



DOLLARS AND SENSE

THE ECONOMIC RATIONALE TO PROTECT
SPOTTED OWL HABITAT IN BRITISH COLUMBIA



David
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The Economic Rationale to Protect Spotted Owl Habitat in British Columbia

August 2008

A summary of a report by Duncan Knowler, PhD and Kristin Dust of the School of Resource and Environmental Management at Simon Fraser University

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Many wildlife species in
Canada directly depend on
old-growth forests for survival.

Summary

This short document provides some context to, and the major findings of, an important study conducted by researchers at Simon Fraser University. The study assesses the economic value of old-growth forests inhabited by the endangered spotted owl. It looks not just at the value of the timber or trees on such lands, but at the recreational value of those forests, the value of their “non-timber” forest products, and the value such forests have as storehouses of carbon.

After taking all of these things into account and ascribing dollar values to them, the study finds that in 72 of 81 scenarios, increased forest conservation yields better economic returns than does status quo logging and limited conservation. This conclusion contrasts sharply with the traditional, narrowly focused view, as expressed in countless land use debates in British Columbia, that increased forest conservation is simply too costly an option for society.

The study’s authors are quick to point out that these findings are only a beginning, and that if other important functions associated with forests are considered in future economic analyses – for example, the important role that forests play in moderating water flows and protecting water quality – the economic case for conservation would only increase.

The study is a first of its kind, providing a detailed and broad analysis of the economic implications of protecting or conserving old-growth forest in Canada, with a specific focus on old-growth forest inhabited by the spotted owl. The spotted owl is among the most endangered wildlife species in Canada in large part because it is directly dependent on old-growth forests for its survival.

The reason for undertaking the study was to address an important gap in our understanding of what are the tradeoffs or “costs” of protecting forests. As the study’s authors, Duncan Knowler and Kristin Dust, conclude, there typically have been two land use “options” available when considering forests. The first is to log them. The second is to conserve them. “Although the

The study assesses the economic value of old-growth forests inhabited by the endangered spotted owl.



SHARON TOOCHIN PHOTO

perceived costs of foregoing logging appear to be high,” Knowler and Dust report, “there are few economic studies that have examined these two land use options in BC in sufficient detail to determine which best meets society’s interests.”

Moving forward, it appears that increased forest conservation will yield better financial returns than status quo logging and limited forest conservation. This is particularly true as jurisdictions around the globe, including British Columbia, wrestle with how to bring their greenhouse gas emissions down in an effort to counteract global warming. Among the many tools being considered in those efforts are markets where carbon credits are bought and sold, thus allowing high greenhouse gas emitters to offset their emissions by purchasing credits from low emitters or, as the case may be, carbon capturers. Should the growing of trees or the conserving of forests gain increased acceptance as legitimate carbon-storing activities, then the economic value of conserved forests will become that much greater, potentially vaulting British Columbia into a global leadership position in forest conservation for purposes of carbon management.

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Introduction

Economic analyses that focus narrowly on the value of timber versus other forest resources do a disservice to society. They skew perceptions about the costs of forest conservation. Trees, when viewed as sources of wood, are relatively easy to ascribe dollar values to. Industry and government economists know with a great deal of certainty what it costs to cut them down and turn them into logs. They know too what it costs to move the logs. They can also cite a voluminous literature on log, lumber, pulp and paper and other forest product prices over time. Such information, combined with other figures on the jobs created and payroll taxes collected as a result of forest industry activities, allow for seemingly clear “indicators” of the economic contributions that the industry makes to society.

Since the market in conserved forest ecosystems and the trade in endangered forest dwelling species are negligible in comparison to the global timber trade (British Columbia has relatively little private forestland that has been bought or sold for conservation purposes and only limited experience with conservation organizations putting up money to promote conservation-oriented activities on public forestlands), it has been easy for BC’s forest industry and the province, which regulates that industry, to build the case that a logged forest is more valuable than a conserved one.

Such a constrained accounting of the value of forests is, however, increasingly challenged. The consensus that we must act swiftly to address climate change, for example, has more and more people – including elected leaders who have committed to reduce greenhouse gas emissions – talking about the important role that forests play in carbon capture and storage. With further talk of tradable carbon credits in a future market where overall CO₂ emissions are capped and heavy greenhouse gas emitters must offset their emissions by purchasing credits from low-emitters or enterprises that pull CO₂ out of the atmosphere, a new and important measurable economic value of forests presents itself – one, it should be added, that will serve to challenge conventional views.

It has been easy for BC’s forest industry and the province, which regulates that industry, to build the case that a logged forest is more valuable than a conserved one.

This short, popular summary of a ground-breaking new study of old-growth forests in proximity to Greater Vancouver suggests that society will ultimately benefit if a broader economic view of natural resources is embraced. The study finds that in just about every case it makes more economic sense to conserve tracts of such forest than it does to log them. In doing so, society not only realizes more economic benefits but gives one of the most endangered forest-dwelling species in Canada a fighting chance to survive. Moreover, as the area of forest that is conserved increases there will be improved prospects to meet much-needed greenhouse gas emission reductions.

The study finds that in just about every case it makes more economic sense to conserve tracts of such forest than it does to log them.



Report Summary

This summary presents some of the key findings of a detailed economic study of forests inhabited by the endangered spotted owl. Spotted owls are endangered because they require old-growth forests for their habitat, and old-growth forests have become increasingly rare due to logging and human settlement. The study, led by Duncan Knowler, an associate professor at Simon Fraser University's School of Resource and Environmental Management, looks at the economics of protecting old-growth forests inhabited or known to have been home to the spotted owl, one of the most endangered forest-dwelling bird species on the North American continent. In Canada, the owl species is found only in British Columbia and only then in a small area in the southwest corner of the province.

