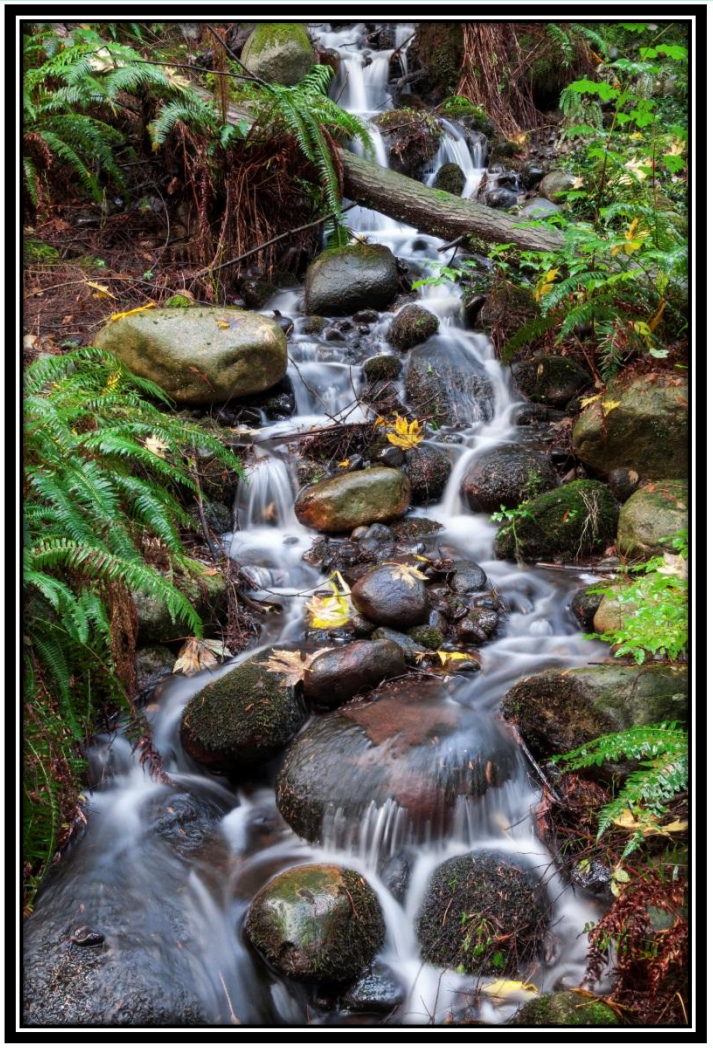
An Introduction to the Assessment and Monitoring of Cumulative Effects

Golder Associates

Outline

- Introduction
- Scoping
- Analysis of Effects
- Mitigation
- Determination of Significance
- Monitoring



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Introduction

- “Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions.” (Hegmann et al. 2009)
- Intended to help prevent death by a thousand cuts.

