Biodiversity investigation

Field trip experiment

Xunwen Chen
19 April 2021

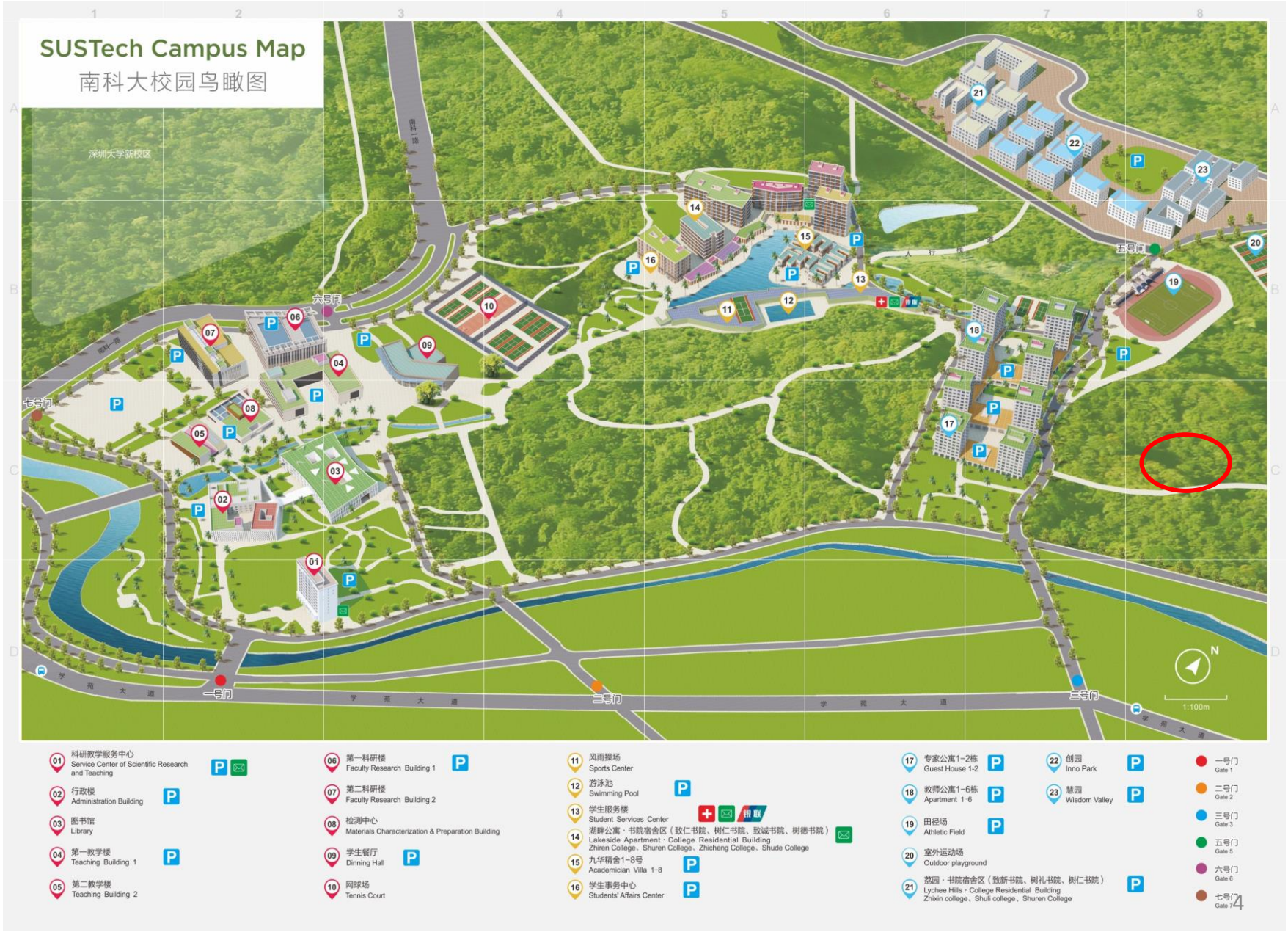
Objectives

- Learn to use two basic ecological sampling methods
  - Line transect
  - Quadrat

