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Shellfish Tissue Monitoring in New Hampshire Estuaries 2003 and 2004

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Shellfish Tissue Monitoring in New Hampshire Estuaries 2003 and 2004

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A Final Report to

The New Hampshire Estuaries Project
University of New Hampshire
Durham, New Hampshire

Submitted by

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INTRODUCTION

Conducted by a committee of Canadian and US government and university scientists, Gulfwatch examines the effects of decades of development and industrialization on the water quality of the Gulf as it relates to human health as well as its impact on other marine organisms. Gulfwatch scientists collect blue mussels at over 60 US and Canadian sites Gulf-wide, and analyze the organisms' tissue for potentially harmful levels and concentrations of toxins including heavy metals, chlorinated pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs).

New Hampshire increased the number of Gulfwatch sampling locations from two sites per year in 1997 to an average of five sites per year from 1998-2004. The increased spatial coverage provides comprehensive information for contaminant concentrations throughout the New Hampshire estuarine waters.

All samples collected for the Gulfwatch monitoring program, from the Canadian provinces as well as the New England states involved, have been sent to the same laboratories for analysis. All of the samples have been analyzed at the same time in the same laboratories in an effort to reduce error and variability. This practice has ensured the consistency that was necessary to generate an accurate overall picture of the health of the Gulf.

During the 2003 and 2004 sampling seasons, mussels were collected at 5 sampling locations in New Hampshire. In 2003 and 2004, the Gulf of Maine Council covered the costs for analyzing two and three of the sampling locations, respectively. The NHEP covered the costs for analyzing the remaining three locations in 2003 and two locations in 2004. The Gulfwatch tasks from the 2003 and 2004 agreements between DES and the NHEP are listed below.

Gulfwatch Task from the 2003 Memorandum of Agreement between the Office of State Planning (the former NHEP host) and the Department of Environmental Services

> DES will hire a subcontractor to analyze shellfish tissue (blue mussel) samples taken from three Gulfwatch sites in 2003. The three sites to be tested in 2003 are MECC (Portsmouth Harbor, Clark Cove), NHDP (Dover Point), and NHHS (Hampton Seabrook Harbor). Four replicates will be collected at each site, for a total of 12 samples/year. Each sample will be analyzed for organics and metals @ $450/sample. The sample collection and analysis procedures will follow the Gulfwatch Program QA Project Plan. The results of the analyses will be sent to the NHEP Coastal Scientist in an Excel spreadsheet after they have been quality assured. Up to $5,400 in federal funds may be used for this task. Implementation of this activity is relevant to NHEP Management Plan action SHL-6. [Workplan reference #: 02-B-2]

Gulfwatch Task from the 2004 Memorandum of Agreement between the Office of Energy and Planning (the former NHEP host) and the Department of Environmental Services

> DES will hire a subcontractor to analyze shellfish tissue (blue mussel) samples taken from two Gulfwatch sites in 2004. The two sites to be tested in 2004 are NHDP (Dover Point) and NHHS (Hampton-Seabrook Harbor). Four replicates will be collected at each site, for a total of 8 samples per year. Each sample will be analyzed for organics and metals at $676 per sample. The sample collection and analysis procedures will follow the Gulfwatch Program QA Project Plan. The results of the analyses will be sent to the NHEP Coastal Scientist in an Excel spreadsheet after they have been quality assured. Up to $5,410 of NHEP funds may be used for this task and will be matched by at least $5,410 in non-federal funds. Implementation of this activity is relevant to NHEP Management Plan action SHL-6. [Workplan reference: 04-M-2]

The funding originally allocated for the NHEP Gulfwatch samples was $5,400 and $5,410 in 2003 and 2004, respectively. These allocations were based on analytical cost estimates of $1,800/site in 2003 and $2,704/site in 2004. In 2003, the Gulfwatch Program changed laboratories and the analytical costs increased to $2,882/site. In addition, the Association of U.S. Delegates to the Gulf of Maine Council began to charge a 13% indirect cost for its contracts with DES. Therefore, the original allocations were not sufficient to cover the actual laboratory costs and indirect charges. With the approval of the NHEP Director, DES used NHEP funds allocated for the DES Ambient Rivers Monitoring Program to make up the balance of the costs. In 2003 and 2004, $2,784 and $354, respectively, were added to the Gulfwatch allocations. The Association of U.S. Delegates to the Gulf of Maine Council agreed to waive the indirect cost charges in 2003 and 2004. Therefore, the total cost of the laboratory analyses for the NHEP samples was $8,184 in 2003 and $5,764 in 2004.

PROJECT GOALS AND OBJECTIVES

The goal of this project was to provide data for two NHEP indicators of estuarine condition: TOX1 and TOX3. These two indicators report on "Shellfish tissue concentrations relative to FDA standards" and "Trends in shellfish tissue contaminant concentrations", respectively. Both of these indicators depend on data from the Gulfwatch Program. In particular, TOX3 requires annual data at benchmark sites to assess trends. In 2003 and 2004, the NHEP supported the collection and analysis of tissue samples from benchmark sites in Portsmouth Harbor, Hampton-Seabrook Harbor and Dover Point.

METHODS

Blue mussel samples were collected from five locations in 2003 and 2004. The station visits and field data have been documented in two interim reports (Appendix A and Appendix B). The NHEP provided funding to analyze samples from three stations in 2003 and two stations in 2004. In 2003, the NHEP samples were collected from Hampton-Seabrook Harbor (NHHS), Dover Point (NHDP) and Portsmouth Harbor (MECC). In 2004, the NHEP samples were collected from Hampton-Seabrook Harbor (NHHS) and Dover Point (NHDP). The stations sampled match the requirements of the contracts between the NHEP and DES.

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 sets of samples to be analyzed for inorganic contaminants were delivered to the Battelle Marine Sciences Laboratory in Sequim, Washington. The mussels prepared for organic contaminant analysis were delivered to the Environment Canada, ECB Laboratory in Moncton, New Brunswick. The analytical procedures for organic contaminant analysis followed Sowles et al. (1997). The analytical procedures for metals analysis are described in Appendix C. Table 1 contains a summary of the trace metal (inorganic) and organic compounds measured in the mussel tissue.

The data were quality assured by the individual laboratories following the procedures in Sowles et al. (1997) and Appendix C. In addition, the data were compared to results from the same station previously to identify any outliers. The results from the individual replicates samples were plotted to identify any samples with large variance within the sample.

NH Gulfwatch procedures for aggregating congeners, testing for normality, and calculating descriptive statistics were followed (Chase et al., 2001). In particular, to calculate total PCBs, PAHs, DDTs and pesticides, the concentrations of detected congeners were summed. Results that were below the analytical detection limit were excluded from the total.

Table 1: Target analytes for tissue analysis

Metals	Polycyclic Aromatic Hydrocarbons	Polychlorinated Biphenyls	Pesticides
Hg	Naphthalene	8;5	Hexachlorobenzene
Ag	1-Methylnaphthalene	18;15	Heptachlor
Cd	2-Methylnaphthalene	28	Aldrin
Ni	Biphenyl	29	Mirex
Pb	2,6-Dimethylnaphthalene	44	g-HCH (Lindane)
Zn	Acenaphthylene	50	Heptachlor Epoxide
Al	Acenaphthene	52	g-Chlordane
Cr	2,3,5-Trimethylnaphthalene	66;95	cis-Chlordane
Cu	Fluorene	77	t-Nonachlor
Fe	Phenanthrene	87	Dieldrin
	Anthracene	101;90	o,p'-DDD
	1-Methylphenanthracene	105	o,p'-DDE
	Fluoranthene	118	p,p'_DDE
	Pyrene	126	p,p'-DDD
	Benzo(a)Anthracene	128	o,p'-DDT
	Chrysene	138	p,p'-DDT
	Benzo(b)Fluoranthene	153;132	a-Endosulfan
	Benzo(k)Fluoranthene	169	b-Endosulfan
	Benzo(e)Pyrene	170;190	a_BHC
	Benzo(a)Pyrene	180	Metoxychlor
	Perylene	187	Endrin
	Indeno(1,2,3,4-cd)Pyrene	195;208	
	Dibenz(a,h)Anthracene	206	
	Benzo(ghi)Perylene	209	

RESULTS

The laboratory results for the samples are provided in Appendix D. Valid results above reporting detection limits were available for all parameters except for copper and chromium. Results for copper in the samples from NHDP and NHHS in 2003 all had large variance between the replicate samples. The problem was not limited to NH Gulfwatch samples, but rather was observed in other samples from the Gulf of Maine. These results were devalidated because they are not representative of conditions in the estuary. In addition, the chromium concentrations in the samples from MECC in 2004 were anomalously high compared to results from 1993-2002 and 2004 at this site. These values were devalidated. The devalidated results are shown in Appendix E.

The valid data from the NHEP stations in 2003 and 2004 have been incorporated into the DES Gulfwatch database.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions about the condition of the estuaries based on these data will be drawn in the next NHEP Water Quality Indicators Report.

The *New Hampshire Estuaries Project Monitoring Plan* (NHEP, 2004) recommends annual mussel sampling at three locations (Portsmouth Harbor, Great Bay and Hampton-Seabrook Harbor) and clam and oyster sampling every three years at Hampton-Seabrook Harbor and Great Bay, respectively. The annual mussel monitoring appears to be funded through 2006 for all three benchmark sites. The clam and oyster monitoring occurred in 2005 but future support is unknown.

REFERENCES

Chase, M., S. Jones, P. Hennigar, J Sowles, G. Harding, K. Freeman, P. Wells, C Krahforst, R. Crawford, J. Pederson, and D. Taylor. 2001. *Gulfwatch: Monitoring Spatial and Temporal Patterns of Trace Metal and Organic Contaminants in the Gulf of Maine (1991-1997) with the Blue Mussel, Mytilis edulis L.*

NHEP. 2004. New Hampshire Estuaries Project Monitoring Plan. New Hampshire Estuaries Project, Portsmouth, NH.

Seed, R., 1968. *Factors influencing shell shape in the mussel* Mytilus edulis. J. Mar. Biol. Ass. U.K. 48: 561-584/

Sowles, J., R. Crawford, P. Hennigar, G. Harding, S. Jones, M.E. Chase, W. Robinson, J. Pederson, K. Coombs, D. Taylor, and K. Freeman, 1997. *Gulfwatch project standard procedures: field and laboratory Gulfwatch implementation period 1993-2001*. Gulf of Maine Council on the Marine Environment, State Planning Office, Augusta, ME.

APPENDIX A: FIELD REPORT FOR 2003

MEMORANDUM

TO: Dr. Stephen Jones, UNH

FROM: Phil Trowbrige, NHDES

RE: 2003 Gulfwatch Samples

DATE: December 31, 2003

The purpose of this memorandum is to document the sample collection activities for Gulfwatch 2003.

On 10/1/03 and 10/2/03, NHDES managed the collection of mussel samples from five sites. These sites are summarized in the following tables. Photographs and maps for each site are provided in Appendix A.