Introduction

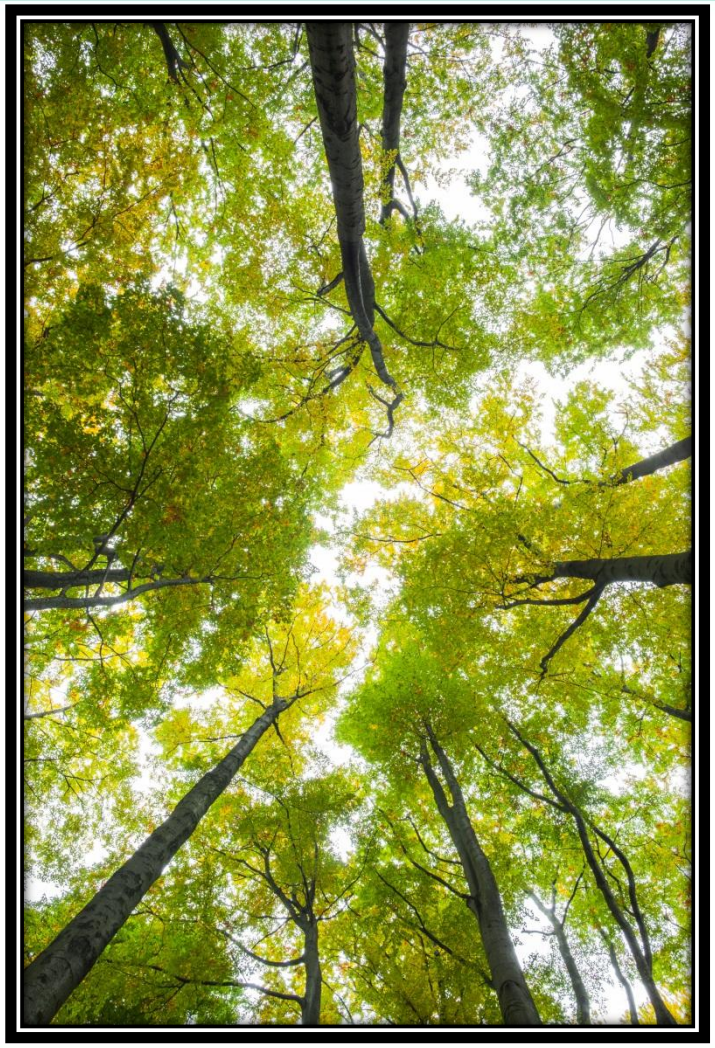
- Guidelines for CEAs are laid out in Terms of Reference/Application Information Requirements.
- The steps for Cumulative Effects Assessments (CEAs) are:
  - Scoping;
  - Analysis of effects;
  - Mitigation;
  - Determination of significance; and
  - Monitoring.

Scoping

- Identify Valued Ecosystem Components (VECs) and Key Indicators (KIs) to focus the assessment, considering:
  - Socio-economic importance
  - Cultural importance
  - Regulatory requirements
  - Ecological importance (e.g., keystone species)
  - Conservation concerns.

Scoping

- Select spatial and temporal boundaries that are big enough include important interactions but small enough to be manageable.
- Spatial boundaries should be biological and geographical where possible.



Scoping

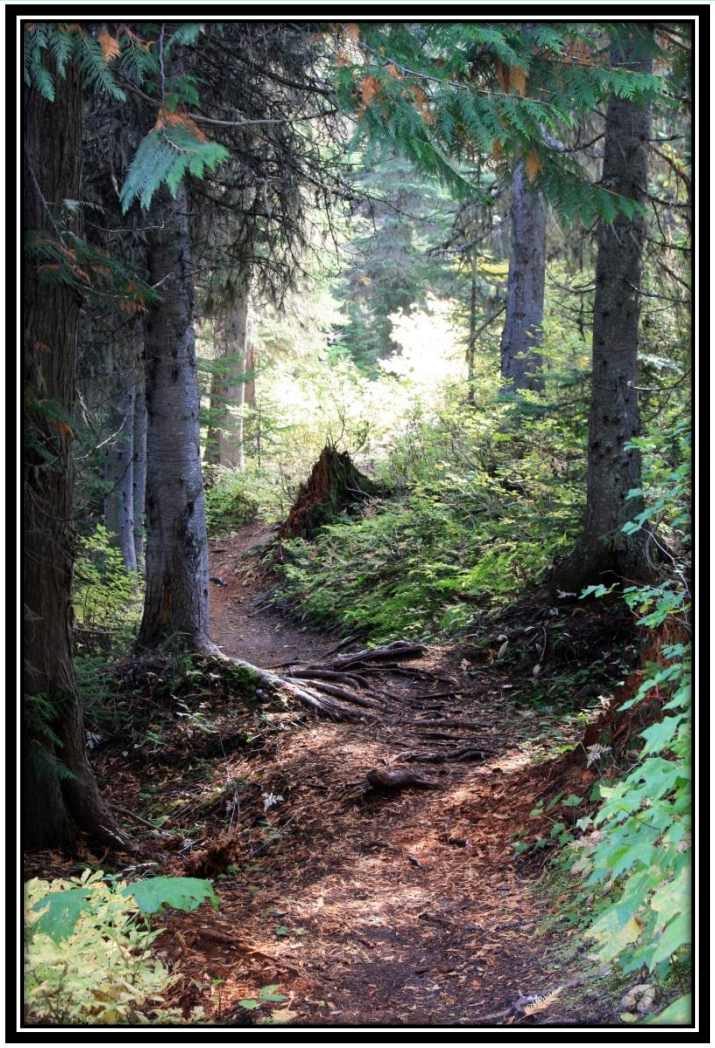
- Considerations when defining a Terrestrial Regional Study Area (RSA):
  - geographic boundaries (e.g., mountains, rivers, watersheds)
  - wildlife home ranges and habitat (e.g., moose, caribou)
  - Aboriginal Rights and Interests including but not limited to traditional land use boundaries and cultural heritage
  - ecological zones
  - predicted aerial deposition extent (e.g., airsheds)
  - footprint and “zone of influence” of existing, approved and planned developments

