Research article

1990s, California began using data collected by the park's monitoring program to track declining abalone populations. The state used this data in its decision to close the pink, green, and white abalone fisheries in 1996, and the red abalone fishery in southern California in 1997. Without the data provided by the monitoring program, abalone populations could have been completely wiped out by overfishing.

David Kushner uses a 1-meter (3.2-foot) **quadrat** (a square measuring device) to measure plant and animal populations within the kelp forests in the Channel Islands. He uses quadrats together with 100-meter (328-foot) **transects** (lead-filled woven nylon line marked at 1-meter intervals) that are installed permanently at the monitoring sites. During each quadrat sampling effort, he lines up a quadrat along the transect line to determine the **density** of certain mobile and immobile species within the quadrat.He determines densities for 18 species, including fish, algae, and invertebrates. For 2 hours, Kushner tallies the number of juvenile and adult giant kelp, sea urchins, bat stars, giant spined sea stars, snails, and other species that he sees. Then he records his results on an underwater data sheet. Kushner also carries out another kind of sampling: monitoring species by descending to the floor of the ocean and slowly moving along the transect line, counting certain plants and animals as he goes. The monitoring team gathers information at the same spot once a year (usually between June and October) to monitor change in densities of species over time.

Journal Question

How can humans help protect the kelp forests in the Channel Islands?

Fact or *Fallacy?*

When large pieces of kelp break off during storms and become drift algae, all resident animals need to abandon the drifting kelp and quickly find a new home on other kelp plants or they will not survive.

Fallacy: *Animals continue to feed and find shelter on drifting kelp for weeks or even months after it is severed.*

Vocabulary

Alternation of generations *n.* The most common life cycle among marine plants, consisting of an alternation between a gametophyte generation and a sporophyte generation.

Blade *n.* The leaf-like part of kelp where most of the plant's photosynthesis takes place.

Density *n.* The number of individual plants or animals per unit of area.

Gametophyte *n.* A microscopic kelp plant that forms when spores are released by specialized reproductive kelp blades.

Holdfast *n.* The root-like structure of kelp that anchors the kelp to rocks on the ocean floor.

Kelp *n.* A photosynthetic type of alga consisting of a holdfast, stipe, and blade(s).

Pneumatocysts *n.* Also known as gas bladders or floats, these gas-filled structures, located at the base of each blade, help push the blades of the giant kelp toward the sunlight at the surface of the water.

Quadrat *n.* A square frame used by divers to mark off distinct areas in which to monitor the number of selected species.

Species *n.* A group consisting of animals (or plants) that share many physical characteristics and can interbreed.

Sporophyte *n.* A kelp plant (often quite large) that forms when a gametophyte's egg is fertilized.

Stipe *n.* The section of kelp that connects the holdfast and the blades. A stipe looks like a land plant's stem.

Transect *n.* A line, marked at regular intervals, along which scientists align their quadrats to monitor species.