Grouping

- One person in one group

Location


SUSTech Campus Map
南科大校园鸟瞰图
深圳大学新校区
南科一路
人行林荫路
六号门
五号门
七号门
一号门
二号门
三号门
学苑大道
1:100m
N
01 科研教学服务中心 Service Center of Scientific Research and Teaching
02 行政楼 Administration Building
03 图书馆 Library
04 第一教学楼 Teaching Building 1
05 第二教学楼 Teaching Building 2
06 第一科研楼 Faculty Research Building 1
07 第二科研楼 Faculty Research Building 2
08 检测中心 Materials Characterization & Preparation Building
09 学生餐厅 Dinning Hall
10 网球场 Tennis Court
11 风雨操场 Sports Center
12 游泳池 Swimming Pool
13 学生服务楼 Student Services Center
14 湖畔公寓·书院宿舍区（致仁书院、树仁书院、致诚书院、树德书院） Lakeside Apartment · College Residential Building Zhiren College、Shuren College、Zhicheng College、Shude College
15 九华精舍1-8号 Academician Villa 1-8
16 学生事务中心 Students' Affairs Center
17 专家公寓1-2栋 Guest House 1-2
18 教师公寓1-6栋 Apartment 1-6
19 田径场 Athletic Field
20 室外运动场 Outdoor playground
21 荔园·书院宿舍区（致新书院、树礼书院、树仁书院） Lychee Hills · College Residential Building Zhixin college、Shuli college、Shuren College
22 创园 Inno Park
23 慧园 Wisdom Valley
一号门 Gate 1
二号门 Gate 2
三号门 Gate 3
五号门 Gate 5
六号门 Gate 6
七号门 Gate 7


注意防蛇 爱护环境 请勿随意丢弃垃圾
Watch out for snakes. Please don't litter and help keep the environment clean
MAP
Wetland Park
步道公园平面图
南方科技大学













2018-2019

2019-2020

2019-2020


2019-2020


2019-2020


2019-2020

Things needed for each group

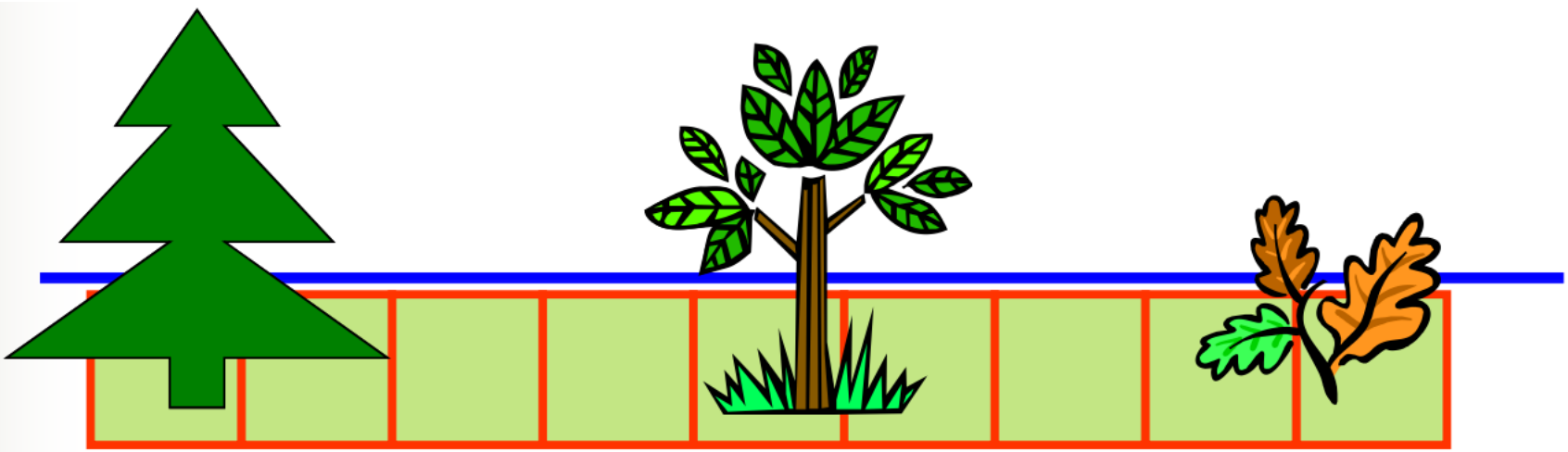
- 10 m measuring tape × 1
- Pen × 1
- 50 cm × 50 cm quadrat (prepared by students)
- Printed worksheet

