Forest Mycology: Inventory and Management Strategies for the Sunshine Coast Community Forest.

Wild Edible and Medicinal Mushrooms

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Executive Summary

Non-timber forest products are derived from botanical and mycological species that can be harvested for commercial, recreational or traditional use. These include wild edible, medicinal, and nutraceutical mushrooms. The management of botanical resources has received increased attention in the Sunshine Coast Community Forest recently. The impacts of timber harvesting on forest fungi has become the focus of scientific research and political debate.

The use of partial retention systems has been explored earlier in a Roberts Creek portion of the SCCF/SCPI tenure. Alternative harvesting systems were tested to meet certain landscape and stand requirements reflecting the mandate of the BC Forest Practices Code to establish a more diverse landscape and conserve biological diversity. Partial retention systems can be employed in sensitive areas to meet a variety of biological, social and economic objectives.

To date over 400 vascular plants, mosses, liverworts, lichens, and fungi have been identified from the study area. There are an estimated 1200 species of fungi in the tenure areas. It became clear from these early studies that further research was required to examine forest enhancement (agroforestry) and create cultivation forests in areas close to urban centers.

In autumn 2015 eighty-one species of mushrooms were encountered in the study areas. This is not an exhaustive list. Many more species exist in the SCCF tenure. Most of the major wild edible and medicinal mushrooms were encountered. The objective of 2016 mushroom research was to examine ten economically valuable species in three areas of the SCPI tenure: Roberts Creek, Wilson Creek and Halfmoon Bay. In spring 2016 we also monitored early mushroom succession in the burned portions of the tenure area in West Sechelt.

The results to date are discussed in the following report. A model is developed comparing mushroom values and timber value. Plans for future research and the development of mushroom management strategies are proposed. The present study has increased our understanding of ecologically sensitive fungi in coastal ecosystems. This information will help foresters to develop programs that sustain key mycological values in the SCCF tenure.

The Sunshine Coast Community Forest (SCPI) is doing more to promote the understanding of wild edible and medicinal mushrooms than any other Community Forest in the province.

INTRODUCTION

British Columbia is recognized for its rich mushroom diversity. Fungi perform important ecological roles in forests. Wood and litter decomposers (saprophytes), mycorrhizal (tree-root symbiotic), pathogenic and parasitic fungi interact with other organisms creating ecosystem stability and biological diversity.

Past forest management focused primarily on tree disease fungi. The extensive commercial harvest of wild edible mushrooms and resource conflicts have led to concern regarding the sustainability of mushroom diversity and abundance. This has heightened awareness amongst resources managers and the public of their importance. The impacts of timber harvesting on forest fungi has again become the focus of scientific research and political debate.

The objective of the SCCF Forest Mycology project is to examine the types and abundance of several economically valuable mushrooms in 3 areas of the SCPI tenure: Halfmoon Bay, Wilson Creek and Roberts Creek. We have also monitored early fungal succession in the recently burned portions of the tenure area in West Sechelt.

We have identified the "best bet" BC edible and potentially 'neutraceutical' mushrooms which could be harvested and exported to the US, Europe and Asia. These species are represented in **bold**. Criteria involved volume available in BC, consumer preferences and trends, proven markets in regions of the US, Canada, Asia and Europe.

Table 2: Edible BC Wild Food Mushrooms (not exhaustive)

Genus/Species	**Common Name**
Armillaria ostoyae *& allies*	Honey Mushroom
Auricularia auricular	Tree Ear
Aleuria aurantia	Orange Peel
Boletopsis leucomelaena	**Kurotake**
Boletus edulis	**King Bolete**
Boletus mirabilis	**Velvet Top**
Boletus smithii	Smith's Bolete
Boletus zelleri	Zeller's Bolete
Cantharellus formosus	**Pacific Golden**
Cantharellus infundibuliformis	**Funnel Chanterelle**
Cantharellus subalbidus	**White Chanterelle**
Cantharellus cibarius	**Rainbow Chanterelle**
Clavulina cristata	Crested Coral
Dacrymyces palmatus	Orange Jelly
Gomphidius oregonensis	Oregon Gomphidius
Gomphidius subroseus	Rosy Gomphidius
Gomphus clavatus	**Pig's Ear Gomphus**
Hericium abietis	Connifer Coral Hericium
Hydnum repandum	**Hedgehog**
Hygrophorus bakerensis	Mount Baker Waxy Cap
Hypholoma capnoides	Smoky Grilled Wood Lover
Hypomyces lactifluorum	**Lobster Mushroom**

