Module 2: Inventory, Mapping & Compatible Management[1]

This module on inventory, mapping and compatible management systems is the second in a series of professional development modules exploring the compatible management of timber and non-timber resources. It provides an overview of inventory methods for non-timber forest products, describes the role of participatory and community-based inventories and mapping in compatible management, and examines several examples of how resource managers and researchers in British Columbia are integrating or proposing to integrate NTFP inventory and mapping into land and resource planning. The module is aimed at resource managers, community development specialists, and others with an interest in forest management.

A goal of the module is to introduce some of the key information and skills required by those wishing to support the effective management and sustainable utilization of non-timber resources.

[1] This module is largely based on the work of Brian Titus (Natural Resources Canada) and Wendy Cocksedge (ex-Centre for Livelihoods and Ecology, Royal Roads University).

Overview of the Module

The Inventory and Mapping in Compatible Management Systems module consists of 4 lessons:

- Introduction to inventory methods for NTFRs
- NTFRs and ecosystem-based mapping
- Participatory and community-based inventory and mapping
- Tying the threads together: Inventory, mapping, and management

This course module moves from introductory material to more complex topics that provide learners with the opportunity to gain a more in-depth understanding of approaches to NTFR inventory and mapping and how those might be applied to their own specific management situations or interests.

This module is designed for the on-line or distance education learner working individually or as part of an on-line group guided by an instructor. If part of a group, activities can be used to promote collaboration and interaction with co-learners. Learning success will be evaluated based on the completion of a series of activities.

The required prerequisite for this module is Module 1: An Introduction to Compatible Management of Timber – Non-Timber Resources. Exceptions to the prerequisite requirement (i.e., for those able to demonstrate the required knowledge of the NTFP sector and the concept of compatible management) may be approved through prior discussion with the course instructor.

Resources

Learning is supported with the written notes provided as well as web links to on-line resources. Suggestions for additional resources are also included.

Module Outline & Timeline

This module is comprised of 4 lessons. The estimated time that it will take you to work through each lesson is noted. Additional time may be required to complete assignments.

- Lesson 1. Introduction to NTFR Inventory Approaches (3 hours)
- Lesson 2. Using Ecosystem-Based Mapping for NTFR Inventories (3 hours)
- Lesson 3. Participatory and Community-Based NTFR Inventory and Mapping (2 hours)
- Lesson 4. NTFR Inventory, Mapping, and Management (3 hours)

Assessment

Student assessment is based upon the student's ability to successfully demonstrate the achievement of specific learning outcomes through the assignments provided. These assignments involve:

- Summarizing key points from the readings and learning objects and
- Applying the knowledge gained about NTFR inventories and compatible management to questions focused on their own specific situation.

Marks are apportioned as follows:

- Lesson 1 – 25%
- Lesson 2 – 25%
- Lesson 3 – 25%
- Lesson 4 – 25%

Lesson 1. Inventories and Non-Timber Forest Resources

LESSON OVERVIEW

As resource managers have shifted more attention toward managing forests for multiple resource values, the demand for inventories of non-timber forest resources has increased. With the widespread availability of geographic information systems (GIS) technology, mapping is as integral as ever to resource inventory efforts.

Interest in NTFR inventory and mapping efforts is driven to a significant degree by concerns about sustainability, as well as by the need to quantify resource volumes for potential future development. Some concerns centre on the negative impacts that forest practices such as mining, grazing, and timber harvesting may have on the sustainability of non-timber forest resources. In other cases, concerns are focused around the negative impacts that commercial harvesting of non-timber forest products may have on the sustainability of the resource being harvested, the surrounding forest ecosystem, or both. Members of First Nations are also increasingly interested in inventorying and mapping non-timber resources as a key component of strategies for maintaining and enhancing cultural practices, as well as for documenting territorial claims. Commercial harvesters and resource managers see inventory and mapping efforts as important tools for determining whether specified areas are likely to provide commercially viable quantities of resources.

