Nutritionists have known for decades that seafood is a premier source of top-quality protein, minerals, and vitamins (especially the important B-complex vitamins). Also, seafoods are low in fat and contain all nine essential amino acids—that is, those that some bodies cannot manufacture on their own. And, ocean fishes contain 17 to 25 percent protein by weight. While that percentage is less than most meats, the protein in seafood is more readily broken down and absorbed than the protein in red meats and poultry. Furthermore, seafood contains substantial amounts of omega-3 fatty acids, a crucially important fatty acid that we can only obtain from the foods we eat. Omega-3 fatty acids help keep our bodies from developing arthritis, heart disease, and stroke. Recent studies indicate that eating seafood can decrease your risk of heart attack, stroke, obesity, and hypertension. For thousands of years this saltwater heart of the Sonoran Desert harbored what seemed to be an inexhaustible supply of seafood. The legendary productivity (and fishing) of the Gulf inspired the likes of John Steinbeck, Ed Abbey, Ofelia Zepeda, David Quammen, John Janovy, Jr., and Ann Zwinger to explore and celebrate its natural wealth. With a watery surface of some 100,000 square miles, the Sea of Cortez reaches within 50 miles of California and Arizona. Many North Americans eat from this wild but increasingly imperiled ecosystem, whether they realize it or not. In historic times, traditionally captured large predatory fishes near the top of the food chain—sea basses, groupers, corvinas, snappers, sharks, and the like—were harvested with no concerns for sustainability, as if their abundance could never be depleted. Thirty years ago, when I first started working in the Sea of Cortez, this was still the assumption. But no longer; given the dramatic fish depletions here and in the rest of the world’s seascape, we can no longer delude ourselves with the myth of unending abundance.
As a result of over-fishing, populations of large predators are now a mere shadow of what they were 40 years ago.

In this narrow gulf—as in all the world’s oceans—up to 90 percent of the population of most predatory fish species has disappeared due to overfishing. Today, all of the traditionally fished species from the Sea of Cortez have been overharvested to the point of collapse, or near-collapse, of their commercial fisheries. Traditionally, preferred finfish have been so reduced in numbers that many Mexican fishermen now catch virtually any fish they can catch, of any edible size. Decades of shrimp extraction have not only decimated shrimp populations, but also severely disrupted the seafloor ecosystem in much of the Gulf.

In the northern Gulf, the commercial finfish and wild-shrimp fisheries have essentially collapsed, and tourists in beach towns like Puerto Penasco (Robby Point) are now just as likely to be served cod or pollock, shipped frozen from Alaska or Europe, as a fresh local fish. Species once regarded as “trash fish” or “bycatch”—such as triggerfish, parrotfish, and skate—are now routinely sold in restaurants. How did we get here and what can we do about it?

Ancient harvests from the Sea of Cortez

What were early inhabitants of the Gulf’s desert coastlines consuming, and are these edible species still abundant? Archeological excavations of prehistoric kitchen middens (dining-site trash dumps) indicate they were feeding on shellfish, finfish, crabs, and sea turtles from coastal lagoons and the open coast, although they also captured some terrestrial reptiles, mammals, and birds that lived along the coast. They relied most heavily on clams and blue crabs, and a few fish species taken from coastal lagoons and estuaries. Thus, many of the seafood traditions that began in the Sea of Cortez in prehistoric times continue to this day in western Mexico, while others, such as the ritual harvest of sea turtles, have all but disappeared as the animals themselves have dramatically declined over the last century.

Primary producers, algae and seaweed that capture the sun’s energy at the base of the marine food web, are especially abundant in this semi-enclosed sea. This high primary productivity is driven by year-round strong solar input, upwelling of nutrient-rich bottom waters continuously drawn into the Gulf from the open Pacific, and good circulation. And, this productivity has supported one of the world’s most important concentrations of small oceanic fishes (such as anchovies, sardines, and mackerel), which in turn has provided critically important food sources for larger predatory fishes, jumbo squid, sea birds, marine mammals, and, eventually, humans. Beginning in the 1930s, however, a strong commercial fishery developed in this rich marine ecosystem, with some regrettable ecological impacts.

Remember John Steinbeck’s little gem of a novel, The Pearl? The first fishery in the Sea of Cortez to be over-fished was the pearl oyster fishery of the La Paz-Cape Region, which drew Spanish colonists to the area in the 1600s and 1700s. Today, every commercial species in the Gulf is probably overfished, except perhaps jumbo squid, which only recently arrived in the Gulf of California in numbers large enough to harvest. Artisanal fisheries today take about 80 species of finfish and shellfish, using long-gillnets, gillnets, cast nets, hook-and-line, pots, and traps. An estimated 50,000 artisanal fishers operate 25,000 panga cut-out boats. Gulf waters are also subjected to fishing pressure from sportfishing by American tourists.

