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Does bull kelp need help?

Researchers lobby for protections while they learn more about how the giant grows and its role in marine life

Bull kelp habitat



Birds
Seabirds such as pigeon guillemots make use of the kelp beds for resting and foraging.

Blades
The blades are where photosynthetic and reproductive organs are found.

Pneumatocyst
The grapefruit-size, gas-filled bulb contains carbon monoxide that keeps the blades floating close to the surface where more sunlight is available.

Stipe
The kelp's ropelike stem — less than one inch in diameter, but up to 120 feet long — connects the blades and pneumatocyst to the seafloor.

Fish
Kelp forests provide habitat for a variety of fishes such as juvenile salmon, copper rockfish and ling cod.



Rockfish



Ling cod

Holdfast
Anchors the plant to the rocky seafloor. The holdfast is usually ripped from the bottom by fall storms after the plant has released its spores.

Seabed life
Sea urchins and abalone graze on bull kelp, while the holdfast provides habitat for a variety of invertebrates such as crabs and sea stars.



Juvenile salmon

By BEN LARSON ♦ THE OREGONIAN

The giant seaweed bullwhips strewn about the sand are a familiar sight to Oregon beachgoers. The thick brown tubes may look menacing, but these colossal members of the algae kingdom — bull kelp — are vital to coastal ecosystems.

Now Oregon policymakers and marine conservationists want to ensure that these watery giants are preserved and protected against commercial harvest.

Bull kelp, which grows in dense offshore forests, is Oregon's dominant type of kelp. Although the floating kelp doesn't appear to be in immediate jeopardy from human activity, it lures harvesters who turn kelp into "melt-in-your-mouth" snacks, medicines and other products.

In a new report, researchers say kelp beds, which provide food and habitat for a host of marine creatures, deserve special protection to keep commercial harvesters from causing irreversible damage.

Kelp beds attract harvesters because the algae can be made into products that include herbal supplements, pharmaceuticals, additives in ground beef, fertilizer and sushi wraps. Kelp extract — algin — is used as a thickener in ice cream, salad dressing, lotions and paint.

The detailed report comes just as the Oregon Department of State Lands considers new kelp management measures.

Yuri Springer, a marine ecologist who is the study's lead author, said not enough is known about bull kelp's ability to survive widespread extraction.

"It's not clear how effectively that species of kelp could replenish itself if it was removed by harvesting."

The report by Springer, Cynthia Hays and Mark Carr, researchers at the University of California Santa Cruz, and Megan Mackey of the Pacific Marine Conservation Council says large-scale commercial harvesting can pose a threat to the bull kelp and the animals that rely on it.

Bull kelp, *Nereocystis luetkeana*, can be found from the temperate waters of Southern California to the frigid seas around the Aleutian Islands.

The towering tethered algae, which can grow 120 feet tall and as much as 5 inches a day, provide food and habitat for sea urchins, rockfish, juvenile salmon, sea otters and other marine creatures. Kelp beds also provide a resting place and foraging area for gulls, herons and waterfowl.

Sandy beach food webs also are fueled by dead kelp plants that storms wash ashore. The tangles of decomposing kelp provide food and beach shelter for scavenging amphipods and other animals.

Kelp isn't just for the fish and other marine life. Kelp forests furnish the setting for recreation, from kayaking to scuba diving.

Commercial harvesting of giant kelp — *Macrocystis luetkeana*, a cousin of bull kelp and the dominant West Coast species — is a long-standing practice. In contrast, "harvest pressure on bull kelp to date appears to be negligible," the researchers say.

The two kelp species have a similar life cycle. Kelp reproduction begins when

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About bull kelp



13-foot blades



120 feet high

What is bull kelp

Oregon beachcombers are familiar with bull kelp, often found washed up on the beach after a winter storm. Bull kelp gets its name from its similar appearance to a bull whip. Native tribes used kelp stipes to make fishing line and used pneumatocysts to store fish oil. Today, kelp extracts are used to thicken products like ice cream, hand lotion and paint.

Bull kelp harvesting

Bull kelp is not being harvested commercially off the Oregon coast, but conservationists want to ensure that strict regulations are in place to prevent future overharvesting of kelp beds. Harvesting bull kelp before it reproduces can devastate a kelp forest community.

Bull kelp

Scientific name: *Nereocystis luetkeana*
Other names: Ribbon kelp, bulb kelp, sea otter's cabbage. *Nereocystis* is the Greek word for "mermaid's bladder."
Description: Fast-growing seaweed
Habitat: Cold, rough coastal waters
Range: Southern California to Alaska
Diet: Light and nutrients from the water
Growth: Growth: up to 5 inches per day
Size: Height up to 120 feet, blades up to 13 feet, shown here to scale

Bull kelp's one-year life cycle

Fall
Blades of mature kelp, or sporophytes, develop spore-forming patches called sori that sluff off the plant before releasing their spores.



