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# Ambient Water Quality and Shellfish Tissue Monitoring in New Hampshire Estuaries 2001 and 2002

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Ambient Water Quality and Shellfish Tissue Monitoring in New  
Hampshire Estuaries 2001 and 2002

# **Ambient Water Quality and Shellfish Tissue Monitoring in New Hampshire Estuaries 2001 and 2002**

A Final Report to

The New Hampshire Estuaries Project

Submitted by

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June 2003

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## EXECUTIVE SUMMARY

The Department of Environmental Services received funding from the New Hampshire Estuaries Project (NHEP) to conduct monitoring activities in 2001 and 2002. The monitoring activities involved water monitoring in tidal tributaries and estuarine waters and tissue monitoring of mussels, clams and oysters. These monitoring activities were a direct result of recommendations made by the NHEP Technical Advisory Committee and the Monitoring Plan and were completed with the overall purpose of improving the understanding of water quality trends and the concentrations of toxic contaminants in shellfish tissue. The Department of Environmental Services, in cooperation with the University of New Hampshire Jackson Estuarine Lab, completed all tasks as planned except for the 2002 estuarine monitoring for nutrients and microbial indicators. These two monitoring activities were funded and conducted through the New Hampshire National Coastal Assessment Program for 2002. All raw data except for Gulfwatch data are presented in this Final Project Report. Data summaries and interpretations will come at a later time.

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## INTRODUCTION

On March 14, 2001, the New Hampshire Governor and Executive Council approved a memorandum of agreement (MOA) between the Department of Environmental Services and the Office of State Planning to implement aspects of the New Hampshire Estuaries Project *Management Plan* (NHEP, 2000) and *Monitoring Plan* (Jones and Langan, 2001). This report covers the following monitoring aspects in the MOA:

1. Ambient River Monitoring of Coastal Tributaries
2. Ambient Microbial and Nutrient Indicators Monitoring of Estuarine Waters
3. Gulfwatch Monitoring: Toxic Contaminant Monitoring of Shellfish Tissue

The NHEP accomplishes its monitoring program by promoting cooperation by all agencies and organizations who participate in monitoring activities, in order to maximize the usefulness of current monitoring efforts (Jones and Langan, 2001). The monitoring activities listed above are enhancements of existing monitoring programs. The Department of Environmental Services

(DES) is responsible for the ambient monitoring programs and works in concert with the University of New Hampshire and the Gulf of Maine Council to monitor the toxic contaminants through the Gulfwatch program. These new efforts were recommended in the *Monitoring Plan* as necessary actions to fill data and/or information gaps.

The purpose of this report is to provide a record of completed monitoring activities and the associated raw data. All data collected under these monitoring activities will be provided to the NHEP Coastal Scientist (Phil Trowbridge) for synthesis and interpretation. The NHEP Coastal Scientist will manage the data presented in this Final Report and will make conclusions under separate cover at a later time.

## **PROJECT GOALS AND OBJECTIVES**

The overall goal of the NHEP monitoring program is to develop a better understanding of the status and trends of estuarine environmental quality using scientifically credible information. The *Monitoring Plan* was also developed to evaluate the success of the NHEP *Management Plan* objectives and this was accomplished by converting the *Management Plan* objectives into monitoring questions.

The *Monitoring Plan* objectives that pertain to each of the three activities listed above are as follows:

### **Ambient River Monitoring of Coastal Tributaries**

*Monitoring Objective 1A:* To determine if concentrations of fecal-borne microbial contaminants are increasing with time.

*Monitoring Objective 2A:* To determine whether concentrations of dissolved and particulate nutrients are increasing as regional development and population increases.

*Monitoring Objective 2D:* To determine whether the concentration of dissolved oxygen and percent oxygen saturation in NH tidal waters change over time.

### **Ambient Microbial and Nutrient Monitoring of Estuarine Waters**

*Monitoring Objective 1A:* To determine if concentrations of fecal-borne microbial contaminants are increasing with time.

*Monitoring Objective 2A:* To determine whether concentrations of dissolved and particulate nutrients are increasing as regional development and population increases.

*Monitoring Objective 2B:* To determine whether concentrations of phytoplankton (as measured by chlorophyll-a) in NH tidal waters change significantly over time.

*Monitoring Objective 2D:* To determine whether the concentration of dissolved oxygen and percent oxygen saturation in NH tidal waters change over time.

### **Gulfwatch Monitoring: Toxic Contaminant Monitoring of Shellfish Tissue**

*Monitoring Objective 3A:* To determine if toxic contaminant concentrations in seafood species from NH coastal waters are increasing with time.

*Monitoring Objective 3B:* To determine if concentrations of toxic contaminants in sediments, water and biota are increasing with time.

## **SITE SELECTION AND METHODS**

### **Ambient River Monitoring of Coastal Tributaries**

Initial site selection for ambient tributary monitoring was based six existing DES Ambient River Monitoring Program sites at the Great Bay Estuary tidal dams on the Exeter, Lamprey, Oyster, Bellamy, Cocheco and Salmon Falls Rivers. Two new sites were established on the freshwater portions of the Little Harbor tributaries, Berry's Brook and Sagamore Creek. These two new site locations were added to broaden the spatial coverage of the ambient monitoring to ensure adequate coverage of tributaries that discharge into shellfish growing waters. A new Great Bay Estuary site was established on the Winnicut River at the tidal dam in March 2002. This new site was added because the Winnicut River is a significant tributary to Great Bay that was not currently monitored for water quality. The relatively rural watershed has experienced recent and continuing development that could impact the quality of the water flowing into Great Bay.

Field and laboratory methods were conducted in accordance with the DES Ambient River Monitoring Program standard procedures. Samples were collected at the downstream side of road crossings using a sampling bucket and rope. Field measurements were made for dissolved oxygen, temperature, conductivity, pH, and turbidity. River water was poured into sampling containers for laboratory analysis for TKN, ammonia, nitrate/nitrite, total phosphorus, biological oxygen demand, *E. coli*, and chlorophyll-a. Samples were transported to and analyzed by the DES Laboratory Services Unit and the Limnology Laboratory.

The DES Watershed Assistance Staff collected samples on a pre-scheduled monthly basis from March through December during 2001 and 2002 with the exception of March 2001 when samples were collected twice during the month. Heavy rainfall prompted an additional sampling in March 2001 to monitor the effects of rainfall on the river quality. Eight sites were sampled during 2001 and nine sites were sampled in 2002. The sites and sampling dates are listed below in Tables 1 and 2.

**Table 1 Sampling locations for ambient river monitoring, 2001 and 2002**

<u>Site Identification</u>	<u>River</u>	<u>Town</u>
5-Ber	Berry's Brook	Rye
5-Sag	Sagamore Creek	Portsmouth
2-Wnc	Winnicut River	Greenland
9-Ext	Exeter River	Exeter
5-Lmp	Lamprey River	Newmarket
5-Oys	Oyster River	Durham

5-Blm	Bellamy River	Dover
7-Cch	Cochecho River	Dover
5-Sfr	Salmon Falls River	Rollinsford

**Table 2 Sampling dates for ambient river monitoring, 2001 and 2002**

<u>Date Sampled</u>	<u>Notes</u>
March 20, 2001	
March 23, 2001	Field and bacterial analyses only.
April 19, 2001	
May 15, 2001	
June 20, 2001	All sites except Sagamore Creek and Berry's Brook
June 28, 2001	Sagamore Creek and Berry's Brook only.
July 23, 2001	
August 14, 2001	
September 11, 2001	
October 17, 2001	
November 13, 2001	
December 5, 2001	
March 19, 2002	
April 16, 2002	
May 14, 2002	
June 25, 2002	
July 16, 2002	
August 13, 2002	
September 24, 2002	
October 22, 2002	
November 26, 2002	
December 16, 2002	

### **Ambient Microbial and Nutrient Monitoring of Estuarine Waters**

Site selection for ambient estuarine monitoring was based on existing Shellfish Program sites. Five sites were selected in the Great Bay Estuary and two sites in Little Harbor for nutrient/eutrophication and microbial indicators monitoring and an additional four sites were selected in Hampton Harbor for microbial indicator monitoring only. DES Shellfish Program personnel collected the water samples. Nutrient/eutrophication indicators samples were collected once monthly at low tide from March through December 2001. And, microbial indicators samples were collected once monthly at low tide from May through September 2001. Beginning in 2002, all nutrient/eutrophication and microbial indicator monitoring was conducted by the New Hampshire National Coastal Assessment Program (NCA).

The NCA is an EPA initiative to monitor the status and trends of environmental health in the Nation's estuaries. The New Hampshire NCA program began in 2000 under the cooperative actions of DES and UNH. The intent of DES was to integrate as many NHEP monitoring needs into the NCA by using the capacity-building and long-term monitoring efforts that are inherent in the state NCA program. Monitoring program managers worked together to integrate several of the NHEP monitoring needs into the NCA and were successful in integrating the estuarine



nutrient and microbial indicator monitoring for the 2002 NCA sampling season. NCA data will be published under a separate report as data become available.

All microbial indicator sites were sampled monthly from May through September 2001. Sampling sites included five sites in Hampton Harbor, two in Little Bay and four in Great Bay. The sites and sampling dates are listed below in Tables 3 and 4.

**Table 3 Microbial indicator sampling locations**

Site Identification	Waterbody	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)
GB20	Great Bay	43 <sup>0</sup> 09'10.79"N	-70 <sup>0</sup> 49'56.83"W
GB50	Great Bay	43 <sup>0</sup> 07'23.13"N	-70 <sup>0</sup> 52'13.76"W
GB4A	Great Bay	43 <sup>0</sup> 04'10.11"N	-70 <sup>0</sup> 52'54.91"W
GB16	Great Bay	43 <sup>0</sup> 03'36.06"N	-70 <sup>0</sup> 51'21.3"W
GB2	Great Bay	43 <sup>0</sup> 07'46.43"N	-70 <sup>0</sup> 50'57.75"W
LHB6	Little Harbor	43 <sup>0</sup> 03'12"N	-70 <sup>0</sup> 43'42"W
LHB13	Little Harbor	43 <sup>0</sup> 03'30"N	-70 <sup>0</sup> 43'44"W
HH10	Hampton Harbor	42 <sup>0</sup> 54'15.55"N	-70 <sup>0</sup> 49'23.18"W
HH19	Hampton Harbor	42 <sup>0</sup> 53'32.93"N	-70 <sup>0</sup> 49'35.67"W
HH2B	Hampton Harbor	42 <sup>0</sup> 53'15.5"N	-70 <sup>0</sup> 49'35.93"W
HH1A	Hampton Harbor	42 <sup>0</sup> 53'45.32"N	-70 <sup>0</sup> 49'4.18"W

**Table 4 Microbial indicator sampling dates by waterbody**

<u>Great Bay</u>	<u>Little Harbor</u>	<u>Hampton Harbor</u>
May 17, 2001	May 3, 2001	May 21, 2001
June 28, 2001	June 27, 2001	June 12, 2001
July 25, 2001	July 12, 2001	July 16, 2001
August 27, 2001	August 13, 2001	August 23, 2001
September 6, 2001	September 5, 2001	September 25, 2001

**Table 5 Nutrient and eutrophication indicators sampling locations**

Site Identification	Waterbody	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)
GB20	Great Bay	43 <sup>0</sup> 09'10.79"N	-70 <sup>0</sup> 49'56.83"W
GB50	Great Bay	43 <sup>0</sup> 07'23.13"N	-70 <sup>0</sup> 52'13.76"W
GB4A	Great Bay	43 <sup>0</sup> 04'10.11"N	-70 <sup>0</sup> 52'54.91"W
GB16	Great Bay	43 <sup>0</sup> 03'36.06"N	-70 <sup>0</sup> 51'21.3"W
GB2	Great Bay	43 <sup>0</sup> 07'46.43"N	-70 <sup>0</sup> 50'57.75"W
LHB6	Little Harbor	43 <sup>0</sup> 03'12"N	-70 <sup>0</sup> 43'42"W
LHB13	Little Harbor	43 <sup>0</sup> 03'30"N	-70 <sup>0</sup> 43'44"W

**Table 6 Nutrient and eutrophication sampling dates listed by waterbody**

<u>Great Bay</u>	<u>Little Harbor</u>
March 29, 2001	March 15, 2001
April 12, 2001	April 16, 2001
May 17, 2001	May 3, 2001
June 28, 2001	June 27, 2001
July 25, 2001	July 12, 2001
August 27, 2001	August 13, 2001
September 6, 2001	September 5, 2001
October 10, 2001	October 30, 2001
November 5, 2001	November 6, 2001
December 10, 2001	December 6, 2001

Nutrient/eutrophication indicators samples were transported to and analyzed by the Jackson Estuarine Laboratory. Parameters included total suspended solids (TSS), % organic content which is used to calculate particulate organic matter (POM), chlorophyll a, and nitrate+nitrite. UNH JEL SOP's 1.05, 1.06, 1.07, and 1.08 were followed for sample bottle preparation, processing and analyses. Samples are filtered through 0.45 $\mu$  glass fiber filters with separate filters being used to capture solids for TSS/POM and chlorophyll a analyses. TSS is determined using standard gravimetric procedures and POM by loss on ignition (LOI) at 500°C. Chlorophyll a is analyzed using acetone extraction and spectrophotometry on a Beckman DU 640. The filtrate is analyzed for nitrate+nitrite using the cadmium reduction wet chemistry method for LACHAT AA. The data are stored in an EXCEL spreadsheet, maintained at Jackson Estuarine Laboratory and sent to DES following data review.

