



## *Attack of the Purple Loosestrife*

**Overview:** Wild rice is a keystone species in the ecosystem. If it were removed, many other species would be negatively impacted. In our region, it is being threatened by a number of different factors, a couple of which, purple loosestrife and Canada geese, will be covered in this lesson. Students will act out a small-scale ecosystem in order to learn about the issues facing wild rice in our area.

**Subject Areas:** Science

**Grade Levels:** K-5, 6-8

### **Objectives:**

- Students will be able to define native species and identify wild rice as such.
- Students will be able to define keystone species and identify wild rice as such.
- Students will be able to define invasive species and identify purple loosestrife as such.
- Students will demonstrate the effect an invasive species can have on native species.
- Students will graph the effects of predators and invasive species have on wild rice.
- Students will observe, analyze, and discuss those effects.
- Students will develop some solutions to these things impacting wild rice.

### **Topics:**

Animals, Ecology, Plants, Water

### **Great Lakes Literacy Principles:**

1. The Great Lakes, bodies of fresh water with many features, are connected to each other and to the world ocean.
5. The Great Lakes support a broad diversity of life and ecosystems.
6. The Great Lakes and humans in their watersheds are inextricably interconnected.
8. The Great Lakes are socially, economically, and environmentally significant to the region, the nation and the planet.

### **Materials:**

- Boundary Markers (i.e. cones, backpacks, PFDs, etc., anything highly visible)

- Poker Chips (or some other type of token)
- Count down timer of some kind (stop watch, phone, watch, etc.)
- Field white boards and markers ( or some other means of data collection and graphing)

**Brief Background (key vocabulary is bolded):**

Wild rice is a **keystone species** in our region. This means that if it were removed from the ecosystem, the effects on other species would be greatly impacted and the ecosystem itself would change drastically. It is also a very important part of the Ojibwe cultural history of our area. It is a **native species** in this region, meaning that it is here due to natural processes with no human intervention. It is indigenous. Other species of plants have moved into the wild rice area and are impacting its ability to thrive. One such plant, purple loosestrife, arrived from Europe (because it has beautiful flowers) and has no natural predators in our region. It is also an emergent aquatic plant and is outcompeting wild rice for resources. Purple loosestrife is referred to as an **invasive species** because of its role in the ecosystem. An invasive species is one that is has been brought in by people and outcompetes native plants. Purple loosestrife meets both of those criteria. An additional threat to wild rice that is put into play in this activity is the Canada goose. An increase in the population of geese in the area is putting a lot of pressure on the wild rice crop. During wild rice's floating leaf stage, geese will eat the new, green leaves off the shoots before they stand up, effectively crippling the plants ability to thrive. These are a couple of factors that are effecting the wild rice in our area. Other factors not addressed here are human impact, water quality, and other invasive plants.

**Procedure:**

1. Before your students arrive, get your rectangular game area set up. There is not a required amount of space but it needs to be large enough to allow participation for your whole group at times but small enough that a person walking through the game area cannot avoid everyone at any one time.
2. Now you will need to line up your class and start designating roles for your students. Be sure to explain the role each thing plays in the ecosystem. The activity will progress in stages so that all your students will be able to participate. The roles are:
  - a. **Sun (energy source):** This person walks back and forth the long way through the “wild rice bed” handing out tokens as they are gently tagged by plants.
  - b. **Wild Rice Plant (native species, keystone species):** This person must stand with both feet planted on the ground but will be able to spin around in place and reach out to the sun to get a token of energy. If they move their feet, they have been uprooted by a boat or a carp and they are out of the game for now. At the end of each round, the plants that have collected 5 or more tokens (enough energy to seed) can bring another person in to be a wild rice plant in the next round. They can bring in one person per 5 tokens they collect (5 tokens = 1 person, 10 tokens = 2 people, etc).
  - c. **Canada Goose (predator, native species):** This person walks back and forth the short way through the wild rice bed. As they walk, they can gently “peck” the plants. Each peck takes one token away from the plant. If they are able to collect 10 tokens (enough energy to breed), they can bring in another person to be a goose with them. Additionally, the goose only eat the rice plants, they do not eat loosestrife.

