

K – 2nd Grade Standards Correlated Lesson Plans
for
“A New Home for an Old Friend”

Understanding and preventing
invasive organisms

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USC Sea Grant

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Why Teach Stewardship?

In the primary grades we help students to understand their community and their place in the world. Whether in an urban setting or rural neighborhood, part of understanding their place in the world includes understanding their impact on nature. Students learn to watch insects, throw away trash, clean up to avoid ants and so much more as they discover the wonders of nature. Part of enjoying nature is protecting nature by being a responsible pet owner. Pet ownership includes giving pets all they need and making certain our pets don't hurt the natural world. Putting a bell on a cat so it doesn't catch birds, cleaning up after our dog so its wastes don't pollute the watershed and not releasing aquatic organisms are all important lessons that students need to learn to be responsible pet owners. These lessons help build an awareness of the natural world in our communities and an understanding of protecting nature. Students become enamored with films such as Finding Nemo and must learn the balance between imagination and the importance of not releasing animals into the ocean or natural habitats. Some species change their range within a habitat independent of humans. Changes brought about by human introduction of species can entirely upset a balanced ecosystem.

All of the lessons tie to California grade level standards, national science standards, Education in the Environment Principles and Concepts and National Ocean Literacy Concepts. These lessons were developed for classroom teachers, as teachers are some of the best models for students as they learn about their place in the world. The lessons are broken down into introductory activities prior to reading

- Introduction to the Ocean and Ocean Life and One Fish Two Fish, Now its Whose Fish? - Kindergarten
- Habitats Are Homes and Where Are All the Fish- 1st Grade
- Introduction to Lifecycles – 2nd Grade

strategies for reading the book and extensions to use following reading

- Finding A New Home for an Old Friend - Kindergarten – 2nd grade
- Kindergarten – Extend the Reading
- 1st grade – Extend the Reading
- 2nd grade – Extend the Reading

General Background: Introduction of species has happened as people have moved from one location to another whether exploring or relocating. Ships placed animals on islands so there would be food for the return trip back. Immigrants brought their favorite herbs to plant to make their new home feel just like home. The impact of introduced/non-native species is much better understood and eradication programs are underway to remove invasives such as wild pigs from the California Channel Islands where they have disturbed roots thus destabilizing the native oaks and

ironwood trees. The pigs were food that attracted golden eagles, which also feed on island foxes in such large numbers that it caused them to become endangered.

Invasive species can upset entire economic systems as well, such as the mitten crabs in San Francisco that pushed out the native crabs caught by the fishing industry. *Caulerpa sp* was introduced in southern California and with quick (as well as costly) response it was stopped. The risk of damaging the coastal nurseries for a vast number of species is tremendous.

A single goldfish or piece of algae released into a habitat can impact an ecosystem. We all have a responsibility to protect our natural world and our students can be the teachers to adults in their lives who may not know the best choices when dealing with pets and in protecting the natural world for their future.

Introduction to the Ocean and Ocean Life - Kindergarten

Learning Objectives: Students will describe the three states of water and the differences between ocean saltwater and freshwater.

Prerequisite Knowledge:

- ability to follow simple directions
- ability to use descriptive words to share observations
- ability to draw observations

Standards Alignment:

National Science Standards: A, B, D

Ocean Literacy Principles and Concepts: 1a, e

Education in the Environment Initiative Principles and Concepts: IIb, c
Kindergarten

CA Science Content Standards 1.b, c., 2.a, c

CA Visual Arts Creative Expression Content Standard 2.4, 2.5

Background:

The ocean covers about 70% of the earth and all of the ocean basins are interconnected by currents. Most of the Earth's water (97%) is found in the ocean. The ocean is a key part of the water cycle. Seawater is saline. The salt in seawater comes from eroding land, volcanic emissions, reactions at the seafloor and atmospheric deposition.

Materials:

- clear glass of water
- ice cube
- water in a cup to put in a freezer
- globe or map of the earth
- electric kettle with water to heat
- clear bowl with fresh water
- clear bowl with salt water
- popsicle stick for each students to use
- watercolors mixed with Epsom salts
- brushes and paper

Vocabulary: Earth, ocean, salty, freeze, steam, sea life

Preparation time: 20 minutes to gather materials

Instruction time: 40 – 50 minutes though ice will need to be check later

Differentiated instruction: Have students use pictures to match what they are observing if they have difficulty with drawing observations. Break lesson into separate sections if whole lesson is too long for students to focus. Assess students for prior knowledge and for understanding and modify lesson to meet comprehension needs. For accelerated students

allow them to develop their own experiment and hypothesize what will happen as they apply the action to the water.