The study, co-authored by research assistant Kristin Dust, looks at three different forest management approaches in an area commonly described by the forest industry and forest industry regulator – British Columbia's Ministry of Forests – as the Fraser Valley Timber Supply Area or Fraser TSA. The first, a "status quo" approach sees logging proceed under current guidelines, which so far have failed to reverse a decline in owl numbers even though somewhat greater areas of forest are conserved. The other two approaches increase the area of forest to be conserved while further restricting where logging activities may take place. In the first increased conservation scenario, denoted "All Suitable Habitat", 100 per cent of forest stands that currently meet the minimum requirements for suitable owl habitat are preserved or removed from the logging land base. In the second scenario, "Packed Territories", further land is conserved to reflect areas of forest that are currently suitable habitat for spotted owls and adjacent forest areas that have been logged and will, if left alone, become suitable owl habitat one day. The idea behind this conservation approach is to protect contiguous areas of owl habitat.

The researchers then calculated the values for timber; recreational use of forests (broadly defined and including hiking and hunting); non-timber forest products such as wild, harvestable mushrooms; and carbon storage. All of their scenarios were nuanced to take into account the

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JEREMY SEAN WILLIAMS PHOTO

“Our results suggest that ... there would be a net benefit rather than an opportunity cost associated with increased preservation of old growth forests. In other words, the benefits of preservation in terms of increased recreational opportunities, non-timber forest products, and carbon sequestration and storage outweigh the costs in terms of lost producer surplus from timber harvesting.”

complexity of how logged forests change over time. For example, on the recreation front, for several years following logging and road-building, opportunities to hunt certain species such as moose may actually increase due to the abundance of browse available for ungulates in forests cleared of their trees. Over time, as new trees re-grow in logged areas, such hunting opportunities will decline. These and other realities relating to the constant flux that managed forests are in was taken into account to arrive at reasonably rigorous conclusions about the value of forests over time.

Knowler and Dust conclude that in the vast majority of cases, the status quo approach makes less economic sense than does increased conservation. In other words, by conserving more old-growth forest economic conditions actually improve. “Our results suggest that ... there would be a net benefit rather than an opportunity cost associated with increased preservation of old growth forests. In other words, the benefits of preservation in terms of increased recreational opportunities, non-timber forest products, and carbon sequestration and storage outweigh the costs in terms of lost producer surplus from timber harvesting.”

Significantly, these findings are based only on a partial analysis of this forest’s economic value to society. For example, the authors considered neither the value of the continued existence and future recovery of the spotted owl itself nor the economic, social or environmental values associated with access to adequate supplies of clean drinking water. In the Greater Vancouver area where the largest human population in the province relies on surface water sources for water, forests are critical to ensuring both the quantity and quality of water. Further study of these important but omitted values is now underway at SFU. Knowler and Dust also base their conclusions on very conservative and low estimates of the value of carbon capture and storage.

Definitions of Some Economic Terms

PRODUCER SURPLUS: The extra income received by businesses that is above the minimum amount required to produce their output.

OPPORTUNITY COST: The value of the next best alternative that is foregone because we choose to carry out a given policy or decision.

NET FOREST VALUE: Net benefits to society generated through timber harvesting, non-timber forest products, recreation opportunities and carbon sequestration/storage, under different management scenarios.

“...inclusion of these [and other] values would only strengthen the argument in favour of increased preservation of old growth habitat in the Fraser Timber Supply Area,” the SFU team reports.

At the end of this summary, a detailed table is presented that breaks down the net economic values of forests in the study area under 81 different scenarios. In the vast majority of cases, the results show that higher rates of forest conservation yield better economic results.

However, this summary first presents results under three different sets of pricing assumptions. The first pricing scenario considers values in a market where log prices rise. The second presents findings based on a constant price for logs. And the third looks at what the results would be in a world where log prices decline. Each scenario is then considered in light of the three forest management approaches noted above.

The first scenario – higher log prices – would prevail in a situation where generally robust timber demand was constrained by supply, thus pushing prices up. The second scenario assumes that prices will be stable (adjusted for inflation) because demand and supply are, with minor variations, relatively in synch. The third scenario – lower future prices – could occur for at least two reasons. First, the general quality of wood fibre declines. This is known to occur as wood products derived from old-growth trees diminish in terms of the total supply, because old-growth trees have physical characteristics (tight wood grains, fewer knots) that trees from second-growth forests or tree plantations lack. Second, as more wood fibre becomes available due to the growth in tree plantations worldwide, supply may exceed demand.

By looking at three different future price regimes, the study’s authors cover off some of the most important eventualities.

In each of the three different scenarios presented in the following summary table, a discount rate¹ of 4 per cent is used as is a future price for carbon of \$75 per metric ton. There is good reason to believe, however, that the \$75-per-tonne figure underestimates the real value of carbon. For example, the widely-publicized Stern Review on the Economics of Climate Change (Cambridge University Press 2006) estimates that the social cost of carbon should be about \$350 a metric ton, nearly five times greater than the figure used by Knowler and Dust. In this regard, it is also important to remember that British Columbia is one of an emerging number of jurisdictions that is intent upon establishing a market for carbon. Under such a market, high greenhouse gas emitters would purchase “carbon credits” from lower greenhouse gas emitters as part of a cap and trade system. It is expected that under such a system demand for credits from major greenhouse gas emitters such as the coal and cement industries would rise. If carbon markets become firmly established, then, it is possible that carbon prices could rise dramatically. Nevertheless, even with the much lower figure used by the SFU researchers, increased forest conservation proves to be more economically attractive than timber harvesting and limited conservation.

Because old-growth trees have physical characteristics (tight wood grains, fewer knots) that trees from second-growth forests or tree plantations lack, wood products derived from old-growth trees diminish in terms of the total supply.



