Bekanigizijig– mitigoon
(Different kinds of wood)

HMONG
Not available

SPANISH
Not available

SMALL DIAMETER WOODS

ANYTIME

BS&W

Lenticels: **Openings in the bark, often visible as horizontal stripes, that allow gas exchange between the air and inner bark tissue.**

Key Characteristics

PRODUCT

- **Small diameter wood is simply immature tree growth, branches and sticks, and parts of small stature plants. These can be found just about anywhere.**

HARVEST

- **Harvest small diameter wood when site damage will be minimal and when conditions best serve end use.**

SOCIO-ECONOMIC

- **Small diameter wood is the raw material for value-added woodworking found in specialty stores and high-end products.**

REGULATORY

- **Consult with land management agencies before harvesting on public land.**

Location

Small diameter wood gathered from shrubs or immature and small trees can be found in upland and lowland sites across the state and region.

Identification

DESCRIPTION

There are many species of trees and shrubs that are desirable because of their natural attributes, such as smaller size, bark color or texture, wood strength or aroma. These species are used to create specialty products. The traditional forest products industry considers many of these products unusable, or even waste. However, historically small diameter wood has contributed to forest lives and livelihoods in numerous and diverse ways.

Harvest and Uses

WHAT TO HARVEST

Shrubs:

Alder species (*Alnus spp.*) are members of the birch family (*Betulaceae*), and are distributed through North and South America. In Minnesota, there are two alder species: Speckled alder (*A. rugosa)* which grows primarily in wetlands, and green alder (*A. crispa)* is associated with upland forests. Both species are shrubs that achieve growth of up to 15 feet. Their bark is generally thin with lenticels. Alder wood is soft, even-grained and is often used for rustic furniture and arbors. The mature cones, which are very small and similar to a pine cone, are used for potpourri and earrings. Harvesting alder does not hurt the individual plant as they will naturally re-sprout from the remaining root system.

Common buckthorn (*Rhamnus cathartica)* is a non-native, invasive shrub that can grow into a small tree, reaching up to 35 feet. This species is currently listed as a restricted,

SMALL DIAMETER WOODS

ANYTIME

BS&W

Above: Chair of small diameter wood made and photographed by G. Mourin.

noxious weed and state law prohibits import, sale or transport of plants in Minnesota. When young, its bark is thin and gray, becoming rough and scaly with age. Branch ends may be tipped with a sharp thorn.

Common buckthorn grows in both upland soil types and saturated soils. In past decades, it was frequently planted for landscaping and often displaced native vegetation, primarily dispersed by birds through consumption of its berries. It has two key features: persistent leaves that remain green through autumn and early winter, and blackish berries that remain on the plant throughout winter. If working with buckthorn, pay special attention to the berries growing on female plants: they should be bagged and removed from the site to prevent spread. The bark of buckthorn yields a yellow, or saffron colored dye. Its sapwood is orange and makes beautiful spoons, trellises and furniture. Larger pieces can be turned using a lathe.

Ironwood or hophornbeam (*Ostrya virginiana)* is a small tree or shrub of the birch family found throughout most of Minnesota. Ironwood is common in upland forests and is very shade tolerant. It is a heavy, dense and durable wood used for fence posts, tool handles or arbors. Branches are very slender, or fine, with gray-brown bark. Ironwood produces a fall fruit that is hop-like in appearance. Its leaves can persist throughout winter.

Willow (*Salix spp.)* includes 300-400 species that exhibit a variety of growth forms that reflect the species and site conditions, ranging from low growing shrubs to medium or tall shrubs and trees. Willows are most commonly associated with water, frequenting habitat along creeks, streams, rivers and lakeshore. They are valuable for shoreline or stream bank restoration. They also have the ability to grow on dry sites with mineral soils. Willow species are often found growing with other species such as alder. Like alder, willow species re-sprout from root stock after harvest.

Wild crafters use willows to build furniture, to fashion fences and arbors, and favor the flexible stems and outer bark for basketry. Smaller branches make good whistles or

Above: Birch bark baskets trimmed with willow sticks. Artist: J. Northrup. Photo by D. Wilsey

SMALL DIAMETER WOODS

ANYTIME

BS&W

Peat lands: **Land characterized by the accumulation of peat, which is densely accumulated and packed vegetation. Most common in wetlands.**

Catkins: **A flower cluster, often drooping, with inconspicuous or no petals.**

simple flute-like instruments. The inner bark contains salicin, which deters bacteria, fungi and insects. Salacin is also a traditional pain reliever and the precursor to aspirin.

