Factor 39 Carbon Sequestration

Description:

- Forest carbon is of emerging importance in forest management in British Columbia. The implementation of projects under the Forest Carbon Initiative (FCI) should be directly considered the management practice impacts on forest carbon.
- The carbon stocks in a given forest ecosystem are described by different carbon pools. The five terrestrial carbon pools defined by Intergovernmental Panel on Climate Change (IPCC) are aboveground biomass carbon (ABC), belowground biomass carbon (BBC), dead organic matter (DOM), forest floor litter (FFL), and soil organic carbon (SOC). The sum of all the fives pools referred as total ecosystem carbon (TEC).
- From the climate change perspective, regardless of what management strategies implemented on the ground, the goal is to reduce greenhouse gas (GHG) emissions to the atmosphere. The net ecosystem carbon balance (NECB) is used to describe the net change between the given ecosystem and atmosphere. If the atmosphere is used as base, a positive NECB means the atmosphere carbon pool is increasing, thus, the given ecosystem is losing carbon, namely, a carbon source ecosystem, while a negative NECB means the ecosystem is a carbon sink.
- In order to make different GHGs (e.g., carbon dioxide, methane) comparable in carbon accounting, carbon dioxide equivalent (CO_2e) is adopted, and the global warming potential (GWP) is used to convert each of greenhouse gases into CO_2e. The conversions in this analysis are: 1 CO=1 CO_2e; 1 CH_4=28 CO_2e; 1 N_2O = 298 CO_2e.
- The harvest wood product (HWP) calculator was used to account harvest wood product (https://www.for.gov.bc.ca/het/climate/carbon/). This tool calculates wood products - logs, lumber, plywood, panels, or paper. In addition to the emissions of carbon and other GHGs gases, the storage of carbon in different products also computed over time. An HWP of ~27.25% was used to account for the carbon remaining from wood products after 100 years.
- For the harvest flow of the Lakes TSA base case, a carbon analysis was completed. The following describes the carbon dynamics over the first 100 years of the base case.

