STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Water Resources

WATER QUALITY REGULATIONS

July 2006

AUTHORITY: These regulations are adopted in accordance with Chapter 42-35 pursuant to Chapters 46-12 and 42-17.1 of the Rhode Island General Laws of 1956, as amended

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WATER QUALITY REGULATIONS

Rule 1. PURPOSE

It is the purpose of these regulations to establish water quality standards for the state's surface waters. These standards are intended to restore, preserve and enhance the physical, chemical and biological integrity of the waters of the State, to maintain existing water uses and to serve the purposes of the Clean Water Act and Rhode Island General Laws Chapter 46-12. These standards provide for the protection of the surface waters from pollutants so that the waters shall, where attainable, be fishable and swimmable, be available for all designated uses, taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and also taking into consideration their use and value for navigation, and thus assure protection of the public health, safety, welfare, a healthy economy and the environment.

Rule 2. LEGAL AUTHORITY

The authority for these regulations is vested in the Director by Chapter 46-12, Water Pollution, Chapter 42-17.1, Environmental Management and Chapter 42-17.6, Administrative Penalties For Environmental Violations of the General Laws of Rhode Island, as amended. These rules and regulations are further promulgated pursuant to the requirements and provisions of all chapters of the General Laws of Rhode Island relating to the duties and responsibilities of the Director for the waters of the state, and in accordance with the requirements of Chapter 42-35, Administrative Procedures Act.

Rule 3. - SUPERSEDED RULES

Upon adoption, these rules and regulations will supersede "Water Quality Regulations for Water Pollution Control" dated August 6, 1997 and re-filed with the Secretary of State on December 31, 2001.

Rule 4. - LIBERAL APPLICATION

The terms and provisions of these rules and regulations shall be liberally construed to allow the Department to effectuate the purposes of state law.

Rule 5. - SEVERABILITY

If any provision of these rules and regulations or the application thereof to any person or circumstance is held invalid by a court of competent jurisdiction, the remainder of the rules and regulations shall not be affected thereby. The invalidity of any rule or rules or parts of any rule or rules shall not affect the validity of the remainder of these rules and regulations.

Rule 6. - APPLICATION OF THESE REGULATIONS

A. Nothing in these rules and regulations shall be deemed to interfere with the Director's power and duty to issue an immediate order pursuant to section 46-12-10 of the General Laws of Rhode Island.

B. These regulations apply to all waters of the State, all systems or means of wastewater treatment, including sewers, all discharges into surface waters, all activities which will likely impact water quality and/or activities that will likely cause or contribute to flow alterations. These regulations shall also apply to those activities regulated by the federal government, other state agencies, programs within the Department and/or local governmental entities. All departmental regulations should be construed to be consistent and/or complementary and any perceived conflicts are unintentional. Should a perceived conflict arise between or among these regulations and the requirements imposed by the other departmental regulations or other governmental entities, the most stringent requirement shall govern.

Rule 7. - DEFINITIONS

For the purposes of these regulations, the following terms shall have the following meanings:

"Acute toxicity" means lethal or sublethal severe adverse effect(s) to an organism when exposed to a toxic pollutant(s) for a relatively short period of time. In aquatic toxicity tests, an effect observed in 96 hours or less is typically considered acute.

"Administrator" means the administrator of the United States Environmental Protection Agency or any subordinate or subordinates to whom the Administrator delegates the powers and duties vested in that office.

"Applicable standards and limitations" means all state, interstate and federal standards and limitations to which a discharge or activity is subject under the Clean Water Act or any State Acts including but not limited to effluent limitations, water quality standards, standards of performance, toxic effluent standards or prohibitions, best management practices, and pretreatment standards under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the Clean Water Act.

"Applicant" means a person who applies for any approvals for any discharge, activities, projects, or facilities in accordance with the requirements of these regulations.

"Application" means all forms, documents, and other information required by the Department to apply for a permit, order, certificate, or other approval from the Department in accordance with the requirements of these regulations.

"Approval" means an authorization, Order of Approval, permit, certification, license or equivalent determination issued pursuant to regulations promulgated by the Department.

"Aquaculture facility" means a defined managed water area or facility for the maintenance or production of harvestable freshwater, estuarine or marine plants and/or animals. Defined managed water area as used in this definition, means the portions of the waters of the state within which the permittee or permit applicant confines and/or plans to confine the cultivated species, using a method or plan of operation (including but not limited to, physical confinement) which, on the basis of reliable scientific evidence, is expected to ensure that specific individual organisms comprising an aquaculture crop will enjoy increased growth and be harvestable within a defined geographical area.

"Aquatic Research Related Activities" means an activity in which research is conducted to evaluate the effect of various factors on the health, growth, or reproduction of aquatic organisms.

"Best Management Practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of and impacts upon waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Best Professional Judgment (BPJ)" means a determination, based on best engineering and/or scientific practices and best management practices, involving any pollutant, combination of pollutants or practice(s), on a case by case basis, which is determined by the Director to be necessary to carry out the provisions of the Clean Water Act and any applicable chapters of the General Laws of Rhode Island. BPJ can be used to set Best Available Technology Economically Achievable, Best Conventional Pollutant Control Technology, Best Practicable Control Currently Available or Best Management Practices limitations pursuant to the Clean Water Act either in the absence of an applicable promulgated effluent guideline or where promulgated effluent limitation guidelines only apply to certain aspects of the discharge's operation or to certain pollutants.

"Bioassay" means a toxicity testing procedure using aquatic organisms to determine the concentration or amount of a toxic pollutant(s) causing a specified response in the test organisms under stated test conditions.

"Brackish water" means those waters of the state in which the natural level of salinity is greater than 1 (one) part per thousand but less than 10 (ten) parts per thousand, 95 percent or more of the time.

"CFR" means the Code of Federal Regulations.

"Chronic toxicity" means lethal or sublethal adverse effect(s) to an organism or its progeny, based on various physiological measurements including but not limited to growth, survival, or reproductive success when exposed to a toxic pollutant(s) for a relatively long period of time. The methods commonly used to estimate chronic effects involve exposures of typically seven (7) days or less.

"Clean Water Act (CWA)" refers to the Federal Water Pollution Control Act (33 U.S.C. § 1251) et seq. and all amendments thereto.

"Combined Sewer" means a sewer which serves as a sanitary sewer and a storm sewer.

"Combined Sewer Overflow (CSO)" means flow from a combined sewer that is discharged into a receiving water without going to a treatment works. A CSO is distinguished from bypasses which are diversions of waste streams from any portion of a treatment works.