The microbial indicators samples were transported to the DES Laboratory Services Unit for analyses. Parameters included Enterococci and *E. coli* in accordance with Standard Methods for the Examination of Water & Wastewater, 17<sup>th</sup> Edition, 1989. The analytical method reference number is SM 9222B. The data are stored in the DES Shellfish Program routine monitoring database.

### **Gulfwatch Monitoring: Toxic Contaminant Monitoring of Shellfish Tissue**

In 1991 the Gulf of Maine Council initiated a toxic contaminant monitoring program using the blue mussel as an indicator species. Each year, two sites in New Hampshire waters were monitored as part of this Gulf of Maine-wide program. In 1998, New Hampshire increased the spatial coverage of sampling locations by collecting mussels at six to eight sites each year. In 2001, New Hampshire again expanded Gulfwatch by collecting oysters and clams in Great Bay and Hampton Harbor, respectively. The purpose of the additional indicators was to collect data from other species that were harvested for human consumption.

In 2001, the NHEP funded the analytical costs of one oyster, two mussel and two clam sites under the NH Gulfwatch Program. The oysters were collected from Nannies Island and the clams from Middle Ground and the Yankee Fisherman's Cooperative in Seabrook. The latter

site was collected to provide information specifically for the NH Shellfish Program. The two mussel sites were located at Dover Point and Schiller Station. Six other sites were also monitored with support from DES. These sites were located at the Hampton Harbor Rt. 1A bridge, Fox Point, Little Harbor, South Mill Pond, Peirce Island, and Clark's Cove. In 2002, the NHEP funded the analyses for one oyster, one clam and two mussel sites. The oysters were collected at Adams Point and the clams were again collected at Middle Ground. The two mussel sites were located at Dover Point and the Hampton Harbor bridge. DES and the Gulf of Maine Council supported the analytical costs for mussel sites at Clark's Cove, Rye Harbor, North Mill Pond and the PSNH Schiller Station on the Piscataqua River in 2002.

Mussels were collected from South Mill Pond, Pierce Island, Fox Point and Schiller Station on October 4, 2001 and from Hampton Harbor, Little Harbor, Clarks Cover and Dover Point on October 8, 2001. Clams were collected from the Middle Ground and the Yankee Fisherman's Cooperative on October 18, 2001, as well as oysters from Nannie Island on October 22, 2001. Mussels were collected from Rye Harbor and Hampton Harbor on September 30, 2002, from Clarks Cove and Schiller Station on October 2, 2002 and from North Mill Pond and Dover Point on October 29, 2002. Clams were collected from Middle Ground on September 30, 2002 as well as oysters from Adams Point on October 22, 2002. All shellfish were measured, shucked and prepared for transport within 24 hours of collection.

The sets of samples to be analyzed for inorganic contaminants were delivered to the State of Maine Health and Environment Testing Laboratory in Augusta, Maine. The mussels prepared for organic contaminant analysis were delivered to the Environment Canada, ECB Laboratory in Moncton, New Brunswick.

**Table 7 Gulfwatch Sites, Species and Funding Sources for 2001 and 2002**

<b>Funding Source</b>	<b>Site Location</b>	<b>Site ID</b>	<b>Shellfish species</b>	<b>Latitude (degree minutes)</b>	<b>Longitude (degree minutes)</b>
<b>2001</b>					
NHEP	Middle Ground	NHMG	clams	42 <sup>0</sup> 53.4'N	-70 <sup>0</sup> 49.4'W
NHEP	Nannie's Island	NHNI	oysters	43 <sup>0</sup> 04.1'N	-70 <sup>0</sup> 51.6'W
NHEP	Yankee Coop	NHYC	clams	42 <sup>0</sup> 53.9'N	-70 <sup>0</sup> 49.0'W
NHEP	Dover Point	NHDP	mussels	43 <sup>0</sup> 07.1"N	-70 <sup>0</sup> 49.4"W
NHEP	Schiller Station	NHSS	mussels	42 <sup>0</sup> 53.5'N	-70 <sup>0</sup> 49.0'W
DES	Hampton Harbor	NHHS	mussels	42 <sup>0</sup> 53.5'N	-70 <sup>0</sup> 49.0'W
DES	Little Harbor	NHLH	mussels	43 <sup>0</sup> 03.3'N	-70 <sup>0</sup> 43.0'W
DES	South Mill Pond	NHSM	mussels	43 <sup>0</sup> 04.5'N	-70 <sup>0</sup> 49.4'W
DES	Pierce Island	NHPI	mussels	43 <sup>0</sup> 04.3'N	-70 <sup>0</sup> 44.6'W
DES	Clark's Cove	MECC	mussels	43 <sup>0</sup> 04.4'N	-70 <sup>0</sup> 43.4'W
DES	Fox Point	NHFP	mussels	43 <sup>0</sup> 07.1'N	-70 <sup>0</sup> 45.6'W
<b>2002</b>					
NHEP	Middle Ground	NHMG	clams	42 <sup>0</sup> 53.4'N	-70 <sup>0</sup> 49.4'W

NHEP	Adams Point	NHAP	oysters	43 <sup>0</sup> 05.4'N	-70 <sup>0</sup> 51.8'W
NHEP	Dover Point	NHDP	mussels	43 <sup>0</sup> 07.1"N	-70 <sup>0</sup> 49.4"W
NHEP	Hampton Harbor	NHHS	mussels	42 <sup>0</sup> 53.5'N	-70 <sup>0</sup> 49.0'W
DES	Rye Harbor	NHRH	mussels	43 <sup>0</sup> 00.0'N	-70 <sup>0</sup> 44.4W
DES	North Mill Pond	NHNM	mussels	43 <sup>0</sup> 04.5'N	-70 <sup>0</sup> 45.6W
GOMC	Schiller Station	NHSS	mussels	42 <sup>0</sup> 53.5'N	-70 <sup>0</sup> 49.0W
GOMC	Clark's Cove	MECC	mussels	43 <sup>0</sup> 04.4'N	-70 <sup>0</sup> 43.4'W

Several annual data reports on the results of the Gulf of Maine-wide Gulfwatch program have been published (Chase, et al., 1998; Chase et al., 1997; Chase et al., 1996a; Chase et al., 1996b), as well as a New Hampshire Gulfwatch report for the 1998 results (Jones and Landry, 2000). A review of the results, program and logistics of the first five years of the Gulfwatch Program was published in 1998 (Jones et al., 1998), and an in-depth analysis of scientific findings for the first seven years has been recently published (Chase et al., 2001). The use of the Gulfwatch approach for a smaller area like coastal New Hampshire has also been analyzed (Jones et al, 2001).

All field sampling was conducted as outlined in Sowles et al. (1997). Collection times were set to avoid collecting during or shortly after periods when stormwater runoff and wave resuspension of bottom sediment could result in enhanced uptake and accumulation of sediment in the mussel gut. At each site, mussels were collected from four discrete areas within a segment of the shoreline that was representative of local water quality. Using a ruler to measure length, 45-50 mussels of 50-60 mm shell length were collected. The mussels were cleaned of all sediment, epibiota, and other accretions in clean seawater from the collection site, placed in clean containers, and then transported to the lab in coolers with ice packs. Prior to shucking, mussels were thoroughly rewashed to minimize tissue contamination from any remaining surface debris, and residual seawater was drained from the shells.

In the laboratory, individual mussel lengths, widths and heights (as defined by Seed, 1968) were determined to the nearest 0.1 mm using calipers. Using plastic or stainless steel wedges, mussels were shucked directly into appropriately prepared Mason jars for metal and organic analysis, respectively (for details see Sowles et al., 1997). Composite samples (20 mussels/composite; 4 composites/station) were capped, labeled and stored at -15 degrees Celsius.

The analytical procedures used, followed those reported for the previous years (Sowles et al., 1994, 1996; Chase et al., 1996a, b, 1997, 1998). Table 8 contains a summary of trace metal (inorganic) and organic compounds measured.

**Table 8 Inorganic and organic contaminants analyzed in shellfish tissues for the New Hampshire Gulfwatch Program**

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**INORGANIC CONTAMINANTS**

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**Metals**

Ag Al Cd Cr Cu Fe Hg Ni Pb Zn

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**ORGANIC CONTAMINANTS**

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<u>Aromatic Hydrocarbons</u>	<u>Chlorinated Pesticides</u>	<u>PCB Congeners</u>
		PCB 8
Naphthalene	Hexachlorobenzene (HCB)	PCB 18
1-Methylnaphthalene	gamma-hexachlorocyclohexane	PCB 28
2-Methylnaphthalene	Heptachlor	PCB 29
Biphenyl	Heptachlor epoxideAldrinMirex	PCB 44
2,6-Dimethylnaphthalene	cis-Chlordane	PCB 50
Acenaphthylene	trans-Nonachlor	PCB 52
Acenaphthene	Dieldrin	PCB 66
2,3,5-Trimethylnaphthalene	Alpha-endosulfan	PCB 77
Fluorene	beta-Endosulfan	PCB 87
Phenanthrene		PCB 101
Anthracene	<u>DDT and Homologues</u>	PCB 105
1-Methylphenanthrene		PCB 118
Flouranthene	2,4'-DDE	PCB 126
Pyrene	2,4'-DDD	PCB 128
Benzo [a] anthracene	2,4'-DDT	PCB 138
Chrysene	4,4'-DDE	PCB 153
Benzo [b] flouranthene	4,4'-DDD	PCB 169
Benzo [k] flouranthene	4,4'-DDT	PCB 170
Benzo [a] pyrene		PCB 180
Benzo [e] pyrene		PCB 187
Perylene		PCB 195
Indeno [1,2,3-cd] pyrene		PCB 206
Dibenzo [a,h] anthracene		PCB 209
Benzo [g,h,l] perylene		

**FIELD AND LABORATORY DATA**

**Ambient River Monitoring of Coastal Tributaries**

Ambient River data for both 2001 and 2002 are in Appendix A. The 2001 data were analyzed and reported in the DES third quarterly report submitted on March 9, 2002.

### **Ambient Microbial and Nutrient Monitoring of Estuarine Waters**

Microbial indicators data are provided in Appendix B. Nutrient and eutrophication indicator data are in Appendix C and were reported and analyzed in the DES third quarterly report submitted on March 9, 2002. In general, the data are well within the range of data collected from these locations in the past, and for Great Bay, similar to data collected during the same time period at other locations in the estuary. None of the data indicate any water quality problems.