Steps:

1. **Engage:** Hold up a clear glass of water and an ice cube and ask what is special about water? Show students and discuss that very few things in nature can be found as a gas (in the air), as a liquid (in the ocean, a puddle or a glass) or as a solid (ice cube).
2. **Experiment:** What happens when we put water in the freezer? Pour water into a cup and mark the level of the water on the cup. Put the cup of water in the freezer and check on it through the day and observe and discuss what happens. (This is a great at home activity.)
3. What happens when we heat water? Heat water in a pot on a hot plate or electric pot and observe what happens – ask “Where does the water go?” (*It turns in to steam.*)
4. Draw a picture of what the water looks like during each experiment.

	before	midway check	after
water in freezer			
heat water			

5. **Expand:** Show students a globe and ask if they think that all water on Earth is the same, whether it is in the ocean, raining down or in a lake? Let students know that ocean water is called salt water because there is salt dissolved in the water - - it tastes salty. We can't see the salt with our eyes but we can taste it and feel it when the water evaporates.
6. **Explore** the difference with saltwater and freshwater by using popsicle sticks and two containers of water, one fresh water and one saltwater. Have the students dip one end into the first cup and touch the stick to their tongue. Dip the other end into the second cup and touch the stick to their tongue. Discuss the differences in taste. What else can they think of that tastes salty?

7. **Express:** Have the students share animals that they can think of that live in ocean water. (*whales, sharks, fish, sea stars, snails, etc.*)
8. Create a painting showing some of the life that is found living in the ocean to review what they have discussed. To obtain a crystal-like look mix water colors with Epsom salts and paint an ocean scene with watercolors.

Extension:

On a sunny day, pour about 1/4 cup of salt water into a pie tin, label the pie tin and put the tin in the sun. In another pie tin add 1/4 cup of fresh water, label the pie tin and put it next to the other tin in the sun. Ask students what do they think will happen to the water by the end of the day? Check the pie tins later in the day. See if any salt is left behind once the water evaporates.

Extend at Home:

1. Read a story about the ocean.
2. Have students put water in an open dish and the same amount in a covered dish. Watch to see what happens.
3. Have students make a list with their parents of things that taste salty.

Student Resources:

Water Dance by Thomas Locker

A Drop Around the World by Barbara McKinney

One Fish, Two Fish.....Now Its Whose Fish? - Kindergarten

Learning Objectives: Students will identify features of a fish and recognize the large diversity of fish. Identify the basic needs of a fish. Students will understand why lionfish and other introduced fish can be a problem. Students will explain how humans can influence the functioning of natural systems.

Prerequisite Knowledge:

- knowledge of basic needs of living things
- resources used by organisms to meet their basic needs
- ability to interpret pictures and use descriptive words to share observations
- ability to count to 10 and recognize bigger/smaller, more/less

Standards Alignment

National Science Standards: A, B, C

Ocean Literacy Principles and Concepts: 5, 6e, g

Education in the Environment Initiative Principles and Concepts: IIb,c
Kindergarten

CA Science Content Standards 2.a, c

CA Math Measurement Standard 1.1 and Number Sense 1.1

Background:

Over 30,000 species of fish are found in the world. Most of them are found in the ocean. All fish are vertebrates with fins used to move through the water and gills used to breathe with in the water. As animals they must find food, avoid becoming food and successfully reproduce. Fish lifecycles vary from species to species with some fish living a few years and others living for over 100 years.

Fish are naturally found in specific ranges determined by habitat availability, water temperature, predators, prey and other factors. These ranges vary from species to species and changes in resources impact the survival of a fish as well as other animals within an environment.

Native species are those found living in their place of origin or their historical range. Introduced species are those plants and animals that were introduced or transported into a new location outside of where they are found naturally. When an introduced species is able to flourish and spread rapidly, displacing other species it may be considered invasive. Both humans and nature can have the power to significantly change ecosystems. Goldfish are an example of a fish often found in classrooms for students to study and they too have a native range, so when released into the environment can upset a natural system.

Lionfish are an example of a territorial fish that will compete with other fish for an area. They eat a large number of other animals and can disturb the natural environment when they eat herbivores that graze on algae. If there are fewer grazers, the algae covering may increase thereby changing other populations in the environment.

Materials:

- model or stuffed animal of a fish
- images of many different types of fish including eels, sharks, rays and a wide variety of ocean fishes
- lionfish presentation
- projector, screen and computer for lionfish presentation

Vocabulary: fish, fins, gills, invade, introduced, natural habitat, native species, introduced/non native species, invasive species

Preparation time: 10 minutes to gather materials

Instruction time: 30 - 40 minutes though ice will need to be check later

Differentiated instruction: use physical model of fish if pictures are too abstract. Write names of parts to identify (mouth, eye, gills, fins). Have accelerated students research a fish and share their findings about the different types of fish in the ocean.

