

Voyager

F o r k i d s o f a l l a g e s

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The Sheltering FOREST

By Nan Criqui

Bright and Bold

Neon-bright garibaldi are California's official marine fish. Garibaldi are very aggressive and will chase away anything that invades their territory—even larger fishes.

The male garibaldi is a stay-at-home dad, but a pretty grouchy one. He makes an algae nest and invites his mate to lay her eggs there.

Afterward, the male chases her away and defends the eggs himself until they hatch.

Grab a mask, fins, and snorkel, and go explore the giant kelp forests growing in the ocean along California's coast. So many animals make their homes there that you could visit daily for two years and find a new animal species on each trip.

Many areas of Earth support large numbers of animals. However, few places are so livable that they attract not just hundreds of individual animals, but also hundreds of different species of animals. Kelp forests are one of these special places.

Giant kelp forests provide everything animals need: food, shelter, protection from enemies, and places to raise young. From their leaflike blades bobbing on the ocean's sunny surface to their rootlike holdfasts on the dark seafloor, giant kelp supply space for animals with many different needs. Changes in temperature, food supply, light level, and plant cover create unique nooks and crannies that shelter more than 750 species of animals.

Fishy Stories

Jaws of Steel California sheephead have jaws powerful enough to crack clam shells and break open sea urchins, two of their favorite foods. For protection while they sleep, young sheephead cover themselves with a coating of mucous.

Nothing wants to eat a sleeping sheephead!

All sheephead start off life as females. After a few years as adult females, something strange happens. They become males and spend the rest of their lives in this new role.



Kelp Look-alikes

Giant kelpfish are masters of disguise that spend their lives among the kelps they mimic.

Long, thin, and shaped like kelp blades, they are able to change color to blend in with their background. No, they can't do polka dots, but they can change from green to brown to red.

Grooming Services

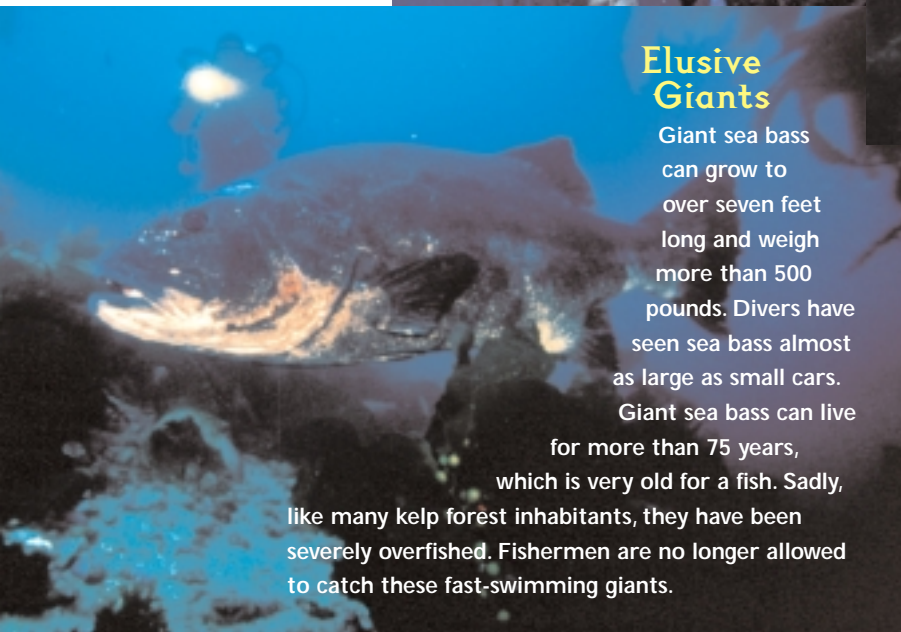
Señoritas are small, buck-toothed fish that have a strange way of adding to their diet. They eat parasites, dead tissue, and other unwanted material from the skins of other fishes. This service is so valuable that other fishes actually wait in line for their turn to be groomed.



Elusive Giants

Giant sea bass can grow to over seven feet long and weigh more than 500 pounds. Divers have seen sea bass almost as large as small cars.

Giant sea bass can live for more than 75 years, which is very old for a fish. Sadly, like many kelp forest inhabitants, they have been severely overfished. Fishermen are no longer allowed to catch these fast-swimming giants.