Under the three future price scenarios, then, what are the net forest values when one considers the economic implications of increased forest conservation in spotted owl habitat in the Fraser Timber Supply Area?

To arrive at the numbers in this short summary table and in the more detailed table that is presented at the end of this overview, Knowler and Dust compared the value that forests have as “managed stands”, where trees are logged, to their value as protected habitat, where logging does not occur in order to conserve forest for the spotted owl.

Once economic values were arrived at for each of the major items studied and under the three future log price scenarios, three very distinct forest management approaches were considered. The first approach was essentially the status quo. The status quo approach is rooted in the 1997 provincial Spotted Owl Management Plan. Under that plan, some spotted owl habitat is preserved within zones in the forest known as “long term activity centres” or LTACs. Within each LTAC, logging is permitted so long as two thirds (67 per cent) of the productive forest within the unit contains trees that are at least 100 years old. This plan does, then, have a level of conservation. But the areas conserved may shift over time. In the 10-plus years since the Spotted Owl Management Plan was adopted, the number of the owls has continued to fall, bringing them closer to extirpation.

The status quo approach is rooted in the 1997 provincial Spotted Owl Management Plan. Under that plan, some spotted owl habitat is preserved within zones in the forest known as “long term activity centres” or LTACs.

The other two scenarios increase conservation. In the first increased conservation scenario, 100 per cent of forest stands that currently meet the minimum requirements for suitable owl habitat are preserved or removed from the timber harvesting land base. In the second, “packed territories” are identified. These areas of land include both areas of forest that are currently suitable habitat for spotted owls and adjacent forest areas that have been logged and will, if left alone, become suitable owl habitat one day. The idea behind this conservation approach is to protect contiguous areas of owl habitat.

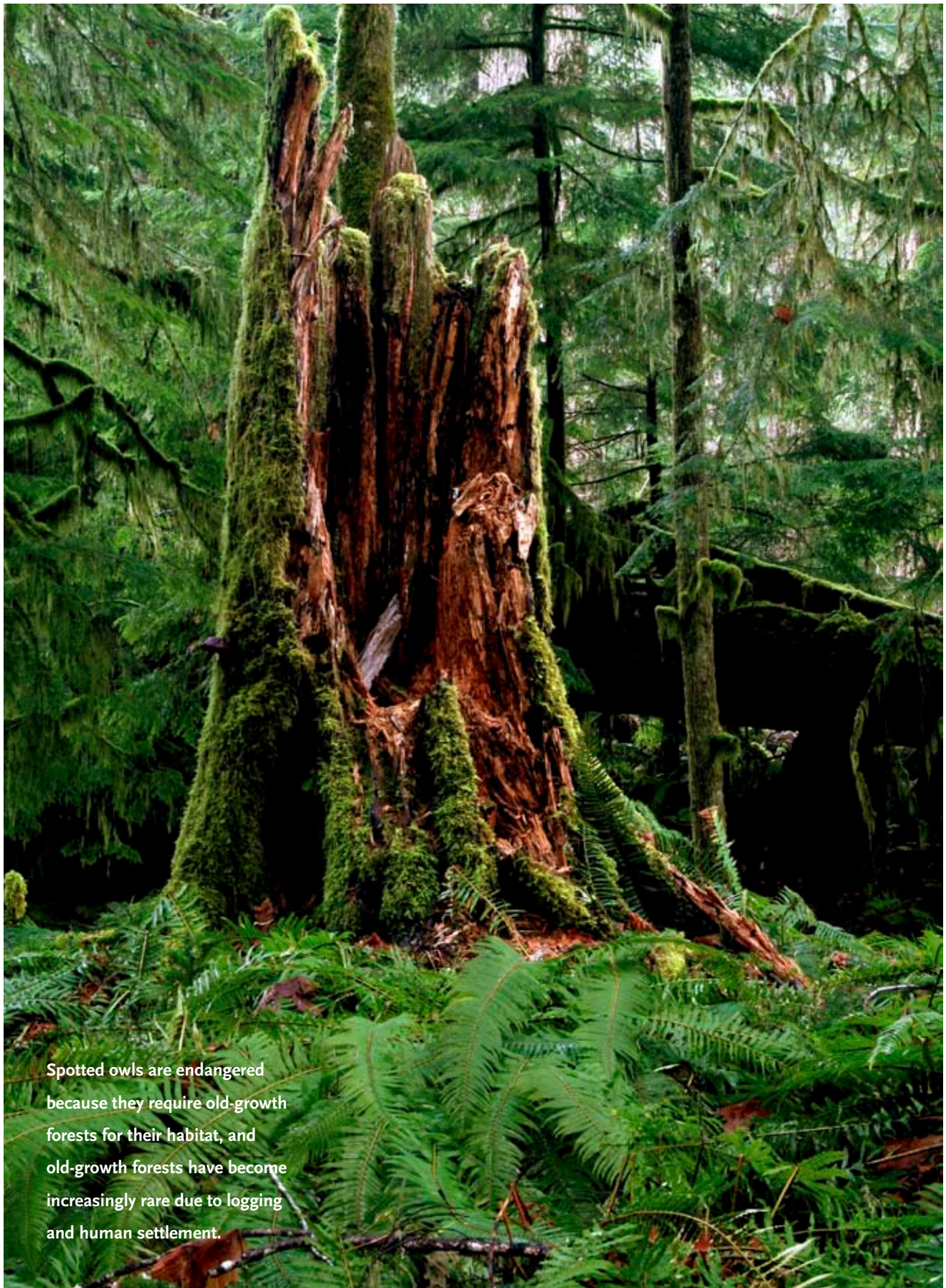
Table 1: Net Forest Values: Timber, Recreation, Non-Timber Forest Products, and Carbon

Future log price	Discount rate	Carbon price (tonne)	Status quo (timber, limited conservation)	All suitable habitat (increased conservation)	Packed territories (even higher conservation)
Rising	4%	\$75	\$1.76 billion	\$1.82 billion	\$1.83 billion
Constant	4%	\$75	\$1.64 billion	\$1.74 billion	\$1.75 billion
Falling	4%	\$75	\$1.51 billion	\$1.66 billion	\$1.67 billion

Source: The Economics of Protecting Old-Growth Forest: An Analysis of Spotted owl Habitat in the Fraser Timber Supply Area of British Columbia. Knowler and Dust 2007.

