# BC08 Inventory Notes

Updated: 15 June 2019

## Bookmarks

* [Data Management and Access](https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-inventory/data-management-and-access)
* [VRI Data Standards](https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-inventory/data-management-and-access/vri-data-standards)
* [VRI Polygons and Rank 1 Layer](https://catalogue.data.gov.bc.ca/dataset/vri-forest-vegetation-composite-polygons-and-rank-1-layer)

## General

* There is a new inventory available (May 2019) that includes 1.3 million new polygons (fires etc.); TFL48 is now included as well. We will need to test it soon. We may also want to consider testing using the version used in CAS\_04 to see if we get similar results. Here are the number of polygons for the last 3 inventories:
  + 2014 - 4,431,314 (used in CAS\_04; TFL 48 excluded; 1 layer)
  + 2017 - 4,861,240 (available in 2018 and the one analysed here; TFL 48 excluded; 1 layer)
  + 2018 - 5,151,772 (available in 2019; TFL 48 included; 1 layer)
* The **inventory\_standard\_cd** attribute in the 2 latest inventories includes 4 categories: F, V, I, and L which was not present or used in CAS\_04. There is no information online. **What is class "L" and should we include it or not?**
* Spatial overlap among attribute groups (based on BC\_082E translated files from CAS\_04):
  + There is full overlap between LYR and DST polygons
  + There is no overlap between LYR and NFL polygons - **polygons should include LYR and NFL attributes in some cases**
  + There is no overlap between NFL and DST polygons
  + There is partial overlap between LYR and ECO polygons
  + There is partial overlap between NFL and ECO polygons
  + There is partial overlap between DST and ECO polygons
* **ALL: Can we come up with simple rules/criteria for dealing with horizontal and vertical stratification within a polygon? For example, when is a polygon a non-forested polygon vs when it is forested with non-forested components?**

## HDR Attributes

The HDR attributes have changed quite a bit from those in the CASFRI specifications. There is no documentation about the rationale for the changes but it’s assumed that they better reflect the needs of the project and the information in the inventories.

* **PV: Update CASFRI specification document with name changes and descriptions (with help from Melina and Steve)**

## NFL Attributes

In CAS\_04, the NFL and LYR polygons all have a unique CAS\_ID implying that a polygon is either forested or non-forested. The VRI inventory, however, allows for sub-polygon components that are forested, non-forested, non-vegetated or anthropogenic. There can be 3 components and they must cover at least 10% of the polygon area each. These components are useful when finer polygons cannot be digitized due to minimum mapping unit standards etc.

* Is the intent of CASFRI to keep a separation of forested vs non-forested polygons or is it desirable to maintain information at the sub-polygon level? The latter would imply that there could be NFL polygons or NFL components within LYR polygons.
* **Action**: Based on Steve’s response, there should be overlap i.e., polygons that have both LYR and NFL attributes and are not exclusive. This means we need a rule to define whether a polygon is non-forested or is forested with non-forested components.
* Are NFL attributes meant to be exclusive i.e., the polygon is considered entirely one non-forest type? For example, currently it seems that if there is a species\_1 there is no NFL attributes.
* From Appendix 12: “CAS Translation (Whenever a forest inventory includes crown closure for a non-forested attribute - then migrate into CROWN CLOSURE LYR field)”. Does this mean that NFL attributes = “NULL\_VALUE” if the crown closure field is not NULL?
* It might make more sense to use the new FOR\_MGMT\_LAND\_BASE\_IND to distinguish NFL from LYR attributes (see section below)
* CASFRI specifies UNPRODUCTIVE\_FOREST with 6 values but the CAS\_04 only has PRODUCTIVE\_FOR with 2 values (“PF”,“PP”). Why is that?
* The Perl code (NFL section) calculates $UnProdFor from NON\_FOREST\_DESCRIPTOR
* The Perl code (NFL section) uses is.na(species\_cd); however, we changed that to for\_mgmt\_land\_base\_ind = N to reflect the BC VRI recommendation.

Notes on BC inventory attributes:

* there are 3 land cover components (e.g., land\_cover\_class\_cd\_1) but no corresponding percent attributes, so we cannot tell how extensive each component is within a polygon. The Photo Interpretation Procedures manual suggests these 6 attributes exist plus an additional one for all other components (pct).
* there are 3 non vegetation cover types (e.g., non\_veg\_cover\_type\_1) along with 3 corresponding percent (e.g., non\_veg\_cover\_pct\_1) and pattern (e.g., non\_veg\_cover\_pattern\_1) attributes. In contrast to land cover components these only track non-vegetation types.

