The Ecology of Closure: Synergistic Impacts of Acidification and Pathogen Proliferation on BC Shellfish

Technical brief on the biological stressors impacting the Canadian Shellfish Sanitation Program (CSSP) regions.

1. The Synergistic Threat: OA + SST

Ocean Acidification (OA) is no longer a distal threat. Recent studies at the University of British Columbia confirm that OA significantly decreases the growth and shell integrity of Pacific oysters (*Magallana gigas*) and bay mussels (*Mytilus spp.*) [cite: 1.3.2]. When coupled with rising Sea Surface Temperatures (SST), these organisms enter a state of metabolic stress that increases their susceptibility to secondary stressors like heatwaves and predation [cite: 1.3.2].

2. Pathogen Dominance: Vibrio and POMS

Warmer summer months are now synonymous with *Vibrio parahaemolyticus* proliferation. Research indicates that seawater temperature is the strongest predictor of oyster mortality, with risks spiking between \(16^\circ C\) and \(24^\circ C\) [cite: 1.5.1]. This thermal window also favors the replication of Ostreid herpesvirus 1 (OsHV-1), the primary driver of Pacific Oyster Mortality Syndrome (POMS) [cite: 1.5.1].

> **Strategic Note:** In 2021, the Pacific Northwest heat dome served as a catastrophic catalyst, creating ecological vacancies that opportunistic pathogens like *Vibrio* have since occupied [cite: 1.5.1].

3. The Economic Consequences of Closure

Area closures are the ultimate manifestation of this biological crisis. A single oyster recall or sanitary closure can generate upwards of $50,000 in losses per day for producers and restaurants [cite: 1.4.2]. For BC growers, the decrease in harvest revenue directly compromises the cash flow necessary to purchase seed for the following season, creating a downward economic spiral [cite: 1.4.2].