Teacher(s)	John Moore, Nathanael Hsu, John O'Verko, Jeanne Wiemer, Maggie Parks, Jason Walker, Daniel Watkins, Megan Dora, Evan Zuzik	**Subject group and discipline**	Sciences: Biology		
Unit title	Population Ecology	**MYP Year**	Year 5	**Unit duration**	6 weeks (30 hours)

Inquiry: Establishing the purpose of the unit

Key concepts	Related concept(s)	Global contexts
Relationships	Sciences: Biology ✔ Interaction ✔ Environment ✔ Balance ✔ Energy ✔ Patterns	**Identities and relationships** We chose relationships as the context because most of Ecology is about unseen relationships, hidden from the naked eye. Students will begin to see the connections between themselves and the environment in ways they were not aware of previously.

Conceptual Understanding

Statement of inquiry

Ecological relationships are highly balanced; even minor changes within them can have great consequences.

Inquiry questions

Factual **How do organisms interact and relate to one another? Consider the differences between energy & matter.**
- Students will investigate how organisms interact with one another and their environment.

Factual **How do humans knowingly, and oftentimes unknowingly, impact the environment around them?**
- Students will understand that humans have both intended and unintended consequences on the environment.

Factual **Where does food and nutrients come from? Why are there limited trophic levels?**
- Students will be able to explain how energy flows through an ecosystem while matter and nutrients cycle in an ecosystem.

Factual **How does energy transfer between organisms?**
- Students will investigate how organisms interact with one another and their environment.

Conceptual **What ecological consequences does human development cause?**
- Students will understand that humans have both intended and unintended consequences on the environment.

Conceptual **How can humans manage their impacts on the environment?**
- Students will understand that humans have both intended and unintended consequences on the environment.

Conceptual **What causes equilbrium? What disturbs equilibrium?**
- Students will be able to explain how ecosystems always change as geological or biological conditions vary.

Conceptual **What happens when a population gets too big?**
- Students will be able to explain how populations grow with or without limitations.

Debatable **What responsibility do Americans have in protecting the global environment?**
- Students will understand that humans have both intended and unintended consequences on the environment.

Debatable **What is a healthy community? How does that affect each individual member of the community?**
- Students will be able to explain the factors that promote a healthy community.

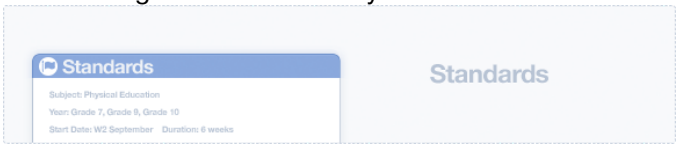
Objectives	Summative assessment	
A: Knowing and understanding • i. explain scientific knowledge • ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations • iii. analyse and evaluate information to make scientifically supported judgments. **C: Processing and evaluating** • i. present collected and transformed data • ii. interpret data and explain results using scientific reasoning • iii. evaluate the validity of a hypothesis based on the outcome of the scientific investigation **D: Reflecting on the impacts of science** • ii. discuss and evaluate the various implications of the use of science and its application in solving a specific problem or issue	*Outline of summative assessment task(s) including assessment criteria:* Examination S **Ecology Test** *(A)* Task S **Carrying Capacity Lab** *(C)*	*Relationship between summative assessment task(s) and statement of inquiry:* Test will evaluate the factual and conceptual questions. Case study (ex. White-Tail Deer) will assess students on understanding equilibrium and disequilibrium. Socratic seminar on different readings for the Human Impact Inquiry Qs.

Approaches to learning (ATL)

IB ATL CATEGORY	MYP ATL CLUSTER	SPECIFIC ATL SKILL	LEARNING EXPERIENCES
 Research	**VI. Information literacy skills**	**Finding, interpreting, judging and creating information** • Collect, record and verify data	Students will complete the carrying capacity lab in three parts: hands-on data collection with beans, population growth simulation and

		• Present information in a variety of formats and platforms • Collect and analyse data to identify solutions and make informed decisions • Process data and report results • Understand and use technology systems	math, then mathematical modeling using Excel. We teach them how to use Excel formulas.
 Thinking	**VIII. Critical thinking skills**	**Analysing and evaluating issues and ideas** • Gather and organize relevant information to formulate an argument • Interpret data	Students will make sense of data and apply it to make inferences about organisms and ecosystems.

Action: Teaching and learning through inquiry

Content	Learning process
Knowledge & Skills: • Organisms transform energy (flow of energy) and matter (cycles of matter) as they survive and reproduce. The cycling of matter and flow of energy occurs at all levels of biological organization, from molecules to ecosystems. At the high school level, the concept of energy flow as unidirectional in ecosystems is explored. • Use real-time data to investigate population changes that occur locally or regionally, with mathematical models of exponential growth model and logistic growth model. • Ecosystems tends to have cyclic fluctuations around a state of rough equilibrium. In the long run, however, ecosystems alwayas change as geological or biological conditions vary. 	**Learning Experiences** How will students know what is expected of them? Will they see examples, rubrics, templates, etc.? How will students aquire the knowledge and practice the skills required? How will they practice applying these? Do the students have enough prior knowledge? 1. Rubric for presentations provided before presentation. Students will also be able to evaluate each other using the same rubric. 1. Excel practicing (2 days: human pop'n webquest then graphing dog pop'n) 2. Video & concept map of Human Impact on Environment (Eutrophication, etc.) 3. Case studies (Global Warming, Populations, etc.) 4. Graphic organizer of hierarchy (ecosystem, etc) 5. Bookwork / WKSH on specific topics 6. Presentation on Ecology Topic (e.g. Cycling of Matter) 7. Socratic Seminar of Human Impact on Environment Pre-test says they don't know much about ecology. **Teaching strategies** How will we use formative assessments to give students feedback during the unit? What different teaching methodologies will be employed? How are we differentiating teaching and learning for all? Have we considered those learning in the language other than their mother tongue? Have we considered those with special educational needs?

	1. Students will self-assess formatively using the rubrics for their presentations. 2. HW will be graded and returned with comments/notes. 3. Some work will be gone over in class to improve understanding. 1. Direct instruction 2. Heterogeneous grouping 3. Random grouping 4. Student presentations & feedback 5. Independent inquiry
	Quiz F **Ecology Quiz**
	Describe how you will differentiate teaching & learning for this unit?

Learner Profile

Balanced: Like all ecosystems, students must balance the aspects of their lives. Going too far in any one direction can throw the whole ecosystem (person) off kilter.

International Mindedness

Current environmental events from around the world (coral devastation, rabbits in Australia, etc). How one nation's environmental policies affect the world.

Resources

Youtube: http://www.youtube.com/watch?v=cTOiKHw-K6I

Website: http://www.dnr.state.oh.us/

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
Need to post key concept, global context and statement of inquiry. Introduce it on Day 1, make connections throughout unit: "how does ____ apply to our concept of relationships?" The statement of inquiry may not match all of the inquiry questions, and humans and the environment isn't so heavy on	The concept of relationships is working really well - it was very easy to make connections with it near daily, even with the introduction of math formulas from our "new" standards. Not really sure how to naturally work in the global context here, but maybe it's a challenge because it so closely matches our key	

the "new" standards aligned with our PARCC assessment.	concept? Perhaps we could choose a different one to provide two points of connection with students. Regardless, relationships is solid.	