

**Table ES-1. Summary of potential impacts to the aquatic environment from installation and operation of marine and hydrokinetic renewable energy technologies.**

Issue	Effects on the physical and biological environment				
	Physical environment	Animal behavior	Individual injury and mortality	Population-level effects	Community- and ecosystem-level effects
Alteration of currents and waves	Current velocities or wave heights will be reduced in proportion to the size and number of units	Minor effects on animal behavior are expected	No injuries or mortalities are expected	Minor alterations of plant and animal populations from changed hydraulic environment	Minor alterations of plant and animal communities from changed hydraulic environment
Alteration of bottom substrates, sediment transport, and sediment deposition	Slower currents and smaller waves will increase sediment deposition	Minor effects on animal behavior are expected during installation	Few injuries or mortalities are expected from gradual changes in substrate composition and dynamics	Minor, localized changes to plant and animal populations from changes in substrates	Moderate changes to plant and animal communities in vicinity of altered bottom substrates
Alteration of benthic habitats	Altered current velocities and sediment transport and deposition will change habitats for bottom-dwelling plants and animals	Avoidance of unsuitable habitats by some species and attraction by other species	Mortality of sessile organisms during project installation	Population declines in vicinity of the project for some species and population increases for other species	Changes in plant and animal communities in response to altered substrates
Noise	Additional noise in the environment from installation and operation	Avoidance of areas with highest noise levels. Possible masking of animal communications and echolocation	Fish kills near pile-driving activities. Injury and mortality from operational noise probably minor.	Probably minor for fish. Unknown effects for marine mammals and sea turtles	Small or no changes to plant and animal communities from operational noise
Electromagnetic fields (EMF)	New electrical and magnetic fields in the water and sediments near generating devices and electrical cables	EMF may alter feeding behavior or migration of animals near the project	Incidence of injuries and mortalities from the predicted electrical and magnetic field strengths are expected to be small	Minor for feeding behavior changes. Unknown population impacts from effects on long-distance migrations	Minor for feeding behavior changes. Unknown impacts from effects on long-distance migrations

Chemical toxicity	Releases of contaminants from oils and other operating fluids and anti-biofouling coatings	Minor effects on behavior from released contaminants, except for avoidance of oil spills	Toxicity to plants and animals exposed to contaminants. Potential bioaccumulation of metals and other compounds	Potential effects on local plant and animals population from toxicity to individuals	Potential effects on local communities and ecosystems from population-level changes
Interference with animal movements and migrations	Creation of new structures on the bottom and in the water column	Entanglement or avoidance by some organisms. Attraction of some species to new habitat	Injury and mortality associated with entanglement and increased predator activity. Decreased injury and mortality if fishing is reduced.	Potential enhancement because of additional structures and reduced fishing. Potential decline from entanglement and interference with migrations	Unknown overall effect of avoidance and attraction mechanisms and between population enhancement and declines.
Strike	Rigid, moving structure and possible cavitation near rapidly moving blades	Unknown ability of animals to sense and avoid strike will mitigate the potential for damage	Unknown levels of injury and mortality from blade strike, impingement, and exposure to cavitation	Unknown changes to animal populations from strike mortality	Unknown effects on communities and ecosystems from strike mortality
Ocean Thermal Energy Conversion (OTEC) operation	Transfer of large volumes of water between ocean depths. Alteration of water temperatures, dissolved solids, and dissolved gas concentrations. Addition of biocides.	Unknown effects on behavior. Probably avoidance of discharge plume and intakes.	Injury and mortality from entrainment, impingement, and temperature shock. Toxicity of biocides.	Unknown amount of change to plant and animal populations from individual mortalities and avoidance of the project area	Unknown amount of change to communities and ecosystems from mortalities and avoidance of the project area