

Due by 27th June, 2005

Biodiversity

Objective

The primary objective of this laboratory is to compare biological diversity among differing communities. The second objective is to introduce transect sampling as a way of studying community composition.

Overview

The purpose of this laboratory is to evaluate different ecosystems by measuring biodiversity. Biodiversity is a measure of the variety of life on earth with three components: 1) genetic diversity-the total number of genetic characteristics; 2) species diversity; and 3) habitat or ecosystems in a given unit area.

To measure biodiversity it is necessary to understand certain concepts, such as species, population, community, habitat and ecosystem, which should be terms you are familiar with from lecture. A species is defined as a group of individuals capable of interbreeding. Organisms of the same species that live in the same habitat compose a population. A community consists of an assemblage of populations existing in a common area, which interact with each other and share the same general resources. A habitat is the region where and individual, population, or species exists, or can exist. An ecosystem is an ecological community together with its physical environment, considered as a one unit.

Communities are incredibly diverse, both in structure and function. It is not possible to study every organism in a community, but we can study samples, which provide insight into the function of the entire community. In a community, the data that researchers gather may not encompass every species and individual, but this data can then be utilized to approximate the entire community. In this case the appropriate methodology to measure biodiversity is the quadrat method.

Procedure

Study site: See attached handout for Portland wild areas. Pick a good one, as you will be visiting this site in Lab 3 as well.

Materials- string, plot marker flags, and a tape measurer.

Method

The quadrat method uses plots of fixed size and shape as sampling units. Plots can be square, round or rectangular. In gathering data, many small samples are more informative than a few larger ones. The position of plots surveyed should be determined randomly to eliminate bias. To establish a plot choose a base point and mark with a flag marker. Then measure the appropriate distance between points and establish a plot by laying string in between the two points. Do the same to establish your chosen shape (e.g. a square.) You can also measure out a piece of string to the correct dimensions prior to arriving in the field. The suggested number of plots is four. If you are planning on circular plots, the diameter should be 0.5 meters (1.6 feet) and a square plot should have each side about 0.88 meters (2.8 feet). It might be a good idea to space out the plots to eliminate bias and compare their composition.

Within each plot count the number of plants representing each species (you don't have to know species name, just assign each individual species a code- e.g. grass like species 1.) Record the number of each species per plot in the handouts provided to you with this lab. Also record clumped, even, or other kinds of distribution found in each plot and associate this distribution with species type.

Assignment

- State the objective and explain how this objective was achieved-1 page (include purpose of assignment, establish importance of the issue).
- Include a description of your site and what you specifically did (i.e. materials and methods)-1 page.
- Finally, answers to the questions attached to this laboratory-1 page.
- Also attach to the report all data sheets, with calculations and sketches of plots.

Analysis Questions

- 1) Based on the relative density of each species, which plant was the most dominant? Do you think the study area you chose is high in biodiversity? Explain.
- 2) According to the relative frequency of each species, are the plants in the community uniformly distributed, randomly distributed, or clumped in groups?
- 3) Are there any features or characteristics of the environment (moisture, shade) that might lead to the distributions you observed?

Reports submitted without your name, class, subject and date will not be accepted.

Include the following points in your report

Presentation: Proper heading and subheadings (0.25)

Grammar, spelling, complete sentences (0.5)

Depth of analysis (0.25)

Importance of biodiversity (1)

Purpose of assignment (1)

Importance of measuring biodiversity (1)

Apparatus used (0.5)

Methodology, include the chosen area (1.5)

Observation, including data sheets (2)

Sketch of plot, to scale (0.5)

Analysis of observed results (1.5): see questions above

List of Portland's natural areas:

Area name	Location	Features	Directions
Smith and Bybee Lakes	N. Portland	Western Painted Turtles, trail and water access	2.5 mi W of I-5 on N. Marine Dr., or access off N. Portland Road
Oxbow Regional Park	8 miles East of Gresham	Access to Sandy River, 15 miles of trails, Roosevelt Elk. \$3 per car	E on 84 to exit 17 (Troutdale), go past truckstop to 257th, turn right and go 4 miles to Division, turn left and follow signs to park (6 miles)
Tryon Creek State Park	SW Portland	nature center, trails	I-5 to Terwilliger Blvd. Exit, S about 1 mile past Northwestern School of Law
Tualatin Hills Nature Park	Beaverton	marshes, meadows, wetlands, forest	15655 SW Millikan Blvd, access off SW 170th
Powell Butte Nature Park	connected to Springwater Corridor	extinct volcano	off SE Powell Butte at SE 162nd Ave.
Jackson Bottom Wetland Preserve	Hillsboro	winter migrations of up to 15,000 aquatic birds; tundra swans, bald eagles, great blue herons, short-eared owls	South from Hillsboro on 219, about 7 blocks past Baseline, next to the wastewater treatment plant
Cooper Mountain and Clear Creek	Washington County		
Beggars-tick Wildlife Refuge	SE Portland	wetlands with diverse native plant community	SE 111th, just north of Foster, accessible from the Springwater Corridor
Howell Territorial Park	Sauvie Island	Howell lake, Bybee House, agricultural museum	1 mile from Sauvie Island Bridge

