Understanding Invasive Aquatic Plants (UE/MS/HS)

Answer Key – Higher Order Questions

A Collaboration the Florida Fish and Wildlife Conservation Commission / Invasive Plant Management Section http://myfwc.com/ , the Aquatic Plant Management Society http://www.apms.org/ and the UF/IFAS Center for Aquatic and Invasive Plants http://plants.ifas.ufl.edu/education

QUESTION 1 Sample Top Score Response:

Floating: Jellyfish float in the water with tentacles that hang down but don't reach the ocean bottom. I think of floating plants the same way. They float along the top with roots that hang down but don't reach the bottom of the lake.

Emergent: The tops of the plants "emerge" from the water in emergent plants.

Submersed: A submarine can go under the water, and only the periscope sticks up. Submersed plants grow under water and hardly any of the plant sticks up.

QUESTION 2 Sample Top Score Response:

1- Native plants provide food for native animals.
2- Native plants provide habitat for the bugs that fish eat.
3- Native plants prevent erosion on our shorelines.
1- Invasive plants can clog pipes and ditches.
2- Invasive plants spread quickly and can block entire waterways so that boats can't pass.
3- Invasive plants can grow on top of native plants, blocking out the sun the native plants need.

STANDARDS:
SC.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

QUESTION 3 Sample Top Score Response:

Invasive plants have no natural predators, so they are not held in check like native plants are. Many invasive plants produce large numbers of seeds or break into pieces that can grow into new plants. They can also survive in a wide range of temperatures, soils, and water conditions, so they may be able to spread farther than native plants.

STANDARDS:
SC.5.L.17.1: 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.
SC.7.L.17.2: Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
SC.912.L.17.6: Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

QUESTION 4 Sample Top Score Response:

Method 1: Invasive plants have been brought here on purpose to be used in aquariums, landscaping or water gardens (hydrilla and water hyacinth).

Method 2: Some invasive plants are introduced from one lake to another accidentally on boat propellers, boat trailers or other equipment. (hydrilla). Some are accidentally introduced to Florida from ships (from ballast water).

STANDARDS:
SC.4.N.1.4: Recognize ways plants and animals, including humans, can impact the environment.
SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

QUESTION 5 Sample Top Score Response:

Sample Top Score Response:

a) Chemical b) Biological c) Mechanical d) Physical

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QUESTION 6 Sample Top Score Response:

Sample Top Score Response: Integrated Plant Management is the best way to battle the invasive weed problem in Florida's waters because it helps to knock back a huge problem when time and money are limited. If habitat managers can find a bug that eats only the invasive plant, that's a good way to go because it saves time and money on machines and workers needed to mechanically or physically remove the plants. If a bug isn't available, they can use a chemical herbicide which can be sprayed from boats or planes. This costs less money and time than using machines or draining the water from a lake. But people want fewer chemicals in their environment, so in some cases using machines or hand methods is better, especially on lakes with small patches of problem plants. Different plant species and different lakes need different methods. Sometimes several methods working together are best.

STANDARDS:
SC.912.L.17.17: Assess the effectiveness of innovative methods of protecting the environment.

QUESTION 7 Sample Top Score Response:

Sample Top Score Response:

Hydrilla and water hyacinth are both invasive aquatic plants that grow very quickly. Hydrilla was brought from Asia in the 1950s to grow in aquariums. Water Hyacinth was brought over earlier, in the 1800s, from South America for its beautiful flowers and as possible food for cattle. Both plants spread too far to completely eradicate

Hydrilla and water hyacinth both grow into tangled mats that cover large bodies of water making it impossible for sunlight or oxygen to get into the water. This kills native plants, fish, and other wildlife. Both plants also cause problems for boaters, as the mats get tangled in propellers. Hydrilla can jam against bridges and dams and cause flooding. Water hycinth floats and can clog irrigation pipes and knock over bridges.

Water hyacinth forms millions of tiny seeds and new plants can grow from buds on the parent plant. Hydrilla, on the other hand, does not produce seeds. New hydrilla plants sprout from roots and broken stems. Also root buds called tubers are formed, making hydrilla impossible to eradicate. Hydrilla, which unlike water hyacinth, is a prohibited plant in the US. Water hyacinth is managed by controlling small patches of plants before they become mats. Hydrilla is managed using biological, mechanical, chemical and physical controls.

STANDARDS:
SC.4.N.1.4: Recognize ways plants and animals, including humans, can impact the environment.
SC.5.L.17.1: 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.
SC.7.E.6.6: 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.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
SC.912.L.17.17: Assess the effectiveness of innovative methods of protecting the environment.

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QUESTION 8 Sample Top Score Response:

Sample Top Score Response:

Ducks Unlimited – At first, I wasn't sure how a website about duck hunters supported the goal of educating people about Florida's invasive plant problem. Then I typed "invasive" into the website's search engine. Several hits came up with articles about how Ducks Unlimited members are working to preserve duck habitat by getting rid of the invasive plants. So that's how this website supports the Center's goal.

Invasive.org -- This website supports the Center's goal of educating people about Florida's invasive plant problem by providing information on identification and control of invasive plants. It also talks about bugs that introduce diseases to native plants, how controlled burns affect invasive plants, and other topics relating to invasive plants. It is not limited to wetland species, so it gives a broader view of the invasive plant problem inside and outside Florida.

Florida Fish and Wildlife Conservation Commission (Nonnative species) – This websites goes along with the Center's goal of educating people about Florida's invasive plant problem because it is trying to control Florida's invasive animal program. It has good articles on rounding up pythons and how people can turn in their "illegal" invasive pets without getting in trouble.