"Contiguous zone" means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

"Controlled relay" means the transplant of shellfish from certain Class SB, SB1 and/or SC waters to Class SA waters suitable for shellfish harvesting under the coordination and authority of the RIDEM for the purpose of natural purification and controlled harvest.

"Cultural eutrophication" means the human-induced acceleration of primary productivity in a surface waterbody resulting in nuisance conditions of algal blooms and/or dense macrophytes.

"Department" or "Departmental" or "DEM" or "RIDEM" or "Director" means the Rhode Island Department of Environmental Management or the director of the Department of Environmental Management or any designee to whom the Director delegates the powers and duties vested in that office.

"Depuration" means the artificial holding of shellfish for purification purposes.

"Designated Bathing Beach" means bathing beaches licensed by the Rhode Island Department of Health.

"Designated uses" are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. In no case shall assimilation or transport of pollutants be considered a designated use.

"Discharge" means to cause or allow the addition or release of any pollutants to the waters of the State or placement of any pollutant where it is likely to enter the waters of the State and includes but is not limited to surface water runoff, spilling, depositing, placing, leaking, pumping, pouring, emitting, emptying, or dumping. This definition includes additions of pollutants into waters of the State from both point and nonpoint sources. This term does not include an addition of pollutants by an indirect discharge.

"Discharger" means any person who causes, or allows, any discharge.

"Dredging" means the excavation of sediments from beneath surface waters by mechanical or hydraulic means.

"Effluent limitations" means any restriction imposed by the Director on quantities, discharge rates and concentrations of pollutants which are discharged from point sources into surface waters of the state or the contiguous zone.

"Effluent limitation guidelines" means a regulation published by the Administrator under Section 304(b) of the Clean Water Act to adopt or revise effluent limitations.

"Effluent limited waters" means any segment of a surface waterbody where the water quality currently meets or is expected to meet applicable water quality standards after the application of the technology-based effluent limitations required by Sections 301(b) and 306 of the Act.

"EPA" means the United States Environmental Protection Agency.

"Existing use" means those designated uses and any other uses that do not impair the designated uses and that are actually attained in a waterbody on or after November 28, 1975; except that in no case shall assimilation or transport of pollutants be considered an existing use.

"Facility" means any building, structure and operation, including land or appurtenances thereto, on one contiguous site.

"Filling" means to place dirt, soil, stones, gravel, sand, sediment, tree stumps, brush, leaves, solid waste, debris, garbage, trash, pollutants, or any other material, substance, or structure, either foreign or related, on or in any waters of the state or in such a way as to alter the natural character, function or value of any waters of the state.

"Fish and Wildlife" means birds, fish, shellfish, mammals and all other classes of wild aquatic and land organisms and all types of vegetation upon which they are dependent, including all indigenous species.

"Flow Alteration" means the withdrawal of water from a surface water, either directly or indirectly, or the alteration of the normal flow patterns of a surface water due to a project which diverts or holds the surface water.

"Freshwater" means those waters of the State in which the natural level of salinity is equal to or less than one (1) part per thousand, 95 percent or more of the time.

"Groundwater" means water found underground which completely fills the open spaces between particles of soil and within rock formations.

"Habitat" means the area which provides direct support for a given species, population or community. It includes all environmental features that comprise an area such as air, water, vegetation, soil, substrate and hydrologic characteristics.

"Hazardous substance" means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

"Hazardous waste" means any waste as defined in accordance with Section 23-19.1-4 of the General Laws of Rhode Island of 1956, as amended, and regulations adopted pursuant thereto.

"High quality waters" include all Class A and SA surface waters as well as other surface waters whose quality exceeds the minimum water quality criteria for any State aquatic life and/or human health criteria or water quality standards assigned to them; or whose quality and characteristics make them critical to the propagation or survival of important living natural resources; or those waters constituting a Special Resource Protection Water or an Outstanding National Resource Water.

"Indirect discharge" means any discharge into a treatment works.

"Kettlehole" means a pond or freshwater wetland in a depression in the earth's surface formed by the melting of a wholly or partially buried block of glacial ice.

"Lake, pond or reservoir" means any body of water, whether naturally occurring or created in whole or in part, excluding sedimentation control or stormwater retention/detention basins, unless constructed in waters of the State.

"Load allocation" means the portion of a receiving water's loading capacity that is attributed either to one of its nonpoint sources of pollution or to natural background sources.

"Loading Capacity" means the maximum amount of loading that a surface water can receive without violating water quality standards.

"Low quality waters" or "degraded" means any water whose quality falls below any of the criteria of rule 8.D. in accordance with Applicable Conditions of rule 8.E. and corresponding to its classification as designated in rule 8.C., as determined by the Director, shall be considered degraded for that particular criterion and in violation of its water quality standards and, therefore, unsatisfactory for any designated uses which the Director determines are affected by the particular criterion which is violated. Waters in their natural hydraulic condition may fail to meet their assigned water quality criteria from time to time due to natural causes, without necessitating the modification of assigned water quality standard. Such waters will not be considered to be violating their water quality standards if violations of criteria are due solely to naturally occurring conditions unrelated to human activities.

"Marina" means:

a) a dock, pier, mooring, wharf, float or combination of such facilities that may accommodate five (5) or more recreational vessels as a commercial operation or in association with a club; or

b) any dock, pier, mooring, wharf, float or combination of such facilities used as a commercial operation, aside from a) above, at which any vessel is serviced or maintained.

"Marine Sanitation Device (MSD)-Type I" means a marine toilet which, under prescribed test conditions, will produce an effluent that will not exceed a fecal coliform bacteria count of one thousand (1,000) parts per hundred (100) milliliters, and have no visible solids.

"Marine Sanitation Device (MSD)-Type II" means a marine toilet which, under prescribed test conditions, will produce an effluent that will not exceed a fecal coliform bacteria count of two hundred (200) parts per hundred (100) milliliters, and have suspended solids not greater than one hundred and fifty (150) milligrams per liter.

"Marine Sanitation Device (MSD)-Type III" means a marine toilet which is designed to prevent the discharge from the vessel of any treated or untreated sewage, or any waste derived from sewage.

"Marine toilet" means any toilet or receptacle for the containment of human wastes located on or within any vessel, as defined herein, not including a portable potty.

"Mixing Zone" means a limited area or volume in the immediate vicinity of a discharge where mixing occurs and the receiving surface water quality is not required to meet applicable standards or criteria, provided the minimum conditions described in rule 8.D.1.e and 8.D.1.f. of these regulations are attained.