Hampton Old Growth Forest	NW Portland	Patch of old growth forest in comparison to planted forest	about 15 mi NW on Highway 30, turn left on McNamee Rd, Park at the orange gates
Balch Creek	NW Portland in Macleay Park	beautiful creekside trail that connects to Wildwood Trail	head W on Vaughn St., turn left on NW 25th, turn right onto NW Lovejoy, which turns in Cornell Rd. Continue through two tunnels and Macleay Park is on the right.
Marquam Natural Area	SW Portland	part of Portland's 40-Mile Loop; views from Council Crest, access to Washington Park	go toward OHSU on Sam Jackson Parkway, on right after the Carnival restaurant
Tualatin River National Wildlife Refuge	Sherwood, Scholls	on the Tualatin River, will have facilities	I-5 S to Tigard/Newburg Exit 294; go straight to SW Beef Bend Rd., then turn R and travel 3 miles
George Rogers, Waluga, and Springbrook Parks	Lake Oswego	natural areas	
Oregon Zoo	SW Portland	zoo	Hwy. 26 W to Oregon Zoo exit
Forest Park	Portland's West Hills	traversed by Wildwood trail and the 40-Mile Loop	from Macleay Park on NW Cornell Rd., just east of the Audubon Society of Portland Headquarters
Scappoose Bay		Kayaking center	
Greenway Park	Beaverton	Fanno Creek Watershed	Access off Hall Blvd.
Fanno Park	Tigard		
Gabriel Park	SW Portland		SW Vermont and 45th
Oaks Bottom Wildlife Refuge	SE Portland	163-acre wetland system	SE 7th Ave, park in the lot at the north end of Sellwood Park
Tualatin Hills Park and Recreation area	Beaverton		SW 158th and Walker
Bethany Meadows Park	Washington County		NW Kaiser and Springville
Mt Tabor Park	NE Portland	extinct volcano, songbird migration	from SE 60th, several streets enter the park
Blue Lake County Park and Chinook Landing	NE Portland	intensely managed with little habitat diversity, but lots of wildlife	Between Sandy Blvd. and MarineDr., west of 223rd Ave. Entrance on Blue Lake Rd.
Reed Canyon and Crystal Springs	SE Portland at Reed College	green herons, belted kingfishers, beavers, river otters, muskrats, rhododendron gardens	Reed campus bordered by SE 39th, SE Woodstock, SE 28th, and SE Steele
Audubon Society	NW Portland	Pittock, Founders, and Collins Sanctuaries with trails	NW Lovejoy to 5151 NW Cornell, near 53rd Ave.

Sauvie Island Wildlife Area	NW Portland	seasonal lake, high diversity of birds	10 miles NW out highway 30, cross the Sauvie Island Bridge, go north 2 miles, headquarters is on right just past Reeder Road
Shillapoo Lake	Vancouver, WA		N on 5, West through Vancouver on 501
Ridgefield National Wildlife Refuge	Ridgefield, WA		N on 5 to exit 14, W on 501 to Ridgfield, 2 options, check at the headquarters

Internet Activity for the day:

In-class group assignment:

Discuss the following questions within your groups and share your views with the rest of the class.

Group 1:

- What are coral reefs? Give e.g. within and outside US.
- Why are they important?
- What are the problems that exist and what are the solutions, if any?
- Mention 2 initiatives being taken within the US to protect coral reefs

Group 2:

- Why is iron important to living beings?
- Why does the question of 'pumping iron into the ocean' arise?
- What would be the impact of increasing iron in the ocean bodies and how would this be achieved?
- What are the criticisms faced by this concept?

Group 3:

- Ivory billed woodpecker: Give a brief outline of its habit and habitat
- Why is this bird significant?
- Where was it rediscovered and what is currently known about the bird?
- What do you think will be the impact of significant decreases in bird populations of the Earth? For example, will insect populations most likely increase?

Group 4:

- What are the factors that have contributed to the decline in salmon stocks in the Snake River basin?
- How has damming the lower Snake River affected endangered salmon?
- Compare the benefits: Dams and Reservoirs vs. Restored River
- What are your views on this issue?

Group 5:

- What are the different types of whales?
- Who is presently hunting whales?
- What is Australia's policy on whaling?