Steps:

1. **Engage:** Hold up a model or stuffed animal fish for students to view. How many have seen a fish or know someone who has a fish?
2. Share pictures of many types of fish. Are all fish the same? (*No there are many different kinds of fish. All fish have fins to move with and gills that they use to breathe in the water.*)
3. What parts of the fish can you name? (*eyes, mouth, etc.*) Can you help me count the fins on this fish? Hold up the fish and count the fins you can see including the tail or caudal fin.
4. Fish use their fins to swim. Some are fast swimmers and some move slowly. Can you stick out your arms like fins and pretend to use them to swim?
5. Where do fish live? (*In water – some in fresh water others in ocean water. Most can only live in fresh or ocean water – not both.*) How was the ocean water different from the fresh water that we tested? (*The seawater was salty.*)
6. What else do fish need to stay alive? (*food, water, air, shelter*)
7. Now we are going to learn about a fish that got put into a new place in the ocean and the problems that it caused. Introduce lionfish slide show.

Review questions:

1. When are lionfish a problem?
2. How can we help prevent the problem?
3. What might happen if lionfish ended up everywhere?

Explore:

We are going to have lionfish visiting our room this week. When you find one bring it up and put it on our chart. Each day has separate spaces for the fish we find that day. We will add it to our chart and discover how many we find this week. We will count to see how many we find each day and which day has the most lionfish. We will use the lionfish to make a graph of all the fish we find.

Examine:

The fish might be different sizes. Usually the bigger fish are the older fish and the smaller fish are the younger fish. Sometimes a fish is bigger because it eats more than the other fish. In our next lesson, we are going to read a story about a lionfish.

Extend at home:

1. Visit a pet store or an aquarium and watch how the fish move.
2. Talk about what makes up the fish's habitat?
3. Read a story about a fish.

Student resources:

1. Books about fish
2. Paintings/drawings of fish

Habitats Are Homes – 1st Grade

Learning Objectives: Students will describe an ocean environment including the animals and seaweeds that live there. Students will identify how animals use seaweeds.

Prerequisite Knowledge:

- ability to follow simple directions
- ability to use descriptive words to share observations
- knowledge of animal and plant needs for survival
- ability to draw observations

Standards Alignment:

National Science Standards: A, B, D

Ocean Literacy Principles and Concepts: 5 a, d, e, 6 c, d, g

Education in the Environment Initiative Principles and Concepts: II c, d
Grade 1

CA Science Standards: 2 a, b, c

CA Reading Listening and Speaking 1.1 – 1.5, 2.2

Background:

The ocean offers vast living space and diverse habitats. Most of the living space on Earth is in the ocean and life in the ocean includes all of the major groups of organisms. Some regions of the ocean support more life than anywhere else on earth. The natural habitats of the ocean provide the resources for animals and seaweeds that live in those habitats to meet their needs.

When there are significant changes to those habitats, whether natural or human caused, the animals and seaweeds may not be able to survive. Factors that influence the success of fish include the salinity, water temperature, amount of oxygen available, habitat to hide and to reproduce and food resources available. Some fish are able to adapt to a wide range of habitats while others are more limited to the range of water quality characteristics.

When new species are introduced to a habitat they are faced with tremendous challenges to survive and reproduce. Native species may also be out-competed by the introduced species if they are more adaptable to the environmental changes.

Materials:

- Pictures of different fish showing their mouths (sardines with mouths open filtering water, wrasses with teeth showing so as to bite coral, tuna with mouth open to bite smaller fish, ray with mouth on the bottom to suck up crabs, etc.)
- Crayons and paper
- Pictures of habitats where the fish live
- Pictures of prey items (food choices) the fish eat (see above under fish)
- Pictures showing fish habitats including seaweeds, rocks, sand, etc.

- lionfish Powerpoint including image of lionfish to start the discussion

Vocabulary: habitat, seaweed, compete

Preparation time: 20 minutes

Instruction time: 40 minutes

Differentiated instruction: Have completed examples that students can follow as they begin matching. For accelerated students have them look at body shape and how that helps the fish maneuver more effectively in its habitat.

Steps:

1. **Engage:** How many of you have watched a fish eat? What kind of food did the fish eat? Did it pick up its food with a fork?
2. Fish have different kinds of mouths. Some fish have teeth to crush or bite food. Others have mouths to catch tiny food in large gulps of water. Others suck food in from the muddy bottom.
3. **Examine:** look at the different pictures of fish and types of food that fish eat. Can you match a fish with they type of food it eats by looking at its mouth? Review the pairs.
4. Let's draw a picture of what you think you would find in a fish's home or habitat. Remember to put a place to protect itself and a type of food to eat. Share their pictures.
5. Let's look at some other fish and where they live. When we look at the body of a fish we can tell a little bit about where that fish lives. Fish with large fins use those fins to move around. Fish with smaller fins may do less moving or turning and live in places where there aren't things to swim around such as in the open ocean. When a fish is dark on top and light on the bottom it looks like the surface of the water and it lives on the surface. Fish that are flat from top to bottom live on the bottom and hide in the sand.
6. Explore the different habitats and see if you can decide where each fish might live. In nature sometimes fish compete with each other for food especially if there are more animals needing food than there is food available. Sometimes they compete with one another for a place to live. This is true if you have an aquarium at home too. You can only have as many fish as there is food and a place to live.
7. What do you think would happen if new fish come and eat the same food as the fish that have been living in the habitat? (*The fish would compete with one another for food and some fish might not get enough food to survive. It would have to leave, look for food elsewhere, change food, or it might die.*)

8. We are going to learn about a fish called the lionfish that was put into a new habitat in the ocean. **Engage:** Show students an image of a lionfish. Talk with the students about what they think a lionfish might eat, and where might it live based upon the picture.

