

Submission on Old Growth Forests by Bernhard H.J. Juurlink, Mill Bay, BC

Preamble

Note there may be considerable overlap between this document and the Koksilah Watershed Group document since I have had a hand in preparing both. I thank Cliff Stainsby for reading over the document and making suggestions on how to improve it.

BC Forestry is in decline. The reason for this is the current forestry practices (see Bob Williams. 2018. Restoring Forestry in BC: The story of the industry's decline and the case for regional management. 36 pp. *Canadian Centre for Policy Alternatives*). Just on an economic basis something needs to change in our forestry practices. **But there is an even more important reason to change forestry practices:** the world is in a crisis with the rapid increase in atmospheric greenhouse gasses resulting in unwanted climate change and an unprecedented decrease in biodiversity since human history started to be recorded. Furthermore, our watersheds are suffering. In the Cowichan Valley there is a crisis in the Cowichan River and Koksilah River watersheds and a number of aquifers such as Aquifer 206 in the Mill Bay region are in serious replenishment deficits. Saving our old growth forests and promoting the maturation into old growth of a large fraction of our forest can counter many of these negative ecological changes.

Important Roles That Mature Forests Play In The Health Of Our Planet

Forests and the Carbon Cycle: Mature forests sequester large amounts of carbon dioxide. Historically, forests sequester a large fraction of the carbon dioxide released into the atmosphere. Clearcutting converts forests from major sequesters of carbon dioxide to net producers of carbon dioxide. Today clearcutting of forests in BC results in the release of 42 million tonnes of carbon dioxide annually and at the same time reduces the ability of the forests to sequester carbon dioxide by 26.5 million tonnes per year; that is, a climate change impact greater than all of BC's official greenhouse gas production (Clearcut Carbon. December 2019, *Sierra Club Report*). And as can be seen below, healthy forests result in healthy streams and wetlands and such wetlands sequester even more carbon dioxide per unit area than mature forests.

Conclusion: Retention and increase in area of mature forests is essential for BC's Climate Strategy.

Forests and the Health of Anadromous Fish Habitats: Mature forests on mountain tops retain snow longer than clearcutted mountain tops: snow in forests melts slowly as the weather warms resulting in cool water entering the streams that feed the river. Forest floors with fallen trees hold water that is slowly released once the winter rains stop, thereby supplying trees (i.e., the forest) with water in the summer, replenishing aquifers and feeding streams. One study has shown that downed trees on the forest floor hold 25 times the amount of moisture as the same volume of forest soil (B. Marcot. 2017. Ecosystem processes related to wood decay. *USDA Research Note*. PNW-RN- 576. 44 pp.) The importance of a mature forest for the watershed is shown by the fact that a Douglas fir forest that is 40 years old has a 50% lower stream flow in summer than forests that are 150 to 500 years old (T.D. Perry & J.A. Jones. 2017. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. *Ecohydrology*, **10(2)**: e1790). The reason for this is that there is a lessor ability to hold water by the forest floor of young forests.

A 45-year study of the effects of clearcutting at Carnation Creek near Bamfield clearly shows the negative effects of clearcutting and emphasises the need for more mature forests for the health of

our salmon populations (P.J. Tschaplinski & R.G. Pike. 2017. Carnation Creek watershed experiment – long-term responses of coho salmon populations to historic forest practices. *Ecohydrology* **10(2)**: e1812). Clearcutting effects include rises in summer stream water temperature (4° C) and rises in ambient summer air temperature (3.2° C). Incidentally, worldwide deforestation also has a global impact on ambient surface temperature (J.A. Prevedello *et al.* 2019 Impacts of forestation and deforestation on local temperature across the globe. *PLOS One* **14(3)**: e0213368).

The Tschaplinski & Pike study has revealed that over the years after clearcutting, the salmon habitat declined due to less stable streambed and loss of structural diversity and cover for the fish. Some of these negative changes took decades to occur such as streambank erosion and hill soil slides into creeks. Initially, likely due to increased stream temperature the winter survival of fry and yearlings that migrate as smolts to the sea increased markedly, however, 15 years after the clearcutting there was a progressive decline such that by 20 years following clearcutting only half of the number of smolts migrated to the sea compared to before logging started (Figure 1).

