



Friends of the Island Fox

a Program of the Channel Islands Park Foundation, a 501 (c) (3) public benefit org.

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Grade Level: K - Four

Objective: Students will understand how gradual small changes in an ecosystem can result in large cumulative change that is detrimental to some plants and animals.

Method: Students role play the various plants, animals and people involved in *The Island Fox Tale*.

Materials: Representative costumes or name signs.

CA Standards:

Science: K.2a; 1.2c;
3.3b,c,d; 4.2a,b,c, 4.3b,c
History/Social Science:
Chronological and Spatial
Thinking: 1.3; Historical
Interpretation: 3

EEI:

Principle II, Concept A
Principle III, Concept C
Principle IV, Concept
A,B,C,

The Island Fox Tale; An Ecosystem Play

The story of the Channel Island fox demonstrates food webs and the interconnectedness of natural systems. Students play the roles of the plants, animals and humans influences on Santa Cruz Island. Through active participation, students build an understanding of how animals and plants need each other and how humans can impact natural systems in negative and positive ways.

Background: Historically, the island fox and the bald eagle lived together on the California Channel Islands of San Miguel, Santa Rosa, Santa Cruz and Santa Catalina. For at least 6,000 years, the island fox was the largest land animal on the islands and the bald eagle was the largest predatory bird.

Native insects and fruiting plants provide important food resources for the Channel Island fox. When Europeans arrived, they introduced a variety of animals and plants into the island environment that were not native to California. Many of these introduced species caused negative impacts on native plants and animals. Domestic goats, sheep, rabbits, and especially pigs destroyed native plants. Introduced grasses and fennel displaced native plant communities.

Following World War II, DDT was used extensively across California as an insecticide for agriculture and residential areas. The chemical was introduced into local watersheds and the ocean. The bald eagle's diet consists primarily of fish and fish-eating birds. Accumulated DDT in a female bald eagle's body causes an inability to produce normal egg shells. When the parent eagles attempted to incubate their eggs, the shells crushed. Due to toxic build-up of DDT in marine fish, the bald eagle went extinct across the Channel Islands. Bald eagles are very territorial. While they lived on the Channel Islands, they kept

other eagles from nesting there.

In 1972, DDT use was banned in the United States. However, there were no bald eagles to recover on the Channel Islands. Other birds, however, like the brown pelican began to recover.

In the mid-1990s, biologists noticed a decrease in island foxes across the northern islands. By 1998 it was determined that golden eagles had colonized the northern islands. As mammal-hunting specialists, golden eagles were attracted to the feral (wild) pigs on Santa Cruz Island. Soon however, the golden eagles also discovered the small island fox which had previously known no predators. Golden eagles began hunting the island fox toward extinction.

In 2000, only 15 island foxes survived on both San Miguel and Santa Rosa Islands. Island foxes were taken into protective captive breeding facilities on the northern islands. The National Park and the Nature Conservancy began capturing golden eagles and relocating them back to the mainland in Northern California. Bald eagles were simultaneously reintroduced to the islands where they had lived with hopes they would help to keep golden eagles away. Between 2005-2007, feral pigs were removed from Santa Cruz Island.

As of 2008, all island foxes have been released back into the wild. Conservation efforts continue and monitoring these populations insures the further recovery of island foxes. Efforts are also underway to remove non-native plants across the islands and reestablish native habitats.

Procedure:

1. Create representative costumes or name badges for the following characters (25).
Suggestions: hats or ears cut out of craft foam visors work well for animals, plastic plants, and hats or props for human characters:

Native to Channel Islands

- 3 island foxes
- 3 deer mice
- 1 Jerusalem cricket
- 1 Catalina cherry
- 1 wild currant
- 3 native grass
- 3 fish
- 1 bald eagle

Introduced to Channel Islands

- 3 feral pigs
- 1 golden eagle
- 2 non-native plants
- 1 farmer with DDT spray bottle
- 1 biologist
- 1 ranger

2. Start the play by introducing the Channel Islands. A map is helpful. The Channel Islands are off the Southern California coast. They are very special islands with some plants and animals that are found nowhere else in the world. Designate an area that will be the island, an area to be the ocean, and an area that will be "Off the Island."
3. Introduce the plants and animals that are native to the Channel Islands and how they are interconnected.