Inventories and associated mapping efforts can help address the needs of a diverse group of users for information about species abundance, distribution, and quality criteria. However, most conventional forest resource inventories focus on timber species; when understory plants are included, properties that are critical for harvesters, such as commercial or subsistence use qualities, are typically not considered. Lesson 1 provides an overview of inventory and mapping approaches that have been or are being used to gather data about the abundance, distribution, and qualities of non-timber forest resources. This module emphasizes biological inventory and mapping methods; other approaches are available for gathering and mapping socio-economic and cultural data about non-timber forest resource use.

LEARNING OUTCOMES

By the end of this lesson, participants will be able to:

- Describe the benefits and limitations of relying on existing inventory efforts and data sources (i.e., distribution maps, inventory maps, GIS-based mapping etc.) for managing non-timber forest resources;
- Describe the three major types of conventional inventories used in British Columbia and explain how their use can help improve managers' understanding of non-timber forest resources; and
- Identify basic considerations that need to be taken into account when designing and implementing NTFR inventories.

READINGS & RESOURCES

Non-Timber Forest Product Inventory (multiple contributors). In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 15-26. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Berch, Shannon, Richard Winder, and Tyson Ehlers. 2006. Appendix 3 – Full case study reports: Chanterelle mapping project, North Island. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 94-95. http://cntr.royalroads.ca/files-

cntr/Incorporating%20NTFPs.pdf

Ehlers, Tyson, Shannon M. Berch, and Andy MacKinnon. 2003. Inventory of non-timber forest product plant and fungi in the Robson Valley. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 100-104. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Berch, S.M. and J.M. Kranabetter. 2010. Compatible management of timber and pine mushrooms. B.C. Ministry of Forests and Range, Forest Science Program, and Centre for Non-Timber Resources, Royal Roads University, Victoria, B.C. Land Management Handbook 64. www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh64.htm

Non-Timber Forest Resource Monitoring in the Babine Watershed (Larry McCulloch for Babine Watershed Monitoring Trust, 2012), available on the internet at http://www.babinetrust.ca/DocumentsBWMT/BWMTReports/2011-1Non-TimberForestResourcesJune2012.pdf

WEBSITES TO REVIEW

Terrain Resource Information Management (TRIM)
http://archive.ilmb.gov.bc.ca/crgb/pba/trim/

Vegetation Resource Inventory (VRI)
http://www.for.gov.bc.ca/hts/vri/intro/index.html

Terrestrial Ecosystem Mapping (TEM) and Predictive Ecosystem Mapping (PEM)
http://www.env.gov.bc.ca/ecology/tem/index.html

Biogeoclimatic Ecosystem Classification (BEC)
http://www.for.gov.bc.ca/hre/becweb/

National Forest Inventory (NFI)
https://nfi.nfis.org/home.php?lang=en

E-Flora BC
http://www.eflora.bc.ca/

LESSON NOTES

A key issue for compatible management is estimating the location and amount of non-timber resources on the land base. If this type of information is lacking for targeted NTFRs, resource managers will be unable to predict how different harvest levels and practices will affect the resource and the surrounding ecosystem, how timber management and other activities will impact non-timber resources, or how NTFR harvesting practices interact with timber harvesting and other forest management practices. The sheer number of species included in the category, “non-timber forest resources” alone makes inventorying them an immensely more complex task than inventorying timber species. The differences in the biological and ecological characteristics of non-timber species adds further complexity to inventory efforts.

Given the number and diversity of species within the NTFR category, efforts to develop a one-size-fits-all inventory system for these resources presents a number of challenges. However, it is both possible and sometimes desirable to integrate non-timber forest resources into conventional forest resource inventories. Advantages of this approach are that it fosters the development of common data collection standards, results in the production of widely accessible data, and reduces costs by minimizing duplication of effort.

