

# BCTS

BC Timber Sales

Strait of Georgia Business Area

## KARST MANAGEMENT Protocol for BCTS Strait of Georgia

Feb 4, 2016

### Introduction

This protocol is intended to recommend management practices when operating within karst terrain. Karst terrain comprises roughly 10% of the land base in BC and 4% of the land base on Vancouver Island. Ten percent (~13,000 ha) of the limestone on Vancouver Island is in BCTS operating areas, while 61% resides on Tree Farm Licences and 26% on other Crown Lands.

Karst terrains in low to mid-elevations grow bigger trees with higher value due to the increased pH (lower acidity) in the soils. Mineral and nutrient uptakes are advanced in these sites.

Karst terrain is made up of sedimentary surface bedrock comprised mainly of carbonate bedrock, generally known as limestone. Limestone is a soft rock, identified by the colour grey to black; if it has undergone a metamorphic process the colour can change to white (marble) to blue green grey. Karst has a distinctive topography that has developed over time, and may be characterized by fluted and pitted rock surfaces, pits, sinkholes, disappearing streams, springs, substantial subsurface drainage systems, and of course, caves.

With the majority of the subsurface cavities formed after uplift, caves and karst features hold the geological record of the uplift and the severe acidic conditions during that time. Rainwater coming in contact with CO<sub>2</sub> in the air and soil also produces a weak carbonic acid which trends along joints and fissures in the limestone created by uplift. The majority of the large mouth caves on Vancouver Island were in-filled by glaciation and are now experiencing a gradual flushing out. Current measurements of calcium carbonate levels in the water entering large cave systems indicate that the pH of the water entering these systems is not acidic enough to form the features we have today. The caves and karst feature shapes and formations have frozen the record of uplift and hold very important hydrological, scientific, biological, cultural and recreational values. The significant values are legally recognized by GAR orders. Karst features are to be treated with respect and managed accordingly.

Resource inventory work in progress includes updating of karst spatial layers for operational maps and planning and working with local caving groups in order to add detail to our karst feature spatial layer. Karst is also reviewed annually in any blocks that fall under the Road and Block Review or various audits.



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## 1. Legal Framework

The Campbell River and South Island Natural Resource Districts currently have GAR orders protecting Karst and Karst features.

Link to the Campbell River Natural Resource District (DCR) GAR Order:

[http://www.for.gov.bc.ca/dcr/Stewardship\\_files/Karst.pdf](http://www.for.gov.bc.ca/dcr/Stewardship_files/Karst.pdf)

Link to the South Island Natural Resource District (DSI) GAR Order:

[http://www.for.gov.bc.ca/ftp/DSI/external/!publish/Stewardship/SIFD\\_Objectives\\_Matrix/8\\_Resource\\_Features/Approved\\_Karst\\_GAR\\_Order%20December\\_11\\_2009.pdf](http://www.for.gov.bc.ca/ftp/DSI/external/!publish/Stewardship/SIFD_Objectives_Matrix/8_Resource_Features/Approved_Karst_GAR_Order%20December_11_2009.pdf)

## 2. Management Objectives and Strategies

### **2.1. To manage the karst resource in a professionally sound manner that respects ecological and social values associated with timber harvesting.**

2.1.1. Establish reserves, management zones of an appropriate size to protect significant features.

2.1.2. Manage the unique attributes and characteristic of the microclimate in and around significant features by ensuring that water flow, air flow, air temperature, relative humidity, level of shading, sediment load, special habitat qualities and visual aesthetics are considered.

2.1.3. Plan and implement appropriate harvesting systems and techniques in and around significant karst areas where harvesting is intended.

