



AQUATIC INVASIVE SPECIES TEACHING MODULE

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ABSTRACT: Only recently the threat of aquatic invasive species (AIS) has gained local, state and national attention. Although AIS affects our economics, recreational activities, and possibly our health, it has not been extensively addressed in textbooks, teacher training, or standard curricular material. In addition, teachers often have inadequate resources to present what AIS are, their detrimental effects, and methods of management.

With this issue in mind, the Bayfield County Aquatic Invasive Species Committee established an education initiative to *provide the county school districts K-12 educational programs addressing AIS/invasive species ecological and economic impacts to both coastal and inland water resources.*

With the help of area educators, modules will be designed to address the important AIS issues within Bayfield County and possibly other regions. These modules will provide introductory teaching objectives and suggestive lessons for both classroom coverage of AIS and outdoor outings for field investigations and observations. This material, with modifications, may be embedded into existing curricula within a broad spectrum of subject areas and grade levels while addressing state standards.

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INTRODUCTION: Wisconsin lakes and rivers are critical to the state's economy, and citizens' enjoyment and health gained from high quality waters. It is critical that students become future stewards of the environment through the educational process as students today are the decision makers of tomorrow. National, state, and regional policies are being promulgated every month concerning AIS. It is therefore appropriate and necessary that activities involving AIS are included in academic studies. This can best be accomplished through teacher leadership and student involvement.

Teaching Modules are defined (Prof. Mary Corbin Sies) as being *conceptualized self-contained "units" of content or technique. A unit can cover just one class or more (in which latter case, the module usually specifies day 1, day 2, etc.).* For our aquatic invasive species (AIS) activities, we will consider a module as a unit/lesson that can be "plugged" into an existing curriculum/unit.

THE TEACHING MODULE: The study of aquatic invasive species assists students' understanding of key ecological principles through the context of 'what goes wrong' when AIS are introduced to an environment. Additionally, AIS can gravely affect the economics of a region by diminishing recreational activities, tourism, fisheries, and industries relying on water. Modules are to be designed to introduce students to a variety of AIS, how they might be identified, how they spread, their detrimental effects and how they might be controlled.

COURSE STRATEGY: An AIS module should be designed around techniques such as discussions, readings, visual aids, resource materials, laboratory work, and importantly, field work/observations. There is a vast amount of instructional material available from state/local governments, colleges/universities, lake associations and water oriented research organizations. This binder includes a bibliography of other resources.

SUGGESTED MODULE GOALS/OBJECTIVES:

- Disseminate AIS information to students appropriate for their level of understanding
- Enrich and challenge motivated students
- Provide teachers with strategies and resources to embed AIS studies into their curriculum
- Provide students with the opportunity to monitor AIS
- Provide students with the opportunity to collect and identify selected aquatic plants and animals
- Integrate AIS studies into local curricula
- Align AIS with state standards for their area of study

MODULE TIME SCHEDULE AND TOPICS

Suggested Time Schedule:

- One to five, 50 minute class sessions
- At least one extended two hour field trip to local pond/lake
- Pre-module essay to establish students' AIS understanding
- Daily studies to include AIS readings and computer investigations to gather AIS information
- Final, post-module AIS essay to ascertain students' gained understanding

General Topics of Study:

- Establish what aquatic plants and animals are
- Establish what AIS are and their differences with native aquatic species
- Detrimental effects of AIS focusing on the ecological principles of: 1) habitat alteration, 2) resource competition, 3) altered predator-prey relationships (altered food chain)
- Detrimental economic impacts
- AIS research models/methods
- AIS control methodology
- Methods/protocol for collecting/identifying aquatic species from local pond/lake
- Legislation for prevention and control
- Methods for individuals to help curb AIS spread – volunteerism

EXAMPLE CLASS SUGGESTIONS

- Understanding the difference between native aquatic species and AIS
- Utilize/integrate previous student learning to increase their knowledge of the aquatic biotic community
- Introduce AIS through visual aids, hand-outs, guest lecturers and live/preserved samples
- Wall-mounted posters/bulletin boards featuring AIS
- Field trip: collect various aquatic plants
 1. Record location
 2. Determine: emergent, submerged, free floating
 3. Determine: native or AIS
- Hand-out and review Clean Boats Clean Waters (CBCW) protocol/procedures
- Hand out and review Citizen Lake Monitoring Network AIS Monitoring
- Students role-play boat landing CBCW activities
- Student oriented AIS research project- science/AIS fair

