Ecological Site Mapping of the UBC Alex Fraser Research Forest

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Introduction

This project was undertaken to provide an advanced and detailed ecological framework for supporting ecosystem-specific research, education, planning, and operations in the UBC Alex Fraser Research Forest (AFRF), located in central British Columbia. Knowledge about ecosystems and their distribution over the landscape is essential for stand level forest management and research.

The objectives of this project were to:
- Increase the effectiveness of instruction in ecology, silvics, and silviculture through the production of a reliable, stand-level, ecosystem map and its associated products, and
- Provide a spatial framework for research and sustainable management on the Alex Fraser Research Forest.

What is an ecosystem and site?

An ecosystem is made up of an environment, its natural processes, and the combination of organisms living in it. Change in structure and function over time is inherent to ecosystems. The most easily observed components are vegetation and soil. Ecosystems and their boundaries can be recognized, classified, and mapped via plant communities and their associated climate and soil moisture and nutrient conditions. An environmental portion of an ecosystem with a distinctive climate and soil is termed a site.

Why site classification and mapping?

Site classification organizes ecosystems into groups that háve similar site qualities and vegetation potentials, according to the principle of "ecological equivalence." These are called site associations. A site series is the climatically uniform portion of a site association. Each site series provides a different environment for plant growťh, either in climatic or soil conditions or both. **We adopted site series as mapping units and amplifled the environmental content of each site series by adding modifiers, such as topography, to provide further environmental information.**

Methodology

With some deviations, mapping followed the approach described in the 1998 Standards for Ecosystem Mapping in British Columbia. Accomplishments over the two-year duration of this project are summarized in Figure 1 of the poster.
Figure 1 Flowchart deseribing major activities, work progress, and final products..

We sampled vegetation and soil of those ecosystems that were difficult to identify using the existing Forest Service field guide for local ecosystems. Global positioning system (GPS) units recorded the location of waypoints during reconnaissance and ground inspections (Figure 2).

Names and codes for biogeoclimatic units and site series (Table 1) follow the 1997 Field guide for site identification and interpretation for the Cariboo Forest Region with one major exception. While maintaining the Forest Service site series number codes as the key means of communicating site series delineations, we abbreviated the names to a generic name (Latin/English) of a major indicator species. Site series modifiers were devised according to the specific environmental characteristics of site series and forest conditions encountered (Table 1).

Table 1 Codes, nomenclature, site modifiers, and eolour scheme for site series in the IDFxm subzone and IDFxm/IDFdk3 transition of the Knife Creek Block (IDFxm - Vety Dry Mild Interior Douglas-fir; IDFdk3 = Horsefly variant of the Dry Cool Interior Douglas-fir).

Figure 2 Section of a draft site series map showing locations of GPS waypoints (triangles). Site series outlined in each numbered polygon are hyperlinked to a site attribute file in a geographic information system (GIS).

Site series were identified using subzone/variant units, soil moisture and nutrient regimes, topography (landform) of a site, and oceurrence of indicator plant species (which were considered to be independent of vegetation succession). To ensure a high reliability of the map, approximately 90% of the map polygons were inspected in the field and, if required, polygon boundaries, site identification, and modifiers were revised. During the ground verification phase, images of forest communities were taken to develop a visual library of site series on the forest (Photos 1 through 34).

Site units and map

Table 1 presents a portion of the mapping legend for the 3500-hectare Knife Creek Block, situated in the Interior Douglas-Fir (IDF) biogeoclimatic zone. The table contains the eolour scheme for all sites series in the IDFxm subzone and IDFxm-dk3 transition, and modifiers applicable to each series..

What's in it for you?

Education
• The CD-ROM of maps, GIS database and image library, as well as the report, provide a framework for conducting other field-based studies of ecosystems and their components.
• Use the CD-ROM as a tool for teaching about plants, soils and ecosystems.
• Prepare for field trips and demonstrations at the AFRF by reviewing maps and images on the CD-ROM.
• Increase your understanding about how vegetation changes with climate and topography by using the site series.

