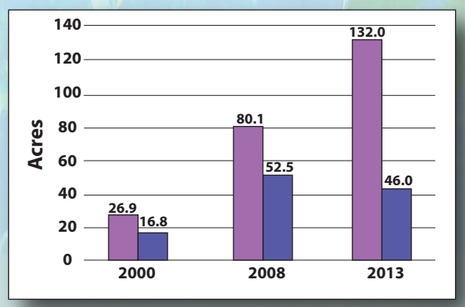
Kelp Beds

Giant kelp is a dramatic feature of the coast of Southern California. It needs clean water to thrive, and when conditions are right it can form dense underwater forests that support a huge number of animals and plants. In the 1980s the only kelp in Los Angeles-Long Beach Harbor was a narrow band along the Cabrillo Breakwater, but as the graph shows it has grown steadily, and by the spring of 2014 kelp covered 132 acres along virtually all of the breakwaters, rocky shorelines, and submerged rock dikes in the outer harbor areas of both ports. The Harbor seems to be a special place for kelp because it behaves differently here than along the coast – for example, a 2006 coast-wide survey showed that kelp was lush in the Harbor but was at a low along the coast.

Area of Kelp Canopy in the Ports of Los Angeles and Long Beach



Kelp is seasonal, typically at its maximum in spring, when cold, nutrient-rich water and lots of sunlight promote growth.

Eelgrass Beds

Eelgrass is an important nursery habitat for many fish and invertebrates. It clarifies water and stabilizes sediment, and its presence indicates unpolluted conditions. Eelgrass thrives in shallow water in the Harbor, with major beds off Cabrillo Beach and in a remote area of the Harbor off Terminal Island. Eelgrass has vastly expanded in the last 15 years, covering 67 acres of Harbor bottom in the 2013 survey. It is noteworthy that eelgrass has expanded into Inner Harbor areas where it did not grow in the past, which is a sign of improved water quality.

Shallow Water Habitat

As an important nursery resource for many fish species, shallow-water areas are considered valuable wildlife habitat. The Port has created 555 acres of shallow-water habitat in the Cabrillo area and near Pier 300 on Terminal Island, adding to natural shallows in both areas. As in previous studies, the 2013 study showed that the shallow areas created by the Port are rich in small pelagic fish, such as topsmelt, which are an important food for many fish-foraging birds. Shrimp, which are important food for many fish, are also especially abundant in shallow-water areas.

Topsmelt - *Atherinops affinis*

Photo: Aquarium of the Pacific

Economic Engine, Environmental Steward

The Port of Los Angeles has taken its role as a steward of marine resources very seriously. The steady improvements in habitat quality that have occurred in the Harbor, even as cargo volumes have increased, clearly shows the effectiveness of the many pollution control efforts that the Port, its tenants, upstream cities, and state and federal governments have undertaken. Because of these efforts, fish and other marine life flourish in areas once thought nearly dead, giant kelp grows along the breakwaters where huge cargo ships pass, threatened and endangered species are regular visitors, and eelgrass meadows nurture a wealth of fish and invertebrates adjacent to busy cargo terminals.

For more information on the Port's water quality, habitat protection, and endangered species programs, visit the Environment section of our website at: www.portoflosangeles.org

HARBOR HABITAT 2013 UPDATE

THE PORT OF LOS ANGELES

Scientists have been studying the biology of Los Angeles Harbor regularly for nearly 50 years to keep track of what lives here and how it has changed in response both to environmental protection efforts and the growth of the Port of Los Angeles. Decades ago, unchecked pollution limited the amount and diversity of marine life in Los Angeles Harbor, but starting in the early 1970s, pollution control and conservation efforts started a steady improvement in habitat quality. This brochure describes how the results of the most recent year-long study, which started in 2013 and ended in 2014, relate to the previous studies, including the 2008 study described in the brochure "Harbor Habitat, Our Biological Treasures".

The Port of Los Angeles is a center of international commerce, hosting some 2,000 ships from all over the world each year and handling millions of tons of cargo. At the same time, the Port supports rich, diverse marine life: from sea lions to pelicans, anchovies to kelp, hundreds of species of animals and plants live in and thrive around the waters of Los Angeles Harbor.

Diverse Habitats

Let's explore their world – the marine life of the nation's busiest harbor. Los Angeles Harbor has a remarkable variety of marine habitats in a relatively small area – there's open water, the sand and mud harbor bottom (the benthic habitat), shallow protected areas, rocky shoreline and pilings, eelgrass, kelp beds, beaches, and even a small salt marsh. These diverse habitats are one reason Los Angeles Harbor supports so many species of fish, birds, marine mammals, and marine invertebrates.

Open Water

The open waters of Los Angeles Harbor are home to millions of fish and to plankton (tiny floating plants and animals that are important food for larger animals). Approximately 36 fish species live in the water column; known as pelagic species, they are an important food source for other fish, marine mammals, and marine birds. By far the most abundant pelagic fish in the 2013 study, as in all previous studies, was northern anchovy, which made up nearly 95% of the pelagic fish caught by the scientists. The other abundant pelagic fish were grunion, Pacific mackerel, topsmelt, and jacksmelt. The 2013 study caught far more pelagic fish than previous studies; future studies will tell us whether this is a trend or part of normal long-term variability.

Northern Anchovy
Engraulis mordax

There are about 60 species of demersal fish (species that mostly hang around near the bottom) in the Harbor. White croaker is consistently the most abundant, making up some 40% of the demersal fish caught in the 2013 survey, which is an increase from the 25% seen in previous surveys.

