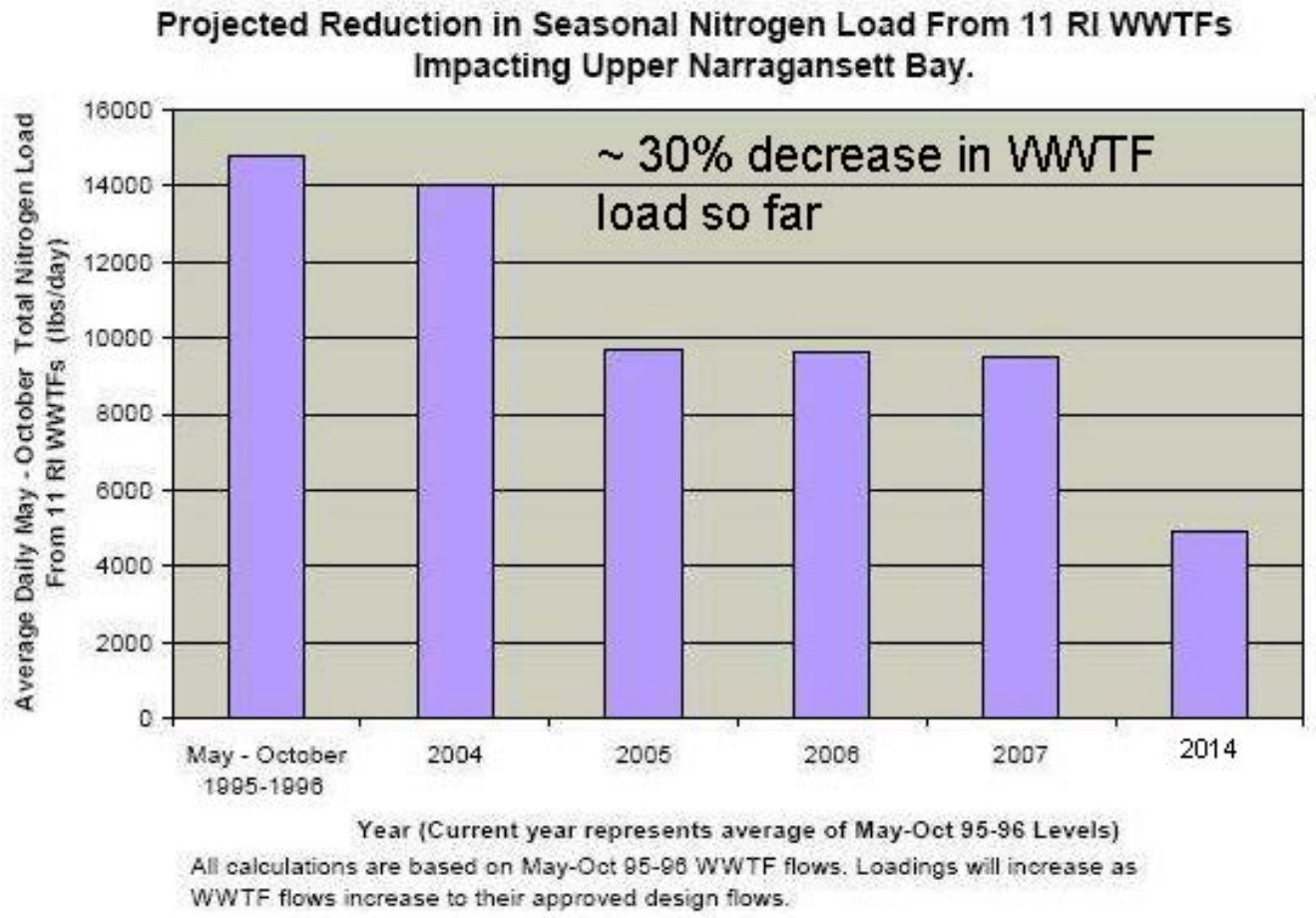
Projecting a decrease of 50% DIN from WWTF loads from new permit limits = ~ 35 % decrease Tot DIN to Bay

(BUT > 35% decrease for Upper Bay)



-Bad Decision? Controversy Rearing?

Is there potential to reach tot N level too low to sustain present shellfisheries & fisheries w/ the projected AWT load decreases?

Nixon, S. W., Graduate School of Oceanography, Univ. of Rhode Island, Narragansett, RI 02882

CHANGING PERSPECTIVES ON NUTRIENTS IN ESTUARIES

Eutrophication of the coastal marine environment first emerged as an issue of environmental concern in the northeast U.S. in the 1950's. Prior to that time, marine ecologists focused on the positive role of nutrients in stimulating primary and secondary production in the sea. Work in this region in the 1950's and 1960's showed that N rather than P was the nutrient most limiting to primary production in coastal waters. Studies of nitrogen in estuaries and lagoons increased rapidly during the past 40 years and a general perception has emerged that estuaries are "overenriched" with nitrogen, often leading to lower bottom water oxygen concentrations and, in some cases, to mass mortalities of animals. On a more subtle level, secondary production may be impacted by physiological stress and habitat loss due to low oxygen. This concern has led to regulatory pressure to denitrify sewage effluents, a major source of N in the urban estuaries of the northeast. But N reduction and consequent "oligotrophication" of estuaries may lead to food stress and reduced secondary production. Will clear waters show us empty nets? Narragansett Bay is a coming great experiment that should be used to learn about links between N reductions and ecosystem responses at all scales. Eutrophication of the Bay occurred over 50 years from 1880 to 1930 with virtually no documentation. Oligotrophication will be much faster, and fascinating to study. But we need to get started now.

Chapter 18
Impacts of Nutrients on Narragansett Bay Productivity: A Gradient Approach

Candace A. Oviatt

18.1 Introduction

Severe events in summer 2003, which included masses of rotting macroalgae and fish kills, aroused public concern and accelerated the ongoing plans by RIDEM to initiate nutrient reduction measures at Rhode Island sewage treatment facilities. Mesocosm studies have indicated that nitrogen limits primary production in the bay (Oviatt *et al.,* 1995). In 2004, denitrification processors were installed in one of the largest plants, and regulations to decrease nitrogen output to 5 mg L^{-1} (357 μM) in the effluent have been established in all Rhode Island facilities (RIDEM, 2004; A. Liberti, personal communication). RIDEM has also been working with regulators in Massachusetts to reduce nitrogen input from plants upstream of Narragansett Bay. While RIDEM

Candace A.Oviatt
University of Rhode Island, Graduate School of Oceanography, 11 Aquarium Road, Narragansett, RI 02882
coviatt@gso.uri.edu

A. Desbonnet, B. A. Costa-Pierce (eds.), *Science for Ecosystem-based Management.*

managers estimated the reduction in TN concentrations to about 50% that of 2004 levels, other authorities, including the Chair of the Nutrient Monitoring Committee of The Rhode Island Governor's Narragansett Bay and Watershed Planning Commission, suggested reduction on the order of 20% (Pryor, 2004). The aggressive regulations have stirred controversy in the scientific community with respect to how reduced nutrients might reduce the productivity of resource species in the bay, as well as excited hopes in conservation groups that eelgrass meadows might return to areas now long dominated by abundant macroalgae.