

MAKING WAVES FOR A HEALTHY OCEAN



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BY MARILYN HOPE SMULYAN

WHEN I STAND ON SAN FRANCISCO'S OCEAN BEACH AND look west, it's difficult for me to comprehend that we humans can have any impact of consequence on a body of water that is so vast, let alone impacts that are life-threatening to marine organisms and, ultimately, to us. But we do.

In all likelihood it hasn't helped that everything continues to look so grand from above. Regardless of whether it's relatively calm with the sun shimmering off its blue-gray surface or whipped into crashing waves that undercut steep banks and erode sandy beaches, the ocean draws us in with its power and constantly changing appearance. It's easy to overlook the problems that lie within when they are hidden underwater and concealed behind such mesmerizing beauty. That is, unless you are one of the people intimately familiar with its depths.

"I think of the ocean as the land continued," says master diver Francesca Koe. "Instead of air above, there is water. If you do shore dives and walk in, the land doesn't disappear; it just continues underwater."

So do the impacts of our terrestrial lives.

Veteran divers and fishermen can still recall when red abalone were so prevalent north of San Francisco that at low tide you could just walk in at the right places and pick your fill. But not anymore. "In the case of 'abs,'" Koe says, "the decline is definitely due to human pressure, especially poaching. We've simply been taking and consuming them unsustainably."

Measuring up to 12 inches, the red is the largest abalone in the world. As the name implies, its color is a distinctive brick-red that comes from the algae in its diet. The beautiful multicolored

shells and tasty meat have made red abalone a top prize for commercial fishermen and individual divers in years past. Now they are one of the many depleted marine fisheries along our coastline and recreational free divers (those who dive without any breathing apparatus) are the only people still allowed to harvest them.

It is a story that has been repeated far too often for too many species along the California coast, threatening to turn one of the world's most productive ecosystems into a pale imitation of its former self. But just as Bay Area residents began organizing 45 years ago to save San Francisco Bay, so California citizens are finally waking up to the threats facing our unique marine habitats. Now, for example, the red abalone's rocky kelp forest habitat is one of many under consideration for protection under California's pioneering

Marine Life Protection Act, which has spawned a comprehensive public process to identify the most ecologically significant and at-risk areas in state waters.

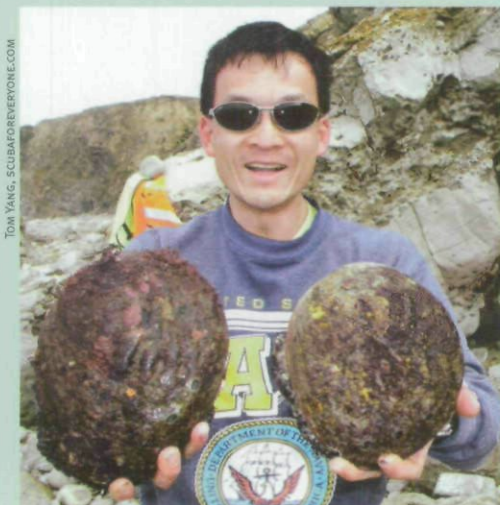
TROUBLING INDICATORS

In the Bay Area, "our" little slice of the ocean from Monterey to Salt Point is one of the most biologically productive and diverse marine ecosystems in the world, yet there are many indicators that it is in trouble, from depleted fisheries and pollution to oiled seabirds and sea lions with cancer, not to mention rising water temperature.

The problems are numerous and complex, with impacts from overfishing and pollution—including water contaminants, oil spills, and human garbage—among the most significant.

Lurking behind these issues is the specter of climate change. News reports remind us daily that rising ocean temperatures

have the potential to change ocean currents and wreak havoc on the planet's interconnected and complex marine ecosystems. Ellie Cohen, executive director of PRBO Conservation Science, says biologists from her organization have already observed reduced breeding success in seabirds that correlates with changes in



TOM YANG, SCUBADIVERFOREVERYONE.COM

(top) A large winter wave breaks at Garrapata State Beach south of Monterey. (left) Free diver Joe Wu holds two red abalones he caught offshore at Fort Ross State Historic Park on the Sonoma coast.



FRANK BAETHIS

Young elephant seal at Año Nuevo with a toilet seat stuck around its neck. (Biologists were able to remove the seat.) Entanglement in human debris is a major cause of injury and death for marine mammals along the California coast.

wind patterns and ocean currents that in turn coincide with climate change models. Such developments add a new urgency to ongoing efforts to address local and direct sources of marine degradation, because healthy animals and ecosystems have a better chance of surviving the stress of warming temperatures.