Genus/Species	Common Name
Laccaria laccata	**Common Laccaria**
Lactarius deliciosus	**Delicious Milky Cap**
Lactarius rubrilacteus	Red Juicy MilkyCap
Laetiporus sulphureus	**Sulphur Shelf**
Lycoperdon periatum	Stuffed Puffball
Lycoperdon pyriforme	Pear Shaped Puffball
Lyophyllum decastes	Fried Chicken Mushroom
Morchella esculenta	**Yellow Morel**
Morchella elata	**Black Morel**
Pleurocybella porrigens	**Angel Wing**
Pleurotus ostreatus	**Oyster Mushroom**
Pluteus cervinus	Deer Mushroom
Polyozellus multiplex	**Blue Chanterelle**
Pseudohydnum gelatinosum	White Jelly
Rozites caperata	Gypsy Mushroom
Russula xerampelina	Shrimp Mushroom
Sparassis radicata	**Caulliflower Mushroom**
Suillus brevipes	Slippery Jack
Suillus caerulescens	Blue-Staining Slippery Jack
Suillus cavipes	Hollow Stemmed Larch Bolete
Suillus granulatus	Dotted Stalked Slippery Jack
Suillus lakei	Lake's Bolete
Suillus luteus	**Slippery Jack**
Suillus subolivaceus	Slippery Jill
Suillus tomentosus	Woolly Capped Bolete
Tremella lutescens	Witches Butter
Tricholoma caligatum	Fragrant Pine
Tricholoma flavovirens	Man-On-Horseback
Tricholoma magnivelare	**Pine Mushroom**
Tricholoma portentosum	Streaked Tricholoma
Tuber gibbosum	**Oregon White Truffle**

Table 3: Potentially Nutraceutical and Medicinal BC Mushrooms (not exhaustive)

Genus/Species	Common Name
Amanita muscaria	Fly Agaric
Armillaria mellea	**Honey Mushroom**
Auricularia auricula	**Wood Ear**
Boletopsis leucomelaena	**Kurotake**
Boletus edulis	**King Bolete**
Boletus mirabilis	**Velvet Top**
Boletus zelleri	Zeller's Bolete
Cantharellus spp.	**Chanterelles**
Cordyceps spp.	Insect Fungi
Fomes fomentarius	Tinder Polypore

Genus/Species	Common Name
Fomitopsis officinalis	**Quinine Conk**
Fomitopsis pinicola	**Red Belt**
Ganoderma applanatum	**Artist's Conk**
Ganoderma oregonese	**Varnish Shelf**
Ganoderma tsugae	**Hemlock Varnish Shelf**
Gloeophyllum separium	Gilled Polypore
Grifola frondosa	**Maitake**
Hericium abietus	Coral Hydnum
Inonotus obliquus	**Chaga**
Laetiporus sulphureus	**Sulfur Shelf**
Lenzites betulina	Gilled Polypore
Morchella esculenta	**More**l
Phellinus igniarius	Flecked-Flesh Polypore
Pleurotus ostreatus	**Oyster Mushroom**
Polyporus spp.	Polypores
Schizophyllum commune	**Split Gill**
Trametes versicolor	**Turkey Tail**
Tremella spp.	Witches Butter
Tricholoma magnivelare	**Pine Mushroom**

In an Economic Strategy to Develop Non-Timber Forest Products in BC, Fogarty, Wills and Lipsey have identified *neutraceutical and medicinal mushrooms* as one of BC's "best economic bets". The world market for these was estimated at US $1.5 billion and growing at 33 percent annually. In the US, markets for herbal remedies and other health products in general, expanded 70% during the past decade. British Columbia's forest fungi are now generally recognized as ecologically and economically valuable resources.

