

Entrainment Effects at an LNG Import Terminal During Unloading

BP, Delaware River Estuary, New Jersey



Situation

British Petroleum (BP) is proposing to build an LNG import terminal at Crown Landing located along the banks of Delaware River in Gloucester County, NJ. LNG, the liquid form of natural gas most notably used for cooking and heating at homes and for generating electricity, is transported in purpose-built, double-hulled ships. During the unloading while at berth, lasting around 12 hours, LNG carriers take on about 30,000 m³ of water to maintain hydraulic stability when empty. Concerns exist regarding the entrainment effects and possible fishery losses due to this ballast water intake. Striped Bass, White Perch and Bay Anchovy are the species of concern since they consistently dominate the ichthyoplankton population in the Delaware River.

Approach

ERM's in house model GEMSS-ENM (Generalized Environmental Modeling System for Surfacewaters-Entrainment Module) was applied to estimate the equivalent number of adults lost due to entrainment. GEMSS-ENM incorporates several approaches available in the literature and adopted by the agencies nationwide. Application of GEMSS-ENM also requires specification of flow fields in the waterbody which was accomplished by applying the 3-D hydrodynamic model, Deft3D. Deft3D generates flow fields in the region and GEMSS-ENM uses these flow fields to simulate transport of fish eggs, larvae and juveniles throughout the water body between sampling regions and eventually to the intake.

GEMSS-ENM estimated equivalent adult fish population impacts based on fish egg and larval density data collected

in Delaware River Estuary for the period between April and July 2003.

Results

Using field data, the GEMSS-ENM was run for four 30 day periods (individually for each month from April through July). The number of equivalent adult lost for the four species during the four different months were found to be minimal. Due to relatively small intake capacity and number of intake operations (100/yr), and existence of ichthyoplankton in initial life stages, the number of equivalent adults lost was small. While striped bass represented the highest number of individuals, most of the population was in the egg lifestage, which, due to natural mortality, resulted in almost negligible numbers of equivalent adults lost.

