BES 316 2010

**DESCRIBING FOREST COMMUNITIES IN THE FIELD**

Goals for Today

1. To apply skills and approaches learned in the previous vegetation sampling labs to sample complex forested plant communities in the field
2. To collect data on tree DBH to create age class structures for forest stands

***SCHEDULE for APRIL 22, 2010***

|  |  |
| --- | --- |
| **Time Period** | **Activity** |
| 8:45 – 9:15 | Drive to St Edward State Park |
| 9:15 – 12:30 | Vegetation sampling |
| 12:30 – 1:00 | Drive back to UWB |

**NOTES FOR TODAY**

* **Dress appropriately**
* **Bring a field notebook for recording data in any kind of weather**
* **Read this handout carefully**

**EQUIPMENT**

Each group of 3-4 students will need to take the following equipment out to the field:

* Two 50-m measuring tapes
* 2 metersticks
* 1 plant guidebook
* 20 bamboo stakes
* 1 roll flagging
* 1 DBH tape

**LOGISTICS / PROCEDURES**

4 nested quadrats per student group (16 m2for herbs; 100m2 for trees & shrubs)

DBH of all trees in tree quadrats

Saint Edward State Park in Kenmore is a 316-acre complex of second and third growth forests (60-80 years old), buildings, recreational facilities and a relatively natural shoreline. In fact, it is one of the last stretches of undeveloped shoreline on Lake Washington. The natural vegetation areas are a mosaic of successional forest communities and wetlands, largely along the streams in the north and south canyons leading down to the lake. In 1996, Pacific Biodiversity Institute (PBI) conducted a detailed vegetation survey for the park, delineating a number of vegetation polygons. A map of these polygons is provided at the end of this lab handout.

For our vegetation analysis, we will focus on sampling two general forest communities:

1. Western hemlock – sword fern community
2. Red alder – sword fern community

Inside each of the polygons that PBI sampled there was often a mix of communities. The polygons that contained a significant component of our target communities are listed in the table preceding the polygon map. As a class, we will select a polygon area that looks appropriate for sampling for each community. Both student groups will sample one set of nested quadrats in each community type. In this lab we will not use transects as we did in the wetlands, but instead you will sample vegetation cover using nested quadrats.

**Quadrat Sampling of Vegetation in the Field**

1. Vegetation cover will be measured with quadrats. Herbaceous species vegetation will be sampled in 4-meter by 4-meter sampling area. Shrub and tree species canopy cover will be measured in a ten-meter by ten-meter quadrat. These will be nested approximately as shown:

4 x 4 m

sampling quadrat

10 x 10 m

sampling quadrat

1. Select an area that is dominated by your community with a minimum size of 30 meters by 30 meters. Your groupwill sample one nested quadrat located ssomewhere randomly in one quarter of your larger community area (the other students group will sample a different nested quadrat that they locate in the community area. If there is time, some groups may be able to measure a second set of nested quadrats in that community, but we will assess this in the field.

Group 2 sample site 1

Group 1 sample site 1

Group 2 sample site 2 (only if time)

Group 1 sample site 2 (only if time)

* Estimate the cover of each species within your nested quadrats as you did for the wetland community sampling. All cover estimates should be done by projecting the canopy outline of each species / plant onto the ground.
* For each 10 meter by 10 meter tree sampling quadrat you should measure the DBH (at 1.5 meters above the ground) of every tree. Note the species along with the DBH value of each tree. If time allows you should measure the DBH of as mant trees within your overall community area as possible so you can later construct age class structure diagrams for each major tree species.

**DATA & CALCULATIONS**

You should enter your data into Excel (as you did for the wetland data) and email it to your instructor **before class on Tuesday, April 27** so I can distribute it to the entire class. Your written report will use data from BOTH student groups.

You should analyze your data in a similar fashion as you did for the wetland vegetation analysis lab. Based upon the quadrat data, how do the communities compare in terms of species richness, diversity, dominance, major species, and cover of different growth forms? Are differences in diversity explained by differences in richness or dominance or both? Given what you can find out about the biology of major species (or indicator species) present in each community, can you draw an inferences about differences in the environment of those two communities?

