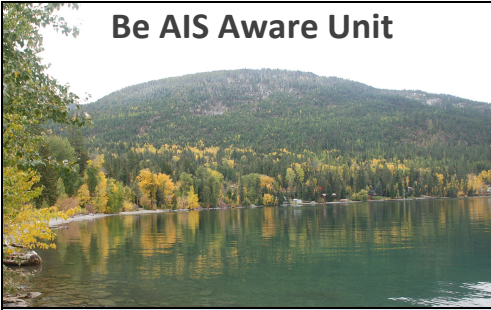


## Be AIS Aware Unit



# Managing AIS

*Do you ever wonder how local community members are impacted by AIS?*

### ◆ Grade Level

Middle School

### ◆ Subject Areas

Environmental Science,  
Economics and Human Impacts

### ◆ Key Topics

Aquatic invasive species,  
economic impact, societal  
impact

### ◆ Duration

Preparation Time: 5 min  
Activity Time: 30 min (50  
minutes w/economics  
extension)

### ◆ Setting

Classroom (groups)

### ◆ Skills

Reading and sharing  
information

### ◆ Standards

#### **Common Core:**

WHST.6-8.9: Draw evidence from  
informational texts to support  
analysis, reflection, and research.  
CCSS.ELA-Literacy.SL 6-9  
Present claims and findings,  
sequencing ideas logically and using  
pertinent descriptions, facts, and  
details to accentuate main ideas or  
themes; use appropriate eye contact,  
adequate volume, and clear  
pronunciation.

#### MT Social Science Standard

#### Content Standard 1

Students access, synthesize, and  
evaluation information to  
communicate social studies  
knowledge to real world situations.

## Overview

- 1 Article read by each group
- 2 Minutes to share what they learned
- 3 People per group

Each small group will have 15-20 minutes to read one fact sheet and watch one short video about the impacts of Aquatic Invasive Species (AIS) on various stakeholders in Montana. They will prepare and give a short presentation to share with the class about their stakeholder.

## Objectives

Students will be able to:

- synthesize an article about AIS and economy and society.
- share information orally about the impacts of AIS on a variety of stakeholder communities.
- Learn about trade-offs to policy from a variety of perspectives.

## Materials

### **Activity**

- Six readings about the impacts of AIS on various stakeholders in the community.

## Advanced Preparation

- Copy the student readings or use the provided laminate copies
- Copy the student worksheets #1-2 (double-sided)
- Assign students to groups of three (or whatever is appropriate)

## Background

This is a short lesson providing students with the opportunity to learn about the impacts of AIS on a variety of stakeholders in Montana. The lesson challenges students to quickly read and synthesize this information into a short presentation to share with their classmates. There is an extension included to engage students with thinking about trade-offs (important in economics and sustainability science) for any particular action that impacts stakeholders.

## Vocabulary:

**Stakeholder:** a customer, employee, or community member who may be affected by or affects a local problem or issues.

**Tradeoff:** a balancing of factors all of which are not attainable at the same time.



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## Procedure

### ◆ The Activity (25 minutes)

- Place students in groups of three (or more depending on class size).
- Explain that each group will read and summarize one article about the impacts of AIS on various community members (stakeholders). Then, the groups will present two-minute summaries to the class.
- Assign or allow the students to select which article they will read. Pass out the student worksheets (#1-2).
- Allow students 15-20 minutes to read the article and prepare their presentation. The presentation should: 1) summarize the article/video and present key points; 2) discuss the economic or other societal impact of AIS; 3) provide one example of how this stakeholder relates to their life.
- As the presentations are being made, have the other students write down one or two things they learned about each stakeholder.

### ◆ Wrap Up (5 minutes)

- Have students share one or two things they learned about the impacts of AIS on various stakeholders, or continue with the economics activity.

