CONCENTRATIONS OF ENDEMIC SPECIES

HIGH CONSERVATION VALUE 1, QUESTION 2

Does the forest contain a globally, nationally or regionally significant concentration of endemic species?

BACKGROUND

The Committee On the Status of Endangered Wildlife in Canada (COSEWIC) defines endemic species as a species native and confined to a certain region; having comparatively restricted distribution. Endemism tends to be most prevalent in tropical ecosystems with great species diversity and specialized habitats and on islands where breeding populations are isolated for many generations. These specialized habitats allow species to specialise, adapt, and eventually to evolve into different species. .

The restricted global range area characteristic of many endemic species makes them especially vulnerable to changes in the habitat conditions or introduced competitors and/or predators. Endemic species are often unable to readily adapt to these habitat modifications or quickly expand their range area so disturbance or loss of suitable habitat (including changes in forest structure, establishment of invasive species) typically results in permanent loss of local or regional meta-populations.

Only one to five percent of Canadian species are endemic to the country (Canadian Biodiversity/McGill, however a greater (but still relatively small) number of species are endemic breeders (i.e., breed only in Canada or within a narrow range) or have distinct and restricted ranges of subspecies. For example, several endemic species of plants and animals and an endemic subspecies of black bear occur on Haida Gwaii/QCI; an unusual white form of the black bear—the Spirit bear—lives on Princess Royal Island; and a

While loss of endemic species is most often a concern for tropical or temperate systems, there are some applications to Canada's forests, espeically at the regional scale.

DATA SOURCES

As currently noted in Appendix 5 of the FSC Canada, National Boreal Standard, local authorities on species groups and known or expected range distributions will need to be consulted to determine if there are concentrations of endemic species in an ecoregion where a forest license is located.

Some data sources that may provide general guidance on levels of endemism for coarse scale ecoregion assessments include:

- WWF Ecoregion Conservation Assessment (see www.panda.org)
- Conservation International Hotspot Areas (see www.conservation.org)
- Atlas of Canada Endemic Plant Diversity (http://atlas.gc.ca/site/english/maps/environment/ecology/components/endemicplantdiversity)

Data sources for digital mapping of species distribution include:

- NatureServe (bird and mammal distributions and bird breeding ranges; see http://www.natureserve.org/getData/birdMaps.jsp http://www.natureserve.org/getData/mammalMaps.jsp)
- Regional CDCs (*e.g.* Ontario Natural Heritage Information Centre; see http://www.mnr.gov.on.ca/MNR/nhic/nhic.cfm)
- USGS Trees of North America (see http://climchange.cr.usgs.gov/data/atlas/little/)

DEFINING POPULATIONS IN THE BOREAL AS 'ENDEMIC'

For the most part it will not be common anywhere in the boreal forest to locate a globally or nationally significant concentration of endemic species. This, in part, can be attributed to the relatively broad ranges of most vascular plant and vertebrate species common to the boreal and the fact that much of the boreal has only recently migrated into its current geographical distribution since the last glacial period. This has resulted in insufficient evolutionary time for regional differentiation (genetic drift) of populations into locally restricted or 'endemic' species.

At the regional level however, concentrations of sub-species and isolated or disjunct populations of more broadly ranging species may occur. This is particularly true for areas in close proximity to unusual microclimatic or geomorphologic conditions or glacial refugia.

For example, of the approximately 3,200 species of vascular plants that have been identified as native to Canada, about are 150 endemic species (Botanic Gardens Conservation International). The concentration of these species is in areas that possess unique characteristics such as the central Yukon, the Athabasca sand dunes, and the isolated Queen Charlotte Islands. These plants have genetically adapted to these particular environmental conditions. Figure 2.1 shows the distribution and concentration of endemic plant species in Canada.

The Aurora trout (Salvelinus fontinalis timagamiensis in central Ontario provides another example. It is endemic to only two small lakes, and is thought to be the product of the isolation of a population of brook trout after the last glaciation. The Aurora trout is listed as endangered by COSEWIC as a result of lake

acidification, and extensive restoration work has been undertaken to reverse its decline (Snucins et al. 1995).

Similar to Question 1, it is recommended that the Terrestrial Ecoregions of Canada be used as a guiding regional framework within which to determine whether the ranges of species, sub-species, breeding areas or disjunct populations are sufficiently restricted to qualify as regionally endemic.

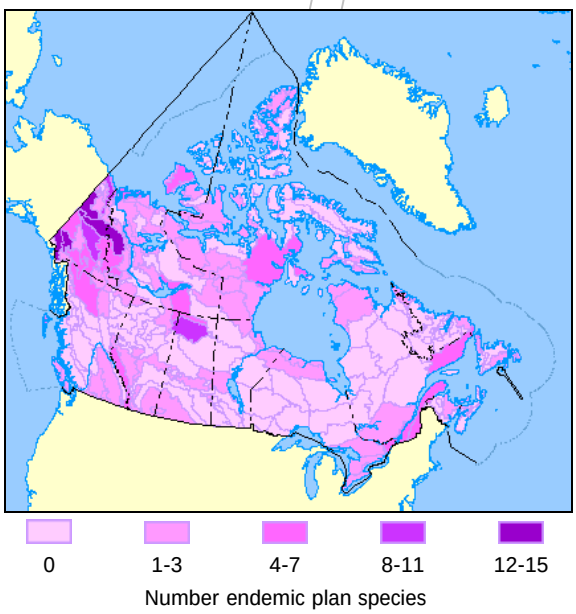
INTERPRETING THE PRECAUTIONARY PRINCIPLE

As noted above, a geographically restricted critical life stage, such as breeding, is often considered an important facet of endemism. For example, while many migratory songbirds have large global ranges, many breed only or primarily within the boreal forest. If the majority of a bird's breeding range is restricted to a single ecoregion, then significant concentrations of suitable breeding habitat should be taken under consideration for HCVF status.

For example, *the* Cape May warbler (*Dendroica tigrina*) breeds mostly within the allocated southern boreal forest region and prefers dense black spruce stands. Conversion of these spruce stands to other forest stand types within a license area could result in the loss or reduction of local populations.

Spatial information on breeding ranges can be acquired online from NatureServe at no cost (http://www.natureserve.org/getData/birdMaps.jsp; Ridgley *et al.* 2003).

Figure 2.1 Distribution and concentration of endemic plant species in Canada (source: The Atlas of Canada)



SUMMARY OF RECOMMENDATIONS

Most endemism in Canada is regionally, not nationally or globally significant. Thus, recommendations focus on the regional scale of analysis:

- Select the Terrestrial Ecoregions of Canada as a guiding regional framework
- Consider the following species taxonomic and life history attributes when identifying geographically (regionally) restricted distributions.
    - Sub-species
    - Disjunct and/or reproductively isolated populations
    - Breeding areas (especially for migratory species).

LITERATURE CITED

Snucins, E., J. Gunn and W. Keller. 1995. Restoration of the Aurora trout to its acid-damaged native habitat. Conservation Biology 9(5) : 1307-1311

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