"Municipality" means a quasi-governmental corporation, association or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes; a city, town, county, district, or a designated and approved management agency under Section 208 of the Clean Water Act.

"Natural background conditions" means all prevailing dynamic environmental conditions in a waterbody or segment thereof, other than those human-made or human-induced.

"New discharge" means any discharge which commenced subsequent to November 28, 1975, unless appropriate approvals had been granted.

"No Discharge Area/Zone" means an area of the surface waters of the state which has been requested by the Director of the Department of Environmental Management and declared by the United States Environmental Protection Agency, pursuant to Section 312 of the Clean Water Act, to be an area in which any discharge of sewage from vessels is prohibited.

"Non-contact cooling water" means water which is used to reduce temperature and does not come into direct contact with any raw material, intermediate product (other than heat), or finished product.

"Nonpoint Source" or "NPS" means any discharge of pollutants that does not meet the definition of Point Source in section 502.(14). of the Clean Water Act and these regulations. Such sources are diffuse, and often associated with land-use practices, and carry pollutants to the waters of the State, including but not limited to, non-channelized land runoff, drainage, or snowmelt; atmospheric deposition; precipitation; and seepage.

"Nutrient" means a chemical element or compound such as but not limited to nitrogen or phosphorous which is essential to and promotes the growth and development of marine or freshwater plant species.

"Outstanding National Resource Waters (ONRW)" means waters of National and State Parks, Wildlife Refuges, and other such waters designated as having special recreational or ecological value.

"Person" shall include an individual, trust, firm, joint stock company, corporation (including a quasi-governmental corporation), partnership, association, syndicate, municipality, municipal or state agency, fire district, club, non-profit agency or any subdivision, commission, department, bureau, agency or department of state or federal government (including any quasi-governmental corporation) or of any interstate body.

"Point source" means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation or vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

"Pollutant" means any dredged material, solid waste, incinerator residue, sewage, garbage, sewage sludge, sediment, filter backwash, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, industrial or municipal or agricultural waste or effluent, petroleum or petroleum products, including but not limited to oil; or any material which will likely alter the physical, chemical, biological or radiological characteristics and/or integrity of water.

"Pollution" means the human-made or human-induced alteration of the physical, chemical, biological or radiological characteristics and/or integrity of water.

"Pretreatment requirements" means any limitation or prohibition on quantities, quality, rates, and/or concentrations of pollutants directly or indirectly discharged into or otherwise introduced into a treatment works that are imposed by federal or state regulation or by the treatment works.

"Primary Contact Recreational Activities" means any recreational activities in which there is prolonged and intimate contact by the human body with the water, involving considerable risk of ingesting water, such as swimming, diving, water skiing and surfing.

"Priority pollutant" means those pollutants listed pursuant to Section 307(a)(1) of the Clean Water Act (see Appendix B).

"Public Drinking Water Supplier" means any city, town, district, or other municipal, public, private corporation or company, or non-profit entity authorized to engage in the collection and treatment of surface water for the purposes of distribution of drinking water in Rhode Island and whose source of drinking water is a surface water in Rhode Island.

"Public Drinking Water Supply" means the source of surface water for a public drinking water supplier.

"Pycnocline" means a steep density gradient in an estuary caused by differences in temperature or salinity between the bottom and surface layers of water that limits mixing of the two layers.

"Rhode Island Pollutant Discharge Elimination System (RIPDES)" means the Rhode Island system for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing point source discharge permits and imposing and enforcing pretreatment requirements pursuant to Title 46, Chapter 12 of the General Laws of Rhode and the federal Clean Water Act.

"RIPDES Regulations" means the Rhode Island Pollutant Discharge Elimination System Regulations promulgated by the Department and any amendments thereto.

"Runoff" means water that drains from an area as surface flow.

"Sanitary sewer" shall mean a sewer which conveys sewage.

"Seawater (Saltwater)" means those waters of the State in which the natural level of salinity is equal to or greater than ten (10) parts per thousand, 95 percent or more of the time.

"Secondary Contact Recreational Activities" means any recreational activities in which there is minimal contact by the human body with the water, and the probability of ingestion of the water is minimal, such as boating and fishing.

"Sewage or wastewater" means human waste, or wastes from toilets and other receptacles intended to receive or retain body waste, and any wastes, including wastes from households, commercial establishments, and industries.

"Sewage from vessels" means human body wastes and the wastes from toilets and other receptacles intended to receive or retain body wastes that are discharged from vessels, and regulated under Section 312 of the Clean Water Act or under Rhode Island law.

"Sewage sludge or sludge" means residue, partially solid, or solid, treated or untreated, resulting from the treatment of sewage, including such residues from the cleaning of sewers, by processes such as settling, flotation, filtration and centrifugation, and does not meet the criteria for a hazardous waste.

"Sewer" means a pipe or conduit that conveys wastewater or stormwater.

"Site" means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

"Special Resource Protection Waters (SRPW)" means surface waters identified by the Director as having significant recreational or ecological uses, and may include but are not limited to: wildlife refuge or management areas; public drinking water supplies; State and Federal parks; State and Federal designated Estuarine Sanctuary Areas; waterbodies containing critical habitats, including but not limited to waterbodies identified by the RIDEM Natural Heritage Program as critical habitat for rare or endangered species; wetland types or specific wetlands listed as rare, threatened, endangered, of special interest or of special concern by the Rhode Island Natural Heritage Program; waterbodies identified by the U. S. Department of the Interior on the Final List of Rivers for potential inclusion in the National Wild and Scenic Rivers System.

"State Guide Plan" shall mean goals, policies, or plan elements for the physical, economic, and social development of the state, adopted by the State Planning Council in accordance with §42-11-10 of the General Laws of Rhode Island, 1956, as amended.

"Storm sewer" means a sewer which conveys stormwater.

"Stormwater" means precipitation induced runoff.

"Surface water" means any waters of the state that are not groundwaters.

"Total Maximum Daily Load" or "TMDL" means the amount of a pollutant that may be discharged into a waterbody and still maintain water quality standards. The TMDL is the sum of the individual wasteload allocations for point sources and the load allocations for nonpoint sources and natural background taking into account a margin of safety.

"Toxicity" means the chemical, biological or biochemical adverse effect(s) of a pollutant or combination of pollutants on organisms.

"Toxic Pollutant" means any pollutant that has the potential to cause toxicity.

