Review of Effects of Radiation on Aquatic Populations

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Radiation is not a recent introduction to the marine environment, since low levels from environmental and cosmic sources have been present throughout geological time. Lethal amounts of radiation differ widely among marine organisms and are related to variations such as species, age, physiological status, and body size. These variations are further complicated by the interaction of environmental factors. Exclusive of the eggs of fish and larvae of invertebrates and fish, most marine organisms for which data exist are relatively radioresistant.

Limited studies on the effects of chronic exposure have been conducted. These have been limited to selected developmental stages and indicate that, with the possible exception of some Russian data, the dose necessary to evoke an unequivocally detectable biological response is considerably above that of concentrations of radionuclides in the environment as a result of controlled waste disposal operations.

Studies on the genetic consequences of radiation exposure to population indicate that, despite larger numbers of mutations, increased utilization or reproductive capacity maintains a population at preradiation density.

Field studies on the effects of radiation indicate that our best technologies and methods cannot demonstrate effects on marine ecosystems, at prevailing dose rates, that are clearly and uniquely attributable to ionizing radiation.

However, more sensitive parameters of radiation effects on individuals, populations, and communities need to be developed. Long-term studies, in which factors such as rates of growth, morphological abnormalities, onset of maturity, and reproductive capacity are

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considered, for example, should be emphasized. Chromosomal studies under experimental and field conditions should be extended, and the somatic and genetic consequences of such changes on populations and ecosystems should be evaluated.