

## Freshwater Plants Jigsaw Puzzle -- Activity #1 (Steps 1, 2, 3, 4)

### Teacher Notes



**Hundreds of aquatic and wetland plant species** can be found throughout Florida -- in our own backyard, neighborhood, or local pond. Learning more about these plants is the first step to becoming better environmental stewards. After all, we need to know more about our native plants and animals before we can begin to tackle the problems associated with invasive non-native species. Having the ability to recognize and identify flora and fauna gives us a greater sense of ownership. It's been shown: we tend to care more about a plant or animal if we know its name). The following puzzle and related activities are designed to help students develop better observation skills and also a working vocabulary of plant species commonly found in Florida. For more information about Florida's freshwater plants (macrophytes) and habitats:



- <http://plants.ifas.ufl.edu/guide/natplant.html>
- <http://plants.ifas.ufl.edu/guide/invplant.html>
- <http://plants.ifas.ufl.edu/guide/aqumac.html>
- [http://plants.ifas.ufl.edu/guide/contents\\_by\\_keyword.html](http://plants.ifas.ufl.edu/guide/contents_by_keyword.html)

**Key Question(s):** What characteristics or “clues” can we use to **define** and **identify** aquatic plants? What characteristics can we use to **categorize** or **classify** aquatic plants? What is the difference between personal opinion and verified observation? Why is observation so important in science?

**Science Subject:** Biology, Environmental Science, Life Science, Integrated Science

**Grade Level:** Grades 4-5 and Grades 6-7- 8

**Science Concepts:** **Grades 4 and 5:** Comparing and contrasting through observation, data collection and interpretation; compare and contrast adaptations displayed by plants and animals. **Grades 6-7-8:** Analyzing and describing why and how organisms are classified; describing and investigating limiting factors in a local ecosystem and their impacts.

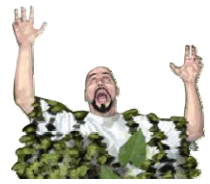
**Language Arts:** **Grades 4-5-6:** Recording information (observations, notes, lists, charts, etc.); organizing information to show understanding; use of new vocabulary and using context clues to determine the meaning of unfamiliar words.

**Overall Time Estimate:** 2 class periods

**Learning Styles:** Visual, auditory, kinesthetic

**Lesson Summary:** Students begin with *Silent Invaders* AV presentation followed by discussion of the four main habitat categories: emersed (including grasses, sedges/rushes), floating, floating-leaved, and submersed. After completing a quick review of the terminology (via matching activity), students will assemble a jigsaw puzzle illustration of a typical Florida freshwater pond/lake habitat. Next, they use the puzzle and accompanying field guides to complete an observation chart. Lastly, students and teacher play “What Am I?” ... a plant identification guessing game.





**Student Learning Objectives:**

- 1) Learn about aquatic plants and associated terminology through presentation, discussion and observation.
- 2) Complete a word matching activity; learn difference between native, non-native and invasive plant species.
- 3) Use visual clues/observation skills to assemble a 14" X 20" jigsaw puzzle illustration of a Florida freshwater environment. Use some of these same clues can be used to help identify the plants themselves.
- 4) Use newly learned plant characteristics to "guess" the identity of various plants, based only on descriptions (clues) given by the teacher.
- 5) Learn to utilize more than one resource or visual clue (field guides, etc.) to identify plants.

**Vocabulary**

**aquatic plants** - plants that grow in water or wet areas; plants that must complete part or all of their life cycle in, on or near the water.

**emersed plants** – plants rooted to the bottom (in shallow water) and having most of the vegetative growth above the water.

**floating-leaved plants** – plants that may or may not be anchored to the sediment, but has leaves that float on the surface of the water

**free-floating plant** – a plant that floats freely on the surface; it does not have any roots attached to the bottom of a lake or pond.

**habitat** - the locality or external environment in which a plant lives (aquatic, terrestrial, etc.)

**invasive plant** - a non-native plant species that is able to spread on its own, causing environmental or economic harm.

**native plant** – a plant species that occurs naturally in a geographic region or area (also referred to as an indigenous plant); it has not been introduced by humans (intentionally or unintentionally).

**non-native plant** – a plant species that is present in a region outside its original, historic range due to intentional or unintentional introduction; "exotic"; not always invasive.

The introduction of the plant to a new area is often the result of human activity.

**submersed plants** - plants growing with their root, stems, and leaves completely under the surface of the water. Sometimes the leaves and/or flowers may grow above the surface.