Date / Time	Station	Latitude (Decimal degrees)	Longitude (Decimal degrees)	Water Temperature (deg C)	Personnel
10/1/03 0915	NHHS - Hampton/ Seabrook Harbor, Hampton, NH	42.8972	-70.8164	13.0	N. Landry M. Wood P. Foss C. Brown
10/1/03 0920	NHLH – Little Harbor, New Castle, NH	43.0581	-70.7154	12.5	P. Trowbridge A. Chapman T. Walsh S. Sheehy
10/1/03 1030	NHDP – Dover Point, Dover, NH	43.1196	-70.8267	14.5	P. Trowbridge A. Chapman T. Walsh S. Sheehy
10/2/03 1025	MECC – Clarks Cove, Kittery, ME	43.0774	-70.7244	15.0	N. Landry S. Landry
10/2/03 1020	NHSM – South Mill Pond, Portsmouth NH	43.0729	-70.7489	15.0	P. Trowbridge D. Kellam S. Soule J. Kennedy

The samples were brought back to the UNH Jackson Estuarine Laboratory where they were processed. Sample collection and processing was conducted followed Gulfwatch SOPs (GOMC, 1994). Samples

Physical data on the mussels were transferred from hard copy datasheets to Excel spreadsheets. Data entry was checked twice for transcription errors following NHDES protocols. The physical data for the samples is provided in Appendix B. The original datasheets will be kept on file at NHDES.

If you have any questions about this report, please contact me at (603) 271-8872 or ptrowbridge@des.state.nh.us.

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Appendix A

Photographs and Maps of Sampling Sites

Site: NHHS – Hampton/Seabrook Harbor, Hampton, NH

Photo looking south at Rte 1A bridge

Site: NHLH – Little Harbor, New Castle, NH

Photo taken looking west from Jaffrey Point

Site: NHDP – Dover Point, Dover, NH

Photo taken looking west under the Rte 4 bridge

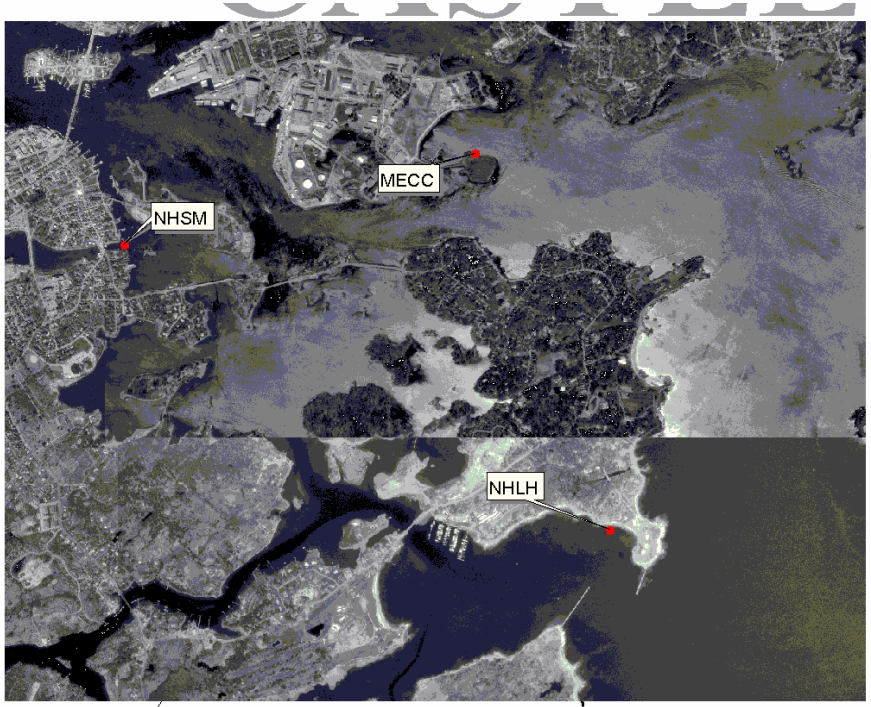
Site MECC – Clarks Cove, Kittery, ME

Photo taken looking north toward Kittery ME

Site: NHSM – South Mill Pond, Portsmouth, NH

Photo taken looking west toward Marcy Street

Gulfwatch 2003 Stations Near Portsmouth NH

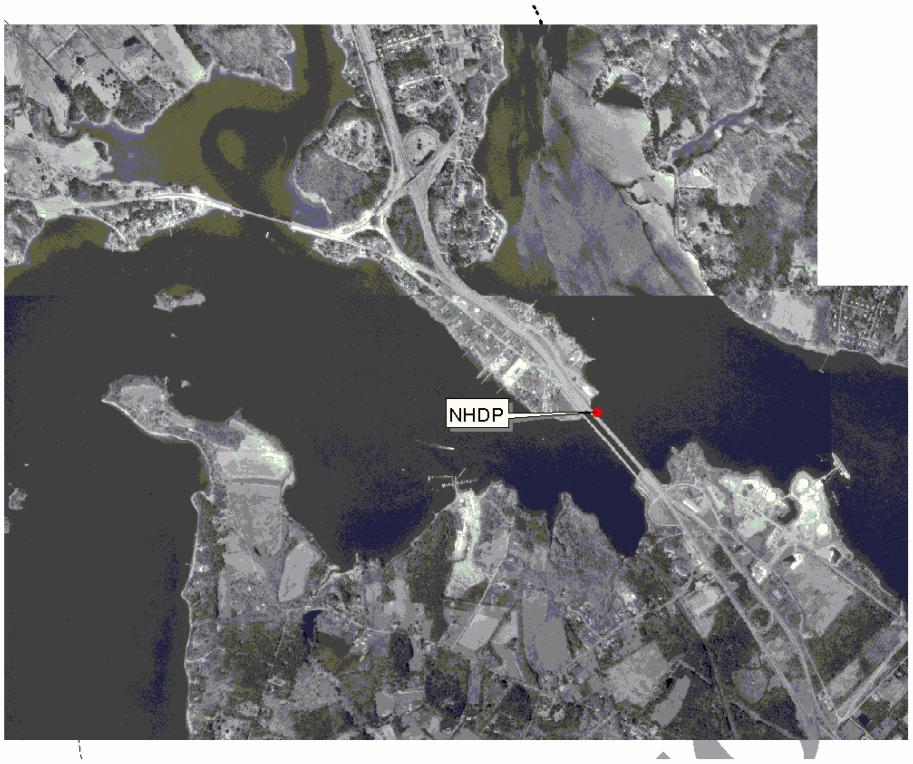


0.9 0 0.9 1.8 Miles

Political Boundaries
State boundary
County boundary
Town boundary
Text Town Names

N
W E
S

2003 Gulfwatch Station at Dover Point, Dover NH

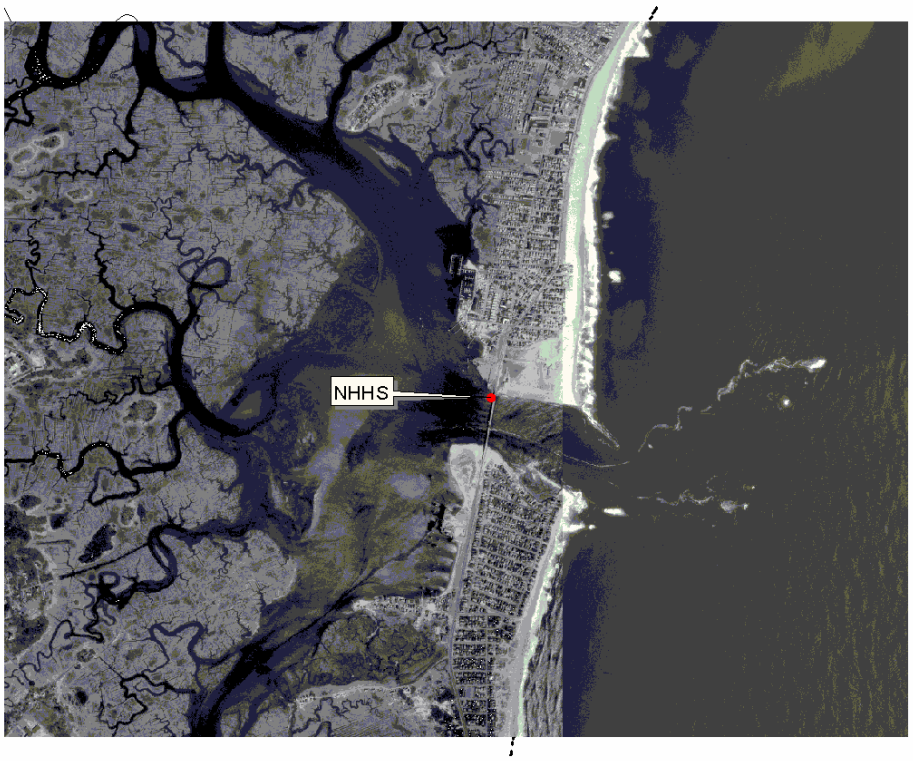


0.9 0 0.9 1.8 Miles

Political Boundaries
State boundary
County boundary
Town boundary
Text Town Names

N
W E
S

2003 Gulfwatch Station at Hampton/Seabrook Harbor, Hampton, NH



Political Boundaries
State boundary
County boundary
Town boundary
Text Town Names

N
W
E
S

Appendix B

Physical Data for Mussels

NH-GOM 2003 Sample Jar Data Summary

Indigenous Mussels **Autumn, 2003** GOM

				TARE WEIGHT		TOTAL WEIGHT		TISSUE WEIGHT	
Site	Site #	Jar label	Location	ORGANICS	METALS	ORGANICS	METALS	ORGANICS	METALS
Clark Cove	MECC-1	MECC1N031002	1	177.396	178.275	273.775	277.092	96.379	98.817
on Seavey I.	MECC-2	MECC2N021002	2	178.441	177.347	276.689	284.040	98.248	106.693
in Portsmouth	MECC-3	MECC3N031002	3	178.537	179.045	267.933	265.626	89.396	86.581
Harbor, Maine	MECC-4	MECC4N031002	4	178.061	178.005	278.240	274.764	100.179	96.759
	Site #	Jar label	Location						
South Mill	NHSM-1	NHSM1N031002	1	177.587	177.365	296.728	290.663	119.141	113.298
Pond	NHSM-2	NHSM2N031002	2	177.918	177.415	308.937	315.227	131.019	137.812
Portsmouth,	NHSM-3	NHSM3N031002	3	177.588	177.527	310.552	301.625	132.964	124.098
New Hampshire	NHSM-4	NHSM4N031002	4	178.192	178.394	288.937	298.269	110.745	119.875
	Site #	Jar label	Location						
Hampton-	NHHS-1	NHHS1N031001	1	177.873	178.147	288.839	298.243	110.966	120.096
Seabrook Harbor	NHHS-2	NHHS2N031001	2	177.572	177.579	273.317	293.618	95.745	116.039
Hampton,	NHHS-3	NHHS3N031001	3	178.875	177.525	296.510	304.880	117.635	127.355
New Hampshire	NHHS-4	NHHS4N031001	4	177.827	178.441	299.627	313.782	121.800	135.341
	Site #	Jar label	Location						
Dover Point	NHDP-1	NHDP1N031001	1	177.960	177.381	269.627	260.952	91.667	83.571
	NHDP-2	NHDP2N031001	2	178.052	177.453	271.743	282.436	93.691	104.983
Dover	NHDP-3	NHDP3N031001	3	177.484	178.947	263.385	270.221	85.901	91.274
New Hampshire	NHDP-4	NHDP4N031001	4	177.526	177.415	272.827	267.438	95.301	90.023
	Site #	Jar label	Location						
Little Harbor	NHLH-1	NHLH1N031001	1	179.040	177.158	259.200	261.943	80.160	84.785
	NHLH-2	NHLH2N031001	2	177.310	177.982	248.605	248.146	71.295	70.164
New Castle	NHLH-3	NHLH3N031001	3	177.770	178.144	256.632	256.333	78.862	78.189
New Hampshire	NHLH-4	NHLH4N031001	4	177.524	177.376	249.935	262.084	72.411	84.708

