Lionfish…Could The Invade Our Waters?!?![1]

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Invasive Species Series

Lionfish… Could They Invade Our Waters?!?!

Sneak Peek
Students will be introduced to concepts and issues surrounding invasive species. A new non-native species in Florida is the lionfish *Pterois volitans*. Students will explore how this fascinating fish from the Indian and Pacific Oceans could harm Florida reef systems. This activity incorporates information gathering, critical thinking, predicting, and persuasive writing/illustrations.

Aligned with the following Sunshine State Standards and FCAT Benchmarks for grades 6-8:

SC.D.1.3.3 CS	SC.G.2.3.3 CS
SC.D.2.3.2 AA	SC.H.1.3.1 AA
SC.F.2.3.4 CS	SC.H.2.3.1 CS
SC.G.1.3.2 CS	

AA= annually assessed
CS = content sampled

Objectives:

Students will…

- Identify adaptations that contribute to a species' success.
- Gather information in order to create a compelling argument about the harm an invasive species can cause.
- Demonstrate understanding of people's roles in spreading invasive species.
- Demonstrate critical thinking skills by predicting what might happen when a new species is introduced into an ecosystem.

National Park Service
http://www.flmnh.ufl.edu/fish/Gallery/Descript/RedLionfish/RLionfish.html

Materials:

- Copies of the following: St. Petersburg Times article, KWL chart, Florida Aquarium fact sheet and Assessment Action worksheet.
- Overhead projector and KWL* transparency (optional). *KWL= Know, Want to Know, Learned.
- Student research materials (books, Internet access, journals, etc.).
- Poster supplies:
  - Poster board.
  - Markers, colored pencils, paint, etc.
  - Magazines/books for ideas (optional).
  - Sample posters for models (optional).

Background:

Invasive species are plants or animals that are not ***native*** to a particular area and cause harm, often by disrupting natural ecosystems. Invasive species may compete with native species for food and living space. A

successful invasive species will take over space in which a native species would normally live. It is often difficult to determine exactly what harm a potential invader may cause until it is too late. Case studies have often shown that once an invasive species is established it is virtually impossible to **eradicate**.

***Lionfish… will they take over*?**

The introduction of a plant or animal does not necessarily mean it will thrive in that environment. The success of an ***aquatic*** invader depends on many factors including water temperature, water chemistry, available food sources, presence of ***predators***, etc.

In the coral reefs of the Pacific and Indian Oceans, the lionfish species *Pterois volitans* has been adapting over time within its natural habitat. The population of this highly venomous fish has been kept in balance because lionfish are a natural part of the ecosystem. They typically prey upon fish, shrimp and crabs. While there is very little information known about their predators, some lionfish species are thought to be preyed upon by sharks and cornetfish. Over time, lionfish have developed a unique ***niche*** and a balance with other species in the Pacific and Indian Oceans. If they were to become an established part of Atlantic Ocean food webs, they would do so without their natural predators or prey. Researchers can attempt to predict what the consequences may be, but only time can tell whether these fish will cause severe ecological damage. Over the past several years, lionfish have been seen along the east coast of Florida and as far north as New York. They have likely been released from aquaria, including home aquaria.

Sightings of lionfish along the east coast of the United States.
(image from the National Oceanographic and Atmospheric Administration)

Procedure:

1. Distribute the attached article from The St. Petersburg Times. Allow time for students to read the article, and emphasize that this article relates to a current Florida environmental issue.
2. As a class, complete a KWL chart, beginning with the K and the W. Draw the grid on the board or an overhead, or copy and distribute the one provided at the end of this activity. Discuss what students feel they know about lionfish, as well as what they would like to learn. The L portion of the chart should be left blank at this time.
3. Over the course of one to two classroom sessions, allow students to research information about the species *Pterois volitans.* Instruct students to locate information that includes appearance, adaptations, distribution, feeding habits, behavior and predators. Students should also note anything else they find interesting or that matches what is listed in their W column of the chart. Utilize newspaper articles, books, the Internet, journal articles, etc.
4. Complete the L portion of the chart as a class, adding information that was learned. Correct any misinformation in the K section of the chart.
5. Refer back to the St. Petersburg Times article. Review with students the fact that the species they have studied may be starting to inhabit Florida reef systems.
6. Divide the students into pairs or small groups. Review the idea that lionfish introductions are likely the result of aquarium introductions before moving to the next step.
7. Explain to students that the task at hand is for each group to design an educational poster to be displayed at local aquarium and pet stores that sell aquatic species. Distribute and review the Assessment Action worksheet that explains in more detail how students should design this poster.
8. When students have completed their posters, have each pair/team unveil it to the rest of the class.
9. If time allows, discuss each poster and its content. Is it visually appealing? Does it succeed in its intent?