Table 2: Annual Logging Rates in Spotted Owl Forests Under Three Scenarios

Status quo (some conservation)	All suitable habitat (increased conservation)	Packed territories (even higher conservation)
1.43 million m ³	961,700 m ³ to 1.07 million m ³	Constant 961,700 m ³



Spotted owls are endangered because they require old-growth forests for their habitat, and old-growth forests have become increasingly rare due to logging and human settlement.

Even when the lost “economic opportunity” associated with that foregone log harvest is considered, the SFU research team found that in nine out of ten cases it made more economic sense to conserve more forest rather than log it.



Under the status quo, the current allowable log harvest is 1.43 million cubic metres per year. A cubic metre is roughly equivalent to one telephone pole’s worth of wood. In the first increased conservation scenario, the allowable annual logging rate begins at 961,700 cubic metres and, after six decades, increases to 1.07 million cubic metres. Under the most conservation-intensive, third option the allowable annual logging rate remains constant at 961,700 cubic metres.

To reach an annual logging level of 961,700 cubic metres from the present rate of 1.43 million cubic metres necessitates a 33 per cent drop in logging rates. Yet even when the lost “economic opportunity” associated with that foregone log harvest is considered, the SFU research team found that in nine out of ten cases it made more economic sense to conserve more forest rather than log it.

To conclude, this summary presents a detailed table from the Knowler/Dust study showing all 81 economic scenarios considered by Simon Fraser University team. The table includes findings based on discount rates of 1, 4 and 7 per cent and carbon prices of \$20, \$75 and \$120 per tone. Of note, even in the rare cases where the status quo delivers higher net forest values than does the other two conservation scenarios, the status quo never seriously outpaces the net forest values in the other two more conservation-oriented forest management approaches and this only occurs for very optimistic assumptions about the price of raw logs and pessimistic assumptions about the value of carbon. Furthermore, given that the analysis excludes some important conservation values, such as ecosystem services, timber production might no longer appear favourable if these omitted values were included.

Endnote

- 1 Discounting is used in the treatment of cash flows that occur over a multi-year period since individuals view more distant benefits and costs differently than more immediate ones. When benefits and costs extend over more than one time period, economists use a discount rate to weight benefits and costs occurring in different time periods. Since we prefer having a sum of money in the present to waiting until a later time period for it, we place a greater emphasis (weight) on current values than on ones in distant periods. Weighting a series of benefits or costs using this discount rate and summing these values yields a present value.

Results at a Glance

Table 3: Value of Forests for Timber, Recreation, Non-timber Forest Products and Carbon Under Various Market Conditions and Conservation Scenarios				
<i>Note: Shaded areas represent higher economic values than those of status quo logging</i>				
Carbon price	Discount rate	Status quo conservation	Increased conservation	Maximum conservation
WITH RISING LOG PRICES (IN MILLIONS OF DOLLARS)				
\$20 per tonne	1%	\$4,171.5	\$4,004.1	\$4,026.8
	4%	\$1,613.6	\$1,575.2	\$1,563.6
	7%	\$934.3	\$928.9	\$909.6
\$75 per tonne	1%	\$4,507.5	\$4,546.0	\$4,610.1
	4%	\$1,760.9	\$1,826.3	\$1,831.3
	7%	\$1,028.0	\$1,090.7	\$1,080.2
\$150 per tonne	1%	\$4,965.7	\$5,248.9	\$5,405.5
	4%	\$1,961.7	\$2,168.8	\$2,196.3
	7%	\$1,155.9	\$1,311.3	\$1,312.9
WITH CONSTANT LOG PRICES (IN MILLIONS OF DOLLARS)				
\$20 per tonne	1%	\$3,664.6	\$3,663.2	\$3,710.5
	4%	\$1,493.3	\$1,496.7	\$1,487.7
	7%	\$888.2	\$899.3	\$880.5
\$75 per tonne	1%	\$4,000.6	\$4,205.1	\$4,293.8
	4%	\$1,640.6	\$1,747.8	\$1,755.4
	7%	\$982.0	\$1,061.1	\$1,051.1
\$150 per tonne	1%	\$4,458.8	\$4,944.0	\$5,089.2
	4%	\$1,841.4	\$2,090.3	\$2,120.5
	7%	\$1,109.8	\$1,281.7	\$1,283.8
WITH FALLING LOG PRICES (IN MILLIONS OF DOLLARS)				
\$20 per tonne	1%	\$3,127.8	\$3,294.5	\$3,361.1
	4%	\$1,364.2	\$1,410.6	\$1,403.4
	7%	\$838.3	\$866.2	\$847.8
\$75 per tonne	1%	\$3,463.8	\$3,836.3	\$3,944.4
	4%	\$1,511.5	\$1,661.7	\$1,671.1
	7%	\$932.0	\$1,028.0	\$1,018.4
\$150 per tonne	1%	\$3,921.9	\$4,575.3	\$4,739.8
	4%	\$1,712.3	\$2,004.2	\$2,036.1
	7%	\$1,059.8	\$1,248.6	\$1,251.1