In addition to those data and comparisons you will have tree DBH information from which you can construct age class structure diagrams. Intepret (with appropriate caveats) these diagrams based upon the lecture and readings about age class structures.

**WRITTEN REPORT**

Each student should submit an INDIVIDUAL written report **at the start of class on May 4th**. Everything past the summarized data tables distributed by the instructor should be done individually (analysis, and writing). This report will include:

* A brief written summary of the results and your interpretation (this should be very brief and direct, like one would find in a combined “Results and Discussion” section of a scientific paper). Please make this double spaced. There are no page restrictions, but I would not expect much more than 4 to 6 pages of text. Cite references where appropriate (though I do not expect a literature search – use the class readings and other easily available materials, such as background materials from your previous course in basic ecology). I will expect you to incorporate some ecological information on the species measured (see below) to help explain things about your communities in a more robust fashion.
* The tables used for analysis (described previously in this handout)
* Any other graphics you might generate to present ideas
* Literature cited list (if appropriate)

The emphasis in grading will be on your analysis, but presentation will also be a significant factor. You should treat all written products for this class as you would a professional paper with a target audience of well educated peers not taking this same class. It should be well written, with close attention paid to clarity of writing and brevity (but not at the expense of completeness).

**Some information sources on Pacific Northwest forest plants:**

General plant field guides used in class (Pojar and McKinnon)

Native Plant Workbook: <http://depts.washington.edu/propplnt/plantindex.htm>

WSU Extension native plants database: <http://cahedb.wsu.edu/nativePlant/scripts/webMain.asp>

King county native plant guide: <http://green.kingcounty.gov/GoNative/Plant.aspx?Act=find>

Leigh, M. 1999. Grow your own native landscape. WSU Cooperative extension publication..

## USDA NRCS PLANTS database <http://plants.usda.gov/index.html>

USFS Fire Effects Information Database (contains good ecological information): <http://www.fs.fed.us/database/feis/plants/index.html>

Plant species list modified from a vegetation survey conducted by Pacific Biodiversity Institute in 2006

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Scientific Name** | **Common Name/Accepted Synonym** | **Growth Form** | **Alien?** |
| ACMA3 | *Acer macrophyllum* | bigleaf maple | Tree |  |
| ACTR | *Achlys triphylla* | vanilla leaf | Herb |  |
| ADBI | *Adenocaulon bicolor* | pathfinder | Herb |  |
| ALRU2 | *Alnus rubra* | red alder | Tree |  |
| ARME | *Arbutus menziesii* | madrone | Tree |  |
| ATFI | *Athyrium filix-femina* | common ladyfern | Fern |  |
| BEPE2 | *Bellis perennis* | lawn daisy | Herb | a |
| BRPA3 | *Bromus pacificus* | Pacific brome | Grass |  |
| BRRI8 | *Bromus rigidus* | Rip-gut brome | Grass | a |
| BRVU | *Bromus vulgaris* | Columbia brome | Grass |  |
| CAOC | *Cardamine occidentalis* | big western bittercress | Herb |  |
| CAOL | *Cardamine oligosperma.* | little western bittercress | Herb |  |
| CADE9 | *Carex deweyana* | Dewey sedge | Grass-like |  |
| CAHE7 | *Carex hendersonii* | Henderson's sedge | Grass-like |  |
| CAOB3 | *Carex obnupta* | slough sedge | Grass-like |  |
| CIAL | *Circaea alpine* | small enchanter's nightshade | Herb |  |
| CIAR4 | *Cirsium arvense* | Canada thistle | Herb | a |
| CLEMA | *Clematis* | leather flower | Vine | a |
| CONU4 | *Cornus nuttallii* | Pacific dogwood | Tree |  |
| COCO6 | *Corylus cornuta* | California hazelnut | Shrub |  |
| COTON | *Cotoneaster sp.* | cotoneaster | Shrub | a |
| CRMO3 | *Crataegus monogyna* | oneseed hawthorn | Tree | a |
| CYSC4 | *Cytisus scoparius* | scotchbroom | Shrub | a |
| DAGL | *Dactylis glomerata* | orchardgrass | Grass | a |
| DIFO | *Dicentra formosa* | Pacific bleeding heart | Herb |  |
| DIPU | *Digitalis purpurea* | purple foxglove | Herb | a |
| DREX2 | *Dryopteris expansa* | spreading woodfern | Fern |  |
| ELGL | *Elymus glaucus* | blue wildrye | Grass |  |
| EPAN2 | *Epilobium angustifolium* | fireweed | Herb |  |
| EPCIW | *Epilobium ciliatum* | fringed willowherb | Herb |  |
| EQAR | *Equisetum arvense* | field horsetail | Herb |  |
| EQHY | *Equisetum hyemale* | scouringrush horsetail | Herb |  |
| GAAP2 | *Galium aparine* | Cleavers | Herb | a |
| GATR3 | *Galium triflorum* | fragrant bedstraw | Herb |  |
| GASH | *Gaultheria shallon* | salal | Shrub |  |
| GERO | *Geranium robertianum* | Herb Robert | Herb | a |
| GEMA4 | *Geum macrophyllum* | largeleaf avens | Herb |  |
| HEHE | *Hedera helix* | English ivy | Shrub | a |
| HOLA | *Holcus lanatus* | common velvetgrass | Grass | a |
| HODI | *Holodiscus discolor* | Indian plum | Shrub |  |
| HYTE | *Hydrophyllum tenuipes* | Pacific waterleaf | Herb |  |
| HYRA3 | *Hypochaeris radicata* | hairy cat's ear | Herb | a |
| ILAQ80 | *Ilex aquifolium* | English ivy | Herb / vine | a |
| LAMU | *Lactuca muralis* | wall lettuce | Herb | a |
| LACO3 | *Lapsana communis* | common nipplewort | Herb | a |
| LALA4 | *Lathyrus latifolius* | perennial pea | Herb |  |