Scoping

- Temporal boundaries are generally used as scenarios.
- To minimize uncertainty it may be best to start at baseline and extend to only include “certain” or “reasonably foreseeable” future planned actions.
- Baseline may be the existing case, but often represents existing and approved developments.
- Generally, “reasonably foreseeable” is defined as the intent to proceed with a development is announced.

Scoping

- In Alberta the “Planned Development Case” includes any disturbance that has been publicly disclosed up to six months prior to submission of the Proponent’s Application.
- Pre-industrial and hypothetical future scenarios are sometimes applied.



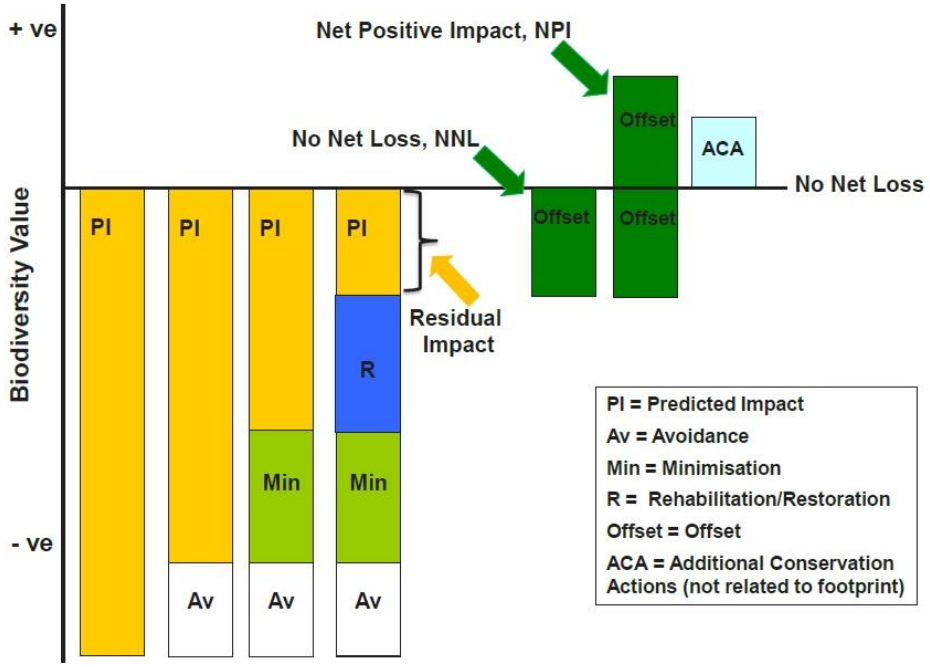
Analysis of Effects

- Pathway analysis with a focus on likely effects
- Analyses are quantitative where possible, dependent upon the quality and quantity of available data:
  - Land cover/ habitat type data
  - Soil data
  - Data for existing, approved, and planned disturbances
  - Wildlife habitat associations (habitat suitability modelling)
  - Wildlife population trends using demographic data (population modelling)
  - Presence of regulatory or ecological thresholds