Bioactive substances, including several clinically tested cancer drugs have been isolated from medicinal fungi found in the study area. A new compound (ganodernic acid D) has been extracted from the Artist's conk, *Ganoderma applanatum* (Fogarty et al, UBC Botany Department). Other mushrooms selected are of traditional or cultural importance. Three species of slime mold (*Fulgio septica, Leocarpus fragilis, and Lycogala epidendrum*) were encountered.

In several Science Council/MoF-supported projects, Fogarty et al identified nearly 400 species of fungi, lichens and plants from coastal British Columbia forests. On the Sunshine Coast we then studied 120 types of mushrooms under alternative silviculture systems: (clearcut with reserves, shelterwood, extended rotation and unlogged control). During this research, some of British Columbia's most economically valuable, indigenous wild edible and medicinal mushroom species were identified. The species selected were from a range of ecological roles or niches and included 59 saprophytic, 6 parasitic, and 55 mycorrhizal fungi. Mushroom survey results are summarized below:

Table 1. Number of the 120 selected species from each ecological niche recorded fruiting post timber harvest in the control (CN), extended rotation (ER), shelterwood (SW), and clearcut (CC).

Eco Niche	CN	ER	SW	CC
Parasitic	6	4	5	1
Mycorrhizal	54	48	37	4
Saprophytic	55	49	41	34
Totals	115	101	83	39

It became clear that further research is needed to examine the effects of timber harvesting systems on forest fungi. Increased baseline information, long-term data collection, and greater replication are necessary to determine the spatial and temporal distribution of mushrooms and to elucidate trends under varying canopy structures.

This preliminary research examines three portions of the SCCF tenure and a burn site to provide base line (pre-timber harvest) information.

Research in British Columbia and the Pacific Northwest reflects the increased interest in the impacts of logging and other disturbances on biological diversity. Clear-cut logging has received much attention. Plant succession after clear-cutting has been the subject of numerous long-term studies.

Fewer data exist regarding the impacts of timber harvesting on mushrooms. Fewer yet with respect to partial retention logging, especially in coastal ecosystems. Resilience of wild mushroom populations after disturbance needs more research, especially in areas identified as high priority for mushroom values.

Clearly a priority is to examine areas of increased mycological diversity and develop ecological and economic models to help predict changes for potentially sensitive mushroom species. Forest cultivation and enhancement of valuable fungi and plants also requires more research and development.

A number of models have been developed to predict long-term mushroom productivity in managed stands. Many parameters and assumptions are involved and it will be several decades before some of the longer-term hypotheses can be tested.

In autumn 2016 we examined 10 select mushrooms known to grow within the tenure. Three tenure sites were studied -- Roberts Creek, Wilson Creek and Halfmoon Bay. Surveys were also conducted in spring in a portion of the recently burned area

This study focuses on the value of important edible and medicinal mushrooms from a range of ecological roles. This report summarizes baseline data from autumn 2015 and results to date from spring and autumn 2016 mushroom surveys. Specimens of the selected species have been dried and stored for reference purposes.

STUDY AREA

The Sunshine Coast Community Forest tenures are located on the Sunshine Coast approximately 50 km north of Vancouver, British Columbia, in the Pacific Ranges Drier Maritime Coastal Western Hemlock Biogeoclimatic Sub-zone (CWHdm). Elevation of the research sites ranges from 200 to 600 m above sea level. This zone has relatively dry, warm summers and moist, mild winters with little snowfall.

Douglas fir (*Pseudotsuga menziesii*), Western Hemlock (*Tsuga heterophylla*) and Western Red Cedar (*Thuja plicata*) dominate. Other prominent tree species include white pine and alder. Aside from scattered veterans, the dominant trees are between 90 and 150 years old. Timber volume estimates range from 700 to 1100 m3/ha. Major under-story species include salal, red huckleberry, twinflower, sword fern, and a variety of mosses liverworts and lichens.

