

THE STRUCTURE AND FUNCTION OF “THE SALMON FARM REEF” – IT’S NOT SIMPLY BIOFOULING

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The installed infrastructure comprising a fish farm represents a physical habitat that provides a new and unique substrate for colonization by marine invertebrates, kelps/seaweeds, and an associated assemblage of resident and transient demersal/pelagic fish species. Given the relative permanency of the farm structures, these habitats can, in essence, be considered floating “reefs”. A 2-year study in coastal British Columbia has documented the structure and function of the fish farm reef, given the nature of the physical infrastructure as well as the inputs of the farm itself that will inevitably stimulate or depress colonization processes.

The Salmon Farm Reef Project examined the sub-surface structures that comprise a salmon farm facility. Our inventory and sampling approach used a fixed focal length high-resolution camera system (Go-Pro) operated via relayed Wi-Fi signal to the surface operator, a sample scraper and material capture unit, and a new artificial substrate component to document surface recruitment related to exposure. Four farm sites were selected for seasonal monitoring of the farm’s reef community – the farms were chosen based on differing oceanographic conditions, assuming these conditions would support different biological reef communities.

The results of the project revealed a very clear difference in the reef community depending upon oceanographic conditions (water quality and flow) and the exposure of each farm’s physical structures to the environment (orientation to flow, sunlight, depth, etc.). There is also a very high degree of internal variability among similar structures, suggesting the patchy nature of the community structure. “Function” of the Salmon Farm Reef assumed the average commercial farm comprises a 10-cage array (30-metre cages) with 14 x 28 metre feed/accommodation barge, anchored in 55 metres of water. The entire subsurface area of the structures was estimated at 1,119 m² – and using our biomass data this would suggest that the farm reef system supports 19.2 MT of biological community comprised of 76 species.

Using species-specific filtration rates derived through the literature, and actual mussel density data from our sampling program, our functional estimate suggests that those sites where a high proportion of filter feeders exist revealed a significant filtration capacity across the farm. With 50% mussel (small) coverage and an individual filtration rate of 0.6 litres/hour, the entire farm would filter approximately 14.5 million litres of seawater daily.

The positive and negative aspects of the Salmon Farm Reef were discussed in terms of potential biosecurity, farm management practises, organic/inorganic waste mitigation, habitat creation, and interactions with wild species.