Mitigation

- Identify mitigation and its likely effect on reducing the effects of project and cumulative effects.
- Mitigate according to the mitigation hierarchy (BBOP 2013):

1. Avoid
2. Minimize
3. Rehabilitate/restore
4. Offset



Evaluation of Significance

- Determine the significance of residual project effects and cumulative effects after mitigation
- Criteria for determining whether environmental effects are significant within the ecological context are:
  - Magnitude;
  - Geographic extent;
  - Duration;
  - Frequency; and
  - Reversibility.

Determination of Significance

- The determination of significance is often value-based, and therefore difficult to define and defend.
- A resilience-based determination of significance can help
- Have ecological thresholds been exceeded, or will they?

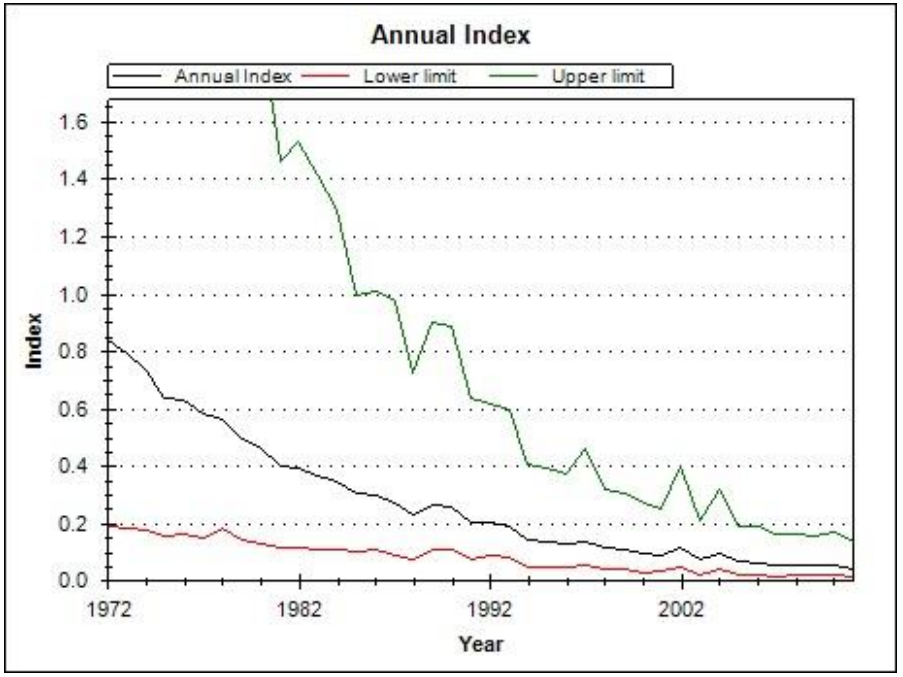
Monitoring

- A general discussion of planned monitoring and adaptive management of mitigations is submitted with the EIA.
- Detailed mitigation and monitoring plans are required in development approval conditions.

The End

Determination of Significance: Black-throated green warbler

- Estimated 7.4% decline per year in the Alberta population from 1972 to 2011 (95% total; Environment Canada 2013)
- Habitat loss and fragmentation in breeding range may be responsible for the decline
- Likely significant cumulative effects



Determination of Significance: Canada warbler

- Estimated 3.5% decline per year in the Alberta population from 1972 to 2011 (75% total; Environment Canada 2013)

- Habitat loss in wintering and breeding range may be responsible for the decline
- Abundance is similar between disturbed and undisturbed areas in the boreal
- To be conservative in the face of uncertainty, significant