### **Gulfwatch Monitoring: Toxic Contaminant Monitoring of Shellfish Tissue**

The laboratory results have not yet been received from the two laboratories. The 2001 Gulfwatch data are expected in July 2003. Once the data are received, a report will be written for all NH Gulfwatch data. The report will discuss the status and trends of toxic contaminants found in mussel tissue for estuarine waters. Emphasis will be placed on the potential impact of risks associated with contaminants found in the shellfish growing waters.

Landry and Jones (2001) reported on the 2000 Gulfwatch monitoring that was partially supported by the NHEP. The analytical data were not available for that report but are included in this report. Refer to Appendix D for 2000 Gulfwatch data.

## **RECOMMENDATIONS**

### **Ambient River Monitoring of Coastal Tributaries**

Monitoring should continue on a monthly basis at the nine coastal river sites to establish trends in ambient quality. Baseline conditions and trends will be important in regards to monitoring the success of the NHEP *Management Plan* implementation. Steps should be taken to ensure all agencies and organizations that are interested in the data have access to it.

### **Ambient Microbial and Nutrient Monitoring of Estuarine Waters**

NHEP is no longer involved in this work because DES currently administers the monitoring through the EPA-funded National Coastal Assessment program. Therefore, there are no recommendations because the goal of incorporating NHEP indicator monitoring into other long-term programs has been reached for these indicators.

### **Gulfwatch Monitoring: Toxic Contaminant Monitoring of Shellfish Tissue**

The *New Hampshire Estuaries Project Monitoring Plan* recommends annual mussel sampling at three locations (Portsmouth Harbor, Great Bay and Hampton/Seabrook Harbor) and semi-annual clam and oyster sampling at Hampton/Seabrook Harbor and Great Bay, respectively. The annual mussel monitoring appears to be funded through 2003 for all three sites. The mussel and clam monitoring support is unknown at this time.

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## APPENDIX A AMBIENT RIVER DATA FOR COASTAL TRIBUTARIES

### Physical Data

Station	River Name	Date	Time	Turbidity (NTU)	pH (units)	Water Temp (Celcius)	Air Temp (Celcius)	Conductivity (Uhoms/cm)
05-Ber	Berry's Bk	03/20/01	11:55	0.69	ND	2.3	ND	204
05-Lmp	Lamprey R	03/20/01	14:15	2.12	ND	2.2	ND	95.7
05-Sag	Sagamore Ck	03/20/01	12:20	4.49	ND	2	ND	248
05-Sfr	Salmon Falls R	03/20/01	15:15	1.51	ND	1.9	ND	91.3
09-Ext	Exeter R	03/20/01	13:28	2.53	ND	1.2	ND	112
05-Blm	Bellamy R	03/20/01	14:40	4.80	ND	3.3	ND	108.2
05-Oys	Oyster R	03/20/01	14:30	10.42	ND	2.7	ND	174.6
05-Sag	Sagamore Ck	03/23/01	9:45	2.93	6.30	1.1	ND	67.8
05-Blm	Bellamy R	03/23/01	11:40	8.60	6.40	1.3	ND	62
05-Sfr	Salmon Falls R	03/23/01	12:15	9.60	6.40	1.2	ND	57
05-Ber	Berry's Bk	03/23/01	10:05	3.95	6.40	1.8	ND	68
09-Ext	Exeter R	03/23/01	10:45	9.31	6.30	1.3	ND	43.9
05-Lmp	Lamprey R	03/23/01	11:15	9.64	6.20	1.6	ND	48.7
05-Oys	Oyster R	03/23/01	11:25	21.80	6.40	0.9	ND	63
05-Blm	Bellamy R	04/19/01	11:35	2.10	6.58	6.4	ND	81
05-Ber	Berry's Bk	04/19/01	9:50	0.60	5.09	6.1	ND	204.8
09-Ext	Exeter R	04/19/01	10:45	1.50	5.60	9.1	ND	119
05-Oys	Oyster R	04/19/01	11:20	3.60	6.46	8.8	ND	137.6
05-Sag	Sagamore Ck	04/19/01	10:15	3.50	7.36	6	ND	452
05-Sfr	Salmon Falls R	04/19/01	12:15	3.20	5.52	5.3	ND	63.5
05-Lmp	Lamprey R	04/19/01	11:00	0.95	5.83	8.7	ND	87.4
05-Blm	Bellamy R	05/15/01	12:25	4.50	6.56	15.7	ND	154.6
05-Lmp	Lamprey R	05/15/01	11:55	1.60	6.19	17.1	ND	151
05-Sag	Sagamore Ck	05/15/01	10:51	5.20	5.45	15.7	ND	1229
05-Ber	Berry's Bk	05/15/01	10:32	3.10	6.42	12.7	ND	293.3
05-Sfr	Salmon Falls R	05/15/01	13:19	2.60	5.69	16.2	ND	103.9
05-Oys	Oyster R	05/15/01	12:09	4.40	6.10	15.3	ND	229
09-Ext	Exeter R	05/15/01	11:20	2.40	6.51	16.6	ND	192.1
05-Blm	Bellamy R	06/20/01	10:35	4.00	6.49	26.4	ND	108.1
05-Oys	Oyster R	06/20/01	10:10	5.40	5.92	24.8	ND	207.1
05-Lmp	Lamprey R	06/20/01	9:55	2.50	6.06	25.2	ND	130.9
05-Sfr	Salmon Falls R	06/20/01	11:05	2.30	6.71	27.3	ND	97.3
05-Sag	Sagamore Ck	06/28/01	9:55	2.90	6.60	25.2	ND	715
05-Ber	Berry's Bk	06/28/01	9:35	1.90	6.29	23.4	ND	239
05-Blm	Bellamy R	07/23/01	12:37	4.80	7.63	27.7	ND	184.6
05-Lmp	Lamprey R	07/23/01	11:40	2.20	7.77	27.2	26.5	165.8
05-Sag	Sagamore Ck	07/23/01	10:40	2.10	7.53	24.4	26.2	1009
05-Oys	Oyster R	07/23/01	11:55	3.50	8.26	26.1	27.5	267.4
05-Ber	Berry's Bk	07/23/01	10:20	3.40	6.63	20.6	26.2	269.9
05-Sfr	Salmon Falls R	07/23/01	13:05	3.70	7.47	27.7	27.5	136.4
09-Ext	Exeter R	07/23/01	11:15	3.20	7.66	25.9	26.2	183.2
05-Blm	Bellamy R	08/14/01	12:00	3.30	7.17	24.3	ND	196.8
05-Lmp	Lamprey R	08/14/01	11:30	1.30	7.11	24.4	ND	176
05-Sag	Sagamore Ck	08/14/01	10:37	3.00	7.04	22.9	ND	1200
05-Oys	Oyster R	08/14/01	11:45	5.50	6.91	23	ND	387.4
05-Sfr	Salmon Falls R	08/14/01	12:45	2.20	7.47	24.9	ND	178.7
09-Ext	Exeter R	08/14/01	11:07	1.40	7.08	23.7	ND	200.4

05-Ber	Berry's Bk	08/14/01	10:20	13.00	6.32	20.5	ND	316.1
05-Sfr	Salmon Falls R	09/11/01	13:10	1.00	8.46	24.5	ND	190.7
05-Blm	Bellamy R	09/11/01	12:00	2.10	7.55	24.5	ND	187.2
09-Ext	Exeter R	09/11/01	11:00	0.75	7.35	23.6	ND	226.5
05-Lmp	Lamprey R	09/11/01	11:22	0.85	7.38	24.1	ND	186.4
05-Oys	Oyster R	09/11/01	11:34	1.70	7.94	24.5	ND	311.7
05-Sag	Sagamore Ck	09/11/01	10:18	3.00	7.60	22.7	ND	1336
05-Ber	Berry's Bk	09/11/01	10:05	ND	ND	ND	ND	ND
05-Lmp	Lamprey R	10/17/01	12:02	1.60	6.85	13.9	15.4	164.8
07-Cch	Cochecho R	10/17/01	14:00	5.10	5.69	13	12.6	127.4
09-Ext	Exeter R	10/17/01	11:25	1.70	6.74	13.9	16.0	179.3
05-Sfr	Salmon Falls R	10/17/01	14:16	2.40	6.11	13.9	12.6	153.8
05-Blm	Bellamy R	10/17/01	13:35	6.10	6.55	14.3	13.3	146.2
05-Sag	Sagamore Ck	10/17/01	10:55	45.00	6.77	13.9	12.5	898
05-Oys	Oyster R	10/17/01	12:40	39.00	5.92	13.6	13.1	238.6
05-Ber	Berry's Bk	10/17/01	10:25	5.60	5.68	12.3	12.4	350.3
05-Blm	Bellamy R	11/13/01	12:10	3.49	7.20	4.2	7.3	202.8
07-Cch	Cochecho R	11/13/01	12:25	2.95	6.90	5.1	7.3	111.3
09-Ext	Exeter R	11/13/01	11:00	2.80	7.10	5.7	5.4	245.9
05-Lmp	Lamprey R	11/13/01	11:30	1.17	6.90	5.5	5.4	99.7
05-Oys	Oyster R	11/13/01	11:55	3.65	7.40	4.8	7.3	369.4
05-Sag	Sagamore Ck	11/13/01	10:30	4.73	7.80	5.2	5.4	1395
05-Sfr	Salmon Falls R	11/13/01	12:40	1.85	6.90	5.8	6.7	112.8
05-Ber	Berry's Bk	11/13/01	10:10	2.70	6.00	1.7	5.4	524
05-Blm	Bellamy R	12/05/01	12:30	4.53	6.26	7.2	13.3	143.5
07-Cch	Cochecho R	12/05/01	13:25	3.32	6.35	6.9	17.2	119.6
05-Lmp	Lamprey R	12/05/01	11:50	1.23	6.27	8.3	13.4	101.4
05-Oys	Oyster R	12/05/01	12:05	3.08	5.78	8.1	13.3	213.6
05-Sag	Sagamore Ck	12/05/01	10:45	5.82	5.49	7.6	16.9	1480
05-Sfr	Salmon Falls R	12/05/01	13:10	1.87	6.11	8.1	17.2	90.8
05-Ber	Berry's Bk	12/05/01	10:30	0.65	4.72	6	16.9	418.5
09-Ext	Exeter R	12/05/01	11:10	3.17	6.11	7.4	13.4	243.4
05-Ber	Berry's Bk	03/19/02	9:55	0.40	5.43	3.7	4.5	164.4
05-Sag	Sagamore Ck	03/19/02	10:15	5.50	6.70	3.9	4.5	94.3
02-Wnc	Winnicut R	03/19/02	10:45	2.30	4.78	3.5	4.6	191.1
09-Ext	Exeter R	03/19/02	11:15	1.90	4.48	3.5	4.6	134.2
05-Lmp	Lamprey R	03/19/02	11:35	1.50	5.00	3.8	4.6	88.4
05-Oys	Oyster R	03/19/02	13:15	3.80	5.51	4.1	5.4	145.2
05-Blm	Bellamy R	03/19/02	13:30	3.30	5.33	3.3	5.4	92.1
07-Cch	Cochecho R	03/19/02	14:05	2.20	5.05	3.7	5.4	98.7
05-Sfr	Salmon Falls R	03/19/02	13:50	1.40	4.23	3.6	5.4	69.8
05-Ber	Berry's Bk	04/16/02	10:20	1.80	6.43	12.7	30.8	214.7
05-Sag	Sagamore Ck	04/16/02	10:35	7.00	7.55	14.6	30.8	799
02-Wnc	Winnicut R	04/16/02	11:00	3.50	6.93	14.5	30.8	260.6
09-Ext	Exeter R	04/16/02	11:25	1.90	6.75	15.8	30.8	147.8
05-Lmp	Lamprey R	04/16/02	11:55	1.20	6.65	16.6	30.8	127.8
05-Oys	Oyster R	04/16/02	12:10	5.80	7.04	15.7	30.8	159.3
05-Blm	Bellamy R	04/16/02	12:30	3.30	6.85	17.2	23.5	111.9
07-Cch	Cochecho R	04/16/02	1:10	3.30	6.89	14.6	23.4	156.1
05-Sfr	Salmon Falls R	04/16/02	12:55	1.60	6.46	15.2	23.5	102.3
05-Ber	Berry's Bk	05/14/02	10:10	1.30	5.80	8.8	7.2	214.3

