Integration of Non-Timber Forest Products (NTFPs) with Timber Production

Sharing the forest – a future beneath the trees?

Timber, NTFPs, and Conservation

Forest management regimes designed solely to produce merchantable timber neglect other potential economic returns and services from forested ecosystems as well as values outside the traditional timber market. Non-timber values include:

- Biodiversity + Conservation
- Ecosystem services
- Recreation
- Ecotourism
- Range management
- Food and medicinal plants (NTFPs)
- AgroForestry

Non-Timber Forest Products

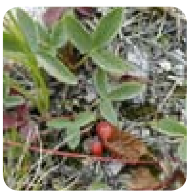
Non-timber forest products (NTFPs) consist mainly of plants and fungi that may be used for a variety of traditional, commercial, recreational or cultural purposes. NTFPs have been, and continue to be, harvested throughout North America for traditional uses by local First Nations groups. Many traditional cultures the world over understand the relationship between NTFPs and the ecosystems in which they thrive. Understory herbs and shrubs, in particular, have been used for millennia by First Nations for a variety of uses to support livelihoods, including medicinals, edibles, cultural purposes, and trade. Current livelihood values of these species, which include cultural, subsistence, recreational, and commercial uses, has led to speculation that the harvest of NTFPs may be a sustainable use of natural resources that could aid in the diversification of forest management.

The economic value of NTFP extraction may offer periodic income during the otherwise profitless period between timber harvests. Conversely, land set aside primarily for NTFP purposes, such as areas designed to protect wildlife habitat and ecosystem integrity, may often overlook the conservation potential of managed stands. The co-management of forested land for multiple resource use may potentially form a synergy between two apparently disparate objectives, economic growth and land stewardship.

Bunchberry

Saskatoon Berry

Soapberry



Strawberry

Major Question

Can we integrate timber production and NTFPs to maintain landscape biodiversity?

Second-Growth Forests

- Millions of ha in BC and the Pacific Northwest
- Production of both timber and ecological values
- Future storehouse of Biodiversity?
- Future production of NTFPs?

Landscape Biodiversity

- Diversity of forestry practices
- Stand-level diversity, tree species composition
- Variety of successional stages + old-growth
- Planned rather than by default

Diversify Forestry Practices

- Pre-commercial Thinning (PCT) and Fertilization – tools to alter stand structure and rate and direction of ecological succession
- Relatively unused, at least in terms of diversity of treatments
- Abundance of high-density (>2,000 stems/ha) thinned and unthinned stands of young (< 30 yrs) conifers
- Relatively few lower-density stands
- Few intensive treatments

Thinning overstory trees increases understory light levels, and consequently has positive effects on growth of understory vegetation. Increased shrub cover in managed stands has been attributed to PCT and, while thinning may not change patterns of understory succession, it may extend the period conducive to understory growth. Understory response to fertilization tends to be more variable and species specific. Although much work has been done on the effects of thinning and fertilization on timber supply and understory biodiversity, the impacts on potential NTFP harvest have yet to be examined at an operational level.

The values provided by NTFP harvest in managed stands may provide an added incentive for land managers to treat understory regrowth and development as an important component to forest management, while simultaneously managing for timber production. As part of a larger project on the effects of incremental silviculture of lodgepole pine stands on non-timber values, this study examined shrubs and herbs within the understory that could potentially contribute to livelihoods.

This project determined if large-scale PCT and repeated fertilization in pole-sized lodgepole pine stands, up to 10 years after the onset of treatments, would enhance production of NTFPs compared to that in young plantations, mature, and old-growth stands. *Continued on inside*

Continued from previous

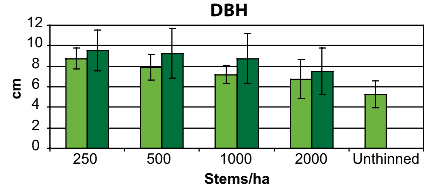
Replicate study areas were located near Summerland, Kelowna, and Gavin Lake in south-central BC. Stand treatments began in 1993 and sampling of NTFPs occurred annually from 1998 to 2003. Each study area had four sets of paired stands thinned to ~ 250 (very low), 500 (low), 1000 (medium), and 2000 (high) stems/ha. Stand ages in 1993 ranged from 12-14 years. Fertilization (optimum nutrition) of one stand of each pair was initiated in 1994 and repeated in 1996, 1998, 2000, and 2002.

Responses in these young managed stands were compared to those in unmanaged young unthinned lodgepole pine of the same age, mature (80-120 years old) and old-growth (140-250 years old) stands.

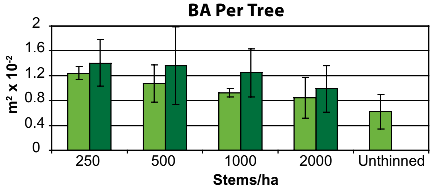
Response of Timber

At the tree level, fertilization treatments significantly increased diameter at breast height (DBH), basal area (BA), and volume growth and heavy PCT significantly increased DBH and BA growth.