Today, the most important species for artisanal fishers are shrimp, jumbo squid, and clams. For the industrial fishery, the Pacific (or Monterey) sardine is the most important species, followed by shrimp, tuna, and squid. As traditionally sought large predatory fish and shrimp have dwindled, industrial fishers have shifted increasingly to sardines and jumbo squid. The shift in primary target species has had significant socioeconomic impacts, but it could have even more profound ecological repercussions. Sardines and anchovy, and jumbo squid, are key elements of the Gulf’s ecological ecosystem. They represent species very near the bottom and top of the oceanic food chain, respectively. Their population sizes have direct effects on the rest of the food web, including the reproductive success of marine mammals, and marine turtles, as well as having high trophic levels that regulate the productivity of the oceanic food chain, respectively. Their population sizes have direct effects on the rest of the food web, including the reproductive success of marine mammals, and marine turtles, as well as having high trophic levels that regulate the productivity of the oceanic food chain, respectively.
More than one-third of the seafood consumed in the world is now farm raised.

The alternative to wild-caught shrimp is farmed shrimp. Almost all shrimp farming takes place in earthen lagoons dredged along coastal waters in the world’s tropics, where environmental regulations are typically weak or unenforced. Coastal environmental impacts are especially high in Southeast Asia, e.g., Thailand, Vietnam, and Bangladesh. (These are the only three countries of origin I saw on a recent frozen-shrimp search at my local Trader Joe’s market!). Endangered habitats such as mangrove forests are being destroyed or degraded in all of the tropical countries where shrimp farming is taking place. And, since the shrimp ponds are in place, the operations flush directly into the sea, polluting it with wastewater, a variety of chemicals (pesticides, antibiotics, pharmaceuticals), escaped exotic shrimp, and exotic strains of shrimp diseases that infect local wild populations.

But, there’s good news. U.S. shrimp farmers must adhere to strict regulations that circumvent most of the above problems. For example, U.S. shrimp farms are not allowed to drain directly into the sea. And, more and more U.S. farms are using largely vegetable-based feeds that produce shrimp close to a 1:1 ratio of fishmeal to fishmeal production, as opposed to fish pellets made from wild-caught fish, requiring a 3:1 ratio (a real net loss from the sea). A fine example of good shrimp farming practices is the Desert Sweet Shrimp Farm in Gila Bend, Arizona (www.desertsweetshrimp.com). In Mexico, in just the past few years, new federal and state regulations on shrimp farming have also been improving the situation. Some farms are

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For now the consumer’s best choice for sustainably produced jumbo shrimp is U.S.-farm-raised.
In Mexico, shrimp are typically raised in dirt ponds bulldozed out of the open water, and, often, introduced (exotic) microorganisms from other regions include antibiotics, added vitamins and hormones, other chemicals used in the food, shrimp feces, and dead shrimp wash out to the coast—along with additions to habitat destruction, Mexico's coastal shrimp farms usually pollute or negatively impact the environment. Unfortunately, this rarely happens, especially in the developing world (where most of our farmed seafoods originate). Most of the world's saltwater farming (mariculture) actually threatens wild fish stocks and disrupts or destroys natural habitats. The cultivation of carnivorous fish and shellfish (e.g., salmon, shrimp) and introducing exotic diseases. For all these reasons, marine farms rely on huge quantities of wild-caught seafood. It can take over three kilos of wild-caught fish to raise one kilo of farmed salmon on shrimp, resulting in a net loss of fish from the sea. Today, about a quarter of all seafood caught in the wild is converted into fishmeal to feed farmed fish and shrimp.

In addition, farmed fish and shrimp, whose place of origin is typically not local, frequently escape into the sea, polluting the gene pools of native species and introducing exotic diseases. For example, all salmon species, marine species that are low in the food chain and subsist on a plant diet (herbivores) and will breed in captivity (e.g., catfish, trout, tilapia), are the best species that are imported with the shrimp that are introduced into the ponds. In doing so, huge nutrient loads from uneaten food, shrimp feces, and dead shrimp wash out to the coast—along with introduced (exotic) microorganisms from other regions that are imported with the shrimp that are introduced into the ponds.