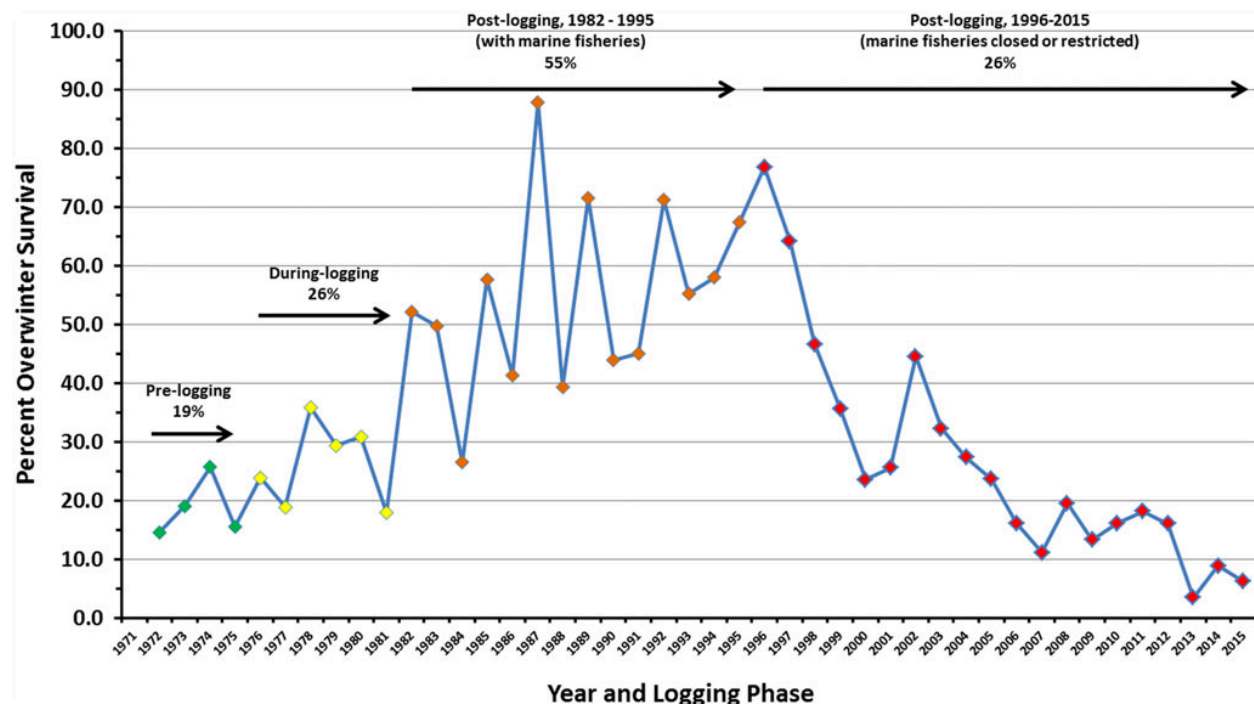


Figure 1. Percentage of juvenile coho salmon that survive the winter and migrate to the sea as smolts in the Tschaplinski & Pike study (2017. Carnation Creek watershed experiment – long-term responses of coho salmon populations to historic forest practices. *Ecohydrology* **10(2)**: e1812). This figure forms Figure 12 in their manuscript.

Conclusion: Mature forests are important for the health of fish populations, particularly anadromous fish such as salmon.

Forests and the Watersheds: Mature forests are important transient stores of the water from the winter rains. As noted above, Douglas fir forests that are 40 years old have 50% lower stream flow than forests that are 150-500 years old. This lower ability of clearcuts and young forests to transiently store water from the winter rains is dramatically seen in the Figure 2 which is taken from: R. Winkler *et al.* 2017. Streamflow response to clear-cut logging on British Columbia’s Okanagan Plateau. *Ecohydrology* **10(2)**: e1836. Clearcutting had little effect on total annual

streamflow water volume flow. What clearcutting does do is increase the creek waterflow during the rainy season and decreases water flow during the dry season. This effect is amplified by the amount of clearcutting. What this figure shows is the importance of the floors of mature forests in acting as a temporary water storage device.

