

## Daniel Cheney

I've been involved with various aspects of shellfish farm management in Willapa Bay and elsewhere since the 1970's. The SEIS correctly observes the difficulties farmers face in growing oysters on grounds densely colonized with burrowing shrimp. The high shrimp densities observed since the 1960's have been described as reflecting both human disturbances and changing ocean-system dynamics. The current proposal to apply imidacloprid to reduce shrimp densities on the most productive grounds in Willapa Bay and Grays Harbor, is the result of concentrated efforts since the mid-1990's to: 1) examine alternative control and culture methods; 2) study the ecology and marine chemistry of the growing areas; 3) better understand the ecosystem services provided by shellfish culture; and 4) conduct laboratory and field experiments on the effects of a range of chemical, physical and electrical tools for shrimp control.

I believe the SEIS adequately addresses the rationale and need for the application of imidacloprid, and cites current literature on this and other chemicals used or proposed for control of burrowing shrimp. The examination of the three alternatives fairly reviewed anticipated impacts for a range of treatment options; however, some readers may not have access to the more detailed available information on ecosystem changes that would result under Alternative 1 (no treatment). Aspects of these ecosystem changes were evaluated in greater detail in the 2015 FEIS, and are briefly quoted as follows:

--From FEIS – p 3-4. Deposit-feeding polychaetes, bivalves, tube-dwelling tanaids and amphipods (e.g., *Corophium* spp.), and other sedentary species were reduced in numbers in areas where dense populations of ghost shrimp were present.

--From FEIS – p 3-5. Burrowing shrimp act to limit eelgrass presence by disrupting the sediment and making it too soft for eelgrass roots and rhizomes (Dumbauld and Wyllie-Echeverria 2003; Hosack et al. 2006). Dumbauld and Wyllie-Echeverria found a strong increase in eelgrass abundance in areas where carbaryl was experimentally applied to burrowing shrimp.

--From FEIS – p 3-5. Oyster beds provide important ecosystem services such as water filtration, resulting in decreased suspended solids, turbidity, and increased denitrification; habitat for epibenthic invertebrates such as crabs; carbon sequestration; and stabilization of adjacent habitats and the shoreline.... Oysters grow well on hard, rocky bottom or on semi-hard mud firm enough to support their weight. Shifting sand and soft mud are usually unsuitable for oysters.

--From FEIS – p 3-28. The treatment of intertidal oysterbeds with carbaryl [a chemical treatment for shrimp control until 2013] clearly reduces abundance of shrimp in this zone and we documented the same pattern of seagrass colonization on a commercial oyster bed and lack of seagrass in an adjacent unsprayed area. Density of native seagrass *Z. marina* shoots was also enhanced in plots treated with carbaryl, but only at lower tidal elevations or in intertidal pools where it could survive (Dumbauld, B.R. and S. Wyllie-Echeverria. 2003. The influence of burrowing thalassinid shrimps on the distribution of intertidal seagrasses in Willapa Bay, Washington, USA. *Aquatic Botany* 77:27–42)

--From FEIS – p 3-48. Increased densities of burrowing shrimp could result in decreased biodiversity and increased sedimentation (Dumbauld and Wyllie-Echeverria 1997; Colin et al. 1986). High densities of burrowing shrimp have been associated with lower numbers of *Dungeness*

crab, oysters, and other shellfish due to competitive exclusion and habitat modification caused by the shrimp (Doty et al. 1990; Brooks 1995; Dumbauld and Wyllie-Echeverria 1997)."

This information coupled with the uncertainty, production risks and high costs associated with the described alternative off-bottom oyster culture and non-chemical burrowing shrimp control methods, clearly indicate the no action Alternative 1 is not acceptable from both ecological and food production perspectives. I urge the Washington Department of Ecology to support and permit the more balanced approaches afforded by Alternatives 3 and 4.