"Treatment works" means any devices and systems for the storage, treatment, recycling, and reclamation of wastewater; any devices and systems for the storage, treatment, recycling and reclamation of sewage from vessels used to implement section 201 of the Act; or any devices and systems necessary to recycle or reuse water at the most economical cost over the design life of the works. These include intercepting sewers, outfall sewers, sewage collection systems, pumping, power, and other equipment, and their appurtenances, extensions, improvements, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities; and any works, including acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment (including land for composting sludge, temporary storage of such compost and land used for the storage of treated wastewater in land treatment systems prior to land application); or any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of wastewater, including wastewater in combined sewers.

"Undesirable or Nuisance Species" means any plant or animal aquatic species which becomes so numerous due to pollutants or physical or hydrological modifications that it interferes with, or indicates an impairment of, the designated use(s) of a waterbody.

"Use Attainability Analyses" means a structured scientific assessment of the factors affecting the attainment of a use which may include physical, chemical, biological, and economic factors. The physical, chemical and biological factors affecting the attainment of a use shall be evaluated through a waterbody survey and assessment. Waterbody surveys and assessments shall be sufficiently detailed to evaluate at a minimum:

a. current aquatic uses achieved in the waterbody;

b. causes of any impairment of the aquatic uses and why the impairment cannot be rectified; and

c. aquatic uses(s) that can be attained based on the physical, chemical, and biological characteristics of the water body.

"Vessel" means any boat or other watercraft whether moved by oars, paddles, sails or other power mechanism, inboard or outboard, or any other boat or structure floating upon the water whether or not capable of self-locomotion, including house boats, floating businesses, barges and similar floating objects.

"Wasteload allocation" means the portion of a receiving water's loading capacity that is allocated to one of its point sources of pollution.

"Wastewater" refer to definition of sewage.

"Waterbody segment" means a defined section or described area which is part of a larger surface waterbody of the state.

"Water quality criteria" means elements of the State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use.

"Water quality limited waters" means any segment of a surface waterbody where the water quality does not meet applicable water quality standards, and is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by Sections 301(b) and 306 of the Act.

"Water quality standard" means provisions of State or Federal law which consist of a designated use(s) and water quality criteria for the waters of the State. Water Quality Standards also consist of an antidegradation policy.

"Waters of the State" or "The Waters" means all surface water and groundwater of the State of Rhode Island, including all tidewaters, territorial seas, wetlands, and land masses partially or wholly submerged in water; and both inter- and intra-state bodies of water which are, have been or will be used in commerce, by industry, for the harvesting of fish and shellfish or for recreational purposes.

"Wetlands" means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Freshwater wetlands are determined by the Department in accordance with the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act, as amended. Coastal wetlands are determined by rules and regulations under the jurisdiction of the Coastal Resources Management Council.

Rule 8. - SURFACE WATER QUALITY STANDARDS

A. Purpose. A water quality standard defines the water quality goals of a surface waterbody, or portion thereof, by designating the use or uses of the water and by setting criteria necessary to protect the uses. Water quality standards are intended to protect public health, safety and welfare, enhance the quality of water and serve the purposes of the Clean Water Act and Chapter 46-12 of the General Laws of Rhode Island. "Serve the purposes of the Act" (as defined in Section 101(a)(2) and 303(c) of the Clean Water) means that water quality standards should, whenever attainable, provide water quality, including quantity, for the protection and propagation of fish and wildlife and for recreation in and on the water and take into consideration their use and value as public water supplies, propagation of fish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation.

Such standards serve the dual purposes of establishing the water quality goals for a specific surface water body or waterbody segment and serve as the regulatory basis for the establishment of water-quality-based-treatment controls and strategies beyond the technology-based levels of treatment required by Sections 301(b) and 306 of the Clean Water Act.

B. Water Use Classification - The surface waters of the state shall be assigned to one of the classes listed below. Each class is defined by the designated uses, which are the most sensitive and therefore governing water uses which it is intended to protect. Surface waters may be suitable for other beneficial uses, but shall be regulated to protect and enhance the designated uses. In no case shall waste assimilation or waste transport be considered a designated use.

(1). Freshwater:

(a). Class AA[@] - These waters are designated as a source of public drinking water supply (PDWS) or as tributary waters within a public drinking water supply watershed (the terminal reservoir of the PDWS are identified in Appendix A), for primary and secondary contact recreational activities and for fish and wildlife habitat. These waters shall have excellent aesthetic value.

(b). Class A - These waters are designated for primary and secondary contact recreational activities and for fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have excellent aesthetic value.

(c). Class B[*] - These waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.

(d). Class B1[*] - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class B criteria must be met.

(e). Class C - These waters are designated for secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These water shall have good aesthetic value.

[@] Class AA waters used for public drinking water supply may be subject to restricted recreational use by State and local authorities.

[*] Certain Class B and B1 waterbody segments may have partial use designations assigned to them as noted in rule 8.B.(3) below.

(2). Seawater:

(a). Class SA[*@] - These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation and industrial cooling. These waters shall have good aesthetic value.

(b). Class SB* - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

(c). Class SB1 * - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met.

(d). Class SC - These waters are designated for secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

* Certain Class SA, SB and SB1 waterbody segments may have partial use designations assigned to them as noted in rules 8.B(3) below.

@ Some Class SA waters contain Closed Safety Zones which are waters in the vicinity of an approved sanitary discharge which may be impacted in the event of complete failure of treatment and are therefore, currently prohibited to shellfishing. Although shellfishing use is restricted, all SA criteria must be met.

(3). Partial Uses - In accordance with rule 19 of these regulations, the Department may designate a partial use for the above listed water use classifications. Partial use denotes specific restrictions of use assigned to a waterbody or waterbody segment that may affect the application of criteria. For example, a partial use designation may be appropriate where waters are impacted by activities such as combined sewer overflows and concentrations of vessels. Additional partial uses may be so designated by the Director if provided in accordance with rule 19.

(a). CSO - These waters will likely be impacted by combined sewer overflows in accordance with approved CSO Facilities Plans and in compliance with rule 19.E.1 of these regulations and the Rhode Island CSO Policy. Therefore, primary contact recreational activities; shellfishing uses; and fish and wildlife habitat will likely be restricted.

(b). Concentration of Vessels - These waters are in the vicinity of marinas and/or mooring fields and therefore seasonal shellfishing closures will likely be required as listed in the most recent (revised annually) RIDEM document entitled Shellfish Closure Areas~~.~~ , however, all Class SA criteria must be attained.

