CO2 in the oceans drives ocean acidification.

Over the past 250 years or so, burning fossil fuels has increased atmospheric CO2 levels by nearly 40 percent from 280 ppmv (part per million by volume) to 391 ppmv, and the level is rising by about 2 ppmv per year, according to the European Project on Ocean Acidification (EPOCA).

During this time, the oceans have been absorbing carbon dioxide. Otherwise, atmospheric CO2 would be 460 ppmv, according to EPOCA.

The oceans have absorbed an estimated 525 billion tons, or about half the fossil fuel carbon emissions, over the last 200 years, according to Richard Feely, senior scientist at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory in Seattle.

“Ocean acidification is affecting the shells of clams, scallops and other species. CO2 in the oceans drives ocean acidification.

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“The ocean’s daily uptake of 22 million tons of carbon dioxide is starting to take its toll on the chemistry of seawater,” writes Feely and colleagues in a briefing paper. Carbon dioxide absorption lowers ocean pH, which decreases availability of the calcium carbonate essential to shellfish.

Scientists have been working to make sense of the implications for wild and farmed shellfish. Stephanie Talmage and Christopher Gobler, at Stony Brook University in Southampton, N.Y., studied the growth and survival of the larvae of hard clams (Mercenaria mercenaria) and Atlantic bay scallops (Argopecten irradians) under past, present and projected future seawater conditions.
Larvae grown in pre-industrial CO₂ concentrations grow faster and have higher survival rates and thicker, more robust shells compared to larvae grown under modern CO₂ levels. “Bivalves exposed to CO₂ levels expected later this century had shells that were malformed and eroded,” according to the abstract of Talmage and Gobler’s paper, published Oct. 5 in the Proceedings of the National Academy of Sciences.

The Pacific Northwest oyster industry is likely seeing the first acute effects of ocean acidification. Along the first acute effects of the oyster industry is likely seeing now is the beginning of the increase in atmospheric CO₂. If we project forward, it’s a whole lot worse.”

By 2009, the Pacific Northwest shellfish industry were working together on the oyster die-off problem. This year’s federal budget included $500,000 to help hatcheries purchase monitoring equipment. In July, growers, scientists and managers gathered for a workshop on ocean acidification impacts on shellfish. They concluded that existing datasets varied too much to explain the impacts of ocean acidification on shellfish productivity, and that data collection should be coordinated among all groups.

Taylor’s hatchery is also closely monitoring the water and looking to improve in genetics to adapt. While native oysters seem to be better adapted to more acidic water, non-native Pacific oysters are commercially preferred. Among the Pacifics, some strains are emerging that appear to be more resilient to the acidity.

Meanwhile, Taylor’s 2010 hatchery production was double — its best year ever. The winds generally blew into Hood Canal from the south, keeping the surface waters in place and protecting the hatchery — for now — from water rich in CO₂.