When studying ecosystems and food webs, scientists often talk in terms of “bottom-up” or “top-down” controls. Bottom-up factors include climate, currents, and nutrients, all of which affect the abundance of prey, while top-down factors are influenced by consumers (predators), including humans. As Cohen points out, “We can’t control from the bottom up, from the productivity of plankton on up, except by reducing global warming over the long term. But we can have a more immediate impact from the top down, taking on the issues of over-fishing, oil pollution, and plastics. In the ocean, the more we do to minimize these top-down impacts, the more we can do to protect the ecosystem in the long term.”

OIL SPILLS AND THE COMMON MURRE

From the time they began patrolling the shoreline of the Gulf of the Farallones National Marine Sanctuary (GFNMS) in 1993, volunteers with Beach Watch, a program of the nonprofit Farallones Marine Sanctuary Association, observed hundreds of oily dead birds and tar balls washing up on Point Reyes beaches after winter storms. “Everyone suspected the oil was from a sunken freighter,” explains volunteer Gordon Bennett. “But there are a lot of wrecks out there,” he adds, so authorities didn’t know where to start looking for the source of the oil spill.

The turning point came when the volunteers from Beach Watch found several oil-covered common murres on Drakes Beach that were still alive. “[Murres] float around on the water and tend to go in the currents in the same ways that oil slicks do,” says Bennett. “So when a boat releases oil, and it floats up to the surface, the birds in the area get caught in it and they end up beached.” The fact that these particular birds were still alive narrowed down the search area for the source of the oil, because the birds can only survive a short time in that condition.



DAVID WIMPFHEIMER, WWW.CALMAMURALIST.COM



GFNMS LIBRARY

Using a central shipwreck database, the authorities identified the S.S. *Jacob Luckenbach*—which sank 17 miles southwest of the Golden

Gate in 1953—as the likely culprit. Oil samples subsequently confirmed the team’s hunch, and in 2002, the Coast Guard oversaw the massive project of removing over 100,000 gallons of oil from the sunken ship. According to Bennett, volunteers are now finding far less tar on the beach.

“Oil spills can have the biggest impact because they have the potential to be catastrophic,” says sanctuary superintendent Maria Brown. “It’s not a matter of if, but of when we’re going to have a spill like the *Exxon Valdez* here, because we have three shipping lanes that converge outside the Golden Gate, a narrow entrance, a major port, oil refineries, and lots of fog.” She notes that over 6,000 large commercial vessels enter and exit San Francisco Bay through sanctuary waters each year.

“It only takes a small amount of crude oil—a blotch the size of a quarter—to kill a bird,” says Bennett. The birds try to remove the oil by preening, they ingest it, and it quickly damages their internal organs. Seabirds such as western grebes and scoters are particularly vulnerable to oil spills because they often “raft” in tight configurations, so a slick hitting them could very well kill many birds at once.

Given that the largest colony of breeding marine birds in the contiguous United States is right off the Golden Gate, the stakes here are high. The site of that colony, the Farallon Islands, forms the core of the Gulf of the Farallones sanctuary, one of three contiguous federal marine sanctuaries—along with Monterey Bay and Cordell Bank—that extend from Cambria to Bodega Bay. The three combined form the largest protected marine area in the continental United States.

Established in response to public outrage over oil spills, the marine sanctuaries prohibit oil drilling within their boundaries,

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(left) The crippled hull of the tanker *Puerto Rican* being towed into San Francisco Bay. The vessel exploded and sank in October 1984, eventually releasing over 1.47 million gallons of oil into the Gulf of the Farallones. (above left) An oiled and starving juvenile murre struggles on to a beach at Point Reyes. (above) Volunteers with the Beach Watch program consult field guides to identify a dead bird (a Cassin’s auklet) found on Rodeo Beach.

although spills from other sources still occur. While sanctuary status can't prevent pollution, the education and outreach work done by sanctuary staff has helped raise the profile of the issue and mobilize people to get involved. Beach Watch volunteers like Bennett are the "eyes and ears" and first line of defense against spills of all sizes. Trained teams patrol area beaches once or twice a month and document their findings, including the number of dead and live animals, and the presence of oil paddies, driftwood, and seaweed. Some oil comes from natural seeps in the sea floor, but even small amounts of oil are tested to make sure they aren't from a leaking ship and all tar balls are removed so they don't sicken the birds.

MARINE MAMMALS: SENTINELS OF HUMAN HEALTH?