Resource managers will need to implement targeted inventories in management situations where greater detail about particular species is required than can be obtained through conventional inventories. Likewise specially designed inventories are called for when seasonally-specific species (i.e., many commercially important edible mushrooms) or qualities are important management considerations. Predictive modeling (for indicating likely sites of NTFR occurrence) based on stand and site conditions may be an

appropriate option for such situations.

POINTS TO PONDER

As you make your way through the unit resources (readings and inventory websites), keep in mind the following questions and comments.

- What trade-offs exist among the different inventory approaches in terms of geographic scale, cost, accessibility of required information, and ease of implementation?
- How can the different inventory approaches be used in combination to produce useful information about the distribution, abundance, and quality of non-timber resources?

ASSIGNMENT 1.1

After completing the required readings and exploring the website resources for this unit, write a 2-page narrative (not more than 500 words) that addresses the following points:

Discuss the benefits and limitations of relying on existing inventory efforts and other data sources for managing non-timber forest resources.

Review "Chanterelle mapping project: North Island", "Non-Timber Forest Resource Monitoring in the Babine Watershed" and "NTFP inventory methodology on the North Island". These case studies illustrate how the limitations of different inventory methods can be overcome by using several methods in combination. Describe how you could apply a multi-methods approach to inventory NTFRs in your area. What existing inventory data could you draw upon? What species would you need to gather data on? What approach or approaches could you use to gather that data? What challenges would you be likely to encounter?

Submit your narrative to the instructor by the date indicated in your course schedule.

Lesson 2. Using Ecosystem-Based Mapping for NTFP Inventories[2]

LESSON OVERVIEW

In the past two decades, resource managers in British Columbia have increasingly adopted ecosystem-based approaches to forest management. Ecosystem-based management requires in-depth knowledge and understanding of a diversity of inter-related physical and biological resources, including timber, wildlife, water, range, soils, understory vegetation, fungi, mosses, and recreation. The BC biogeoclimatic ecosystem classification (BEC) system provides a valuable framework for organizing and applying knowledge of the province's ecosystems to manage these diverse resources. Lesson 2 provides an in-depth look at the elements of the BEC system and illustrates how the framework can be combined with terrestrial and predictive ecosystem mapping to provide managers a starting set of tools for inventorying and managing non-timber forest resources.

Terrestrial and predictive ecosystem mapping provide information on the presence and cover of understory species and their surrounding site conditions. They do not, however, assess the species' productivity. For example, a vegetation inventory may help show the predictive habitat for black huckleberry (*Vaccinium membranaceum*) in an area, but of the cover predicted, only a small percentage may actually contain good berry patches.

Adding a productivity assessment can provide further information on the NTFR value. This productivity factor is a crucial piece of information in understanding how site and stand conditions may affect the abundance and availability of non-timber resources. Non-timber (NT) quality codes incorporate NTFR values in a vegetation inventory, enabling a quick productivity assessment of the species of

[2] Adapted from Meidinger and MacKinnon 2006.

interest, and setting the stage for NTFR inventories to be tied into new or ongoing vegetation inventories.

LEARNING OUTCOMES

By the end of this lesson, participants will be able to:

- Describe the basic elements of the BEC system;
- Explain the key differences between terrestrial ecosystem mapping and predictive ecosystem mapping and the circumstances under which each would be appropriate to use for NTFR inventory and mapping;
- Explain how BEC data can be used to predict the presence and abundance of NTFR species; and
- Describe the limitations of relying solely on BEC data for operational level NTFR inventories.

READINGS & RESOURCES

Field Manual for Describing Terrestrial Ecosystems (B.C. Land Management Handbook No. 25, pages 3-17, available on the web at: www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh25-2.htm).

Non-Timber Quality Codes. Centre for Livelihoods and Ecology. http://cle.royalroads.ca/node/205.

