**ESS Internal Assessment 2017 Guidelines**

* You need to decide on a topic that you wish to investigate
* You CANNOT work in groups!! This is an INDEPENDENT assessment!!
* Below is the research question you can investigate if you are having difficulty coming up with your own topic

**To what extent do pH, nitrate, potassium, phosphate levels (choose ONE) in soil impact the biodiversity of plant species?**

* + Research why pH, N, P, or K is important to plants and what impacts levels of pH, N, P, or K in soil (fertilizers, pollutants, pesticides, etc.)
	+ For example areas prone to fertilizer run-off will have higher levels of nitrates. Research how nitrates impact plant growth. Choose 2 sites: 1. An area with high fertilizer run-off with known N levels, 2. An area that is relatively undisturbed with no or low fertilizer run-off with known N levels. You will test the nitrate levels of the soil from each location (Ms. Simmons has soil testing kits for you to use). Gather plant data (3-4 quadrats per site) and calculate Simpson Diversity averages for each site and compare results.
* If you want to do your own investigation, Ms. Simmons must approve it before you begin (see list below for ideas)
* Please remember that it has to relate to an **environmental issue** and that you are responsible for **obtaining your own supplies**
* Ms. Simmons has some supplies available for students to use but only a limited amount
* Please make sure that you reference the IA rubric during this entire process. There are also several examples with annotations on Ms. Simmons’ website.
* Look at pages 402-409 in your ESS textbooks to help guide you through this process
* You must come up with a relevant, coherent, and focused research question, a hypothesis, a rough outline on how you will execute your IA (bullet points are fine), as well as a list of supplies. EVERYONE must do this regardless if you are doing the one Ms. Simmons has suggested.
	+ **Due by 1/25 or 1/26**

Below are some example of possible topics to investigate:

* Indicator organisms

Investigate aquatic, terrestrial or air pollution in your city, town or college through the use of the presence or absence of indicator organisms (for example, lichens, mayflies).

* Zonation

After a preliminary field visit to a particular ecosystem, investigate the presence or absence of zonation patterns.

* Productivity

Investigate changes in productivity in different habitats of an ecosystem that you have visited. Measurements of productivity may have been taught by the teacher. The planning criterion can be assessed by the application of the techniques to the habitats.

* Environmental gradient

Use a sampling method to quantify the pattern and measure changes in an abiotic factor that is considered responsible for the gradient.

* Population growth curves

Design an investigation that will look at a limiting factor on plant, animal or fungi growth (for example, flour weevils, duckweed (Lemna), yeast).

* Succession

Investigate succession in an ecosystem of your choice. You could use your sampling skills to determine if the differences seen can be attributed to succession by comparing findings with literature regarding species expected in the area. (Note: This is only practicable if you are near abandoned fields, or that have access to fields whose history of clearing is known).

* Soil

Plan an investigation into one of these aspects of soil: (a) compaction, (b) soil conditioners, (c) wind reduction techniques or (d) cultivation techniques.

* Erosion due to run-off

Plan and carry out an investigation into the factors that affect sediment load in run-off.

* Diversity indices

Investigate differences in diversity for two or more different habitats.

* Rate of decomposition

Choose one of the following areas to investigate: (a) type of material, (b) level of pollution, (c) soil type, (d) temperature or (e) amount of moisture.

* Acid rain

Design an experiment to measure the effect of acid rain on either plants or building materials.

* Water pollution and Lemna growth

Investigate the growth of duckweed (Lemna) over time, given different conditions. Possible suggestions are: water type or a pollutant common in water bodies—oil, heavy metals, pesticides and fertilizers.

* Ultraviolet radiation

Design an experiment to look at the effects of ultraviolet radiation on plants or materials (for example, rubber, plastic).