Definitions from VRI photo interp guide:

* Non-Treed polygon: a polygon is considered Non-Treed if less than 10% by crown cover of the polygon area consists of tree species of any size.
* Non-vegetated categories: the fifth level of the B.C. Land Cover Classification Scheme. This classifies the polygon into one of a number of specific categories of Non-Vegetated cover.
* Non-Vegetated cover types: the fourth level of the B.C. Land Cover Classification Scheme. This classifies the polygon as Snow / Ice, Rock / Rubble or Exposed Land if Non-Vegetated. The Non-Vegetated cover type is left blank for water features.
* Non-Vegetated polygon: a polygon is considered Non-Vegetated when the total cover of trees, shrubs, herbs, and bryoids (other than crustose lichens) covers less than 5% of the surface area of the polygon. Bodies of water are included in this class.

### FRI attributes

It’s not clear that the Perl code and our implementation are correct or what is intended (see previous comments/questions). It might be better to have 2 sets of NFL attributes:

1. Polygon-level based on BCLCS 1-5
2. Sub-polygon-level based on the attributes we used here.

**for\_mgmt\_land\_base\_ind**

Forest Management Land Base Indicator (FMLB) is an attribute field to indicate whether the polygon is forested or has been forested and is capable of producing a stand of trees [for\_mgmt\_land\_base\_ind]. This allows the user to filter out polygons that are traditionally considered non-productive such as lakes, rock and alpine. Polygons that have harvest history are included in the FMLB as well as any polygon with a site index greater than or equal to 5.

The FMLB indicator is defined based on the following criteria:

* Opening Indicator = Y; polygon is considered forest,
* Opening Indicator = N, but history data indicates logging; polygon is considered forest,
* BCLCS level 1 = U (no data); polygon is considered non-forest,
* BCLCS level 1 = A (alpine); polygon is considered non-forest,
* Non-productive descriptor is not null; polygon is considered non-forest, and
* Site Index >= 5; polygon is considered forest.

This is an attempt to replicate how this attribute was created.

library(tidyverse)

# Replicate forest management land base indicator (FMLB; see PDF)

xx = mutate(x,

logging=if\_else(substr(line\_7b\_disturbance\_history,1,1)=="L",1,0),

logging=if\_else(is.na(logging),0,logging),

fmlb = if\_else(

(substr(line\_7b\_disturbance\_history,1,1)=="L" & site\_index>=5) |

(inventory\_standard\_cd %in% c("F") & is.na(non\_productive\_descriptor\_cd) & site\_index>=5) |

(inventory\_standard\_cd %in% c("V","I","L") & !bclcs\_level\_1=="U") &

(!bclcs\_level\_3=="A" & site\_index>=5), 1, 0))

table(x$fmlb, x$logging)

**non\_veg\_cover\_type\_1**

* Mostly used with inventory\_standard\_cd = “V”
* This set of attributes describes the portion of the polygon that is non-vegetated (vegetation cover is less than 5% of the total surface area of the polygon) and is not obscured by vegetation or shadows.
* Non-vegetated cover types are the designations (from BCLCS level 5) for all observable non-vegetated land cover within the polygon. Note that the level 4 non-vegetated cover type codes (SI-Snow/Ice, RO-Rock/Rubble and EL-Exposed Land) are no longer acceptable for this attribute.
* A maximum of five (5) non-vegetated attributes are acceptable per polygon.
* DW = Down Dead Wood

**land\_cover\_class\_cd\_1**

* Mostly used with inventory\_standard\_cd = “V”
* Land Cover Components (LCC’s) allow detailed description of cover complexes that occur within polygons. Up to three LCC’s can be defined within a polygon, and are ranked based on percent cover (total = 100%). Attributes for each LCC include cover codes from either level 4 or 5 of the BCLCS, plus a reporting of soil moisture regime based on nine classes. If more than three components exist, the remaining percent cover is added to the largest LCC.
* Includes additional non-vegetated types: SI, RO, EL that are not in non\_veg\_cover\_type\_1
* Where are the LCC% attributes? If not there, then we can only use the first component as an indicator of the presence of that component.

**bclcs\_level\_4**

* Use with all inventory\_standard\_cd (F, V, I, L)
* Provides a single classification for an entire polygon and is used for broad scale land cover reporting (therefore may not be that useful, esp. if we’re using LCCs)
* Missing a few classes e.g., rivers and lakes; this is fine for V where this is covered in the other 2 attributes but not for F. bclcs\_level\_5 records these 2 classes as RI and LA.

**non\_forest\_descriptor**

* Use with inventory\_standard\_cd = “F”

**non\_productive\_descriptor\_cd**

* Use with inventory\_standard\_cd = “F”