Please note that partial use designations are represented by the lower case letters, "a" or "b", which appear in brackets {} next to the classification as found in Appendix A.

C. Water Quality Classifications - All surface waters of the State have been categorized according to the water use classification of rules 8.B.(1), (2), and (3) based on considerations of public health, safety and welfare, recreation, propagation and protection of fish and wildlife, and economic and social benefit. The surface waters of the State are classified according to the list of water segments in Appendix A. For waterbodies not listed in Appendix A, the following apply:

(1). All streams tributary to Class A waters shall be Class A.

(2) All waters tributary to Class AA waters shall be Class AA.

(3). All freshwaters hydrologically connected by surface waters and upstream of Class B, B1, SB, SB1, C or SC waters shall be Class B unless otherwise identified in Appendix A of these regulations.

(4). All other fresh waters, including, but not limited to, ponds, kettleholes and wetlands not listed in Appendix A shall be considered to be Class A.

(5). All seawaters not listed in Appendix A shall be considered to be Class SA. All saltwater and brackish wetlands contiguous to seawaters not listed in Appendix A shall be considered to be Class SA.

(6). All saltwater and brackish wetlands contiguous to seawaters listed in Appendix A shall be considered the same class as their associated seawaters.

D. Water Quality Criteria - The following physical, chemical and biological criteria are parameters of minimum water quality necessary to support the surface water use classifications of rule 8.B. and shall be applicable to all waters of the State.

(1). General Criteria - The following minimum criteria are applicable to all waters of the State, unless criteria specified for individual classes are more stringent:

(a). At a minimum, all waters shall be free of pollutants in concentrations or combinations or from anthropogenic activities subject to these regulations that:

i. Adversely affect the composition of fish and wildlife;

ii. Adversely affect the physical, chemical, or biological integrity of the habitat;

iii. Interfere with the propagation of fish and wildlife;

iv. Adversely alter the life cycle functions, uses, processes and activities of fish and wildlife; or

v. Adversely affect human health.

(b). Aesthetics - all waters shall be free from pollutants in concentrations or combinations that:

i. Settle to form deposits that are unsightly, putrescent, or odorous to such a degree as to create a nuisance, or interfere with the existing or designated uses;

ii. Float as debris, oil, grease, scum or other floating material attributable to wastes in amounts to such a degree as to create a nuisance or interfere with the existing or designated uses;

iii. Produce odor or taste or change the color or physical, chemical or biological conditions to such a degree as to create a nuisance or interfere with the existing or designated uses; or,

iv. Result in the dominance of species of fish and wildlife to such a degree as to create a nuisance or interfere with the existing or designated uses.

(c). Radioactive substances - The level of radioactive materials in all waters shall not be in concentrations or combinations which will likely be harmful to humans, fish and wildlife, or result in concentrations in organisms producing undesirable conditions.

(d). Nutrients - Nutrients shall not exceed the limitations specified in rule 8.D.(2) and 8.D.(3) and/or more stringent site-specific limits necessary to prevent or minimize accelerated or cultural eutrophication.

(e). Thermal Mixing Zones - In the case of thermal discharges into tidal rivers, fresh water streams or estuaries, where thermal mixing zones are allowed by the Director, the mixing zone will be limited to no more than one quarter (1/4) of the cross sectional area and/or volume of river flow, stream or estuary, leaving at least three quarters (3/4) free as a zone of passage. In wide estuaries and oceans, the limits of mixing zones will be established by the Director.

(f). Non-thermal Mixing Zones - In the case of non-thermal discharges, in applying these standards the Director may recognize, where appropriate, a limited acute and/or chronic mixing zone(s) on a case-by-case basis. The locations, size and shape of these zones shall provide for the maximum protection of fish and wildlife.

(g). At a minimum, all mixing zones must:

i. Meet the criteria for aesthetics, in accordance with rule 8.D.(1).b;

ii. Be limited to an area or volume that will prevent interference with the existing and designated uses in the associated waterbody segment and beyond;

iii. Allow an appropriate zone of passage for migrating fish and other organisms, prohibit lethality to organisms passing through the mixing zone, and protect for spawning and nursery habitat; and

iv. Not allow substances to accumulate in sediments, fish and wildlife or food chains such that known or predicted safe exposure levels for the health of humans or fish and wildlife will be exceeded.

(h). For activities that will likely cause or contribute to flow alterations, streamflow conditions must be adequate to support existing and designated uses.

(2). Class-specific Criteria for Freshwaters - see Table 1

(3). Class-specific Criteria for Seawaters - see Tables 2 and 3

E. Applicable Conditions - The water quality standards apply under the most adverse conditions, as determined by the Director according to sound engineering and scientific practices on a case-by-case basis unless defined below.

(1). The ambient water quality criteria are applicable at or in excess of the following flow conditions:

(a). Aquatic Life Criteria - The acute and chronic aquatic life criteria for freshwaters shall not be exceeded at or above the lowest average 7 consecutive day low flow with an average recurrence frequency of once in 10 years (7Q10). The acute and chronic aquatic life criteria for seawater shall not be exceeded beyond the boundary of the mixing zone(s), as defined and determined by rules 8.D.(1).e, f and g of these regulations, and thence throughout the waterbody. If a mixing zone has not been established, these criteria shall not be exceeded in any portion of the receiving water.

(b). Human Health Criteria - The freshwater human health criteria for non-carcinogens and carcinogens are applicable at or in excess of the harmonic mean flow, which is a long-term mean flow value calculated by dividing the number of daily flows analyzed by the sum of the reciprocals of those daily flows. For seawaters, the ambient human health water quality criteria for carcinogens and non-carcinogens are applicable when the most adverse hydrographic and pollution conditions occur at the particular point of evaluation.

F. Federal Approval and Periodic Review - These water quality standards are subject to approval by the administrator pursuant to section 303(c) of the Clean Water Act. In accordance with paragraph 303(c)(1) of the Act, the Water Quality Standards shall be reviewed periodically but at least once every three years, and amended as necessary.

G. Symbolic Representative of Water Quality Standards - The Director shall issue maps from time to time which indicate assigned water use classification.