Rapping It Up!

1. Why is it often difficult to predict how an introduced species may impact its new ecosystem?

2. Invasive species compete with native species for food and living space. Why is it important for native species to survive in their natural ecosystems?

3. What factors would make introduced lionfish difficult to eradicate from Florida reefs?

4. What did you learn from this activity about life in Florida waters overall?

Glossary:

Aquatic – Living or growing in, on, or near water.

Eradicate – Eliminate, exterminate, remove.

Invader/Invasive species – A plant or animal that is not native and causes harm, including disrupting natural ecosystems.

Native species – A plant or animal species that originated in a certain place. A species occurring in its natural range. Species that were present in Florida at the time the first Spanish settlers arrived.

Niche – The unique role of an organism in its ecosystem.

Predator – An organism that feeds on another organism.

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St. Petersburg Times

Poisonous fish cluster off coast; [SOUTH PINELLAS Edition]

CRAIG PITTMAN. **St. Petersburg Times**. St. Petersburg, Fla.: Feb 16, 2002. pg. 5.B

Abstract (Document Summary)

Although Florida ranks second only to Hawaii in the number of exotic species that have invaded the state, the lionfish is a rarity among exotics, said [Dan Roberts] of the Florida Marine Research Institute. Virtually all of the others that have been found in Florida have been plants, animals or freshwater fish. The lionfish is one of the first saltwater species to relocate to the Sunshine State.

The Florida Marine Research Institute's experts do not know how the lionfish could have spread throughout Florida's offshore waters, but one theory blames Hurricane Andrew and the tropical fish industry. Miami is a central shipping point for the nation's tropical fish trade, Roberts said, so perhaps the 1992 hurricane that hit South Florida damaged a shipping company, allowing the lionfish to escape and start breeding.

State wildlife officials first heard reports of lionfish being seen near Key Biscayne, Boca Raton and West Palm Beach, but nothing could be confirmed. Last summer, there were lionfish sightings off North Carolina, suggesting the Gulf Stream current had swept them north, Roberts said.

Full Text (702 words)

David Brown heard the stories. Somewhere off Florida's east coast, divers had seen an exotic creature with bright stripes and long, fanlike fins.

So Brown, who teaches marine biology at Wilson Senior High School in Jacksonville, told a friend that if he saw one, he should try to bring it back.

Two days later the friend, commercial spearfisherman David Hagan, saw six of the exotic fish. Hagan swam up close enough to capture a small one in a bag - taking care not to get stuck by its dangerous, venomous fins.

"I hated to mess with that fish," Hagan said, adding, "They're pretty."

Brown shipped the bag to the Florida Marine Research Institute, where this week experts confirmed two years of rumors: It was a lionfish, native to Australia and Malaysia - not Florida.

On Friday, the institute issued a public warning to all divers who might venture into deep waters anywhere off Florida's east coast: Watch out for the lionfish.

One prick from its fins can cause pain, numbness, paralysis, respiratory illness and, in rare cases, death.

"The dorsal, anal and pelvic fins have spines that are attached to glands that secrete this toxin," said Dan Roberts, a research scientist at the institute's St. Petersburg lab. "It's easy to get nailed by them. The points of these things are like hypodermic needles."

A California woman who sued a pet store for selling her a lionfish without warning her about the fins described its sting this way: "I immediately felt intense pain in my right hand. The pain was indescribable. It was as though one was taking a hammer and slamming at full strength the hammer upon my right thumb. It was excruciating. Then, the pain worsened. It was too terrible to think about."

Despite the risk, lionfish are extremely popular with tropical fish collectors, selling for anywhere from $50 to $100, according to Frank Sinatra - yes, that's his real name - who owns Aquarium Professionals in St. Petersburg.

"They have a little bit of a mystique to them, a little danger," he said.

In fact, the curious-minded can get a closeup view of lionfish at St. Petersburg's Pier Aquarium.

Although Florida ranks second only to Hawaii in the number of exotic species that have invaded the state, the lionfish is a rarity among exotics, said Roberts of the Florida Marine Research Institute. Virtually all of the others that have been found in Florida have been plants, animals or freshwater fish. The lionfish is one of the first saltwater species to relocate to the Sunshine State.

The Florida Marine Research Institute's experts do not know how the lionfish could have spread throughout Florida's offshore waters, but one theory blames Hurricane Andrew and the tropical fish industry. Miami is a central shipping point for the nation's tropical fish trade, Roberts said, so perhaps the 1992 hurricane that hit South Florida damaged a shipping company, allowing the lionfish to escape and start breeding.

"They're everywhere out there," said Hagan, who began spearfishing for lobster in 1973. "I've been seeing them for about the last year, year and a half. They usually start in about 120 feet of water and you see them out to about 200 feet."