	MECC 2003 METALS				T=	sal=	pH=		
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
MECC-1	1	53.6	11	53.5	27.7	21.4	4.496	182.771	178.275
MECC-1	2	53.5	12	57.7	30.6	25.4	10.989	189.264	
MECC-1	3	56.9	13	54.0	30.3	22.5	15.293	193.568	
MECC-1	4	52.7	14	57.7	27.8	25.0	21.441	199.716	
MECC-1	5	51.3	15	52.7	28.9	22.0	26.401	204.676	
MECC-1	6	56.1	16	50.7	26.9	19.2	30.213	208.488	
MECC-1	7	57.1	17	53.2	29.0	21.2	34.312	212.587	
MECC-1	8	57.7	18	51.7	26.9	22.7			
MECC-1	9	56.1	19	51.7	27.7	22.8	42.098	220.373	
MECC-1	10	56.1	20	57.9	31.9	24.3	48.593	226.868	
	1-20 tot						98.817	277.092	
MECC-2	1	56.4	11	54.4	26.8	22.5	5.431	182.778	177.347
MECC-2	2	57.0	12	50.9	26.5	23.9	9.716	187.063	
MECC-2	3	50.4	13	56.8	30.3	22.0	15.353	192.700	
MECC-2	4	55.6	14	52.5	24.8	20.7	19.623	196.970	
MECC-2	5	56.4	15	52.7	29.6	22.4	25.272	202.619	
MECC-2	6	57.1	16	54.2	26.6	20.5	29.474	206.821	
MECC-2	7	51.5	17	53.4	26.0	22.7	35.184	212.531	
MECC-2	8	56.5	18	54.6	29.4	22.0	40.522	217.869	
MECC-2	9	52.1	19	50.4	28.5	21.4	45.445	222.792	
MECC-2	10	50.7	20	54.3	26.1	27.9	52.586	229.933	
	1-20 total						106.693	284.040	
MECC-3	1	57.7	11	55.5	29.2	22.9	3.709	182.754	179.045
MECC-3	2	57.7	12	55.4	27.1	22.7	8.108	187.153	
MECC-3	3	54.2	13	50.6	29.0	19.9	11.808	190.853	
MECC-3	4	50.8	14	50.6	28.5	18.2	14.741	193.786	
MECC-3	5	57.7	15	53.1	28.5	23.8	20.365	199.410	
MECC-3	6	53.3	16	52.5	27.6	20.5	24.280	203.325	
MECC-3	7	56.8	17	54.3	29.8	20.6	29.231	208.276	
MECC-3	8	55.6	18	50.7	26.7	20.6	33.509	212.554	
MECC-3	9	55.0	19	52.8	26.5	21.5	37.275	216.320	
MECC-3	10	52.5	20	51.1	26.4	20.2	40.636	219.681	
	1-20 total						86.581	265.626	
MECC-4	1	53.7	11	57.8	32.2	20.1			178.005
MECC-4	2	50.8	12	57.9	28.1	25.2			
MECC-4	3	52.2	13	53.2	28.6	19.6			
MECC-4	4	58.1	14	55.9	28.8	24.0			
MECC-4	5	55.7	15	53.7	27.5	23.3			
MECC-4	6	52.2	16	56.6	29.5	25.4			
MECC-4	7	52.1	17	55.3	28.4	24.7			
MECC-4	8	57.2	18	58.4	31.9	23.8			
MECC-4	9	55.4	19	52.4	30.4	22.0			
MECC-4	10	55.4	20	52.4	28.4	20.6			
	1-20 total						96.759	274.764	

	MECC 2003 ORGANICS								
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
MECC-1	1	51.5	11	54.5					177.396
MECC-1	2	52.8	12	58.6					
MECC-1	3	55.0	13	56.0					
MECC-1	4	57.3	14	50.9					
MECC-1	5	51.3	15	58.2					
MECC-1	6	51.3	16	55.3					
MECC-1	7	56.6	17	52.2					
MECC-1	8	50.6	18	59.2					
MECC-1	9	56.2	19	54.7					
MECC-1	10	53.5	20	52.8					
	1-20 tot						96.379	273.775	
MECC-2	1	55.6	11	57.6					178.441
MECC-2	2	53.7	12	54.1					
MECC-2	3	51.3	13	56.3					
MECC-2	4	57.0	14	53.7					
MECC-2	5	51.3	15	51.5					
MECC-2	6	51.9	16	55.0					
MECC-2	7	55.6	17	55.5					
MECC-2	8	51.4	18	56.4					
MECC-2	9	56.9	19	55.4					
MECC-2	10	57.8	20	51.4					
	1-20 total						98.248	276.689	
MECC-3	1	55.3	11	52.0					178.537
MECC-3	2	50.9	12	51.5					
MECC-3	3	54.6	13	58.2					
MECC-3	4	52.0	14	51.3					
MECC-3	5	53.5	15	51.7					
MECC-3	6	51.9	16	54.9					
MECC-3	7	50.7	17	50.2					
MECC-3	8	54.3	18	53.1					
MECC-3	9	51.4	19	24.7					
MECC-3	10	53.2	20	54.2					
	1-20 total						89.396	267.933	
MECC-4	1	57.4	11	54.4					178.061
MECC-4	2	54.2	12	53.3					
MECC-4	3	56.2	13	57.9					
MECC-4	4	55.9	14	53.9					
MECC-4	5	52.1	15	56.3					
MECC-4	6	57.6	16	56.6					
MECC-4	7	58.6	17	50.9					
MECC-4	8	56.9	18	56.9					
MECC-4	9	53.5	19	54.7					
MECC-4	10	58.0	20	54.6					
	1-20 total						100.179	278.240	

	NHSM 2003 METALS			T=	sal=	pH=		
Indigenous	Mussels					Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHSM-1	1	56.7	11	51.6	29.3	18.7	4.628	181.993	177.365
NHSM-1	2	51.8	12	51.8	26.8	22.5	8.833	186.198	
NHSM-1	3	58.2	13	58.0	32.3	21.0	15.923	193.288	
NHSM-1	4	57.6	14	50.3	30.5	19.5	18.846	196.211	
NHSM-1	5	59.9	15	52.1	31.0	19.3	23.791	201.156	
NHSM-1	6	57.5	16	59.6	31.4	24.1	31.457	208.822	
NHSM-1	7	54.5	17	56.1	29.9	24.2	37.804	215.169	
NHSM-1	8	52.2	18	57.8	31.8	24.1	43.833	221.198	
NHSM-1	9	51.5	19	57.9	33.7	24.2	49.703	227.068	
NHSM-1	10	57.4	20	53.8	27.2	20.1	53.535	230.900	
	1-20 tot						113.298	290.663	
NHSM-2	1	56.1	11	56.3	29.0	22.9	6.944	184.359	177.415
NHSM-2	2	57.8	12	59.9	31.4	25.0	15.155	192.570	
NHSM-2	3	56.4	13	58.5	28.3	30.7	22.564	199.979	
NHSM-2	4	55.9	14	54.1	30.5	22.8	26.624	204.039	
NHSM-2	5	58.1	15	59.9	31.6	27.9	37.216	214.631	
NHSM-2	6	52.9	16	59.3	29.6	24.3	45.089	222.504	
NHSM-2	7	55.2	17	58.8	31.6	24.8	52.658	230.073	
NHSM-2	8	55.1	18	59.9	31.4	25.7	59.497	236.912	
NHSM-2	9	54.8	19	58.2	32.1	22.4	65.513	242.928	
NHSM-2	10	58.5	20	57.1	28.8	23.8	71.993	249.408	
	1-20 total						137.812	315.227	
NHSM-3	1	56.7	11	57.8	33.7	22.5	6.920	184.447	177.527
NHSM-3	2	56.0	12	58.5	31.0	23.0	14.200	191.727	
NHSM-3	3	57.6	13	58.0	33.7	24.5	21.533	199.060	
NHSM-3	4	52.1	14	58.9	31.4	23.6	27.896	205.423	
NHSM-3	5	54.3	15	56.7	30.3	20.2	34.167	211.694	
NHSM-3	6	56.7	16	58.9	30.2	25.7	40.797	218.324	
NHSM-3	7	55.5	17	59.7	29.3	27.1	46.229	223.756	
NHSM-3	8	56.5	18	55.9	31.0	22.5	51.853	229.380	
NHSM-3	9	57.9	19	56.7	31.1	25.3	60.084	237.611	
NHSM-3	10	56.3	20	52.5	26.5	20.5	64.360	241.887	
	1-20 total						124.098	301.625	
NHSM-4	1	53.4	11	54.7	30.9	21.0			178.394
NHSM-4	2	56.6	12	57.1	30.7	27.7			
NHSM-4	3	55.6	13	58.2	30.9	22.9			
NHSM-4	4	57.3	14	54.5	29.7	22.6			
NHSM-4	5	53.1	15	56.5	29.0	26.5			
NHSM-4	6	58.5	16	53.0	30.1	23.5			
NHSM-4	7	54.9	17	55.6	28.9	26.1			
NHSM-4	8	53.6	18	56.0	30.6	24.8			
NHSM-4	9	57.2	19	53.8	29.1	22.1			
NHSM-4	10	53.4	20	57.1	31.6	21.0			
	1-20 total						119.875	298.269	