California Grunion
Leuresthes tenuis

Pacific Mackerel
Trachurus symmetricus

Topsmelt
Atherinops affinis

White Croaker
Genyonemus lineatus

California Lizardfish
Synodus lucioceps

Queenfish
Seriphus politus

Speckled Sanddab
Citharichthys stigmaeus

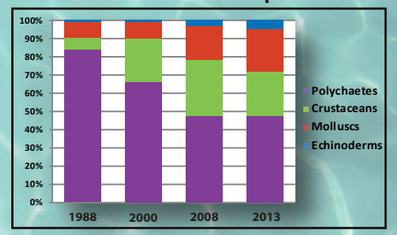
California Tonguefish
Symphurus atricauda

The Harbor is unique along the Southern California coast in the abundance of white croaker, which are mostly found offshore in much deeper water. The other abundant species were California lizardfish, queenfish, speckled sanddabs, California tonguefish, and staghorn sculpins. California lizardfish was the second-most abundant demersal fish in the 2013 study, making up a quarter of the total catch. In previous studies the species accounted for less than 1 % of the catch; scientists don't yet know why this dramatic change has happened.

The Benthic Habitat

The mud and sand at the bottom of the Harbor, called sediment, is home to an amazing variety of sea life. Hundreds of types of invertebrates, as well as demersal fish, live in, on, or just above the sediment. The 2013 study identified 344 species of invertebrates living in the sediments (the infauna) and another 110 species that live on the sediment surface (the epifauna). Together these animals form a thriving, productive ecological community – the benthic community.

Benthic Infauna Composition

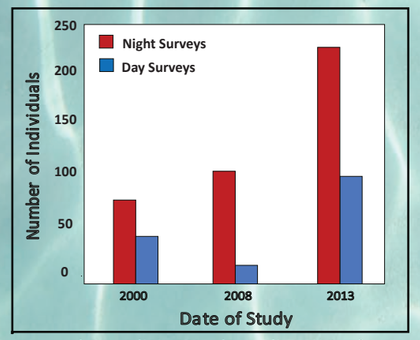


The declining dominance by polychaetes in the last 25 years indicates improved habitat quality in the Harbor.

This bar graph shows how the diversity of the benthic community has increased in recent years: in the 1988 study, 85% of the infauna were polychaete worms, in the 2000 study more than half of the infauna were polychaetes, and in the 2008 and 2013 studies only 40% of the infauna were polychaetes. The change is largely due to the decline in the number of polychaete species tolerant of high levels of pollution. In the 2013 study the top ten species included four species of polychaetes, a small clam (mollusc), and five crustacean species (a small crab and four small shrimp-like creatures). In addition, although there were fewer animals in the 2013 study than in earlier surveys, they are types that are larger and longer-lived. These two trends – more diversity and a shift to longer-lived animals – indicate increasing habitat quality in the Harbor.

In fact, a measure of habitat quality called the Benthic Response Index, used for the first time in the 2013 study, found "reference," or ecologically healthy, conditions in virtually the entire Harbor. Only two small areas – the Consolidated Slip and Fish Harbor – were characterized as showing the effects of low disturbance by pollution.

Abundance of Benthic Epifauna



Invertebrates living on the sediment surface have increased in abundance over the years.

The epifauna in the Harbor is an important food source for many species in the marine food web, including sole and juvenile halibut, lobsters, and other predators. The epifauna in the 2013 study, as in previous studies, was dominated by three shrimp species. Other abundant species were crabs, spiny lobsters, sea slugs, sea squirts, sea cucumbers, and brittle stars. Although the dominant species have remained steady over the years, abundance and the number of species have not. As the graph shows, the 2013 study caught more than twice as many animals as the 2000 and 2008 surveys, and there were also nearly twice as many species.

Birds

The Harbor is a great habitat for marine birds: thousands of birds live here. In the 2013 study the scientists saw an average of 6,355 birds during each of the 12 two-day surveys, and a total of 96 species during the year. The composition of the bird community in the Harbor has been generally the same for at least 25 years: as in previous studies, gulls, grebes, terns, pelicans, and cormorants were the most abundant birds in the 2013 study. Some species, like gulls and cormorants, are year-round residents; others, like terns, ducks, and many shorebirds, are seasonal visitors.

Western Gull
Larus occidentalis

Western Grebe
Aechmorphorus occidentalis

Elegant Tern
Sterna elegans

Brown Pelican
Pelecanus occidentalis

Brandt's Cormorant
Phalacrocarax penicillatus

The Harbor is an important resource for the endangered California least tern, a small gull-like bird that feeds on small fish and raises its young on a special nesting site created and managed by the Port on Pier 400. Thirteen other special-status bird species occur in the Harbor, and three of them (pelicans, double-crested cormorants, and elegant terns) are among the ten most abundant.

Non-Native Organisms

Ships calling from all over the world can bring non-native sea life to the Port of Los Angeles in their ballast water or on their hulls, as can other human activities such as aquaculture and improper disposal of hobby aquarium water. Roughly 8% of the species in the Harbor, including some of the most widespread benthic organisms such as mussels, oysters, New Zealand snail and Asian clam, are not native to these waters. This proportion has been steady for at least the past 25 years, and the scientists who conducted the 2013 study pointed out that "the newcomers appear to have fit into the harbor biological communities, which now consist of a mixture of a few non-native and many native species".