Meidinger, Del and Andy MacKinnon. 2006. Using the tools: Biogeoclimatic ecosystem classification, terrestrial ecosystem mapping, and predictive ecosystem mapping. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 26-38. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Meidinger, Del and Andy MacKinnon. 2006. Appendix 2 – Biogeoclimatic ecosystem classification. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 84-93. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Cocksedge, Wendy, Johnny Nelson, and Tyson Ehlers. 2006. Methodology for predicting NTFP presence and abundance based on BEC data. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 107-113. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Frederickson, Signy and Tyson Ehlers. 2006. NTFP inventory methodology on the North Island. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 96-99. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

SOME POSSIBLE WEB RESOURCES

BEC System Webpage
http://www.for.gov.bc.ca/hre/becweb/system/index.html

How BEC works
http://www.for.gov.bc.ca/hre/becweb/system/how/index.html

Methods
http://www.for.gov.bc.ca/hre/becweb/system/methods/index.html

Applications
http://www.for.gov.bc.ca/hre/becweb/system/applications/index.html

Maps
http://www.for.gov.bc.ca/hre/becweb/resources/maps/index.html

GIS products

http://www.for.gov.bc.ca/hre/becweb/resources/maps/gis_products.html

Ecological classifications
http://www.for.gov.bc.ca/hre/becweb/resources/classificationreports/index.html

Eng, Marvin and Del Meidinger. 1999. A method for large-scale biogeoclimatic mapping in British Columbia. Version 1.0. Research Branch. Ministry of Forestry.
http://www.for.gov.bc.ca/hre/temalt/docs/bigbec.pdf

Ecogen website
http://www.for.gov.bc.ca/hre/ecogen/ecogen.htm

TEM summary of methods and standards
http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/tem/tem7/tem71.htm

PEM inputs diagram
http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/pem/assets/pem-3.jpg

PEM generic process diagram
http://www.ilmb.gov.bc.ca/risc/pubs/teecolo/pem/assets/pem-2.jpg

ADDITIONAL RESOURCES

Filatow, Deepa and Maija Finvers. 2009. British Columbia terrain, soil, and ecosystem mapping databases now available online. Streamline, Watershed Management Bulletin, Spring, 2009.
http://www.forrex.org/sites/default/files/publications/articles/Streamline_Vol12_No2_art3.pdf

Meidinger, D., B. Enns, A. Banner, and C. Jones. 2000. EcoGen: A model for predictive ecosystem mapping. In Proceedings, From science to management and back: A science forum for southern interior ecosystems of British Columbia. C. Hollstedt, K. Sutherland, and T. Innes (editors). Southern Interior Forest Extension and Research Partnership. Kamloops, B.C. Pp. 45-7.
http://www.for.gov.bc.ca/hre/ecogen/downloads/econt01.pdf

LESSON NOTES

The BEC system is a framework for presenting information that describes British Columbia's ecosystem structures, functions, and processes. The system draws primarily on climate, soil and vegetation data, and combines and organizes data gathered at multiple scales ranging from localized sites to broad ecoregions. Managers can use the BEC system to assist in the development of integrated resource management strategies at a range of scales. For non-timber forest resources, the BEC system is useful for making broad-scale predictions about where particular resources are likely to be located, as well as rough estimations of the plant's cover.

Ecosystem mapping builds on the BEC system to provide managers with site-specific biophysical information. Two approaches, terrestrial ecosystem mapping (TEM) and predictive ecosystem mapping (PEM) are commonly used in British Columbia. TEM uses aerial photos and field sampling to identify and delineate ecosystem polygons. PEM is an automated computerized approach that uses existing data on ecosystem components and their relationships to predict the spatial distribution of particular species or habitat types. Because of its greater accuracy, TEM is most useful for situations where large-scale (1:5000 to 1:50,000) maps are needed. PEM provides much less detail and is typically used when smaller-scale mapping is sufficient.

POINTS TO PONDER

As you make your way through the unit resources, keep in mind the following questions and comments.

- What are the advantages of using ecosystem-based approaches to NTFR inventories?
- What are the advantages of using predictive modeling for non-timber forest resources inventories? What are its limitations?