The Marine Mammal Center rescues between 500 and 800 stranded animals each year and treats many of those at its facility in the Marin Headlands. Malnutrition and maternal separation are the leading causes of stranding, followed by disease and toxic algae poisoning. Also on the list is entanglement in fishing gear and other marine debris. A more indirect, but just as serious, impact on these mammals is the pollution generated by such land-based activities as pesticide use, which shows up as disease in the animals. "We see cancer in about 17 percent of the adult sea lions that die at the Marine Mammal Center, and they all have high rates of PCBs and DDT in their blubber," says Frances Gulland, the center's head veterinarian. "The actual percentage in the overall population is probably much lower, but for the sick animals that we are seeing, it is a lot of cancer."

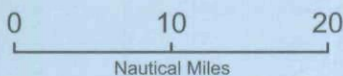
These marine mammals are top-level predators that eat the same sardines, anchovies, squid, and hake (the fish used to make frozen fish sticks) that we do, and that's likely how they are ingesting the PCBs and DDT. However, because sea lions migrate and eat while they're on the move, it's hard to know exactly where they are coming into contact with the contaminated fish or squid.

Protected Marine Areas of Central California

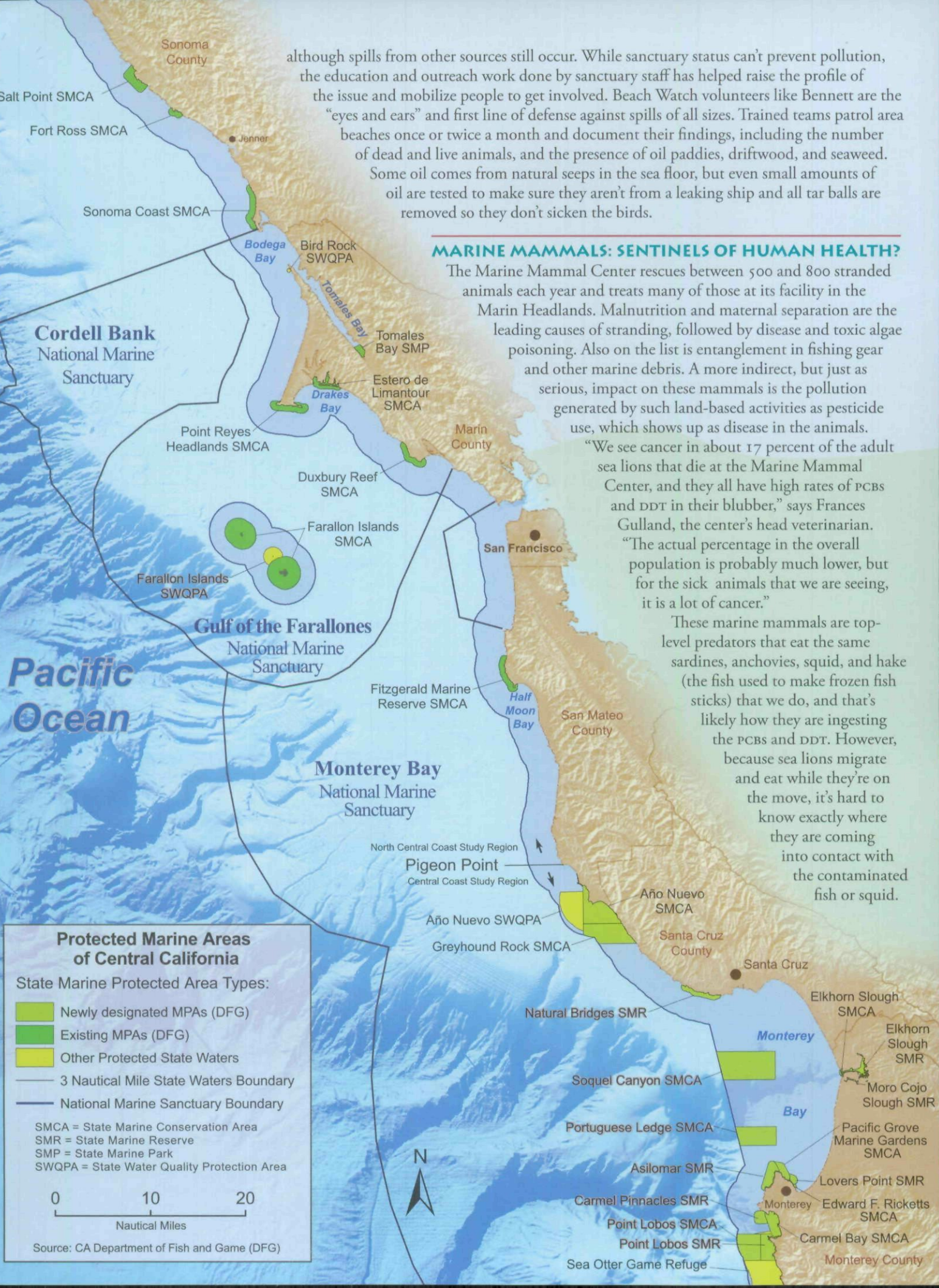
State Marine Protected Area Types:

- Newly designated MPAs (DFG)
- Existing MPAs (DFG)
- Other Protected State Waters
- 3 Nautical Mile State Waters Boundary
- National Marine Sanctuary Boundary

SMCA = State Marine Conservation Area
 SMR = State Marine Reserve
 SMP = State Marine Park
 SWQPA = State Water Quality Protection Area



Source: CA Department of Fish and Game (DFG)



Trained volunteers and staff from the Marine Mammal Center struggle to rescue a wounded California sea lion on the rocky shoreline near Pacifica.



This exemplifies one of the biggest challenges marine researchers face: It's difficult to determine cause and effect in a literally fluid environment when things are on the move, particularly when it comes to water quality. "One of the biggest problems facing the oceans is pollution, and it's everywhere now, even in Antarctica," says Dr. John Largier of UC Davis's Bodega Marine Lab. "But when we're asked to identify the types of pollutants, their sources, and what impacts they're having, we just don't know enough." Researchers can measure contaminant levels entering the ocean from watersheds and sewage outfalls, but monitoring the movement of these contaminants once they're in the ocean is a major challenge.

There is a concerted effort to understand and address these issues throughout the state, including a study by Largier and his colleagues on the freshwater plume from San Francisco Bay. It contains contaminants, sediments, and nutrients from 59,000 square miles of the state's urban, agricultural, and wild lands—40 percent of California's land area. By studying where the plume goes and how it mixes with ocean water, scientists hope to better understand the effects it has on life in the ocean.

While scientists research the impact of pollution, others work to reduce it. "California is at the forefront on a number of ocean protection issues," says Kaitilin Gaffney of the Ocean Conservancy, a nonprofit research and advocacy group. "We have passed a series of landmark water quality laws governing invasive species, nonpoint source pollution, water quality monitoring, cruise ship waste dumping, and aquaculture." And state voters have approved more than \$16 billion in state water-related bonds over the past decade, including last year's Proposition 84, which directs \$500 million in funding to protect ocean water quality and watersheds.

Independent local fishermen, like these netting herring in Tomales Bay, have long been an important part of the Bay Area economy, but declining fish stocks make it increasingly difficult for them to make a living.

RESTORING FISHERIES AND SAVING ECOSYSTEMS

In 1999, the Legislature passed the California Marine Life Protection Act (MLPA), to enhance the effectiveness and coherence of the state's limited system of marine protected areas (MPAs), coastal areas designated to protect critical marine life and habitats. Initial efforts to implement the act were thwarted by a lack of funding. Now, however, in a unique collaboration dubbed the California MLPA Initiative, the California Resources Agency, the state Department of Fish and Game, and the private nonprofit Resources Legacy Fund Foundation are working together to carry out the act's mandate for a thorough review and expansion of the state's MPAs.

The renewed effort comes none too soon. In 2002, the U.S. Secretary of Commerce declared the status of the West Coast's groundfish fisheries "a disaster." Six of the seven West Coast species listed as "overfished" by the federal government—bocaccio, canary rockfish, cowcod, darkblotched rockfish, widow rockfish, and yelloweye rockfish—were once common in Central California waters.

In addition, scientists from the National Oceanic and Atmospheric Administration (NOAA) have documented a 45 percent decline in the average size of West Coast fish species studied over the past 25 years. The degraded condition of these fish populations is another sign of the impact humans have had on our ocean resources, once thought to be inexhaustible.

It's not only loss of species that we need to be concerned about, but also an "unraveling of the overall ecosystem" of the oceans, according to a recently completed study by researchers from the National Center for Ecological Analysis and Synthesis (NCEAS) at UC Santa Barbara. This study warns of profound societal impacts, ranging from diminished availability of seafood to increased coastal damage from winter storms.