Spotted Owl Habitat Species: Status and Threats

Genus and Species	Common Name	B.C. Ranking ¹	COSEWIC Ranking ²	Listed Under SARA ³	Threats ⁴
AMPHIBIANS					
<i>Ambystoma gracile</i>	Northwestern Salamander	Yellow	Not at risk	No	Other
<i>Ascaphus truei</i>	Coastal Tailed Frog	Blue	Special concern	Yes	Timber harvesting; Indirect effects of timber harvesting
<i>Dicamptodon tenebrosus</i>	Coastal Giant Salamander	Red	Threatened	Yes	Timber harvesting; Indirect effects of timber harvesting
<i>Taricha granulosa</i>	Rough-skinned Newt	Yellow	Not assessed	No	Timber harvesting
RAY-FINNED FISHES					
<i>Cottus aleuticus</i>	Coast range Sculpin	Yellow	Not assessed	No	
<i>Cottus confusus</i>	Shorthead Sculpin	Blue	Threatened	Yes	Mining, oil and gas
<i>Cottus rhotheus</i>	Torrent Sculpin	Yellow	Not assessed	No	
<i>Cottus sp. (Cultus Lake)</i>	Cultus Pygmy Sculpin	Red	Threatened	Yes	Restricted distribution
<i>Hybognathus hankinsoni</i>	Brassy Minnow	Yellow	Not assessed	No	
<i>Oncorhynchus clarki clarki</i>	Cutthroat Trout, <i>clarkii</i> subspecies	Blue	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting; Other
<i>Oncorhynchus gorbuscha</i>	Pink Salmon	Yellow	Not assessed	No	
<i>Oncorhynchus keta</i>	Chum Salmon	Yellow	Not assessed	No	Timber harvesting; Agriculture; Urbanization; Other
<i>Oncorhynchus kisutch</i>	Coho Salmon	Yellow	Endangered	No	Timber harvesting; Indirect effects of timber harvesting; Agriculture; Livestock grazing; Urbanization; Other
<i>Oncorhynchus nerka (Cultus Lake)</i>	Sockeye Salmon	Yellow	Endangered	No	Timber harvesting; Other
<i>Oncorhynchus tshawytscha</i>	Chinook Salmon	Yellow	Threatened	No	Timber harvesting; Mining, oil and gas; Alien species introduction; Other
<i>Prosopium williamsoni</i>	Mountain Whitefish	Yellow	Not assessed	No	
<i>Rhinichthys cataractae</i>	Longnose Dace	Yellow	Not assessed	No	Alien species introduction; Other
<i>Salvelinus malma</i>	Dolly Varden	Blue	Not assessed	No	Unknown
<i>Spirinchus sp.</i>	Pygmy Longfin Smelt	Red	Data deficient	No	Restricted distribution
LAMPREYS					
<i>Lampetra tridentata</i>	Pacific Lamprey	Yellow	Not assessed	No	Other
MAMMALS					
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	Blue	Not assessed	No	Mining, oil and gas; Human disturbance; Other
<i>Eptesicus fuscus</i>	Big Brown Bat	Yellow	Not assessed	No	
<i>Glaucomys sabrinus</i>	Northern Flying Squirrel	Yellow	Not assessed	No	
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Yellow	Not assessed	No	
<i>Lasiurus cinereus</i>	Hoary Bat	Yellow	Not assessed	No	
<i>Martes americana</i>	Marten	Yellow	Not assessed	No	Timber harvesting
<i>Martes pennanti</i>	Fisher	Blue	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting
<i>Myotis californicus</i>	California Myotis	Yellow	Not assessed	No	
<i>Myotis evotis</i>	Western Long-eared Myotis	Yellow	Not assessed	No	Human disturbance