State wildlife officials first heard reports of lionfish being seen near Key Biscayne, Boca Raton and West Palm Beach, but nothing could be confirmed. Last summer, there were lionfish sightings off North Carolina, suggesting the Gulf Stream current had swept them north, Roberts said.

In June sport divers swimming in 120 feet of water about 35 miles offshore from St. Simons Island, Ga., killed a 9-inch red lionfish with a speargun. Then, last month, Hagan found the 6-inch one that went to the Florida Marine Research Institute.

Now that the lab has confirmed the lionfish rumors, the institute will step up its investigation, Roberts said. However, once word gets out about where to find free lionfish, there may not be as many available.

"As soon as the tropical fish collectors recognize them, they'll probably go out and start collecting them," he joked.

- Times researcher Caryn Baird contributed to this report.

[Illustration]
Caption: A lionfish at St. Petersburg's Pier Aquarium spreads its fins.; Photo: PHOTO, LARA CERRI

People: Brown, David, Hagan, David, Roberts, Dan
Text Word Count 702
Document URL:

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Lionfish… Could They Invade Our Waters?!?!

K **What I feel I know…**	*W* **What I would like to know…**	*L* **What I have learned…**

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Lionfish

Pterois sp.

Order: Scorpaeniformes
Family: Scorpaenidae

Size: May reach 14-17 inches.

Description: Lionfish are easily recognized by their elongated, venomous dorsal spines and bright stripe patterns. Appendages on the head and around the eyes mask the mouth and eyes. Lionfish appear to hover in the water column. They have been observed hanging motionless at the crest of a reef or ledge waiting for prey items to approach.

Range and Habitat: Temperate and tropical Indo-pacific Ocean. Commonly seen in openings of coral or around pilings in harbors and bays

Wild Diet: Crustaceans, worms, smaller fish. Usually prefer live prey.

Notes:

- The Florida Aquarium will house 3 species of lionfish: *Pterois volitans*, *P. radiata*, and *P. antennata*. There are currently over 300 species in the Scorpaenidae family.
- Due to their striking appearance, lionfish are also known as dragonfish, turkeyfish, zebrafish, scorpionfish and firefish.
- Lionfish are primarily nocturnal hunters. If hungry, these voracious feeders will try to swallow anything that they can get into their mouths.
- Lionfish often use their large pectoral fins to trap and corner smaller fish. When feeding on benthic (bottom-dwelling) prey, these fins spread like a net to trap prey.
- The venomous dorsal spines of lionfish are used as a defense mechanism. Lionfish will often point these spines toward a predator.
- The sting of a lionfish can be painful for long periods of time, but it is rarely fatal to humans unless multiple stings are inflicted and help is not sought immediately. For immediate treatment, apply very hot water to the afflicted area.

THE FLORIDA AQUARIUM

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Assessment Action!

Lionfish… Could They Invade Our Waters?!?!

National Park Service
http://www.flmnh.ufl.edu/fish/Gallery/Descript/RedLionfish/RLionfish.html

Background:
A local university's aquatic research department needs your help! They need to spread the word about the possible effects that lionfish may have on Florida reefs. Little is known about how this invasive species might negatively affect local aquatic habitats, so it is up to you to educate others.

Task:
Your task is to create a visually appealing poster that conveys accurate information. Your poster should express how *Pterois volitans* may harm Florida reef systems. The poster should include information about both lionfish and Florida reefs in order to show the relationships between this potential invasive species and its "new" habitat.

Audience:
Consumers that visit aquarium and pet shops are the audience for your work. Many of these people own and maintain their own tanks of aquatic species.

Purpose:
The purpose of your poster is two-fold. The main purpose of the poster is to spread awareness of how lionfish (non-native species potentially becoming invasive) could harm Florida reefs. The second purpose of your poster is to share the fact that lionfish may have arrived on Florida reefs through release from aquaria, so your target audience's actions play a part in the health of local ecosystems.

Procedure:
1. Gather as much information as possible about lionfish species *Pterois volitans.*
2. As a group, list the top five adaptations that you think make these fish excellent "survivors." What do they have/use/do to hunt and stay alive?
3. Conduct a fact-finding investigation of Florida reefs. What lives on a Florida reef? What are the typical predator/prey relationships?
4. Mentally place lionfish into a Florida reef system. Review your top five lionfish adaptations and brainstorm the ways that these fish may harm Florida reefs.
5. As a team, decide how your poster will illustrate the negative effects that lionfish could have on reefs and why they happen, as well as the role that people may have played in introducing this predator into a new habitat.
6. Sketch ideas for your poster, keeping in mind that the poster should contain accurate information while being appealing enough to catch the attention of store customers.
7. Using the materials provided, create your final poster that will be displayed at stores. Be sure to adhere to the timelines set by your teacher.