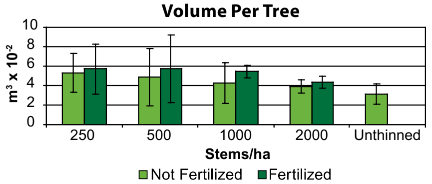
DBH



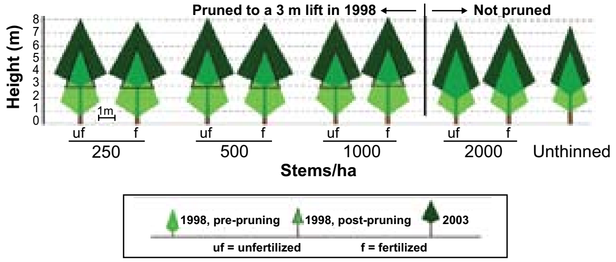
BA Per Tree



Volume Per Tree



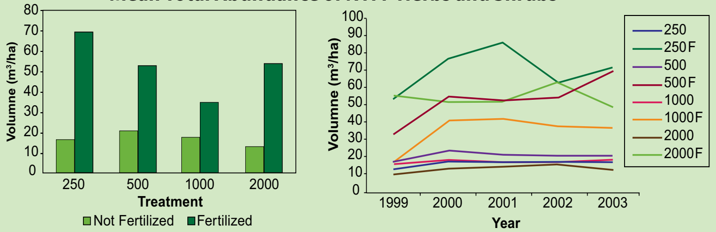
Rate of change in both crown area and crown volume was significantly greater for trees growing in fertilized compared to unfertilized stands.



Response of Potential NTFPs

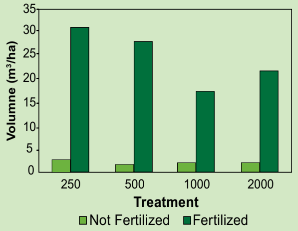
Mean total abundance of the 54 NTFP species (26 herbs and 28 shrubs – approximately 60% of all understory species) had a significant, positive relationship with the fertilizer treatment, as well as time.

Mean Total Abundance of NTFP Herbs and Shrubs

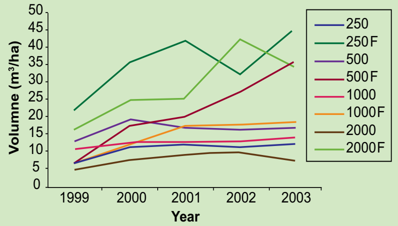


Mean total abundance of shrubs was not affected by fertilizer treatment, but did increase significantly with time. Mean total abundance of herbs increased in the fertilization treatment. Neither mean total abundance of herbs nor shrubs responded significantly to density treatments. Mean total species richness was significantly reduced by fertilization, but not density.

Mean Total Abundance of Herbs

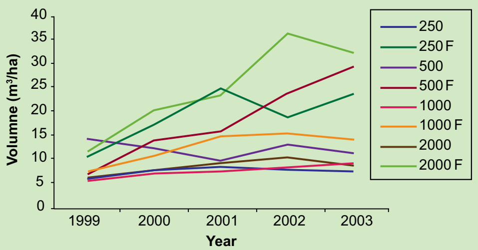


Mean Total Abundance of Shrubs



Mean total abundance of berry producing NTFPs were also assessed, indicating a significant change over time. There was no significant density or fertilization effects.

Mean Total Abundance of Berry-producing NTFPs



Three herb species responded significantly to either density or fertilization treatments. Mean abundance of yarrow, fireweed, and common dandelion responded positively to fertilizer. Fireweed reached a high mean abundance in fertilized (24 m³/0.01 ha)


Yarrow


Bee hives in fireweed

vs. unfertilized (1 m³/0.01 ha) stands, but did not differ among density treatments. Fireweed is important to apiculture (honey and other bee-related products).

Several shrub species demonstrated significant treatment responses. Mean abundance of red raspberry showed a positive response to fertilization. Kinnikinnick was negatively affected by fertilization, but not density. Grouseberry declined in fertilized stands over time compared to non-fertilized stands.

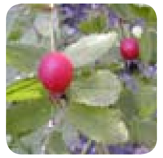

Red Raspberry

Mean abundance of Saskatoon berry, prickly rose, willow, and snowberry, appeared to be enhanced in fertilized stands.

Alternatively, wild strawberry, soapberry, and dwarf blueberry tended to decline in response to fertilization. Of the other relatively common species, Sitka alder, black gooseberry, and pyramid spiraea had variable responses to fertilization.


Kinnikinnick


Saskatoon Berry


Prickly Rose


Snowberry


Black Gooseberry

Comparison to Unmanaged Stands?