9. Show the Powerpoint of the Lionfish.

View slide #1 Lionfish Invasion. Chart other names children can come up with for Lionfish. Mention its Latin name & translation. Lionfish – (*Pterois volitans*) Latin translation = Flying Danger

View slide #2 What's a lionfish? Compare class names to other common names listed on the slide. Now have children list traits of the Lionfish they have observed from the photos.

View slide #3 Traits of a Lionfish. Compare and add traits to chart after viewing slides.

View slide #4 Native habitat, Slide #5 New invasive distribution.

View slide #6 Cartoon on aquarium dumping (source of the problem.)

View slide #7 What should we do with unwanted aquarium plants and pets?

10. **Extend** - Teach rhyme/finger play:

Rhyme/Finger play

1, 2, 3, 4, 5

Once I caught a fish alive

Why did I let it go?

Because it stung my finger so!

Which finger did it sting?

The little one that wears the ring.

Where Are All the Fish? – 1st Grade

Learning Objectives: Students will identify and read a bar graph; will to show most and least; will measure lionfish images to the closest inch/centimeter, will give and follow oral directions to a specified location.

Prerequisite Knowledge:

- understanding of one to one correspondence up to 25
- ability to measure to the nearest inch or centimeter
- read numbers to 25
- follow simple directions

Standards Alignment:

National Science Standards: A, B, C

Ocean Literacy Principles and Concepts: 5, 6e, g

Education in the Environment Initiative Principles and Concepts: II b, c

First Grade:

CA Math Standards: Number Sense 1.1

Measurement: 1.1, 2.3, 2.4

CA Reading Listening and Speaking 1.1 – 1.5

Background:

Fish are naturally found in specific ranges determined by habitat availability, water temperature, predators, prey and other factors. These ranges vary from species to species. Changes in resources impact the survival of a fish as well as other animals within an environment.

Lionfish live in tropical ocean areas of the South Pacific. They have large fins that are used to help them move slowly through the water and help them to pin their food. Their fins contain venom, which is located at the base of their spines. The fish uses this neurotoxin for protection. They tend to be nocturnal, gliding and feeding along the coral at night, and live under ledges and crevices during the day. As coral reefs decline due to pollution there are risks to survival for fish of the coral reefs. Lionfish are territorial, chasing away or eating other fish in their area. They decrease the number of herbivores that eat seaweed, which can cause an increase in algae thus changing the habitat and balance.

Scientists conduct biological surveys to look at populations of animals and in some cases remove invasive animals from a threatened habitat. When surveys are conducted the species are identified and their size is often recorded so that the results can be compared in subsequent surveys.

Materials:

- lionfish pictures in a variety of sizes up to 25 centimeters (10")

- graphing space for each day of the week
- rulers for students to measure fish

Vocabulary: longer, shorter, measure, inch or centimeter, nocturnal, describe, transport

Preparation time: 20 minutes

Instruction time: 20 – 30 minutes

Differentiated instruction: Provide an image of the lionfish so students can see what it looks like in conducting their search. Initially hide fish where students can see them easily. On each subsequent day make it more challenging. Create a measuring tray to fit the fish into to measure. Have accelerated students create their own picture graphs of the fish. Compare the number of fish from day to day and by size. Investigate other marine animals that are nocturnal.

Steps:

1. **Engage:** We are learning about lionfish this week. You will notice that there are some lionfish that have been introduced to our room. We are going to check each day to find how many fish there are in the room and how big they are.
2. Without telling anyone where the fish is at raise your hand if you “spy” a lionfish. Call on students to describe the location of the fish proximity and position using words like: near, far, below, above, up, down, behind, in front of, next to, left or right of, etc.
3. Assign a student to locate and “capture” the fish that is being identified. As a group measure the fish. The total length of a fish is measured from the tip of the mouth to the end of the tail or caudal fin. Record its length and place the fish on your graph for the day.
4. Repeat until all of the fish are found for the day. Continue through the week. Notice where the fish are more easily found and where they are harder to find. Let students know that some lionfish are caught and sold in the aquarium trade. Which size would be easier to transport? Which size might be harder to put in a home aquarium?

Extend at home:

1. Have students measure their pets or pictures of animals they have at home.
2. Graph birds that they see in their yard or neighborhood each day.