### ◆ Economics/Sustainability Extension (20 minutes)

- Engage students with this scenario:
- Because of the ecological and economic damages connected with zebra and quagga mussels, managers decide to close Flathead Lake to all motorized boats to prevent their introduction. By adopting this policy, managers have reduced the risk of mussel introduction to Flathead Lake to nearly zero. Managers understand that some groups will be happy with this new policy while other groups will be very unhappy. Please discuss which groups will be better off (happy) because of the new policy and which groups will be worse off (unhappy) and why.
- POSSIBLE ANSWERS ARE PROVIDED BELOW, but your students may think of other groups/stakeholders affected by this policy. The main teaching emphasis should be that all decisions have consequences for a variety of stakeholders and managers are tasked with weighing the benefits vs. costs of any decision.
- Groups that will be better off if zebra and quagga mussels are kept out of Flathead Lake because motorized boats are no longer allowed on the lake:
  - SKQ Dam operators – the hydroelectric facility will not have to shut down their facility to clean infrastructure of mussels. Operators lose money when they shut down the dam because they are not generating electricity to sell.
  - Irrigators – farmers will not have to spend extra time and money cleaning and repairing gate heads, pumps, screens, and irrigation pipes.
  - County government – property values will not be negatively impacted, so revenue generation will remain steady. Services provided – fire and police protection, road and sewer maintenance, and public education – can be maintained at current levels.
  - Lakeshore homeowners – beaches will remain mussel-free, thus no foul odors or cuts from sharp shells, and property values will be protected.
  - Near-shore recreationists such as swimmers, beachgoers, and non-motorized boat owners (ex. kayaks, canoes, and stand up paddle boards) – mussel-free beaches mean no foul odors or cuts from sharp shells.
  - Anglers who don't use motorized boats or fish from shore – these anglers can expect to fish for the same fish that have been in the lake since the mid 1990s (post Mysis shrimp introduction).



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## Managing AIS

- Groups that will be worse off if motorized boats are no longer allowed on Flathead Lake to prevent the introduction of zebra and quagga mussels:
  - Motorized boat owners – these folks will no longer be able to enjoy the lake; instead, they must trailer their boats to another lake to use them. This will cost the boat owners additional gas money to get to the new lake.
  - Fishing guide companies – the guides will no longer take their clients to Flathead Lake to catch lake trout. Guides can take their clients to other lakes but it will cost additional gas money, and the clients might not like the other lakes as much as Flathead Lake.
  - Anglers who use motorized boats – these fishermen will need to trailer their boats to another lake to fish. This will cost extra gas money to go to another lake, and this other lake may be inferior to Flathead Lake in terms of scenery and fishing experience.

## Teacher Resources

### Assessment Options

Have students:

- **complete the Managing AIS activity** as described.
- **create a 30-second video** summarizing their understanding of AIS impacts to stakeholders in their community.

### Modifications

- Students may dress up for their presentations and/or create a skit to play the roles of the stakeholder during their presentation.
- The worksheets can be enlarged for students in need of larger text.

### Extensions

Students can:

- **create an action plan** for the proposed Flathead Lake closure policy on motorized boats.
- **conduct a debate or town hall meeting** to discuss the proposed closure of Flathead Lake to all motorized boats. Students take the roles of stakeholders and Flathead Lake managers in the discussion.
- **interview stakeholders** in their community to learn how invasive mussels could further impact the region.

### Online Resources

DNRC Estimated Economic Damages of Invasive Mussels to Montana Fact Sheet:

[http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc\\_econ\\_one\\_pager\\_final\\_0119.pdf](http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc_econ_one_pager_final_0119.pdf)

DNRC Enumeration of Potential Economic Costs of Dreissenid Mussels Infestation in Montana Report:

[http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc\\_economic\\_cost\\_dreisseid\\_mussels\\_0119.pdf](http://dnrc.mt.gov/divisions/cardd/docs/misac-docs/dnrc_economic_cost_dreisseid_mussels_0119.pdf)

### Acknowledgements

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## Presentation Worksheet

**As you read your assigned article and view the short video, take notes to answer the following questions for your group's two-minute presentation:**

Article: \_\_\_\_\_

1) Summarize the article/video and present key points:

2) Discuss the economic or other impacts of AIS on this group of people:

3) Provide one example of how this stakeholder (community members) relates to your life.



**As you listen to the presentations, list one or two things you learned about each stakeholder:**

AIS Impacts on Fishing

AIS Impacts on Infrastructure: Electricity Generation

AIS Impacts on Agriculture

AIS Impacts on American Indian Communities

AIS Impacts on Homeowners

AIS Impacts on Watercraft Users



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