Common Core State Standards

4th Grade

Common Core Code	FL Common Core Code	Common Core Standard
RI.4.1	LAFS.4.RI.1.1	Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
W.4.2	LAFS.4.W.1.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.4.2b	LAFS.4.W.1.2b	Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
W.4.2d	LAFS.4.W.1.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.4.4	LAFS.4.W.2.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
L.4.3	LAFS.4.L.2.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
L.4.3a	LAFS.4.L.2.3a	Choose words and phrases to convey ideas precisely.

5th Grade

RI.5.1	LAFS.5.RI.1.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
W.5.2	LAFS.5.W.1.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
W.5.2b	LAFS.5.W.1.2b	Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
W.5.2d	LAFS.5.W.1.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.5.4	LAFS.5.W.2.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
L.5.3	LAFS.5.L.2.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.

6th Grade

RI.6.1	LAFS.6.RI.1.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
W.6.2	LAFS.6.W.1.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.6.2b	LAFS.6.W.1.2b	Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
W.6.2.d	LAFS.6.W.1.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.

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W.6.4	LAFS.6.W.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
L.6.4	LAFS.6.L.3.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.
RST.6-8.1	LAFS.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.4	LAFS.68.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
RST.6-8.7	LAFS.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
WHST.6-8.1	LAFS.68.WHST.1.1	Write arguments focused on discipline-specific content.
WHST.6-8.1a	LAFS.68.WHST.1.1a	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
WHST.6-8.1b	LAFS.68.WHST.1.1b	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
WHST.6-8.2	LAFS.68.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.6-8.2a	LAFS.68.WHST.1.2a	Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
WHST.6-8.4	LAFS.68.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.6-8.8	LAFS.68.WHST.3.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
WHST.6-8.9	LAFS.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.

7th Grade

W.7.2	LAFS.7.W.1.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.7.2b	LAFS.7.W.1.2b	Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
W.7.2.d	LAFS.7.W.1.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.7.4	LAFS.7.W.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
L.7.4	LAFS.7.L.3.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.
RST.6-8.1	LAFS.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.4	LAFS.68.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
RST.6-8.7	LAFS.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
WHST.6-8.1	LAFS.68.WHST.1.1	Write arguments focused on discipline-specific content.
WHST.6-8.1a	LAFS.68.WHST.1.1a	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
WHST.6-8.1b	LAFS.68.WHST.1.1b	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
WHST.6-8.2	LAFS.68.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.6-8.2a	LAFS.68.WHST.1.2a	Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
WHST.6-8.4	LAFS.68.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.6-8.8	LAFS.68.WHST.3.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
WHST.6-8.9	LAFS.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.

8th Grade

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W.8.2	LAFS.8.W.1.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
W.8.2a	LAFS.8.W.1.2a	Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
W.8.2b	LAFS.8.W.1.2b	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
W.8.2d	LAFS.8.W.1.2d	Use precise language and domain-specific vocabulary to inform about or explain the topic.
W.8.4	LAFS.8.W.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
L.8.4	LAFS.8.L.3.4	Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.
RST.6-8.1	LAFS.68.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.4	LAFS.68.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
RST.6-8.7	LAFS.68.RST.3.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
WHST.6-8.1	LAFS.68.WHST.1.1	Write arguments focused on discipline-specific content.
WHST.6-8.1a	LAFS.68.WHST.1.1a	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
WHST.6-8.1b	LAFS.68.WHST.1.1b	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
WHST.6-8.2	LAFS.68.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.6-8.2a	LAFS.68.WHST.1.2a	Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
WHST.6-8.4	LAFS.68.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.6-8.8	LAFS.68.WHST.3.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
WHST.6-8.9	LAFS.68.WHST.3.9	Draw evidence from informational texts to support analysis reflection, and research.

9 – 10th Grade

W.9-10.2	LAFS.910.W.1.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
W.9-10.2a	LAFS.910.W.1.2a	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
W.9-10.2b	LAFS.910.W.1.2b	Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
W.9-10.2d	LAFS.910.W.1.2d	Use precise language and domain-specific vocabulary to manage the complexity of the topic.
W.9-10.4	LAFS.910.W.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
W.9-10.6	LAFS.910.W.2.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
L.9-10.4	LAFS.910.L.3.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.
RST.9-10.1	LAFS.910.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
RST.9-10.4	LAFS.910.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

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RST.9-10.7	LAFS.910.RST.3.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
WHST.9-10.1	LAFS.910.WHST.1.1	Write arguments focused on discipline-specific content.
WHST.9-10.1a	LAFS.910.WHST.1.1a	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
WHST.9-10.1b	LAFS.910.WHST.1.1b	Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
WHST.9-10.2	LAFS.910.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.9-10.2a	LAFS.910.WHST.1.2a	Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
WHST.9-10.4	LAFS.910.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.9-10.9	LAFS.910.WHST.3.9	Draw evidence from informational texts to support analysis, reflection, and research.

11 – 12th Grade

W.11-12.4	LAFS.1112.W.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
W.11-12.6	LAFS.1112.W.2.6	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
L.11-12.4	LAFS.1112.L.3.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.
RST.11-12.1	LAFS.1112.RST.1.1	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
RST.11-12.4	LAFS.1112.RST.2.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
RST.11-12.7	LAFS.1112.RST.3.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
WHST.11-12.1	LAFS.1112.WHST.1.1	Write arguments focused on discipline-specific content.
WHST.11-12.1a	LAFS.1112.WHST.1.1a	Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
WHST.11-12.1b	LAFS.1112.WHST.1.1b	Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.
WHST.11-12.2	LAFS.1112.WHST.1.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
WHST.11-12.2a	LAFS.1112.WHST.1.2a	Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
WHST.11-12.4	LAFS.1112.WHST.2.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHST.11-12.9	LAFS.1112.WHST.3.9	Draw evidence from informational texts to support analysis, reflection, and research.