



Grade 7 Science Outcomes

- Demonstrate the importance of choosing words that are scientifically appropriate (109-12, 109-13)
 - Specific terms addressed include ecosystem, abiotic, biotic, species, community, and habitat.
- Define and delimit questions to investigate in a local ecosystem (208-3).
 - Teachers could address the outcomes of the core laboratory activity “Field Trip to the School Yard” through engagement in this project.
- Defend a course of action to protect the local habitat of a particular organism (113-11)
 - Many of the outcomes in the “Environmental Action” topic of this unit can be addressed in this project. For example “recognize that humans have influenced the natural environment through pollution”.
- Recognize that a variety of groups and individuals are interested in protecting the environment (112-4, 112-8)
- Investigate the biotic and abiotic factors of a local ecosystem (306-3)
 - Practical science skills addressed include
 - Categorization of samples collected (human made vs. non-human made)
 - Measurement and categorization of samples collected (macro, meso or micro plastic)

Grade 7 Math Outcomes

- 7N3. Solve problems involving percentages from 1% to 100%
- The process of presence sampling and comparison of samples between testing areas also provides a basis for developing understanding of ratios which will support students’ acquisition of this concept in grade 8.

Grade 7 Technology Education Outcomes

- Unit 3 – Design Activity. In addition to addressing many of the outcomes in this unit, students could develop a communications solution relating to the data they collect.
- Students also have opportunity to engage in technology building (with simple and safe tools)

Grade 8 Curriculum

The grade 8 unit “Water Systems on the Earth’s Surface” provides an ideal backdrop to student involvement in this citizen science project. During a field trip to a coastal environment, teachers could reinforce many of the concepts covered in this unit. In addition, participation in this project provides a real life example of the effects of humans and technological on these environments. In addition, students can further refine their microscope skills in the identification of microplastics in their samples. This also provides an opportunity for the teacher to underscore the way in which advanced technology helps further our observations and subsequent understanding of our world.

Grade 8 Science Outcomes

- Describe some positive and negative effects of marine technologies on ocean species (113-2)
 - Teachers could expand on the issues related to fishing and other marine-based industries to include the use of various plastics (e.g., nets, ropes, containers, etc.). While not specifically discussed in the curriculum guide, discussion of non-marine industry sources of plastics (e.g., plastic bags, items from landfills, etc.) points out the impact on ocean species.



- Recognize that problems related to the oceans cannot be completely resolved using scientific and technological knowledge (113-10)
 - Discussion of the different types of materials from their sampling procedures should help students recognize the role for concerned citizens, the importance of addressing sustainable development, etc.
- Use a light microscope to produce a clear image of cells (209-3)
- Estimate measurements of cells viewed with a microscope (209-2)
 - During their analysis of their samples for microscopic items, students will expand their understanding of the importance of microscopy beyond the study of cells. Students can further refine their understanding of and skills of how to measure the size of items viewed with a microscope.

Grade 10 – 12 Science Curriculum

Participation in this Citizen Science project will provide senior high science students with the opportunity to consolidate and apply knowledge gained in previous science courses. It will also provide them with a framework to further develop the science process skills outlined in the GCOs of various curriculum documents.

From the perspectives of Science, Technology, Society and Environment (STSE) and sustainable development this project provides the opportunity to give the students a comprehensive view of a timely and relevant issue; that of marine plastics and their impacts on marine ecosystems. It also provides an opportunity to provide them with the skills and attitudes to become engaged citizens, proficient citizen scientists, and contribute to reliable scientific data.

Whether students engage in this project as part of their science class or as a member of an after school environmental or science club, they will experience a true 21st Century learning opportunity. Through their sampling of marine plastics on beaches or in water columns, analyzing the samples collected, and proposing courses of action to address the issues they encounter, students will be engaged in a real world activity that requires Critical Thinking, Problem Solving, Collaboration and Communication skills.

Specific Connections to Senior High Science Curriculum

Science 1206 – Ecology (2017 Pilot Version)

- Describe the mechanisms of bioaccumulation, and explain its potential impact on the viability of and diversity of consumers at all trophic levels. (outcome 87.0)
- Analyse the impact of external factors on an ecosystem (outcome 89.0)
- Explain why different ecosystems respond differently to short-term stresses and long-term changes (outcome 90.0)
- Explain how a paradigm shift can change scientific world views (outcome 91.0)
- Compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology (outcome 94.0)
- Propose a course of action on social issues related to science and technology taking into account human and environmental needs (outcome 96.0)



Science 2200 – Ecosystems

- Explain how a paradigm shift, with respect to environmental attitudes, can change scientific world views in understanding sustainability (114-1)
- evaluate relationships that affect the biodiversity and sustainability of life within the biosphere (NLS-1)
- analyze from a variety of perspectives the risks to society of a biodiversity loss (118-2)
- explain biotic and abiotic factors that keep natural populations in equilibrium and relate this equilibrium to the resource limits of an ecosystem (318-5)
- understand that biodiversity loss due to human activity adversely affects ecosystems (NLS-2)
- compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data (213-5)
- plan changes to predict the effects of, and analyze the impact of external factors on an ecosystem (331-6,
- analyze the impact of external factors on the ecosystem (331-6)
- work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise (215-6)
- evaluate individual and group processes used in planning, problem solving and decision making, and completing a task (215-7)
- compare the risks and benefits to the biosphere of applying new scientific knowledge and technology to industrial processes (118-1)

Environmental Science 3205

Unit 1 Introduction to Environmental Science

- Impacts of economy, environment, and society on sustainability
- Role of environmental monitoring
- Ecological footprint
- Eco-citizenship and environmental responsibility (individuals, industry, society)
- Importance of protecting species

Unit 2 Recreation in the Environment

- Ecological integrity – policy and processes

Unit 4 Water Use and the Environment

- Human impacts on water resources
- Marine ecosystems – impacts of pollution
- Marine debris (many outcomes)