	NHSM 2003 ORGANICS								
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length	Height	Width	Wet weight	Wet weight	Weight
NHSM-1	1	57.2	11	58.0					177.587
NHSM-1	2	59.9	12	59.2					
NHSM-1	3	52.7	13	57.1					
NHSM-1	4	51.7	14	55.3					
NHSM-1	5	57.0	15	53.1					
NHSM-1	6	58.1	16	51.5					
NHSM-1	7	58.2	17	58.5					
NHSM-1	8	58.0	18	52.8					
NHSM-1	9	51.9	19	51.2					
NHSM-1	10	55.2	20	54.9					
	1-20 tot						119.141	296.728	
NHSM-2	1	54.1	11	58.6					177.918
NHSM-2	2	57.2	12	54.4					
NHSM-2	3	56.0	13	55.6					
NHSM-2	4	56.5	14	59.5					
NHSM-2	5	57.0	15	56.4					
NHSM-2	6	56.3	16	59.8					
NHSM-2	7	59.2	17	56.5					
NHSM-2	8	59.2	18	52.9					
NHSM-2	9	55.0	19	58.2					
NHSM-2	10	59.4	20	58.4					
1-20 total							131.019	308.937	
NHSM-3	1	59.9	11	56.3					177.588
NHSM-3	2	59.6	12	57.6					
NHSM-3	3	58.3	13	57.7					
NHSM-3	4	59.3	14	57.5					
NHSM-3	5	54.3	15	57.9					
NHSM-3	6	56.1	16	53.7					
NHSM-3	7	58.8	17	58.8					
NHSM-3	8	56.4	18	59.6					
NHSM-3	9	57.8	19	59.5					
NHSM-3	10	58.2	20	58.0					
1-20 total							132.964	310.552	
NHSM-4	1	59.6	11	54.7					178.192
NHSM-4	2	54.3	12	53.3					
NHSM-4	3	57.1	13	55.8					
NHSM-4	4	53.2	14	57.0					
NHSM-4	5	56.6	15	56.9					
NHSM-4	6	52.9	16	57.3					
NHSM-4	7	51.8	17	50.5					
NHSM-4	8	55.9	18	56.7					
NHSM-4	9	56.6	19	54.7					
NHSM-4	10	59.8	20	53.4					
1-20 total							110.745	288.937	

	NHHS 2003 METALS			T=	sal=	pH=		
Indigenous	Mussels					Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHHS-1	1	56.0	11	57.2	30.1	22.3	5.478	183.625	178.147
NHHS-1	2	52.9	12	52.3	27.9	24.4	11.505	189.652	
NHHS-1	3	54.9	13	58.5	32.1	25.7	20.215	198.362	
NHHS-1	4	52.4	14	55.1	29.6	22.8	25.973	204.120	
NHHS-1	5	51.2	15	53.8	32.2	26.0	32.816	210.963	
NHHS-1	6	59.7	16	56.6	33.7	24.8	40.310	218.457	
NHHS-1	7	55.0	17	53.7	28.0	23.1	46.340	224.487	
NHHS-1	8	53.8	18	55.4	29.9	24.2	52.727	230.874	
NHHS-1	9	53.1	19	54.9	30.5	25.3	58.825	236.972	
NHHS-1	10	53.5	20	58.6	28.9	22.1	65.685	243.832	
	1-20 tot						120.096	298.243	
NHHS-2	1	52.6	11	58.6	33.6	26.5	9.062	186.641	177.579
NHHS-2	2	53.8	12	53.6	28.0	21.2	14.696	192.275	
NHHS-2	3	52.8	13	56.8	31.3	24.8	21.546	199.125	
NHHS-2	4	53.3	14	56.0	28.5	27.4	28.736	206.315	
NHHS-2	5	57.1	15	56.7	31.0	23.2	34.433	212.012	
NHHS-2	6	54.1	16	57.0	30.4	25.7	41.735	219.314	
NHHS-2	7	57.7	17	57.7	29.1	23.0	48.630	226.209	
NHHS-2	8	54.4	18	56.7	29.4	22.1	54.839	232.418	
NHHS-2	9	58.6	19	58.0	29.6	25.0	61.905	239.484	
NHHS-2	10	51.1	20	57.7	29.0	22.2	67.745	245.324	
	1-20 total						116.039	293.618	
NHHS-3	1	57.2	11	53.9	29.5	23.4	5.604	183.129	177.525
NHHS-3	2	55.8	12	54.3	27.4	23.6	12.180	189.705	
NHHS-3	3	56.8	13	52.1	26.7	19.8	16.074	193.599	
NHHS-3	4	58.2	14	55.7	29.8	24.0	22.499	200.024	
NHHS-3	5	58.8	15	57.1	29.1	21.7	28.558	206.083	
NHHS-3	6	56.1	16	55.6	30.2	24.7	35.701	213.226	
NHHS-3	7	53.8	17	53.0	29.5	19.6	40.229	217.754	
NHHS-3	8	53.1	18	55.2	27.1	24.4	45.665	223.190	
NHHS-3	9	55.3	19	59.3	34.4	25.5	54.047	231.572	
NHHS-3	10	54.0	20	52.3	28.7	23.6	60.030	237.555	
	1-20 total						127.355	304.880	
NHHS-4	1	54.3	11	57.5	31.2	24.5			178.441
NHHS-4	2	56.8	12	58.2	27.0	25.4			
NHHS-4	3	58.0	13	57.6	29.5	25.3			
NHHS-4	4	54.4	14	57.4	31.6	26.5			
NHHS-4	5	58.4	15	50.9	27.5	21.0			
NHHS-4	6	56.6	16	52.3	53.5	27.7			
NHHS-4	7	55.7	17	58.0	27.4	30.1			
NHHS-4	8	58.0	18	58.2	33.0	24.3			
NHHS-4	9	57.9	19	50.9	28.6	24.0			
NHHS-4	10	58.9	20	56.3	31.9	22.5			
	1-20 total						135.341	313.782	

	NHHS 2003 ORGANICS								
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHHS-1	1	55.2	11	53.5					177.873
NHHS-1	2	55.0	12	58.8					
NHHS-1	3	53.9	13	53.9					
NHHS-1	4	54.3	14	53.5					
NHHS-1	5	54.2	15	53.3					
NHHS-1	6	52.1	16	51.0					
NHHS-1	7	57.1	17	54.7					
NHHS-1	8	54.8	18	58.6					
NHHS-1	9	59.5	19	56.7					
NHHS-1	10	53.6	20	57.4					
	1-20 tot						110.966	288.839	
NHHS-2	1	52.4	11	53.9					177.572
NHHS-2	2	50.4	12	56.0					
NHHS-2	3	55.5	13	54.4					
NHHS-2	4	56.0	14	50.9					
NHHS-2	5	54.3	15	52.9					
NHHS-2	6	56.7	16	53.5					
NHHS-2	7	54.2	17	52.2					
NHHS-2	8	50.3	18	52.8					
NHHS-2	9	52.4	19	54.6					
NHHS-2	10	50.4	20	54.6					
1-20 total							95.745	273.317	
NHHS-3	1	50.6	11	58.6					178.875
NHHS-3	2	55.6	12	54.3					
NHHS-3	3	57.7	13	55.9					
NHHS-3	4	56.7	14	56.0					
NHHS-3	5	53.5	15	54.0					
NHHS-3	6	51.6	16	57.3					
NHHS-3	7	54.9	17	53.5					
NHHS-3	8	51.1	18	50.3					
NHHS-3	9	57.9	19	55.0					
NHHS-3	10	55.9	20	55.4					
1-20 total							117.635	296.510	
NHHS-4	1	50.2	11	56.6					177.827
NHHS-4	2	53.9	12	56.1					
NHHS-4	3	54.4	13	57.5					
NHHS-4	4	56.6	14	51.7					
NHHS-4	5	55.1	15	54.2					
NHHS-4	6	52.8	16	50.3					
NHHS-4	7	57.9	17	57.0					
NHHS-4	8	55.0	18	50.1					
NHHS-4	9	52.9	19	54.9					
NHHS-4	10	53.7	20	56.1					
1-20 total							121.800	299.627	

	NHDP 2003 METALS				T=	sal=	pH=		
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHDP-1	1	55.9	11	57.2	28.9	22.3	5.831	183.212	177.381
NHDP-1	2	54.7	12	51.6	24.0	21.7	8.871	186.252	
NHDP-1	3	51.9	13	54.1	28.6	22.7	13.979	191.360	
NHDP-1	4	55.2	14	54.2	28.2	19.3	18.034	195.415	
NHDP-1	5	56.4	15	50.0	25.6	19.2	21.675	199.056	
NHDP-1	6	53.2	16	53.3	28.5	22.6	27.288	204.669	
NHDP-1	7	52.5	17	52.6	25.5	19.7	30.841	208.222	
NHDP-1	8	58.2	18	52.1	27.5	21.9	35.041	212.422	
NHDP-1	9	51.1	19	50.6	26.9	19.1	38.759	216.140	
NHDP-1	10	57.5	20	51.8	26.9	23.9	43.065	220.446	
	1-20 tot						83.571	260.952	
NHDP-2	1	55.6	11	54.7	27.6	22.8	4.835	182.288	177.453
NHDP-2	2	57.5	12	54.9	26.7	22.7	9.956	187.409	
NHDP-2	3	56.5	13	58.8	30.2	23.7	16.485	193.938	
NHDP-2	4	53.5	14	55.4	26.5	25.1	21.368	198.821	
NHDP-2	5	59.6	15	53.0	27.7	21.3	25.723	203.176	
NHDP-2	6	53.7	16	51.7	25.0	22.7	30.721	208.174	
NHDP-2	7	58.7	17	60.0	30.1	24.1	37.112	214.565	
NHDP-2	8	51.2	18	54.7	27.9	21.9	41.599	219.052	
NHDP-2	9	53.4	19	53.5	23.4	24.0	46.107	223.560	
NHDP-2	10	53.7	20	57.6	30.2	24.3	52.060	229.513	
	1-20 total						104.983	282.436	
NHDP-3	1	59.3	11	53.0	25.9	25.1	3.270	182.217	178.947
NHDP-3	2	51.5	12	53.6	27.1	22.7	8.019	186.966	
NHDP-3	3	52.7	13	52.6	25.3	22.7	12.467	191.414	
NHDP-3	4	52.7	14	54.9	27.2	25.2	18.254	197.201	
NHDP-3	5	57.7	15	55.1	29.0	22.1	25.349	204.296	
NHDP-3	6	56.0	16	51.3	27.2	22.6	29.138	208.085	
NHDP-3	7	55.6	17	50.2	25.0	21.5	30.994	209.941	
NHDP-3	8	53.3	18	52.2	27.8	22.8	33.938	212.885	
NHDP-3	9	54.4	19	51.1	26.4	22.0	37.849	216.796	
NHDP-3	10	56.3	20	55.1	25.3	23.8	43.065	222.012	
	1-20 total						91.274	270.221	
NHDP-4	1	54.8	11	55.4	27.8	22.3			177.415
NHDP-4	2	53.1	12	57.1	27.1	22.7			
NHDP-4	3	58.0	13	56.7	25.6	24.7			
NHDP-4	4	52.9	14	57.1	29.0	24.2			
NHDP-4	5	53.2	15	58.6	26.7	25.3			
NHDP-4	6	54.6	16	54.9	27.8	20.8			
NHDP-4	7	52.1	17	54.0	27.5	22.8			
NHDP-4	8	55.1	18	54.9	27.6	23.0			
NHDP-4	9	52.8	19	54.3	27.2	23.1			
NHDP-4	10	55.2	20	54.3	26.5	23.3			
	1-20 total						90.023	267.438	