TABLE 1. 8.D.(2). Class-Specific Criteria - **Fresh Waters**

CRITERION	CLASS AA[1]	CLASS A	CLASS B, B1, B{a}, B1{a}	CLASS C
1. Dissolved Oxygen	Cold Water Fish Habitat - Dissolved oxygen content of not less than 75% saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/l, except as naturally occurs. For the period from October 1st to May 14th, where in areas identified by the RI Division of Fish and Wildlife as cold water fish spawning areas the following criteria apply: For species whose early life stages are not directly exposed to the water column (ie, early life stages are intergravel), the 7 day mean water column dissolved oxygen concentration shall not be less than 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall not be less than 8 mg/l. For species that have early life stages exposed directly to the water column, the 7 day mean water column dissolved oxygen concentration shall not be less than 6.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall not be less than 5.0 mg/l. Warm Water Fish Habitat - Dissolved oxygen content of not less than 60% saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5.0 mg/l, except as naturally occurs. The 7 day mean water column dissolved oxygen concentration shall not be less than 6 mg/l.			
2. Sludge deposits, solid refuse, floating solids, oil, grease, scum	None allowable.			None in such amounts that would impair any usages specifically assigned to this class.
3. Color and turbidity.	None in such concentrations that would impair any usages specifically assigned to this class. Turbidity not to exceed 5 NTU over background.		None in such concentrations that would impair any usages specifically assigned to this class. Turbidity not to exceed 10 NTU over natural background.	
4. Fecal Coliform Bacteria (MPN/100ml)	**Drinking Water Supply Criteria:** - applied at the terminal reservoir of the system - Not to exceed a geometric mean value of 20 MPN/100 ml and not more than 10% of the samples shall exceed a value of 200.			None in such concentrations that would impair any usages specifically assigned to this class.
	Primary Contact Recreational/Swimming Criteria- Not to exceed a geometric mean value of 200 MPN/100 ml and not more than 10% of the total samples taken shall exceed 400 MPN/100 ml, applied only when adequate enterococci data are not available.			
5. Enterococci	**Primary Contact Recreational/Swimming Criteria** Non-Designated Bathing Beach Waters Geometric Mean Density: 54 colonies/100 ml Designated Bathing Beach Waters Geometric Mean Density: 33 colonies/100 ml Single Sample Maximum*: 61 colonies/100 ml * Criteria for determining beach swimming advisories at designated beaches as evaluated by Health.			None in such concentrations that would impair any usages specifically assigned to this class.
6. Taste and odor	None other than of natural origin and none associated with nuisance algal species.		None in such concentrations that would impair any usages specifically assigned to this class nor cause taste or odor in edible portions of fish.	
7. pH (Standard Units)	6.5 - 9.0 or as naturally occurs.			

TABLE 1. 8.D.(2). Class-Specific Criteria - **Fresh Waters**, cont.

CRITERION	CLASS AA*	CLASS A	CLASS B, B1, B{a}, B1{a}	CLASS C
8. Temperature/ Temperature increase	No activity shall raise the temperature of the receiving waters above the recommended limit on the most sensitive receiving water use nor cause the growth of undesirable or nuisance species of biota. In no cases shall an activity cause the temperature to exceed 83 degrees F. Heated discharges into designated coldwater habitats shall not raise the temperature above 68 degrees F outside an established thermal mixing zone. In no case shall the temperature of the receiving water be raised more than 4 degrees F.			
9. Chemical constituents	a. None in concentrations or combinations that could be harmful to humans or fish and wildlife for the most sensitive and governing water class use, or unfavorably alter the biota, or which would make the waters unsafe or unsuitable for fish and wildlife or their propagation, impair the palatability of same, or impair waters for any other existing or designated use. None in such concentrations that would exceed the Water Quality Criteria and Guidelines as found in Appendix B. b. The ambient concentration of a pollutant in a water body shall not exceed the Ambient Water Quality Criteria and Guidelines, (Appendix B) for the protection of aquatic organisms from acute or chronic effects, unless the criteria or guidelines are modified by the Director based on results of bioassay tests conducted in accordance with the terms and conditions provided in the RIDEM Site Specific Aquatic Life Water Quality Criteria Development Policy.			
10. Nutrients	a. Average Total Phosphorus shall not exceed 0.025 mg/l in any lake, pond, kettlehole or reservoir, and average Total P in tributaries at the point where they enter such bodies of water shall not cause exceedance of this phosphorus criteria, except as naturally occurs, unless the Director determines, on a site-specific basis, that a different value for phosphorus is necessary to prevent cultural eutrophication. b. None in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication, nor cause exceedance of the criterion of 10(a) above in a downstream lake, pond, or reservoir. New discharges of wastes containing phosphates will not be permitted into or immediately upstream of lakes or ponds. Phosphates shall be removed from existing discharges to the extent that such removal is or may become technically and reasonably feasible.			

[1] Class AA waters used for public drinking water supply may be subject to restricted recreational use by State and local authorities.

TABLE 2. 8.D.(3). Class-Specific Criteria - **Sea Waters**

CRITERION	CLASS SA, SA{b}	CLASS SB, SB1, SB{a}, SB1{a}	CLASS SC
1. Dissolved Oxygen	See Table 3		
2. Sludge deposits, solid refuse, floating solids, oil, grease, scum	None allowable.		None in such amounts that would impair any usages specifically assigned to this class.
3. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this class. Turbidity not to exceed 5 NTU over background.	None in such concentrations that would impair any usages specifically assigned to this class. Turbidity not to exceed 10 NTU over background.	
4. Fecal Coliform Bacteria (MPN/100ml)	**Shellfishing Criteria: -** Not to exceed a geometric mean MPN value of 14 and not more than 10% of the samples shall exceed an MPN value of 49 for a three-tube decimal dilution.		None in such concentrations that would impair any usages specifically assigned to this class.
	Primary Contact Recreational/Swimming Criteria - Not to exceed a geometric mean value of 50 MPN/100 ml and not more than 10% of the total samples taken shall exceed 400 MPN/100 ml, applied only when adequate enterococci data are not available.		
5. Enterococci	**Primary Contact Recreational/Swimming Criteria** Geometric Mean Density: 35 colonies/100 ml Single Sample Maximum*****: 104/100 ml ***** Criteria for determining beach swimming advisories at designated beaches as evaluated by HEALTH.		None in such concentrations that would impair any usages specifically assigned to this class.
6. Taste and odor	None allowable except as naturally occurs.	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste or odor in edible portions of fish or shellfish.	
7. pH (Standard Units)	6.5 - 8.5 but not more than 0.2 units outside of the normally occurring range.		
8. Temperature/ Temperature Increase	Activities shall not increase the temperature except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case shall an activity cause the temperature to exceed 83 degrees F nor raise the normal temperature more than 1.6 degrees F, 16 June through September and not more than 4 degrees F from October through 16 June. All measurements shall be made at the boundary of such mixing zones as is found to be reasonable by the Director.		
9. Chemical constituents	a. None in concentrations or combinations that could be harmful to humans or fish and wildlife for the most sensitive and governing water class use, or unfavorably alter the biota, or which would make the waters unsafe or unsuitable for fish and wildlife or their propagation, impair the palatability of same, or impair the waters for any other existing or designated use. None in such concentrations that would exceed the Water Quality Criteria and Guidelines as found in Appendix B. b. The ambient concentration of a pollutant in a water body shall not exceed the RI DEM Ambient Water Quality Criteria & Guidelines (Appendix B) for the protection of aquatic organisms from acute or chronic effects, unless the criteria or guideline is modified by the Director based on results of bioassay tests conducted in accordance with the terms and conditions provided in the RIDEM Site Specific Aquatic Life Water Quality Criteria Development Policy.		
10. Nutrients	None in such concentration that would impair any usages specifically assigned to said Class, or cause undesirable or nuisance aquatic species associated with cultural eutrophication. Shall not exceed site-specific limits if deemed necessary by the Director to prevent or minimize accelerated or cultural eutrophication. Total phosphorus, nitrates and ammonia may be assigned site-specific permit limits based on reasonable Best Available Technologies. Where waters have low tidal flushing rates, applicable treatment to prevent or minimize accelerated or cultural eutrophication may be required for regulated nonpoint source activities.		

