

FRESHWATER FISH AND AQUATIC HABITAT

Study geographic boundaries: The project effects assessment area (PEAA) consists of the RoW, extra work spaces, and the downstream reach(es) that could be expected to have measurable effects from sediment releases during any phase of the project. The PEAA extends from 300 m to 1,000 m downstream of the crossings. The regional effects assessment area (REAA) encompasses fish habitats within a 1-km-wide corridor centered on the project RoW (pipeline, roads and transmission lines) and extending up to 1,000 m downstream of the terminals and other project work areas that may affect fish habitat. This is the area assessed for cumulative effects.

Study time boundaries: Construction and operations phases.

Project works and activities considered in the study*:

Construction – clearing of riparian vegetation, installation of pipelines under watercourses, creation of permanent and temporary access roads (including culvert and bridge construction on watercourses), and disposal of waste rock. Operations – maintenance of pipeline and road crossings.

Study methods: Fish and fish habitat productive capacity was selected as a VEC for two reasons: first, the *Fisheries Act* establishes regulatory requirements for the protection of fish and fish habitat. Inclusion of fish and fish habitat productive capacity in the environmental effects assessment ensures the project is

undertaken within the requirements of the legislation. Second, by identifying important fish habitats along the pipeline route and developing mitigation measures to protect these resources, the overall ecological function of the affected aquatic ecosystems can be protected.

Investigations included a review of historical information and a field program. The project crosses six major drainages across Alberta and British Columbia: North Saskatchewan River, Athabasca River, Peace River, Fraser River, Skeena River and Kitimat River, with approximately 785 watercourses along the pipeline route. Of the 1,290 mapped watercourses, these 785 were verified to be present (i.e. there was a defined channel

present) between 2005 and 2008. Pipeline corridor studies and fish habitat surveys were completed to identify and evaluate initial and alternative pipeline routes from a fisheries perspective. These exercises considered the total number of watercourse crossings, the number of major river crossings, the locations of important fish stocks/runs, and the known locations of fish species at risk. Sport fish and species of conservation concern are the primary focus of the ESA. Sport fish include those species commonly targeted by anglers – salmonids, bass, walleye and northern pike – using hook, line, rod and reel rather than with nets or other aids.

VEC	Key Issues	KIR	Baseline Results	Measurable Parameter	Potential Project Effects**	Proposed Mitigation	Residual Effects	Cumulative Effects
Fish and Fish Habitat Productive Capacity	Habitat capacity and destruction Fish health and mortality	n/a	Results from literature research and the 2005 and 2006 field programs indicate the potential occurrence of 59 species near the RoW, including 11 Pacific, 24 Arctic and 24 freshwater fish species common to drainages in both regions. Of the 1,290 mapped watercourses, there were 785 verified to be present (i.e. there was a defined channel present) between 2005 and 2008. No watercourses were present at the remaining 505 watercourses. The pipeline route crosses 194 watercourses in Alberta (all are fish-bearing). Most pipeline stream crossings are in the Athabasca drainage (44 per cent), followed by the Peace River drainage (43 per cent). The pipeline route crosses 591 watercourses in British Columbia (532 fish-bearing and 59 non-fish-bearing). The majority (43 per cent) of pipeline watercourse crossings are in the Peace River drainage followed by the Fraser River (24 per cent) and the Skeena River (21 per cent), respectively.	Area and/or quality of fish habitat in a manner that affects its productive capacity.	Watercourse crossings and water withdrawals or hydrostatic testing are required temporarily to install the pipeline. The extent of all project-related effects is anticipated to be local and short-term, primarily because of minor inputs of sediments to streams. Effects of road development and waste rock extraction on fish and fish habitat will be medium term since effects will persist into the operations phase. However, measurable effects are not anticipated beyond five years after cessation of the activity.	The pipeline route has undergone numerous realignments to accommodate sensitive habitats, important fish stocks/runs, fish species at risk, and engineering concerns. Where potential environmental effects cannot be completely avoided the project design has incorporated measures to: <ul style="list-style-type: none"> Minimize disturbance areas within the pipeline right-of-way Select watercourse crossing techniques on the basis of the biological conditions Adhere to construction least-risk periods for fish species present where practical Promptly reclaim disturbed areas 	Construction activities are predicted to result in few if any effects on fish health. The magnitude of effects and frequency of effects for all construction activities are predicted to be temporary, negligible and occur only once.	Currently being assessed.
				Mortality risks to fish for all life stages including egg, alevin, juvenile and adult stages.	In all of the watercourses crossed by the pipeline, loss of a small number of individuals will be negligible and replacement will occur within a short-term to medium-term frame.	Experience with pipeline watercourse crossings has shown that fish mortalities can be reduced to very low levels and avoided completely through diligent application of mitigation measures.	The loss of a small number of fish that are part of a secure population will not permanently affect the local population. Construction activities are predicted to result in few if any effects on fish mortality risk. The magnitude of effects and frequency of effects for all construction activities are predicted to be negligible and occur only once.	Currently being assessed.

*Refer to Figure 3.1 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.