

# Channeling Our Efforts: A Balancing Act

## Focus questions

Why is conservation and management of the Channel Islands region necessary?

How is the value of an ecosystem or species measured? Does it depend on who is being asked?

What management strategies are being used to protect native plants and animals on the land and in the sea?

Look out at the Channel Islands region today, and its beauty will take your breath away. These unique islands and coastal habitats host seals, sea lions, seabirds, tiny foxes, and plants with colorful names like paintbrush, shooting star, lemonade berry, and live-forever. In the sparkling waters, kelp forests shelter neon-orange garibaldi and boldly striped sheephead, as well as teeming communities of shrimp, brittle stars, and spiny lobster. We would like to believe that these treasures are forever safe. But are they?

Channel Islands National Park, established in 1980, covers five of the eight Channel Islands: Anacapa, Santa Cruz, Santa Rosa, San Miguel, and Santa Barbara. The park protects a total of 49,646 hectares (124,115 acres) of land. It also protects 49,760 hectares (124,400 acres) of sea that extend 1 nautical mile (almost 2 kilometers) from the coastlines of the five islands. (See Map 5 in the JASON XIV Atlas.) The Channel Islands National Marine Sanctuary, also established in 1980, extends 6 nautical miles (11 kilometers) from the high tide line of each of the five islands, covering a total of 1,252 square nautical miles (4,294 square kilometers). With the protection of both a national park and a **marine sanctuary**, shouldn't the wildlife and habitats of the Channel Islands be secure?

The answer to this question is complex. Although hunting is not allowed in national parks, **terrestrial** wildlife is still threatened by pollution, pesticide residues, destructive non-native animals and plants (known as **alien invasive species**), and the results of

careless past land use. For example, cattle and sheep ranching on several islands destroyed native plants and caused erosion. Alien invasive plants, such as European grasses and fennel, have crowded out native grasses and shrubs that wildlife depend on for food and shelter. And alien invasive animal species, such as **feral** pigs, still uproot island vegetation and compete with native animals for food.



A sharp fence line shows the boundary between undegraded (left) and degraded (right) habitat.

Marine areas face their own problems. The National Marine Sanctuary is protected from some of these, but others may threaten it. Though hunting of marine mammals or birds is forbidden, people are allowed to fish and to harvest shellfish, lobster, and kelp. Overfishing, together with offshore pollution and natural events such as El Niño, could be a serious problem for some species. Recently, scientists and fishermen have noticed fewer cowcod, lingcod, and other fish. White abalone, once a staple of the Chumash diet, are now practically extinct.

## Serial Depletion

In the past, a species might be fished in one area until it was almost gone. Then the fishermen would find a new area or target a new species. This process—fishing out areas or species one at a time—is known as serial depletion. It has caused serious problems. For example, on the southwest side of Anacapa Island (in an area called the “Footprint”), rockfish have been totally fished out.

Research article

## History of Federal Protection for the Channel Islands

**1938** President Franklin D. Roosevelt proclaims Santa Barbara and Anacapa a national monument to preserve mammoth fossils.

**1949** President Harry Truman adds submerged lands within 1 nautical mile of Anacapa and Santa Barbara Islands to the monument.

**1980** Five Channel Islands (Anacapa, Santa Cruz, Santa Rosa, San Miguel, Santa Barbara) become the 40<sup>th</sup> national park.

**1980** Waters within 6 nautical miles of the islands designated as the Channel Islands National Marine Sanctuary.

Today, people at the Channel Islands National Park and National Marine Sanctuary are working hard to preserve the **biodiversity** of this unique area. Park projects, such as an island fox recovery effort led by JASON host researcher Tim Coonan, are part of this work. Mr. Coonan's goal is to bring back the population of this endemic fox to a **viable** level. His work to restore the island's ecological balance will benefit all native species.