Introduce Island Foxes (3): *For thousands of years island foxes lived on the Channel Islands. They are small foxes about the size of a house cat and they only live on the Channel Islands and nowhere else in the world. Almost 1,800 island foxes lived on Santa Rosa Island alone.*

Introduce Island Deer Mice (2): *In the winter time the island fox eats the little deer mice that live on the island. There aren't enough mice for the fox to eat all year long, so...*

Introduce Jerusalem Cricket (1): *The rest of the year the island fox eats the Jerusalem crickets. The Jerusalem cricket is a big bug. It is also called a potato bug or an earth baby. The Jerusalem cricket lives in the ground under the trees and bushes on the island. It's a decomposer and helps the ground to be healthy so the plants can grow.*

Introduce Catalina Cherry (1) and Wild Currant (1): *In the summer and fall, the Catalina cherry and the wild currant produce fruit. The island fox is a good climber. It climbs right up into the trees and bushes to eat the fruit. Half of the island fox's diet is fruit. The island fox eats both animals and plants. It is omnivorous. The Catalina cherry has a great big seed. The only animal that lived on the island that was big enough to swallow the seed whole so it could still grow, was the island fox. The island fox helped the Catalina cherry plant because the fox would travel around the island and leave the cherry plant's seed wherever it went in its scat or poop. The plant provided food for the island fox and the island fox helped the plant move its seeds all over the island. This helps all of the other animals that need the cherry plant too, the deer mice, birds, and insects, like the Jerusalem cricket.*

Introduce the Native Grasses (3): *Native grasses were important too. These are the grasses that had always been on the island. They provided food for the deer mice and a place for the island fox to hide.*

Introduce Bald Eagle (1): *Also living on the island was a very large hunting bird with a white head. It is our national bird. Does anyone know what it is? Bald eagle. The bald eagle lived on the Channel Islands with the island fox. It was very territorial and it kept other large hunting birds away. It didn't bother the island fox because the bald eagle likes to eat what? Fish. Where could the bald eagle find fish?*

Introduce the Fish (3): *The ocean surrounds the islands. Fish living in the ocean were the major source of food for the bald eagle.*

4. Have everyone take a good look at the plants and animals that are native to the island and the numbers of each. *This is the way the island should look.*
5. Explain how things changed on the Channel Islands:

When the native people, the Chumash, came to the Channel Islands, they revered the island fox. They thought it was very special. They even took some island foxes to Southern Islands, so there would be island foxes on those islands too.

Introduce Feral Pig (1): *When European people came to the Channel Islands they brought farm animals, like goats, sheep and pigs. A farm animal that goes wild is called feral. When a pig gets away from a ranch or a farm it goes wild very fast. What do pigs eat? A little bit of everything. The feral pigs on the island started to eat the fruiting plants that the fox needed.*
Send the Wild Currents to Off the Island.

Introduce Farmer and DDT (1): *About 50 years ago people started to use a lot of chemical sprays to kill insects on farm plants. One of those chemicals was DDT. DDT was very good*

at killing bugs, so people sprayed it on all kinds of fruits and vegetables, like oranges, lettuce, and strawberries. But the DDT didn't go away. When it rained the chemicals went into the streams and the rivers, and then where did it go? Into the ocean. Who lives in the ocean around the islands? Fish.

Fish and Bald Eagles: Some of the fish died. Send 1 Fish to Off the Island. But many of the fish had the DDT in their bodies. Who was eating the fish? The bald eagle. The DDT in the fish caused the bald eagle's eggs to have fragile shells. When the mother eagle sat on the eggs to hatch them the shells would break. When the bald eagles couldn't have any babies, they went extinct on the islands. Send 1 more Fish and the Bald Eagle Off the Island.

Pigs and Non-native Plants: On the island, the feral pigs were increasing in number. Add in 2 More Pigs. If there are more pigs what is happening to the native plants? The pigs are eating them. Send Catalina Cherry and 2 Native Grasses off the Island. And there are more and more plants that have come from other places, plants that don't belong on the island. Add 2 Non-Native Plants to the Island. These plants do not provide food for the animals that live on the island. Without the native grass, there are fewer deer mice. Without the fruiting plants the insects are affected and it is harder for the island foxes to find food. The deer mice, Jerusalem crickets and island fox numbers became less. Send 1 Island Fox, 1 deer mouse and the Jerusalem cricket Off the Island.

DDT is Banned: In 1972 people realized that DDT was doing bad things to birds, frogs, and fish. If it was making the fish poisonous, who else could it have been hurting? Who else eats fish? People. If it is bad for the fish and the animals, is it bad for people too? Yes. People stopped using DDT in the United States. The fish started to do better. Bring Back 2 Fish to the Ocean.