1. Long shirt, trousers, long socks, strong shoes
2. Beware of animals like snakes
3. Bring drinking water
4. Protection from sunlight
5. Bring mosquito spray
6. Others

In the field

- Set line transect (along the gradient)
- Collect plant data and record on datasheet
- Use quadrat along the transect (belt transect)
- Collect invertebrate data and record on datasheet

Belt transect



quadrat

line transect

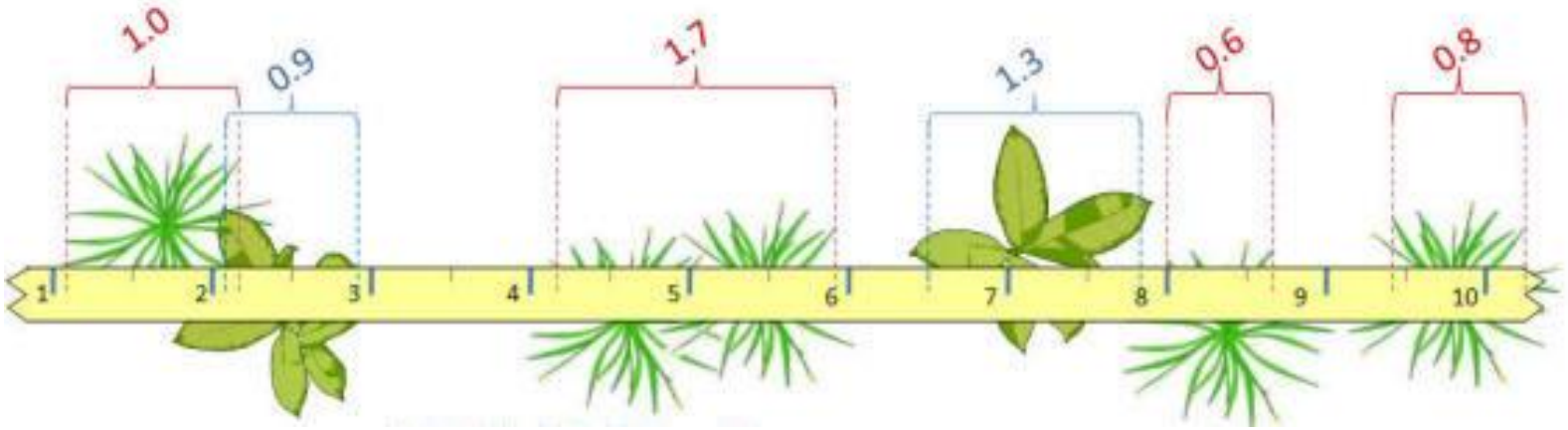
Two common sampling techniques

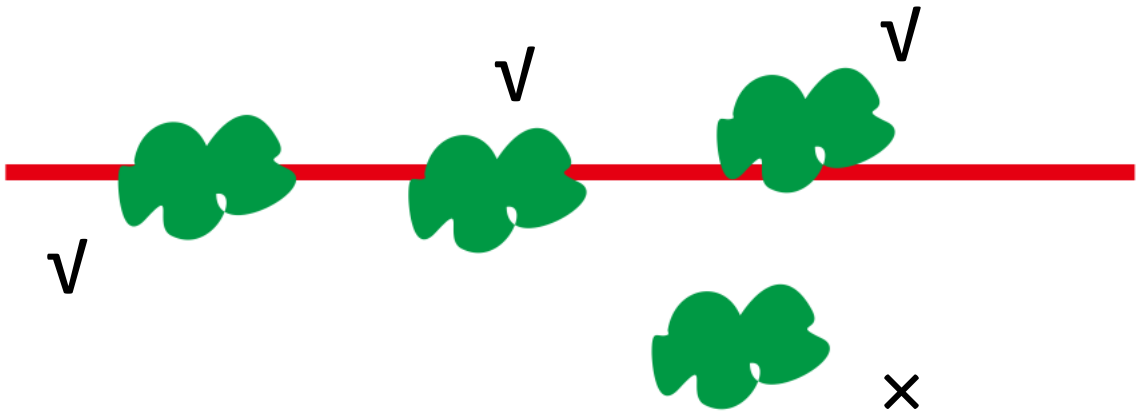
Quadrat

- Square quadrats can be any size. Common sizes include: 25 by 25 cm, 50 by 50 cm, 1 by 1 m and similar sizes in feet.
- Counting the number of objects within the unit area of the quadrat

