

# Exploring Biodiversity a Field Study

## Outdoor/Indoor Activity

The following is an outline to assist in leading your class through “Exploring Biodiversity” a field study for grade 9 & 11 science students. The study is divided into 4 sessions, covered at your pace, utilizing both your classroom and a local park or outdoor green space.

**Note:** The “Exploring Diversity” resource package was developed for a park directed field study in Fish Creek Provincial Park. It visits two distinct ecosystems and a developed day use area for sampling and data collection. The video walks you through sampling in one natural area only. Please modify the data sheets in the resource package to suit your needs.

## Instructions - Session 1, Diversity Within Your Class

This activity will see students create a series of charts to define the diverse characteristics of their class. It is a way of demonstrating characteristics of biodiversity.

1. View video to the 1:07 time mark.
2. Ask your students to consider their classmates and think about things that are similar amongst them and different amongst them. You may want to start by simply asking and discussing physically observable characteristics such as:
  - Gender (be sensitive to how this is discussed)
  - Eye colour
  - Hair colour
  - Height
  - Ethnicity (be sensitive to how this is discussed)
3. Expand the discussion to include other elements such as:
  - Neighborhoods they live in
  - Clubs they belong to
  - Favourite music
  - Favourite school subject
  - Those with pets, cat, dog, or something more exotic
4. Using any combination of characters you define, ask students to create pie charts or bar graphs to illustrate how many of their classmates fall into certain defined groups. The more combinations you ask for the more diversity may be demonstrated.

### Materials:

- [Exploring Biodiversity Field Study Video](#)
- [Exploring Biodiversity Resource Package](#)
- [A Simplified Key to Native Trees & Shrubs](#)
- 10 metre Tape Measure
- 30 metre Tape measure or Rope
- Air Thermometre
- Compass

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- Ask your students to identify those characteristics that are most common in the class and those that are the most unique.
- This can then lead to or support further discussing the definitions of biodiversity (diversity of species, diversity of ecosystems, genetic diversity).

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## Outdoor/Indoor Activity

### Instructions – Session 2, Diversity Within Species

1. Watch video from the 1:07 mark to the 3:32 mark.
2. Make copies of the data sheets from the resource package for each student or group.
3. For this session, you will need to split your class into working groups and have an outdoor natural space to explore. You will need one 30 metre rope or tape measure plus a 10 metre tape measure for each group.
4. Find an area populated by a variety of trees and shrubs large enough to stretch out the 30 metre tape/rope. Instruct each group to create a 3 metre X 3 metre quadrat or square with their 10 metre tape measure from a spot along the 30 metre rope. Spread groups out along the length of the 30 metre rope. Group quadrats should not overlap.
5. Instruct students to observe and count the number of each individual tree and shrub species present in their quadrat. Students should record the number of distinct species and the number of individuals of each species. This will give them a sense of the diversity of species of trees and shrubs. At this point students need not know what the different species are, just be able to distinguish the differences that separate them.
6. Instruct students to select five individuals of the most common or numerous species they recorded. Students are to carefully examine these five individuals and record the following:
  - Similar characteristics observed in the five individuals.
  - Unique or dissimilar characteristics observed in the five individuals.
  - Evidence of any interactions with other organisms.
7. To identify the species students are observing you will need a few resources for them to utilize, but primarily an identification key for trees and shrubs. Identification keys are found in most field guides. To identify native trees and shrubs around Calgary, the “Simplified Key to Native Trees and Shrubs of Fish Creek Provincial Park” is a useful resource. See the activity “Dichotomous What?” page 6 in the resource guide to teach students about dichotomous keys. A few other field guides to try:
  - Trees and Shrubs of Alberta by Kathleen Wilkinson
  - Plants of the Western Boreal Forest & Aspen Parkland by Johnson, Kershaw, MacKinnon and Pojar

# Exploring Biodiversity a Field Study

## Outdoor/Indoor Activity

### Discussion

Once students have collected and recorded the required information, you can utilize it in a number of analyses back in the classroom.

- Create bar graphs and pie charts to show different aspects of diversity from their observations.
- Work up diversity indices – web search Simpson Diversity Index, Shannon Diversity Index, Species Richness, Species Evenness.
- Examine and identify interactions recorded. For example, “What animals or insects use the tree/shrubs?”