- d. Purple Loosestrife Plant (invasive species): This person must stand with their right foot planted on the ground at all times. They can rotate on that foot but it must not move. If their foot moves, they have been uprooted and are out of the game for now. As with the rice plants, if the loosestrife plant collects 5 tokens at the end of the round, in the next round they can bring in another loosestrife plant per 5 tokens collected.
  - e. Local aquatic ecologist(s) (observer/data collector): This person or people, will collect data at the end of each round, before the start of a new round. This will include, number of wild rice plants, number of loosestrife plants, number of geese. This data will then be graphed according to rounds.
3. The game is conducted in timed rounds and you can do as many rounds as you would like.
- a. Round 1: You need to have a sun and 5 wild rice plants. Place your 'plants' relatively spread out so that the 'sun' can pass between them easily. The sun will walk back and forth along the long axis of the game area for 2 minutes (or another fixed amount of time as seems appropriate for your group). At the end of the 2 minutes your local aquatic ecologist(s) will come out and survey the plants to determine if they have enough energy (5 tokens) to seed a new plant. If so, bring out the new rice plants.
    - i. Game Notes: Make sure the student in the sun role does not attempt to avoid everyone, this will make for a long, unproductive activity. Also, keep an eye out for overly aggressive tagging. The sun must keep moving. Only one token per tag (i.e. the plant is not allowed to quickly tag the sun twice as they pass by and collect 2 tokens.)
  - b. Round 2: Introduce the Canada goose explain the rules for the goose. The goose will walk back and forth along the short axis of the game area. The goose may tag the plants to collect their energy, one token per tag. The sun will walk back and forth along the long axis of the game area handing out tokens as they are tagged by plants. The goose does not get to tag the sun directly for a token. Both the goose and the sun must keep moving. They are not allowed to stop at a plant and continually give and/or take tokens from that plant. Again, the round lasts for 2 minutes (or your designated amount of time). At the end of the round, your ecologist(s) come out to assess the situation and determine if more geese or plants get to come out.
  - c. Round 3: Introduce purple loosestrife to the game and explain the rules for purple loosestrife. Depending on how many wild rice plants you have on the game area, add two fewer than the wild rice plants you have (i.e. if you have 7 wild rice plants, add 5 loosestrife; if 5, then 3; etc.). The round will run like the previous 2 round ran. After the round is over, the ecologists will assess and collect data. The same rule about seeding applies to the purple loosestrife plants so if they collect 5 tokens, they seed and can bring in a new plant for the next round.
  - d. Round 4 and beyond: At this point, you can continue with as many rounds as you would like. Subsequent rounds will be conducted like round 3 was conducted. No new elements are added and no elements are taken away. At this point, it will be about data collection and the changing structure of the wild rice bed.

4. At this point, you can gather your class somewhere outside or bring them back inside. Begin this portion with a discussion of the data collected. Pose observation questions to the students, such as:
  - i. What happened when it was just wild rice?
  - ii. What happened when the goose came into the game?
  - iii. What happened when purple loosestrife came into the game?Then move into other connective questions, such as:
  - iv. What does this mean for wild rice?
  - v. Do we need to help protect wild rice?
  - vi. What can we do to help wild rice?
5. During the discussion, direct them back to the data collected by the ecologists as evidence for their observations and answers. Make use of the white boards to graph and display the data for the class to see. Ask them to point out changes, similarities, differences, etc. In short, get them into the data produced as a means of demonstrating changes. This also a good time to refer back to the key vocabulary (keystone species, invasive species, native species) and check their knowledge.
6. Now that they are familiar with the data and what's happening out in the field, challenge them to come up with solutions to these problems facing wild rice. They can work independently or in small groups to come up with two different solutions for the geese and two different solutions for the purple loosestrife.
7. At this point, younger, elementary aged groups can just tell you about their solutions, perhaps write down or draw out their answers to show you how they might look/work.
8. If you are working with an older group (6<sup>th</sup>-8<sup>th</sup> grade, perhaps), have them write out or draw out what their solutions will entail. Have them answer some or all of the following questions:
  - i. What is your solution?
  - ii. How will you make that solution happen?
  - iii. What do you need to make it happen?
  - iv. Who might you need to work with to make it happen?
  - v. Where will the solution be implemented?
  - vi. How long might it take to implement?
9. As a wrap up for the lesson, point out that these are ongoing issues that scientists are dealing with and for which they are coming with solutions. The work your students are doing has the possibility of informing the work of current researchers and land managers. These are real problems without clear cut solutions and they can help out.

Teacher Reflection:

*Please find "comments" section on the curriculum page.*