

Karst Impact Analysis

At the request of the Chief Forester, an impact assessment was carried out to determine how much provincial forest would be impacted by implementing the draft karst management guidelines currently under development. The analysis was undertaken in two parts – one overview assessment for the province as a whole, and a detailed assessment of two TFLs on Vancouver Island where karst management is a common occurrence.

Provincial Analysis

The provincial analysis was based on data from 1:250 000 karst potential maps that were completed in 1999. These maps identify areas where karst development is likely to occur. For the purpose of this analysis, the level of karst development was not estimated, since this would require detailed field work in most cases. The analysis focuses on showing how much of British Columbia is potentially underlain by karst, and, in particular, how much of the forest land base might be impacted by the karst management guidelines.

The provincial land base was broken down into forested areas and non-forest areas. It was not possible to further break down the forested land base into operable and inoperable areas -- this information is not available at the provincial level. However, forested areas were further broken down into:

- logged areas (logged less than 20 years ago);
- young forest (20 –140 years old); and
- old forest (greater than 140 years old).

Non-forest areas include:

- alienated lands:
 - parks
 - residential/agriculture mix
 - agriculture
 - mining
 - recreation areas
 - urban areas
- alpine areas:
 - alpine
 - glaciers and snow
- non-forest:
 - freshwater
 - wetlands
 - shrubs
 - barren surfaces
 - sub-alpine avalanche chutes
 - range lands
 - estuaries

Provincial overview:

11.2% of British Columbia is potentially underlain by karst
Of the 11.2% -- 5.7% is forest (5.5% is non-forest)

Of the 5.7% forest :

- 0.6% is logged
- 2.5% is young forest
- 2.6% is old forest

Regional Breakdown:

Cariboo Region

4.7% of the Cariboo Region is potentially underlain by karst
Of the 4.7% -- 3.2% is forest (1.6% is non-forest)

Of the 3.2% forest :

- 0.5% is logged
- 1.0% is young forest
- 1.6% is old forest

Kamloops Region

4.5% of the Kamloops Region is potentially underlain by karst
Of the 4.5% -- 3.3% is forest (1.2% is non-forest)

Of the 3.3% forest :

- 0.5% is logged
- 1.9% is young forest
- 0.9% is old forest

Nelson Region

28.5% of the Nelson Region is potentially underlain by karst
Of the 28.5% -- 14.9% is forest (13.6% is non-forest)

Of the 14.9% forest :

- 2.7% is logged
- 7.5% is young forest
- 4.7% is old forest

Prince George Region

17.8% of the Prince George Region is potentially underlain by karst
Of the 17.8% -- 8.6% is forest (9.1% is non-forest)

Of the 8.6% forest :

- 0.7% is logged

- 3.9% is young forest
- 4.1% is old forest

Prince Rupert Region

3.6% of the Prince Rupert Region is potentially underlain by karst
Of the 3.6% -- 1.5% is forest (2.2% is non-forest)

Of the 1.5% forest :

- 0.0% is logged
- 0.2% is young forest
- 1.2% is old forest

Vancouver Region

3.1% of the Vancouver Region is potentially underlain by karst
Of the 3.1% -- 1.9% is forest (1.2% is non-forest)

Of the 1.9% forest :

- 0.3% is logged
- 0.6% is young forest
- 1.0% is old forest

Discussion:

To help put this provincial analysis in context, it is important to understand that the majority of the potential karst in British Columbia lies in the interior of the province, and that there is a significant difference between the karst in the Interior and that found in coastal regions.

Karst located in the Interior is generally less susceptible to surface development owing largely to the protection provided by the deeper soils and surficial materials deposited through glaciation. This 'buried karst' is much less likely to be impacted by forestry activities than the karst along the coast where the soils tend to be thinner. As a result, much of the Interior forested karst is likely to be rated as low or moderate vulnerability, and the impact of the karst management guidelines in these areas is expected to be minimal.

Rationale:

- Karst inventory field trials were carried out at five sites during 1999: two on Vancouver Island (Extravagant Creek and Tashish River), two on the mainland (Chetwynd area and Nelson area), and one on the North Coast (Chapple Inlet on the east side of Princess Royal Island).
- In the Northern Interior (Chetwynd area) and the Southern Interior (Nelson area), much of the karst was found to be buried beneath relatively thick mantles of glacial

till. The result was that most of the karst at these two Interior sites was considered low to moderate vulnerability from an operational point of view.

- The vulnerability factors that led to these lower ratings for the Interior sites were:
 - epikarst development – due to the generally thick layers of soils and surficial material, there was little exposed epikarst to evaluate;
 - density of surface karst features – there were some discrete surface karst features observed, but relatively few;
 - karst roughness – the karst topography was generally smoothed out by the depth of soil depth and past glacial action;
 - subsurface karst potential – somewhat difficult to assess due to the thicker soils; however, it is expected that the subsurface karst potential would be no greater than it is on the coast and would be much less susceptible to surface disturbance because of the protection provided by the deep surficial covering (the smaller trees in the Interior, smaller equipment used, and common practice of harvesting on snow would also lessen the impact of surface activities on the subsurface);
 - riparian management - the lower density stream networks and generally less energetic streams of the Interior would result in lower requirements for riparian management along sinking or losing streams (also fewer sinking and losing streams because of the thicker soils and glacial till deposits);
 - karst flora/fauna - niches for karst flora and fauna are not as common in the Interior as they are on the coast due to the generally drier climatic conditions.
- These Interior field trial sites were located in the two forest regions with the largest percentage of potential karst in forested areas – the Prince George Region (8.6%) and the Nelson Region (14.9%).
- Based on the results of the field trials, and the experience of the consultants who conducted the trials (karst specialist Paul Griffiths and geoscientist Tim Stokes), it is expected that most of the forested karst in the interior of British Columbia would likely be low or moderate vulnerability, and therefore the impact of the karst management guidelines may be relatively minor in the Interior.
- As a comparison, the field trial sites on Vancouver Island and Chapple Inlet had more areas of high vulnerability karst owing to wetter climatic conditions, thinner soils, more exposed and better developed epikarst, a higher density of surface karst features, higher measurable evidence of subsurface potential, increased surface roughness, more complex stream networks and a higher number of sinking and losing streams, and more favourable habitat sites (wetter) for karst flora and fauna.
- Vancouver and Prince Rupert Regions tend to have more vulnerable karst than that found in the Interior, but a relatively low percentage of forested karst (1.9% and 1.5%, respectively).