### **2.2. To plan and conduct forest activities consistent with the relevant karst GAR orders.**

## 3. Management Practices Consideration

### **3.1. Planning Level**

3.1.1. Identify and review -

3.1.1.1. Karst potential mapping from the LRDW and TSG karst layer

3.1.1.1. Local knowledge, previously identified or adjacent karst features, SP information

3.1.1.2. Aerial overview / ground recce

3.1.1.3. Area of influence of known karst

3.1.2. Incorporate newly collected karst data into operational karst map layers and plans

### **3.2. Recce Level**

3.2.1. Conduct field verification, preliminary overview karst assessment (layout engineer or Karst Specialist)

3.2.2. Identify and stratify karst unit into vulnerability polygons (Karst Specialist), review adjacent SP or karst assessment information.

3.2.3. Update operational maps and plan with new data and existing data.

3.2.4. If in DSI, GAR order requires annual reporting as per FPPR section 86(3) (b). The planners will forward the updated karst spatial layers to the DSI DM.

### **3.3 Pre-Harvest and Post-Harvest**

3.3.1. Identify approximate boundaries of operations considering the above information.

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- 3.3.2. Review proposed boundaries with individuals performing the karst assessment before layout begins.
- 3.3.3. Finalize harvest boundaries and road locations.
- 3.3.4. Conduct final Karst Field Assessment on the karst /non-karst area of influence with Karst Specialist.
- 3.3.5. Conduct cave surveys on newly found features with a Karst Specialist or in conjunction with local caving groups.
- 3.3.6. Conduct simple baseline monitoring of key cave/karst feature attributes that the Karst Specialist or a provincially recognized caving group reasonably considers to be at particular risk of being “damaged or rendered ineffective” by the harvesting activity.
- 3.3.7. Planning Forester or Forest Technician to send karst info to GIS Dept for updating the karst spatial layers.
- 3.3.8. Ensure that karst features and prescriptions are accurately and visibly indicated on harvest maps and that any monitoring information is linked and filed for reference.
- 3.3.9. Field review harvest and road building operations after completion to ensure the karst assessment recommendations have been followed and are adequate and look for opportunities to improve karst management prescriptions.

## 4. References

### **4.1. Data Management**

- 4.1.1. Karst area spatial layer is located under the Managed Areas group in ArcMap Geo Layer Manager. For Classified layers, Karst Features and Cave Passageways see the GIS dept.
- 4.1.2. Location of file geo-database – [\\bctsdata.bcgov\Data\tsg\\_root\Restricted](\\bctsdata.bcgov\Data\tsg_root\Restricted)

### **4.2. Handbooks -Contacts**

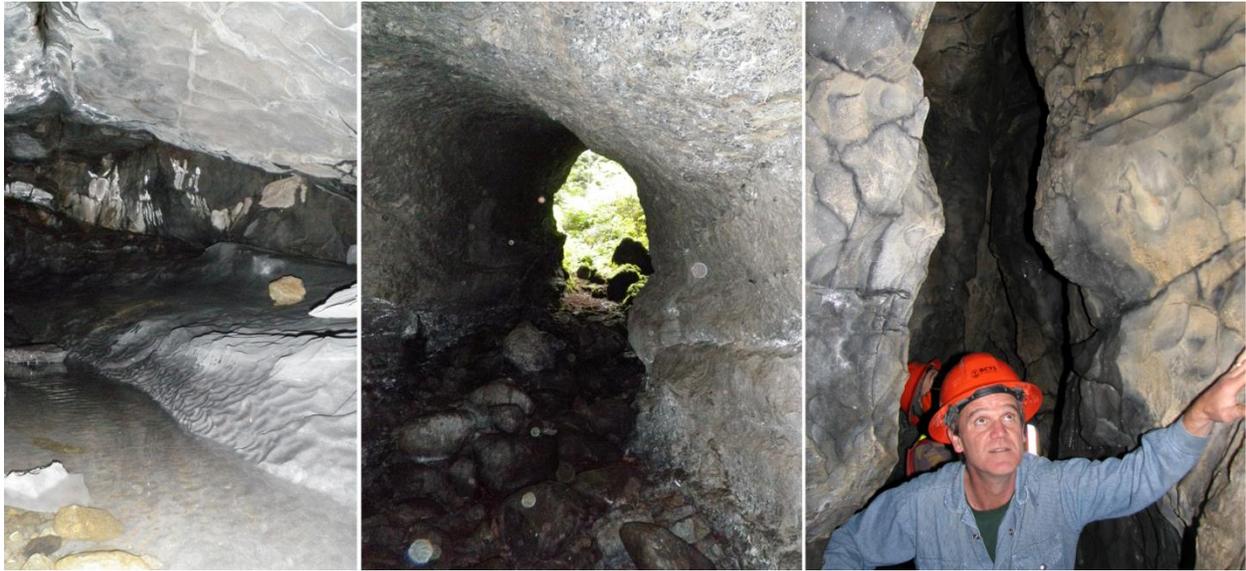
- 4.2.1. Karst Management Handbook: <http://www.for.gov.bc.ca/hfp/publications/00189/Karst-Mgmt-Handbook-web.pdf>
- 4.2.2. Cave Karst Inventory Standards and Vulnerability Assessment Procedures for BC Procedures: [http://archive.ilmb.gov.bc.ca/risc/pubs/earthsci/karst\\_v2/karst\\_risc.pdf](http://archive.ilmb.gov.bc.ca/risc/pubs/earthsci/karst_v2/karst_risc.pdf)