Research
• Site descriptions for research sites can be found easily using the map and GIS database.
• Choose research sites by reading the report and searching the GIS database by site,

vegetation, soils and accessibility

Management
• Improved site-specific planning and field operations such as land use allocation, silviculture, growth and yield projections, protection, range, reereation, and watershed management will oceur at AFRF..

This project will advance ecological site mapping by:

(1) Recognizing new site series,
(2) Framing local site modifiers that enhance environmental information of site series,
(3) Presenting a eolour site series map,
(4) Delineating a high proportion of simple (i.e. one site series) polygons using 1:10,000 scale on the map,
(5) Developing site identification tools specific to the forest,
(6) Achieving high attribute and spatial reliability through high-intensity, GPS assisted ground inspections,
(7) Deriving a series of interpretive maps about site productivity and potential, and
(8) Capturing images of forest communities, hyperlinked to polygons in a GIS, that provide a visual reference for each site series.

These tools are expected to improve teaching and student understanding of ecosystem identification and interpretation, as well as research and management activities on the Alex Fraser Research Forest.

A pamphlet and more detailed information on this project can obtained from:

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Photos:

1_ICH-SBS06dp_Oplopanax, Ac, open
2_ICH,WS, WM_wetlands, shrubs, sedges, graminoids open
3_Oplopanax horridus open
4_SBS_02cr_bedrock, andesit open
5_ICH04ft_ cohort of giant Cw, old growth open
6_ICH-SBS-BR_andesite talus open
7_SBS02cr_outlook over crest rocky site open
8_ICH03sk_ young Fd, Sx, Bl stand, lots of dead trees, windfall open
9_view to Quesnel Lake open
10_ICH04ft_twins Cw above GL open
11_ICH, WF_wetland of Fire Lake open

12_ICH05ft_giant Ac snag open
13_IDFdk3_01zn_Pl, At, Sheperdia, Calamagrostis open
14_IDFdk3_WM_wetland marsh with intensive grazing open
15_IDFdk3_01zn_Sx, At, variable retention cutting open
16_IDFxm07dr_Fd stand with old growth trees open
17_IDFdk05cs_Fd, Pl, Hylocomium open
18_IDFdk08ty_Sx, high quality, lower canopy open
19_IDFdk02cr_Fd, Jr on cliff open
20_IDFdk02cr_cliff with Fd, Rocky mountain Jr open
21_ICH01cs_Fd good quality, pruned open
22_ICH04ft_old growth Cw open
23_ICH07ft_Equisetum arvense open
24_SBS-BR_bedrock, rocky site without forest open
25_ICH07ft_Sx, Equisetum, Oplopanax open
26_ICH07gr_Cw, Oplopanax open
27_ICH01wt_K. Klinka in old growth Cw, Bl, Sx open
28_ICH01wt_old growth Cw, Bl, Sx open
29_ J. Macku a K. Klinka above SP06 soil pit open
30_ICH-SBS07ft_Ac, Oplopanax open
31_ ICHmk3-01dr_Aster conspicuus open
32_Gavin Lake, UBC cabin open
33_ICHmk3-04sl_Rubus parviflorus. open
34_ ICHmk3-03sl_Cypripedium montanum. open
35_ICH-SBS08sl_ SP01, even aged Fd, Cw, Sx stand open
36_ICH-SBS08sl_ SP01, Orthic Eutric Brunisoil open
37_ICH-SBS08ft_SP02, very good quality Aspen as species with low occupancy open
38_ICH-SBS08ft_SP02, Gleyed Dark Grey Luvisoil open
39_ICH-SBS08ft_SP03, Gleyed Dystric Brunisoil open
40_ICH-SBS08ft_SP03, even aged Sx, Bl stand open
41_ICH-SBS08ft_SP06 sample plot open
42_soil profile_SP06_brunisoil open
43_ICH-SBS08dr_SP07_stand open
44_ICH-SBS08dr_SP07_soil profile_Gleyed Gray Brown Luvisol open
45_ICH-SBS08ft_SP08_stand, Pl, Cw, plant cover open
46_ICH-SBS08ft_SP08_soil profile_Gleyed Gray Luvisol open

Poster presentation (1 MB)