Lean and Mean

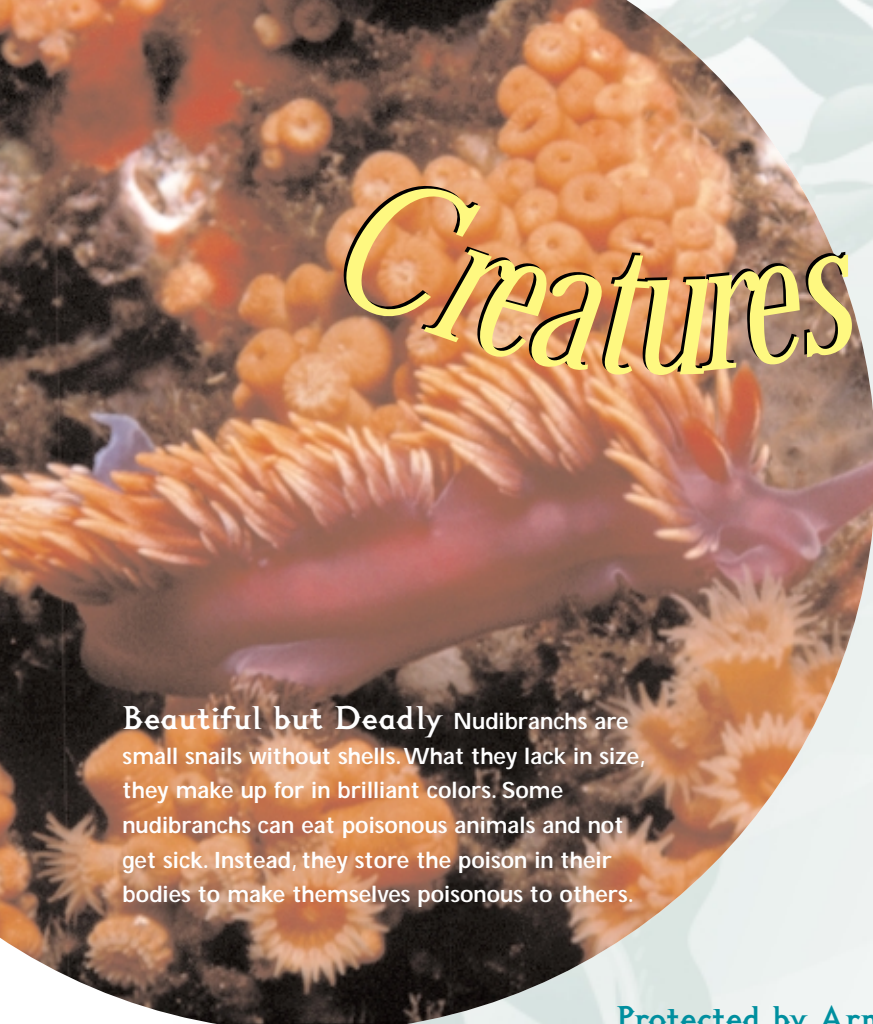
California moray eels pass water over their gills to breathe in a way that is different from that of other fishes. This is why their mouths are usually open, and they look as if they are about to bite. Moray eels are not particularly aggressive, however, unless you are a favorite dinner item like a crab or a sea urchin. The long, flexible bodies of these fish are perfectly adapted for their lives of slithering through crevices and caves.

Puffing Up for Protection

Swell sharks get their name from their ability to take water into their stomachs when frightened and then "swell" up. (They are also called balloon sharks.) This makes them look bigger and makes them more difficult to eat. Swell sharks also have flesh that is slightly poisonous—making them an all-around bad dinner choice for larger fishes.