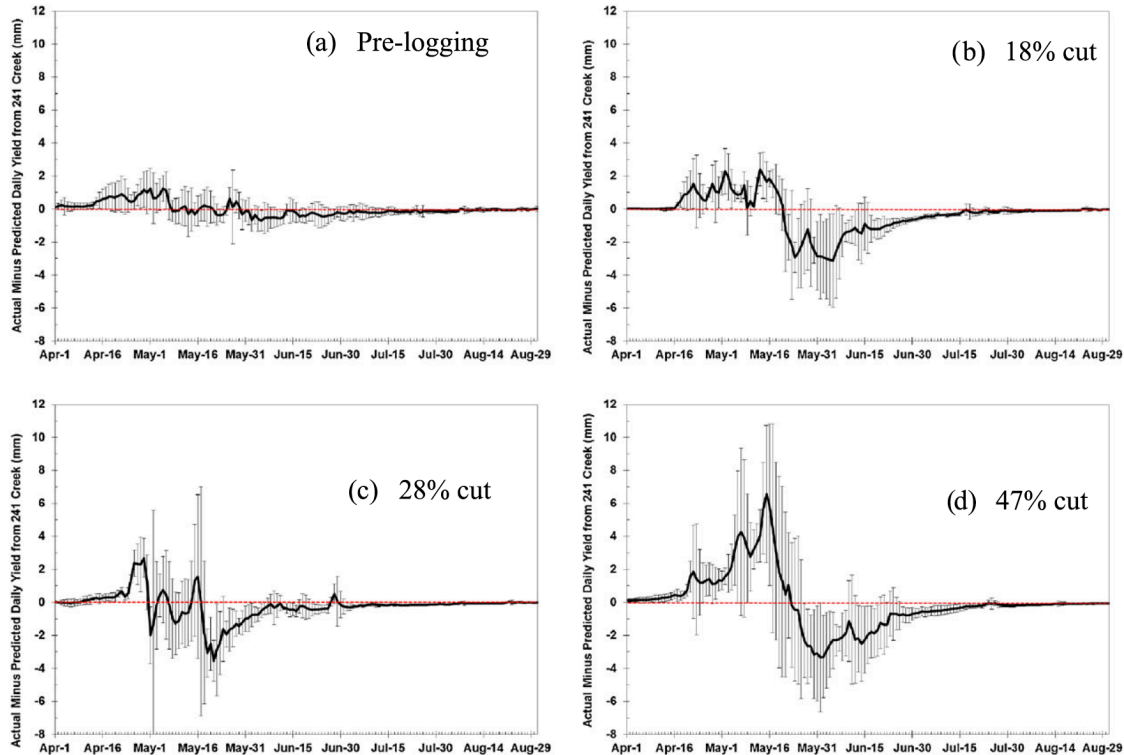


Figure 2: This is taken from Winkler *et al.* 2017 (Figure 7 of Winkler *et al.* 2017). It shows deviation of actual stream flow volume (solid black line) from predicted stream volume flow of an uncut forest (stippled red line) in the Creek 241 watershed before clearcutting and at times following different extents of clearcutting. Before clearcutting there is little difference between actual flow and predicted flow, but this changes with clearcutting. The start of the study is 1986 and the end is 2014.

Figure 2 educates us on what has happened in the Cowichan River and Koksilah River watersheds and our aquifers since the time of European settlement began. Increased deforestation, even with tree planting, results in more of the winter rains rapidly running into the ocean, thereby resulting in less of the water being transiently stored in the forest floor and less water replenishing the aquifers. In contrast, during the dry season there is less water available to enter our streams and rivers. The reason for this is that there no longer is prolonged retention of snow and the forest floors store less water, resulting in less water for streams and rivers. This creates a habitat crisis for fish and all other creatures that directly or indirectly rely upon the habitat of streams and rivers. This also results in less water available to replenish our aquifers. This past summer we saw that the Cowichan river had so little water flow that water needed to be pumped over the weir at Lake Cowichan and the use of water licences in the Koksilah watershed was temporarily suspended.