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| --- | --- | --- | --- | --- |
| **Code** | **Scientific Name** | **Common Name/Accepted Synonym** | **Growth form** | **Alien?** |
| LEMI3 | *Lemna minor* | common duckweed | Aquatic herb |  |
| LOPE | *Lolium perenne* | perennial ryegrass | Grass | a |
| LOCI3 | *Lonicera ciliosa* | orange honeysuckle | Vine |  |
| LUAN | *Lunaria annua* | annual honesty | Herb | a |
| LUCA\* | *Luzula campestris* | field woodrush | Grass-like |  |
| LYAM3 | *Lysichiton americanus* | American skunkcabbage | Herb |  |
| MANE2 | *Mahonia nervosa* | Cascade barberry | Shrub |  |
| MADI | *Maianthemum dilatatum* | False lily of the valley | Herb |  |
| MAMA11 | *Matricaria matricarioides* | Pineapple weed | Herb | a |
| MELU | *Medicago lupulina* | black medick | Herb | a |
| MOSI2 | *Montia sibirica* | Siberian miner’s lettuce | Herb |  |
| NEPA | *Nemophila parviflora* | smallflower nemophila | Herb |  |
| OECE | *Oemleria cerasiformis* | Indian plum | Shrub |  |
| OESA | *Oenanthe sarmentosa* | water parsely | Aquatic herb |  |
| OPHO | *Oplopanax horridus* | devilsclub | Herb |  |
| OSCH | *Osmorhiza chilensis* | Sweet cicely | Shrub |  |
| PHAR3 | *Phalaris arundinacea* | reed canarygrass | Grass | a |
| POAN | *Poa annua* | annual bluegrass | Grass | a |
| POPR | *Poa pratensis* | Kentucky bluegrass | Grass | a |
| POGL8 | *Polypodium glycyrrhiza* | licorice fern | Fern |  |
| POMU | *Polystichum munitum* | swordfern | Fern |  |
| POBAT | *Populus balsamifera* | black cottonwood | Tree |  |
| PRLA5 | *Prunus laurocerasus* | cherry laurel | Tree | a |
| PSME | *Pseudotsuga menziesii* | Douglas-fir | Tree |  |
| PTAQ | *Pteridium aquilinum* | bracken fern | Fern |  |
| RARE3 | *Ranunculus repens* | creeping buttercup | Herb | a |
| RHPU | *Rhamnus purshiana* | Cascara | Shrub |  |
| RILA | *Ribes lacustre* | prickly currant | Shrub |  |
| RISA | *Ribes sanguineum* | redflower currant | Shrub |  |
| ROGY | *Rosa gymnocarpa* | dwarf rose | Shrub |  |
| RONU | *Rosa nutkana* | Nootka rose | Shrub |  |
| RUDI2 | *Rubus armeniacus* | Himalayan blackberry | Shrub | a |
| RULA | *Rubus laciniatus* | cutleaf blackberry | Shrub | a |
| RULE | *Rubus leucodermis* | whitebark raspberry | Shrub |  |
| RUPA | *Rubus parviflorus* | thimbleberry | Shrub |  |
| RUSP | *Rubus spectabilis* | salmonberry | Shrub |  |
| RUUR | *Rubus ursinus* | Dewberry | Shrub |  |