MUSHROOM SAMPLING METHODS

Two types of Mushroom Surveys were performed from September to December 2015:
Reconnaissance surveys--to collect information on the selected mushroom species and other macro-fungi encountered, and their ecotypes (saprophytic, parasitic, mycorrhizal).
Permanent sampling plots--to initiate collection of longer term, area based, seasonal data on the types and abundance of the main ecologically sensitive, economically and culturally valuable mushrooms.

From preliminary research ten species were selected for study in autumn 2016. These covered a range of ecological roles (saprophytic, parasitic, and mycorrhizal) and include many well-known edible and medicinal mushrooms. Some of these, such as the pine mushroom (*Tricholoma magnivelare*) and chanterelles (*Cantharellus* spp.), represent potential indicator species and are of ecological and economic importance.

Appendix 1 shows the 10 mushrooms selected: Edible choice--Pine mushrooms, chanterelles, boletes, morels and cauliflower mushroom. Medicinal and nutraceuticals—Artists conk, hemlock varnish cap, Oregon varnish cap, turkey-tail and split-gill.

These mushrooms were collected during surveys in three portions of the tenure and the burn site. During reconnaissance surveys, approximately 1 ha area (1000m line x 10m swath) was examined in each portion of the tenure on successive days. Data was collected on the cumulative net-weight in pounds (to nearest pound for edible and nearest 0.1 pound for medicinal). The approximate 2016-dollar value of ten select species was determined from average prices paid locally (buying stations) and internet pricing. Weight and dollar value data were tabulated and the value for the ten types encountered was calculated and converted to an average per ha for the three areas.

Fungi were identified using mushroom field guides, texts, literature and local knowledge. Specimens of select species were collected for identification, dried, labeled and stored for reference purposes.

RESULTS

Table 2 shows macro-fungi encountered in each site and the burn. This is not an exhaustive list of the types that exist in the study areas. The ten edible and medicinal mushroom species we are currently examining and numerous others were encountered.

Table 2. Macrofungi observed and ecological roles in each SCCF site.

(Ecological role or niches: S= saprophytic; M= mycorrhizal; P= parasitic)

Latin Name	Common Name	EcoRole	Robs Ck.	Angus Ck.	HM Bay	Burn
Aleuria aurantia	orange peel fungus	S	x	x	x	x
Amanita porphyria	fly agaric	M		x		
Armillaria ostoyae	honey mushroom	P	x	x	x	
Armillaria sinipina	cedar honey mushroom	P	x	x	x	
Anthracobia melaloma	burn-site ochre cup	S				x
Boletopsis leucomelaena	kurotake	M	x			
Boletus edulis	king bolete	M	x			
Boletus mirabilis	velvet top	M	x	x	x	
Camarophyllus graveolens	moth balls	M	x			
Cantharellus cibarius	rainbow chanterelle	M	x	x		
Cantharellus formosus	pacific golden	M	x			
Cantharellus subalbidus	white chanterelle	M	x			
Cantharellus infundibuliformis	funnel chanterelle	M	x	x	x	x
Chroogomphus tomentosus	woolly gomphidius	M	x	x		
Clavaria purpurea	purple club coral	S	x	x		
Clavulina cinerea	blue-grey coral	S	x	x	x	
Clavulina cristata	crested coral	S	x	x	x	
Collybia acervata	clustered collybia	S	x	x	x	
Coltricia cinnamomea	cinnamon polypore	S	x	x		
Cortinarius cinnamomeo-luteus	cinnamon cort	M	x	x	x	
Cortinarius corrugis	corrugated top	M	x	x	x	
Cortinarius cotoneus	electric motor cort (dark)	M	x			
Cortinarius glaucopus	green bulbous cort	M	x			
Cortinarius traganus	pungent cort (pear smell)	M	x	x	x	
Dacrymyces palmatus	orange jelly	S	x	x	x	
Fomitopsis officinalis	hoof conk	S	x			
Fomitopsis pinicola	red belt	S	x	x	x	x
Fuligo septica	scrambled egg slime	S	x	x		
Ganoderma applanatum	artists conk	S	x	x	x	
Ganoderma tsugae	hemlock varnish cap	S	x	x		
Gloeophyllum saepiarium	gilled polypore	S			x	
Gupiniopsis alpinus	golden jelly cone	S	x	x	x	
Hebeloma crustuliniforme	poison pie	M	x			
Hydnellum aurantiacum	orange hydnellum	M	x	x		
Hydnellum caeruleum	bluish grey tooth/orange flesh	M	x			
Hydnellum peckii	strawberries n' cream	M	x	x	x	
Hydnellum regium	blue hydnellum	M	x			
Hydnum repandum	hedgehog	M	x	x	x	