05-Sag	Sagamore Ck	05/14/02	10:30	11.00	7.10	9.8	9.9	669
02-Wnc	Winnicut R	05/14/02	10:55	12.00	5.72	8.7	8.9	208.4
09-Ext	Exeter R	05/14/02	11:15	5.50	5.97	10.9	8.9	154.4
05-Lmp	Lamprey R	05/14/02	11:50	3.90	7.13	10.9	12.4	130.2
05-Oys	Oyster R	05/14/02	11:58	20.00	5.80	9.3	12.4	131.3
05-Blm	Bellamy R	05/14/02	12:35	10.00	6.02	7.5	12.4	102.5
07-Cch	Cochecho R	05/14/02	1:15	17.00	6.53	10.7	12.4	140
05-Sfr	Salmon Falls R	05/14/02	1:00	5.30	6.02	10.7	12.4	98.2
05-Ber	Berry's Bk	06/24/02	10:10	1.00	6.44	18.6	ND	219.8
05-Sag	Sagamore Ck	06/24/02	10:24	2.80	7.50	20.2	ND	610
02-Wnc	Winnicut R	06/24/02	10:32	6.40	6.91	19.7	ND	270.3
09-Ext	Exeter R	06/24/02	10:54	3.50	6.81	21	ND	150.5
05-Lmp	Lamprey R	06/24/02	11:18	2.80	6.90	20.4	ND	124.9
05-Oys	Oyster R	06/24/02	11:34	8.20	7.22	20.1	ND	174.2
05-Blm	Bellamy R	06/24/02	11:55	3.30	6.91	21.6	ND	101
07-Cch	Cochecho R	06/24/02	12:30	5.60	6.88	19.8	21.7	135.2
05-Sfr	Salmon Falls R	06/24/02	12:15	2.60	6.89	21	ND	101.7
05-Ber	Berry's Bk	06/25/02	12:05	ND	ND	19.2	ND	ND
05-Sag	Sagamore Ck	06/25/02	12:20	ND	ND	21.5	ND	ND
02-Wnc	Winnicut R	06/25/02	11:45	ND	ND	20.9	ND	ND
09-Ext	Exeter R	06/25/02	11:10	ND	ND	21.2	ND	ND
05-Lmp	Lamprey R	06/25/02	10:45	ND	ND	21.2	ND	ND
05-Ber	Berry's Bk	07/16/02	8:54	5.00	6.45	20	ND	263.8
05-Sag	Sagamore Ck	07/16/02	9:08	1.80	7.42	21.4	ND	1101
02-Wnc	Winnicut R	07/16/02	9:25	1.70	7.08	22.5	19.9	355.6
09-Ext	Exeter R	07/16/02	9:50	3.20	7.14	23.5	ND	184.5
05-Lmp	Lamprey R	07/16/02	10:11	3.00	7.43	25	23.4	154.7
05-Oys	Oyster R	07/16/02	10:25	4.60	7.41	24.2	ND	272
05-Blm	Bellamy R	07/16/02	10:50	4.40	7.44	24.4	ND	177.4
05-Sfr	Salmon Falls R	07/16/02	11:00	3.20	7.43	25.6	ND	160.8
07-Cch	Cochecho R	07/16/02	11:15	5.00	7.43	24.7	27.2	203.9
05-Ber	Berry's Bk	08/13/02	8:35	310.00	6.40	21.8	22.5	283.1
05-Sag	Sagamore Ck	08/13/02	8:50	11.00	7.39	23	22.5	151
02-Wnc	Winnicut R	08/13/02	9:10	1.20	7.72	24.8	22.5	402.1
09-Ext	Exeter R	08/13/02	9:30	3.30	7.70	26.4	22.5	250.1
05-Lmp	Lamprey R	08/13/02	9:52	1.30	7.58	26.2	26.3	186.3
05-Oys	Oyster R	08/13/02	10:10	2.90	7.42	25.7	26.3	333.8
05-Bel	Bellamy R	08/13/02	10:25	3.70	7.29	27	26.3	256.6
07-Cch	Cochecho R	08/13/02	11:00	1.10	8.00	27.2	27.2	322.2
05-Sfr	Salmon Falls R	08/13/02	10:43	1.40	7.86	27.1	27.1	210.1
05-Ber	Berry's Bk	09/24/02	8:50	13.00	6.34	16.6	ND	242.5
05-Sag	Sagamore Ck	09/24/02	9:11	4.10	6.91	20.6	14.5	1565
02-Wnc	Winnicut R	09/24/02	9:31	3.00	7.58	20.9	ND	362.5
09-Ext	Exeter R	09/24/02	9:53	5.50	6.96	21.1	ND	217.8
05-Lmp	Lamprey R	09/24/02	10:21	1.40	7.72	20.9	ND	185.9
05-Oys	Oyster R	09/24/02	10:36	18.00	6.75	6.75	16.9	300.5
05-Blm	Bellamy R	09/24/02	10:51	6.80	7.24	20.9	ND	184.1
07-Cch	Cochecho R	09/24/02	11:25	6.40	8.06	21.6	ND	364.4
05-Sfr	Salmon Falls R	09/24/02	11:09	1.60	7.17	21.7	ND	232.7
05-Ber	Berry's Bk	10/22/02	9:21	0.64	4.77	4.4	9.0	694
05-Sag	Sagamore Ck	10/22/02	9:55	7.03	7.56	8.4	6.4	1,018.00

02-Wnc	Winnicut R	10/22/02	10:17	4.36	6.06	9.1	5.2	331.6
09-Ext	Exeter R	10/22/02	10:45	3.16	5.84	9.9	21.4	237.4
05-Lmp	Lamprey R	10/22/02	11:22	1.86	6.72	9.8	7.1	232.9
05-Oys	Oyster R	10/22/02	11:43	5.40	7.14	9.2	7.9	287.6
05-Blm	Bellamy R	10/22/02	12:09	6.24	6.81	10	12.1	201.1
07-Cch	Cocheco R	10/22/02	12:58	3.53	6.35	9.5	14.5	151
05-Sfr	Salmon Falls R	10/22/02	12:39	2.02	6.61	11	10.3	159
05-Ber	Berry's Bk	11/26/02	9:25	0.20	5.80	3.4	6.9	3.256
05-Sag	Sagamore Ck	11/26/02	9:40	11.00	7.60	5.4	5.2	1,178.00
02-Wnc	Winnicut R	11/26/02	10:15	1.70	7.00	4.2	9.7	360.7
09-Ext	Exeter R	11/26/02	10:52	10.00	6.80	4.5	8.0	192.6
05-Lmp	Lamprey R	11/26/02	11:30	1.50	6.70	4	7.4	143.8
05-Oys	Oyster R	11/26/02	11:47	3.50	6.90	4.6	6.8	187.8
05-Blm	Bellamy R	11/26/02	12:16	2.80	6.80	4.9	5.4	124
07-Cch	Cocheco R	11/26/02	12:55	2.00	6.70	4.3	7.5	127.5
05-Sfr	Salmon Falls R	11/26/02	12:29	1.20	6.50	4	6.5	110.9
05-Ber	Berry's Bk	12/16/02	9:31	1.00	5.90	1	0.6	125
05-Sag	Sagamore Ck	12/16/02	9:56	15.00	7.30	2.2	2.4	310.5
02-Wnc	Winnicut R	12/16/02	10:17	4.90	6.80	0.3	2.2	108.7
09-Ext	Exeter R	12/16/02	10:46	26.00	6.60	0.4	1.2	84.7
05-Lmp	Lamprey R	12/16/02	11:30	4.20	6.70	0.40	3.1	71.5
05-Oys	Oyster R	12/16/02	11:51	9.20	6.80	0.6	1.9	79.8
05-Blm	Bellamy R	12/16/02	12:11	3.30	6.70	2.2	1.0	66.5
05-Sfr	Salmon Falls R	12/16/02	12:40	3.10	6.50	0.9	2.5	58.6
07-Cch	Cocheco R	12/16/02	13:02	5.10	6.80	0.5	2.4	81.1

Biological Data

Station	River Name	Date	Time	Dis_oxy (mg/L)	Dis_oxy (%sat)	BOD5 Qual	BOD5 (mg/L)	Chlor-a (mg/L)	E. coli<->	E. coli (cts/100mL)
05-Ber	Berry's Bk	03/20/01	11:55	6.85	49.9	< 4		0.54	<	10
05-Lmp	Lamprey R	03/20/01	14:15	13.5	97.7	< 4		0.76	<	10
05-Sag	Sagamore Ck	03/20/01	12:20	9.93	73.8	< 4		0.38	<	10
05-Sfr	Salmon Falls R	03/20/01	15:15	12.22	88.5	< 4		0.92	<	10
09-Ext	Exeter R	03/20/01	13:28	12.7	88.1	< 4		0.57		30
05-Blm	Bellamy R	03/20/01	14:40	12.1	92.3	< 4		0.9		40
05-Oys	Oyster R	03/20/01	14:30	13.1	96.5	< 4		1.47		50
05-Sag	Sagamore Ck	03/23/01	9:45	13.3	92.8		ND	ND		5
05-Blm	Bellamy R	03/23/01	11:40	12.65	89.4		ND	ND		20
05-Sfr	Salmon Falls R	03/23/01	12:15	13.6	95.7		ND	ND		30
05-Ber	Berry's Bk	03/23/01	10:05	11.9	85.7		ND	ND		110
09-Ext	Exeter R	03/23/01	10:45	12.62	88.9		ND	ND		130
05-Lmp	Lamprey R	03/23/01	11:15	12.79	91.5		ND	ND		170
05-Oys	Oyster R	03/23/01	11:25	13.25	94.9		ND	ND		270
05-Blm	Bellamy R	04/19/01	11:35	11.08	90.1	< 4		3.46		10
05-Ber	Berry's Bk	04/19/01	9:50	7.95	64.9	< 4		0.9	<	10
09-Ext	Exeter R	04/19/01	10:45	9.51	82.4	< 4		1.09		10
05-Oys	Oyster R	04/19/01	11:20	10.52	90.2	< 4		1.47		10
05-Sag	Sagamore Ck	04/19/01	10:15	10.61	86.1	< 4		1.82	<	10
05-Sfr	Salmon Falls R	04/19/01	12:15	11.9	93.8	< 4		1.09	<	10
05-Lmp	Lamprey R	04/19/01	11:00	10.64	89.5	< 4		1.09		20
05-Blm	Bellamy R	05/15/01	12:25	9.13	91.7	< 6		24.06	<	10
05-Lmp	Lamprey R	05/15/01	11:55	8.25	85.5	< 6		4.39	<	10
05-Sag	Sagamore Ck	05/15/01	10:51	9.96	100.3	< 6		2.37	<	10
05-Ber	Berry's Bk	05/15/01	10:32	5.86	55.2	< 6		3.46		20
05-Sfr	Salmon Falls R	05/15/01	13:19	8.37	58.2	< 6		7.11		20
05-Oys	Oyster R	05/15/01	12:09	8.76	87.7	< 6		32		60
09-Ext	Exeter R	05/15/01	11:20	6.99	71.5	< 6		5.14		100
05-Blm	Bellamy R	06/20/01	10:35	7.59	93.1	< 3		11.7		40
05-Oys	Oyster R	06/20/01	10:10	6.74	79.6	< 3		10.6		70
05-Lmp	Lamprey R	06/20/01	9:55	7.04	85.2	< 3		5.26		100
05-Sfr	Salmon Falls R	06/20/01	11:05	7.53	95	< 3		13.3		220
05-Sag	Sagamore Ck	06/28/01	9:55	5.97	72.5	< 3		1.61		79
05-Ber	Berry's Bk	06/28/01	9:35	2	23.6	< 3		1.78		100
05-Blm	Bellamy R	07/23/01	12:37	7.78	98.5	< 3		4.2	<	10
05-Lmp	Lamprey R	07/23/01	11:40	8.28	104.7	< 3		7.32		10
05-Sag	Sagamore Ck	07/23/01	10:40	7.53	90	< 3		ND	<	10
05-Oys	Oyster R	07/23/01	11:55	9.59	118.6	< 3		10		20
05-Ber	Berry's Bk	07/23/01	10:20	3.51	39.2	< 3		ND		50
05-Sfr	Salmon Falls R	07/23/01	13:05	8.36	106.4	< 3		8.56		50
09-Ext	Exeter R	07/23/01	11:15	8.14	101.2	< 3		19.62		70
05-Blm	Bellamy R	08/14/01	12:00	6.35	75.6	< 3		7.28		10
05-Lmp	Lamprey R	08/14/01	11:30	6.56	78.5	< 3		9.84	<	10
05-Sag	Sagamore Ck	08/14/01	10:37	6.02	70.1	< 3		3.79		10
05-Oys	Oyster R	08/14/01	11:45	2.43	28.2		4.8	40.41		20
05-Sfr	Salmon Falls R	08/14/01	12:45	ND	ND	< 3		9.76		50
09-Ext	Exeter R	08/14/01	11:07	5.13	60.6	< 3		10.76		60