Table 3
Saltwater Dissolved Oxygen Criteria

I. For **surface waters above a seasonal pycnocline**, not less than an instantaneous value of 4.8 mg/l more than once every three years, except as naturally occurs.

II. For waters **below the seasonal pycnocline**, Aquatic Life Uses are considered to be protected if conditions do not fail to meet protective thresholds, as described below, more than once every three years. DO criteria presented here shall be protective of the most sensitive life stage – survival effects on larvae which affects larval recruitment – for both persistent and cyclic conditions. This criteria evaluates effects of exposure to low DO over time on larval recruitment. Because larval recruitment occurs over the whole season, the low DO exposure effects are cumulative. Exposures are evaluated on a daily basis to determine the total seasonal exposure. The criteria to protect larval survival is established to limit the number of exposure days over the range of low DO conditions such that the cumulative percentage of larvae affected shall not exceed a 5% reduction in larval recruitment over the season. If the Director determines that a smaller percent impairment on larval recruitment is necessary on a site specific basis, a criteria modification will be processed in accordance with Rule 19.F. Protection of larval survival will also afford adequate protection of juvenile and adult life stages. The critical recruitment season for evaluation of DO exposure is defined as May 1 through October 31. While recruitment may occur at other periods of the year, this timeframe reflects periods when hypoxia are most prevalent.

Waters with a DO concentration above an instantaneous value of 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be:

1. Less than 2.9 mg/l for more than 24 consecutive hours during the recruitment season; nor
2. Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor
3. Shall they exceed the cumulative DO exposure presented in Table 3.A.

The method for calculating cumulative low DO exposure throughout the recruitment season is as follows:

A. For **persistent low DO conditions** (low DO conditions that vary little within a day, e.g., <0.5 mg/l), the limit represents allowable DO conditions below 4.8 mg/l provided the exposure duration (number of days observed) does not exceed the corresponding allowable number of days (as presented in Table 3.A.) that ensure adequate larval recruitment over the course of the season. The cumulative seasonal low DO effects are evaluated by totaling the fractions of the observed (or projected) exposure duration (in days) divided by the allowable number of days for each DO concentration. The sum of the decimal fractions shall not exceed 1.0. The minimum daily DO measurement is used to represent the daily DO value. The criteria for 24 hour DO concentration and allowable number of days as presented in Table 3.A. are calculated using the following equation:

$$\Sigma\ t_i(\text{actual})/t_i(\text{allowed}) < 1.0$$

$$DO_i = 13.0/(2.80 + 1.84e^{(-0.10t_i)}$$

Where DO_i = allowable concentration (mg/l)
t_i = exposure interval duration (days)
i = exposure interval

B. For **cyclic low DO conditions** (DO conditions that fluctuate broadly within a day, e.g.>0.5 mg/l) the limit represents the allowable number of days at a given daily larval percent mortality that protects against greater than 5% cumulative impairment of larval recruitment over a recruitment season. The maximum daily percent larval mortality is a function of DO minimum for any exposure interval/range (mg/l) and the duration of the interval (hours) and

is determined using the Time-to-death (TTD) curves presented in Figure 3.A. (from EPA-822-R-00-012, November 2000) The maximum daily percent larval mortality from cyclic exposures is determined from the observed data point falling closest to a TTD curve of greatest effect (ie., highest percent mortality). The calculated maximum daily percent larval mortality shall not exceed the allowable number of days as presented in Table 3.A and Figure 3.B. Cumulative cyclic low DO effects observed over the course of the season are evaluated by tallying the number of days at each percent mortality observed for the season. The observed number of days at each percent mortality are divided by the allowable number of days for each percent mortality. The sum of the decimal fraction shall not exceed 1.0.

Table 3.A.
Saltwater DO Criteria For Waters Below the Seasonal Pycnocline

24 Hour (Daily) DO Exposure Concentration (mg/L)	Daily Percent Larval Mortality (%)	Allowable Number of Days Without Exceeding a 5% Reduction in Seasonal Larval Recruitment
4.6	4.96	42
4.5	6.05	30
4.4	7.36	24
4.3	8.93	20
4.2	10.79	18
4.1	12.98	16
4	15.55	14
3.9	18.51	12
3.8	21.88	10
3.7	25.69	9
3.6	29.89	8
3.5	34.47	7
3.4	39.36	6
3.3	44.46	5
3.2	49.69	4
3.1	54.92	3
3	60.05	2
2.9	64.97	1

