



# NOAA's West Coast Center for Oceans & Human Health

## An Overview

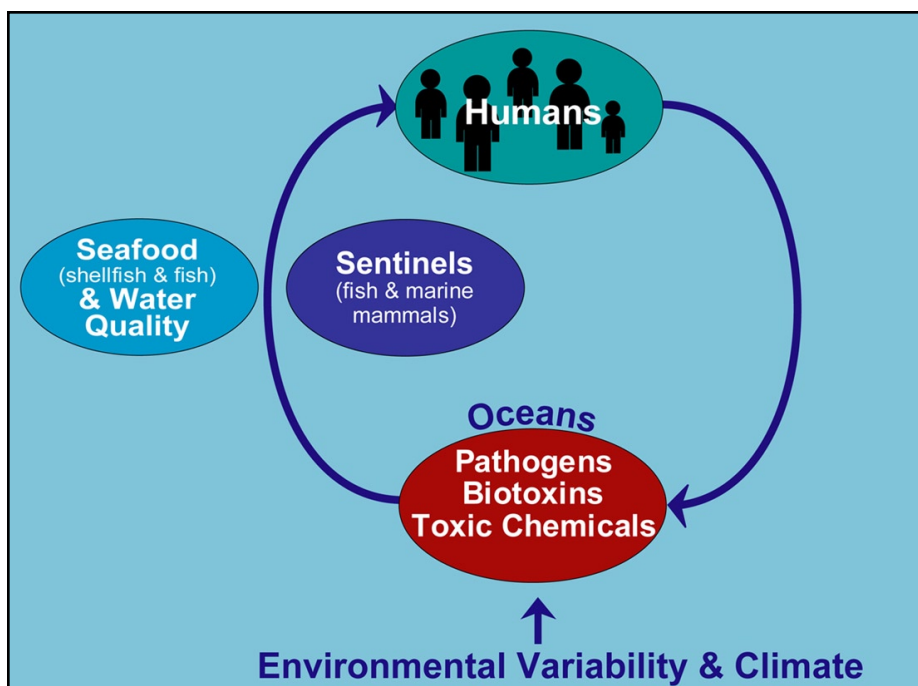
Oceans affect each of us, whether we work, play in, or live near or far from them. The oceans are a tremendous source of biodiversity, production, and inspiration; they support many human uses from transportation to recreation, provide sustenance, play a key role in controlling greenhouse gases and generating weather patterns, and support millions of creatures, big and small.

Oceans and humans are inextricably linked: our activities on land, sea, and in the air impact the health of the oceans and the health of the oceans impacts us. Oceans can threaten or benefit human health just as humans can threaten or benefit ocean health. Despite this critical linkage, very little is known about the relationships between oceans and human health. In July 2004, the National Oceanic and Atmospheric Administration (NOAA) created three Centers to address this serious gap.

Based at the Northwest Fisheries Science Center in Seattle, WA, the NOAA West Coast Center for Oceans and Human Health (WC Center) consists of a multidisciplinary research team of federal, academic, and non-profit organization scientists who are working together to understand, predict, and reduce both direct and indirect effects of the oceans on human health to assist natural resource and human health managers. WC Center scientists are conducting this research using an ecosystem-based approach that includes studies of infectious microorganisms, toxin-producing algae, shellfish, fish, and marine mammals, as well as important environmental factors, including climate variability and change.



We are drawn to the oceans. At least 37% of the U.S. population lives in coastal counties, which comprise only 17% of the land area. Between 1960 and 1990, coastal area population grew by more than 38 million people. And these numbers are continuing to increase daily. With this population increase comes greater human interaction with and impact on the oceans.



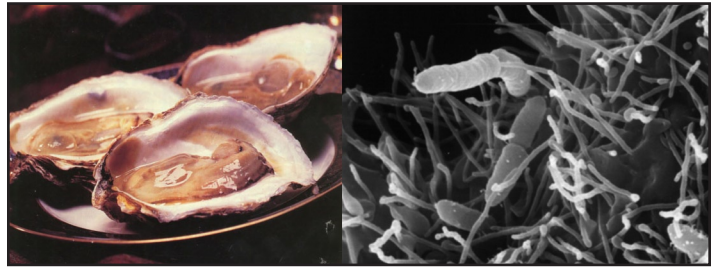
A diagram illustrating the WC Center's ecosystem based approach that encompasses direct and indirect effects of the oceans on human health.

## Direct Effects

Oceans directly impact human health in many ways, such as through consumption of contaminated seafood and exposure to waterborne pathogens. WC Center scientists are investigating the sources, transport, and fate of harmful pathogens, biotoxins, and toxic chemicals in seafood (fish and shellfish) under changing ocean conditions and human/land-use activities. Scientists are also evaluating the potential for marine mammals to act as a “source” for human or terrestrial pathogens. Through this research, we will be able to develop early warning systems to better predict where outbreaks may occur, for example, as well as methods to reduce or eliminate threats to human health, such as through molecular or specific seafood preparation techniques that reduce or eliminate harmful agents from seafood.

## Indirect Effects

Oceans also indirectly impact human health and can provide important clues as to current and potential human health risks. WC Center scientists are investigating the impacts of pathogens, biotoxins, and toxic chemicals on the health of sentinel species, like fish and marine mammals. By understanding the impacts of these harmful agents on the health of sentinel species, we can better understand what is happening or what could happen to humans. Through this research, for example, we will be able to develop human risk models to inform management actions, such as a model that better links consumption of contaminated seafood with human disease.



*Vibrio* species (right) have certain characteristics which enable them to colonize shellfish and cause disease, including the ability to attach to and colonize host cells.

In the U.S., there are approximately 25,000 cases of foodborne disease that require hospitalization every year. Waterborne bacterial infections may be the cause of as many as half of these cases. As part of its oceans and human health studies, WC Center scientists are investigating the relationship between naturally occurring *Vibrio* species, bacteria which cause severe gastroenteritis in healthy individuals who consume affected shellfish, and their association with shellfish and contribution to human disease.

NOAA's West Coast Center for Oceans and Human Health is conducting its research through four core programs in microbiology, ecotoxicology, marine mammal ecology, and climate impacts. In support of these interdisciplinary research programs, key priorities for the WC Center include sharing data and research results with the public and other science institutions, fostering the exchange of information between diverse communities, including other oceans and human health programs, and providing valuable educational opportunities.

NOAA's key partners in this WC Center include the University of Washington (Seattle, WA), Institute for Systems Biology (Seattle, WA), Oregon State University (Corvallis, OR), the Marine Mammal Center (Sausalito, CA), the University of California, Davis (Davis, CA), and NOAA's Alaska Fisheries Science Center (Seattle, WA).

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Marine mammal mortalities and poor health raise concerns about deteriorating ocean health. Marine mammals and humans share similar prey items and habitat. By understanding marine mammal health we can better understand current and potential impacts to human health and emerging diseases of concern.