Genus and Species	Common Name	B.C. Ranking ¹	COSEWIC Ranking ²	Listed Under SARA ³	Threats ⁴
<i>Myotis keenii</i>	Keen's Long-eared Myotis	Unknown	Data deficient	No	Timber harvesting; Indirect effects of timber harvesting; Agriculture; Other
<i>Myotis lucifugus</i>	Little Brown Myotis	Yellow	Not assessed	No	Human disturbance
<i>Myotis thysanodes</i>	Fringed Myotis	Blue	Data deficient	No	Timber harvesting; Livestock grazing; Human disturbance; Other
<i>Myotis yumanensis</i>	Yuma Myotis	Yellow	Not assessed	No	Human disturbance
<i>Neurotrichus gibbsii</i>	Shrew-mole	Yellow	Not assessed	No	
<i>Peromyscus maniculatus</i>	Deer Mouse	Yellow	Not assessed	No	
<i>Tamias townsendii</i>	Townsend's Chipmunk	Yellow	Not assessed	No	Indirect effects of timber harvesting
<i>Tamiasciurus douglasii</i>	Douglas' Squirrel	Yellow	Not assessed	No	
BIRDS					
<i>Accipiter gentilis laingi</i>	Northern Goshawk, <i>laingi</i> subspecies	Red	Threatened	Yes	Timber harvesting
<i>Aix sponsa</i>	Wood Duck	Yellow	Not assessed	No	Intentional and accidental mortality; Other
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	Red	Threatened	Yes	Timber harvesting; Indirect effects of timber harvesting; Environmental contamination; Intentional and accidental mortality; Other
<i>Bucephala albeola</i>	Bufflehead	Yellow	Not assessed	No	
<i>Bucephala islandica</i>	Barrow's Goldeneye	Yellow	Not assessed	No	
<i>Catharus guttatus</i>	Hermit Thrush	Yellow	Not assessed	No	Indirect effects of timber harvesting
<i>Certhia americana</i>	Brown Creeper	Yellow	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting
<i>Chaetura vauxi</i>	Vaux's Swift	Yellow	Not assessed	No	Timber harvesting
<i>Colaptes auratus</i>	Northern Flicker	Yellow	Not assessed	No	Unknown
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Yellow	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting; Other
<i>Empidonax difficilis</i>	Pacific-slope Flycatcher	Yellow	Not assessed	No	
<i>Empidonax hammondi</i>	Hammond's Flycatcher	Yellow	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting; Other
<i>Empidonax occidentalis</i>	Cordilleran Flycatcher	Unknown	Not assessed	No	Timber harvesting; Livestock grazing
<i>Glaucidium gnoma</i>	Northern Pygmy-Owl	Yellow	Not assessed	No	Timber harvesting
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Yellow	Not at risk	No	Intentional and accidental mortality; Other
<i>Histrionicus histrionicus</i> (western)	Harlequin Duck	Yellow	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting; Mining, oil and gas Environmental contamination
<i>Ixoreus naevius</i>	Varied Thrush	Yellow	Not assessed	No	
<i>Lophodytes cucullatus</i>	Hooded Merganser	Yellow	Not assessed	No	Timber harvesting
<i>Loxia curvirostra</i>	Red Crossbill	Yellow	Not assessed	No	
<i>Mergus merganser</i>	Common Merganser	Yellow	Not assessed	No	
<i>Otus flammeolus</i>	Flammulated Owl	Blue	Special concern	Yes	Timber harvesting; Indirect effects of timber harvesting; Other
<i>Otus kennicottii kennicottii</i>	Coastal Western Screech-Owl	Blue	Special concern	Yes	Timber harvesting; Agriculture
<i>Picoides tridactylus</i>	American Three-toed Woodpecker	Yellow	Not assessed	No	Timber harvesting Disruption of fire regimes
<i>Picoides villosus</i>	Hairy Woodpecker	Yellow	Not assessed	No	
<i>Poecile rufescens</i>	Chestnut-backed Chickadee	Yellow	Not assessed	No	
<i>Regulus satrapa</i>	Golden-crowned Kinglet	Yellow	Not assessed	No	Timber harvesting

Genus and Species	Common Name	B.C. Ranking ¹	COSEWIC Ranking ²	Listed Under SARA ³	Threats ⁴
<i>Sitta canadensis</i>	Red-breasted Nuthatch	Yellow	Not assessed	No	
<i>Sphyrapicus ruber</i>	Red-breasted Sapsucker	Yellow	Not assessed	No	
<i>Sphyrapicus thyroideus thyroideus</i>	Williamson's Sapsucker, thyroideus subspecies	Red	Endangered	Yes	
<i>Strix nebulosa</i>	Great Gray Owl	Yellow	Not at risk	No	
<i>Strix occidentalis caurina</i>	Spotted Owl	Red	Endangered	Yes	Timber harvesting; Other
<i>Strix varia</i>	Barred Owl	Yellow	Not assessed	No	
<i>Troglodytes troglodytes</i>	Winter Wren	Yellow	Not assessed	No	
<i>Vireo gilvus</i>	Warbling Vireo	Yellow	Not assessed	No	
<i>Wilsonia pusilla</i>	Wilson's Warbler	Yellow	Not assessed	No	
VASCULAR PLANTS					
<i>Achlys triphylla</i>	Vanilla-leaf	Yellow	Not assessed	No	
<i>Adenocaulon bicolor</i>	Pathfinder	Yellow	Not assessed	No	
<i>Adiantum aleuticum</i>	northern maiden-hair	Yellow	Not assessed	No	
<i>Allotropa virgata</i>	Candystick	Yellow	Not assessed	No	Timber harvesting
<i>Arnica latifolia</i>	Mountain arnica	Yellow	Not assessed	No	
<i>Asarum caudatum</i>	Wild ginger	Yellow	Not assessed	No	Timber harvesting
<i>Boschniakia hookeri</i>	Vancouver groundcone	Yellow	Not assessed	No	
<i>Chamaecyparis nootkatensis</i>	yellow-cedar	Yellow	Not assessed	No	
<i>Chimaphila menziesii</i>	Menzies' pipsissewa	Yellow	Not assessed	No	
<i>Chimaphila umbellata</i>	prince's pine	Yellow	Not assessed	No	Timber harvesting; Other
<i>Clintonia uniflora</i>	queen's cup	Yellow	Not assessed	No	
<i>Coptis asplenifolia</i>	spleenwort-leaved goldthread	Yellow	Not assessed	No	Timber harvesting
<i>Corallorhiza maculata</i>	spotted coralroot	Yellow	Not assessed	No	Indirect effects of timber harvesting; Other
<i>Corallorhiza mertensiana</i>	western coralroot	Yellow	Not assessed	No	
<i>Cypripedium montanum</i>	mountain lady's-slipper	Yellow	Not assessed	No	Timber harvesting; Indirect effects of timber harvesting Disruption of fire regimes; Other
<i>Dryopteris expansa</i>	spiny wood fern	Yellow	Not assessed	No	
<i>Erythronium montanum</i>	white glacier lily	Blue	Not assessed	No	Unknown
<i>Gaultheria humifusa</i>	alpine-wintergreen	Yellow	Not assessed	No	
<i>Gaultheria ovatifolia</i>	western tea-berry	Yellow	Not assessed	No	
<i>Goodyera oblongifolia</i>	rattlesnake-plantain	Yellow	Not assessed	No	
<i>Gymnocarpium dryopteris</i>	oak fern	Yellow	Not assessed	No	
<i>Hemitomes congestum</i>	gnome-plant	Yellow	Not assessed	No	Timber harvesting
<i>Hieracium scouleri</i>	western hawkweed,	Yellow	Not assessed	No	
<i>Listera borealis</i>	northern twayblade	Yellow	Not assessed	No	
<i>Listera caurina</i>	northwestern twayblade	Yellow	Not assessed	No	
<i>Listera convallarioides</i>	broad-leaved twayblade	Yellow	Not assessed	No	
<i>Listera cordata</i>	heart-leaved twayblade	Yellow	Not assessed	No	Timber harvesting
<i>Luzula glabrata hitchcockii</i>		Yellow	Not assessed	No	
<i>Lysichiton americanus</i>	skunk cabbage	Yellow	Not assessed	No	
<i>Maianthemum racemosum</i>	false Solomon's-seal	Yellow	Not assessed	No	
<i>Maianthemum stellatum</i>	star-flowered false Solomon's-seal	Yellow	Not assessed	No	
<i>Melica subulata</i>	Alaska oniongrass	Yellow	Not assessed	No	
<i>Menziesia ferruginea</i>	false azalea	Yellow	Not assessed	No	