http://www.webpages.uidaho.edu/veg_measure/Modules/Lessons/Module%205(Density)/5_2_Plot-Based_Techniques.htm

Line transect



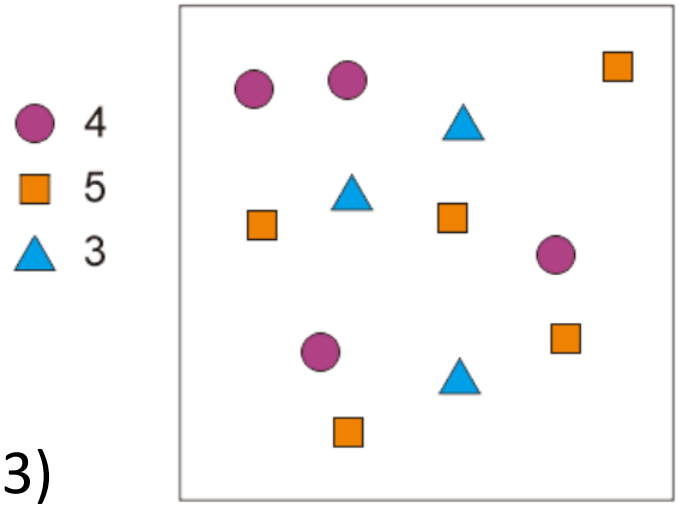


View from the top

Calculation

For quadrat

- Relative density = no. of individuals of a target species/total no. of individuals of all species



Relative density of ● = 4/(4+5+3)

For line transect

- Relative density (same as quadrat)

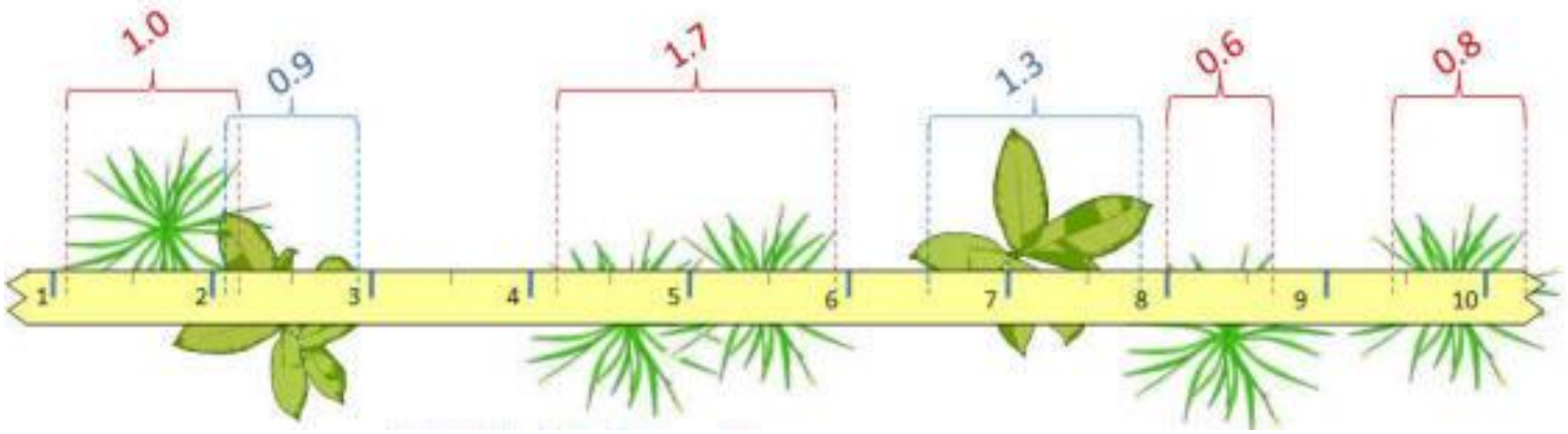
- Relative frequency = no. of intervals in which a target species occurs/total number of intervals for all species

no. of intervals containing  = 2

total no. of intervals containing all species = 6

relative frequency = 2/6

- Relative dominance = total intercept length of a target species/total intercept length of all species