Host researcher Satie Airame works with the Sanctuary on a project to establish **marine reserves**. Reserves are even more protected than marine sanctuaries: they are "no take" areas, places where marine resources may not be fished or harvested. Dr. Airame believes that marine reserves provide a safe haven in which threatened species can thrive. In the long run, marine reserves can help not only those who enjoy the sea's beauty and diversity, but also those who depend on it for their food and livelihood.

### The terrestrial story: what happened to the island fox?

The Channel Islands have a unique ecology, including endemic species such as the island fox. In order to fill specific niches or adapt to an island environment, some large species gradually evolved into smaller ones (**dwarfism**), while small species evolved into larger ones (**gigantism**). The island fox is an example of dwarfism. Although it is the island's largest native mammal, the island fox is one of the smallest foxes in the world. Only 30 to 33 centimeters (12 to 13 inches) in height and weighing less than 2 kilograms (4 pounds), it is about the size of a



This island fox looks tiny next to researcher Tim Coonan.

small house cat—far smaller than its closest mainland relative, the gray fox.

The story of the island fox shows how a single factor can start an ecological chain reaction with devastating results. Once abundant on six of the eight Channel Islands, the fox population fell in the mid-1990s on San Miguel, Santa Rosa, and Santa Cruz. Mr. Coonan and his team set out to track what was happening. On San Miguel, they captured and marked foxes with tiny, rice-sized electronic ID tags. When the foxes were recaptured, researchers read the tags with a device like a grocery store barcode reader. Then, using the ratio of marked to unmarked foxes, Tim Coonan was able to estimate the size of the current fox population. He determined that fox numbers had dropped from 436 in 1994 to 15 in 1999!

#### Fox Decline on San Miguel Island

Year	# of Foxes
1993	305
1994	436
1995	303
1996	101
1997	70
1998	47
1999	15

Tim Coonan's team had to find out what was killing the foxes. In 1998, they fitted eight foxes with radio collars and tracked them. Over the next 4 months, four of the foxes were attacked and eaten. Scientists found a golden eagle feather at one of the scenes. But this was only a piece of the puzzle. Why were golden eagles suddenly threatening the foxes?

Golden eagles are not native to the Channel Islands. Until recently, bald eagles were the top predators. But bald eagles do not harm foxes, because they eat mostly fish and carrion (dead animals). Bald eagles have disappeared from the Channel Islands because of DDT in the environment. (DDT is a pesticide, now



An island fox in the captive breeding program.

banned in the United States, that causes eggshell thinning.) Eagles that ate fish in which DDT was concentrated laid eggs that were more fragile and likely to break before the eaglets hatched. As a result, fewer and fewer bald eagles lived in the Channel Islands.

Gradually, golden eagles moved into the niche vacated by bald eagles. Unlike bald eagles, golden eagles catch live birds and mammals. Because island foxes are **diurnal**, they were easy prey. The foxes also had little plant cover in which to hide, because alien invasive plant species, such as fennel and alien annual grasses, had largely replaced the more protective native chapparal and woody plants. Feral pigs provided another food source for the golden eagles, attracting even more of them. Because they don't eat fish, golden eagles were also less affected by DDT. The golden eagles settled in to stay.

DDT was the factor that began the chain of events that almost brought the island fox to extinction! But today there is hope for the foxes' return, thanks to a two-pronged program directed by Mr. Coonan. First, golden eagles are trapped on the islands and released in remote areas of northeastern California. Second, foxes are being bred in captivity on the Channel Islands to be released back into the wild. Park managers also plan to remove feral pigs, thus making the area less attractive to golden eagles. Finally, they plan to bring back bald eagles, remove alien invasive plants, and replant native species. If these management techniques succeed, the Channel Islands' ecosystems may again function smoothly without further human intervention.

