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Woods Hole Oceanographic Institution

New England Salt Pond Data Book

by

Anne E. Giblin

June 1990

Technical Report

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CRC-90-2
Coastal Research Center

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ABSTRACT

This volume contains information on New England salt ponds and lagoons. The first part contains abstracts of a symposium on salt ponds and lagoons held in conjunction with the New England Estuarine Research Society (NEERS) on April 21, 1988. These should provide both scientists and managers with an overview of recent research on salt ponds. the second part contains, maps, morphometric data, and references for individual salt ponds in Connecticut, Rhode Island, and Massachusetts. The third section is a comprehensive bibliography of papers and reports on salt ponds, including information on ponds located outside of New England. A listing of references organized according to topic areas is also provided.

PREFACE

On April 21, 1988 a Special Symposium on Salt Ponds and Lagoons was held in conjunction with the 1988 Spring meeting of the New England Estuarine Research Society (NEERS). The day long symposium was co-sponsored by the Ecosystems Center of the Marine Biological Laboratory and the Waquoit Bay National Estuarine Research Reserve. Participants in the symposium were asked to submit an abstract of their presentation and copies of relevant research papers.

The "New England Salt Pond Data Book" is an out growth of that symposium. The first section contains the abstracts which summarize the participants' recent research on salt ponds. These should provide both scientists and policy makers with an overview of some of the environmental problems salt ponds are experiencing. The second part contains maps, morphometric data, and references for individual salt ponds in New England. In many cases the maps are not current. Maps are provided to help design sampling programs, current charts should be consulted for navigation. Finally, the third section is a comprehensive bibliography of papers and reports on salt ponds and lagoons. Many of these papers are on file at the Waquoit Bay National Estuarine Research Reserve. The Reserve is currently undergoing renovations which will be completed by October 1990. Individuals wishing to use the library there should contact the Waquoit Bay Reserve Manager after September 30, 1990 (508-457-0495).

OTHER USEFUL BIBLIOGRAPHIES

Bucci, A. (ed) 1979. The Bay Bib: Rhode Island Marine Bibliography Revised Edition, Vol. I. Coordinated by C.Q. Dunn & L.Z. Hale. Coastal Resource Center, Notheast Regional Coastal Information Center, Marine Advisory Service, and National Sea Grant Depository. U. Rhode Island Marine Technical Report # 70.

Lewis, R.S. & C. Coffin 1985. Long Island Sound: A Biblography. State of Connecticut, Department of Environmental Protection, Natural Resources Center Marine Program. DEP Bulletin #8.

Scheltema, R.S. 1984. Development and Planktonic Larvae of common Benthic Invertebrates of the Woods Hole Massachusetts Region: Summary of existing data and bibliographic sources. Woods Hole Oceanographic Institution Technical Report WHOI-84-13; CRC-84-2.

Tripp, B.W. 1985. Buzzards Bay Bibliography: A Reference Collection of Scientific and Technical Reports Published on Buzzards Bay. Woods Hole Oceanographic Institution Technical Report WHOI-85-27. CRC-85-1.

Yentsch, A.E., M.R. Carriker, R.H. Parker, V.A. Zullo. 1966. Marine and Estuarine Environments, Organisms and Geology of the Cape Cod Region: an indexed bibliography 1665-1965. Systematics Ecology Program, Marine Biological Laboratory. Leyden Press.

EXTENDED ABSTRACTS AND PROGRAM

1988 SPECIAL SYMPOSIUM ON COASTAL PONDS AND LAGOONS

HELD APRIL 19, 1988 AS PART OF THE SPRING MEETING OF
THE NEW ENGLAND ESTUARINE RESEARCH SOCIETY

SPONSORED BY

THE ECOSYSTEM CENTER
MARINE BIOLOGICAL LABORATORY
WOODS HOLE, MASS

AND

THE WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE
WAQUOIT, MASS

SPECIAL SYMPOSIUM ON COASTAL PONDS & LAGOONS

21 APRIL, 1988

WOODS HOLE, MASSACHUSETTS

HOSTED BY

THE ECOSYSTEMS CENTER
MARINE BIOLOGICAL LABORATORY
WOODS HOLE, MASSACHUSETTS

AND

WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE

PROGRAM

Morning session chaired by Anne Giblin, The Ecosystems Center

0850	Welcome: John Hobbie, Director, The Ecosystems Center
0900	Lee, V., Coastal Resources Center, GSO, University of Rhode Island, Narragansett, RI. EUTROPHICATION, SCIENTIFIC RESEARCH AND MANAGEMENT INITIATIVES FOR RHODE ISLAND COASTAL LAGOONS.
0940	Caraco, N. F., Institute of Ecosystem Studies, Millbrook, NY. RELATIONSHIP BETWEEN PRODUCTION AND NUTRIENT LOADING IN A BRACKISH COASTAL POND, SIDERS POND, FALMOUTH, MASSACHUSETTS.
1000	Break
1020	Valiela, I. and J. Costa, Boston University Marine Program, Marine Biological Laboratory, Woods Hole, MA. N AND P INPUTS INTO BUTTERMILK BAY AND ITS WATERSHED.
1040	Gaines, A. G. Jr., Marine Policy Center, Woods Hole Oceanographic Institution, Woods Hole, MA. PERSPECTIVES ON SCIENCE AND MANAGEMENT IN SOUTHERN NEW ENGLAND ESTUARIES.
1100	Kerfoot, W. B., K-V Associates, Inc., Falmouth, MA. FIVE YEARS UNDER SAIL - EXPERIENCES WITH THE NUTRIENT BYLAWS.
1125	Buckland, K. J., Planning Board, Town of Falmouth, MA. SCIENTIFIC CERTAINTY VS. REGULATORY NEEDS: THE CASE OF NUTRIENT STANDARDS FOR COASTAL PONDS.
1145	Discussion
1200	Lunch