Diamond willow is a desirable specialty wood named for diamond-shaped lesions on the stem that expose the heartwood. Its unique visual qualities make it a favorite for walking sticks and other crafts, such as tables and lamps.

Trees:

Aspen (*Populus spp.*) are considered the fastest growing trees in Minnesota. They are pioneer species, thriving in full sun, with the ability to sprout profusely from the parent root system. Two of the four members of the *Populus* genus found in Minnesota are frequently used as saplings: big tooth aspen (*P. grandidentata*) and trembling aspen (*P. tremuloides*).

At 10-15 years, aspen saplings have thin, smooth bark that is white/gray on trembling aspen and a greenish-yellow on big tooth aspen. Both are used for basketry. The wood is strong, but very lightweight. Young trees make excellent walking sticks, poles and rustic furniture. Small trees are often used to decorate commercial retail spaces.

Above: Peeled aspen poles. Photo by J. Krantz.

Black spruce (*Picea mariana)* is a conifer common to the boreal forest and is found in the Great Lakes region of northeast Minnesota, Wisconsin and Michigan. Black spruce is abundant on peat lands, swamps and can also be found on sites with mineral soil.

Black spruce is a small to mid-size tree, with gray, scaly bark. Its strong, light-weight, long-grained and even-textured wood is used by the paper industry as pulp. Black spruce wood is used for fish traps, snowshoe frames and drying racks. Its pitch, or resin, can be chewed and used to dress wounds. A medicinal tea is made from the inner bark of black spruce. Its roots serve as lacing for basketry and as a lashing for canoes. Small diameter spruce is commonly used structurally, such as for garden lattices and teepee poles.

Paper birch (*Betula papyrifera* Marsh) is common throughout Minnesota. It is a relatively large tree with a small crown and distinctive white bark. On young stems, however, bark is golden brown and covered with horizontal, cream-colored lenticels. The young bark is also very thin. At around 15 years of age, trees begin to shed, revealing the well recognized chalky, white bark .

Young paper birch stems are very desirable décor items when fashioned as candle holders, yule logs, curtain rods and other household items. Small trees, or saplings, decorate store fronts and shopping centers. Wreaths can be formed from small branch clusters. The winter male catkins are desirable as a winter floral or decorative material.

Northern white cedar (*Thuja occidentalis*) is an evergreen whose range extends from

SMALL DIAMETER WOODS

ANYTIME

BS&W

Above: An assortment of items made from small birch logs and bark, artist unknown. Photo by D. Fuller.

northern and east-central Minnesota through the Great Lakes into the north eastern states. It grows to 75 feet and has a conical shape and scale-like needles. The bark of older trees is thin and silvery gray with vertical strips separating at its ends from the trunk.

Northern white cedar originally grew in upland sites, but now also is common to swamps and other wet sites where it often exhibits a cow's horn appearance. Its light, decay-resistant wood led to its extensive historic use in shingles, shakes, siding, poles (including telephone poles) and for wooden boats. The outer bark is valued for baskets, mats and (historically) lodging; the inner bark makes good rope or lashing. Cedar roots can be used for baskets and ropes. The needles make a tea that is rich in vitamin C. The aromatic boughs are desirable for wreaths and other décor featuring fresh greens. Carpenters value curved and twisted cedar wood for railings, furniture and arbors.

Red cedar (*Juniperus virginiana*) is a small conifer ranging 30-40 feet in height and displaying pyramidal form. It is found frequently in southern Minnesota. The fragrant, decay-resistant wood often lines closets and storage chests. Other uses include fence posts and rails, rustic furniture, stiles and pencils. Potential market opportunities exist for products that feature red cedar's aromatic properties, such as landscape mulch, pet bedding and potpourri. There is also potential for extraction of essential oils.

Tamarack (*Larix larcinea*) is a medium to large deciduous conifer common to most of Minnesota, with a range extending from Alaska, through the Great Lakes region and out to the eastern seaboard. Tamarack grows on both upland sites and in swamps.

Tamarack wood is decay resistant and therefore valuable for posts, poles, railroad ties, in mine shafts and to craft wooden boats. It is also suitable for flooring and, when chipped, for landscaping. Chemicals extracted from tamarack have a variety of applications such as dietary supplements, hair products and cosmetics. Branches make nice arbors, trellises and rustic furniture, and wreaths. The persistent cones are suitable for décor applications.