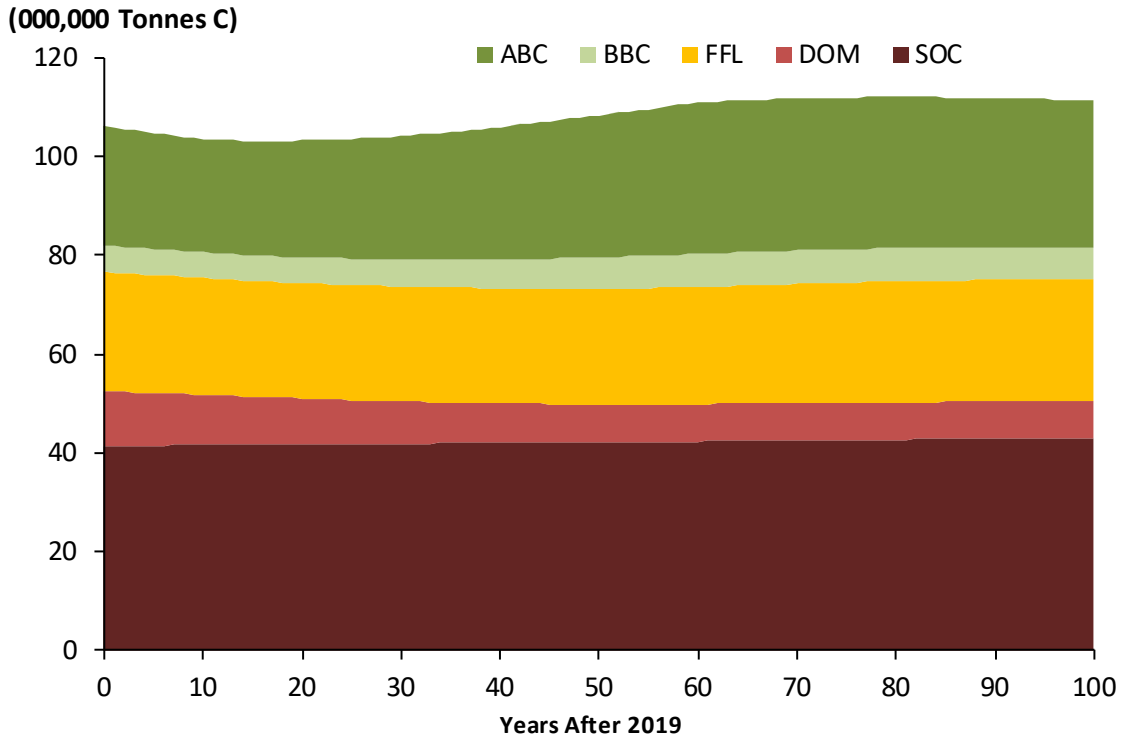

Figure 1: Forest carbon for the Lakes TSA base case (ABC: Aboveground Biomass Carbon, BBC: Belowground Biomass Carbon, FFL: Forest Floor Litter, DOM: Dead Organic Matter, SOC: Soil Organic Carbon).

- The aboveground biomass carbon (ABC), belowground biomass carbon (BBC), forest floor litter (FFL), dead organic matter (DOM), and soil organic carbon (SOC) pool are slightly increased during the first 100 years projection (Figure 43). Overall, the total ecosystem carbon (TEC) pool increased about 4.9% (43). While consider THLB and non-THLB separately, the TEC increased about 1.3% in THLB and 10.9% increase in nTHLB (Figure 44).

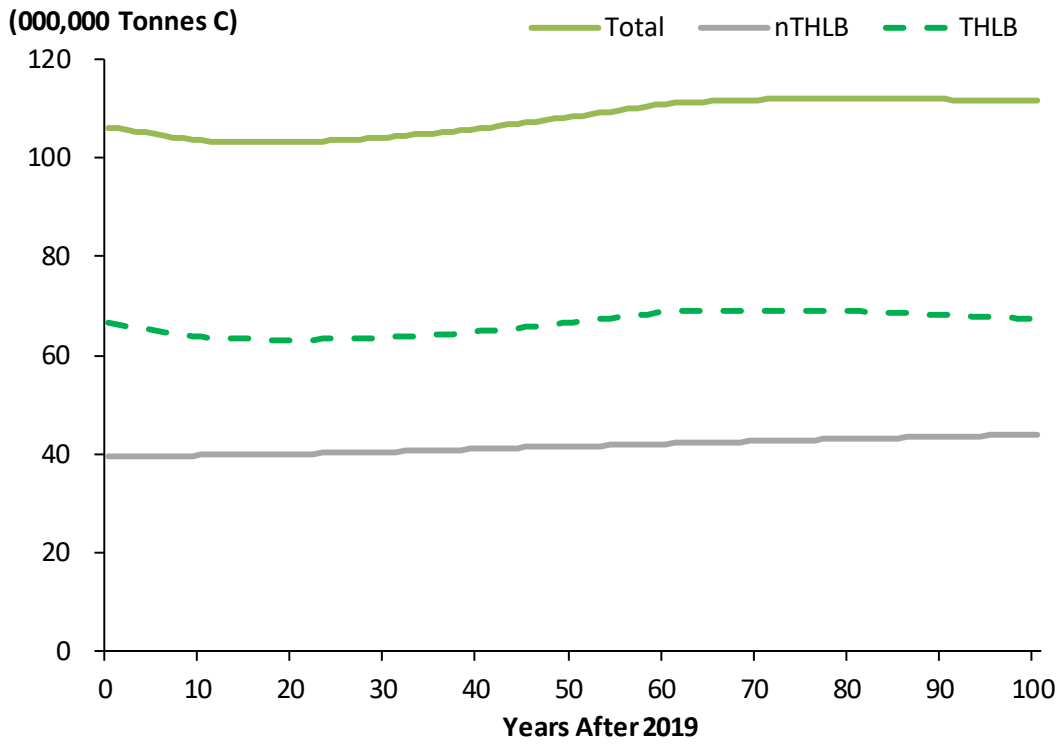

Figure 2: The total ecosystem carbon (TEC) by THLB and non-THLB.