Genus and Species	Common Name	B.C. Ranking ¹	COSEWIC Ranking ²	Listed Under SARA ³	Threats ⁴
<i>Moneses uniflora</i>	single delight	Yellow	Not assessed	No	
<i>Monotropa hypopythis</i>	piresap	Yellow	Not assessed	No	
<i>Monotropa uniflora</i>	indian-pipe	Yellow	Not assessed	No	
<i>Orthilia secunda</i>	one-sided wintergreen	Yellow	Not assessed	No	
<i>Oxalis oregana</i>	redwood sorrel	Blue	Not assessed	No	Unknown
<i>Piperia unalascensis</i>	Alaska rein orchid	Yellow	Not assessed	No	
<i>Platanthera obtusata</i>	one-leaved rein orchid	Yellow	Not assessed	No	
<i>Platanthera orbiculata</i>	large round-leaved rein orchid	Yellow	Not assessed	No	
<i>Platanthera stricta</i>	slender rein orchid	Yellow	Not assessed	No	
<i>Polystichum imbricans</i>	narrow-leaved sword fern	Yellow	Not assessed	No	
<i>Prosartes hookeri oregana</i>	Hooker's fairybells	Yellow	Not assessed	No	
<i>Pterospora andromedea</i>	pinedrops	Yellow	Not assessed	No	Other
<i>Pyrola asarifolia</i>	pink wintergreen	Yellow	Not assessed	No	
<i>Pyrola chlorantha</i>	green wintergreen	Yellow	Not assessed	No	
<i>Pyrola picta</i>	white-veined wintergreen	Yellow	Not assessed	No	
<i>Rubus lasiococcus</i>	dwarf bramble	Blue	Not assessed	No	Unknown
<i>Rubus nivalis</i>	snow bramble	Red	Not assessed	No	Unknown
<i>Rubus pedatus</i>	five-leaved bramble	Yellow	Not assessed	No	
<i>Selaginella oregana</i>	Oregon selaginella	Red	Not assessed	No	Unknown
<i>Streptopus amplexifolius</i>	clasping twistedstalk	Yellow	Not assessed	No	
<i>Streptopus roseus</i>		Yellow	Not assessed	No	
<i>Streptopus streptopoides</i>	small twistedstalk	Yellow	Not assessed	No	
<i>Taxus brevifolia</i>	western yew	Yellow	Not assessed	No	Timber harvesting
<i>Thuja plicata</i>	western redcedar	Yellow	Not assessed	No	
<i>Tiarella trifoliata</i>	three-leaved foamflower	Yellow	Not assessed	No	
<i>Tiarella unifoliata</i>	one-leaved foamflower	Yellow	Not assessed	No	
<i>Trillium ovatum</i>	western trillium	Yellow	Not assessed	No	
<i>Vaccinium alaskaense</i>	Alaskan blueberry	Yellow	Not assessed	No	
<i>Vaccinium membranaceum</i>	black huckleberry	Yellow	Not assessed	No	
<i>Vaccinium ovalifolium</i>	oval-leaved blueberry	Yellow	Not assessed	No	
<i>Vaccinium parvifolium</i>	red huckleberry	Yellow	Not assessed	No	
<i>Viola glabella</i>	stream violet	Yellow	Not assessed	No	
<i>Viola orbiculata</i>	round-leaved violet	Yellow	Not assessed	No	

Notes: This table shows the conservation status and threats to species associated with late-successional and old-growth forests within the range of the Northern Spotted Owl in Canada. Conservation status rankings are reported under the B.C. Conservation Data Center, the Committee on Status of Endangered Wildlife in Canada (COSEWIC), and the federal Species at Risk Act (SARA) and are reported as of July 28, 2008. Known threats to these species come from the scientific literature reviewed by NatureServe, available at www.natureserve.org. Table first published in Moola et al. 2006. Biodiversity.

¹ B.C. Ranking Definitions

Red: Includes any indigenous species or subspecies that have- or are candidates for- Extirpated, Endangered, or Threatened status in British Columbia.