Some cultures favor tamarack wood for toboggans, snow shoes and canoes. Roots stripped of bark and boiled (to make them pliable) are used to create woven bags that store medicinal products and wild rice. Along with spruce, the roots are used in traditional bark canoes. Native American communities residing near Hudson Bay developed a means to fashion hunting decoys from tamarack branches and twigs. Historically, tamarack bark was used for tanning. The inner bark is recognized in traditional medicine as a treatment for wounds and burns.

REFERENCES

Densmore, F. (1979). *Chippewa customs*. Saint Paul, MN: Minnesota Historical Society.

Gardner, J. (1996). *Wooden boats to build and use.* Mystic, CT: Mystic Seaport Museum.

Hawkinson, S., & Warren, J. (2003). *Timber connections.* Saint Augustine, FL: Bluewater Press.

Lynch, D., & Mackes, K. (2002). *Opportunities for making wood products from small-diameter trees in Colorado.* RMRS-RP-37. Fort Collins, CO: USDA Forest Service.

Meeker, J.E., Elias, J.E., & Heim, J.A. (1994). *Plants used by the Great Lakes Ojibwa.* Odanah, Wisconsin: Great Lakes Indian Fish and Wildlife Commission.

Russell, G. R. (2006). *West central Minnesota's red cedar resource.* Saint Paul, MN: Minnesota Department of Natural Resources.

(Continued)

SMALL DIAMETER WOODS

ANYTIME

BS&W

Smith, W. (2008). *Trees and shrubs of Minnesota*. Minnesota Department of Natural Resources. Saint Paul, Minnesota.

Wojtech, M. (2011). *Bark: A field guide to trees of the Northeast.* Hanover, NH: University Press of New England.

WHEN TO HARVEST

Species found on wetter sites — lowland conifers, speckled alder, etc. — are best harvested when soil is frozen. This allows access and minimizes damage such as compaction and rutting from tires.

The bark is retained for many products created from small diameter wood. When bark removal is desired, there may be particular harvest seasons or windows of opportunity after harvest that are better suited to the process. Typically, bark removal is easiest immediately following harvest, becoming increasingly difficult as the inner bark and wood dry out. In some cases, soaking may prolong the workable timeframe.

HOW TO HARVEST

When harvesting small diameter wood, ensure that your activity does not damage the site through compaction or rutting. Additionally, harvest practices should not damage non-target plant life, whether un-harvested growth from the same plant or nearby vegetation.

Many harvesters use hand tools, such as pruners, hand saws and, in some cases, power brush saws. Often, stems are cut close to the roots. Unwanted tops and branches may be removed in the field, but do not overlook the value of the twigs and cones.

Markets

Markets for such a diverse category of products are likewise diverse. Raw materials are commonly offered for sale in classified advertisements and on the Internet, through eBay and Craigslist. Value-added products created from small diameter wood can be found anywhere from flea markets to upscale specialty stores. Marketing small diameter wood or value added products made from it can be challenging due to the unpredictable supply of raw material. High levels of technical labor needed to transform wood to finished product also tends to require higher prices than markets may bear.

Regulations

As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law.

Most small diameter wood may not be legally gathered from state forests, parks, recreation areas, or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 1 states that, “No person . . . shall disturb, destroy, injure, damage, deface, molest, or remove any state property, including . . . wildflowers or vegetation of any kind dead or alive. . . .”

Always seek written permission of private landowners and do your part to build positive relationships. Many landowners, if asked, would be happy to allow foraging on their lands. Consider offering the landowner something of value in exchange for access.

In all cases, consider using harvest as an opportunity to educate and share value with the landowner or land managers. Often the value of small diameter wood goes unnoticed or unrecognized.

CHARACTER WOOD

ANYTIME

BS&W

From tree to table. *Above: Ash burl found in the woods. Right: Initial cuts into the ash burl. Below: Bowl from the ash burl, turned by artist Bob Carls. Photos by J. Miedtke.*

LIFE FORM
Tree (primary)

PART USED
Branches, trunks (boles), and roots

COMMON NAMES
Character wood
Burls
Knots
Crotch wood
Knees
Spalted wood
Hollow logs
Figured grains

OJIBWE
Maanigin (tree that is deformed in a good way)

HMONG
Not available

SPANISH
Not available

CHARACTER WOOD

ANYTIME

BS&W

Burls: **Abnormal growths on tree trunks, branches, root collars or roots.**

Key Characteristics

PRODUCT

- **Character wood exists in some form everywhere trees grow.**

HARVEST

- **Harvest character wood anytime, but pay attention to specific considerations related to the product in question and the implications of harvest to the site.**

SOCIO-ECONOMIC

- **Character wood is the raw material for some of the finest value-added woodworking found in specialty stores and high-end products.**

REGULATORY

- **Consult with land management agencies before harvesting on public land.**

CAUTIONS

- **Character wood is frequently overlooked due to lack of awareness.**

Location

Character wood exists in some form everywhere trees grow.