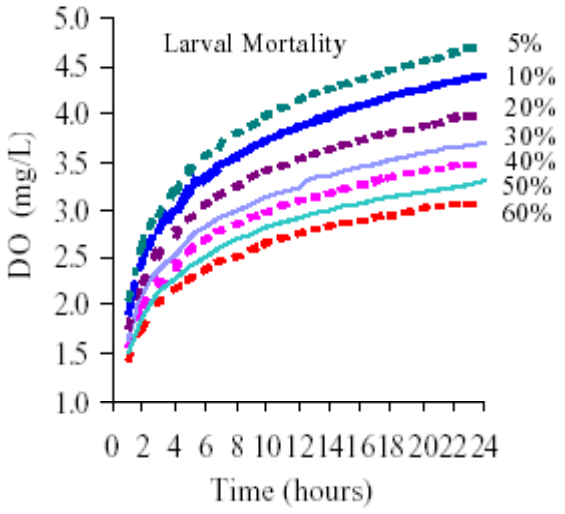

Figure 3.A. Time To Death (TTD) Curves for 5-60% Mortality

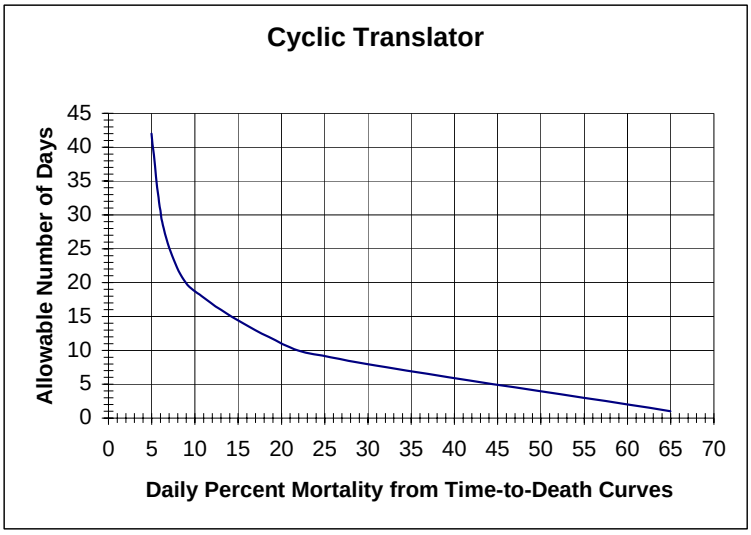

Figure 3.B. Cyclic Translator for Waters Below the Seasonal Pycnocline

For seasons with both cyclic and persistent cycles of low DO, all the data will be treated as cyclic exposure patterns with the persistent data set at the 24 hour/1-day exposure duration. Daily percent mortalities will be determined from Figure 3.A., and Table 3.A. will be used to determine the acceptable number of days the low DO pattern can occur over the course of the season.

III. For **waters without a seasonal pycnocline**, DO concentrations above 4.8 mg/l shall be considered protective of Aquatic Life Uses. When instantaneous DO values fall below 4.8 mg/l, the waters shall not be:

1. Less than 3.0 mg/l for more than 24 consecutive hours during the recruitment season; nor
2. Less than 1.4 mg/l for more than 1 hour more than twice during the recruitment season; nor
3. Shall they exceed the cumulative DO exposure presented in Table 3.A.

Cumulative low DO exposures in the 2.95 - 4.8 mg/l range shall be evaluated as described above in Section II but shall not exceed the information presented in Table 3.B.

For persistent low DO conditions in waters without a seasonal pycnocline, the criteria for 24 hour DO concentration and allowable number of days as presented in Table 3.B are calculated using the following equation:

$$DO_i = 17.523/3.3+2.01e^{(-0.091\ t_i)}$$

Where DO_i = allowable concentration (mg/l)
t_i = exposure interval duration (days)
i = exposure interval

For cyclic low DO conditions in waters without a seasonal pycnocline, the daily percent mortalities for observed data are determined from Figure 3.A. and shall not exceed the allowable number of days presented in Table 3.B and Figure 3.C.

Table 3.B.
Saltwater DO Criteria For Waters without a Seasonal Pycnocline

24 Hour (Daily) DO Exposure Concentration (mg/L)	Daily Percent Larval Mortality (%)	Allowable Number of Days Without Exceeding a 5% Reduction in Seasonal Larval Recruitment
4.6	4.96	16
4.5	6.05	14
4.4	7.36	12
4.3	8.93	11
4.2	10.79	10
4.1	12.98	8
4.0	15.55	7
3.9	18.51	6
3.8	21.88	5
3.7	25.69	4
3.6	29.89	3
3.5	34.47	2
3.4	39.36	1

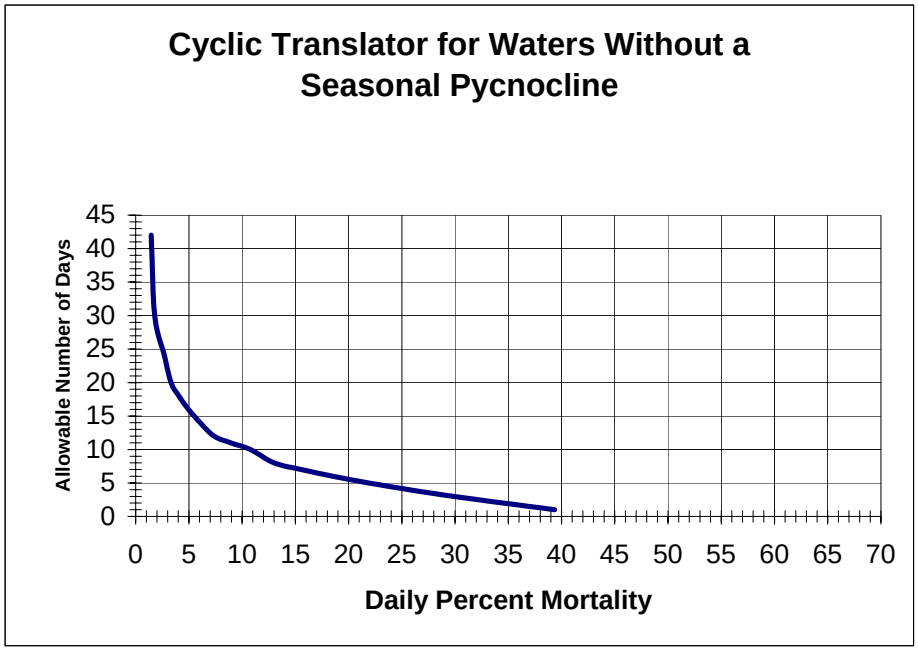

Figure 3.C. Cyclic Translator for Waters Without a Seasonal Pycnocline

For seasons with both cyclic and persistent cycles of low DO, all the data will be treated as cyclic exposure patterns with the persistent data set at the 24 hour/1-day exposure duration. Daily percent mortalities will be determined from Figure 3.A., and Table 3.B. will be used to determine the acceptable number of days the low DO pattern can occur over the course of the season.