| RUAC3 | *Rumex acetosella* | common sheep sorrel | Herb | a |
| RUOB | *Rumex obtusifolius* | bitter dock | Herb | a |
| SARA2 | *Sambucus racemosa* | red elderberry | Shrub |  |
| SODU | *Solanum dulcamara* | climbing nightshade | Herb | a |
| SOAU | *Sorbus aucuparia* | European mountain ash | Tree | a |
| STCO14 | *Stachys cooleyae* | Cooley’s hedge nettle | Herb |  |
| STME2 | *Stellaria media* | common chickweed | Herb | a |
| STAM2 | *Streptopus amplexifolius* | claspleaf twistedstalk | Herb |  |
| SYAL | *Symphoricarpos albus* | common snowberry | Shrub |  |
| TAOF | *Taraxacum officinale* | dandelion | Herb | a |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Scientific Name** | **Common Name/Accepted Synonym** | **Growth Form** | **Alien?** |
| TABR2 | *Taxus brevifolia* | Pacific yew | Tree |  |
| TEGR2 | *Tellima grandiflora* | bigflower tellima | Herb |  |
| THPL | *Thuja plicata* | western red cedar | Tree |  |
| TITR | *Tiarella trifoliate* | threeleaf foamflower | Herb |  |
| TOME | *Tolmiea menziesii* | youth on age | Herb |  |
| TRLA6 | *Trientalis latifolia* | Pacific starflower | Herb |  |
| TRPR2 | *Trifolium pretense* | red clover | Herb | a |
| TRRE3 | *Trifolium repens* | white clover | Herb | a |
| TROV2 | *Trillium ovatum* | Pacific trillium | Herb |  |
| TRCA21 | *Trisetum canescens* | tall trisetum | Grass |  |
| TSHE | *Tsuga heterophylla* | western hemlock | Tree |  |
| URDI | *Urtica dioica* | nettle | Herb |  |
| VAOV2 | *Vaccinium ovatum* | California huckleberry | Shrub |  |
| VAPA | *Vaccinium parvifolium* | red huckleberry | Shrub |  |
| VEAM2 | *Veronica Americana* | American speedwell | Herb |  |
| VIMA | *Vinca major* | bigleaf periwinkle | Herb | a |
| VIGL | *Viola glabella* | pioneer violet | Herb |  |

Community Polygons (see map at end of handout to reference polygon number) with a strong component of target vegetation associations for sampling. The % occurence refers to the proportion of the polygon area that fits into the target plant community.

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| **Polygon** | **Western Hemlock – sword fern** | **Red alder – sword fern** |
| 15 | 100% |  |
| 14 | 10% (90% Doug-fir / sword fern) |  |
| 18A | 60% |  |
| 18C |  | 60% |
| 19 |  | 60% |
| 20 |  | 92% |
| 22 |  | 100% |
| 21 | 10% (88% Doug-fir / sword fern) |  |
| 23 | 15% | 80% |
| 3 | 100% |  |
| 4 | 70% (30% Doug-fir / sword fern) |  |