Identification

DESCRIPTION

Character wood has unique wood properties created by living things, such as insects or diseases, or non-living conditions particular to the site, weather or disturbance. These disturbances influence the growth and structure of a tree. Essentially, character woods are anomalies found in trees. These anomalies are prized by wood bowl turners, woodcarvers, artisans, furniture makers, boat builders and other appreciators of natural oddities.

In some cases, specific tree species may be prone to certain types of abnormal tree growth or formation. It is important to be able to recognize these special features in the woods, and to be able to plan for their harvest.

Harvest and Uses

WHAT TO HARVEST

Burls are abnormal growths or protuberances that may be found on the trunk, branch or on the roots or root collar of trees. Burls may be found on nearly every tree species. Burls are desirable because of the unique shapes and fanciful grain or figuring.

Generally, there are two types of burls:

- Eye burls are found at the base of the trunk and may sometimes extend down into larger roots below the surface and have an “eyes,” or a spotted appearance. Eye burls from ash trees have sharp little points under the bark.
- Layered burls were initially part of the sapwood but eventually transited into

CHARACTER WOOD

ANYTIME | BS&W

Above: Burl being cut for use. Photo by D. Fuller.

heartwood. These special burls are produced when there is more rapid cell production in the cambium layer.

Both eye and layered burls result from an injury or other external stimulus which affects the growth pattern of the tree, resulting in deformity. Wood grain patterns may be layered, wavy, swirled, marbled or feathered depending on the type of burl.

Burls are subject to shake ring, the separation of wood fibers between and parallel to growth layers. While the quality of burl is not known until you begin working with it, burl wood is valued for veneer and frequently is turned to create high-end products like clocks, mirrors, knife handles, wood bowls, etc.

Knots occur where a branch intersects the trunk of a tree. They are formed in a variety of ways:

- When the intersection occurs within the trunk of the tree it results in a change in the direction of annual ring growth. If the wood produced at this junction — between branch and bole — is healthy, a live knot will be produced. Fibers from live knots are very strong.
- Black, or encased, knots are formed when a branch dies within the trunk. Black knots are filled with pitch or resin separating the dead-limb wood from the living stem wood.
- Knots also occur where a branch breaks off from the trunk and the tree responds by growing over the wound. This type of knot is desired by woodcarvers and can be carved into cups or spoons.

Knots are desirable for paneling and cabinetry. Voyageurs during the fur trade era would carve drinking cups, called noggins, from wood sections that contained knots.

Crotch wood is typically hard, dense wood that frequently exhibits unusual grain (see photo below). It is caused by forces exerted within the tree to support a main branch where it joins, or interfaces, the trunk. The compression process that strengthens the tree so it can support the branch causes the

Above: Knot bench, artist unknown. Photo by D. Fuller.

Cambium layer: **The transitional layer of tree cells located between the xylem (heartwood) and phloem (sapwood). Cambium layer cells can become either xylem or phloem cells.**

Knots: **The intersections of tree branches and the trunk.**

Crotch wood: **Hard, dense wood at the union of diverging growth that typically exhibits beautiful grain patterns.**

CHARACTER WOOD

ANYTIME | BS&W

Flamed: **A particular, undulating wood grain pattern. Also known as curly or rippled.**

Hollow logs: **Tree trunks or branches with the center rotted away.**

Knees: **Hard, dense wood fibers around the base of the tree or root collar.**

Spalted wood: **Wood that results from the decay process as fungi invade a tree.**

Figured grains: **Interesting wood grain growth resulting from varied causes.**

wood fibers to twist and compress, creating various figures and grains that can be very beautiful. At times, the grain in crotch wood becomes quite distorted and may display a flamed appearance. Elm, maple and oak are known for this elegant grainy wood pattern.

Knees are another example of hard, dense wood fibers found at the base of the tree (root collar) and extending at a right angle along the primary roots.

Knees were used by ship and boat builders (white oak, live oak and tamarack). Gunsmiths used knees for gunstocks (walnut). Knees were also used for Irish hurling sticks (ash). Smaller pieces were frequently sold to furniture and cabinet makers to be used for feet on large chests, cabinets, beds, looms and other furniture. Interestingly, hockey sticks were made of pine and used knees and slabs taken off the stump at ground level. Knees are also used frequently for table-top clocks.