05-Ber	Berry's Bk	08/14/01	10:20	2.22	24.7		6.5	26.44		160
05-Sfr	Salmon Falls R	09/11/01	13:10	9.29	111.5		ND	ND	<	5
05-Blm	Bellamy R	09/11/01	12:00	7.66	91.2		ND	ND	<	10
09-Ext	Exeter R	09/11/01	11:00	6.79	80.1		ND	ND	<	10
05-Lmp	Lamprey R	09/11/01	11:22	7.35	87.4		ND	ND	<	10
05-Oys	Oyster R	09/11/01	11:34	8.79	105.1		ND	ND	<	10
05-Sag	Sagamore Ck	09/11/01	10:18	7.9	87.9		ND	ND	<	10
05-Ber	Berry's Bk	09/11/01	10:05	ND	ND		ND	ND		ND
05-Lmp	Lamprey R	10/17/01	12:02	8.62	83.1	<	3	8.22		60
07-Cch	Cochecho R	10/17/01	14:00	9.45	89.7	<	3	4.74		160
09-Ext	Exeter R	10/17/01	11:25	6.62	64.2	<	3	6.07		160
05-Sfr	Salmon Falls R	10/17/01	14:16	9.4	90.9	<	3	11.19		480
05-Blm	Bellamy R	10/17/01	13:35	8.59	84.1	<	3	9.69		610
05-Sag	Sagamore Ck	10/17/01	10:55	8.22	80.1		4.5	6.08		1400
05-Oys	Oyster R	10/17/01	12:40	8.1	77.9	<	3	10.26		3400
05-Ber	Berry's Bk	10/17/01	10:25	4.55	43.2		4.4	7.94		10500
05-Blm	Bellamy R	11/13/01	12:10	11.18	85.7		2.8	13.42	<	5
07-Cch	Cochecho R	11/13/01	12:25	11.31	89.2	<	2.4	2.91	<	10
09-Ext	Exeter R	11/13/01	11:00	7.58	60.5	<	2.4	8.82		10
05-Lmp	Lamprey R	11/13/01	11:30	11.06	87.6	<	2.4	2.39	<	10
05-Oys	Oyster R	11/13/01	11:55	10.22	79.6		3.7	25.01	<	10
05-Sag	Sagamore Ck	11/13/01	10:30	10.4	81.9	<	2.4	4.05		10
05-Sfr	Salmon Falls R	11/13/01	12:40	10.86	86.7	<	2.4	4.03		30
05-Ber	Berry's Bk	11/13/01	10:10	8.32	59.9	<	2.4	1.11		80
05-Blm	Bellamy R	12/05/01	12:30	10.79	89.3	<	2.4	12.49	<	10
07-Cch	Cochecho R	12/05/01	13:25	12.34	101.8	<	2.4	9.89		10
05-Lmp	Lamprey R	12/05/01	11:50	11.16	94.9	<	2.4	4.93		10
05-Oys	Oyster R	12/05/01	12:05	10.26	87	<	2.4	5.88		10
05-Sag	Sagamore Ck	12/05/01	10:45	11.07	92.4	<	2.4	11.97	<	10
05-Sfr	Salmon Falls R	12/05/01	13:10	11.61	98.5	<	2.4	6.23		10
05-Ber	Berry's Bk	12/05/01	10:30	8.79	70.7	<	2.4	0.93		20
09-Ext	Exeter R	12/05/01	11:10	9.25	77	<	2.4	15.08		20
05-Ber	Berry's Bk	03/19/02	9:55	9.91	72.5	<	3	0.9		50
05-Sag	Sagamore Ck	03/19/02	10:15	11.48	87.1	<	3	5.5	<	10
02-Wnc	Winnicut R	03/19/02	10:45	24	181.5	<	3	1.99		10
09-Ext	Exeter R	03/19/02	11:15	27.62	207.4	<	3	2.37		20
05-Lmp	Lamprey R	03/19/02	11:35	12.46	99.4	<	3	3.63	<	10
05-Oys	Oyster R	03/19/02	13:15	16.33	124.9	<	3	4.29		20
05-Blm	Bellamy R	03/19/02	13:30	17.53	130.9	<	3	8.37		10
07-Cch	Cochecho R	03/19/02	14:05	19.26	145.4	<	3	4.15		10
05-Sfr	Salmon Falls R	03/19/02	13:50	17.6	133.2	<	3	3.65		40
05-Ber	Berry's Bk	04/16/02	10:20	18.35	173.7	<	3	7.21		30
05-Sag	Sagamore Ck	04/16/02	10:35	27.18	266.2		3	22.62		240
02-Wnc	Winnicut R	04/16/02	11:00	23.77	232.8	<	3	6.47		130
09-Ext	Exeter R	04/16/02	11:25	26.6	267.3	<	3	6.86		70
05-Lmp	Lamprey R	04/16/02	11:55	33.69	349	<	3	6.07		10
05-Oys	Oyster R	04/16/02	12:10	33.87	346.9	<	3	11.41		50
05-Blm	Bellamy R	04/16/02	12:30	35.08	364.9	<	3	10.67		30
07-Cch	Cochecho R	04/16/02	1:10	33.8	325.3	<	3	11.75		30
05-Sfr	Salmon Falls R	04/16/02	12:55	33.07	328.7	<	3	4.55		100
05-Ber	Berry's Bk	05/14/02	10:10	8.17	70	<	3	3.56		490

05-Sag	Sagamore Ck	05/14/02	10:30	5.97	52.7	< 3	6.83	430
02-Wnc	Winnicut R	05/14/02	10:55	5.04	43.1	< 3	3.1	670
09-Ext	Exeter R	05/14/02	11:15	9.95	90	< 3	3.98	750
05-Lmp	Lamprey R	05/14/02	11:50	11.19	101.2	< 3	2.54	980
05-Oys	Oyster R	05/14/02	11:58	11.73	102.1	< 3	4.22	730
05-Blm	Bellamy R	05/14/02	12:35	12.01	107.6	< 3	3.94	600
07-Cch	Cochecho R	05/14/02	1:15	11.1	100	3.3	5.09	310
05-Sfr	Salmon Falls R	05/14/02	1:00	11.31	101.6	< 3	2.94	990
05-Ber	Berry's Bk	06/24/02	10:10	ND	ND	< 3	2.54	300
05-Sag	Sagamore Ck	06/24/02	10:24	ND	ND	< 3	3.44	60
02-Wnc	Winnicut R	06/24/02	10:32	ND	ND	< 3	2.51	80
09-Ext	Exeter R	06/24/02	10:54	ND	ND	< 3	1.64	590
05-Lmp	Lamprey R	06/24/02	11:18	ND	ND	< 3	1.83	130
05-Oys	Oyster R	06/24/02	11:34	8.42	93.1	< 3	2.92	500
05-Blm	Bellamy R	06/24/02	11:55	8.15	108	< 3	3.44	80
07-Cch	Cochecho R	06/24/02	12:30	9.12	99.7	< 3	2.37	340
05-Sfr	Salmon Falls R	06/24/02	12:15	8.8	98.7	< 3	2.42	150
05-Ber	Berry's Bk	06/25/02	12:05	3.44	37	ND	ND	ND
05-Sag	Sagamore Ck	06/25/02	12:20	7.18	83.1	ND	ND	ND
02-Wnc	Winnicut R	06/25/02	11:45	4.8	53.1	ND	ND	ND
09-Ext	Exeter R	06/25/02	11:10	5.58	63.1	ND	ND	ND
05-Lmp	Lamprey R	06/25/02	10:45	7.59	83.6	ND	ND	ND
05-Ber	Berry's Bk	07/16/02	8:54	1.72	18.8	< 3	5.62	170
05-Sag	Sagamore Ck	07/16/02	9:08	6.03	68.1	< 3	9.03	30
02-Wnc	Winnicut R	07/16/02	9:25	5.95	68.7	< 3	14.48	10
09-Ext	Exeter R	07/16/02	9:50	5.89	69.4	< 3	16.81	1130
05-Lmp	Lamprey R	07/16/02	10:11	7.72	93	< 3	9.65	< 10
05-Oys	Oyster R	07/16/02	10:25	7.24	85.4	< 3	14.88	< 1200
05-Blm	Bellamy R	07/16/02	10:50	8.44	109	< 3	20.53	20
05-Sfr	Salmon Falls R	07/16/02	11:00	11	99.1	< 3	8.37	< 5
07-Cch	Cochecho R	07/16/02	11:15	7.88	94.9	< 3	11.09	150
05-Ber	Berry's Bk	08/13/02	8:35	1.77	19.7	> 6.6	114.69	420
05-Sag	Sagamore Ck	08/13/02	8:50	4.62	53.9	2.4	5.71	90
02-Wnc	Winnicut R	08/13/02	9:10	7.03	84.8	< 2.4	7.32	30
09-Ext	Exeter R	08/13/02	9:30	6.91	85.9	< 2.4	18.13	110
05-Lmp	Lamprey R	08/13/02	9:52	7.74	95.2	< 2.4	5.29	< 10
05-Oys	Oyster R	08/13/02	10:10	8.52	104.9	3.1	26.68	< 10
05-Bel	Bellamy R	08/13/02	10:25	7.27	91.5	< 2.4	2.35	< 10
07-Cch	Cochecho R	08/13/02	11:00	10.56	132.6	< 2.4	4.39	10
05-Sfr	Salmon Falls R	08/13/02	10:43	9.91	127.4	< 2.4	3.86	20
05-Ber	Berry's Bk	09/24/02	8:50	2.62	26.9	5.4	35.49	420
05-Sag	Sagamore Ck	09/24/02	9:11	6.9	76	2.9	30.43	240
02-Wnc	Winnicut R	09/24/02	9:31	5.59	62.7	4.4	41.48	1100
09-Ext	Exeter R	09/24/02	9:53	4.11	46.7	< 2.4	6.52	1090
05-Lmp	Lamprey R	09/24/02	10:21	8.11	90.9	< 2.4	5.86	90
05-Oys	Oyster R	09/24/02	10:36	5.3	58.3	< 2.4	16.42	1850
05-Blm	Bellamy R	09/24/02	10:51	6.29	70.6	< 2.4	7.47	610
07-Cch	Cochecho R	09/24/02	11:25	10.27	116.9	< 2.4	40.52	270
05-Sfr	Salmon Falls R	09/24/02	11:09	7.93	90.4	< 2.4	7.39	< 10
05-Ber	Berry's Bk	10/22/02	9:21	8.18	62.6	< 2.4	4.93	180
05-Sag	Sagamore Ck	10/22/02	9:55	8.62	73.5	< 2.4	2.77	10