BOOKS AND RESORCE MATERIALS

Bayfield County Aquatic Invasive Species Strategic Plan; Bayfield County AIS Committee; Stefania Strzalkowska, Aquatic Invasive Species Project Coordinator: 715-373-6167/ sstrzalkowska@bayfieldcounty.org. This is a comprehensive compilation of Bayfield County's lakes, demographics and present AIS concerns. This handbook also includes the strategic plan to address AIS issues within Bayfield County and on the county's Lake Superior shoreline.
<http://www.bayfieldcounty.org/assets/files/Conservation/BC%20AIS%20SP%20Updated%20Aug09.pdf>

***Through the Looking Glass- A field Guide to Aquatic Plants;** Borman, Susan; Korth, Robert; Temte, Jo; 1997; Wisconsin Lakes Partnership- University of Wisconsin-Stevens Point 54481; 715-346-2116/ www.uwsp.edu/cnr/uwexplakes This text is considered the "Bible" for identifying aquatic plants. It includes common names and scientific names, descriptions and pictures, list of similar species, origin & range, habitat, life cycle and value of more than 90 aquatic plants including invasive species.

***Lake Plants You Should Know- A Visual Field Guide;** Wisconsin Lakes Partnership- University of Wisconsin- Stevens Point 54481; 715-346-2116, www.uwsp.edu/cnr/uwexplakes This text features outstanding museum mount pictures of 14 submergent, and 8 wetland plants, with invasive species side by side with the most commonly confused native. The book is weatherproof so is ideal for field work.

Last Child in the Woods- Saving Our Children from Nature-Deficit Disorder; Louv, Richard; Algonquin Books of Chapel Hill; Chapel Hill NC. This philosophical approach, with research support, advocates student outdoor activities. Although this book does not directly address AIS, it supports efforts to expose children to the wonders of the outdoors and its positive emotional affect.

***Holding onto the Green Zone;** A joint project of the Bureau of Land Mangement, the University of Wisconsin Extension, and the USDA Cooperative State Research, Education, and Extension Service, 2008. A youth program for the study and stewardship of community riparian areas.

Canoes on Wheels (COW); Friends of the St. Croix Headwaters (FOTSCH), Scott Peterson, Executive Director; www.fotsch.org; This organization will provide a trailer, eight canoes, preservers and paddles free for school use. Teachers should schedule equipment well in advance and pick-up the equipment in Solon Springs as scheduled.

Clean Boats Clean Waters (CBCW) materials: www.uwsp.edu/cnr/uwexplakes/cbcw. For a nominal fee CBCW can provide a plethora of AIS materials including handouts, descriptors, preserved samples and materials necessary for monitoring boat landings.

Citizen Lake Monitoring Network (CLMN) materials: <http://www.uwsp.edu/cnr/uwexplakes/clmn/> On line resources for water clarity, water chemistry and AIS monitoring programs. Includes downloadable manuals, forms, everything needed to monitor a water body.

Project WET: Project Coordinator Janet Hutchens; 608-261-8453
janet.hutchens@wisconsin.gov This project includes 91 hands on activities appropriate for students from six through adults, however, materials are only available to teachers who have completed the workshop. <http://dnr.wi.gov/org/caer/ce/pltwild/wet.htm>

IPS (Invasive Plant Species) EDUCATION KIT; University of Wisconsin Stout;
[www.uwstout.edu/faculty/jamesk/invasive Plant/Invasive Plant.htm](http://www.uwstout.edu/faculty/jamesk/invasive%20Plant/Invasive%20Plant.htm). This is a nicely written 107 page IPS kit featuring Aldo Leopold's work, GPS instruction and a number of functional lesson plans. The kit's focus is upon terrestrial invasive plants and does not include AIS, however, the concepts are transferable.

