

# MARINE INVERTEBRATES

**Study geographic boundaries:** Marine terminal PDA, PEAA, CCAA.

**Study time boundaries:** Construction and operations phases.

**Project works and activities considered in the study\*:** Construction – on-shore infrastructure site preparation (clearing, burning, grading, blasting); in-water infrastructure site preparation (dredging, blasting, pile drilling); in-water infrastructure construction (marine terminal, permanent jetty, construction jetty, pile installation, docking berth, underwater structures); construction support vessels (barges, tugs, ocean disposal barges); construction marine vessel traffic (wake, noise). Operations – moored tankers and associated combustion emissions, inert gas

exchange, prop wash, noise, boom deployment; tanker traffic (wake, noise); tug traffic (wake, noise, prop wash).

**Study methods:** Blue mussels are generally representative of sessile invertebrates (those that attach themselves to other things) in the terminal area because of their wide distribution and high biomass in the region. Dungeness crabs are representative of native motile (free swimming) invertebrate species. Hexactinellid sponges aggregations serve as nursery habitat for fish and invertebrates.

Intertidal surveys, using a standard quadrat methodology, were completed in 2005/6 and 2008 along approximately two kilometres of shoreline near the terminal. Additionally, subtidal underwater video surveys were conducted by local experts at three sites. An underwater camera was towed just above the seabed and surface technicians recorded data using state-of-the-art technology and geo-referencing.

VEC	Key Issues	KIR	Baseline Results	Measurable Parameter	Potential Project Effects**	Proposed Mitigation	Residual Effects	Cumulative Effects
Marine Invertebrates	<p>Blue mussels are ecologically important as a food source for numerous species, including marine birds. The dense mats they form provide protection and a place for other intertidal animals including barnacles, crabs and snails.</p> <p>Dungeness crab is the most important crab species harvested in BC. Their eggs are an important food source for Pacific herring, Pacific sardine, rockfish and chinook salmon. They are also dominant predators on the seabed, feeding on clams, other crustaceans and small fish.</p> <p>Benthic sponges were chosen because sponge aggregations are sensitive to disturbance and serve as nursery habitat for fishes and invertebrates. Some species such as those present in Hecate Strait are unique to the western Canadian continental shelf and are ecologically important contributors to species diversity.</p>	<p>Blue mussel</p> <p>Dungeness crab</p> <p>Benthic sponges</p>	<p>The blue mussel is native to the Pacific Northwest, and dominates the hard shoreline of the sheltered coasts of BC, including the terminal area. Blue mussels are common in habitats such as rock shelves, estuaries and boulder beaches, and this was confirmed by observations from the intertidal surveys.</p> <p>No dungeness crabs were captured during a nearshore trapping survey in June 2006. The subtidal camera survey revealed a low abundance of crabs at the marine terminal, suggesting the general area is most likely not primary habitat for dungeness crab in Kitimat Arm.</p> <p>Results of a subtidal video survey of the terminal area in May 2007 indicated a scattered distribution of benthic sponges throughout the survey area. The sponges were present at both ends of the site, but absent from the central region and appeared to be associated with the steep, rugged cliffs found at either end of the site.</p>	Risk of direct mortality.	<p>Construction activities such as blasting and dredging present the greatest risk in terms of direct mortality and disturbances to blue mussels..</p> <p>During operations, project vessels may crush some mussels living on the mooring facilities.</p>	Currently being assessed.	<p>During operation, project vessels may crush some mussels living on the mooring facilities. This is not expected to affect the viability of local mussel populations.</p> <p>Dungeness crabs and hexactinellid sponges are not expected to be killed during operations. The marine terminal will provide increased material for mussels to grow.</p>	Currently being assessed.
				Changes in habitat quality.	<p>Computer modeling indicates that the dredging sediment plume will not extend beyond a few hundred metres and will have low concentrations of suspended solids.</p>	Currently being assessed.	<p>Altered water quality from dredging is expected to have few effects on the abundance and distribution of mussels, crabs and sponges in the area.</p>	Currently being assessed.
				Changes in habitat availability.	<p>Construction activities such as blasting and dredging present the greatest risk in terms of potential disturbances to marine benthic invertebrates.</p> <p>Changes in habitat may occur due to vessel wake and/or vessel noise during routine operations. Increases in underwater sounds may temporarily and intermittently alter the behaviour and movement patterns of crabs.</p>	Currently being assessed.	<p>While the effects of underwater blasting on marine invertebrates are not well understood, most species appear to be able to tolerate the shock waves of underwater explosions.</p> <p>Increases in underwater sounds may temporarily and intermittently alter the behaviour and movement patterns of crabs, although there is limited overlap between primary dungeness crab habitat and the area in which marine sounds will occur.</p> <p>The wake produced from increased marine transportation is not expected to alter present wave motion characteristics enough to change the distribution or abundance of marine invertebrates.</p>	Currently being assessed.

\*Refer to Figure 3.3 in section 3, Project description, for the full list of physical works and activities. \*\*The effects of spills and malfunctions will be included in the update for the supplemental filing.