Afternoon session chaired by Ed Rastetter, The Ecosystems Center

1320	Spaulding, M. L., Ocean Engineering, University of Rhode Island, Kingston, RI 02881. TIDAL EXCHANGE BETWEEN BLOCK ISLAND SOUND AND NINIGRET POND.
1400	Fitzgerald, D. M., Department of Geology, Boston University, Boston, MA. FORMATION AND FATE OF COASTAL BAYS AND TIDAL INLETS IN NEW ENGLAND.
1420	Anderson, D. M., and B. A. Keafer, Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA. DINOFLAGELLATE SPECIES SUCCESSION IN A COASTAL POND: MECHANISMS AND DYNAMICS.
1500	Break
1520	Hickey, M., Division of Marine Fisheries, Sandwich, MA. COLIFORMS.
1540	Teal, J. M. and B. L. Howes, Woods Hole Oceanographic Institution, Woods Hole, MA. NITROGEN BUDGET OF A CRANBERRY BOG.
1600	Short, F. T., E. C. Brainard and J. Wolf, Jackson Estuarine Laboratory, University of New Hampshire, Durham, NH. EAST COAST EELGRASS POPULATIONS: LATITUDINAL TRENDS AND HEALTH ASSESSMENT.
1620	Costa, J. E., Boston University Marine Program, Marine Biological Laboratory, Woods Hole, MA. RECENT AND HISTORICAL CHANGES IN ABUNDANCE OF EELGRASS (Zostera marina L.) IN WAQUOIT BAY, MA.
1640	Deegan, L. A., S. Saucerman and D. Basler, Department of Forestry and Wildlife Management, University of Massachusetts, Amherst, MA. CHANGES IN THE WAQUOIT BAY FISH COMMUNITY OVER A TWENTY YEAR PERIOD.
1700	Adjourn

EUTROPHICATION, SCIENTIFIC RESEARCH AND MANAGEMENT INITIATIVES FOR RHODE ISLAND COASTAL LAGOONS.

V. Lee

Coastal Resources Center

GSO, University of Rhode Island

Narragansett, Rhode Island

Coastal lagoons, locally known as salt ponds, are an important feature along Rhode Island's ocean shore. They are highly productive systems supporting commercial and recreational fin and shellfisheries as well as intense recreational use. Their shoreline is the drawing card for an unprecedented rate of residential and commercial development within their watersheds. The water quality impacts of this development have been documented by a multidisciplinary University of Rhode Island research program and more recently by a volunteer citizen monitoring project. The results of the research have been incorporated into state and local government regulations designed to curtail excessive nutrient and bacteria loadings.

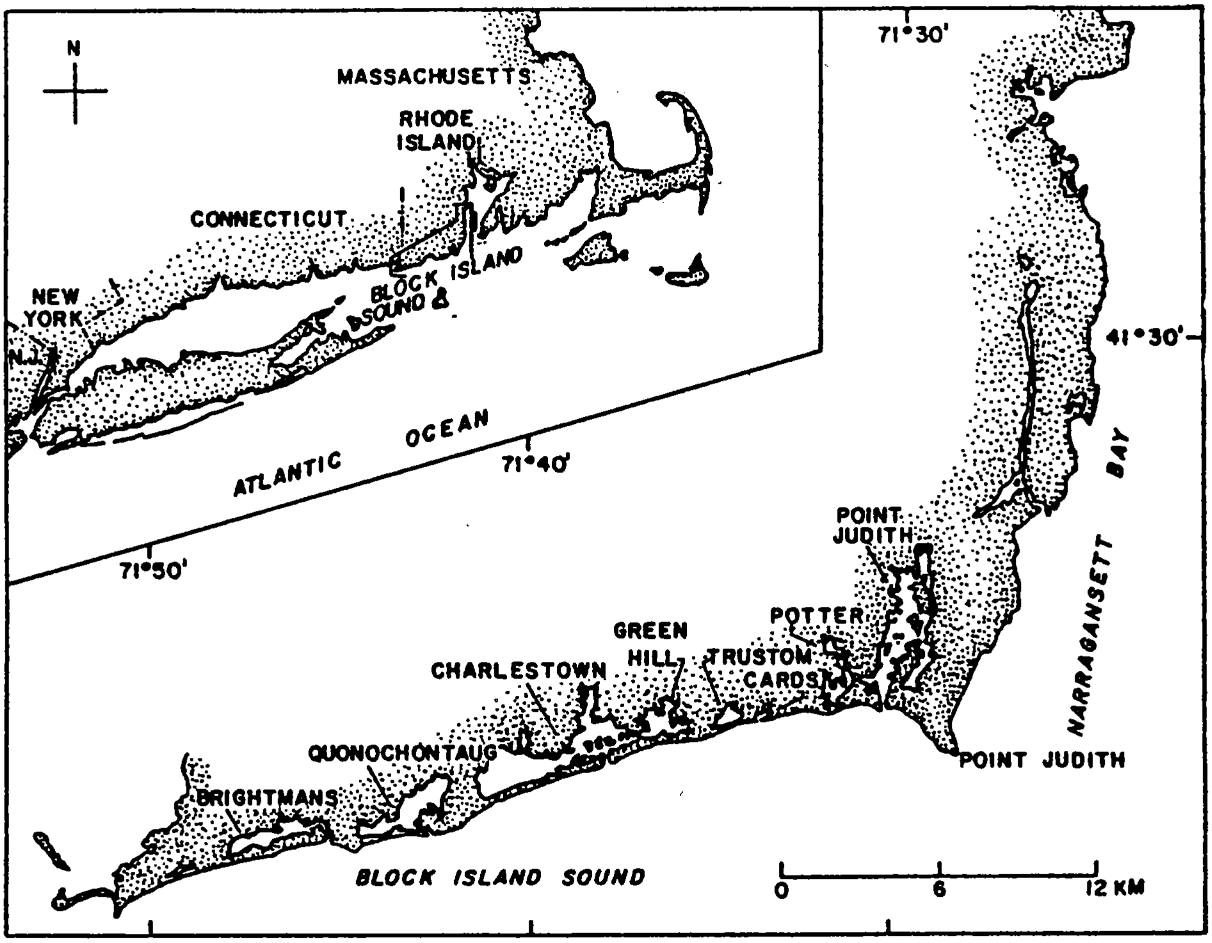
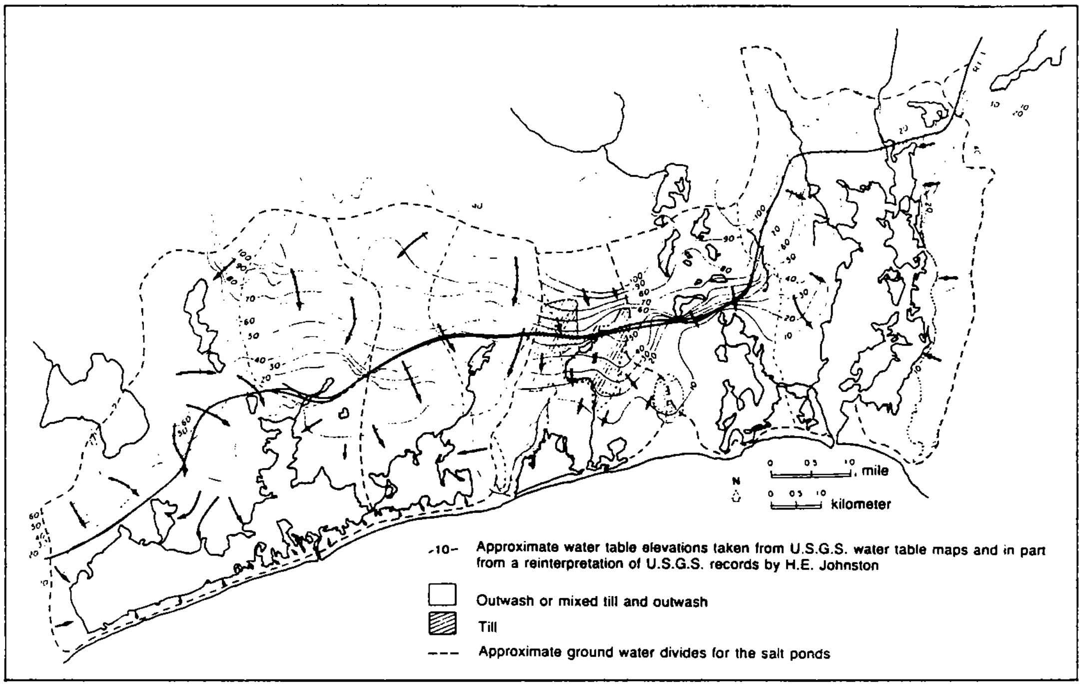
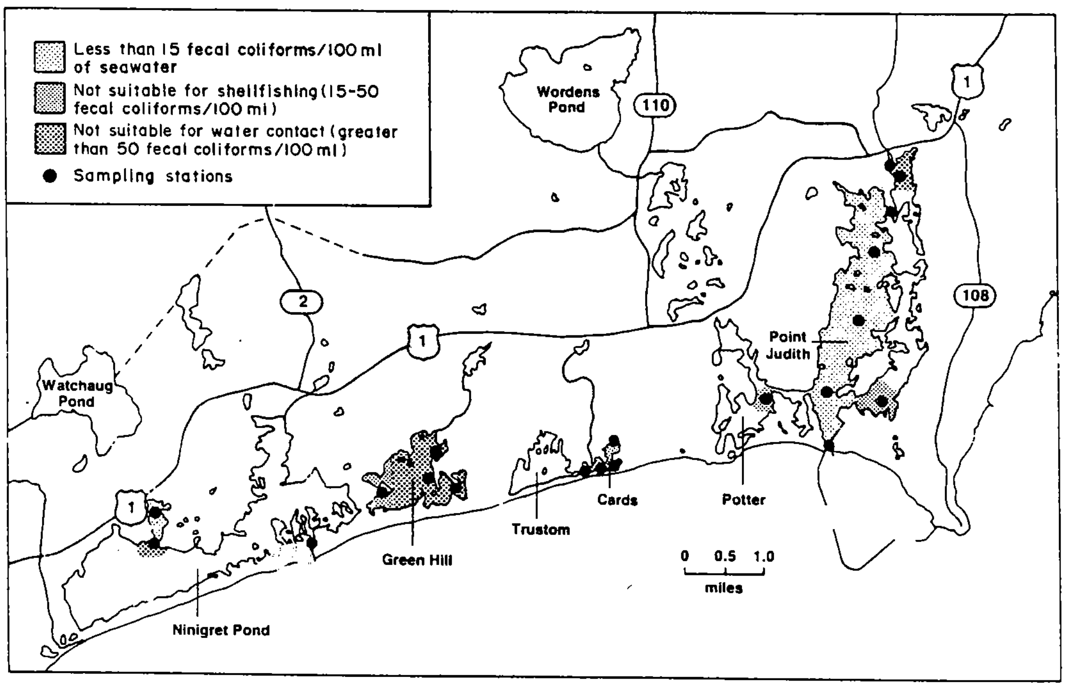


