# Exploring ecosystem and ecological classifications proposed for use in ecosystem accounting:

Canada's Ecological Land Classification, the USGS World Ecological Zones and IUCN Ecosystem Functional Groups

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## Purpose

- to explore relationships between three classifications and provide preliminary information in support of developing an ecosystem or ecological classification for ecosystem accounting.

## Objectives

- explore similarities, differences, strengths, weaknesses and relationships between the classifications through a series of exploratory crosswalks and comparisons both spatial and conceptual in nature.

Specific objectives include;

a) a comparison of the naming conventions (nomenclature)
b) a comparison of the variables and the classes/themes in which they are grouped
c) review of underlying concepts (spatial and non-spatial) and data (methods)
d) a spatial comparison of the WEZ and CAN-ELC adjusted for scale

# Scope, limitations and challenges

- classifications being explored were created for different reasons although with some overlapping purposes
- exploration was preliminary and time was weighted towards scoping;
  - how, what and where do we make the links
- focus was at the continental, national and large regional scales
- challenge of exploring a mix  of ecosystem and ecological concepts within and across the classifications
- challenges of working at different scales with different nested hierarchies
- overlapping data and conceptual challenges

# Examples from exploration

**Table 1. Number of words that match or are similar among terrestrial classifications**

| Classification group | Total word count | CAN-ELC match | USGS-WEZ match | IUCN-EFG match | Average match | Average match percentage |
|---|---|---|---|---|---|---|
| **CAN-ELC** | **42** | | 25 | 16 | **21** | 49% |
| **USGS-WEZ** | **71** | 25 | | 28 | **27** | 37% |
| **IUCN-EFG** | **65** | 16 | 28 | | **22** | 34% |

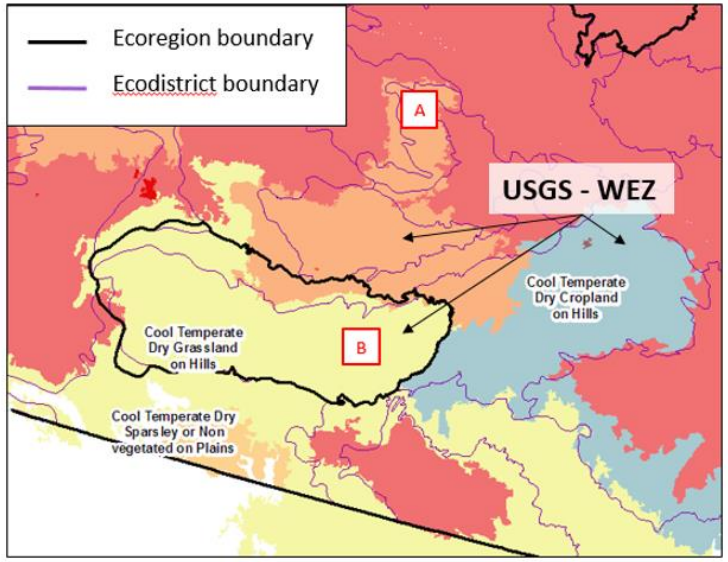
Notes:

The numbers exclude place names and words associated with marine ecological areas.

The similarities identified between classifications includes words that are the same *or similar* in both frameworks.

The "Average match percentage" is relative to the "Total word count".

**Figure 1** – positive correspondence at two scales in southern Alberta




a) Shows good correspondence at the ecodistrict level (finer scale), b) Shows good correspondence at the ecoregion level (medium scale)

**Comparison of extent from national and global land use/ cover datasets for a northern ecoprovince**

| Canada land use class | AAFC-LU definition | Total area (km²) | Globecover (km²) | Difference (km²) | Difference (%) |
|---|---|---|---|---|---|
| 11 | Areas not classified due to clouds | 0 | 12 | 12 | |
| 21 and 25 | Built-up, urban and roads | 997 | 47 | -950 | -95% |
| 31 | Water - natural and human-made | 1,556 | 1,039 | -516 | -33% |
| 41 and 45 | Treed areas | 51,026 | 52,681 | 1,655 | 3% |
| 42 and 46 | Wetland with forest or tree cover | 139 | 0 | -139 | |
| 51 | Annual and perennial cropland | 1,071 | 1 | -1,070 | -100% |
| 61 and 62 | Natural grass, shrubs or grassland for cattle grazing | 2,490 | 5,157 | 2,667 | 107% |
| 71,73 and 74 | Undifferentiated wetland and wetland with shrub or grass cover | 232 | 0 | -232 | |
| 91 | Rock, beaches, ice, barren land | 1,521 | 95 | -1,426 | -94% |
| Grand total | | 59,032 | 59,034 | 2 | 0% |

Notes:
Differences are relative to the AAFC-LU total area.
1. Differences greater than 100% are as follow: Class 45: 40,317%, Class 62: 1,817%

# Examples from exploration;

## Preliminary matching of CAN-ELC to the IUCN-EFG

| Ecozones | IUCN Ecosystem Functional groups | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T2.1 | T2.2 | T2.3 | T3.3 | T4.4 | T4.5 | T5.1 | T6.1 | T6.2 | T6.3 | T6.4 | T7.1 | T7.2 | T7.3 | T7.4 | TF1.6 | TF1.7 |
| 1 | | | | | | | | x | x | x | | | | | | | |
| 2 | o | | | | | | | o | o | x | | | | | | | |
| 3 | x | | | | | | | | | x | | | | | | x | x |
| 4 | x | | | | | | | | | o | | | | | o | x | x |
| 5 | x | | | o | | | | | | o | | | | | | x | x |
| 6 | x | o | | o | o | o | | | | | | o | | o | o | o | o |
| 7 | x | x | | | | | | | | | x | | | | o | | |
| 8 | x | x | | | | o | | | | | | | x | x | o | | |
| 9 | x | x | | | o | | | | | | | o | x | o | o | x | x |
| 10 | o | o | | | | | x | | | | | | x | o | o | | |
| 11 | x | | | | | | | o | o | o | | | | | | | |
| 12 | x | | | | | | | o | o | | x | | | | | | |
| 13 | x | | x | | | | | | | | | | | x | o | | |
| 14 | x | | | | | | | | | | x | | | | o | | |
| 15 | x | | | | | | | | | | | | | | | | x |

| | |
|---|---|
| x | Major occurrence over most of the ecozone |
| o | Major occurrence over part of the ecozone |
| x | Minor occurrence over most of the ecozone |
| o | Minor occurrence over part of the ecozone |

# Preliminary findings and discussion

- significant opportunities to leverage and integrate the classifications
- IUCN EFGs are largely compatible with Canadian ecological land classification but more work needed to link across levels of the hierarchies
- developing more guidance and standards would help promote consistency and comparability across jurisdictions and groups of experts
- caution should be exercised in using land cover and land use datasets whose purpose was not to delineate ecosystems, especially multi class datasets where trade-offs can lead to significant underestimation (wetlands)
- more work is needed on measuring functions and processes in delineating ecosystems
- Consideration could be given to promoting the use of the USGS-WEZ *methodologies* as tools, independent of the spatial data. The USGS methodologies could be used with national and regional datasets.