At the same time, the researchers pointed out, ocean systems "still hold great ability to rebound," and ecosystem-based management—including the creation of protected areas that limit or prohibit extractive activities—can play a significant role. Ben Halpern, an NCEAS research biologist who worked on the study, explains why: "On land, even setting up large



RICHARD DONOVAN ALLEN

protected areas can't bring as much [biodiversity] back because so many species have already gone extinct. In the ocean, however, there have been relatively few extinctions, in part because our impact there has mostly taken place over the last 100 years or so (with a few notable exceptions, such as commercial whaling). Also, because most marine species have planktonic larval stages that may float for hundreds of miles before landing at a new place, they have a better chance of rebounding than a land animal that has to contend with populated urban areas and farmland when trying to find new habitat."

One major purpose of MPAs, then, is to set aside places where breeding and juvenile fish can find shelter, strategic refuges from which recovering fish populations can, in effect, "seed" the rest of the ocean. Gaffney of the Ocean Conservancy explains, "Unlike traditional fisheries management, which focuses on a single species at a time, MPAs can protect intact ocean habitats, and the diversity of algae, invertebrates, and fish that inhabit the area. Scientific studies have shown that species within protected areas are bigger, more plentiful, and more fecund than those outside. Essentially, MPAs act as an IRA or savings account—a way to invest in protection now that will provide future benefits."

Members of the Pacific Coast Federation of Fishermen's Associations (PCFFA) are not quite as enthusiastic. Zeke Grader,

WHAT ARE MARINE PROTECTED AREAS (MPAS)?

MPAs are designated areas along and off the coast, within the three-mile limit of state waters, intended to protect critical marine habitats. There are three different levels of protection:

- State Marine Reserves are off limits to all extractive activities, including fishing and harvesting (of shellfish, seaweed, etc.).
- State Marine Parks allow recreational fishing, but don't allow commercial extraction.
- State Marine Conservation Areas allow some commercial and/or recreational extraction, determined on a case-by-case basis.

the Central Coast, pulling together the best available scientific information on the region's habitats and marine life, as well as a profile of the economic, cultural, and recreational uses of the coastal waters.

After some 60 public meetings, hearings, and workshops, along with reviews by marine scientists and stakeholders, proposals were formulated and forwarded to the California Fish and Game Commission, which approved a network of 29 MPAs, covering approximately 204 square miles (roughly 18 percent) of state waters within the region. Of that area, 85 square miles were designated as no-take state reserves, a significant increase from the existing 12 MPAs and one special closure area that together covered only 3.75 percent of state waters from Santa Barbara to San Mateo. In the greater Bay Area, new protected areas will include the Año Nuevo State Marine Conservation Area (on the San Mateo coast south of Pescadero) and the Natural Bridges State Marine Reserve (near Santa Cruz).

Now up for consideration is the North Central Coast. The process began in March 2007 with a series of public workshops. Meetings to identify areas worthy of protection are scheduled to continue through fall 2007. (To find out how to get involved, or to access reports and updates, go to www.dfg.ca.gov/mlpa.)

If the Central Coast process was any indication, the public meetings will be anything but boring. "What impressed me most was the caliber of public input,"

says the Ocean Conservancy's Kaitilin Gaffney, who participated in the Central Coast Stakeholders Group. "We had divers and fishermen, teachers and local business owners, conservationists and scientists, all working together to come up with a workable system of ocean protection. It wasn't the traditional way of doing things, where a government agency creates the plan and then the public responds. Instead, stakeholders proposed areas to protect, which were then vetted by scientific experts. The final result was a thoughtful compromise that protects some of our most spectacular and ecologically diverse areas, while leaving much of the coast open to fishing."

Grader, too, is hopeful about the North Central Coast process: "If ever there was a chance for groups to work together, this is it. There has been a long history of fishing and conservation groups working together here. It goes back to the 1960s, when a nuclear power plant was proposed for Bodega Bay, and there were battles to stop offshore oil drilling. There was mutual appreciation, because we needed that collaboration between fishermen and the environmental community to win."

(continued on page 40)

Two students identify and tally the invertebrates they find at Duxbury Reef, using a quadrat and ID sheet, as part of a long-term monitoring program run by the Farallones Marine Sanctuary Association to promote student involvement in stewardship of ocean resources.



AMY DEAN

PCFFA's executive director, allows that MPAs are "a good tool to use in certain areas and times," but says no-fishing zones don't address other critical factors for ocean health, particularly those related to water quality and land use. "Our livelihoods depend on protecting that environment," he points out. "We have a real stake in it and need to do things right. We're the big losers if any of this goes wrong." Grader does support establishing MPAs in areas used for baseline research, as well as more limited and carefully targeted restrictions for very sensitive habitats such as coral reefs, where certain types of fishing gear and practices could be harmful.

