

Invasive Species: Disruptors of Energy Flow in Ecosystems

[Ien to introduce these concepts verbally to the class, with a visual display- pictures of native Yukon species on 8.5 x 11 posters that can be joined together in a chain of energy exchange. This 20-30 minute activity could be done outside in a field/ yard if the weather is nice]

Plants harness energy from sunlight, carbon dioxide and water via photosynthesis. Photosynthesis produces glucose- a sugar or carbohydrate. It is amazing to realize that almost all living things on Earth depend on plants to make this “first food”! Plants use the sugars they create to power their cells. Animals eat the plants to gain this power/ energy for their own cells. Animals eat other animals... that ate plants...to obtain energy. The dead bodies of all plants and animals supply energy to the living cells of decomposers in the soil. Decomposers provide needed nutrients to plants for their metabolic processes. The cycle is closed.

[Though this is a gross simplification...] In an ecosystem that has taken thousands of years to develop- not yet impacted by humans or invasive species- the interactions among all of the plants, animals and microorganisms have (more or less) reached equilibrium. Example: McClintock Bay wetlands on Marsh Lake, Yukon [a.k.a. Swan Haven].

Students will be given this Disclaimer: to my knowledge, no scientific study measuring biochemical energy exchange in Yukon ecosystems has ever been conducted... so this is a hypothetical examination of this region.

As species are introduced, students are given species posters to hold up and display for the class

Plants have adapted to grow alongside specific plants (Example: sedges, rushes, and pondweeds, algae). Research shows plant species communicate via pheromones/ chemicals. Each has developed strategies (adaptations) to solve problems posed by their neighbours- they have carved out a unique niche and secured their survival. These same plants have also developed strategies to ward off the known predators in their ecosystem. (Example, through evolution they grew hairs to ward off insects and developed chemical warfare (hard waxy leaves, toxins) to make themselves less palatable to herbivores like aquatic invertebrates). Some plants co-evolved with some animals to ensure their pollen or seeds were dispersed. Many animals depend on harvesting a specific food source (a plant or animal) at a specific time of year (Example- swans and ducks rely on pondweeds and aquatic invertebrates at McClintock Bay each spring and fall- a resting area during their long migrations). The native plants and aquatic invertebrates provide specific nutrients to the waterfowl.

What would happen if an invasive species entered the McClintock Bay wetland ecosystem?

[students provide suggestions]

Potential hypothetical answers: Since each plant has a unique “signature” of chemical compounds (nutrients, toxins) and energy, an invasive plant with a different signature could disrupt the energy transfer through the entire ecosystem. The aggressive Eurasian milfoil may outcompete native pondweeds and not provide the needed nutrients to native aquatic invertebrates. If the inverts die off, the food source for the ducks is lost during their migration. Etc. There are many scenarios that might be explored in this discussion.

Zebra mussels and Quagga mussels have decimated the Great Lakes- fish populations are completely altered and the aquatic invertebrate population has declined due to the loss of food. If these mussels arrive in the Yukon, they could completely change Yukon wetlands.