Introduction: Lifecycles – 2nd grade

Learning Objectives: Students will identify how some seaweeds reproduce and live in the marine environment. Students will describe life stages of a fish. Students will explain when lionfish become a problem, why they are a problem and how can humans influence natural systems.

Prerequisite Knowledge:

- ability to follow simple directions and to use descriptive words to share observations
- knowledge of animal and plant needs for survival
- ability to draw observations.

Standards Alignment:

National Science Standards: A, B, D

Ocean Literacy Principles and Concepts: 5 a, d, e, 6 c, d, g

Education in the Environment Initiative Principles and Concepts: II c, d
Grade 2

CA Science Standards: 2.a-d

CA Reading Listening and Speaking 1.2 – 1.4, 1.8

CA Social Science Standards 2.2, 4.3

Background:

The ocean offers vast living space and diverse habitats. Most of the living space on Earth is in the ocean and life in the ocean includes all of the major groups of organisms. Some regions of the ocean support more life than anywhere else on earth. The natural habitats of the ocean provide the resources for animals and seaweeds that live in those habitats to meet their needs.

When there are significant changes to those habitats, whether natural or human caused, the animals and seaweeds may not be able to survive. Factors that influence the success of fish include water quality characteristics, habitat to hide and to reproduce and food resources available. Some fish are able to adapt to a wide range of habitats including water quality differences while others are more limited.

When new species are introduced to a habitat they are faced with tremendous challenges to survive and reproduce. Native species may also be out competed by the introduced species if they are more adaptable to the environmental changes. For an introduced species to survive it must have the resources it needs to eat, reproduce and to protect itself.

Most fish hatch from eggs that are either brooded (carried) internally or released into the water. Once they hatch the larva survive on an attached egg sack until they are able to collect food, at which point they are considered fry. Fish are considered juveniles as they grow and mature into being able to reproduce at which point they

are considered adults. Fish growth and development varies among species and sometimes among individuals of a species depending upon the environmental conditions such as food availability.

As adults, male lionfish defend a territory and are only found near other lionfish during courtship. When the male finds a female, he swims to her and may circle her slowly. He then swims to the surface, and the female may follow him if she chooses. The male presses his body against the female, and she releases thousands of eggs in a pair of floating balls. The male fertilizes the eggs and leaves in search of other females. The larvae hatch after 36 hours with an egg sack of nutrients attached and are pelagic (living in open water) and begin to swim within 2 - 3 days. Once the babies are about one-half inch long (25-40 days old), they settle to deeper water. Juveniles may live in small groups. Lionfish are mature at around 18–19 cm. total length. They live to 15 years and can double their population in 4.5 -14 years. Lionfish have distinct markings of red or brown and white stripes covering their head and body. Lionfish do most of their hunting at night. During the day, they hide out under ledges and in caves. Lionfish eat just about anything that will fit into their mouth! This includes small fish, shrimps, and crabs. Lionfish lie in wait for their smaller animals, and then they swallow them whole.

Materials:

- Pictures of fish life stages (egg, larva, fry, juvenile, adult)
- 2 paper plates and a brad for each student
- scissors and crayons or pencils
- single hole punch
- Pictures of prey items (food choices) the fish eats
- Pictures showing fish habitats including seaweeds, rocks, sand, etc.
- Lionfish Powerpoint including image of lionfish to start the discussion
- Chickens Aren't the Only Ones by Ruth Heller

Vocabulary: habitat, seaweed, compete, stung, sting, egg, larva, fry, juvenile, adult, reproduce, fertilize, stripes

Preparation time: 20 minutes

Instruction time: 40 minutes

Differentiated instruction: Have examples that students can reproduce on their own, assess and modify to needs. For accelerated students encourage them to look at life cycles of butterflies and frogs and compare and contrast different uses of habitats to different life stages.

Steps:

1. **Engage:** Do all animals have babies that look like the parents?
2. Some animals lay or release eggs. Which animals can you think of that lay eggs? (*birds, dinosaurs, snakes, insects, fish, etc.*)

3. Fish have babies by releasing or carrying eggs until they hatch. Some fish like the seahorse carry their eggs until the babies hatch out. Others lay eggs in nests like the kelp fish do. Some release eggs into the water like the mackerel do. When the babies hatch most fish babies or larva have a yolk sac that is attached to give them food until they can find food on their own.
4. **Examine:** look at the variety of eggs and egg shapes Chickens Aren't the Only Ones has great variety to look at.
5. Let's draw/paste pictures of the life stages of a fish on our plate. First draw the egg sack with thousands of eggs.
6. Within two days the eggs hatch. Draw a larval fish with its egg sack attached.
7. In our next space our fish has grown to a juvenile living with others or alone. Draw its fins and don't forget its stripes.
 1. Look at pictures on the lionfish. Notice how large their fins are. Lionfish move slowly and use their fins to turn and to help trap food.
 2. In our last frame draw an adult after only a couple of years. It lives on its own under a ledge or in a crevice.
11. The lionfish changes habitats from when it is a larva in the open waters until it is a juvenile settling on the bottom. Color in the background to show where these fish live at different times of its life cycle.
12. Write a title for your images and attach the plate on top with a brad.
13. We are going to learn more about when the lionfish was introduced into a new area of the ocean. Engage the students by showing an image of a lionfish. Talk with the students about what they think a lionfish might eat, and where might it live based upon the picture.
14. Show the Powerpoint of the lionfish.