ASSIGNMENT 2.1

After completing the required readings for this unit, write a 2-page narrative (maximum 500 words) that addresses the following points. Submit your narrative to the instructor by the date indicated in your course schedule.

Explain the differences between terrestrial ecosystem mapping (TEM) and predictive ecosystem mapping (PEM) and the circumstances under which each tool would be useful for NTFR inventory and mapping. What are the limitations of each approach?

Review the case study, "Methodology for predicting NTFP presence and abundance based on BEC data." Why did the authors choose to use BEC data rather than predictive or terrestrial ecosystem mapping for their study? What types of information about the targeted non-timber resources were the authors able to obtain using BEC data? What were the limitations of relying solely on BEC data? How would integrating TEM and PEM into this analysis help address those limitations? What were the main barriers to the use of TEM and PEM?

Lesson 3. Participatory and Community-Based NTFR Inventory & Mapping

LESSON OVERVIEW

Involving harvesters and community groups in non-timber forest resource inventory and mapping can benefit individuals, households, communities, and resource managers in multiple ways. For example, harvesters and community members can increase their knowledge about species of interest and hopefully gain the opportunity to participate more fully/effectively in resource management discussions; they also stand to gain a better understanding of the trade-offs associated with resource management decisions. Resource managers can build relationships with the local community through joint inventory and management efforts, while expanding the knowledge base and community support they can draw upon for managing forest resources. Lesson 3 explores key steps to consider when developing and implementing participatory and community-based inventory and mapping efforts for non-timber forest resources.

LEARNING OUTCOMES

By the end of this lesson, participants will be able to:

- Describe how modes of participation, roles, and empowerment are linked in participatory inventory and mapping processes;
- Identify and explain the key steps in participatory and community-based inventory and mapping projects; and
- Discuss how First Nations' claims and cultural traditions relative to non-timber forest resources affect the design and implementation considerations for inventory and mapping projects.

READINGS & RESOURCES

Brigham, Tim and Dave Buck. 2006. Using the tools: Community-based inventories. In: Cocksedge, Wendy (compiler). Incorporating non-timber forest products into sustainable forest management: An overview for forest managers. Royal Roads University. Pp. 38-43. http://cntr.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf

Keefer, Michael, Wendy Cocksedge, Robin Munro, Jason Meuleman, and Nancy MacPherson. 2010. What about the Berries? Managing for Understorey Species. The Centre for Livelihoods and Ecology, Royal Roads University. Pp. 3-10; skim remainder. http://cntr.royalroads.ca/files-cntr/What%20about%20the%20berries.pdf

ADDITIONAL READINGS & RESOURCES

Honda-McNeil, Jamie and Denise Parsons (editors). 2003. Best practices handbook for traditional use studies. Government of Alberta, Aboriginal Affairs and Northern Development. http://www.assembly.ab.ca/lao/library/egovdocs/alaa/2003/138222.pdf

Michel, Henry and Donald V. Gayton (editors). 2002. Linking indigenous peoples' knowledge and western science in natural resource management: conference proceedings. SIFERP Series 4. Conference held at Quaaout Lodge, Chase, B.C., Mar. 14-16, 2001. Southern Interior Forest Extension and Research Partnership. http://www.forrex.org/publications/forrexseries/ss4.pdf

Native Plants and First Nations: How can we create research that is equitable, sustainable and beneficial to all? Workshop Proceedings and Report. Royal Roads University, Victoria, BC January 24 and 25, 2005. The Centre for Non-Timber Resources in partnership with British Columbia Institute of Technology and Community Health Associates of BC. Funded by Natural Health Products Research Program, Health Canada http://cntr.royalroads.ca/files-cntr/NHPD%20Workshop%20Proceedings.pdf

Pilz, David, Heidi Ballard, and Eric T. Jones. 2006. Broadening participation in biological monitoring: Handbook for scientists and managers. PNW-General Technical Report 680. U.S. Department of Agriculture, Forest Service. Pacific Northwest Research Station. Portland, Oregon. USA. http://www.fs.fed.us/pnw/pubs/pnw_gtr680.pdf