Introduce Golden Eagle: Birds started to do better. The brown pelican had been hurt by DDT, just like the bald eagle, but there were some brown pelicans left and they started to have babies again. But there were no bald eagles to do better on the Channel Islands. They had gone extinct. There were none left. One bird that lives on the mainland, where we live, started to do better and it looked for more places to live, the golden eagle. Add Golden Eagle to the Island. The golden eagle eats small mammals. It found baby pigs on Santa Cruz island. There was no bald eagle to chase it away, so it moved onto the island.

e. After so much change in the island ecosystem a crisis impacted the island fox:

Introduce Biologist: In 1994, biologists were looking around the islands and they noticed something....Ask biologist: Are there as many island foxes as there used to be? No. They didn't know why there seemed to be fewer and fewer island foxes. They caught 8 foxes and put radio collars on them, so they could track them. If anything happened to the island fox and it stopped moving for 6 hours, the radio collar would give off a special beep. This allows the biologists to go right away to where the fox's body is and try to figure out what happened. After just a few weeks, a radio collar gave off the special mortality beep. The biologist went right to the spot and found an island fox that had been killed and partially eaten. And there on the ground near the dead fox was a clue, a big feather. Who do you think was eating the island foxes? The golden eagle. The golden eagle came to Santa Cruz

Island to eat the feral pigs, Send 1 Pig Off the Island. But the foxes were small, most of the plants they used to hide in had been eaten by the pigs. No other predator had hunted the island foxes before. The island foxes were easy for the golden eagle to catch. At one point the golden eagles were eating almost a fox a day. Send 1 Island Fox Off the Island. By 2000, there were only 15 island foxes left on San Miguel Island, 15 on Santa Rosa Island, and just over 100 on Santa Cruz Island. Without island foxes to eat the deer mice, there started to be more and more deer mice. Add 2 deer mice.

- 7. How has the island changed? Have everyone look at the plants and animals that now live on the island. Is this the way the island used to look?*
- 8. Introduce the Ranger: The Rangers from the National Park worked with the biologists to capture the island foxes and put them in special caged areas on the island so they would be safe from the golden eagle. In these special areas the island foxes could have their babies and not be eaten by the golden eagle. As long as they were protected by the people, there started to be more island foxes. Bring Back 1 Island Fox to the Island.*

Assessment:

- 9. What was the first thing that the Rangers needed to do to make the island safe for the island fox to live there again?*
- 10. Remove the Golden Eagle: The Rangers captured the golden eagles and took them back to the mainland where they belonged. Who did they need to bring back to the island to help keep the golden eagles away? Bring Back the Bald Eagle to the Island. Young bald eagles were brought to the island. Now those bald eagles are adults and having their own chicks on the islands.*
- 11. Once the golden eagle was gone, the island foxes could be let out of their cages to be wild again. But the island still needed to change so that it could provide food for the island foxes. Who needs to leave so that the plants will return? Remove the Pigs: The Rangers removed the feral pigs from the island. What plants started to come back? Bring Back the Wild currant, the Catalina Cherry, and 1 of the Native Grasses to the Island. When the plants started to come back, that meant there was food for the insects again. Bring Back the Jerusalem Cricket.*
- 12. Is the island completely back to the way it was? No. Who do we still need to remove? The non-native plants so that all of the native plants can grow again. We still need to help the island fox until there are as many of them as there used to be. And the ocean needs our help too. We need to work hard to clean up the water that goes to the ocean so that all of the fish will come back.*

Conclusion:

- 13. Ask students, "What can you do to help the island fox and the Channel Islands?"*

- Try not to spray chemicals on plants and yards. Remember all of the water that runs off your yard or goes into the street, goes into the ocean. If chemicals and trash go into the ocean, they can hurt fish and everyone that eats the fish, bald eagles and people.
- Plant native plants in your yard. Native plants provide food and homes for insects, birds, and all of the animals that are important and native to California, like the island fox.
- Climate change is important to island foxes because they live on an island surrounded by water. Turn off the lights when you leave a room. When you save energy you help slow down climate change.
- All island foxes are back out in the wild again. If you should visit Santa Cruz Island, there is a good chance that you might see an island fox. Remember they are wild animals, respect them. Watch island foxes from a distance and do not feed them. It is not good for wild animals to eat people food.
- Most importantly, tell other people about the island fox. It is a special animal that only lives on our Channel Islands, and we are the only people that can protect into the future.

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