Latin Name	Common Name	EcoRole	Robs Ck.	Angus Ck.	HM Bay	Burn
Hygrophorus bakerensis	almond scented	M	x	x	x	
Hygrophoropsis olida	bubble-gum	M?	x			
Hygrophorus conicus	witches hat	M?	x	x	x	
Hypholoma fasciculare	clustered wood lover	S	x	x	x	
Hypomyces hyalinus	white parasite	P	x	x	x	
Hypomyces lactifluorum	lobster mushroom	P	x			
Ishnoderma resinosum?	resinous conk	S		x		
Laccaria amethysteo-occidentalis	purple laccaria	M	x			
Laccaria laccata	common laccaria	M	x	x	x	x
Lactarius affinus	tan milky cap/hollow stem	M	x	x	x	
Lactarius deliciosus	delicious milky cap	M	x	x		
Lactarius kauffmanii	large grey milky cap	M	x	x		
Lactarius pseudomucidus	slimy milky cap	M	x	x	x	
Laetiporus sulphureus	sulfur shelf	S			x	
Leocarpus fragilis	Insect egg slime	S	x		x	
Lycoperdon pyriforme	studded puffball	S	x	x	x	
Lyophyllum decastes	fried chicken mushroom	M	x			
Marasmius copelandi	garlic mushroom	S	x			
Mycena alcalina	bleach mycena	S	x	x	x	x
Mycena haematopus	bleeding mycena	S	x	x	x	
Mycena pura	pure mycena	S	x	x		
Myxophalia maura	burn-site mycena	S				x
Paxillus atrotomentosus	velvet foot pax	S	x	x		
Phaeolus schweinitzii	dye polypore	P	x		x	
Pleurocybella porrigens	angel wings	S	x	x	x	x
Pluteus cervinus	deer mushroom	S	x			
Polyozellus multiplex	blue chanterelle	M	x			
Polyporus elegans	blackfoot polypore	S	x			
Pseudohydnum gelatinosum	white jelly	S	x	x	x	
Ramaria cystidiophora	yellow (lemon) ramaria	S	x	x	x	
Ramaria stricta	straight branched coral	S	x	x		
Rozites caperata	gypsy mushroom	M?	x	x		
Russula brevipes	false pine'	M	x	x	x	
Russula cascadensis	acrid russula	M	x	x	x	
Russula xerampelina	shrimp mushroom	M	x	x	x	
Schizophyllum commune	split gill	S	x	x	x	x
Sparassis radicata	cauliflower fungus	S	x	x		
Trametes species	turkey tail	S	x	x	x	
Tricholoma magnivelare	pine mushroom	M	x	x	x	
Tricholoma zelleri	Zeller's trich	M	x	x	x	
Tricholomopsis decora	yellow rotter	S	x		x	
Tyromyces chionius	cheese polypore	S	x	x	x	
Xylaria hypoxylon	carbon antlers	S	x			
Totals	**81**		**74**	**54**	**43**	**9**

To date 81 species were observed in the study area (including slime molds):
38 saprophytic, 38 mycorrhizae-forming (or purportedly so) and 5 parasites. In the Roberts Creek site 74 of the species were found fruiting. In the Angus Creek site 53 species were recorded. In the HMB site 43 of the 81 species were encountered. In the burned site 9 species of fungi were recorded fruiting first-year post-burn. (Table 2).