Conclusion: Mature forests are critical for the health of our streams, rivers, wetlands and aquifers.

Forests and Biodiversity: We are currently in a crisis with many species threatened with extinction (Figure 3).

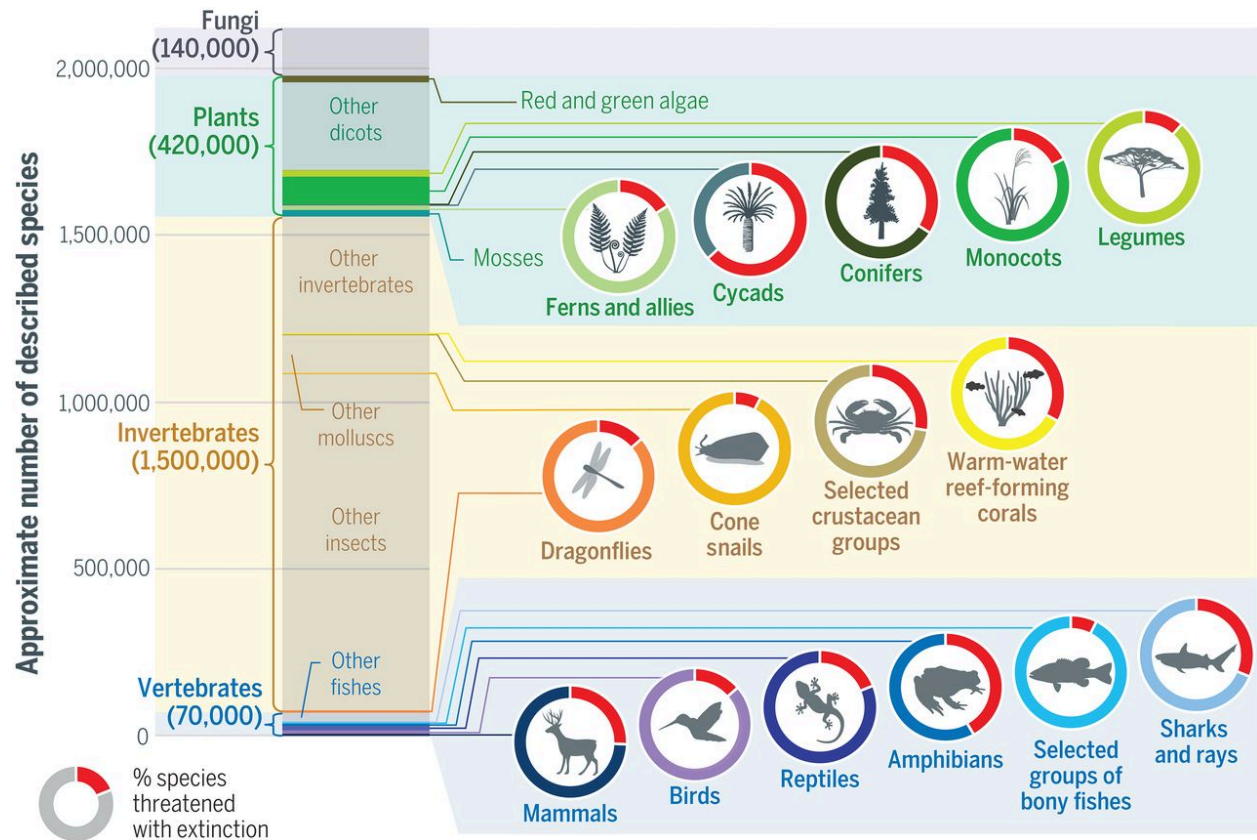


Figure 3. This figure is taken from S. Diaz *et al.* 2019. Pervasive human-driven decline of life on Earth points to the need for transformative change. *Science* **366(6471)**: eaax3100, 10pp). It illustrates the percentage of each group of living things are at risk of extinction (indicated by the red border).