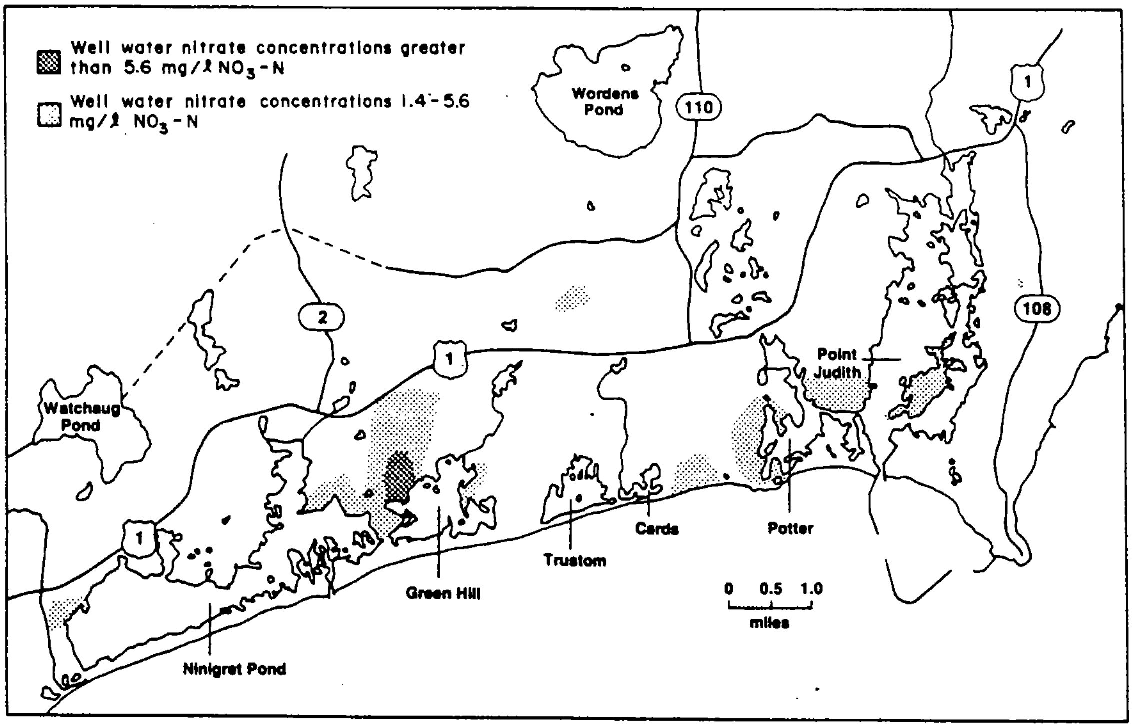
Figure 1. Rhode Island's South Shore salt ponds. The study area includes the ponds from Point Judith west to Charlestown Pond.



Watershed boundaries for the salt pond region. The arrows indicate approximate direction of groundwater flow. Data compiled from U.S.G.S. records by John Grace, 1981.



Median fecal coliform bacteria concentrations in the salt ponds 1980-1981, June through October. Adapted from Nixon et al., 1982.