Table 3. Cumulative net-weight in pounds and dollar value of each of the 10 edible and medicinal mushroom species encountered in the three portions of the tenure.

Roberts Creek

Pines 21 lbs $210	Chanterelles 28 lbs $168	Boletes 9 lbs $54	Morels 0 lbs $0	Cauliflower 7 lbs $35
Artists Conk 5.5 lbs $137.50	Varnish Cap 2 lbs $80	Oregon V Cap 0.7 lbs $28	Turkey-Tail 4.2 lbs $210	Split-Gill 0.2 lbs $20

Wilson Creek

Pines 8 lbs $80	Chanterelles 17 lbs $102	Boletes 5 lbs $30	Morels 0 lbs $0	Cauliflower 4 lbs $20
Artists Conk 8.4 lbs $210	Varnish Cap 1.2 lbs $48	Oregon V Cap 0 lbs $0	Turkey-Tail 3.3 lbs $165	Split-Gill 0.1 lbs $10

Halfmoon Bay

Pines 15 lbs $150	Chanterelles 22 lbs $132	Boletes 8 lbs $48	Morels 11 lbs $110	Cauliflower 6 lbs $30
Artists Conk 10.5 lbs $262.50	Varnish Cap 0.6 lbs $24	Oregon V Cap 0 lbs $0	Turkey-Tail 1.4 lbs $56	Split-Gill 0.4 lbs $40

General Trends

Autumn 2015 was an El Nino (warm) one which impacted mushrooms. The extremely dry summer may be responsible for reduced diversity and abundance of some species. Mushrooms are generally ephemeral and sporadic in nature. Mycelium mats, mycorrhizae-associated mycelium, primordia development and eventual mushroom production depends much on moisture content of the substrate.

The Roberts Creek site had the greatest number of species encountered (74), followed by the Angus Creek site (54), the Wormy Lake site (43) and finally the burn site (9). This trend appears to correlate with the stand attributes. The stems/ha, basal area, and volume were greatest in the Roberts Creek site, followed by the Angus Creek site and finally the Wormy Lake site.

Nine species were encountered in the burn site. Two post-fire fungi (*Myxomphalia maura*, the burn-site mycena), and *Anthracobia melaloma* (the burn-site ochre cup) were found only in the burned area. Some of the other species fruiting in the burn site (*Cantharellus infundibuliformis* (the funnel chanterelle) and *Laccaria lacatta* (the commom laccaria) were encountered in areas where the fire had been less intense and moss and tree roots survived. Angel wings (*Pleurocybella porrigens*) was found on a tree branch that fell to the ground in the burn site after the fire.

The burn site has harbored an array of pioneering post-fire fungi. Morels became prolific in spring 2016. The Roberts Creek site had the greatest number of species encountered. Edibles such as the pine mushroom, chanterelles, boletes and cauliflower fungus were found in all areas. The funnel chanterelle (*Cantharellus infundibulifomis*) was found ubiquitously in all sites including less scorched portions of the burn. Morels were not encountered outside the burnt areas.

The Artists conk, *Ganoderma applanatum*, and Turkey-tail (*Trametes (Coriolus*) were encountered at all sites except the burn. Hemlock varnish cap (*Ganoderma tsugae*) was found in both Angus Creek and Roberts Creek. *Ganoderma oregonense* (Oregon varnish cap) was encountered only outside of the tenure in Roberts Creek in 2015. The pioneering fungus, Split-gill (*Schizophyllum commune*) found at all sites on stumps and fallen logs and appears to be rapidly colonizing some of the burn-site trees.

In Autumn 2016 chanterelles and allies began fruiting early in the tenure. Flushes continued into October; November for the winter chanterelle. Pine mushrooms and boletes flushed in October and early November with good, but relatively short-lived production. Several cauliflower mushrooms were found in each area. Morels proliferated in the burn in spring, but were not encountered outside of the burn.

The select medicinal mushrooms were found in all three areas of the tenure, with the exception of Oregon varnish cap, which was only encountered in Roberts Creek. These economically valuable species will be discussed in the following section.