THE NEW MARINE RESERVES

After several false starts, the California MLPA Initiative is now well under way. To make the process manageable, the initiative divided the coast into several regions, and the Bay Area finds itself split between two of them: the Central Coast, which runs from Point Conception in Santa Barbara County north to Pigeon Point in San Mateo; and the North Central Coast, running from Pigeon Point north to Alder Point in Mendocino County. The task of identifying areas for protection began in 2005 with preparation of an extensive ecological profile for

on the complex food webs of the California Current, are laying the scientific foundation for understanding, protecting, and conserving California's marine ecosystems.

Save Our Shores www.saveourshores.org

The Santa Cruz-based nonprofit uses public education, policy research and development, and citizen action campaigns—including Sanctuary Stewards and monthly beach cleanup programs—to conserve the marine resources of the Monterey Bay NMS and Central California.

Seaflo www.seaflo.org

Sausalito-based Seaflo advocates for the health of marine wildlife and habitats. In early 2008 it will launch a campaign to protect California's marine sanctuaries and MPAs from noise generated by cargo ships, navy sonar, and oil and gas exploration. The public is invited to monthly meetings featuring speakers from the ocean conservation community.

Thank You Ocean www.thankyouocean.org

Thank You Ocean is a collaborative online portal supported by a network of ocean advocacy and education groups through which the general public can find out how to protect California's marine resources and learn more about them.

SANCTUARY UPDATE

In February 2007, Congresswoman Lynn Woolsey reintroduced H.R. 1187, a bill to expand the Gulf of the Farallones and Cordell Bank national marine sanctuaries to include the entire Sonoma coast and parts of Mendocino, making those areas off-limits to oil drilling as well. Given that the seasonal ocean currents would drive oil spilled off the Sonoma coast directly into the existing sanctuaries, this bill would provide an important buffer for some extremely productive and sensitive marine ecosystems.

However, in a setback for ocean protection, Congress approved legislation in 2005 that would allow oil companies to conduct taxpayer-financed seismic surveys within national marine sanctuaries. Not only would the discovery of oil deposits lead to pressure for drilling in the sanctuaries, but the high-intensity sonic blasts in the surveys would likely disturb and injure marine life. Fortunately, while it authorized the program, Congress has failed so far to appropriate funds to implement it.

(continued from page 31) a southern subtropical squid, while at the same time supporting a recovering sea otter population? Are these signs of an ecosystem in trouble or of the incredible diversity and adaptive capacity of the marine environment along the Central California coast?

With an impressive string of universities, research institutions, and nonprofit organizations from Monterey to Bodega bays, there is no shortage of professional and citizen scientists along the coast looking into such questions. While they do, there is still time for the rest of us to get out on (or even into) the ocean, to be awed and enchanted by this watery wilderness that protects such abundant and diverse life right at our doorstep. 🐙

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EACH AND EVERY ONE OF US

The ocean covers 71 percent of our planet's surface, controls our weather and climate, provides most of the oxygen on earth, and gives us essential foods, nutrients, and minerals. It also determines where most of us live: 75 percent of the population of California lives in the state's 19 coastal counties. So it is encouraging to see all the work being done here to learn about, and protect, the ocean.

Ultimately, of course, the success of these efforts is not just up to the scientists and politicians; it is up to us all. What we do every day on land has a profound effect on the ocean and the life within it. From the amount of water we use to the miles we drive to the garbage we generate to the food choices we make—all of these affect the health of the ocean.

If part of the reason you live in this area is that you too are drawn to the ocean and its wild beauty, then consider going to one of the North Central Coast MPA meetings and speaking up for your favorite spot, or sending a letter, or simply keeping informed. Because when it comes to the ocean, every one of us is affected, and every one of us is empowered to help. 🐙

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Cartography: Tim Reed, Gulf of the Farallones NMS (NOAA)
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DAVID LUKAS is a professional naturalist and author whose books include *Wild Birds of California* (Companion Press, 2000) and *Sierra Nevada Natural History* (UC Press, 2004).

MARILYN HOPE SMULYAN is a writer and public affairs consultant who is passionate about natural history and open space. She was one of the founders of *Bay Nature* magazine.

OCEANFEST

An annual celebration of our marine sanctuaries and ocean resources at Crissy Field in San Francisco, sponsored by FMSA. This year's celebration takes place on Saturday, October 6, 11 am–4 pm.

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