

Name _____ Class _____ Date _____

Should the Common Reed be removed from Iona Marsh?

For years, land managers have been working to remove the common reed for a number of reasons. Although the common reed (*Phragmites australis*) is a native plant across most of the northeastern United States, once it becomes established in an area, it acts as an aggressive invasive. It expands rapidly and usually forces out other types of vegetation, including *Typha angustifolia* (cattail), which usually occupies such marshy areas. *Typha* is usually preferred in marshes because it often supports higher biological diversity. However, there are a number of reasons why *Typha* may not be the “best” plant for a marsh—during this activity and the subsequent reading, you will be able to draw your own conclusions. Should the government spend money on restoring Iona Marsh to its ‘pre-reed’ state? You decide!

Part 1: In the first part of this activity, you will look at vegetation maps of Iona Island, which is located in the Town of Stony Point in Rockland County, six miles south of West Point. Using the transparent overlay of boxes, count the number of boxes that are completely covered by *Phragmites* (pink) and *Typha angustifolia* (green) from 1991, 1997, and 2005. Write your results here:

	# boxes of <i>Phragmites</i>	# boxes of <i>Typha</i>	% of vegetation that is <i>Phragmites</i>
1991			
1997			
2005			

Based on your observations, what can you say about the changes at Iona Island since 1991? _____

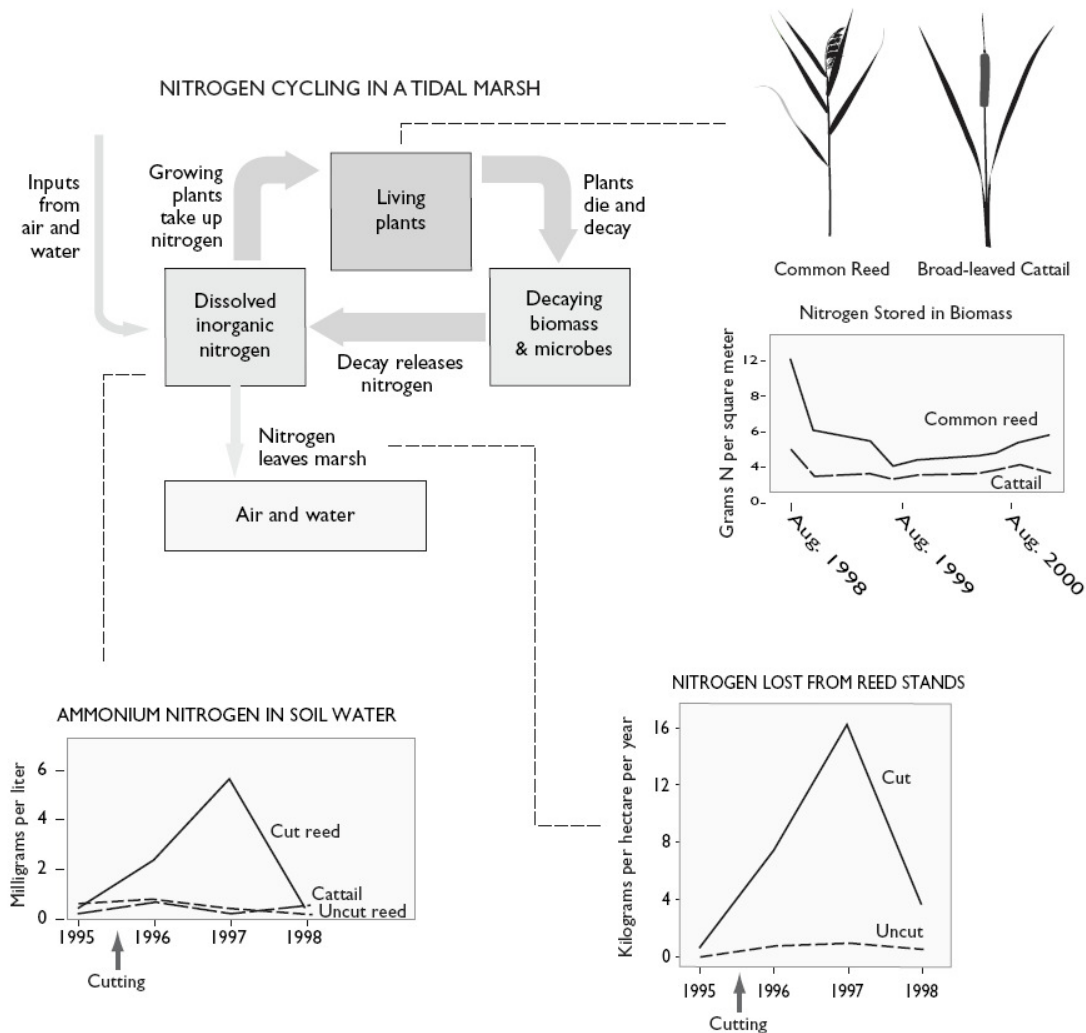
Part 2: On the attached sheet you will find two charts showing information about the bird population at Iona Island and three other Hudson River marsh areas: Constitution Marsh, Tivoli Bays, and Stockport Flats. None of these other marshes has seen an increase in *Phragmites* like that of Iona Island. Based on the data and your observations from Part 1, answer the following questions:

1. Which bird species is the most common at Iona Island?
2. How does this differ from the bird species found at the other marshes?
3. At which marsh do you find the greatest variety of birds?
4. Researchers also looked for nesting sites. What do the results of the nesting survey tell you about the diversity of bird species at Iona Island?
5. Why do you think there is such a different bird population at Iona Island? What other things might influence the bird population besides the presence of *Phragmites*? What else would you like to know about the marshes in order to decide if the invasive species has caused the change in species diversity?

Part 3: Scientists are concerned about marshes and other wetland areas, not just because of the bird populations but also because wetlands perform important ecosystem services. They act as a water filter, removing excess nitrogen from the water supply and allowing it to be used biologically by plants. If wetlands are destroyed or altered, this capacity changes. Currently, most wetlands are a 'sink' for nitrogen, which means they absorb more nitrogen than they release.

Scientists decided to see what would happen when they removed some of the *Phragmites* from a marsh area. They sampled before and after the removal, returning to the study site for several years to measure the long-term impact of reed removal.

The graph at the bottom left shows the difference in the amount of ammonium nitrogen that is in the soil water (porewater) of the marsh in areas that have been cut, areas that haven't been cut, and an area that only has cattails. The graph at the bottom right shows the amount of nitrogen lost from cut and uncut reed, with cutting occurring in the summer of 1995. The third graph in the upper right hand corner shows the difference over time between nitrogen that is stored in two different types of plants: common reed and cattail.



Based on this information, answer the following questions:

1. Based on the diagram, explain how nitrogen moves through a tidal marsh in your own words.
2. Look at the graph showing the amount of ammonium in soil water. In which plant, and at what time, did the ammonium levels increase the most? Why do you think this occurred? How long did it take for the ammonium levels to return to normal? Was this change permanent or temporary (a *bend* or a *break*)?
3. Look at the graph showing the amount of nitrogen lost from common reed stands. How did nitrogen loss change when *Phragmites* was removed? Was this change permanent or temporary?
4. Finally, look at the graph that explains nitrogen stored in the biomass of two different plants, common reed and cattail. How do these two plants differ in their ability to store nitrogen? Which plant stores more nitrogen? What implications does this have for removing a plant from the marsh?
5. Based on these two charts, what can you conclude about the way nitrogen behaves in a marsh where *Phragmites* has been removed?

Part 4: Reading

For homework tonight, read the article by Erik Kiviat, Executive Director of Hudsonia, a not-for-profit organization that works to educate people about the biodiversity in the Hudson region. Once you have completed the reading, write a one-page summary of your response to this question:

Should we spend money on removing common reed from Iona Marsh? Why or why not? Think about what would replace the reed plants, and whether this would cause the bird populations to rebound or not. How hard is to remove reed? What types of management options are there for removing and controlling the plant? What are the implications of eliminating the reed, if it means using a chemical on the marsh? Be sure to reference the research you completed in class as well as the reading. Finally, conclude by thinking about what else you would like to know in order to determine what action to take regarding the common reed.

References:

- Findlay, S., P. Groffman, and S. Dye. 2003. Effects of *Phragmites australis* removal on marsh nutrient cycling. *Wetlands Ecology and Management* vol 11: 157-165.
- Kiviat, Erik. 2007. What reed (*Phragmites*) ecology tells us about reed management. *News from Hudsonia*, Vol 21, No 1.
- Wells, AW, Nieder WC, Swift BL, O'Connor KA, Weiss CA. (2008) Temporal changes in the breeding bird community at four Hudson River tidal marshes. *J. of Coastal Research*. (in press).