AIS-HACCP (Aquatic Invasive Species- Hazard Analysis and Critical Control Point) **A Preventative System to Control the Spread of Invasive** - Training Curriculum; Minnesota Sea Grant Publication Number: MN SG-F11; [218-726-6191](tel:218-726-6191), seagr@d.umn.edu. This is a comprehensive research manual for dealing with AIS and would be appropriate for advanced students and science projects.

RESOURCE PEOPLE

These people are available as guest speakers and to provide resource materials:

Stefania Strzalkowska, Aquatic Invasive Species Project Coordinator: [715-373-6167](tel:715-373-6167)/sstrzalkowska@bayfieldcounty.org

John Kudlas, AIS Workshop Coordinator: [715-795-2031](tel:715-795-2031)/jkudlas@cheqnet.net

SAMPLE LESSON PLAN

This an example of what an upper level AIS lesson might look like. Our task is to design a lesson/lessons relative to your grade level and subject area that could be used and shared with other staff.

SUMMARY

This lesson will focus on identification of native aquatic plants and AIS differentiation. Along with aquatic plant identification will be the underlying concept of invasive species success and personal control methods. It is important to identify aquatic invasive species.

LEARNING OBJECTIVES

At the end of the class/unit, the student will be able to:

- Identify (common/scientific name) native aquatic plants students might encounter
- Identify some AIS plants they might encounter
- Explain what an invasive species is
- Explain why AIS are successful

SUBJECT AREA/S

- Environmental Education
- Science
- Agricultural Education

PREVIOUS LEARNING

Students should already know:

- Some basic aquatic biome knowledge
- Basic classification protocol
- Basics of water chemistry

PREPARATION TIME: 15-20 minutes if samples are available

TEACHING TIME: 45 minutes. Class may be extended until objectives are reached.

SETTING: Indoors/outdoors. Although indoors is a more controlled environment, the outdoor/lake side would be more natural and realistic.

MATERIALS:

- Identification keys made/copied for each pair/team of students
- Text: *Through the Looking Glass*
- Text: *Plants You Should Know- A Visual Field Guide*
- A Plant Identification record sheet for students to record the plants they identified

TEACHER PRESENTATION OUTLINE:

Getting Started (5- 10 minutes)

1. A simple introduction is to bring a pail full of random aquatic plants into class and all the students to look at them to begin self inquiry
2. Review previous learning:
 - What is a water biome?
 - Why are aquatic plants important in the water biome?
 - What is meant by “native” plant?
 - What are “invasive” species?
 - Why are AIS so successful?
 - How might AIS be introduced and spread?
3. Prompt students with challenges
 - Be able to differentiate submerged, free floating and emergent plants
 - Be able to identify presented/displayed aquatic plants
 - Can students identify an invasive aquatic plant?

The Activity

1. Allow students to work in pairs/teams
2. Distribute identification materials to students
3. Pull plants from the pail and describe each, emphasizing differentiated characteristics- pass them around the room
4. Give each pair/team an aquatic plant to identify- let them struggle
5. Have pairs/teams place their identified plants on a large tray correctly labeled
6. Have pairs/teams inspect and handle plants without mixing them up

OPTIONAL EXTENDED ACTIVITIES

1. For inquiring students- provide an opportunity to bring in an aquatic plant (in plastic bag) to class from a lake or pond near their home to identify
2. For inquiring students- provide an opportunity to help with the CBCW project
3. Solicit help from student in developing a bulletin board featuring AIS
4. Have students produce a poster featuring AIS and controls
5. Use a similar activity for other aquatic invasive species besides aquatic plants

ASSESSMENT- Not necessarily a test, but a way to ascertain understanding

Option 1: Using a laboratory type sheet and samples placed around the room, have students identify aquatic plants while rotating about the room. Allow students to use resource materials. Put “surprise” AIS (Eurasian Water Milfoil/Curly leaf Pond Weed) in the collection and see if it is discovered

Option 2: Students write an essay on what the student can do individually to help curb the spread of AIS

Option 3: Provide a written exam to match characteristics

Option 4: Have students role-play a CBCW boat landing scenario

WISCONSIN MODEL ACADEMIC STANDARDS

F.12.7 Investigate how organisms both cooperate and compete in ecosystems.

F.12.8 Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemical and air, water, or earth pollution