	NHDP 2003 ORGANICS								
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHDP-1	1	56.9	11	54.6					177.960
NHDP-1	2	58.5	12	53.9					
NHDP-1	3	56.8	13	54.2					
NHDP-1	4	50.9	14	50.5					
NHDP-1	5	55.5	15	50.6					
NHDP-1	6	52.0	16	53.1					
NHDP-1	7	52.4	17	54.6					
NHDP-1	8	53.5	18	56.3					
NHDP-1	9	57.3	19	54.4					
NHDP-1	10	53.6	20	53.6					
	1-20 tot						91.667	269.627	
NHDP-2	1	53.9	11	53.9					178.052
NHDP-2	2	57.8	12	53.2					
NHDP-2	3	53.5	13	54.5					
NHDP-2	4	56.2	14	50.0					
NHDP-2	5	56.6	15	54.3					
NHDP-2	6	52.9	16	50.6					
NHDP-2	7	54.2	17	57.5					
NHDP-2	8	52.4	18	52.8					
NHDP-2	9	54.9	19	54.8					
NHDP-2	10	54.2	20	51.0					
1-20 total							93.691	271.743	
NHDP-3	1	53.3	11	51.5					177.484
NHDP-3	2	57.9	12	50.1					
NHDP-3	3	53.9	13	53.0					
NHDP-3	4	51.1	14	54.3					
NHDP-3	5	53.0	15	53.0					
NHDP-3	6	55.0	16	50.3					
NHDP-3	7	56.7	17	55.3					
NHDP-3	8	57.2	18	54.6					
NHDP-3	9	50.9	19	54.1					
NHDP-3	10	52.0	20	59.4					
1-20 total							85.901	263.385	
NHDP-4	1	54.7	11	55.2					177.526
NHDP-4	2	52.8	12	51.8					
NHDP-4	3	55.4	13	52.6					
NHDP-4	4	58.1	14	53.4					
NHDP-4	5	53.4	15	53.6					
NHDP-4	6	53.3	16	58.0					
NHDP-4	7	55.1	17	53.5					
NHDP-4	8	51.8	18	54.3					
NHDP-4	9	60.0	19	56.8					
NHDP-4	10	52.5	20	56.3					
1-20 total							95.301	272.827	

	NHLH 2003 METALS				T=	sal=	pH=		
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHLH-1	1	58.5	11	54.3	30.3	23.3	3.803	180.961	177.158
NHLH-1	2	52.4	12	51.0	27.3	22.6	7.995	185.153	
NHLH-1	3	57.6	13	57.9	31.9	23.8	12.836	189.994	
NHLH-1	4	51.2	14	50.3	23.6	25.3	16.275	193.433	
NHLH-1	5	54.7	15	57.3	30.1	24.1	21.869	199.027	
NHLH-1	6	56.0	16	54.8	29.5	22.6	25.648	202.806	
NHLH-1	7	55.9	17	53.5	28.2	22.8	30.064	207.222	
NHLH-1	8	57.6	18	53.6	28.7	24.9	34.183	211.341	
NHLH-1	9	56.8	19	58.8	31.0	25.0	39.407	216.565	
NHLH-1	10	55.2	20	50.8	29.6	20.2	43.252	220.410	
	1-20 tot						84.785	261.943	
NHLH-2	1	52.9	11	52.2	27.3	21.8	3.341	181.323	177.982
NHLH-2	2	56.3	12	50.7	27.2	21.5	6.706	184.688	
NHLH-2	3	51.5	13	51.7	28.3	21.9	10.165	188.147	
NHLH-2	4	52.3	14	50.4	28.2	20.9	13.470	191.452	
NHLH-2	5	52.8	15	57.9	30.0	24.6	18.167	196.149	
NHLH-2	6	56.9	16	55.3	27.4	25.0	21.923	199.905	
NHLH-2	7	50.8	17	55.0	27.3	24.6	25.375	203.357	
NHLH-2	8	51.8	18	56.5	30.0	25.2	25.597	203.579	
NHLH-2	9	51.0	19	55.1	25.8	24.8	32.743	210.725	
NHLH-2	10	50.7	20	56.8	28.6	25.8	37.126	215.108	
	1-20 total						70.164	248.146	
NHLH-3	1	53.4	11	51.7	27.9	20.9	3.252	181.396	178.144
NHLH-3	2	58.0	12	55.7	27.5	24.1	7.558	185.702	
NHLH-3	3	55.2	13	58.3	30.5	24.3	12.859	191.003	
NHLH-3	4	59.1	14	55.8	29.7	24.7	17.225	195.369	
NHLH-3	5	58.7	15	51.5	28.3	21.2	20.092	198.236	
NHLH-3	6	54.7	16	55.3	29.0	23.0	23.875	202.019	
NHLH-3	7	55.7	17	58.2	30.0	24.9	28.501	206.645	
NHLH-3	8	52.1	18	54.3	28.2	22.2	30.639	208.783	
NHLH-3	9	58.5	19	53.4	28.0	21.4	34.155	212.299	
NHLH-3	10	55.2	20	55.3	25.5	24.4	37.873	216.017	
	1-20 total						78.189	256.333	
NHLH-4	1	57.7	11	57.9	28.5	22.7			177.376
NHLH-4	2	54.8	12	53.0	26.0	23.2			
NHLH-4	3	56.7	13	59.9	33.7	23.7			
NHLH-4	4	56.7	14	59.0	29.8	23.0			
NHLH-4	5	52.4	15	53.9	26.1	23.6			
NHLH-4	6	52.3	16	59.8	29.3	26.3			
NHLH-4	7	58.1	17	59.0	31.6	28.8			
NHLH-4	8	52.8	18	52.2	26.6	22.4			
NHLH-4	9	59.4	19	56.6	26.0	22.9			
NHLH-4	10	55.9	20	51.5	28.0	21.6			
	1-20 total						84.708	262.084	

	NHLH 2003 ORGANICS								
Indigenous	Mussels						Tared	Cumulative	Jar
Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Wet weight (g)	Weight (g)
NHLH-1	1	54.2		58.0					179.040
NHLH-1	2	51.9		54.0					
NHLH-1	3	58.7		53.6					
NHLH-1	4	52.4		52.1					
NHLH-1	5	53.1		53.2					
NHLH-1	6	52.3		57.0					
NHLH-1	7	57.6		59.8					
NHLH-1	8	55.3		56.9					
NHLH-1	9	54.4		58.9					
NHLH-1	10	52.5		52.0					
	1-20 tot						80.160	259.200	
NHLH-2	1	56.5		58.2					177.310
NHLH-2	2	50.8		53.2					
NHLH-2	3	52.4		55.5					
NHLH-2	4	52.7		51.5					
NHLH-2	5	56.8		54.8					
NHLH-2	6	53.3		52.2					
NHLH-2	7	57.0		50.5					
NHLH-2	8	54.0		59.2					
NHLH-2	9	50.3		53.5					
NHLH-2	10	51.0		52.5					
1-20 total							71.295	248.605	
NHLH-3	1	53.7		53.7					177.770
NHLH-3	2	56.5		58.0					
NHLH-3	3	57.2		56.5					
NHLH-3	4	53.1		58.8					
NHLH-3	5	57.7		58.5					
NHLH-3	6	58.0		53.0					
NHLH-3	7	59.5		56.0					
NHLH-3	8	53.2		57.6					
NHLH-3	9	50.9		56.0					
NHLH-3	10	57.0		52.9					
1-20 total							78.862	256.632	
NHLH-4	1	59.7		52.6					177.524
NHLH-4	2	51.7		59.7					
NHLH-4	3	57.8		57.6					
NHLH-4	4	50.7		54.7					
NHLH-4	5	58.1		54.5					
NHLH-4	6	52.5		53.2					
NHLH-4	7	54.9		56.0					
NHLH-4	8	50.5		52.8					
NHLH-4	9	56.8		52.4					
NHLH-4	10	56.6		54.8					
1-20 total							72.411	249.935	

APPENDIX B: FIELD REPORT FOR 2004

MEMORANDUM

TO: Dr. Stephen Jones, UNH

FROM: Phil Trowbrige, NHDES

RE: 2004 Gulfwatch Samples

DATE: October 29, 2004

The purpose of this memorandum is to document the sample collection activities for Gulfwatch 2004.

On 10/19/04, NHDES managed the collection of mussel samples from five sites. These sites are summarized in the following tables. Photographs and maps for each site are provided in Appendix A.

Date / Time	Station	Latitude (Decimal degrees)	Longitude (Decimal degrees)	Water Temperature (deg C)	Water Salinity (ppt)	Personnel
10/19/04 0945	NHHS - Hampton/ Seabrook Harbor, Hampton, NH	42.89936	-70.81746	11	32	T. Walsh A. Tillberg J. Brochi
10/19/04 0900	NHPI – Pierce Island, Portsmouth, NH	43.07445	-70.74882	9	33	P. Trowbridge P. Foss A. Alegailey
10/19/04 1050	NHDP – Dover Point, Dover, NH	43.11982	-70.82645	9.5	30	P. Trowbridge P. Foss A. Alegailey
10/19/04 0930	MECC – Clarks Cove, Kittery, ME	43.07747	-70.72467	11	36	N. Landry S. Landry
10/19/04 1100	NHFP – Fox Point, Newington, NH	43.1205	-70.8602	12.4	24.9	S. Jones C. Edwards A. Beach G. George

The samples were brought back to the UNH Jackson Estuarine Laboratory where they were processed. Sample collection and processing was conducted followed Gulfwatch SOPs (GOMC, 1994). Samples

Physical data on the mussels were transferred from hard copy datasheets to Excel spreadsheets. Data entry was checked twice for transcription errors following NHDES protocols. The physical data for the samples is provided in Appendix B. The original datasheets will be kept on file at NHDES.

If you have any questions about this report, please contact me at (603) 271-8872 or ptrowbridge@des.state.nh.us.

Appendix A

Photographs and Maps of Sampling Sites

Site: NHHS – Hampton/Seabrook Harbor, Hampton, NH

Photos of replicate sites between State Pier and boat launch.