Mean total abundance of NTFP herbs and shrubs combined were highest in the thinned and fertilized stands. These managed stands had a mean total abundance of herb and shrub NTFPs that ranged from 2.3 to 13.7 times greater than the other stands. Mean total abundance of shrubs was similar among stand types, while that of herbs was also highest in thinned-fertilized stands. Mean species richness of NTFPs was similar among stands. Mean total abundance of berry producing herbs and shrubs was similar among stands.

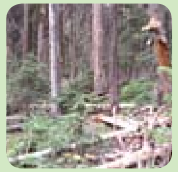

Thinned + fertilized stand


Thinned stand

Kinnikinnick , fireweed, and black twinberry all had significantly higher abundance in young, managed stands than in all other treatments.


Unthinned stand


Mature stand


Old growth stand

Mean abundance (m³/0.01 ha) of NTFPs in the 5 treatment (managed vs. unmanaged) stands over 5 years.

	Thinned	Thinned & Fertilized	Unthinned	Mature	Old Growth
Total herbs	4.14	32.03	3.31	0.11	0.36
Total shrubs	12.18	5.31	7.36	2.61	6.44
Total herbs + shrubs	16.32	37.34	10.67	2.72	6.80
Total berries	3.19	1.97	3.60	0.26	4.38
kinnikinnick	1.03	0.11	0.43	0.00	0.13
fireweed	3.39	30.37	2.72	0.00	0.00
black twinberry	0.78	0.01	0.02	0.00	0.00

Study Limitations

Many NTFP species are harvested from parts of the plant that were not directly measured during this study. Berry production was not measured nor was flowering, or quality of vegetation. These are all significant for NTFP trade. Our study was also species-specific, and did not evaluate the difference among understory communities in each stand type.

Conclusions

Our prediction that large-scale stand thinning (PCT) and repeated fertilization in pole-sized lodgepole pine stands, up to 10 years after the onset of treatments, would enhance production of NTFPs compared to that in mature and old-growth stands is largely supported. The role of old-growth forest stands for NTFPs should not be overlooked given the association of many of the NTFP species with older forests. This study, nonetheless, indicated the potential benefit of incorporating non-timber values into young stand development through overstory manipulation.

The high volume of NTFP species in young managed stands, especially with the application of fertilizer, indicates the importance and potential benefit of using these stand types for non-timber resources. The incorporation of non-timber values through NTFPs may provide at least one avenue for diversifying land-use practices, while also providing periodic income and/or livelihood for landowners or tenure-holders. A component of the rural economy and important to First Nations – Sharing the Forest!

A way to diversify forests, wood products, and perhaps maintain/enhance landscape biodiversity.

References

Clason, A.J., Lindgren, P.M.F., Sullivan, T.P., 2008. Comparison of potential non-timber forest products in intensively managed young stands and mature/old-growth forests in south-central British Columbia. Forest Ecology and Management 256: 1897-1909.

Lindgren, P.M.F., Ransome, D.B., Sullivan, D.S., Sullivan, T.P., 2006. Plant community attributes 12 to 14 years following precommercial thinning in a young lodgepole pine forest. Canadian Journal of Forest Research 36: 48-61.

Lindgren, P.M.F., Sullivan, T.P., Sullivan, D.S., Brockley, R.P., Winter, R. 2007. Growth response of young lodgepole pine to thinning and repeated fertilization treatments: 10-year results. Forestry 80: 587-611.

Sullivan, T.P., Sullivan, D.S., Lindgren, P.M.F., and Ransome, D.B., 2006. Long-term responses of ecosystem components to stand thinning in young lodgepole pine forest. III. Growth of crop trees and coniferous stand structure. Forest Ecology and Management 228: 69-81.

Acknowledgements

We thank Silviculture Branch, British Columbia Ministry of Forests (MoF), Victoria, British Columbia, The Canada-British Columbia Partnership Agreement on Forest Resource Development (FRDA II), Forest Renewal B.C., Forest Innovation Investment, Forest Science Program, Gorman Bros. Lumber Ltd., Riverside Forest Products Ltd., Monsanto Canada Inc., and the Alex Fraser Research Forest, University of B.C. for financial and logistical support. Operational treatments were conducted by the Silviculture sections of Penticton and Horsefly Forest Districts (MoF). We thank J. Hickson, D. Ransome, and H. Sullivan for assistance with the fieldwork.

This summary was prepared by:

T.P. Sullivan
Department of Forest Sciences
Faculty of Forestry
University of BC
Vancouver, BC, Canada V6T 1Z4
e-mail: tom.sullivan@ubc.ca

Applied Mammal Research Institute
11010 Mitchell Avenue
Summerland, BC, Canada V6T 1Z8
e-mail: sullivan@telus.net

Brochure Graphic Design by Studio2 Graphics + Print, Summerland, BC
Printed in Canada