## Marine Reserve Success Stories

Scientific studies show that marine reserves are good for biodiversity. Throughout the world, reserves have larger, more abundant sea life, and a far greater variety of species than their neighboring waters. In a tiny reserve off Anacapa Island (the only marine reserve currently in the Channel Islands), the density of red sea urchins is nine times greater than in nearby fished areas. Off the northeast Atlantic coast, closing fishing in certain areas of Georges Bank has resulted in a 14-fold increase in scallops. Near Florida's Kennedy Space Center, fish in a marine reserve are larger and more than twice as abundant as in unprotected nearby areas.



A kelp harvesting boat in the Channel Islands.

## The marine reserves story: can everyone benefit?

Once scientists zeroed in on the mystery of the island fox, they solved it fairly easily. The solution to the marine reserves mystery is a little harder to see. One problem is that many of its players live underwater. Also, the marine mystery involves thousands of species of sea life, as well as thousands of people with different points of view. While the island fox story deals mainly with the effects of a pesticide and relationships among endemic and alien plant and animal species, the marine reserves story involves a large group of people called **stakeholders**, each of whom has a vital interest in the ocean's resources.

In 1999, the Sanctuary and the California Department of Fish and Game began the process of establishing marine reserves. A large part of this process involved weighing the needs of all the different stakeholders.

To that end, the Marine Reserves Working Group was formed. This 17-member group included federal and state resource managers, commercial and sport fishermen and divers, kelp harvesters, conservationists, and other people from the community: in short, representatives of everyone who had an interest in the Sanctuary's waters. The group's task was to decide what percentage of the Sanctuary should be made into marine reserves and where reserve areas should be located. Dr. Airame served as a scientific advisor for the working group.

The members of the working group discovered that although they all supported the idea of marine reserves, they couldn't agree on where to put the reserves or how big the reserves should be. Some

groups felt they would lose too much income if reserves were established in prime fishing and recreation areas. Other members felt that certain areas must be protected no matter what.

Still others felt their industry didn't have a negative effect on fisheries and, therefore, shouldn't be restricted at all. (In Exercise 6.2, you'll learn more about stakeholder differences.) The 22-month effort ended without a final recommendation; the decision on where to put the reserves was passed to the California Department of Fish and Game. The input from this process, however, will help assure that the marine reserves, wherever they end up, will have long-term benefits for everyone.

### Journal Question



*Why is conservation and management of the Channel Islands necessary? What are the potential benefits and drawbacks of marine reserves?*

### Fact or Fallacy?



The bald eagle can definitely be reintroduced successfully to the Channel Islands, because the threat of DDT is over.

**Fallacy:** Efforts to reintroduce bald eagles to Catalina Island have shown that DDT in the environment is still affecting eggshell thickness, even though this chemical has been banned in the United States since 1972.

## Vocabulary

**Alien (Invasive) species** *n.* A species that enters an area and occupies an ecological niche, succeeding within it so well that it replaces other species in the niche.

**Biodiversity** *n.* The variety of plant and animal species in a given area.

**Captive breeding** *n.* Capturing and mating animals to produce offspring that can eventually be released to the wild. Captive breeding's goal is to restore a depleted population.

**Diurnal** *adj.* Active during the day rather than the night.

**Dwarfism** *n.* An evolutionary adaptation in which a species develops a smaller-than-usual size in order to fill a niche or adapt to a specific, isolated environment.

**Feral** *adj.* Having returned to the wild after being domesticated.

**Gigantism** *n.* An evolutionary adaptation in

which a species develops a larger-than-usual size in order to fill a niche or adapt to a specific, isolated environment.

**Marine reserve** *n.* A "no take" zone in which fishing or harvesting of any marine resources is prohibited.

**Marine sanctuary** *n.* An area in which fishing and harvesting of resources are regulated but not prohibited, and certain activities are restricted.

**Stakeholders** *n.* People, or groups, who have a particular interest, or "stake," in a process or outcome.

**Sustainable** *adj.* Able to be maintained over a long period of time.

**Terrestrial** *adj.* Living or growing on land.

**Viable population** *n.* A number of individuals that allows for successful mating and reproduction, so that a particular plant or animal species can continue to survive.