# Exploring Biodiversity a Field Study

## Outdoor/Indoor Activity

### Instructions – Session 3, Point Counts and Line Transects

Back in the same green space or natural area students will explore sampling techniques for collecting data on birds and mammals.

#### Bird Point Counts – Modified

1. Watch video from the 3:32 mark to the 6:15 mark.
2. Instruct students to spread out and find a spot to stand alone in silence.
3. Give them a set period of time (5 - 10 minutes) to stand, observe, and record all things bird. Birds they see and birds they hear. Utilize the circular chart from the “Exploring Biodiversity” data pages or create your own pages for students to record their observations.
4. If possible, do multiple counts and try them at different times of the day. Students do not need to be able to identify individual species of birds they simply need to distinguish between different species and record observations accordingly.
5. Follow-up by having students work to identify species based on their observations and using a variety of resources from printed field guides to online resources. A great resource is the [Cornell Laboratory of Ornithology](#).

#### Line Transects and Quadrats – Looking for Evidence of Mammals and Insects

1. Watch video from the 6:15 mark to the 8:43 mark.
2. Instead of running a 10 metre tape measure line as suggested in the video run the 30 metre rope into the natural area and have student groups set up 3 metre X 3 metre quadrats along the transect (rope) as in Session 2.
3. Have students walk the full 30 metre line observing approximately one metre on either side for all evidence of mammals. Have them record evidence such as tracks, scat, evidence of feeding, etc.
4. Have students examine their 3 metre X 3 metre quadrat for evidence of insect activity. Things to look for are the insects themselves, anthills, spider webs, feeding areas, etc.

Optional data to collect not discussed in the video:

# Exploring Biodiversity a Field Study

## Outdoor/Indoor Activity

5. Students can record temperature readings and wind observations as indicated in the data sheets.
6. Students can record information on the slope and measure aspect of slope (using the compasses) of their quadrat.

## Discussion

Once students have collected and recorded the required information, you can utilize it in a number of analyses back in the classroom.

- Create bar graphs and pie charts to show different aspects of diversity from their observations.
- Work up diversity indices – web search Simpson Diversity Index, Shannon Diversity Index, Species Richness, Species Evenness.
- Examine and identify interactions recorded. For example, “What animals or insects did students find evidence of and what were they doing?”

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### Instructions – Session 4, Human Impacts

People have a range of impacts on natural environments and therefore biodiversity. Urban landscapes do not lack biodiversity, but they certainly may have a reduced number of native and naturally occurring species than undisturbed natural environments. As in Session 3, students will use point counts and observations to record evidence of human impacts and development in the study area. Note that the video discusses doing transect sampling for human impact, but the new data sheets only include point counts and noting human impacts and development evidence.

1. Watch video from the 8:43 mark to the 10:50 mark.
2. Access the same local natural area park, green space or area of your school grounds as in Sessions 2 and 3 to do the sampling.
3. You can use the pages from the “Exploring Biodiversity” program data forms or create your own to suit.
4. The “Point Count” activity in this session is to observe and record all human impacts seen and heard from locations within your defined study area.
5. Have students identify and record all the various built infrastructure they observe in the area.
6. Ask students to create a list of questions or inquiries around human impact on environments and biodiversity to seek information to answer. Alternatively, you may ask students to generate inquiries from the observations they record. Some possible lines for inquiry:
  - What are some of the easily observed human impacts in a park setting?
  - Are these impacts designed and built (pathways, parking lots, kiosks, picnic tables)?
  - Are these impacts simply due to human use (litter, desire trails, noise)?
  - What benefits do selected human impacts or use observed have on biodiversity of the area?
  - What negative impacts do selected human impacts or use have on biodiversity of the area?

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### Discussion

After completing the above sessions students should have a higher degree of familiarity with the study area you utilized. Given the time they have spent and observations they have made ask students “If you could, how would you re-design the study area? “

Have students work with their group to come up with a plan for the area to redesign it to be more effective for our human uses of the space, but also more favourable for increased and healthier biodiversity.

The complexity of this project is up to you. You can make it as in depth or as quick and easy as you see fit to meet your needs. The idea is to have students re-visit their observations and information and to consider human use and natural biodiversity.