02-Wnc	Winnicut R	10/22/02	10:17	5.74	4.98	< 2.4	6.42	10
09-Ext	Exeter R	10/22/02	10:45	6.74	59.1	< 2.4	3.48	690
05-Lmp	Lamprey R	10/22/02	11:22	9.99	88.3	< 2.4	3.86	30
05-Oys	Oyster R	10/22/02	11:43	10.31	89.4	< 2.4	6.97	< 10
05-Blm	Bellamy R	10/22/02	12:09	10.48	92.2	3	31.29	30
07-Cch	Cocheco R	10/22/02	12:58	11.63	101.6	< 2.4	4.53	20
05-Sfr	Salmon Falls R	10/22/02	12:39	10.52	95.4	< 2.4	5.62	30
05-Ber	Berry's Bk	11/26/02	9:25	10.23	76.5	< 2.4	0.55	110
05-Sag	Sagamore Ck	11/26/02	9:40	8.95	78	< 2.4	4.24	< 10
02-Wnc	Winnicut R	11/26/02	10:15	9.13	70.3	< 2.4	1.11	20
09-Ext	Exeter R	11/26/02	10:52	9.88	76.5	< 2.4	1.28	520
05-Lmp	Lamprey R	11/26/02	11:30	12.68	96.7	< 2.4	1.8	50
05-Oys	Oyster R	11/26/02	11:47	11.42	88.5	< 2.4	1.45	20
05-Blm	Bellamy R	11/26/02	12:16	12.05	94.2	< 2.4	5.5	50
07-Cch	Cocheco R	11/26/02	12:55	12.83	99.4	< 2.4	1.83	30
05-Sfr	Salmon Falls R	11/26/02	12:29	12.54	96	< 2.4	1.26	10
05-Ber	Berry's Bk	12/16/02	9:31	11.72	82.5	< 2.4	0.55	560
05-Sag	Sagamore Ck	12/16/02	9:56	11.45	83.3	< 2.4	0.92	170
02-Wnc	Winnicut R	12/16/02	10:17	11.86	81.8	< 2.4	1.28	290
09-Ext	Exeter R	12/16/02	10:46	12.84	88.8	< 2.4	1.61	1400
05-Lmp	Lamprey R	12/16/02	11:30	13.48	93.2	< 2.4	1.64	300
05-Oys	Oyster R	12/16/02	11:51	12.93	89.6	< 2.4	1.61	330
05-Blm	Bellamy R	12/16/02	12:11	12.58	91.5	< 2.4	2.75	70
05-Sfr	Salmon Falls R	12/16/02	12:40	12.85	89.8	< 2.4	1.28	160
07-Cch	Cocheco R	12/16/02	13:02	14.07	97.6	< 2.4	1.61	130



## Chemical Data

	River Name	Date	Time	NH <sub>3</sub> <> (mg/L)	NO <sub>2</sub> /NO <sub>3</sub> <> (mg/L)	NO <sub>2</sub> /NO <sub>3</sub> (mg/L)	TKN <> (mg/L)	TKN (mg/L)	TSS <> (mg/L)	TSS (mg/L)	TP (mg/L)
05-Ber	Berry's Bk	03/20/01	11:55	< 0.5	< 0.05			0.3		3	0.016
05-Lmp	Lamprey R	03/20/01	14:15	< 0.5		0.2		0.2		4	0.024
05-Sag	Sagamore Ck	03/20/01	12:20	< 0.5	< 0.05			0.3		16	0.025
05-Sfr	Salmon Falls R	03/20/01	15:15	< 0.5		0.27		0.2		1	0.026
09-Ext	Exeter R	03/20/01	13:28	< 0.5		0.19		0.3		4	0.03
05-Blm	Bellamy R	03/20/01	14:40	< 0.5		0.19		0.4		6	0.029
05-Oys	Oyster R	03/20/01	14:30	< 0.5		0.3		0.3		15	0.036
05-Sag	Sagamore Ck	03/23/01	9:45	ND		ND		ND		ND	ND
05-Blm	Bellamy R	03/23/01	11:40	ND		ND		ND		ND	ND
05-Sfr	Salmon Falls R	03/23/01	12:15	ND		ND		ND		ND	ND
05-Ber	Berry's Bk	03/23/01	10:05	ND		ND		ND		ND	ND
09-Ext	Exeter R	03/23/01	10:45	ND		ND		ND		ND	ND
05-Lmp	Lamprey R	03/23/01	11:15	ND		ND		ND		ND	ND
05-Oys	Oyster R	03/23/01	11:25	ND		ND		ND		ND	ND
05-Blm	Bellamy R	04/19/01	11:35	< 0.5		0.08		0.23		6	0.028
05-Ber	Berry's Bk	04/19/01	9:50	< 0.5	< 0.05			0.5		3	0.017
09-Ext	Exeter R	04/19/01	10:45	< 0.5		0.11		0.28		7	0.019
05-Oys	Oyster R	04/19/01	11:20	< 0.5		0.11		0.18		6	0.022
05-Sag	Sagamore Ck	04/19/01	10:15	< 0.5		0.05		0.87		3	0.019
05-Sfr	Salmon Falls R	04/19/01	12:15	< 0.5		0.08		0.24		4	0.018
05-Lmp	Lamprey R	04/19/01	11:00	< 0.5		0.07		0.24		4	0.018
05-Blm	Bellamy R	05/15/01	12:25	< 0.5	< 0.05			0.53		7	0.037
05-Lmp	Lamprey R	05/15/01	11:55	< 0.5		0.09		0.48	<	1	0.02
05-Sag	Sagamore Ck	05/15/01	10:51	< 0.5	< 0.05			0.41		7	0.02
05-Ber	Berry's Bk	05/15/01	10:32	< 0.5	< 0.05			0.88		2	0.04
05-Sfr	Salmon Falls R	05/15/01	13:19	< 0.5		0.19		0.63		2	0.033
05-Oys	Oyster R	05/15/01	12:09	< 0.5		0.13		0.54		4	0.042
09-Ext	Exeter R	05/15/01	11:20	< 0.5		0.14		0.61		3	0.028
05-Blm	Bellamy R	06/20/01	10:35	< 0.1	< 0.05			0.44		3.5	0.04
05-Oys	Oyster R	06/20/01	10:10	< 0.1		0.19		0.77		5	0.051
05-Lmp	Lamprey R	06/20/01	9:55	< 0.1		0.13		0.68		2.5	0.037
05-Sfr	Salmon Falls R	06/20/01	11:05	< 0.1		0.14		0.5	<	2	0.04
05-Sag	Sagamore Ck	06/28/01	9:55	< 0.1		0.11		0.4		6	0.028

05-Ber	Berry's Bk	06/28/01	9:35	< 0.1	< 0.05	1.1	7	0.048
05-Blm	Bellamy R	07/23/01	12:37	< 0.1	< 0.05	0.6	2.5	0.046
05-Lmp	Lamprey R	07/23/01	11:40	< 0.1	< 0.05	0.6	9.5	0.033
05-Sag	Sagamore Ck	07/23/01	10:40	< 0.1	< 0.05	0.2	8	0.014
05-Oys	Oyster R	07/23/01	11:55	< 0.1	< 0.05	0.7	< 1	0.036
05-Ber	Berry's Bk	07/23/01	10:20	< 0.1	< 0.05	1	10	0.043
05-Sfr	Salmon Falls R	07/23/01	13:05	< 0.1	0.2	1.2	3	0.072
09-Ext	Exeter R	07/23/01	11:15	< 0.1	< 0.05	0.8	9.5	0.041
05-Blm	Bellamy R	08/14/01	12:00	< 0.1	< 0.05	0.5	3.75	0.04
05-Lmp	Lamprey R	08/14/01	11:30	< 0.1	< 0.05	0.4	4	0.026
05-Sag	Sagamore Ck	08/14/01	10:37	< 0.1	< 0.05	0.3	6	0.023
05-Oys	Oyster R	08/14/01	11:45	< 0.1	< 0.05	1	11.5	0.103
05-Sfr	Salmon Falls R	08/14/01	12:45	0.2	0.31	0.7	3.75	0.074
09-Ext	Exeter R	08/14/01	11:07	< 0.1	< 0.05	0.4	1.5	0.028
05-Ber	Berry's Bk	08/14/01	10:20	< 0.1	< 0.05	1.9	33.5	0.155
05-Sfr	Salmon Falls R	09/11/01	13:10	< 0.1	0.16	0.7	3	0.045
05-Blm	Bellamy R	09/11/01	12:00	< 0.1	< 0.05	0.5	1	0.027
09-Ext	Exeter R	09/11/01	11:00	< 0.1	< 0.05	0.5	1	0.018
05-Lmp	Lamprey R	09/11/01	11:22	< 0.1	< 0.05	0.5	1	0.015
05-Oys	Oyster R	09/11/01	11:34	< 0.1	< 0.05	0.6	19	0.034
05-Sag	Sagamore Ck	09/11/01	10:18	< 0.1	< 0.05	0.4	12.5	0.028
05-Ber	Berry's Bk	09/11/01	10:05	ND	ND	ND	ND	ND
05-Lmp	Lamprey R	10/17/01	12:02	< 0.1	< 0.05	0.3	3.5	0.024
07-Cch	Cochecho R	10/17/01	14:00	0.2	0.5	0.6	6.5	0.086
09-Ext	Exeter R	10/17/01	11:25	< 0.1	< 0.05	0.4	2.5	0.03
05-Sfr	Salmon Falls R	10/17/01	14:16	0.1	0.37	0.4	7	0.052
05-Blm	Bellamy R	10/17/01	13:35	< 0.1	< 0.05	0.3	8	0.028
05-Sag	Sagamore Ck	10/17/01	10:55	< 0.1	0.06	0.2	45.5	0.074
05-Oys	Oyster R	10/17/01	12:40	0.1	0.19	0.7	ND	0.08
05-Ber	Berry's Bk	10/17/01	10:25	0.1	< 0.05	1.2	8.5	0.106
05-Blm	Bellamy R	11/13/01	12:10	< 0.1	< 0.05	0.3	1.5	0.027
07-Cch	Cochecho R	11/13/01	12:25	0.2	0.31	0.4	1.5	0.058
09-Ext	Exeter R	11/13/01	11:00	< 0.1	< 0.05	0.4	1.5	0.031
05-Lmp	Lamprey R	11/13/01	11:30	0.1	< 0.05	0.3	2.5	0.018
05-Oys	Oyster R	11/13/01	11:55	< 0.1	< 0.05	0.3	5	0.038
05-Sag	Sagamore Ck	11/13/01	10:30	< 0.1	< 0.05	0.2	6	0.019