Distribution of elevated nitrate concentrations in the groundwater of the salt pond region. Concentrations are in milligrams of nitrate nitrogen per liter (ppm) and are mapped from data taken seasonally of groundwater from over 200 residential wells in the region. From Nixon et al., 1982.

Preliminary Estimates of Inorganic Nitrogen Inputs to the Salt Ponds (lbs. N/yr.) (from field measurements by Nixon et al. 1982)

Source	Ninigret Pond	Green Hill Pond	Trustom Pond	Cards Pond	Potter Pond	Pt. Judith Pond
Groundwater	66,920	37,080	9,260	13,910	24,317	59,830
Precipitation on ponds surface	7,400	1,860	680	180	1,420	6,790
Storm runoff	500	230	70	150	140	810
Streams	2,800	2,460	0	570	0	[illegible],000
Block Island Sound	6,000	3,000	0	0	in prep.	in prep.
TOTAL	83,620	42,540	10,010	14,820	25,880	83,440

RELATIONSHIP BETWEEN PRODUCTION AND NUTRIENT LOADING IN A BRACKISH COASTAL POND, SIDERS POND, FALMOUTH MASSACUHUSETTS.

Nina Caraco, Institute of Ecosystem Studies, Millbrook, N.Y.

Coastal ponds are standing bodies of water located close enough to the sea to receive influxes of salt water. On Cape Cod over one hundred coastal ponds mediate the exchange of nutrients between fresh water and the sea and are an important part of the coastal landscape. Numerous dwellings are built on the periphery of coastal ponds and, because human activity in watersheds increase nutrient inputs to the waters they adjoin, this developement is likely responsible for eutrophication of these systems.

The exact relationship between nutrient inputs and eutrophication of brackish coastal ponds is of yet poorly defined. Presently there are relatively few studies on the relationship between nutrient loading and productivity in brackish coastal ponds and, thus, no predictive models of nutrient loading vs. production. If such predictive models were available, they would be extremely useful in the managment of these systems (and in planning development in the region). In this study an attempt is made to determine if empirical models of P loading vs. trophic state developed for fresh waters can be applied directly to brackish coastal ponds. We use trophic data from one brackish coastal pond, Siders Pond, Mass., and compare these measured values with those predicted from models developed in fresh-water lakes.

Trophic State of Siders Pond - Siders Pond is located in the town of Falmouth, Massachussetts. I studied this pond from 1980 to 1983 in order to access the trophic state of this system. Water clarity, phytoplankton chlorophyll and phosphorus concentrations were measured throughout this period (Fig. 1). Further, measurements of phytoplankton production were made during a one year period (1982-83). Finally, benthic metabolism, an additional indicator of lake trophy was estimated as the build up of dissolved inorganic carbon (DIC) in bottom waters. Results from all this data indicate that Siders Pond is eutrophic (Fig. 2) mean surface water chlorophyll concentrations were 15 ug/l, total P concentations averaged 1.2 uM, light extinction coefficient (k) was 2 m^{-1}, dayly production was 860 mg C m^{-2} d^{-1}, and benthic metabolism was 193 mg C m^{-2} d^{-1} (or converting to oxygen, RQ=1, 500 mg O_2 m^{-2} d^{-1}). Thus, Siders Pond trophic status was similar to Lake Erie in 1965-1970.

Nutrient loading to Siders Pond - Siders Pond has a dense population of people in the watershed and this likely leads to high nutrient inputs to the pond. In order to quantify nutrient loading from the watershed I used land-use data and retention coefficients in the watershed of 95% and 50% for P and N, respectively. Other inputs were based on water fluxes and concentrations. Results indicated that P entered Siders Pond primarilly through ground water that was nutrient rich due to sewage inputs (Table 1). I estimate that the total N loading to the lake was 50 g m^{-2} y^{-1}; P loading was roughly 1.3 g m^{-2} y^{-1}.

Relationship Between P loading and Trophic State - There are several empirical models which relate phosphorus loading to trophic state of fresh water lakes. Because this quantitative relationship is known managers can assess the likely impact more watershed developement will have on a lake. Such relationships are unavailable for brackish coastal ponds, therefore, I attempted to see if fresh-water derived models could be applied directly to brackish ponds. Table 2. gives the various trophic state indicators predicted (as functions of P loading) and actual measured values. Results from this comparison demonstrate that trophic state of Siders Pond, at ca 3.5 ppt, can be predicted relatively accurately. Although more comparisons need to be made, this agreement suggests that freshwater derived models, which have been invaluable in managment, may be able to be directly used, or modified slightly, for use in the management of brackish ponds.

Table 1. Annual phosphorus and nitrogen inputs to Siders Pond.

	P	N
	(kg y^{-1}	)
GROUNDWATER	200	6600
PRECIPITATION	5	100
SEA WATER	5	200
RUNOFF	3	12
WATER FOWL	7	50

Table 2. Indices of pond trophic status which were measured and predicted from external P loading to Siders Pond. O2 delpletion is the rate of hypolimnetic oxygen consumption in g m $^{-2}$ d^{-1}, chlorophyll is the average eplimnetic chlorphyll concentration in mg m^{-3}, secchi depth is in m, and production is total water column production in g C m^{-2} y^{-1}.

PARAMATER	MEASURED	PREDICTED	REFERENCE
O_2 depletion	0.55	0.40	Jones and Lee 1982
Summer Secchi	0.8	2.5	Jones and Lee 1982
Chlorphyll	16	19	Vollenweider 1976
Production	315	300	Imboden and Gachter 1975

Fig. 1 Variation in surface water chemistry of Siders Pond from 1980 to 1983. Upper Panel: Total dissolved P, Middle Panel: Chlorphyll concentration, and Lower Panel: Light extinction (1.7/secchi depth).