View slide #1 Lionfish Invasion. Chart other names children can come up with for lionfish. Mention its Latin name & translation. lionfish – (*Pterois volitans*) Latin translation = Flying Danger

View slide #2 What's a lionfish? Compare class names to other common names listed on the slide. Now have children list traits of the lionfish they have observed from the photos.

View slide #3 Traits of a lionfish. Add traits to chart after viewing slides.

View slide #4 Native habitat, Slide

View slide #5 New invasive distribution.

View slide #6 Cartoon on aquarium dumping, the source of the problem.

View slide #7 What should we do with unwanted aquarium plants and pets?

15. In nature sometimes fish compete with each other for food especially if there are more animals needing food than there is food available. Sometimes they compete with one another for a place to live. This is true if you have an aquarium at home too. You can only have as many fish as there is food and a place to live.

16. Let students know that tomorrow they will read a story about lionfish.

Extend at home/Student resources:

1. [An Egg is Quiet](#) by Dianna Hutts Aston
2. http://oceanservice.noaa.gov/education/stories/lionfish/thinking_profile.html profile of scientist studying lionfish
3. Sea babies film on Ocean Channel:
<http://www.ocean.com/film.asp?locationid=44&resourceid=6382&ProdId=&CatId=11&TabID=&SubTabID=>

Finding a New Home for an Old Friend – K-2nd

Learning Objectives: Students will identify responsible pet care. Students will identify the steps of what to do when you can't keep a pet. Students will explain how humans can affect natural systems by the decisions they make. Students will understand why lionfish, *Caulerpa sp.*, and other introduced species can be a problem for a natural environment. Students will identify the ocean on the map or globe.

Prerequisite Knowledge:

- knowledge of basic needs of living things, resources used by organisms to meet their basic needs
- ability to follow a story and interpret pictures
- ability to use descriptive words to share observations,
- recognize patterns found in nature.

Standards Alignment

National Science Standards: A, B, C, F

Ocean Literacy Principles and Concepts: 5, 6e, g

Education in the Environment Initiative Principles and Concepts: IIb-d, Vc
Kindergarten

CA Science Content Standards 2.a, c

CA Reading Comprehension Content Standards 2.1, 2.2

Literary Response and Analysis Content Standard 3.3

CA History- Social Studies Content standard 1.1,2, 4.2

Grade 1

CA Science Standards: 2a - c

CA Social Science/History 1.2, 2.1

CA Reading Comprehension 2.2

CA Reading Listening and Speaking 1.1 – 1.5, 2.2

Grade 2

CA Science Standards 2.a, b, d

CA Social Science/History 3.1

CA Reading Comprehension 1.1, 1.6, 2.4 – 2.6, 3.2

CA Reading Listening and Speaking 1.2, 1.3, 1.8

Background: When living organisms are introduced into a new environment it is extremely stressful for those organisms and many do not survive. Those that are introduced may survive and even impact the environment where they are introduced. Invasive species include any living organism that is introduced into a non-native environment and is able to out compete native species or significantly impact the environment. Non-native plants are frequently put into gardens because people like how they look or they remind them of another place. Invasive species are often weeds that we pull from our gardens. Introduced species of grasses in mudflats can trap sediment to such a degree the mudflat it started in is transformed into a different type of habitat, a high marsh

Invasive species often don't have a predator in their new habitat to keep the population in balance, so they can often out-compete the native species reducing or even eliminating the organisms naturally found there. While some provide food and habitat for animals others may not provide the same resources as the species they are replacing. For example, reducing the necessary habitat for nesting birds in an ecosystem may result in fewer chicks and a decline in the bird population.

Other examples that continue to be challenges for wildlife managers include the releasing of domesticated pets into the wild. This has been a tremendous problem internationally, as these animals are not prepared to survive in nature and their behaviors impact native animals found in the area. One example includes cats that when released can prey upon nesting and migratory birds, yet the cats still have a tough time surviving on their own. Their wastes increase the levels of bacteria in the watershed and can spread diseases impacting human health. Wild parrots are another example of introduced species that are able to thrive in a new environment.

Laws prohibit the release of domesticated animals (including pets) into nature. Ships in port are prohibited from releasing ballast water (the water a ship takes in to balance the load) so as to not introduce new species of plankton. Recreational anglers and hikers are urged to check and clean their equipment, boats, fishing gear and boots, to avoid spreading species to new locations.