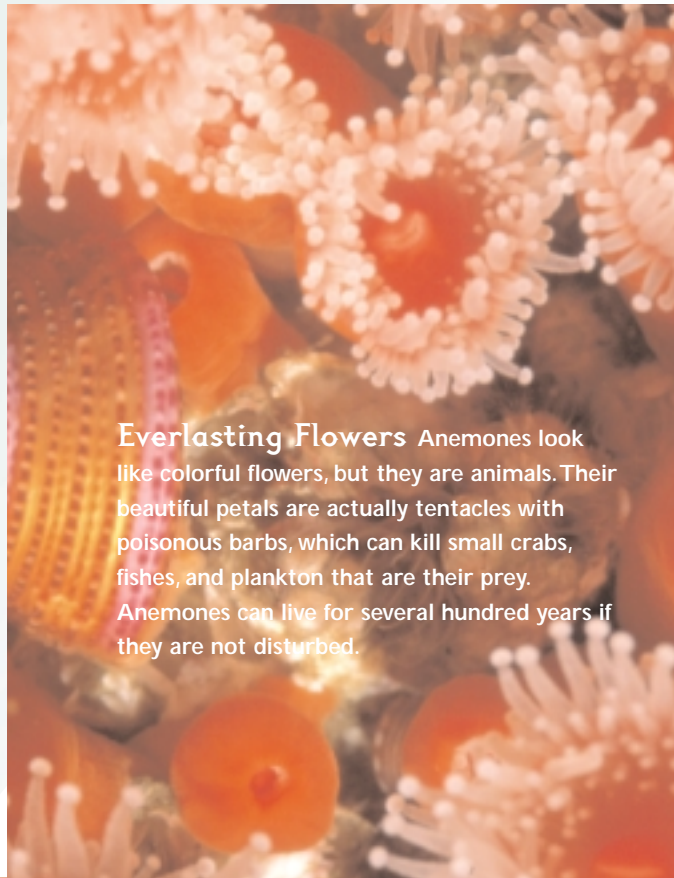
Creatures of the Kelp



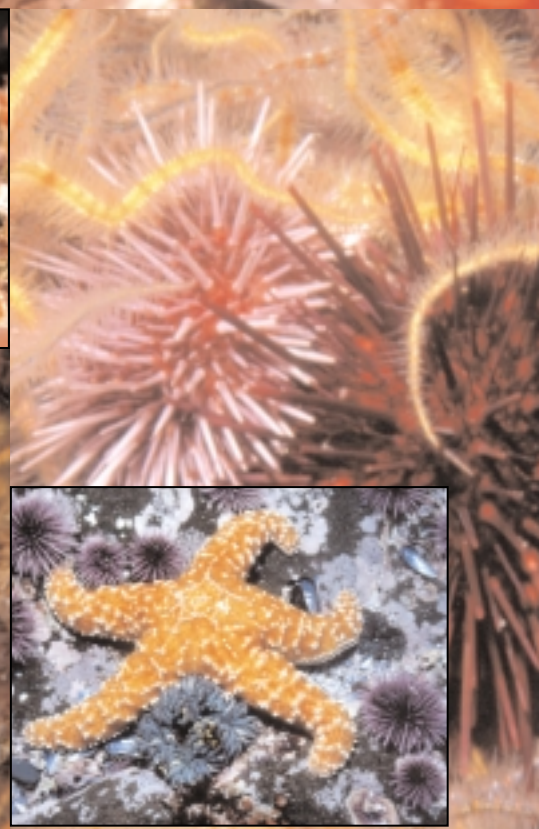
Beautiful but Deadly Nudibranchs are small snails without shells. What they lack in size, they make up for in brilliant colors. Some nudibranchs can eat poisonous animals and not get sick. Instead, they store the poison in their bodies to make themselves poisonous to others.

Protected by Armor

Crabs and lobsters are protected by a hard outer cover. In order to grow, they shed this layer and grow a new, larger one. Nature played a trick on the hermit crab. Its has no covering on its tail and must find an abandoned shell of another animal to make a safe home



Everlasting Flowers Anemones look like colorful flowers, but they are animals. Their beautiful petals are actually tentacles with poisonous barbs, which can kill small crabs, fishes, and plankton that are their prey. Anemones can live for several hundred years if they are not disturbed.





Parts of the Forests

The Canopy

The fronds of giant kelp plants form a floating mat at the sea surface, which may extend for miles.

This canopy provides a perfect nursery for young fishes and shelter for many other animals.



At Home in a Shell

Snails, limpets, and abalone have a muscular "foot" they use to crawl along the seafloor or up giant kelp fronds. Many have a mouth opening with rows of teeth like a file that are able to grind off algae from rocks or drill through the shells of prey.

Understory

Giant kelp form a forest of towering "trees" stretching from the seafloor toward the light at the surface.