05-Sfr	Salmon Falls R	11/13/01	12:40	< 0.1	0.17	0.3	2.5	0.037
05-Ber	Berry's Bk	11/13/01	10:10	0.1	< 0.05	0.3	2	0.022
05-Blm	Bellamy R	12/05/01	12:30	< 0.1	< 0.05	0.4	2	0.023
07-Cch	Cochecho R	12/05/01	13:25	0.1	1.25	0.4	0.05	0.095
05-Lmp	Lamprey R	12/05/01	11:50	< 0.1	0.06	0.3	2.5	0.013
05-Oys	Oyster R	12/05/01	12:05	< 0.1	0.22	0.3	2.5	0.021
05-Sag	Sagamore Ck	12/05/01	10:45	0.1	< 0.05	0.3	3.5	0.022
05-Sfr	Salmon Falls R	12/05/01	13:10	0.1	0.29	0.4	1.5	0.077
05-Ber	Berry's Bk	12/05/01	10:30	0.1	< 0.05	0.7	1.5	0.02
09-Ext	Exeter R	12/05/01	11:10	< 0.1	< 0.05	0.4	3	0.026
05-Ber	Berry's Bk	03/19/02	9:55	< 0.1	< 0.05	0.4	1	0.015
05-Sag	Sagamore Ck	03/19/02	10:15	< 0.1	0.08	0.3	2.5	0.016
02-Wnc	Winnicut R	03/19/02	10:45	< 0.1	0.17	0.3	3	0.016
09-Ext	Exeter R	03/19/02	11:15	< 0.1	0.09	0.3	13	0.015
05-Lmp	Lamprey R	03/19/02	11:35	< 0.1	0.15	0.2	14.5	0.018
05-Oys	Oyster R	03/19/02	13:15	< 0.1	0.26	0.2	15	0.018
05-Blm	Bellamy R	03/19/02	13:30	< 0.1	0.11	0.4	18.5	0.018
07-Cch	Cochecho R	03/19/02	14:05	< 0.1	0.55	0.4	19.5	0.03
05-Sfr	Salmon Falls R	03/19/02	13:50	0.1	0.14	0.2	17.5	0.019
05-Ber	Berry's Bk	04/16/02	10:20	< 0.1	< 0.05	1.1	5	0.029
05-Sag	Sagamore Ck	04/16/02	10:35	< 0.1	< 0.05	0.9	5.5	0.025
02-Wnc	Winnicut R	04/16/02	11:00	< 0.1	0.05	0.8	4.5	0.027
09-Ext	Exeter R	04/16/02	11:25	< 0.1	0.06	0.4	3.5	0.022
05-Lmp	Lamprey R	04/16/02	11:55	< 0.1	0.06	0.4	2	0.017
05-Oys	Oyster R	04/16/02	12:10	< 0.1	0.12	0.4	6	0.023
05-Blm	Bellamy R	04/16/02	12:30	< 0.1	< 0.05	0.4	5	0.025
07-Cch	Cochecho R	04/16/02	1:10	< 0.1	0.32	0.3	4.5	0.03
05-Sfr	Salmon Falls R	04/16/02	12:55	< 0.1	0.11	0.3	6.5	0.027
05-Ber	Berry's Bk	05/14/02	10:10	< 0.1	< 0.05	0.4	3	0.022
05-Sag	Sagamore Ck	05/14/02	10:30	< 0.1	0.08	0.6	5	0.025
02-Wnc	Winnicut R	05/14/02	10:55	< 0.1	0.1	0.5	9	0.05
09-Ext	Exeter R	05/14/02	11:15	< 0.1	0.06	0.5	6.5	0.032
05-Lmp	Lamprey R	05/14/02	11:50	< 0.1	0.08	0.4	ND	0.028
05-Oys	Oyster R	05/14/02	11:58	0.1	0.21	0.4	18.5	0.044
05-Blm	Bellamy R	05/14/02	12:35	< 0.1	0.17	0.3	7.5	0.037
07-Cch	Cochecho R	05/14/02	1:15	0.1	0.38	0.25	21	0.067

05-Sfr	Salmon Falls R	05/14/02	1:00	0.1	0.1	0.3	3.5	0.031
05-Ber	Berry's Bk	06/24/02	10:10	< 0.1	< 0.05	2.8	< 1	0.036
05-Sag	Sagamore Ck	06/24/02	10:24	< 0.1	< 0.05	0.6	< 1	0.024
02-Wnc	Winnicut R	06/24/02	10:32	0.1	0.07	1.3	1	0.056
09-Ext	Exeter R	06/24/02	10:54	0.1	0.09	0.6	< 1	0.044
05-Lmp	Lamprey R	06/24/02	11:18	0.1	0.09	0.7	< 1	0.031
05-Oys	Oyster R	06/24/02	11:34	0.1	0.21	0.9	< 1	0.041
05-Blm	Bellamy R	06/24/02	11:55	0.1	0.06	1.1	< 1	0.03
07-Cch	Cochecho R	06/24/02	12:30	0.1	0.27	0.4	< 1	0.049
05-Sfr	Salmon Falls R	06/24/02	12:15	< 0.1	0.1	0.6	< 1	0.022
05-Ber	Berry's Bk	06/25/02	12:05	ND	ND	ND	ND	ND
05-Sag	Sagamore Ck	06/25/02	12:20	ND	ND	ND	ND	ND
02-Wnc	Winnicut R	06/25/02	11:45	ND	ND	ND	ND	ND
09-Ext	Exeter R	06/25/02	11:10	ND	ND	ND	ND	ND
05-Lmp	Lamprey R	06/25/02	10:45	ND	ND	ND	ND	ND
05-Ber	Berry's Bk	07/16/02	8:54	< 0.1	< 0.05	1.3	16	0.056
05-Sag	Sagamore Ck	07/16/02	9:08	< 0.1	< 0.05	0.7	15.5	0.034
02-Wnc	Winnicut R	07/16/02	9:25	< 0.1	< 0.05	0.9	6.5	0.037
09-Ext	Exeter R	07/16/02	9:50	< 0.1	0.05	0.8	8	0.045
05-Lmp	Lamprey R	07/16/02	10:11	< 0.1	0.24	0.7	7	0.035
05-Oys	Oyster R	07/16/02	10:25	< 0.1	0.61	0.6	14	0.05
05-Blm	Bellamy R	07/16/02	10:50	< 0.1	< 0.05	0.4	7.5	0.054
05-Sfr	Salmon Falls R	07/16/02	11:00	< 0.1	0.6	0.5	9	0.04
07-Cch	Cochecho R	07/16/02	11:15	< 0.1	0.63	0.3	6.5	0.097
05-Ber	Berry's Bk	08/13/02	8:35	0.3	< 0.05	1.8	64	0.148
05-Sag	Sagamore Ck	08/13/02	8:50	1.2	< 0.05	0.7	4	0.034
02-Wnc	Winnicut R	08/13/02	9:10	< 0.1	< 0.05	0.5	1.5	0.021
09-Ext	Exeter R	08/13/02	9:30	< 0.1	< 0.05	<0.5	4	0.027
05-Lmp	Lamprey R	08/13/02	9:52	< 0.1	0.08	0.6	1	0.02
05-Oys	Oyster R	08/13/02	10:10	< 0.1	< 0.05	<0.5	3.5	0.05
05-Bel	Bellamy R	08/13/02	10:25	< 0.1	< 0.05	0.5	< 1	0.034
07-Cch	Cochecho R	08/13/02	11:00	< 0.1	0.5	<0.5	< 1	0.023
05-Sfr	Salmon Falls R	08/13/02	10:43	< 0.1	< 0.05	<0.5	< 1	0.024
05-Ber	Berry's Bk	09/24/02	8:50	0.3	< 0.05	2.1	22.5	0.812
05-Sag	Sagamore Ck	09/24/02	9:11	< 0.01	< 0.05	0.8	15	0.069
02-Wnc	Winnicut R	09/24/02	9:31	< 0.1	< 0.05	1	32.5	0.148

09-Ext	Exeter R	09/24/02	9:53	< 0.1	0.08	0.4	7	0.066
05-Lmp	Lamprey R	09/24/02	10:21	< 0.1	< 0.05	0.3	3.5	0.025
05-Oys	Oyster R	09/24/02	10:36	< 0.1	0.19	0.2	17	0.087
05-Blm	Bellamy R	09/24/02	10:51	< 0.1	< 0.05	0.3	6.5	0.046
07-Cch	Cochecho R	09/24/02	11:25	< 0.1	0.83	0.6	9	0.053
05-Sfr	Salmon Falls R	09/24/02	11:09	< 0.1	0.25	0.4	3.5	0.05
05-Ber	Berry's Bk	10/22/02	9:21	< 0.1	< 0.05	1	1	0.026
05-Sag	Sagamore Ck	10/22/02	9:55	< 0.1	< 0.05	0.6	7	0.027
02-Wnc	Winnicut R	10/22/02	10:17	< 0.1	0.39	0.8	4.5	0.055
09-Ext	Exeter R	10/22/02	10:45	< 0.1	0.08	0.6	3	0.031
05-Lmp	Lamprey R	10/22/02	11:22	< 0.1	0.13	0.3	1.5	0.022
05-Oys	Oyster R	10/22/02	11:43	< 0.1	0.25	0.4	5	0.032
05-Blm	Bellamy R	10/22/02	12:09	< 0.1	0.1	0.6	6.5	0.042
07-Cch	Cochecho R	10/22/02	12:58	< 0.1	0.39	0.5	2.5	0.057
05-Sfr	Salmon Falls R	10/22/02	12:39	< 0.1	0.57	0.4	2	0.047
05-Ber	Berry's Bk	11/26/02	9:25	< 0.1	< 0.05	0.8	1.5	0.015
05-Sag	Sagamore Ck	11/26/02	9:40	0.1	0.19	0.5	12.5	0.031
02-Wnc	Winnicut R	11/26/02	10:15	< 0.1	0.1	0.6	1	0.023
09-Ext	Exeter R	11/26/02	10:52	< 0.1	0.1	0.6	17	0.069
05-Lmp	Lamprey R	11/26/02	11:30	< 0.1	0.12	0.4	3	0.012
05-Oys	Oyster R	11/26/02	11:47	< 0.1	0.37	0.6	3	0.022
05-Blm	Bellamy R	11/26/02	12:16	< 0.1	0.1	0.6	3.5	0.022
07-Cch	Cochecho R	11/26/02	12:55	< 0.1	0.23	0.2	3.5	0.019
05-Sfr	Salmon Falls R	11/26/02	12:29	< 0.1	0.15	0.3	2.5	0.021
05-Ber	Berry's Bk	12/16/02	9:31	< 0.1	0.12	0.5	< 1	0.033
05-Sag	Sagamore Ck	12/16/02	9:56	< 0.1	0.21	< 0.25	10	0.041
02-Wnc	Winnicut R	12/16/02	10:17	< 0.1	0.21	0.3	2.5	0.036
09-Ext	Exeter R	12/16/02	10:46	< 0.1	0.19	0.3	31	0.114
05-Lmp	Lamprey R	12/16/02	11:30	< 0.1	0.16	0.3	3.5	0.03
05-Oys	Oyster R	12/16/02	11:51	< 0.1	0.46	0.4	6	0.049
05-Blm	Bellamy R	12/16/02	12:11	< 0.1	0.08	< 0.25	2	0.029
05-Sfr	Salmon Falls R	12/16/02	12:40	< 0.1	0.19	< 0.25	2.5	0.032
07-Cch	Cochecho R	12/16/02	13:02	< 0.5	0.35	< 0.25	4.5	0.036

## APPENDIX B AMBIENT MICROBIAL DATA FOR ESTUARINE WATERS

STATION	DATE	QUAL	E. coli (cts/100mL)	QUAL	Enterococci (cts/100mL)
GB20	5/17/01	=	8	=	2
GB50	5/17/01	<	10	=	4
GB4A	5/17/01	<	10	=	8
GB16	5/17/01	<	10	=	12
GB2	5/17/01	<	10	=	1
GB20	6/28/01	=	10	=	6
GB50	6/28/01	<	10	=	1
GB4A	6/28/01	<	10	=	0
GB16	6/28/01	=	10	=	3
GB2	6/28/01	<	10	=	5
GB20 DUP	6/28/01	=	10	=	6
GB20	7/25/01	=	20	=	10
GB50	7/25/01	<	10	<	10
GB4A	7/25/01	<	10	<	10
GB16	7/25/01	<	10	<	10
GB2	7/25/01	<	5	=	5
GB20	8/27/01	=	10	=	5
GB50	8/27/01	<	10	<	10
GB4A	8/27/01	<	10	<	10
GB16	8/27/01	<	10	<	10
GB2	8/27/01	<	10	<	10
GB20	9/6/01	<	10	=	10
GB50	9/6/01	<	10	<	10
GB4A	9/6/01	<	10	<	10
GB16	9/6/01	<	10	=	10
GB2	9/6/01	<	5	<	5
LHB6	5/3/01	=	5	=	4
LHB13	5/3/01	=	1	=	1
LHB6	6/27/01	=	130	>	200
LHB13	6/27/01	=	10	=	2
LHB6	7/12/01	=	2	=	3
LHB13	7/12/01	=	0	=	2
LHB6	8/13/01	<	10	=	10
LHB13	8/13/01	<	10	<	5
LHB6	9/5/01	=	10	=	60
LHB13	9/5/01	<	10	=	20