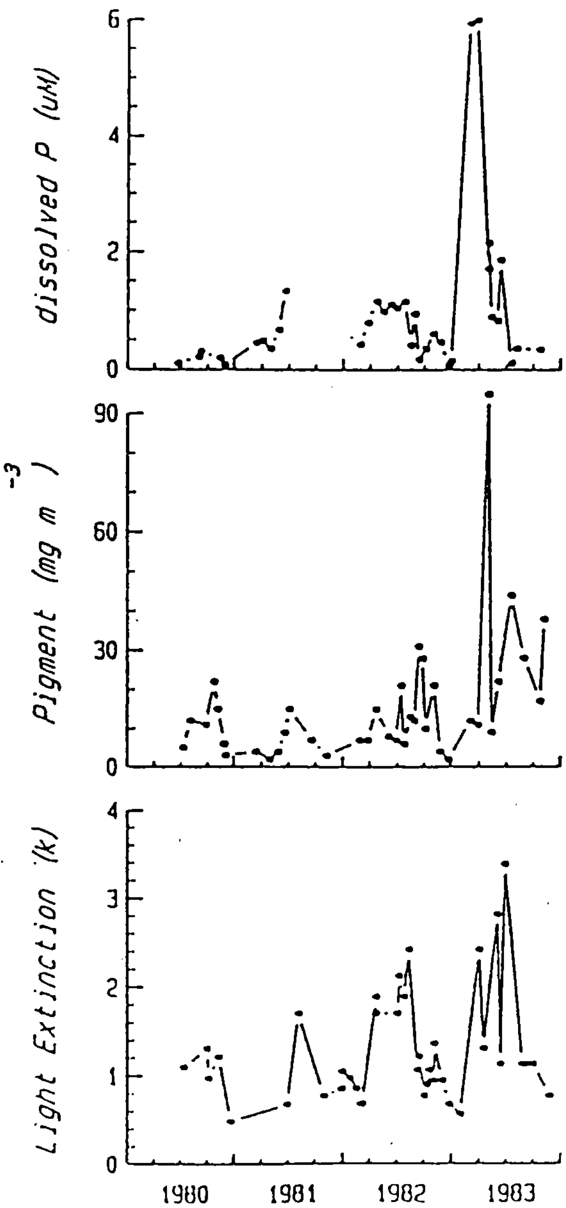
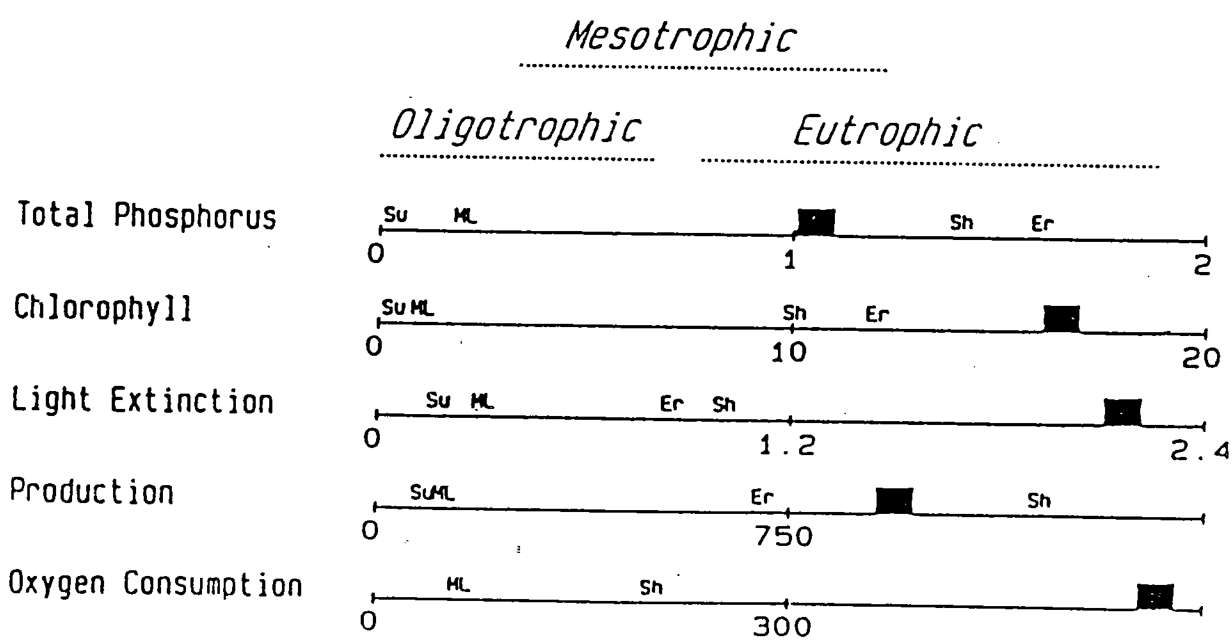


Fig 2. Trophic state of Siders Pond compared to several other lakes and accepted standards (from Wetzel 1975). Siders Pond is indicated by the dark blocks. Data for other lakes shown are from: Mirror Lake (ML); Cole 1982 and Likens 1985;, Shagawa Lake (Sh); Larsen and Malueg 1976, and Lakes Superior and Erie (Su and Er); Schelske 1974.



N AND P INPUTS INTO BUTTERMILK BAY AND ITS WATERSHED

I. Valiela and J. Costa

Boston University Marine Program

Marine Biological Laboratory

Woods Hole, Massachusetts

To evaluate the relative importance of various sources we estimated inputs of nutrients into the watershed and into the Bay itself. Septic systems contributed about half the nitrogen and phosphorus entering the watershed, with precipitation and fertilizer use adding the remainder. Groundwater transported over 85% of the nitrogen and 75% of the phosphorus entering the Bay. Uptake by forests, soils, denitrification, and adsorption intercept two-thirds of the nitrogen, and nine-tenths of the phosphorus that entered the watershed; most nutrients entering the watershed thus failed to reach the Bay. Nitrogen reaching the Bay most likely originates from subsoil injections into groundwater by septic tanks, plus some leaching of domestic fertilizers. Buttermilk Bay water contains relatively low nutrients, probably because of uptake by macrophytes and relatively rapid tidal flushing. Nutrients entering the watershed have a N/P of 6, but passage through the watershed raises N/P to 23, probably because of adsorption of PO_4 in transit. Urbanization of watersheds further increases loadings to nearshore environments, and shifts nutrient loadings delivered to coastal waters to relatively higher N/P, potentially stimulating growth of nitrogen-limited primary producers.

Inputs of nitrogen and phosphorus into the watershed of Buttermilk Bay. N/P expressed by atoms.

	Nitrogen inputs		Phosphorus inputs		
	mol × 10^3 yr^{-1}	% of total	mol × 10^3 yr^{-1}	% of total	N/P
Precipitation onto watershed	1169	33.9	149	23.1	7.7
Septic systems	1466	42.6	247	38.3	5.9
Domestic use of fertilizers	579	16.8	41	6.3	14.2
Agricultural use of fertilizers	231	6.7	209	32.3	1.1
Totals	3445		645		5.3

Table . Measured annual nitrogen and phosphorus inputs into Buttermilk Bay. Values are the product of the average concentration of N and P (Table 1), and annual flows of water from each source, calculated as described in text.

	N inputs		P inputs		
Sources	mol × 10^3 yr^{-1}	% of total	mol × 10^3 yr^{-1}	% of total	N/P
Streams	112	9.6	5.6	11.0	20.0
Groundwater	1000	85.4	38.3	75.3	26.1
Surface runoff	2.2	0.2	0.1	0.2	22.5
Precipitation	54.4	4.6	6.9	13.5	7.9
Waterfowl	2.6	0.2	—		—
Total	1171		50.9		23.0

Inputs and outputs of nitrogen and phosphorus into and out of the watershed of Buttermilk Bay.