- The carbon density varied according to land use types, ranged from 134 tonnes per hectare at the low site index stands to 318 tonnes per hectare at aggregated deciduous stands, with a mean of 199 tonnes per hectare (Table 27).

Table 27. Land use type areas, total ecosystem carbon (TEC), and carbon density

Land use Type	**Area (ha)**	**TEC initial (T C)**	**Carbon Density (T/ha)**
Current WTP	10,166	1,897,664	187
Deciduous	22,455	7,131,844	318
Future WTP	17,708	3,280,938	185
In-operable	7,193	1,434,253	199
LCM	8,658	1,770,840	205
Low site index	4,362	585,354	134
Low Volume	17,917	3,109,347	174
OGMA	55,357	10,625,085	192
Parks	23,312	5,665,589	243
Riparian	19,616	3,692,532	188
THLB	363,193	66,533,402	183
UWR	3,039	562,459	185

Note: LCM: Landscape Connectivity Matrix, OGMA: old growth management area, UWR: ungulate winter range.

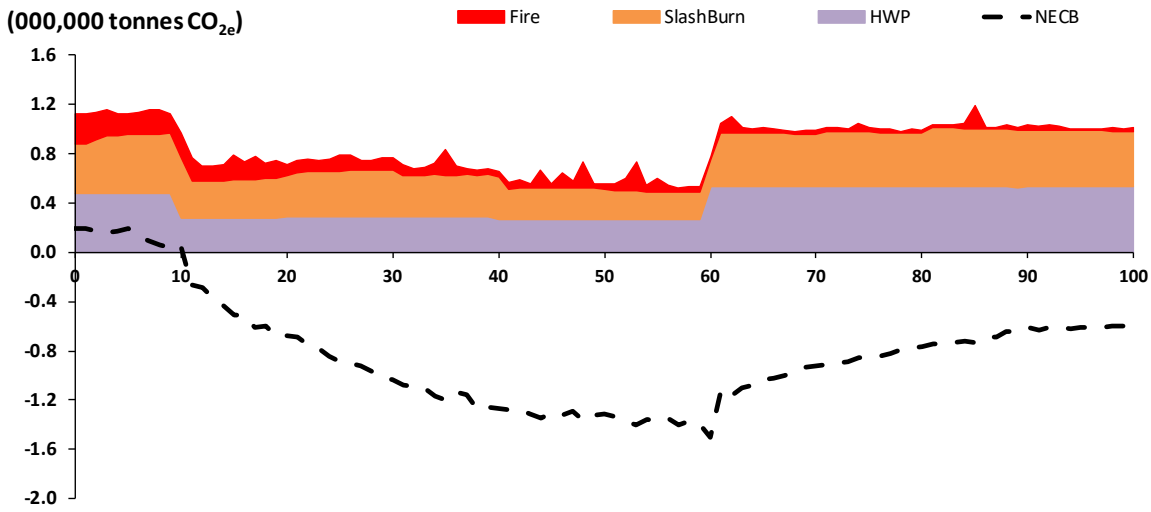

Figure 3 Greenhouse gas emissions by disturbance types (wildfire, harvesting, and slash burning) and net ecosystem carbon balances (NECB).

- The TSA is a strong carbon sink (NECB < 0), with an annual carbon gain of ~0.83 Mt CO_2e by the forests, of which about 18.2% comes from harvest wood products. The major carbon sources are wildfire (~0.08 Mt CO_2e per year), timber harvesting (~0.40 Mt CO_2e per year), and slash burning (~0.38 Mt CO_2e per year- Figure 45).