Today, U.S. farmed shrimp is your best choice because it meets strict government environmental guidelines. Fortunately, the situation in Mexico is now beginning to improve and soon, hopefully, Mexican farms-raised shrimp will be on the recommended list. For now, one of the best places to purchase seafood is your local Wal-Mart. In 2006, the company made a pledge to America that their U.S. stores would sell only sustainably harvested seafoods, relying heavily on recommendations of the Marine Stewardship Council and Aquaculture Certification Council. Because Wal-Mart is the world's largest retail seller of seafood, this decision has had a powerful and positive impact on global seafood markets. In addition, the Walton Family Foundation provides hundreds of millions of dollars annually for marine conservation efforts; they are especially active in protecting the Gulf of California.

What it Being Done?

The rise of the conservation movement in Mexico over the past 20 years has led to significant increased pressure on federal agencies, and meaningful steps are now being taken to protect the Sea of Cortez for the future. Since the landmark declaration of two biosphere reserves in 1995—the Alto Golfo de California and Delta del Río Colorado, and the El Pinacate y Gran Desierto de Altar Biosphere Reserves—hard work and steady lobbying has resulted in the establishment of 15 more protected areas on the Baja California peninsula.

Creating change in fisheries management has been harder. However, because of declining fisheries catches, pressure from environmental organizations, the use of sustainable seafood initiatives, and new political leadership, things are starting to change. There is reason to believe that the government of President Felipe Calderon recognizes the need for better fisheries management. Some positive first steps are being taken. New federal and state laws in Mexico are establishing environmental controls over coastal aquaculture, including shrimp farming. New coastal water protection regulations are now in place. Shrimp farms inland, away from sensitive coastal areas and, regulations on the import of exotic “seed” shrimp and on aquaculture pond discharge in the Sonora estuaries provide the best example of sustainable marine culture are the oyster farms that have sprung up in most of Sonora's coastal lagoons over the past 20 years or so; these farms use no additives and do not pollute or negatively impact the environment.

Consumer power is enormous! In restaurants, supermarkets, and fish markets, ask about the source of the seafoods you buy; ask if it is farmed or wild-caught (and, if caught, where and how it was caught).
We don’t need to stop eating seafood, people lived in a balance with the sea for thousands of years, until only recently.

What Can You Do?

Because we are now aware of the depletion of the seas, we have a greater responsibility, not just for the sake of the marine environment but also for our own selfish interests, to pay attention to the sources of our seafood. And we now have a wealth of information about what to buy and what to avoid to help prevent the overharvesting and degradation of the Sea of Cortez and other ocean environments.

In restaurants, supermarkets, and fish markets, ask about the source of the seafood you buy; ask if it is farmed or wild-caught (and, if caught, where and how it was caught). As evidenced by the history of tuna fishing, consumer power is enormous. Express your interest in sustainably harvested products, and don’t buy finfish and shellfish whose populations are being decimated. The status of this fish may change over time, so keep up-to-date via websites like those at the end of this article. In the meantime, use the lists on these pages to guide your purchases.

The Marine Stewardship Council lists supermarkets and restaurants worldwide where and how it was caught. The Marine Stewardship Council lists supermarkets and restaurants worldwide that carry the council’s sustainable certification, as well as sustainable seafood sources for your business.

For more comprehensive coverage on sustainable seafood choices, visit:

- Arizona-Sonora Desert Museum
- Monterey Bay Aquarium Seafood Watch Program
- The Seafood Watch Project (seafoodwatch.org)
- Marine Stewartship Council (www.msc.org)
- Oceans Alive (oceansalive.org)
- Seafood Choices Alliance (seafoodchoices.com)

Suggested References:


We don’t need to stop eating seafood, people lived in a balance with the sea for thousands of years, until only recently. Fish from the Southern Gulf of California, our Sommer’s Desert ocean, remains an excellent choice for local healthy food. But we need to better manage our harvests and our consumption to prevent catastrophic collapse of marine ecosystems.

A Special Plea to Southern Arizona Restaurateurs

Please consider doing what the Ironwood Food Service’s restaurateurs do at the Desert Museum—make a pledge to serve only sustainable seafoods. It’s easy. Just dedicate your menu to seafoods in the “best choices” list in this issue of somoEENUS (or the “best choices” listed by Monterey Bay Aquarium’s Seafood Watch program). Delicious preparations are easy—think farmed bay scallops, Alaskan salmon andounder, Pacific halibut, Maine or Baja lobster, U.S. mahi mahi, U.S. farmed shrimp and tilapia, and farmed mussels, oysters, and trout. In Monterey, California, over two dozen restaurants have dedicated their menus to the sustainable seafoods. If they can do it, so can Arizona. Go sustainable, and let the Desert Museum help promote your good work.

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