	N (mol × 10^3 yr^{-1})	P (mol × 10^3 yr^{-1})	N/P
Inputs into watershed[a]	3445	645	5.3
Outputs from watershed into Buttermilk Bay[b]	1112 (267–1896)	43.9 (11.5–73.9)	25
% Intercepted in watershed	68 (45–92)	93 (89–98)	

[a] This is the total of inputs from precipitation, septic systems, and fertilizer use from Table 4.
[b] This is the sum of inputs to Buttermilk Bay via groundwater and streams from Table 5. Numbers in parentheses are the absolute range of loading based on the lowest and highest estimates of groundwater flow from Moog (1987).

Mean concentrations of nutrients in source waters for Buttermilk Bay used in nutrient budget calculations. N/P expressed by atoms.

	Mean concentration (μM)				
Source	NH_4	NO_3	DIN	PO_4	N/P
Streams[a]	8.6	5.5	14.0	0.7	20
Groundwater[b]	16.2	70	86	3.3	26
Surface runoff[c]	6	21	27	1.2	23
Precipitation[d]	8.7	13.7	22.4	2.9	7.9

[a] Mean annual concentrations from Red Brook.

[b] Data shown in Figure 8.

[c] Data from samples taken in 5 sites around Buttermilk Bay, 18 Aug 86 (average: 6.0 ± 1.1 μM NH_4, 20.6 ± 13.4 μM NO_3, 1.2 ± 0.5 μM PO_4).

[d] Data from Valiela and others (1978), weighted mean concentration of precipitation during a year and a half of collections.

Value Judgement and Science in Coastal Management: The Case of Anoxia

Arthur G. Gaines, Jr.
Marine Policy Center
Woods Hole Oceanographic Institution

While scientists and other academicians legitimately argue that sound coastal management practices must be based on rigorous scientific and technical information, the importance and role of more or less arbitrary judgements also needs to be recognized. Value judgements are often not overtly identified in setting management goals and sometimes are expressly concealed. For example, a management goal is sometimes to return an impacted water body to an earlier condition, under the unexpressed assumption that the earlier condition was "better". Commonly it is assumed that maintenance of high biological diversity is desirable, although there is no "scientific proof" that this is true. Other examples of value judgements in management are that eutrophication (nutrient enrichment or enhanced productivity) or anoxia (depleted oxygen) or high organic sediments are undesirable. While these are legitimate value judgements and can be the basis of management goals, they are not scientific facts.

One reason for the blurring of value judgement and scientific fact is that scientists sometimes testify on environmental issues without specifically making the distinction themselves. Another is that in the process of setting environmental priorities, agencies such as the U.S. EPA often lump perceived problems of bureaucrats and activists with more technically based issues, such as involving public health.

In this short paper I would like to make the point that anoxia in coastal ponds is improperly perceived by coastal managers, who generally identify the condition as undesirable or even indicative of severe pollution or environmental degradation. While this can be true in some instances, the generalization could lead to expensive and unnecessary mitigation measures in others.

Over the past several years, studies in southern New England have identified several coastal ponds with seasonally reduced oxygen or intermittent or permanent anoxia, typically in their bottom waters (Figs. 1, 2). As research continues it is likely that others will be identified. Generally speaking, these brackish ponds are deeper than 15 feet (5m) and have a sill separating them from the coast, restricting circulation. Under these circumstances oxygen can be completely depleted and hydrogen sulfide can accumulate to very high levels. For example in the Narrow River in Rhode Island (adjacent to Narragansett Bay) hydrogen sulfide accumulates to one of the highest concentrations reported for an arm of the sea. Because these basins are effectively stratified, even local people who frequently use the ponds are often unaware of the anoxia, and during infrequent periods when deep waters are overturned the smell of sulfide can cause considerable public alarm. Sider's Pond in Falmouth, Massachusetts, is probably a similar example.

A study of the sediments in the basins of the Narrow River suggests that bottom waters have been anoxic for over a thousand years—long before significant human impacts could have been present. Judging from changes in the sulfur content of the sediment (Fig 3), we surmise that initiation of anoxia coincided with marine flooding of a fresh water lake formerly occupying this coastal landform. Given the abundant sulfur in seawater, the organic productivity under natural conditions was sufficient to sustain permanent anoxia.

For many years the Narrow River has sustained local fisheries (crabs, shellfish, bass, perch) including one of the major alewife runs in southern Rhode Island. While there has been considerable fluctuation in these fisheries (and in the number of people pursuing them) there is no evidence that anoxia has been detrimental to these uses. The River also sustains many recreational uses, although contamination by fecal bacteria (but not anoxia) has been a problem in recent times.

It is my contention, therefore, that anoxia in certain conditions constitutes a natural feature which managers need not regard as a problem. This is not to say, however, that anoxia cannot be considered a problem or indicative of one. The 1984 anoxic event in Green Pond, Falmouth, Massachusetts, occurred in shallow water and was associated with a massive fish kill (although it is not known which came first).

A related matter is the accumulation of organic sediments in coastal ponds. This material has a consistency sometimes described as "black mayonnaise" and typically smells of hydrogen sulfide. Commonly, high organic sediment is believed to suggest pollution and several coastal communities have proposed removal of these sediments or their burial under clean sand. As indicated in the Narrow River sediment study, this kind of sediment has been deposited naturally in both fresh and brackish basins since glacial ablation over 10,000 years ago.

REFERENCES

Orr, W.L. and A.G. Gaines, 1973. Observations on Rate of Sulfate Reduction and Organic Matter Oxidation in the Bottom Waters of an Estuarine Basin: The Upper Basin of the Pettaquamscutt River (Rhode Island). p. 791-812 In Advances in Organic Geochemistry, Proceedings of the 6th International Congress on Organic Geochemistry, September 18-21, Rueil-Malmaison, France.