Site: NHPI – Pierce Island, Portsmouth, NH

Site: NHDP – Dover Point, Dover, NH

Photo taken under the Rte 4 bridge

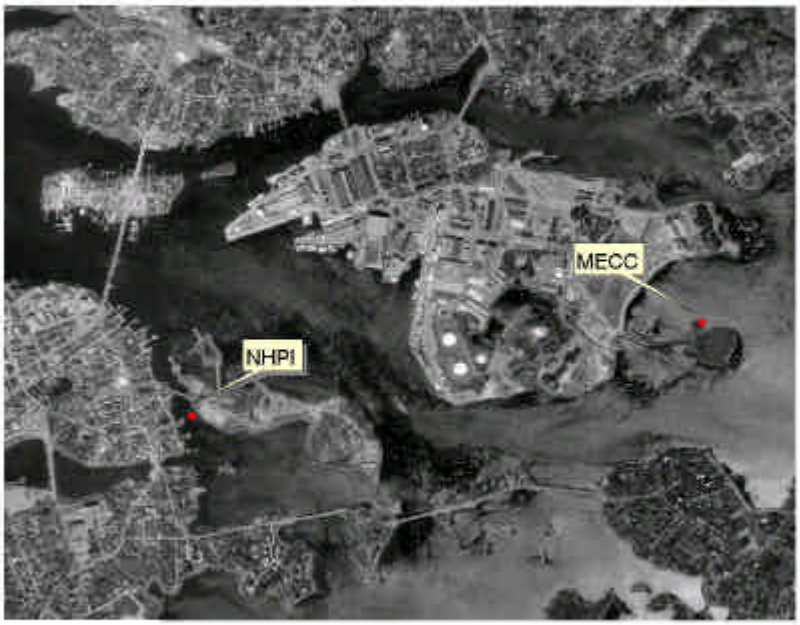
Site MECC – Clarks Cove, Kittery, ME

Photo taken looking toward Kittery ME

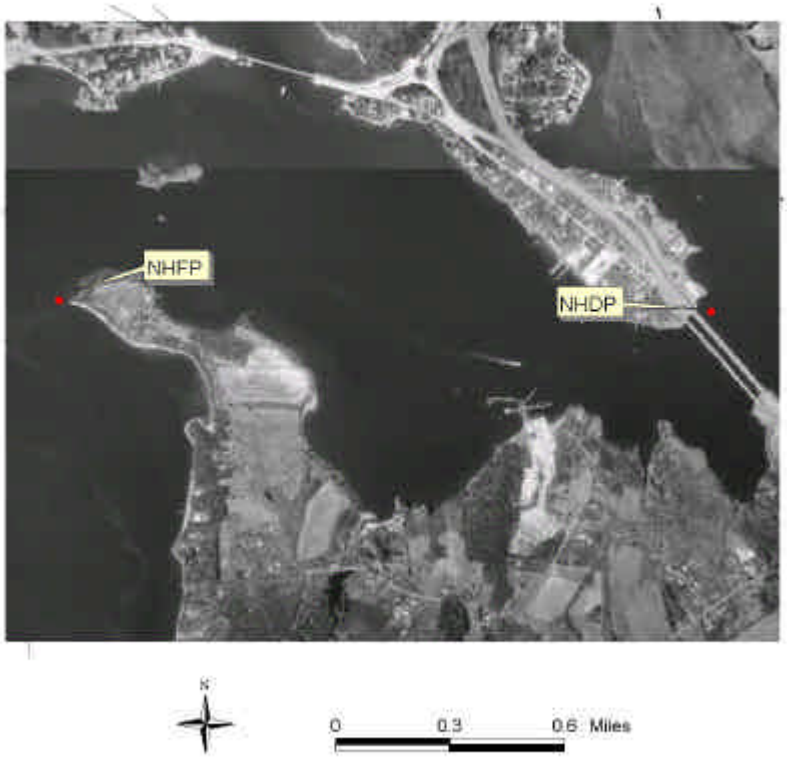
Site: NHFP – Fox Point, Newington, NH

No photos available.

Gulfwatch 2004
Station: MECC and NHPI



Gulfwatch 2004
Station: NHDP and NHFP



Gulfwatch 2004
Station: NHHS

Appendix B

Physical Data for Mussels

NH-GOM 2004 Sample Jar Data Summary

Indigenous Mussels **October 19, 2004** GOM

				TARE WEIGHT		TOTAL WEIGHT		TISSUE WEIGHT	
Site	Site #	Jar label	Location	ORGANICS	METALS	ORGANICS	METALS	ORGANICS	METALS
Clark Cove	MECC-1	MECC1N041019	1	179.664	179.283	278.030	269.380	98.366	90.097
on Seavey I.	MECC-2	MECC2N041019	2	179.582	179.244	273.140	262.410	93.558	83.166
in Portsmouth	MECC-3	MECC3N041019	3	179.210	178.903	269.540	270.679	90.330	91.776
Harbor, Maine	MECC-4	MECC4N041019	4	179.380	178.972	281.022	278.147	101.642	99.175
	Site #	Jar label	Location						
Pierce Island	NHPI-1	NHPI1N041019	1	180.059	179.109	280.186	270.896	100.127	91.787
	NHPI-2	NHPI2N041019	2	179.538	177.597	282.198	280.712	102.660	103.115
Portsmouth,	NHPI-3	NHPI3N041019	3	180.273	178.700	266.260	258.745	85.987	80.045
New Hampshire	NHPI-4	NHPI4N041019	4	179.293	179.338	267.900	273.704	88.607	94.366
	Site #	Jar label	Location						
Hampton-	NHHS-1	NHHS1N041019	1	179.337	178.980	298.953	289.410	119.616	110.430
Seabrook Harbor	NHHS-2	NHHS2N041019	2	179.564	179.340	302.741	294.130	123.177	114.790
Hampton,	NHHS-3	NHHS3N041019	3	180.494	178.980	285.829	282.230	105.335	103.250
New Hampshire	NHHS-4	NHHS4N041019	4	179.563	178.970	280.121	284.900	100.558	105.930
	Site #	Jar label	Location						
Dover Point	NHDP-1	NHDP1N041019	1	180.391	178.775	261.621	262.236	81.230	83.461
	NHDP-2	NHDP2N041019	2	180.080	179.073	284.135	268.789	104.055	89.716
Dover	NHDP-3	NHDP3N041019	3	180.670	179.163	262.820	260.369	82.150	81.206
New Hampshire	NHDP-4	NHDP4N041019	4	180.170	179.396	271.896	264.357	91.726	84.961
	Site #	Jar label	Location						
Fox Point	NHFP-1	NHFP1N041019	1	179.734	179.410	291.022	282.060	111.288	102.650
	NHFP-2	NHFP2N041019	2	180.099	179.172	288.124	275.585	108.025	96.413
Newington	NHFP-3	NHFP3N041019	3	179.568	179.472	291.560	272.147	111.992	92.675
New Hampshire	NHFP-4	NHFP4N041019	4	179.577	178.960	304.131	268.766	124.554	89.806

MECC 2004 (INDIGENOUS MUSSELS) **METALS** *Weight of jar and mussel meat

Site	#	Length (mm)	#	Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
MECC-1	1	52.6	11	53.1	28.7	21.6	4.367	183.650	179.283
MECC-1	2	57.8	12	50.6	27.9	18.3	7.238	186.521	
MECC-1	3	52.2	13	51.5	27.8	21.7	11.159	190.442	
MECC-1	4	54.2	14	50.7	26.2	23.3	14.892	194.175	
MECC-1	5	55.7	15	55.9	29.3	26.0	21.947	201.230	
MECC-1	6	56.8	16	57.0	30.7	23.6	26.993	206.276	
MECC-1	7	51.9	17	54.5	28.0	22.7	32.003	211.286	
MECC-1	8	54.8	18	57.6	28.0	24.1	211.286	217.216	
MECC-1	9	55.6	19	54.6	27.3	23.2	42.406	221.689	
MECC-1	10	57.0	20	53.5	28.0	21.4	46.507	225.790	
1-20 total							90.097	269.380	<----------
MECC-2	1	55.3	11	55.6	28.0	23.6	5.704	184.948	179.244
MECC-2	2	57.8	12	52.3	28.8	20.5	9.343	188.587	
MECC-2	3	53.8	13	55.6	28.2	24.1	15.297	194.541	
MECC-2	4	55.5	14	51.7	25.7	21.5	17.284	196.528	
MECC-2	5	55.4	15	53.5	25.4	22.6	20.954	200.198	
MECC-2	6	53.8	16	53.8	29.0	18.2	24.587	203.831	
MECC-2	7	55.4	17	52.0	26.7	21.7	28.665	207.909	
MECC-2	8	52.8	18	54.9	27.4	20.9	33.061	212.305	
MECC-2	9	53.2	19	51.1	29.2	20.6	36.184	215.428	
MECC-2	10	54.5	20	53.9	29.0	19.8	40.098	219.342	
1-20 total							83.166	262.410	
MECC-3	1	55.5	11	53.9	25.9	23.1	4.521	183.424	178.903
MECC-3	2	50.6	12	50.6	26.9	21.9	9.328	188.231	
MECC-3	3	56.7	13	56.6	29.6	22.8	14.648	193.551	
MECC-3	4	56.4	14	56.3	28.5	21.9	19.424	198.327	
MECC-3	5	57.0	15	53.7	30.7	20.4	23.644	202.547	
MECC-3	6	56.8	16	52.4	26.7	19.6	27.531	206.434	
MECC-3	7	51.8	17	50.8	25.3	21.3	30.869	209.772	
MECC-3	8	53.2	18	58.0	30.0	23.7	36.920	215.823	
MECC-3	9	54.7	19	57.5	28.5	22.0	41.322	220.225	
MECC-3	10	56.9	20	54.9	27.9	23.6	46.697	225.600	
1-20 total							91.776	270.679	
MECC-4	1	54.6	11	58.5	28.3	24.4			178.972
MECC-4	2	58.7	12	59.6	29.9	27.8			
MECC-4	3	57.8	13	58.3	29.3	22.8			
MECC-4	4	57.8	14	57.0	32.4	21.2			
MECC-4	5	56.0	15	58.0	31.1	22.0			
MECC-4	6	57.2	16	52.1	30.7	22.2			
MECC-4	7	58.1	17	52.8	27.3	21.9			
MECC-4	8	55.3	18	57.0	31.7	22.1			
MECC-4	9	50.6	19	56.9	30.2	22.4			
MECC-4	10	56.1	20	58.1	30.2	22.7			
1-20 total							99.175	278.147	

MECC 2004 (INDIGENOUS MUSSELS) **ORGANICS** *Weight of jar and mussel meat

Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
MECC-1	1	54.5	11	54.2					179.664
MECC-1	2	53.8	12	52.8					
MECC-1	3	55.2	13	52.2					
MECC-1	4	53.2	14	55.4					
MECC-1	5	55.5	15	52.2					
MECC-1	6	53.8	16	51.3					
MECC-1	7	52.4	17	56.9					
MECC-1	8	55.7	18	57.1					
MECC-1	9	52.5	19	56.0					
MECC-1	10	55.7	20	53.1					
1-20 total							98.366	278.030	
MECC-2	1	51.5	11	55.1					179.582
MECC-2	2	55.4	12	50.1					
MECC-2	3	52.5	13	53.7					
MECC-2	4	50.3	14	54.2					
MECC-2	5	54.4	15	50.6					
MECC-2	6	57.6	16	57.7					
MECC-2	7	53.9	17	52.3					
MECC-2	8	55.0	18	53.1					
MECC-2	9	57.8	19	50.3					
MECC-2	10	55.5	20	50.2					
1-20 total							93.558	273.140	
MECC-3	1	56.9	11	57.0					179.210
MECC-3	2	54.6	12	53.9					
MECC-3	3	58.4	13	57.3					
MECC-3	4	55.1	14	53.6					
MECC-3	5	54.0	15	58.4					
MECC-3	6	57.3	16	53.6					
MECC-3	7	51.3	17	50.3					
MECC-3	8	50.6	18	51.5					
MECC-3	9	52.9	19	55.1					
MECC-3	10	51.6	20	56.2					
1-20 total							90.330	269.540	
MECC-4	1	57.6	11	57.4					179.380
MECC-4	2	58.6	12	56.6					
MECC-4	3	53.7	13	53.6					
MECC-4	4	55.7	14	57.8					
MECC-4	5	55.9	15	52.2					
MECC-4	6	55.1	16	54.9					
MECC-4	7	54.5	17	53.9					
MECC-4	8	54.4	18	58.3					
MECC-4	9	50.7	19	55.5					
MECC-4	10	57.2	20	58.1					
1-20 total							101.642	281.022	