Yarnell, Patrick and Donald V. Gayton. 2003. Community-based ecosystem monitoring in British Columbia: A survey and recommendations for extension. FORREX Series 13. http://www.forrex.org/forrex_series/forrex-series-13

LESSON NOTES

The management categories "non-timber forest resources" and "non-timber forest products" encompass a very large number and diversity of species and their parts. Acquiring the detailed base of knowledge needed to actively manage for even a fraction of these species can present a major challenge to resource managers. To address this challenge, resource managers and researchers in British Columbia and elsewhere are increasingly working with harvesters and community groups to design and carry out inventory, monitoring, and mapping projects associated with managing these species under compatible management systems.

As indicated in Table 1, participation can take many forms, ranging along a continuum from co-option to collective action. However, managers need to recognize that the ways in which stakeholders wish to participate in inventory and monitoring can vary over the life of the project. For example, some stakeholders may take a strong interest in taking leadership during design and data collection phases, while preferring to let others take the lead in analysis and interpretation phases (or vice versa). Additionally, managers need to be aware of who within participating communities or groups is participating (as well as who is not) and the form that their participation takes over the life of the project. For example, in most NTFP inventories it would be important to pay attention to whether participation is coming disproportionately from commercial, recreational, or subsistence users. Aside from issues of equity, who participates in inventory and mapping will shape the types of ecological knowledge available (or not available) as well as the objectives and probably the species that are focused on or deemed to be of interest.

Managers also need to recognize that harvesters and other stakeholders vary in how they wish to participate in inventory and mapping, as well as in their ability to participate. An important aspect of participatory inventory and monitoring is providing the space for potential participants

to discuss and identify how they wish to contribute to these processes. Resource managers and researchers may also need to build in the mechanisms (and resources) for providing individuals and communities with the technical skills needed to participate effectively in various phases of inventory and mapping efforts.

Community-based inventories are a special type of participatory inventory falling along the co-learning/collective end of the participation continuum. With a community-based inventory, the goal is to enable communities to develop and implement, often with outside assistance, their own inventory of non-timber forest resources to meet a variety of community objectives. The scientific and technical merits of community-based inventories will vary depending on the ecological knowledge and analytical expertise available in the community, as well as the extent to which the inventory process includes technical training and support for participants.

Table 1 – Participation continuum

MODE OF HARVESTER PARTICIPATION	TYPES OF PARTICIPATION	POTENTIAL FOR SUSTAINING HARVESTER INVOLVEMENT & OWNERSHIP	ROLE OF HARVESTERS IN INVENTORY & MONITORING
CO-OPTION	A few harvesters are chosen to participate, but have no real power.	Unlikely	Subjects
CO-OPERATION	Harvesters are assigned tasks, with incentives. Managers and/or scientists decide agenda and direct process.	Unlikely	Employees
CONSULTATION	Harvesters are asked for their opinions & input. Managers and/or scientists analyze information and decide course of action.	Low	Clients
COLLABORATION	Harvesters work together with managers & scientists to determine priorities. Managers and/or scientists direct the process.	Moderate	Collaborators
CO-LEARNING	Harvesters, managers & scientists share their knowledge to create new understanding and work together to form action plans. Managers and/or scientists facilitate.	Higher	Partners

MODE OF HARVESTER PARTICIPATION	TYPES OF PARTICIPATION	POTENTIAL FOR SUSTAINING HARVESTER INVOLVEMENT & OWNERSHIP	ROLE OF HARVESTERS IN INVENTORY & MONITORING
COLLECTIVE ACTION	Harvesters set and implement their own inventory and monitoring program. External Managers, scientists absent.	Highest	Directors

Table adapted from Lynch *et al.* 2004, Nontimber Forest Product Inventorying and Monitoring in the United States: Rationale and Recommendations for a Participatory Approach. http://www.ifcae.org/projects/ncssf1/publications/USNTFPParticipatoryIM-IFCAE2004.pdf The table was originally adapted from Cornwall, A. 1996. Towards Participatory Practice: Participatory Rural Appraisal (PRA) and the Participatory Process. In *Participatory Research in Health: Issues and Experiences*. K. de Koning and M. Martin, eds. London: Zed Books. pp. 94-107.