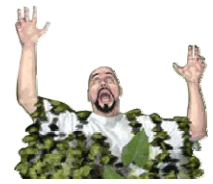
**terrestrial plants** – plants that live on dry land.



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**Materials Needed** -- All print materials (except the puzzles) are available online: <http://plants.ifas.ufl.edu/education>

Teacher:

- View *Silent Invaders* new media presentation online (<http://plants.ifas.ufl.edu/education>) or see teacher disk.
- **Freshwater Plants Jigsaw Puzzle** (ANSWER KEY)
- **Freshwater Plant Habitat Checklist** -- A companion resource for Freshwater Plants Jigsaw Puzzle and related activities including: Freshwater Plant BINGO!; Hands-on Classification Activity, and more... *Note: to be used if students should do any extensions involving additional plants (i.e., other than those depicted on the puzzle.)*
- **OPTIONAL:** Prizes for guessing teams (i.e., for Part 3).

Class:

- **6 jigsaw puzzles** (Contact UF/IFAS Center for Aquatic and Invasive Plants: CAIP-education@ufl.edu)
- **Hand lens magnifiers** – classroom set (optional)

**Grades 4-5**

- **Plant Terminology Match-up** Steps 1 & 2 (UE)
- **Observation Chart** Step 3 2009 (UE)
- **WHAT AM I** activity UE Step 4 2009 (UE)

**Grades 6-7-8**

- **Plant Terminology Match-up** Steps 1 & 2 (MS)
- **Observation Chart** Step 3 2009 (MS)
- **WHAT AM I ?** Step 4 2009 (MS)
- **Freshwater Plant Habitats** – 8.5" X 14" with color illustrations/definitions of emergent, free-floating, floating-leaved, and submersed plants; quantity = 15 (one for every 2 students). See teacher kit.
- **Freshwater Plants in the Southeastern United States 11" X 17" poster** (quantity = 15; one for every 2 students)

Per Student:

- **Plant Terminology Match-Up** activity sheet (UE version or MS version)
- **Observation Chart** (UE version or MS version)
- 1 hand lens magnifier

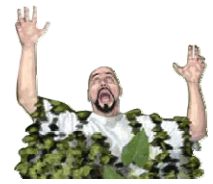
Per Lab Group:

- 1 **Freshwater Plants** jigsaw puzzle per lab group (minimum of 2 students / maximum of 4 students)
- **Freshwater Plants Puzzle illustration** 8.5" X 11" -- one per puzzle
- **Freshwater Plants Jigsaw Puzzle** (Answer Key) -- one per puzzle
- 1 or 2 **Freshwater Plant Habitats** (8.5" x 14") guide
- 1 or 2 **Freshwater Plants in the Southeastern U.S.** 11" X 17" posters (2 pgs/front & back)



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## Procedure

### **STEP 1 'Silent Invaders' Presentation and Discussion**

- Watch *Silent Invaders* new media lesson/presentation as a group; discuss keywords and concepts.
- Use **Freshwater Plant Habitats** (8.5" x 14") to further discuss types of aquatic plants / habitats (vocabulary).
- Observe and discuss the **Freshwater Plants in the Southeastern United States poster** (11" X 17") Talk about the tools available for identifying plants (field guides, internet, books, etc.). Notice how plants are categorized and/or classified in this particular field guide (emersed, floating, floating-leaved, grass-like, submersed). Discuss how this can be used as way to classify plants; it also makes them easier to remember.
- Distribute the terminology "match-up" activity sheets for students to complete.

### **STEP 2 Assemble and discuss puzzles**

- When "match-up" activity is complete, divide students into groups for assembly of the puzzles (group size 3-4).
- Once the puzzles are assembled, give students magnifying hand lenses and begin discussion: What types of plants do they see? How many are in the water? Have they seen plants like this before? Do they see anything besides plants (do they see any animals)? Do any of the plants have flowers? Are any plants UNDER the water? FLOATING? Do they see plants "emerging" out of the water, along the shoreline? Continue to discuss the various types of plants (emersed, floating, submersed, etc.)

### **STEP 3 Observe and complete observation charts**

Give students the Freshwater Plant **Observation Chart** (UE or MS version). Assign a small number of plants from the puzzle illustration to each lab group to research using the materials available (i.e., field guides, etc.). Ask students to try and determine which plants are emersed, submersed, or floating, etc. Answers can be checked against the answer key. They can also find out which plants are native, non-native or invasive. SEE **Freshwater Plants Jigsaw Puzzle (ANSWER KEY)**.