Pouring aquariums into the sewage treatment system allows the water to be cleaned as chlorine is added to kill living organisms. Pouring aquarium water into a storm drain or directly into the ocean prevents it from being cleaned and can result in introducing species to the environment. Any algae large enough to be caught with a net should be frozen before being disposed of to ensure that the algae won't spread.

Lionfish natural history: Lionfish are top predators in their native coral reef habitats in warm, tropical waters of the South Pacific and Indian Oceans including the Red Sea where they feed upon shrimp and crabs. These fish have few predators and tend to live solitarily. The males especially are fierce in defending their territory. They lay eggs in mucus-encapsulated clusters of up to 15,000 eggs that are fertilized within 12 hours and then hatch 36 hours following fertilization. They can swim within two to three days and at 20 – 40 days they are no longer considered larva and are 10 – 12 mm in size. They move slowly and protect themselves with their venomous spines that contain a neuromuscular toxin. They are very popular in aquarium trade.

Lionfish adapt well to a broad range of temperatures and salinity making them very successful as they are introduced to new areas. Lionfish have been reported along the southeastern United States since the early 1990's. They are found in large numbers from Florida to North Carolina. Young have also been found in New York and the Bahamas. Some were introduced from a beachside aquarium that broke

during Hurricane Andrew in 1992. Two concerns for this increase of a non-native species is the success of these top predators out competing the native grouper and other fish and the health risk for recreational swimmers and anglers being stung by their toxin. (*see lionfish info page*)

Caulerpa taxifolia is a marine alga that is native to the Caribbean, Australia, Brazil, Philippines, Vietnam and other tropical seas where it grows in small patches and does not present problems. In the early 1980's it became a popular decoration in home aquaria. When it was introduced to the Mediterranean it grew much more robustly spreading into thousands of hectares. It has a toxin that protects it from sea urchins, fish and other herbivores. While a native non-invasive *Caulerpa taxifolia* is found in the Florida waters, the invasive species from the Mediterranean has also been observed. *Caulerpa taxifolia* was also introduced into California waters by a home aquarist and has been eradicated. It reproduces by fragmentation so even a small piece can cover an area as it grows. Because of its adaptability to grow rapidly even with diverse substrate, nutrient limitations, wide temperature ranges low light and lack of predators in the introduced habitats it out competes the native seaweeds. (*see Caulerpa info*)

Materials:

- Copy(ies) of [A New Home for an Old Friend](#)
- *Caulerpa* presentation and necessary AV equipment to share
- Magnifying lenses
- Samples of *Caulerpa*
- World map to show where Lionfish and *Caulerpa* are found and where they have become invasive species

Vocabulary: aquarium, tank, ocean dumping, *Caulerpa*, lionfish, invade, feathery, freezer, storm drain, food chain, habitat, spiky, grouper, bully, weighs

Preparation time: 20 minutes to gather materials

Instruction time: one or two 30 - 40 minute periods (This lesson can be spread over several days depending upon the time available so that students have a chance to ask questions and to explore their ideas and interpretations of the story. Reviewing responsible choices and the impacts of invasives can happen throughout the year.)

Differentiated instruction: use a big book or powerpoint to focus students attention as a group. Have 1st graders read the sight words that they know as you go through the story.

Steps:

1. **Engage** the students' interest by asking if any of them have ever moved their home. What did they have to do when they moved? (*pack all their belongings, move to the new home and put everything away*) Could they take everything with them? (*Not likely, maybe they gave some things away or threw them away.*)

2. We are going to read about a family that is moving and the problems they face in their move. Let's look at the cover. What do you think this story will include?
3. Read story –as you read encourage students to make predictions about the story using pictures.
4. Ask questions that connect them to the story with their own life experiences (have you had a pet, have you ever moved, etc.)
5. Comprehension check: What was the problem that the children had (*an aquarium of fish/plants they can't move with them*). Who helped solve the problem? (*their mom*). What did they do? (*gave the fish to a friend and froze the seaweed*). Why didn't they put the fish in the ocean? (*Because introduced species are a problem.*)
6. **Investigate:** Something else in the aquarium was a problem that wasn't an animal. Do you know remember what it is? (*a plant called Caulerpa*) Can you think of the name of other plants you know?
7. Let's observe the sample of *Caulerpa* we have with a magnifying glass. What parts do you see? What plant parts does *Caulerpa* have that you recognize (leaves, stem)
8. Let's find out why *Caulerpa* can be a problem. Share slide presentation.
9. Where do *Caulerpa* and lionfish live in nature – where are they from? Look on a map and show where in the ocean they are a problem and where they are naturally found.

Assessment:

If you have a pet that you can't keep or take with you when you move, what will you do? (*be a good citizen and be responsible for finding it a home or returning it to a pet store.*)

Extend at home:

1. If you have a pet, visit the library to find out where is it naturally found.
2. Tell someone you know who has a pet about what you learned today so if they can't keep their pet they know what to do.
3. Use a magnifying glass to look at leaves of plants near your home.

