FREP
Forest & Range Evaluation Program

The *new* Karst Protocol

A snapshot of upcoming changes

1. The focus of the evaluation will be on recording disturbances to sinkholes (SHs) (aka "dolines"), and to the surrounding area within 1-2 tree lengths

Other features such as cave entrances, karst springs, and sinking streams will not be assessed.

Why?

Focusing on sinkholes will allow FREP to compile the robust sample needed to answer the Priority Evaluation Question more quickly than would be possible by spreading evaluation efforts among many different categories of SKFs. Sinkholes are a good choice as karst features to evaluate because they are:

- among the most common karst features in coastal BC, hence plentiful enough to provide a good sample size;
- diagnostic karst features;
- easy to recognize and identify;
- easy to find (i.e., by LiDAR or high-stumping);
- generally easy to delineate and measure;
- important hydrological features of karst systems;
- connected to the subsurface (unlike positive relief features such as karst bluffs or pinnacles);
- their basic form, function and role in karst systems have been well studied;
- occasionally receive sinking streams and/or have surface cave openings;
- often misunderstood (hence, good indicators of knowledge deficits or training deficiencies among assessors or forest professionals)

Note: For the purposes of management, sinkholes with surface cave openings are at the same time cave entrances (see KMH, p. 22).

2. The priority evaluation question for karst is:

"Are current forest practices protecting and maintaining the structure, function and ecological integrity of surface karst features?"

A sub-question has been developed to reflect the new focus:

"Are current forest practices protecting and maintaining the structure, function and ecological integrity of surface karst features of sinkholes?"

3. The sampling methodology has been improved:

- Only "known" sinkholes (as pre-identified in licensee background information) will be used to select which sinkholes will be evaluated against the disturbance indicators.
- "Sampling with replacement" will be used to randomly select which sinkholes to evaluate

Why?

- *Starting with "known" sinkholes will ensure there is no sample selection bias.*
- *Using sampling with replacement allows for a "non-fixed" sample size; therefore, the sample size is flexible so to ensure each site is completed in one field day, and provides for issues like not being able to find a selected sinkhole, running out of time, etc.*
- *These changes will ensure the methodology is statistically rigorous, which in turn allows the results to be extrapolated to the larger population of sinkholes.*

4. If time permits, there will be "rapid assessments" for discovered sinkholes and other surface karst features:

Undocumented sinkholes that are discovered during the field work, as well as other surface karst features (cave entrances and karst springs) will be rapidly assessed for:

- *Any tree removal (y/n)*
- *Any windthrow (y/n)*
- *Whether the area surrounding was 100% treed, partially harvested, clearcut or other.*

Why?

- It is important to document the presence of sinkholes that were not previously documented, as the population frame will need to be adjusted for statistical extrapolation. Additionally, missed features is important feedback to forest practitioners.
- We also wish to capture some data for later analysis on the general condition of these other features.
- The information on non-targeted features might identify red flags such as risks to other, non-SH features. This in turn, may result in future iterations of the Karst Protocol focusing on different surface karst features of interest.

5. Implementation Questions will be added for other features and scenarios in the sample area, where applicable:

- *Did the licensee carry out a karst field assessment (KFA) conforming to the KISVAP?*
- *Did the KFA assessor successfully complete the 3-Day RISC KFA training?*
- *Was the catchment area of the sinking stream delineated?*
- *Was the cave evaluated and surveyed to determine its position in relation to the ground surface?*
- *Was the recharge area for the karst spring delineated?*
- *Was a windthrow hazard assessment done for the feature?*

Why?

- These implementation questions stem from the standards outlined in the Karst Inventory Standards and Vulnerability Assessment Procedure (KISVAP), and to a lesser extent, to the recommended practices in the Karst Management Handbook for British Columbia (KMH).
- Information about whether the KISVAP and KMH are being adhered to will assist policy and decision makers to improve karst management where needed.
- Government expects adherence to the KISVAP and KMH, because these are seen as key to protecting karst resources and meeting Section 70(1) of the FPPR which is triggered when a Government Actions Regulation (GAR) order identifies certain karst elements as resource features.

6. A simple disturbance score will be calculated for each sample area:

- *This is a proportion of the number of evaluated SHs that are disturbed relative to the total evaluated.*
- *The higher the score, the less effective the practices are for protecting SHs.*

Information about each SH surrounding area, whether it was fully retained as a buffer, whether it was partially harvested, windthrown, or clearcut, etc. will also be summarized.

Why?

- The current state of knowledge regarding the impacts from a certain type of disturbance, combination of disturbances, or magnitude of disturbance is not sufficient to support attempts to rate the "impact" to a given site or sinkhole. Therefore, the disturbance % will be presented as a simple means to compare between sites only.
- Information about the area surrounding the sinkhole (and other features) is critical feedback to forest practitioners since no-harvest zones and windthrow management are key ways in which to manage and protect surface karst features.