Mature forests form habitats for many creatures. I will provide a few examples only. Snags, downed tree logs and stumps of mature forests provide a nursery for other trees, shrubs, herbs and ferns (Marcot. 2017, *vide supra*). Snags, partially dead trees, rotting limbs and hollows in trees provide food for many creatures as well as nesting sites for many birds, winter hibernation sites for bears, etc. (Marcot. 2017).

Clearcutting has been shown to result in reduced numbers of red squirrels, snowshoe hares and red-backed voles (Bull and Blumpton, 1999, in Marcot, 2017). Downed wood in intact forest provides habitat for plethodontid lizards (Aubry *et al.* 1988, in Marcot, 2017).

Forests provide habitat for a number of endangered species. For example, the endangered Roosevelt Elk are primarily dwellers of mature forests, avoiding open spaces but eating vegetation near forest edges such as riparian area, flood plains and meadows interspersed within the forest (K.T. Jenkins & E.E. Starkey. 1984. Habitat use by Roosevelt Elk in unmanaged forests of the Hoh Valley, Washington. *Journal of Wildlife Management* **48(2)**: 642-646; J.F. Quayle & K.R. Brunt. 2003. Status of Roosevelt Elk (*Cervus elaphus roosevelti*) in British Columbia. *Wildlife Bulletin No. B-106*, 39 pp. Province of BC). Clearcutting decreases habitat resulting in Roosevelt Elk becoming nuisances for farmers.

Additional species at risk that depend upon mature and/or old growth forests include: the Marbled Murrelet that requires the canopy of old growth forests for nesting; the red-legged frog that requires moist cool lower elevation forests; the Western Red-backed Lizard that requires mature and old growth forests for habitat. For more species at risk in BC see:

<https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/brochures>.

Mature forests also promote streams flowing during the dry season, an important factor for fish. Streams flowing in the dry periods are also important for maintaining our wetlands, including estuaries. Wetlands are the most efficient carbon sequestration ecosystems on the planet and its ecosystem is rich in biodiversity (P.A. Keddy et al. 2009. Wet and Wonderful: The World's largest wetlands are conservation priorities. *Bioscience* **59(1)**: 39-51; D. Were et al. 2019. Carbon sequestration by wetlands: A critical review of enhancement measures for climate change mitigation. *Earth Systems and Environment* **3(2)**: 327-340); hence, promoting wetlands combats climate change and promotes biodiversity.

Conclusion: Old growth and other mature forests provide habitat for many creatures, a considerable number that are now in danger of extinction. Old growth and mature forests also promote healthy streams and rivers as well as wetlands. All of these are important in maintaining and promoting biodiversity in BC as well as in carbon sequestration. Biodiversity is essential for maintaining healthy resilient life support systems for humanity. We conclude that it is important not only to save the few old growth forests that are left but also important to set aside a large fraction replanted forests to mature and eventually form old growth forests.

Concluding Remarks

We, the current people alive in BC, are only temporary tenants of the land. We must take the attitude that the land belongs to future generations, human as well as non-human.

We need legislation to change the law around fee simple. At the moment owning property in fee simple means one can do whatever one wishes with one's property subject to a few restrictions that may be imposed by local, provincial or federal governments. The land we occupy is a gift given to us, the living, by future unborn generations. It is time for the law to recognize that the land belongs not to us, the living, but to all future generations, human, non-human, animals and plants. Land use that affects the ecological health of any region needs careful scrutiny before being approved.

All remaining old growth forests must be set aside and not be harvested. Also, importantly, a large fraction (at least 30%) of forests, both private and Crown forests must be set aside and not be harvested in the future. This is necessary for promoting biodiversity as well as the health of our streams, rivers, wetlands and aquifers that in turn promotes biodiversity. We must change our forests from being net carbon dioxide emitters as they are now to their historical role of being carbon dioxide sequesters. Where forest harvesting is appropriate, both Crown and private, it needs to be done so that our biophysical support systems are healthy and climate disruption is minimized.