Holdfasts and the seafloor

Giant kelp's rootlike holdfasts provide shelter for brittle stars, snails, and crabs. The rocky seafloor has crevices that protect eels, lobsters, and abalone. Sandy areas help conceal clams and scallops. And fishes, nudibranchs, and sea urchins hide in the giant kelp and other seaweed.

Spiny Skins

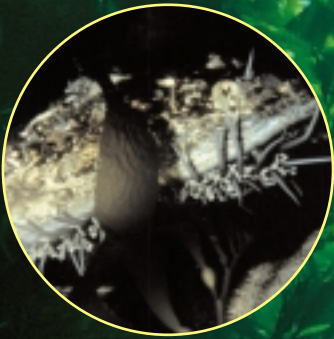
Sea stars, sea urchins, brittle stars, and sea cucumbers have spines embedded in their skins for protection. They even can regrow lost body parts. If a sea star loses an arm, it grows another one. If a sea cucumber is threatened, it can discharge its internal organs, then grow another set.

Delicate BAL

Have you ever built a house of cards or made a domino chain?

In these games, moving one piece affects the whole set.

Knock down the lead domino, and the entire chain falls. In the natural world, too, balance among all the parts is critical. Everything is interrelated, and changes affect the whole system.



An abalone munches a giant kelp blade.



Sea otters are small marine mammals with big appetites. A 60-pound otter eats a whopping 15 pounds of food every day.

Scientists know that sea otters, sea urchins, and kelp forests are interrelated. They are like a domino chain. Sea urchins are important to kelp forests because they eat the fast-growing giant kelp. Slower growing algae can thus survive, which increases the number of different habitats available to animals.

Sea otters eat sea urchins. Without otters, urchin populations explode. Too many urchins can destroy kelp forests. When this happens, fishes and other animals die off or migrate. "Urchin barrens," areas with nothing left but sea urchins, are the result.

Otters have thick, warm pelts that make beautiful coats. And that has put them in danger from humans. When sea otters were discovered by European fur traders 250 years ago, about 300,000 otters lived along the Pacific coast of North America. By 1911 when sea otters were protected by international treaty, fewer than 2,000 remained. Along the California coast, 20,000 animals had become less than 30.

By the mid-1990s, otters had recovered somewhat in northern California waters, and the population increased from 30 to around 2,000. Increases in otter populations in this area, and elsewhere, have been linked to increases in kelp forests.

In southern California, otters disappeared completely. When otters disappeared, sheephead increased. Sheephead eat large numbers of sea urchins. Thus, they helped control the southern California sea urchin population. The California lobster also eats sea urchins.

Sheephead eat abalones and urchins.

Abalones compete with sea urchins for the giant kelp that both species like to eat.

Unfortunately, sea otters, sheephead, abalone, and lobster populations are all in decline. Abalone, sheephead, and lobster all are overfished. Although protected, otters are still at risk from diseases, toxic pollution, oil spills, and predators like the killer whale. Killer whales began targeting otters when their usual food (seals and sea lions) decreased because their food supply (fishes) was reduced by human overfishing and ocean warming. Do you see the domino effect here?

Sheephead have strong jaws and teeth that can crush the shells of sea urchins, snails, and abalone.



This is an urchin barrens.

ANCE



Scripps scientists dive almost daily to study the giant kelp. (top) Peter Edwards uses a meter square to count kelp plants in the Point Loma kelp forests off San Diego, California. (left) Edwards measures the growth of a kelp plant.



California lobsters eat sea urchins.

Marine ecologist Paul Dayton heads a group of Scripps scientists who have studied local kelp forests for 30 years. To understand kelp forests better they have

- recorded how kelps are affected by storms, currents, pollution, and climate conditions such as El Niño (warming) and La Niña (cooling),
- studied the relationships among animals, fishes, and kelps—especially sea urchins and abalones,
- considered how kelp forests have changed through the centuries, and
- studied the effect of marine reserves, areas set aside to preserve natural conditions, where fishing is not allowed.

Their research indicates that giant kelp is very hardy and can recover from major problems, but that fishes and other kelp forest animals are steadily declining. The main problem appears to be overfishing. Dayton and others thus recommend more and larger marine reserves in order to study and protect endangered populations.