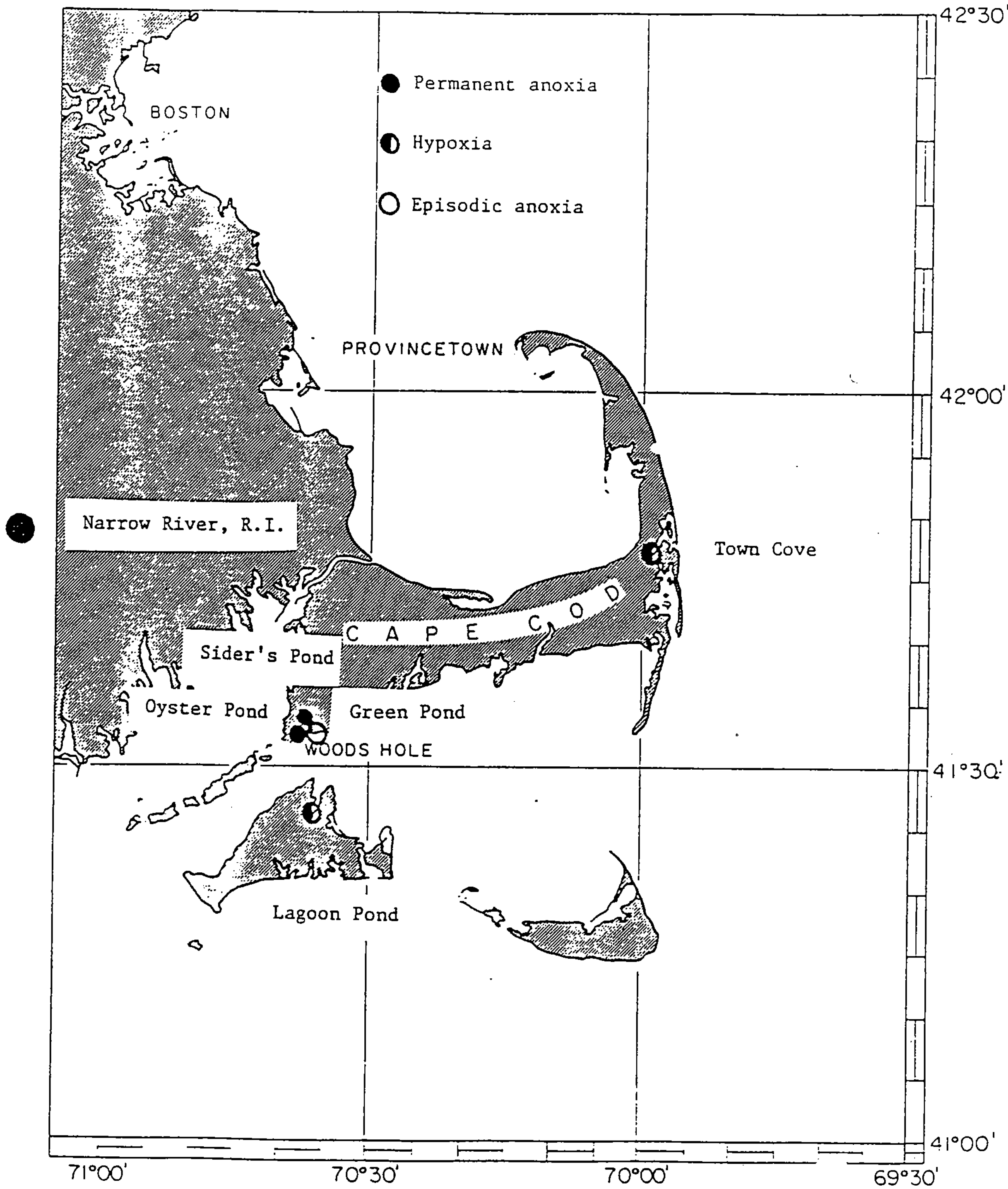


Figure 1. Location of coastal ponds in southern New England containing hypoxic or anoxic bottom waters.

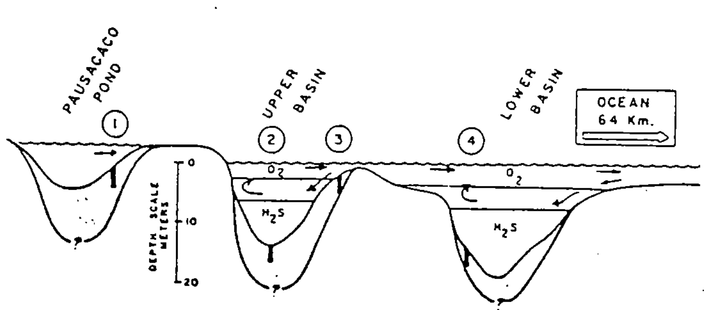


Figure 2. Profile of the Narrow River, Rhode island, showing anoxic bottom waters occupying the estuarine basins (from Orr and Gaines, 1973).

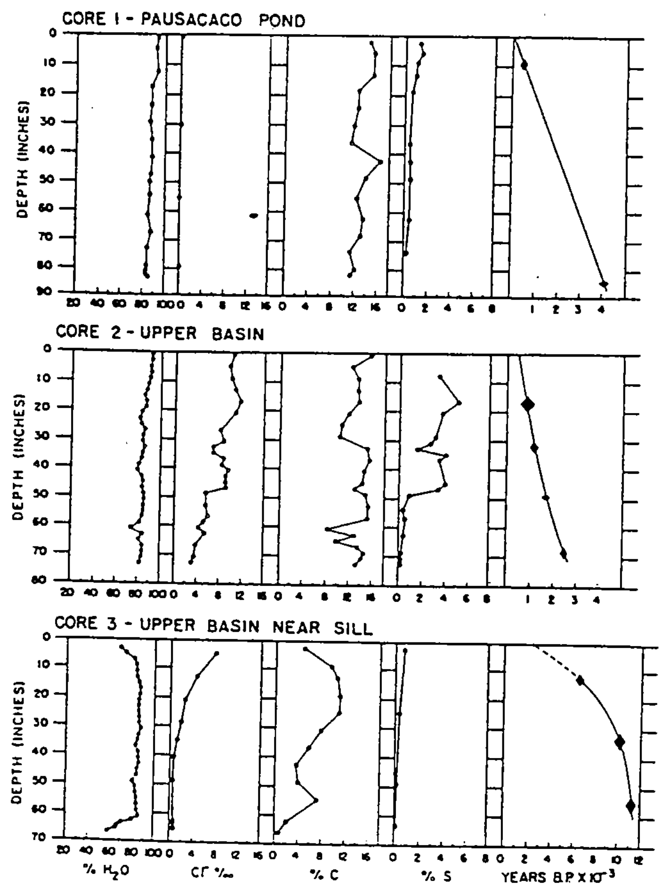


Figure 3. Sediment composition and age in cores from the Narrow River, Rhode Island (from Orr and Gaines, 1973).

ABSTRACT

Five years under sail - experiences with the nutrient bylaws

William B. Kerfoot
K-V Associates, Inc.

In 1982, the Planning Office of the Town of Falmouth commissioned K-V Associates to prepare a cumulative impact procedure for assessing development in vital resource areas. The regions were defined as recharge zones for municipal supply wells, freshwater kettle ponds and salt ponds. The approach involved defining the carrying capacity for the receiving waters based upon best available scientific information and then computing backwards to the nonpoint source contribution from each land surface area to be developed.