*Above: Novel wood grain in a fallen bur oak (*Q. macrocarpa*). Photo by D.Wilsey.*

Spalted wood results from the decay process as fungi invade living or dead trees initiating the decomposition process. The results may bring about pink, gray or multi-colored streaks or the appearance of striking black lines. If these decaying fungi are allowed to grow for too long, however, the strength of the wood is diminished, which ultimately affects the quality of finished products.

Experienced woodworkers intentionally initiate the spalting process by putting logs outdoors to allow fungi to begin their work under a watchful eye. Some people induce spalting by wrapping wood in plastic, which accelerates the spalting process, while others bury the wood in wet leaves. Birch, box elder and maples are common tree species that exhibit spalting.

Hollow logs are trees that are rotted out in the center but still have a solid outer layer of wood. They are very useful to artisans who use them to make sculpture, furniture, flower pots, etc. Logs of northern white cedar are especially desirable.

Figured grains are due to the grain (patterns from growth rings), the cut and the innate properties of the wood. Bird's-eye and curly maple are two examples of figured grains.

Bird's-eye maple is a localized disturbance in the growth rings that produces a fanciful grain pattern. Bird's-eye maple is valued by woodworkers, cabinet makers and artisans. There are different forms or shapes of bird's-eye figuring, including thumb nail (or long eye), round eye and cat's paw. Species that exhibit bird's-eye maple include sugar maple with its classic "curly" grains, yellow birch, red maple and white ash.

Bird's-eye maple is found infrequently in Minnesota, although it is found occasionally on higher (richer) sites in southeastern parts

CHARACTER WOOD

ANYTIME

BS&W

Above: Pen made from figured grain wood (inset). Photos by D. Fuller.

of the state. Bird's-eye maple is relatively more common in Wisconsin and Michigan, and provided an economic boom in the hardwood industry. Auto manufacturers historically used figure wood as accents in vehicle dashboards; these patterns persist in modern, plastic appliques and in luxury vehicles.

Field identification is relatively easy for the trained eye. Look for 'coke bottle' shape in maples. Also, closely examine the logs on the woodpile or at the landing for evidence of figured grain.

Curly maple refers to distorted or undulating patterns of wood fibers that occur when the distortion is perpendicular to the natural grain direction. Typically, this wood is used to make musical instruments, like violins and bassoons. It is also prized by fine furniture makers.

WHEN TO HARVEST

More often than not, trees with character wood or figured grains are discovered during the harvest operation and are then sorted at the landing.

Handling

CAUTION

Developing an interest in character wood may inadvertently lead to the accumulation of various wood products in and around your home and garage.

Markets

Markets for such a diverse category of products are likewise diverse. Raw materials are commonly offered for sale in classified ads and on the Internet through eBay and Craigslist. Value-added products created from character wood can be found anywhere from flea markets to upscale specialty stores. Marketing character wood or value added products made from it can be challenging due to the unpredictable supply of raw material. High levels of technical labor needed to transform wood to finished product also tends to require higher prices than markets may bear.

Regulations

As responsible stewards of our lands, individuals are responsible for checking all regional and local park rules to ensure compliance with the law. Consult with land management agencies before harvesting on public land.

Most character wood may not be legally gathered from state forests, parks, recreation areas or waysides in Minnesota. Minnesota Rule 6100.0900 Subpart 1 states that, "No person . . . shall disturb, destroy, injure, damage, deface, molest, or remove any state property, including . . . wildflowers or vegetation of any kind dead or alive . . . ."

Always seek written permission of private landowners and do your part to build positive relationships. Many landowners, if asked, would be happy to allow foraging on

CHARACTER WOOD

ANYTIME

BS&W

REFERENCES

Bragg. D.C., & Stokke, D.D. (1994). *Field identification of birdseye in sugar maple (*Acer saccharum *Marsh.).* Research paper NC-317. Saint Paul, MN: North Central Forest Experiment Center. United States Forest Service.

Gardner, J. (1996). *Wooden boats to build and use.* Mystic, CT: Mystic Seaport Museum.

Snyder, M. (2008, Spring). What is the difference between red knots and black knots? In *Northern woodlands.* Retrieved from http://northernwoodlands.org

their lands. Consider offering the landowner a something of value in exchange for access.

Always get landowner permission before harvesting on private land. In all cases, consider using harvest as an opportunity to educate and share value with the landowner or land managers. Often the value of character wood goes unnoticed or unrecognized.

Notes

UNIVERSITY OF MINNESOTA
EXTENSION