Student resources:

[One Less Fish](#) by Kim Michelle Toft and Allan Sheather

Additional resource: Washington Sea Grant "Bio-invasions: Breaching Natural Barriers" p 9, 11,15,

Kindergarten - Extend the Reading

Standards Alingment:

CA Reading Comprehension Content Standard 1.10,
CA Visual Arts Artistic Perception Content Standard 1.1,
Creative Expression Content Standard 2.6

Materials:

- Copy of A new Home for an Old Friend
- Scissors
- Paper to cut into shapes to make animals (precut shapes can be used)
- Paper to glue shapes onto
- Markers or crayons for drawing
- Puppets for the roles of the characters in the story

Steps:

1. This story is written as a rhyme. When we read the story some words sound like each other at the end. Let's find the rhyming pairs as we look at the pages again. (*scurry/ blurry, forgot/lot, go/no, do/through, place/space, think/stink, made/invade, bad/sad, small/all, etc.*)
2. **Student Expression:** Did you notice any shapes (like rectangles or triangles) that we recognize in the illustrations on the pages? Let's look back at the pages and see which shapes we can find.
 - circle- fish eyes, truck wheels
 - square – window panes
 - rectangle – aquarium tanks, freezer, doorway, windows
3. Are the pictures of the animals and seaweed photographs or are they drawings? (*drawings made by an illustrator*) Many artists use patterns that they see in nature. The book's illustrator used the natural patterns that lionfish and *Caulerpa* have for his drawings to help us recognize them. What shapes or patterns do you see in the drawings that we sometimes see in nature? (stripes to help the fish hide, seaweed leaves (blades) alternate back and forth on each side, etc.)
4. Create your own underwater image by drawing and cutting out geometric shapes. You can use a rectangle or oval for a fish bowl include fish made with triangles, ovals, circles, etc.
5. The fish can be made as puppets and the students can act out the story using puppets.

Student Resources:

Sea Shapes by Suse MacDonald

1st Grade - Extend the Reading

Standards Alignment:

CA Reading/Decoding 1.11

CA Reading Vocabulary 1.17

CA Writing Applications 2.1

CA Visual and Performing Arts Aesthetic valuing 4.2

Creative Expression 2.2

Prerequisite Knowledge: experience painting a picture

Materials:

- pictures of fish from travel ads or aquarium stores
- paint brushes
- paper
- primary colors of paint and mixing tray

Vocabulary: seaweed, stripes, primary color

Steps:

1. Have students read/find all of the sight words that they know in the story.
2. Re-read the story again together with students reading the parts that they know.
3. An artist drew the pictures for this story. He looked at the real animals and drew them so that they would be interesting for you to look at. Can you think of other drawings or paintings that you have seen with ocean animals? What was the artist trying to show in those pictures?
4. Have the students look at all of the animals in the pictures. Do they all look the same? Are they all the same color, size, and shape? Review that there are many types of fish in the ocean. Some have stripes to help them blend in to their surroundings.
5. Today we are going to paint some fish in a habitat. We are going to mix some of our primary colors to make secondary colors. We will use the new colors to make stripes on our fish and to make seaweeds where the fish live. See what color you get when you mix yellow and blue? What can you use this new color to make? (*seaweed*) What happens when you mix red, yellow and blue? (*brown is made*) Can you use this color to make some of the stripes on your fish?
6. When students have completed their pictures, have them imagine they get to take the fish home as a pet and write a story about their new pet fish.

2nd Grade - Extending the Reading

Standards Alignment:

CA Reading/Decoding: 1.6, 3.2

CA Science: 2 b, d

Prerequisite knowledge: read the story, knowledge of the ocean

Materials:

- paper, pencils and crayons
- word strips or 3 X 5 cards
- yarn or string
- background information on characters found in the book
- hole punch

Vocabulary: invasive, lionfish, *Caulpera sp.*, adaptation, camouflage

Activities:

- Make a word wall with all of the vocabulary words you can think of about the ocean. Add to the wall as you learn more about the ocean. Sort words by categories or groups.
- Pick an animal from the book and pretend you are that animal. Tell us the story from your viewpoint or perspective. If you were that animal what would you tell the students?
- How do you think scientists have learned about invasive species? What new questions do you have about the ocean?
- Play a “Who am I?” game with character card. Hang the card on a string to make a necklace hanging on the back of the students so others can see it but not the student wearing it. Have students ask yes or no questions to figure out which character they are wearing.
- What would happen if the characters made different choices in the story? Generate an alternative ending for the story.
- Can you think of another title for this book? Draw your own cover.
- Identify the different adaptations for the animals in the story. How does it move and what body parts does it use? How does it get its food? How does it protect itself? Where does it live and does it live alone or with others? How does it communicate? How does it deal with changes in the water? (Physical adaptations including teeth, ability to move, reproduce quickly, etc.)