### **STEP 4 WHAT AM I?**

NOW... it's time to play the *WHAT AM I?* game. Call out the characteristics for the listed plants (provided on the *What Am I?* activity sheet). Note: DO NOT read out the name of the plant. Give students a number of chances to name the plant based on clues that you give them. You decide how many chances they get, based on time available.

**Extensions:** Students take turns researching and writing descriptions for other plants depicted in the puzzle and playing the game among their own teams.



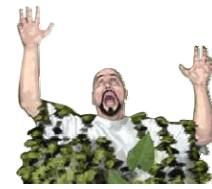
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# Module 1 ~ Silent Invaders

## Jigsaw Puzzle – Teacher Notes



### Sunshine State Standards

**Note 1:** The standards listed in **black** are explicitly addressed by this activity. Those listed in **blue** are touched on briefly and can be more fully developed by the teacher.

**Note 2:** These Teacher Notes include all of the standards for the various Jigsaw Puzzle component activities. Standards for extension activities suggested in the Teacher Notes are also included here.

### 4<sup>th</sup> Grade

**LA.4.1.5.1:** TSW demonstrate the ability to read grade level text.

**LA.4.1.6.1:** TSW use vocabulary that is introduced and taught directly.

**LA.4.1.6.2:** TSW listen to, read, and discuss familiar and conceptually challenging text.

**LA.4.1.7.3:** TSW determine explicit ideas and information in grade-level text, including but not limited to main idea, relevant supporting details, implied message, inferences, chronological order of events, summarizing, and paraphrasing.

**LA.4.2.2.2:** TSW use information from the text to answer questions related to explicitly stated main ideas or relevant details.

**LA.4.4.2.1:** TSW write in a variety of informational/expository forms (e.g., summaries, procedures, recipes, instructions, graphs/tables, experiments, rubrics, how-to manuals).

**LA.4.4.2.2:** TSW record information (e.g., observations, notes, lists, charts, map labels, legends) related to a topic, including visual aids as appropriate.

**LA.4.5.2.1:** TSW listen to information presented orally and show an understanding of key points.

**LA.4.6.2.1:** TSW select a topic for inquiry, refine a predetermined search plan.

**LA.4.6.2.2:** TSW apply evaluative criteria (e.g., readability, currency, accuracy) for selecting and using a variety of appropriate resources, gather and record information, noting the difference between opinions and fact.

**SC.4.E.6.6:** TSW identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).

**SC.4.L.16.4:** TSW compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.

**SC.4.N.1.4:** TSW recognize ways plants and animals, including humans, can impact the environment.

### 5<sup>th</sup> Grade

**LA.5.1.5.1:** TSW demonstrate the ability to read grade level text.

**LA.5.1.6.1:** TSW use vocabulary that is introduced and taught directly.

**LA.5.1.6.2:** TSW listen to, read, and discuss familiar and conceptually challenging text.

**LA.5.1.7.3:** TSW determine the main idea or essential message in grade-level text through inferring, paraphrasing, summarizing, and identifying relevant details.

**LA.5.2.2.2:** TSW use information from the text to answer questions related to explicitly stated main ideas or relevant details.

**LA.5.4.2.1:** TSW write in a variety of informational/expository forms (e.g., summaries, procedures, instructions, experiments, rubrics, how-to manuals, assembly instructions).

**LA.5.4.2.2:** TSW record information (e.g., observations, notes, lists, charts, map labels, legends) related to a topic, including visual aids to organize and record information on charts, data tables, maps and graphs, as appropriate.

**LA.5.5.2.1:** TSW listen and speak to gain and share information for a variety of purposes, including personal interviews, dramatic and poetic recitations, and formal presentations.

**LA.5.6.2.1:** TSW select a topic for inquiry, formulate a search plan, and apply evaluative criteria (e.g., usefulness, validity, currentness, objectivity) to select and use appropriate resources.

**LA.5.6.2.2:** TSW read and record information systematically, evaluating the validity and reliability of information in text by examining several sources of information.

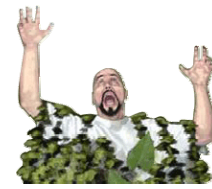
**LA.5.6.3.2:** TSW use a variety of reliable media sources to gather information effectively and to transmit information to specific audiences.

**SC.5.L.14.2:** TSW compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support.



# Module 1 ~ Silent Invaders

## Jigsaw Puzzle – Teacher Notes



SC.5.L.17.1: TSW compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

### 6<sup>th</sup> Grade

LA.6.1.6.1: TSW use vocabulary that is introduced and taught directly.

LA.6.1.6.2: TSW listen to, read, and discuss familiar and conceptually challenging text.