Sori patches

Winter
The spores grow into tiny male or female plants, called gametophytes, which produce either sperm or eggs.



Gametophytes, greatly enlarged

Spring
Fertilization of the eggs produces embryos that begin growing with spring sunlight.

Kelp begins to grow

Summer
Growth accelerates with summer sunlight, bringing the blades of mature kelp to the surface, completing the cycle.

Bull kelp: Poorly timed harvest can be devastating

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sites, called sori, on the fronds of adult plants release male and female spores, which sink to the sea floor. Spores bloom into miniature versions of the adult plants. Sperm from the male plants is then drawn to eggs on the female plants by pheromones. The result of the fusion is the large asexual adult plants that constitute the kelp forests.

Aside from their reproductive process, bull kelp and giant kelp have little in common. And because companies have targeted mostly giant kelp, primarily for pharmaceuticals, much less is known about bull kelp ecosystems or how they would respond to commercial harvest.

Giant kelp can live up to seven years and has multiple batches of fronds spread out vertically along several stalks. Each bunch of fronds is kept afloat by its own pneumatocyst, a buoyant bulb containing carbon monoxide.

Bull kelp, which usually doesn't live more than a year, is less complex. It has only one set of fronds upheld by a solitary pneumatocyst at the top of the plant's one stalk.

When giant kelp's uppermost fronds are harvested, the remaining parts of the plant can continue to grow and release spores that will form the basis of the next generation. But harvesting a bull kelp canopy at the wrong time can be much more harmful.

"If you remove those reproductive or photosynthetic organs before the plant reproduces, that's the end of the game," Springer said.

Oregon law states that as much as 40 miles of submerged land may be leased for up to 50 years with no restrictions on the maximum amount of kelp harvested. The report, paid for by the nonprofit Lenfest Ocean Program, cautions that unrestricted commercial harvest of bull kelp would be unsustainable.

Conservation organizations, government agencies, scientists and businessmen agree that bull kelp needs protection because its unique construction makes it susceptible to the effects of overharvesting.

Mackey, a policy analyst with the Astoria-based Pacific Marine Conservation Council, said the council has stressed to offi-



TERRIL EFIRD/UNIVERSITY OF CALIFORNIA SANTA CRUZ

Bull kelp's distinctive gas-filled bulb keeps the blades of the fast-growing seaweed close to the surface, where they receive more sunlight.

See www.lenfestocean.org/publications/managing_bull_kelp.html for a recent report about bull kelp.

cial at the Department of State Lands "that we think it is important to protect that kind of habitat."

The report echoes the conclusion of an earlier report by the Oregon Department of Fish and Wildlife, which concluded that bull kelp forests warrant special protection because they are vital to coastal ecosystems.

Based on the findings of the two reports, said state lands director Louise Solliday, "we would consider looking at a ban on commercial harvest as part of our special-use rules."

The most recent lease for bull kelp harvest was issued to James Jungwirth by the Oregon Department of Parks and Recreation. Jungwirth is co-owner of a company in Williams, south of Grants Pass, that collects bull kelp for natural products.

"It's a melt-in-your-mouth, tender, salty, snackable seaweed," Jungwirth said. Unlike commercial kelp boats, he said, his kayak-based hand harvesting targets only the tips of bull kelp fronds to preserve the overall integrity of the kelp forest.

"I'm a proponent of hand harvesting, but I don't think machine harvesting of bull kelp really has a place," Jungwirth said. "Maybe it's OK with the giant kelp because it allows it to keep growing. But if you cut the bull kelp off in that manner, it's gone."

Though fragile, bull kelp fills

a dynamic ecological niche.

"The bull kelp seems to have evolved to be at an advantage in higher wave action areas," Springer said.

Bull kelp's sleek silhouette makes it less susceptible to the pull of ocean waves than its weedy counterpart, the giant kelp.

"When you have those two species of macro algae co-occurring in a particular location, if you get high wave action in storms or surges, it tends to remove more of the giant kelp and you're left with disproportionately or relatively more bull kelp," Springer said.

In some areas, kelp forests soften the force of waves against the shoreline and reduce beach erosion.

Overharvesting is not the only threat to bull kelp. It can't survive in water warmer than 64 degrees Fahrenheit. Bull kelp beds growing off the California coast north of Pismo Beach were thinned in 1985 and 1986 by the drainage of cooling water from the Diablo Canyon nuclear power plant.

Large-scale changes in sea surface temperature also may pose a threat, researchers say. Even if restrictive harvest regulations are issued and local sources of pollution that affect the seaweed are controlled, bull kelp could be a victim of climate change.

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