NHDP 2004 (INDIGENOUS MUSSELS) **METALS** *Weight of jar and mussel meat

Site	#	Length (mm)	#	Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHDP-1	1	54.5	11	54.7	26.0	23.2	4.546	183.321	178.775
NHDP-1	2	53.5	12	50.6	27.9	22.7	8.137	186.912	
NHDP-1	3	53.7	13	54.4	30.2	23.7	12.930	191.705	
NHDP-1	4	57.9	14	55.8	26.1	22.0	17.839	196.614	
NHDP-1	5	53.1	15	51.8	27.4	24.3	21.804	200.579	
NHDP-1	6	53.3	16	56.0	25.7	22.8	25.406	204.181	
NHDP-1	7	54.7	17	53.7	27.4	24.9	29.209	207.984	
NHDP-1	8	52.0	18	50.0	26.1	23.0	207.984	211.796	
NHDP-1	9	53.2	19	56.1	29.4	23.5	38.242	217.017	
NHDP-1	10	55.6	20	55.0	25.0	23.5	41.220	219.995	
1-20 total							83.461	262.236	
NHDP-2	1	59.9	11	54.6	26.5	25.2	2.904	181.977	179.073
NHDP-2	2	57.5	12	59.6	31.1	23.5	8.600	187.673	
NHDP-2	3	55.4	13	54.5	26.1	22.4	11.208	190.281	
NHDP-2	4	52.1	14	55.9	28.7	24.2	16.558	195.631	
NHDP-2	5	54.1	15	58.5	29.2	25.4	22.800	201.873	
NHDP-2	6	52.4	16	51.1	26.2	21.5	26.313	205.386	
NHDP-2	7	53.2	17	55.2	28.6	21.2	30.639	209.712	
NHDP-2	8	52.5	18	54.8	26.0	20.8	34.677	213.750	
NHDP-2	9	56.4	19	58.0	28.6	24.4	39.691	218.764	
NHDP-2	10	57.8	20	58.5	27.5	25.9	44.696	223.769	
1-20 total							89.716	268.789	
NHDP-3	1	56.8	11	52.9	24.6	21.9	4.431	183.594	179.163
NHDP-3	2	51.2	12	55.9	26.4	20.7	8.788	187.951	
NHDP-3	3	50.3	13	52.6	27.5	22.9	11.596	190.759	
NHDP-3	4	54.0	14	52.2	26.9	20.0	15.883	195.046	
NHDP-3	5	52.3	15	54.6	26.6	24.9	21.025	200.188	
NHDP-3	6	53.6	16	51.7	26.0	22.4	24.235	203.398	
NHDP-3	7	54.0	17	52.4	27.6	19.9	28.152	207.315	
NHDP-3	8	52.3	18	55.7	26.1	24.1	32.360	211.523	
NHDP-3	9	51.6	19	51.5	26.4	21.3	36.184	215.347	
NHDP-3	10	50.6	20	57.2	30.1	25.0	42.427	221.590	
1-20 total							81.206	260.369	<----------
NHDP-4	1	51.7	11	54.4	27.1	23.1			179.396
NHDP-4	2	50.8	12	53.5	26.4	20.7			
NHDP-4	3	54.4	13	51.3	26.7	20.5			
NHDP-4	4	52.7	14	54.7	25.5	24.1			
NHDP-4	5	55.7	15	54.6	27.0	23.3			
NHDP-4	6	56.9	16	57.9	30.0	25.8			
NHDP-4	7	57.3	17	58.7	31.2	23.6			
NHDP-4	8	51.6	18	52.2	24.3	23.2			
NHDP-4	9	56.5	19	59.2	26.9	31.5			
NHDP-4	10	55.9	20	50.3	26.6	20.7			
1-20 total							84.961	264.357	

NHDP 2004 (INDIGENOUS MUSSELS) **ORGANICS** *Weight of jar and mussel meat

Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHDP-1	1	52.0	11	53.4					180.391
NHDP-1	2	50.9	12	56.9					
NHDP-1	3	54.2	13	51.0					
NHDP-1	4	55.1	14	55.9					
NHDP-1	5	54.0	15	50.5					
NHDP-1	6	53.0	16	54.4					
NHDP-1	7	55.8	17	54.0					
NHDP-1	8	56.7	18	52.5					
NHDP-1	9	52.1	19	52.1					
NHDP-1	10	51.4	20	50.6					
1-20 total							81.230	261.621	
NHDP-2	1	53.0	11	56.4					180.080
NHDP-2	2	58.9	12	54.1					
NHDP-2	3	57.8	13	54.0					
NHDP-2	4	56.6	14	59.1					
NHDP-2	5	55.6	15	55.4					
NHDP-2	6	51.0	16	59.8					
NHDP-2	7	59.3	17	56.1					
NHDP-2	8	59.5	18	56.3					
NHDP-2	9	56.5	19	58.0					
NHDP-2	10	57.3	20	52.2					
1-20 total							104.055	284.135	
NHDP-3	1	52.6	11	52.2					180.670
NHDP-3	2	49.6	12	54.4					
NHDP-3	3	50.4	13	56.2					
NHDP-3	4	50.7	14	56.8					
NHDP-3	5	55.8	15	49.3					
NHDP-3	6	51.3	16	53.6					
NHDP-3	7	53.4	17	52.3					
NHDP-3	8	50.5	18	50.3					
NHDP-3	9	54.2	19	50.7					
NHDP-3	10	53.1	20	52.0					
1-20 total							82.150	262.820	
NHDP-4	1	57.5	11	53.0					180.170
NHDP-4	2	51.2	12	51.2					
NHDP-4	3	55.7	13	54.6					
NHDP-4	4	53.5	14	52.9					
NHDP-4	5	56.4	15	55.0					
NHDP-4	6	58.3	16	54.7					
NHDP-4	7	54.5	17	51.9					
NHDP-4	8	52.4	18	53.7					
NHDP-4	9	55.4	19	58.0					
NHDP-4	10	55.8	20	51.3					
1-20 total							91.726	271.896	

NHHS 2004 (INDIGENOUS MUSSELS) **METALS** *Weight of jar and mussel meat

Site	#	Length (mm)	#	Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHHS-1	1	52.3	11	52.6	26.7	25.0	5.520	184.500	178.980
NHHS-1	2	59.1	12	53.3	29.6	25.2	10.460	189.440	
NHHS-1	3	53.6	13	50.8	25.7	22.7	15.100	194.080	
NHHS-1	4	55.1	14	55.1	31.6	24.1	22.250	201.230	
NHHS-1	5	53.0	15	55.6	28.6	27.6	27.410	206.390	
NHHS-1	6	53.7	16	58.2	28.8	25.5	35.380	214.360	
NHHS-1	7	50.3	17	52.9	30.0	24.0	40.110	219.090	
NHHS-1	8	52.6	18	51.1	25.2	22.4	219.090	223.630	
NHHS-1	9	53.3	19	57.7	29.1	27.1	50.800	229.780	
NHHS-1	10	53.2	20	57.5	31.5	26.1	57.890	236.870	
1-20 total							110.430	289.410	
NHHS-2	1	55.1	11	57.5	31.7	23.1	6.530	185.870	179.340
NHHS-2	2	58.1	12	56.7	29.5	25.0	12.990	192.330	
NHHS-2	3	58.8	13	58.6	29.6	22.7	20.020	199.360	
NHHS-2	4	50.4	14	57.3	28.7	25.6	26.470	205.810	
NHHS-2	5	59.9	15	58.2	28.1	22.4	32.910	212.250	
NHHS-2	6	56.6	16	57.8	31.2	23.2	39.710	219.050	
NHHS-2	7	54.5	17	56.1	28.6	23.2	45.440	224.780	
NHHS-2	8	52.1	18	57.8	29.0	22.5	49.980	229.320	
NHHS-2	9	57.4	19	59.0	31.5	23.1	56.420	235.760	
NHHS-2	10	58.5	20	56.8	29.6	24.5	63.340	242.680	
1-20 total							114.790	294.130	
NHHS-3	1	59.7	11	57.8	29.4	24.1	4.850	183.830	178.980
NHHS-3	2	52.2	12	50.9	27.8	23.5	9.340	188.320	
NHHS-3	3	53.7	13	52.1	26.8	20.4	13.470	192.450	
NHHS-3	4	52.9	14	53.5	29.3	24.7	18.950	197.930	
NHHS-3	5	56.6	15	59.1	29.5	23.9	25.410	204.390	
NHHS-3	6	56.5	16	53.5	26.7	22.0	28.860	207.840	
NHHS-3	7	55.6	17	58.3	30.9	22.8	35.170	214.150	
NHHS-3	8	55.4	18	57.0	28.5	21.8	40.160	219.140	
NHHS-3	9	51.3	19	54.0	30.7	22.2	44.880	223.860	
NHHS-3	10	53.2	20	56.0	28.5	24.2	49.640	228.620	
1-20 total							103.250	282.230	
NHHS-4	1	53.3	11	53.5	27.3	21.7			178.970
NHHS-4	2	54.9	12	55.4	24.8	22.3			
NHHS-4	3	56.3	13	52.9	29.7	24.9			
NHHS-4	4	58.0	14	51.8	26.9	22.5			
NHHS-4	5	56.8	15	53.9	25.9	20.3			
NHHS-4	6	52.4	16	54.6	26.4	21.3			
NHHS-4	7	57.8	17	55.3	28.6	21.8			
NHHS-4	8	55.0	18	50.2	25.7	22.1			
NHHS-4	9	55.0	19	56.3	28.5	24.3			
NHHS-4	10	55.1	20	53.5	29.2	21.2			
1-20 total							105.930	284.900	

NHHS 2004 (INDIGENOUS MUSSELS) **ORGANICS** *Weight of jar and mussel meat

Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHHS-1	1	50.6	11	57.0					179.337
NHHS-1	2	54.1	12	52.2					
NHHS-1	3	51.2	13	53.6					
NHHS-1	4	57.1	14	56.6					
NHHS-1	5	52.2	15	58.4					
NHHS-1	6	54.6	16	54.4					
NHHS-1	7	52.5	17	52.1					
NHHS-1	8	54.1	18	55.5					
NHHS-1	9	53.4	19	53.8					
NHHS-1	10	55.7	20	51.1					
1-20 total							119.616	298.953	
NHHS-2	1	53.5	11	57.1					179.564
NHHS-2	2	55.9	12	58.0					
NHHS-2	3	59.2	13	57.0					
NHHS-2	4	58.4	14	53.3					
NHHS-2	5	59.3	15	56.7					
NHHS-2	6	59.6	16	56.3					
NHHS-2	7	54.1	17	53.7					
NHHS-2	8	55.1	18	52.7					
NHHS-2	9	59.7	19	57.4					
NHHS-2	10	58.0	20	57.8					
1-20 total							123.177	302.741	
NHHS-3	1	51.3	11	53.4					180.494
NHHS-3	2	54.4	12	56.6					
NHHS-3	3	54.8	13	53.0					
NHHS-3	4	58.1	14	55.1					
NHHS-3	5	58.0	15	54.6					
NHHS-3	6	54.1	16	55.2					
NHHS-3	7	52.2	17	51.7					
NHHS-3	8	53.9	18	52.9					
NHHS-3	9	57.5	19	51.1					
NHHS-3	10	55.1	20	57.2					
1-20 total							105.335	285.829	
NHHS-4	1	57.7	11	56.7					179.563
NHHS-4	2	54.6	12	55.7					
NHHS-4	3	53.7	13	56.0					
NHHS-4	4	58.9	14	53.3					
NHHS-4	5	53.7	15	54.5					
NHHS-4	6	55.7	16	55.2					
NHHS-4	7	51.0	17	55.1					
NHHS-4	8	51.1	18	54.2					
NHHS-4	9	50.6	19	53.9					
NHHS-4	10	52.3	20	53.3					
1-20 total							100.558	280.121	