POINTS TO PONDER

As you make your way through the unit resources, keep in mind the following questions and comments.

- What benefits can potentially be derived from involving community members during each phase of a non-timber forest resource inventory and mapping exercise?
- How does or can traditional ecological knowledge fit into inventory and mapping of non-timber forest resources? How can integration of traditional ecological knowledge with scientific knowledge improve the quality of inventory and mapping efforts?

ASSIGNMENT 3.1

After completing the required readings for this unit, write a 1-2 page (maximum 500 words) narrative that addresses the following points.

- Describe the key phases in undertaking a participatory inventory and mapping effort. What considerations need to be taken into account during each phase?
- Most NTFPs in British Columbia are or have been important in First Nations' cultural traditions and their citizens' livelihoods. Discuss how this is likely to influence the design and implementation of NTFP inventory and mapping projects in your area, using examples from readings or your own experience.

Submit your answer to the instructor by the date indicated in your course schedule.

Lesson 4. Tying the Threads Together: Inventory, Mapping & Management

LESSON OVERVIEW

Starting in the mid-1990s, the BC Ministry of Forests, Lands and Natural Resource Operations supported a variety of applied research projects aimed at building capacity among resource

managers to develop and implement compatible management systems. Many of these efforts involved partnerships between researchers, managers, First Nations, local communities, and individual harvesters. Lesson 4 provides an in-depth examination of the challenges and opportunities associated with integrating NTFR inventory and mapping into resource planning and management.

LEARNING OUTCOMES

By the end of this lesson, participants will be able to:

- List several examples from British Columbia of pro-active incorporation of NTFR inventory and mapping results into resource planning and management; and
- Identify common challenges associated with integrating inventory, mapping, and compatible management, and techniques that can be used to overcome them.

READINGS & RESOURCES

Kranabetter, J. Marty, Harry Williams, and Jacques Morin. 2009. Ecological descriptions of Pacific golden chanterelle (Cantharellus formosus) habitat and estimates of its extent in Haida Gwaii. BC Journal of Ecosystems and Management. 10(1):59-67. http://www.forrex.org/JEM/ISS50/vol10_no1_art6.pdf

Berch, S.M. and J.M. Kranabetter. 2010. Compatible management of timber and pine mushrooms. B.C. Ministry of Forests and Range, Forest Science Program, and Centre for Non-Timber Resources, Royal Roads University, Victoria, B.C. Land Management Handbook 64. http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh64.htm

Ehlers, Tyson, Signy Frederickson, and Shannon Berch. 2007. Pine mushroom habitat characteristics and management strategies in the West Kootenay region of British Columbia. BC Journal of Ecosystems and Management. 8(3):76-88. http://jem.forrex.org/index.php/jem/article/view/374

Fogarty, Fidel W., Shannon Berch, and Brian D'Anjou. 2001. Effects of alternative silvicultural treatments on the diversity of forest fungi in the Roberts Creek Study Forest. Forest Research Extension Note, EN-006. Ecology. March 2001. http://www.for.gov.bc.ca/RCO/research/projects/rcsf/en006.pdf

Bravi, Becky and Bill Chapman. 2009. Managing for pine mushrooms through the mountain pine beetle epidemic in the West Chilcotin. Second Edition. Southern Interior Forest Region Extension Note 9. http://www.for.gov.bc.ca/hfd/Pubs/RSI/FSP/EN/RSI_EN09.pdf

ADDITIONAL READINGS

Miller, Michael & Michael E. Keefer. 2009. Siska FSP Berry Project – 2008 Summary Report. http://fnbc.info/sites/default/files/documents/Siska%20Berry%20Project.pdf