### **4.3. Individuals with karst experience within the Strait of Georgia Business Area**

- 4.3.1. Mike Doknjas, GIS Data Analyst, Karst Specialist [Mike.Doknjas@gov.bc.ca](mailto:Mike.Doknjas@gov.bc.ca)

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#### 4.4. Vancouver Island Cave Club names and contacts:

##### 4.4.1. Vancouver Island Cave Exploration Group - VICEG,

Trevor Moelaert (Black Creek) 250 337-2123 alltmoe13@shaw.ca

David Wall (Port McNeill) 250-956-2898 da\_wall2003@yahoo.com

##### 4.4.2. British Columbia Speleological Federation

Phil Whitfield (Kamloops) 250-372-5079 pwhitfield@telus.net

## 5. Safety

Operating on karst inherently involves a degree of risk to work force safety and potential for negatively impacting the environment. Limestone beds can contain numerous deep grikes (slots) and pits, workers must be aware of these hazards by watching carefully where they place their feet and by sufficiently flagging/marking dangerous features. The layout and harvest plan must include a written work procedure to prevent mishaps. Karst assessments are based on findings of surface and accessible subsurface features and geology. Hidden vertical and or shallow collapsible features not found during the layout and assessment phases are a real possibility.

Limestone deposits for the most part are relatively deep. They contain structural and hydrological attributes that can produce significant shallow and deep karst features. Harvest development within karst generally does not uncover or negatively alter a hidden significant karst feature or hydrological flow, although the possibility exists. There is always a moderate safety risk and risk of damage to hidden subsurface karst features by machines within karst areas, the risk is higher near significant karst features.

Never enter a cave or karst feature by yourself or without a trained karst specialist. A person will brief you on the necessary procedures, safety equipment and clothing.

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Generally these include:

1. Safety plan – nearby emergency medical & exposure equipment; communications outward; exact plans, location, and time of return check-in known to back-up individual off-site
2. Warm and appropriate clothing for the cave, temperatures are around 5-8° C
3. 2 quality lights; one will be a back up with spare batteries
4. Hard hat or climbing helmet
5. Rubber boots (Please no caulks in cave)
6. Water resistant gloves
7. Energy snack and water
8. Spare change of clothing and plastic garbage bag for muddy clothing at entrance or vehicle

In the event of an accident requiring rescue from a cave or karst pit, telephone **911** and request the RCMP to initiate a **cave rescue** task through the Emergency Management BC (Provincial Emergency Program) Emergency Coordination Centre. As cave rescue is recognized as a specialized Search & Rescue function, **BC Cave Rescue** should also be alerted through the EMBC Emergency Coordination Centre at **1-800-663-3456**.