DISCUSSION

Timber harvesting results in successional changes for all types of forest fungi. The greater the tree cover post-timber harvest the higher the component of mycorrhizal fungi prevail. Saprophytic and parasitic tree-fungi often fare well post-logging. Roots, stumps, coarse woody debris and humus support a wide variety of species such as the medicinal mushrooms *Ganoderma*, *Trametes* and *Schizophyllum*.

There are over 1000 species of forest fungi in the SCCF tenures. Nearly 400 types have been identified in the Roberts Creek portion alone. The impact of timber-harvesting on 120 of these was examined in previous research by the author. Detailed inventories are beyond the scope of the present research, however, we can continue inventorying and include autumn and spring mushroom forays to collect and identify more species.

The 10 mushrooms selected for the present study represent a wide range of ecotypes. They are all economically valuable and sensitive to disturbances including wild mushroom over-harvesting, soil disruption and compaction by pickers, deforestation and land development.

Inherent problems for surveyors include the fact that forest fungi can be sporadic and ephemeral and other mushroom harvesters picking the crop. Reconnaissance surveys cover more ground and are similar to mushroom pickers meandering through the stand in search of 'patches'. More permanent, linear plots provide area based information.

The two types of surveys performed initiated the collection of longer term, seasonal data on the types and abundance of the main ecologically sensitive, economically and culturally valuable mushrooms. This is the second season of sampling. Longer term data will provide more information regarding the value of the select species.

The average dollar value of select mushrooms in the three areas was about $800/ha. This naturally would vary from year to year and several years of data are required to get meaningful information regarding the per-hectare value of these mushrooms. The timber value is much easier to calculate. Maximum gross timber values are about $100,000 per ha, depending on wood market prices.

Fungi with known medicinal properties are the most valuable non-timber resource. These saprobes are easily cultured and grown and result in light-weight, high value extract products. Logged areas can support a greater number of perennial, wood-decay species. For example, the split-gill is more prevalent in logged areas. Interestingly, this species has proliferated on dead trees and stumps in portions of the burn.

In order to make meaningful comparisons between timber value and non-timber values numerous factors have to be considered. This will require several more years of data collection and analysis. In the meantime we can all enjoy the benefits of these unique organisms.

Further potential research and SCCF mushroom management strategies:

Expand mushroom study to include more SCCF stands scheduled for timber harvest and increase sampling in the burn site in spring 2017 since many post-fire fungi, including morels, fruit in spring rather than in autumn.

Establish an Agroforestry Cultivation Forest for edible and medicinal plants and fungi where species are enhanced or grown in situ. Use approximately 40 hectares of the Roberts Creek Study Forest and surrounds for agroforestry projects, primarily plant and mushroom cultivation and product research and development.

Promote and initiate an education, research facility on the Sunshine Coast for research and development of economically viable non-timber forest products.

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Appendix 1. Choice Edible and Medicinal Mushrooms Selected for 2016 Surveys

Ten of the Major Indigenous Wild Edible and Medicinal Mushrooms for Agroforestry Research and Development

Table 1: Wild edible mushrooms in the Sunshine Coast Community Forest

Common name	Scientific name	Photograph
1. PINE MUSHROOM	Tricholoma magnivelare	
2. CHANTERELLES	Cantherellus cibarius and allies	
3. MORELS	Morchella esculenta and M.elata	
4. BOLETES	Boletus edulis and allies	
5. CAULIFLOWER	Sparassis radicata	

Ten of the Major Indigenous Wild Edible and Medicinal Mushrooms for Agroforestry Research and Development

Table 2: Medicinal Mushrooms in the Sunshine Coast Community Forest

Common name	Scientific name	Photograph
6. ARTISTS CONK	Ganoderma applanatum	
7. HEMLOCK VARNISH CAP	Ganoderma tsugae	
8. VARNISH SHELF	Ganoderma oregonense	
9. TURKEY TAIL	Trametes (Coriolus) versicolor	
10. SPLIT GILL	Schizophyllum commune.