HH10	5/21/01	=	1	=	4
HH19	5/21/01	=	0	=	1
HH2B	5/21/01	=	0	=	10
HH1A	5/21/01	=	0	=	5
HH10	6/12/01	=	3	=	30
HH2B	6/12/01	<	10	=	80
HH19	6/12/01	=	70	=	240
HH1A	6/12/01	=	30	=	20
HH10	7/16/01	<	10	=	2
HH2B	7/16/01	<	10	=	0
HH19	7/16/01	=	10	=	3
HH1A	7/16/01	<	10	=	1
HH10	8/23/01	=	10	=	50
HH2B	8/23/01	=	50	=	40
HH19	8/23/01	=	60	=	60
HH1A	8/23/01	=	100	=	40
HH10	9/25/01	<	10	<	10
HH2B	9/25/01	=	10	=	10
HH19	9/25/01	=	10	=	10
HH1A	9/25/01	=	80	=	10
DUP/HH10	9/25/01	=	30	=	10

## APPENDIX C AMBIENT NUTRIENT DATA FOR ESTUARINE WATERS

<u>TSS</u> (mg/L)						<u>CHL</u> (mg/L)					
	GB2	GB4A	GB16	GB20	GB50		GB2	GB4A	GB16	GB20	GB50
3/28/97	7.60			5.00	9.40	3/28/97	1.02			0.96	0.96
4/11/97	7.40	19.20	23.50	16.00	7.20	4/11/97	2.18	3.50	4.37	0.95	2.23
5/16/97	11.00	37.20	16.20	6.00	28.20	5/16/97	2.20	2.18	1.62	0.70	
6/27/97	19.00	18.80	37.20	8.80	12.00	6/27/97	4.91	6.07	21.05	2.42	5.73
7/24/97	9.80	15.60	17.00	10.40	10.80	7/24/97	1.84	3.12	3.00	3.96	2.40
8/26/97	9.20	4.80	7.40	4.60	5.40	8/26/97	2.74	2.88	2.34	4.99	3.64
9/5/97	12.80	17.00	12.60	9.00	13.20	9/5/97	0.58	1.20	1.16	3.36	1.24
10/9/97	11.20	36.60	13.60	9.40	10.00	10/9/97	0	1.7	2.12	1.84	0.94
11/4/97	8.60	5.80	4.00	4.80	5.40	11/4/97	0.45	0.82	2.18	0.69	1.01
12/9/97	11.00	8.60	10.00	6.80	11.20	12/9/97	2.59	4.53	3.65	1.5	4.43
<b>Mean</b>	10.76	18.18	15.72	8.08	11.28	<b>Mean</b>	1.85	2.89	4.61	2.14	2.51

  

<u>POM</u> (mg/L)						<u>POM</u> (mg/L)					
	GB2	GB4A	GB16	GB20	GB50		GB2	GB4A	GB16	GB20	GB50
3/28/97	2.20			1.20	1.60	3/28/97	5.32			3.73	2.70
4/11/97	1.40	3.20	4.25	2.00	2.40	4/11/97	1.61	2.02	1.48	1.60	1.50
5/16/97	2.60	7.60	3.80	2.40	5.80	5/16/97	3.68	6.17	5.04		4.63
6/27/97	4.40	3.80	7.80	2.20	3.80	6/27/97	3.45	3.64	1.75	2.15	4.85
7/24/97	1.60	2.20	2.60	2.00	1.60	7/24/97	1.65		0.41	5.00	1.27
8/26/97	1.40	0.20	0.40	0.40	0.60	8/26/97	1.15	0.19	0.19	3.74	1.58
9/5/97	1.80	2.40	1.80	2.40	2.20	9/5/97	1.80	0.24	0.12	1.63	0.66
10/9/97	0.00	0.00	0.00	0.00	0.00	10/9/97	3.70	1.92	1.02	13.14	2.67
11/4/97	0.00	0.00	0.00	0.00	0.00	11/4/97					
12/9/97	2.80	2.60	2.20	1.80	2.00	12/9/97					
<b>Mean</b>	1.82	2.44	2.54	1.44	2.00	<b>Mean</b>	2.80	2.36	1.43	4.43	2.48

  

<u>TSS</u> (mg/L)					<u>CHLa</u> (mg/L)				
	T13	T17	LHB6	LHB13		T13	T17	LHB6	LHB13
3/14/97	28.00	16.80			3/14/97	2.90	1.38		



4/15/97	7.60	4.00			4/15/97	0.80	0.94		
5/2/97			11.20	7.80	5/2/97			1.16	1.18
6/26/97			11.50	15.60	6/26/97			7.09	1.88
7/11/97			13.80	14.80	7/11/97			4.30	0.64
8/12/97			10.00	6.00	8/12/97			2.16	1.42
9/4/97			11.60	4.60	9/4/97			0.64	1.08
10/29/97			12.20	3.60	10/29/97			0.50	0.74
11/5/97			31.80	34.00	11/5/97			1.08	0.86
12/5/97			12.40	9.80	12/5/97			1.34	1.20
<b>Mean</b>	17.80	10.40	14.31	12.03	<b>Mean</b>	1.85	1.16	2.28	1.13

<u>POM</u> (mg/L)					<u>NO<sub>2</sub>+NO<sub>3</sub></u> (mg/L)				
	T13	T17	LHB6	LHB13		T13	T17	LHB6	LHB13
3/14/97	3.67	2.40			3/14/97	10.0	7.85		
4/15/97	1.60	0.60			4/15/97	2.40	7.44		
5/2/97			1.60	1.00	5/2/97			5.08	3.14
6/26/97			5.80	4.20	6/26/97			0.35	1.02
7/11/97			2.80	2.40	7/11/97				
8/12/97			2.40	1.00	8/12/97			0.81	0.97
9/4/97			2.40	1.20	9/4/97			0.89	1.16
10/29/97			0.00	0.00	10/29/97				
11/5/97			6.00	6.60	11/5/97				
12/5/97			2.60	2.20	12/5/97				
<b>Mean</b>	2.64	1.50	2.95	2.33	<b>Mean</b>	6.24	7.65	1.78	1.57

## APPENDIX D 2000 GULFWATCH DATA FOR SHELLFISH TISSUE

### Gulfwatch Metals Data for 2000

	AL	CD	CR	CU	FE	PB	HG	NI	% Solids	AG	ZN
<b>Maine Samples</b>											
MECC1N	300	2	3.1	9.7	670	5.8	1.1	2.7	12	ND 0.1	130
MECC2N	400	2.3	4.2	12	1000	8.3	0.8	3	11.2	ND 0.1	150
MECC3N	300	2	3	12	700	6.9	0.9	2.9	10.6	ND 0.1	120
MECC4N	300	1.6	3.2	11	790	6.6	0.5	2.7	12.6	ND 0.1	110
<b>Mean</b>	<b>325</b>	<b>2.0</b>	<b>3.4</b>	<b>11.2</b>	<b>790</b>	<b>6.9</b>	<b>0.83</b>	<b>2.8</b>	<b>11.6</b>	<b>#DIV/0!</b>	<b>128</b>
<b>St. Dev.</b>	<b>50</b>	<b>0.3</b>	<b>0.6</b>	<b>1.1</b>	<b>149</b>	<b>1.0</b>	<b>0.25</b>	<b>0.1</b>	<b>0.9</b>	<b>#DIV/0!</b>	<b>17</b>
	AL	CD	CR	CU	FE	PB	HG	NI	% Solids	AG	ZN
<b>New Hampshire Samples</b>											
NHDP1N	200	2	2	8	440	3	1	3	14	ND 0.1	160
NHDP2N	200	2	3	8	520	3	1	3	13	ND 0.1	140
NHDP3N	300	2	3	8	660	4	0	3	14	ND 0.1	110
NHDP4N	200	2	3	7	440	3	1	3	14	ND 0.1	110
<b>Mean</b>	<b>225</b>	<b>2.3</b>	<b>2.8</b>	<b>7.9</b>	<b>515</b>	<b>3.2</b>	<b>0.68</b>	<b>2.7</b>	<b>14.0</b>	<b>#DIV/0!</b>	<b>130</b>
<b>St. Dev.</b>	<b>50</b>	<b>0.1</b>	<b>0.4</b>	<b>0.6</b>	<b>104</b>	<b>0.6</b>	<b>0.36</b>	<b>0.1</b>	<b>0.4</b>	<b>#DIV/0!</b>	<b>24</b>
NHNM1N	200	2	2	9	510	6	0	3	12	ND 0.1	130
NHNM2N	200	2	2	9	600	7	1	2	13	ND 0.1	140
NHNM3N	500	2	4	11	1200	11	1	2	11	0	240
NHNM4N	200	2	2	8	490	5	1	3	12	ND 0.1	140
<b>Mean</b>	<b>275</b>	<b>2.1</b>	<b>2.8</b>	<b>9.5</b>	<b>700</b>	<b>7.1</b>	<b>0.70</b>	<b>2.5</b>	<b>12.3</b>	<b>0.2</b>	<b>163</b>
<b>St. Dev.</b>	<b>150</b>	<b>0.2</b>	<b>1.1</b>	<b>1.1</b>	<b>337</b>	<b>2.8</b>	<b>0.24</b>	<b>0.2</b>	<b>0.8</b>	<b>#DIV/0!</b>	<b>52</b>
NHHR1N	110	1	1	10	320	2	0	2	17	0	120
NHHR2N	200	1	1	10	420	2	0	2	17	0	99
NHHR3N	160	1	1	9	360	2	0	2	17	0	100
NHHR4N	110	1	1	9	270	2	0	2	18	0	110
<b>Mean</b>	<b>145</b>	<b>1.2</b>	<b>1.1</b>	<b>9.4</b>	<b>343</b>	<b>1.8</b>	<b>0.18</b>	<b>2.1</b>	<b>17.3</b>	<b>0.1</b>	<b>107</b>

<b>St. Dev.</b>	<b>44</b>	<b>0.2</b>	<b>0.0</b>	<b>0.5</b>	<b>63</b>	<b>0.4</b>	<b>0.05</b>	<b>0.1</b>	<b>0.2</b>	<b>0.0</b>	<b>10</b>
NHRH1N	100	2	1	7	360	2	0	3	16	ND 0.1	110
NHRH2N	81	2	1	7	330	4	1	3	15	ND 0.1	100
NHRH3N	200	2	2	12	600	5	1	4	16	ND 0.1	150
NHRH4N	110	2	2	7	440	3	1	3	15	ND 0.1	100
<b>Mean</b>	<b>123</b>	<b>1.8</b>	<b>1.7</b>	<b>8.2</b>	<b>433</b>	<b>3.6</b>	<b>0.70</b>	<b>2.9</b>	<b>15.4</b>	<b>#DIV/0!</b>	<b>115</b>
<b>St. Dev.</b>	<b>53</b>	<b>0.4</b>	<b>0.5</b>	<b>2.6</b>	<b>121</b>	<b>1.3</b>	<b>0.29</b>	<b>0.5</b>	<b>1.0</b>	<b>#DIV/0!</b>	<b>24</b>
NHSS1N	120	2	2	8	330	3	1	2	13	0	110
NHSS2N	100	2	2	7	280	3	1	3	12	ND 0.1	110
NHSS3N	190	3	2	8	450	4	1	3	12	0	130
NHSS4N	140	2	2	9	340	3	1	3	13	0	120
<b>Mean</b>	<b>138</b>	<b>2.1</b>	<b>2.0</b>	<b>7.8</b>	<b>350</b>	<b>3.1</b>	<b>0.85</b>	<b>2.6</b>	<b>12.5</b>	<b>0.2</b>	<b>118</b>
<b>St. Dev.</b>	<b>39</b>	<b>0.4</b>	<b>0.2</b>	<b>0.7</b>	<b>72</b>	<b>0.4</b>	<b>0.13</b>	<b>0.1</b>	<b>0.7</b>	<b>0.2</b>	<b>10</b>