LA.6.1.7.3: TSW determine the main idea or essential message in grade-level text through inferring, paraphrasing, summarizing, and identifying relevant details.

LA.6.2.2.2: TSW use information from the text to answer questions related to the main idea or relevant details, maintaining chronological or logical order.

LA.6.4.2.1: TSW write in a variety of informational/expository forms (e.g., summaries, procedures, instructions, experiments, rubrics, how-to manuals, assembly instructions).

LA.6.4.2.2: TSW record information (e.g., observations, notes, lists, charts, map labels, legends) related to a topic, including visual aids as appropriate.

LA.6.5.2.1: TSW listen and gain information for a variety of purposes, (e.g., clarifying, elaborating, summarizing main ideas and supporting details).

LA.6.6.2.1: TSW select a topic for inquiry, formulate a search plan, and apply evaluative criteria (e.g., relevance, accuracy, organization, validity, currentness) to select and use appropriate resource.

LA.6.6.2.2: TSW collect, evaluate and summarize information using a variety of techniques from multiple sources (e.g., encyclopedias, websites, experts) that includes paraphrasing to convey ideas and details from the source, main idea(s) and relevant details.

SC.6.L.15.1: TSW analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

### 7<sup>th</sup> Grade

LA.7.1.6.1: TSW use new vocabulary that is introduced and taught directly.

LA.7.1.6.2: TSW listen to, read, and discuss familiar and conceptually challenging text.

LA.7.1.7.3: TSW determine the main idea or essential message in grade-level or higher texts through inferring, paraphrasing, summarizing, and identifying relevant details.

LA.7.2.2.2: TSW use information from the text to state the main idea and/or provide relevant details.

LA.7.4.2.1: TSW write in a variety of informational/expository forms (e.g., summaries, procedures, instructions, experiments, rubrics, how-to manuals, assembly instructions).

LA.7.4.2.2: TSW record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information, as appropriate, and attribute sources of information.

LA.7.5.2.1: TSW use effective listening strategies for informal and formal discussions, connecting to and building on the ideas of a previous speaker and respecting the viewpoints of others when identifying bias or faulty logic.

LA.7.6.2.1: TSW select a topic, develop a prioritized search plan, and apply evaluative criteria (e.g., relevance, objectivity, scope of content in print and online sources) to select appropriate resources for research.

LA.7.6.2.2: TSW assess organize and check the validity and reliability of information in text, using a variety of techniques by examining several sources of information, including both primary and secondary sources.

SC.7.E.6.6: TSW identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

SC.7.L.17.3: TSW describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

### 8<sup>th</sup> Grade

LA.8.1.6.1: TSW use new vocabulary that is introduced and taught directly.

LA.8.1.6.2: TSW listen to, read, and discuss familiar and conceptually challenging text.

LA.8.1.7.3: TSW determine the main idea or essential message in grade-level or higher texts through inferring, paraphrasing, summarizing, and identifying relevant details.

LA.8.2.2.2: TSW synthesize and use information from the text to state the main idea or provide relevant details.



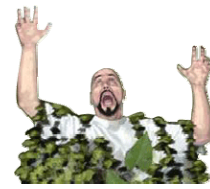
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## Jigsaw Puzzle – Teacher Notes



### Sunshine State Standards, continued

LA.8.4.2.1: TSW write in a variety of informational/expository forms (e.g., summaries, procedures, instructions, experiments, rubrics, how-to manuals, assembly instructions).

LA.8.4.2.2: TSW record information (e.g., observations, notes, lists, charts, legends) related to a topic, including visual aids to organize and record information, as appropriate, and attribute sources of information.

LA.8.5.2.1: TSW demonstrate effective listening skills and behaviors for a variety of purposes, and demonstrate understanding by paraphrasing and/or summarizing.

LA.8.5.2.2: TSW use effective listening and speaking strategies for informal and formal discussions, connecting to and building on the ideas of a previous speaker and respecting the viewpoints of others when identifying bias or faulty logic.

LA.8.6.2.1: TSW select a topic and develop a search plan with multiple research strategies, and apply evaluative criteria (e.g., scope and depth of content, authority, reputation of author/publisher, objectivity, freedom from bias) to assess appropriateness of resources.

LA.8.6.2.2: TSW assess, organize, synthesize, and evaluate the validity and reliability of information in text, using a variety of techniques by examining several sources of information, including both primary and secondary sources.

SS.8.A.1.2: TSW analyze charts, graphs, maps, photographs and timelines; analyze political cartoons; determine cause and effect.

SS.8.G.5.2: TSW describe the impact of human modifications on the physical environment and ecosystems of the United States throughout history.