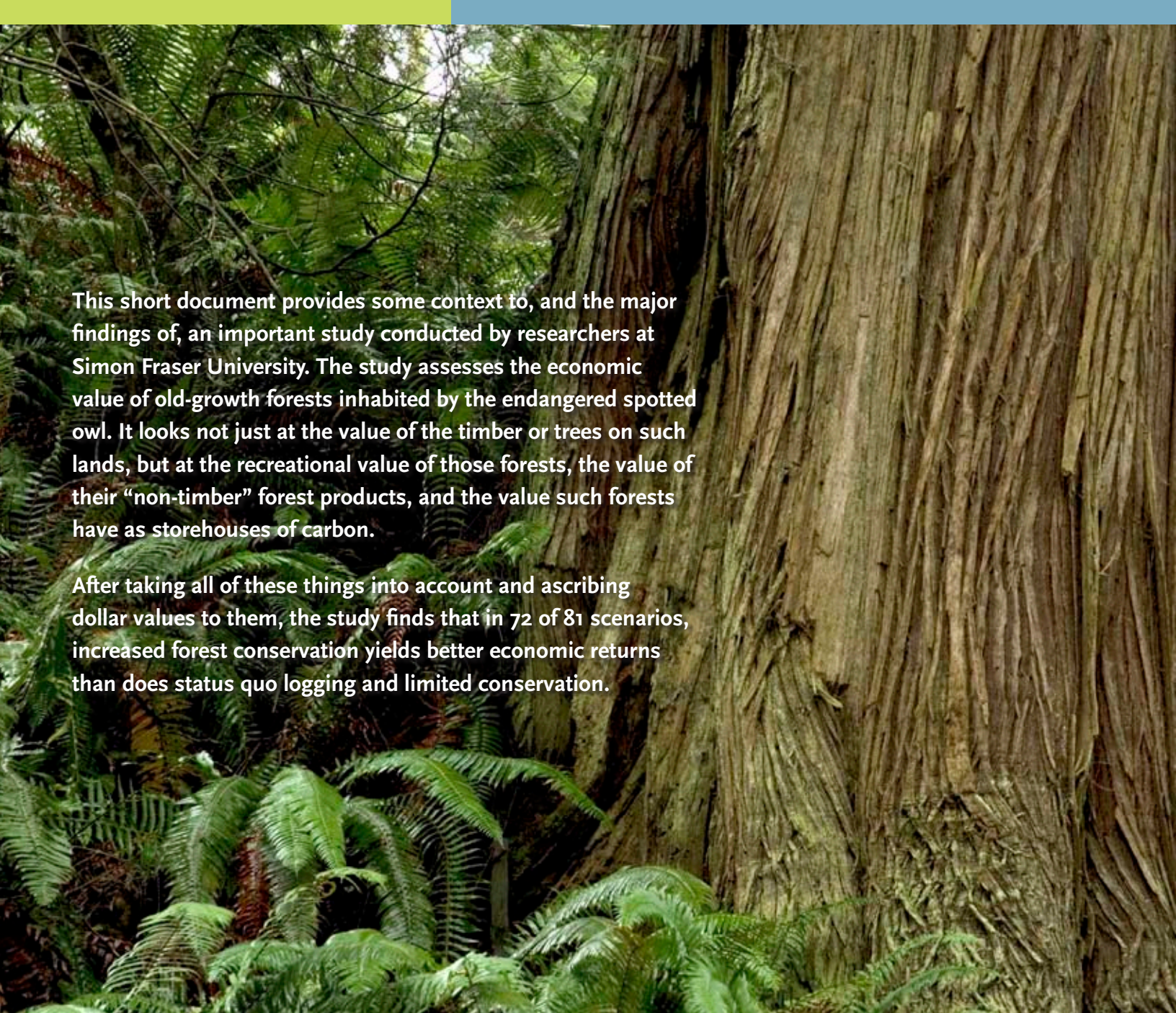
Blue: Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia.

Yellow: Includes species that are apparently secure and not at risk.

² COSEWIC (Committee on the Status of Endangered Wildlife in Canada) is a committee of experts that assesses and designates which species in Canada are at risk. Species that have been ranked by COSEWIC as "special concern, threatened, endangered, or extirpated" may then qualify for legal protection and recovery under the federal Species at Risk Act (SARA).

³ Schedule 1 of the federal Species at Risk Act (SARA) is the official legal list of wildlife species at risk in Canada. It classifies those species as being either extirpated, endangered, threatened, or a special concern. Once listed, a species receives legal protection and recovery measures under the Act.

⁴ Categories include: Timber harvesting; Indirect effects of timber harvesting; Agriculture; Disruption of fire regimes; Livestock grazing; Mining, oil and gas; Tourism; Urbanization; Alien species introduction; Restricted distribution; Environmental contamination; Human disturbance; Intentional and accidental mortality; Other; Unknown



This short document provides some context to, and the major findings of, an important study conducted by researchers at Simon Fraser University. The study assesses the economic value of old-growth forests inhabited by the endangered spotted owl. It looks not just at the value of the timber or trees on such lands, but at the recreational value of those forests, the value of their “non-timber” forest products, and the value such forests have as storehouses of carbon.

After taking all of these things into account and ascribing dollar values to them, the study finds that in 72 of 81 scenarios, increased forest conservation yields better economic returns than does status quo logging and limited conservation.



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Since 1990, the David Suzuki Foundation has worked to find ways for society to live in balance with the natural world that sustains us. Focusing on four program areas – oceans and sustainable fishing, climate change and clean energy, sustainability, and the Nature Challenge – the Foundation uses science and education to promote solutions that conserve nature and help achieve sustainability within a generation.

ecojustice

Ecojustice, formerly Sierra Legal Defence Fund, is Canada’s leading non-profit organization of lawyers and scientists devoted to protecting the environment. Since 1990, we have helped hundreds of groups, coalitions and communities expose law-breakers, hold governments accountable and establish powerful legal precedents in defence of our air, water, wildlife and natural spaces.



WESTERN CANADA
WILDERNESS
COMMITTEE

Founded in 1980, the Wilderness Committee is Canada’s largest membership-based wilderness preservation group with over 30,000 members, and 40,000 additional donors and volunteers. We’ve helped to gain protection for over 40 major wilderness areas in Western Canada, including millions of hectares of critical wildlife habitats and some of the world’s last large tracts of old-growth temperate rainforest and boreal forest.