Weigand, James F. 1998. Management experiments for high-elevation agroforestry systems: Jointly producing matsutake mushrooms and high-quality timber in the Cascade Range of Southern Oregon. PNW Research Station GTR 424. http://www.fs.fed.us/pnw/pubs/pnw_gtr424.pdf

Haynes and Monserud. 2002. A basis for understanding compatibility among wood production and other forest values. PNW GTR 529. http://www.fs.fed.us/pnw/pubs/gtr529.pdf

LESSON NOTES

Government interest in BC in expanding the scientific knowledge base for managing NTFRs can be traced to the rapid development and expansion of the pine mushroom (*Tricholoma magnivelare*) industry in the late 1980s and early 1990s. By the late 1990s, efforts had begun

to evaluate the potential for joint production of pine mushrooms and timber in the Prince Rupert Forest Region. Soon thereafter, similar initiatives were undertaken in the Cariboo Forest Region. At the same time, researchers working in partnership with other stakeholders (resource managers, First Nations, local communities, individual harvesters) began exploring joint production possibilities for chanterelles and timber on Haida Gwaii (formerly the Queen Charlotte Islands) and on Vancouver Island, pine mushrooms and timber in the West Kootenay, berries and timber in the Skeena River area, and salal and timber on Vancouver Island.

The case studies explored in this lesson provide a sense of the breadth and depth of these efforts to develop scientifically credible yet affordable techniques for identifying habitats, estimating the abundance and quality of the resources, and evaluating the impact of timber management strategies on NTFR production. All the cases focus on wild fungi, but each examines the relationship between timber and wild fungi management from a different angle. Fogarty *et al.*'s (2001) study was the first effort in British Columbia to systematically examine the effects of different silvicultural techniques on wild fungi populations. Although limited in its geographical extent, the study provided the first scientifically grounded recommendations for managing forests for timber while retaining fungal biodiversity. Building on this foundation, Ehlers *et al.* (2007) used an intensive ground survey to identify pine mushroom habitat in the West Kootenay region, and developed management recommendations based on their results. Their efforts to implement a predictive ecosystem mapping component, however, proved unsuccessful owing to the poor quality of data sources available. Kranabetter *et al.* (2009) applied a similar approach to that used by Ehlers *et al.* to golden chanterelles on Haida Gwaii. Drawing on the experience of Ehlers *et al.*, they included a terrestrial ecosystem mapping component rather than a predictive ecosystem mapping component with considerable success. Bravi and Chapman (2009) implemented a predictive ecosystem mapping effort for pine mushrooms in the West Chilcotin that was accurate enough for landscape-level management applications. Using the results from this mapping exercise, they provide detailed recommendations for compatible management of timber with pine mushrooms in areas affected by the mountain pine beetle. Berch and Kranabetter (2010) describe a scientific and technical approach to understanding pine mushroom habitat and the compatible management of pine mushrooms and timber. Taken as a group, these case studies provide a sense of the developments that have occurred with respect to scientific knowledge about how timber and non-timber resources can be managed successfully on the same land base.

POINTS TO PONDER

As you make your way through the unit resources, keep in mind the following questions and comments.

- What approaches are used in these case studies to gather data about wild fungi habitat, abundance, and quality? How are they similar? How do they differ?
- Does the approach used to gather data about wild fungi affect the kinds of management recommendations that can be made?

ASSIGNMENT 4.1

After completing the required readings for this unit, write a 2-3 page (500 – 750 words) narrative that addresses the following points.

- Compare and contrast the approaches used in the case studies to develop management recommendations for joint production of timber and wild fungi.
- Identify some of the challenges these cases have in common with respect to integrating inventory, mapping, and compatible management.
- Drawing on these cases, other examples discussed earlier in this module, and your own experiences (as applicable), describe how NTFR inventories and mapping efforts

have helped re-shape timber management strategies over the past two decades.

Submit your answer to the instructor by the date indicated in your course schedule.