ECOSYSTEMS IN DECLINE

HIGH CONSERVATION VALUE 3, QUESTION 9

Are there ecosystem types within the forest or ecoregion that have significantly declined?

BACKGROUND

An ecosystem type may decline within a forest or ecoregion due to many different factors. For example, the removal of targeted species may create anthropogenically rare forest ecosystem types (*e.g.*, late seral red and white pine in eastern Canada). Altered disturbance regimes (*e.g.*, through fire suppression, introduced forest pests or pathogens, altered hydrology) may cause declines in certain ecosystem types, especially those that are highly vulnerable to or dependent on a particular disturbance (*e.g.*, fire dependent systems, woodland encroachment in flood plains resulting from water control structures). In some cases removal or range expansion of a keystone species causes changes in the structure or function of an ecosystem (*e.g.*, beaver). Researchers predict that climate change will cause declines in some forest communities and change the structure of others (Chapin *et al* 2004). Declines in particular ecosystem types have implications for habitat, and are significant because the viability of meta populations may become threatened as an ecosystem type declines regionally.

We have identified three principal issues related to how this question has been addressed in HCVF assessments to date:

1. The definition of decline: Ecosystem decline is principally interpreted as vegetation change. We suggest that decline in faunal elements and ecosystem function (*e.g.*, hydrologic cycle) also constitutes change under this indicator.

2. Baselines: By definition, measuring decline requires a known and appropriate baseline. To date, many HCVF assessments in areas where forests have been harvested for much of the last century have measured decline relative to FRI or other data dating back only several decades. We recommend identifying and documenting decline relative to pre-industrial conditions.

3. Scale: Many assessments have only addressed decline on a regional level. We suggest that finer scale analyses are necessary (*e.g.*, have once common local ecosystem types become scarce?).

DATA SOURCES

The HCVF Framework for Canada lists the following possible data sources:

- Relevant government authorities;
- WWF Terrestrial Ecoregions of North America (Ricketts *et al.* 1999);
- Suitable forest or vegetation inventories;
- Potential vegetation mapping;
- Regional and local experts;
- Conservation Data Centre S1-S3 community types.

Additional data sources might include:

- Provincial ecosite or ecosystem inventories, such as:
  - Ontario MNR NEFEC Inventory
  - BC Sensitive Ecosystem Inventories
- Photography from early or pre-industrial era
- Extrapolation/reconstruction from reference areas (*e.g.*, regional or national parks, refuges)
- Regional sources:
  - Alberta: Timoney 2003, Archibald *et al.* 1996, Beckingham and Archibald 1996, Beckingham *et al.* 1996
  - Saskatchewan: Beckingham *et al.* 1999
  - Ontario: OMNR Landform Vegetation dataset, NOEGTS dataset (1:100,000 scale; intended for engineering use, but broad descriptive database may be useful element of a predictive model)
  - Manitoba: Zoladeski *et al.* 1995

INTERPRETING GLOBAL, NATIONAL AND REGIONAL SIGNIFICANCE

As with naturally rare ecosystem types dependent on narrow ecosystem parameters, the definition of decline is scale dependent. We recommend that HCVF assessments include spatial analysis of the current and pre-industrial ecosystem types located in, adjacent to and within the region of the FMA. If pre-industrial cover data is not readily available, we suggest it should be re-constructed or modeled.

INTERPRETING THE PRECAUTIONARY PRINCIPLE

In the absence of definitive information regarding ecosystems that may be declining, the precautionary principle would lead us to target ecosystem types that are threatened by anthropogenic activity on the landscape. For example, wetlands are often targeted by agriculture for draining and greenbelt mineral deposits are often the focus of mining activity.

Conventional forestry practices target old forest stands first. Under traditional sustained yield management practices there is no requirement to maintain forests older than the optimal rotation age. Therefore, we suggest it is appropriate under the precautionary principle to designate old, merchantable forest types as HCVF.

HCV3 Q9 – ECOSYSTEMS IN DECLINE

ADDITIONAL GUIDANCE

Consult information on species declines and major anthropogenic disturbances

The loss of a significant species within an ecosystem (*e.g.*, caribou, beaver) can cause changes in system function and structure. A broad spectrum of human activities can have cumulative impacts on an ecosystem that may lead to decline; examining the history and impact of various activities will help in choosing an appropriate baseline for assessing decline.

In this document, we have noted that the presence of eastern white pine and red pine at the northern part of their range has been identified as HCVFs under Question 5 (range edge and outliers). A supplementary rationale to identify this community type as a range edge HCV is because of declines in the main part of their range resulting from historical highgrading of large, old trees. Hence, in mixedwood forests of central Ontario, late seral red and white pine have been identified as HCVFs. We would suggest that forest stands with the potential to support late seral red and white pine should also be identified as HCVFs in addition to existing remaining stands.

Spatial analysis

As a result of on ongoing development of HCVF methodologies, it is still common for HCVF reports not to contain maps for every assessed conservation attribute. We recommend mapping information about ecosystem types, including forest communities and proportion and distribution of seral stages. Examining the distribution and extent of an ecosystem type is key to measuring decline and may assist in determining thresholds of HCVF status. Further, providing maps of all diminished ecosystem types, regardless of eventual HCV designation, provides important information for forest management and monitoring, and will help when assessing areas of potential HCV overlap (Question 19).

Choose an appropriate baseline

Factors to consider in choosing an appropriate baseline include:

- Harvest history
- History and effects of other management activities
- History of other human activities in the region

We recommend the following questions as additional guidance

- Have focal, keystone or other species declined in the region or locally (*e.g.*, caribou or beaver)?
- Has some human activity significantly altered the landscape (*e.g.*, hydroelectric or oil and gas development)? How?
- When was the forest first harvested and when were other management prescriptions (*e.g.*, fire suppression, reforestation) enacted? What impact do these activities have on local ecosystems?

Related HCVF Questions and areas of possible overlap

- Question 8 – Rare ecosystem types
- Question 1 – Species or habitats at risk
- Question 10 – Forest fragments

SUMMARY OF RECOMMENDATIONS

- An evaluation of ecosystems in decline should include both floral and faunal elements of ecosystems.
- Pre-industrial conditions constitute an appropriate baseline from which to measure decline; if pre-industrial cover data is not available, we suggest it should be re-constructed or modeled.

LITERATURE CITED

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