



Oregon State
University

Department of Integrative Biology

Oregon State University
3029 Cordley Hall
Corvallis, Oregon 97331

P 541-737-9131

Francis.Chan@oregonstate.edu

February 7, 2020

The Honorable Michael Dembrow, Chair
Senate Committee on Environment and Natural Resources
Oregon State Legislature

Testimony on Senate Bill 1554

Good afternoon Chairman Dembrow and members of the committee.

My name is Francis Chan. I am an Associate Research Professor at Oregon State University. As a scientist working to understand how our ocean is changing and what that means for Oregonians, I appreciate this opportunity to highlight some of the fundamental science that motivates SB 1554.

The ocean is acidifying because CO₂ forms an acid when it dissolves in water, -the more CO₂ moves into the ocean, the greater the acidity. There's confusion over the phrase acidification. The oceans aren't acidic after all. As an analogy, when we say the north pole is warming, that's not to say that it is warm but simply that it is getting warmer. Ocean acidification is just that, not acidic but increasing in acidity. The other challenge we face is the expansion and intensification of low oxygen or hypoxic zones. Oxygen levels are declining in our coastal ocean and reflects global trends that is driven by ocean warming. As water warms, it holds less oxygen. A warmer surface ocean also acts as a blanket that makes it harder for deep waters to be refreshed with oxygen from the atmosphere.

Oregon's coastal oceans have been the frontlines for impacts from ocean acidification and hypoxia or low oxygen conditions. It was the Dungeness crab fleet who first alerted scientists to the appearance of hypoxic zones that suffocated crabs. It was Oregon shellfish growers who first made clear the direct costs of rising acidity. We've learned a lot more since those events. We now know that just as we have a fire season on land, we have a hypoxia season in the sea. As these low oxygen zones form, Dungeness crabs are in poorer condition, and fish like halibut can move away from traditional fishing grounds. We also know that ocean acidification is not just an oyster problem. Just last week, our scientific colleagues reported finding evidence that young Dungeness crabs including those collected from Oregon waters already show signs of their shells dissolving from ocean acidification. The list of marine life we now know to be impacted by ocean acidification in the scientific literature grows every week and now includes rockfish, salmon, and shrimp.

Our coastal ocean is moving into uncharted territory. Tomorrow's ocean will be more acidified, and oxygen-poor at concentrations that we know will impair marine life. There's much that Oregonians can do to prepare for the challenges. By addressing key gaps in our ability to detect and track changes across the state, and securing information needed to support resilience planning, SB1554 ensures that actions we take together to confront the challenges of changing ocean are informed by the best available science on where and when the risks are the greatest, and how we can best manage for a more resilient ocean. I thank this committee, and the chief sponsors of the

bill, Senator Roblan, Representative Smith, and Representative for leadership in readying our state for the changes ahead.

Thank you for your attention, I will be happy to answer any questions you might have.

Sincerely,

A handwritten signature in black ink, appearing to read "Francis Chan". The signature is fluid and cursive, with the first name "Francis" and the last name "Chan" clearly distinguishable.

Francis Chan, PhD
Associate Professor Senior Research
Oregon State University