Originally, the salt water standards were based upon fresh water guidelines projected from the Dillon-Vollenweider Lake approaches. The past few years have strengthened the basis for the marine water proposed critical level. Fish kill events in Bournes Pond and Green Pond have established the undesirability of exceeding the total mean total nitrogen level of .750 mg/l (ppm). A simple model was also developed to allow evaluation of denitrification from fringe marsh regions of salt ponds.

New challenges appear to lie in dealing with salt pond regions where saturation development will exceed the carrying capacity of the water body. Choices of remedial action are presented and discussed. Should action standards be critical limits or be changed to recreational limits to avoid "designing for failure"?

SCIENTIFIC CERTAINTY VS REGULATORY NEEDS: THE CASE OF NUTRIENT STANDARDS FOR COASTAL PONDS

K. J. Buckland

Planning Board, Town of Falmouth

Falmouth, Massachusetts

Falmouth adopted regulations in 1984 called the Nutrient Loading Bylaw. These regulations require a determination of the levels of both the project site and total recharge area loading of phosphorous and nitrogen compounds into the ground water and/or receiving open water body. The results of these assessments have been used to restrict or negotiate changes in development projects, and as a broader planning tool for managing inland and coastal ponds. However, the nitrogen standards for coastal ponds, listed as a maximum 0.75 mg/l N, has remained controversial. The attempts to resolve differences between scientific certainty and regulatory needs are discussed.

COPY OF ARTICLE 46 AND THE VOTE TAKEN
ON SAME AT THE ANNUAL TOWN MEETING HELD
IN FALMOUTH, MASSACHUSETTS ON APRIL 4, 5, 6, 7, 1988

ART. 46 To see if the Town will vote to amend the Zoning Bylaws and ADOPT a NEW Section 4700 COASTAL POND OVERLAY DISTRICT to read as follows:

SECTION 4700 COASTAL POND OVERLAY:

SECTION 4710 PURPOSE: The purpose of this bylaw is to preserve water quality in Falmouth's coastal ponds and harbors in accordance with adopted plans for both development and preservation, while recognizing that the public sector has an equal role with private sectors in meeting the established goals for swimmable, fishable, and usable water of the highest possible esthetic and natural quality.

SECTION 4720 APPLICABILITY: This bylaw shall apply to all developments listed here:

1. Sub-divisions of greater than five (5) lots.

2. Commercial development requiring Site Plan Review Special Permit.

3. Special permit uses filed in accordance with Section 7300 of these bylaws within 2000' of those other water bodies listed in Section 4740 that do not have defined recharge areas if those developments fall within the recharge areas for coastal ponds as shown on the Official Zoning Map.

SECTION 4730 PROCEDURE:

1. All such development proposals listed in Section 4720 must file an Analysis of Development Impact as specified by section 5342, a. sb. and c. with the application made to the reviewing board.

2. The reviewing board shall make findings regarding the Analysis and may withhold approval if the proposal does not comply with the standards of this bylaw, or, the reviewing board may apply restrictions for mitigation in accordance with.

SECTION 4740 RESTRICTIONS:

Development anywhere within the defined recharge areas shall be restricted in accordance with the following goals and standards;

1. HIGH QUALITY AREAS: Areas designated as High Quality Areas shall be provided the highest level of protection. These estuarine areas support high quality shellfish and finfish habitat, valuable recreational areas including swimming areas, and areas of high scenic and esthetic quality. Those development proposals not meeting the standards for these areas must be permanently restricted as necessary to reduce nutrient loading including such actions as:

a. reduction in number of units, bedrooms, rooms or leasable square footage of a building.

b. improvements to area road drainage, pond circulation and other physical conditions within and around the affected water body. High Quality Area Standard: 0.32 mg/l total Nitrogen within the affected water areas as an average over a year.

HIGH QUALITY AREAS:

Megansett Harbor	Wild Harbor	Rands Canal
Seapit River	Waquoit Bay	Israel's Cove
Perch Pond		

Herring River from Buzzards Bay to Wing Pond
West Falmouth Harbor to Chappaquoit Road
Snug Harbor inland to Nashawena Road
Waterways within the Great Sippewissett Marsh
Waterways within the Little Sippewissett Marsh
Outer Quissett Harbor from entrance inland 1400'
Great Harbor west from Gosnold Road
Great Pond inland from Vineyard Sound to Bourne Street
Bournes Pond from Vineyard Sound to Gayle Avenue
West Branch Eel Pond to Fisher Road
East Branch Eel Pond to Seapit River
Green Pond from Vineyard Sound to Green Harbor Road

STABILIZATION AREAS:

Areas designated as stabilization areas shall allow higher nitrogen loading than High Quality Areas if those loadings when combined with public and private capital improvements in a comprehensive program including: dredging, channel openings, drainage improvements, animal control, upgrading septic systems as necessary, etc. would eventually improve water quality in those areas to a point higher than the established standard. Development proposals exceeding the limit for these areas may be temporarily restricted until such improvements are made. Stabilization Area Standard: 0.5 mg/l total Nitrogen.

STABILIZATION AREAS:

Wild Harbor River
Oyster Pond
Salt Pond
Little Pond
Hamblins Pond
Green Pond above the Menauhant Bridge
Moonakis River south of Route 28
Eel Pond, east branch between Seapit River and Atwater Drive

3. Intensive Water Activity Areas. Areas designated as Intensive Water Activity Areas are set aside for the most intensive land uses and active water uses where esthetic quality is the principal water quality concern. Water quality standards shall be the least stringent in these areas to accommodate planned growth and development. Intensive Water Activity Areas Standard: 0.75 mg/l total Nitrogen.

INTENSIVE WATER ACTIVITY AREAS:

Great Harbor east of Gosnold Road
Little Harbor, Woods Hole
Eel Pond, Woods Hole
Falmouth Harbor
Inner Quissett Harbor
Fiddlers Cove
Childs River south of Route 28 to Atwater Drive
Green Pond between the south end of Green Harbor Road and Menauhant Road.

Or do or take any other action in this matter. On request of the Planning Board.

AMENDED: That the Town vote to adopt a new section 4700, Coastal Pond Overlay District as follows:

SECTION 4700 COASTAL POND OVERLAY DISTRICT:

SECTION 4710, PURPOSE: The purpose of this bylaw is to preserve water quality in Falmouth's coastal ponds and harbors in accordance with adopted plans for both development and preservation, while recognizing that the public sector has an equal role with private sectors in meeting the established goals for swimmable, fishable and usable water of the highest possible esthetic and natural quality.