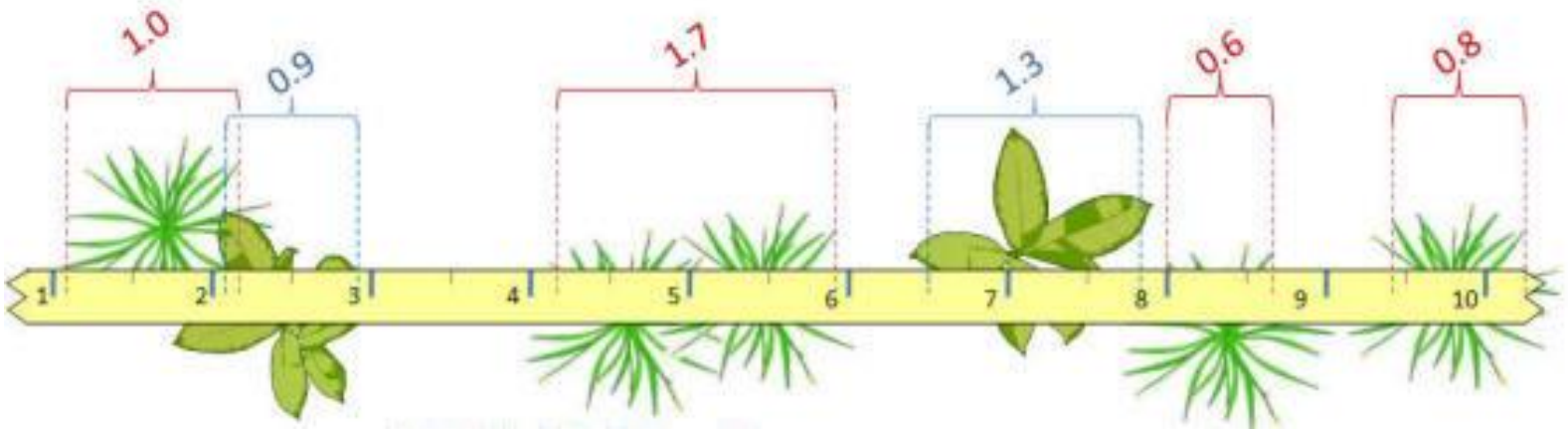


Relative dominance of tree = (0.9 + 1.3) / (1.0 + 0.9 + 1.7 + 1.3 + 0.6 + 0.8)

Try to calculate it for grass

- Important value = relative density + relative frequency + relative dominance

- Shannon index = - Σ Pi Ln (Pi)
- Pi = relative density of species i
- Ln is natural logarithm



P grass = 5/7 = 0.72
P tree = 2/7 = 0.29

P grass Ln (P grass) = 0.72 Ln 0.72 = -0.24
P tree Ln (P tree) = -0.36

Shannon index = - (-0.24 - 0.36) = 0.6

The higher the index, the better the biodiversity

Report

1. Calculate the followings for each plant species
a. relative density
b. relative frequency
c. relative dominance
d. importance value
e. Shannon index (all species)

2. Calculate density of each animal/invertebrate species
a. in each quadrat
b. in total

3. Draw conclusions

References

- Cunningham, W.P., Cunningham, M.A., 2009. Environmental Science: A Global Concern, 11st ed. McGraw-Hill, New York.
- Schulze, E.-D., Beck, E., Müller-Hohenstein, K., 2005. Plant ecology. Springer, Berlin; New York.
- http://www.webpages.uidaho.edu/veg_measure/Modules/Lessons/Module%205(Density)/5_2_Plot-Based_Techniques.htm