NHPI 2004 (INDIGENOUS MUSSELS) **METALS** *Weight of jar and mussel meat

Site	#	Length (mm)	#	Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHPI-1	1	53.4	11	50.4	27.4	21.8	4.724	183.833	179.109
NHPI-1	2	50.4	12	53.2	29.0	22.5	8.763	187.872	
NHPI-1	3	55.5	13	55.6	30.9	23.7	13.609	192.718	
NHPI-1	4	51.6	14	57.3	32.2	22.6	19.285	198.394	
NHPI-1	5	52.7	15	51.0	27.9	21.2	23.116	202.225	
NHPI-1	6	54.2	16	50.8	27.1	21.6	26.494	205.603	
NHPI-1	7	50.0	17	52.6	28.7	24.2	30.537	209.646	
NHPI-1	8	55.6	18	54.7	29.2	23.2	209.646	214.544	
NHPI-1	9	57.5	19	57.2	28.7	26.1	40.390	219.499	
NHPI-1	10	58.2	20	57.3	31.2	24.4	46.450	225.559	
1-20 total							91.787	270.896	
NHPI-2	1	58.1	11	58.2	31.5	24.0	5.838	183.435	177.597
NHPI-2	2	59.5	12	58.1	31.1	21.9	10.756	188.353	
NHPI-2	3	54.8	13	55.1	30.9	23.6	14.208	191.805	
NHPI-2	4	58.2	14	59.3	33.8	23.4	20.797	198.394	
NHPI-2	5	58.5	15	59.4	33.4	24.5	26.945	204.542	
NHPI-2	6	54.3	16	60.5	32.3	24.6	31.698	209.295	
NHPI-2	7	55.2	17	55.7	27.8	24.1	35.626	213.223	
NHPI-2	8	55.9	18	55.8	28.5	27.4	40.027	217.624	
NHPI-2	9	58.4	19	59.3	31.3	23.8	45.917	223.514	
NHPI-2	10	57.7	20	58.5	31.5	23.4	51.469	229.066	
1-20 total							103.115	280.712	
NHPI-3	1	54.6	11	53.1	32.2	21.6	4.405	183.105	178.700
NHPI-3	2	57.0	12	54.4	35.0	22.0	9.095	187.795	
NHPI-3	3	54.0	13	53.1	27.3	24.2	13.488	192.188	
NHPI-3	4	51.0	14	52.3	28.5	21.7	17.045	195.745	
NHPI-3	5	50.0	15	55.4	30.8	24.6	21.054	199.754	
NHPI-3	6	51.5	16	51.9	30.1	23.7	24.870	203.570	
NHPI-3	7	50.4	17	53.9	30.8	21.5	28.039	206.739	
NHPI-3	8	55.4	18	50.8	29.0	21.8	31.321	210.021	
NHPI-3	9	53.4	19	55.6	29.5	25.6	36.005	214.705	
NHPI-3	10	54.7	20	52.6	29.3	24.6	39.386	218.086	
1-20 total							80.045	258.745	
NHPI-4	1	52.8	11	57.2	29.8	26.0			179.338
NHPI-4	2	57.5	12	56.4	30.2	19.2			
NHPI-4	3	57.7	13	57.0	31.4	22.2			
NHPI-4	4	57.5	14	57.7	30.3	22.9			
NHPI-4	5	59.1	15	54.8	30.0	24.6			
NHPI-4	6	55.1	16	54.9	27.9	24.0			
NHPI-4	7	59.5	17	52.2	28.9	21.1			
NHPI-4	8	53.3	18	56.8	28.4	23.2			
NHPI-4	9	55.4	19	59.5	31.5	26.3			
NHPI-4	10	54.5	20	56.0	29.8	22.7			
1-20 total							94.366	273.704	

NHPI 2004 (INDIGENOUS MUSSELS) **ORGANICS** *Weight of jar and mussel meat

Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHPI-1	1	56.2	11	51.9					180.059
NHPI-1	2	58.1	12	53.6					
NHPI-1	3	53.8	13	57.0					
NHPI-1	4	56.4	14	54.5					
NHPI-1	5	57.5	15	53.6					
NHPI-1	6	53.6	16	54.7					
NHPI-1	7	58.5	17	50.1					
NHPI-1	8	56.3	18	53.2					
NHPI-1	9	54.1	19	57.5					
NHPI-1	10	54.7	20	55.6					
1-20 total							100.127	280.186	
NHPI-2	1	53.9	11	56.7					179.538
NHPI-2	2	54.8	12	55.9					
NHPI-2	3	59.2	13	55.8					
NHPI-2	4	56.3	14	57.4					
NHPI-2	5	56.9	15	57.7					
NHPI-2	6	56.5	16	53.5					
NHPI-2	7	52.3	17	51.3					
NHPI-2	8	57.3	18	58.4					
NHPI-2	9	60.7	19	52.5					
NHPI-2	10	59.6	20	52.5					
1-20 total							102.660	282.198	
NHPI-3	1	51.1	11	51.7					180.273
NHPI-3	2	49.1	12	56.8					
NHPI-3	3	50.6	13	51.5					
NHPI-3	4	53.6	14	54.6					
NHPI-3	5	55.2	15	52.3					
NHPI-3	6	54.0	16	53.2					
NHPI-3	7	52.7	17	52.8					
NHPI-3	8	51.9	18	54.9					
NHPI-3	9	50.2	19	56.3					
NHPI-3	10	54.8	20	57.8					
1-20 total							85.987	266.260	
NHPI-4	1	55.7	11	53.5					179.293
NHPI-4	2	53.2	12	55.6					
NHPI-4	3	59.2	13	60.2					
NHPI-4	4	50.5	14	58.2					
NHPI-4	5	52.3	15	55.3					
NHPI-4	6	56.6	16	55.6					
NHPI-4	7	54.9	17	51.5					
NHPI-4	8	57.0	18	54.5					
NHPI-4	9	52.7	19	53.2					
NHPI-4	10	57.1	20	56.2					
1-20 total							88.607	267.900	

NHFP 2004 (INDIGENOUS MUSSELS) **METALS** *Weight of jar and mussel meat

Site	#	Length (mm)	#	Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHFP-1	1	55.5	11	59.1	27.5	25.9	6.290	185.700	179.410
NHFP-1	2	49.9	12	55.4	29.4	23.2	10.940	190.350	
NHFP-1	3	54.7	13	59.0	29.1	26.0	16.190	195.600	
NHFP-1	4	61.0	14	55.1	29.3	24.6	21.070	200.480	
NHFP-1	5	62.0	15	57.4	27.7	28.8	26.150	205.560	
NHFP-1	6	55.3	16	52.6	26.5	21.7	30.970	210.380	
NHFP-1	7	57.5	17	53.5	26.9	21.0	34.810	214.220	
NHFP-1	8	51.4	18	60.4	30.8	25.5	214.220	221.730	
NHFP-1	9	59.3	19	55.5	26.3	26.1	47.370	226.780	
NHFP-1	10	49.8	20	48.9	24.4	22.0	51.590	231.000	
1-20 total							102.650	282.060	
NHFP-2	1	55.6	11	49.0	27.2	20.2	3.768	182.940	179.172
NHFP-2	2	51.2	12	53.0	28.2	19.8	7.828	187.000	
NHFP-2	3	49.3	13	55.7	28.7	22.3	14.459	193.631	
NHFP-2	4	59.0	14	50.3	26.0	24.3	19.483	198.655	
NHFP-2	5	58.3	15	55.4	28.8	21.2	24.328	203.500	
NHFP-2	6	55.2	16	56.4	29.1	21.7	29.630	208.802	
NHFP-2	7	51.1	17	51.4	27.6	19.3	33.786	212.958	
NHFP-2	8	52.9	18	55.5	30.3	24.7	39.129	218.301	
NHFP-2	9	63.5	19	49.9	24.6	19.4	42.498	221.670	
NHFP-2	10	53.6	20	55.4	24.7	25.0	46.484	225.656	
1-20 total							96.413	275.585	
NHFP-3	1	53.7	11	56.0	26.1	23.6	4.250	183.722	179.472
NHFP-3	2	56.8	12	51.6	26.6	22.1	7.947	187.419	
NHFP-3	3	56.2	13	58.4	29.9	23.2	13.075	192.547	
NHFP-3	4	53.1	14	51.3	26.9	22.9	17.951	197.423	
NHFP-3	5	51.0	15	53.1	28.2	23.8	22.406	201.878	
NHFP-3	6	54.2	16	58.2	28.8	25.3	27.721	207.193	
NHFP-3	7	54.6	17	56.3	29.0	22.8	30.680	210.152	
NHFP-3	8	52.1	18	50.5	26.1	21.5	34.835	214.307	
NHFP-3	9	57.3	19	51.7	26.2	20.3	41.089	220.561	
NHFP-3	10	58.1	20	51.0	27.7	22.3	45.321	224.793	
1-20 total							92.675	272.147	
NHFP-4	1	57.1	11	58.6	30.0	23.5			178.960
NHFP-4	2	58.5	12	54.8	29.1	21.8			
NHFP-4	3	52.7	13	55.6	28.3	23.3			
NHFP-4	4	51.7	14	57.5	29.2	25.8			
NHFP-4	5	51.5	15	50.5	25.2	20.3			
NHFP-4	6	54.7	16	50.8	26.2	22.9			
NHFP-4	7	56.2	17	51.8	26.3	23.4			
NHFP-4	8	53.5	18	50.3	25.5	22.3			
NHFP-4	9	52.6	19	52.7	24.3	21.2			
NHFP-4	10	52.7	20	52.9	26.1	22.1			
1-20 total							89.806	268.766	

NHFP 2004 (INDIGENOUS MUSSELS) **ORGANICS** *Weight of jar and mussel meat

Site	#	Length (mm)		Length (mm)	Height (mm)	Width (mm)	Wet weight (g)	Cumulative wet weight (g)*	Jar weight (g)
NHFP-1	1	54.9	11	54.0					179.734
NHFP-1	2	52.9	12	51.4					
NHFP-1	3	50.1	13	58.8					
NHFP-1	4	56.6	14	55.1					
NHFP-1	5	55.4	15	51.9					
NHFP-1	6	57.2	16	56.7					
NHFP-1	7	57.6	17	50.7					
NHFP-1	8	59.5	18	53.7					
NHFP-1	9	54.8	19	56.5					
NHFP-1	10	54.8	20	52.1					
1-20 total							111.288	291.022	
NHFP-2	1	55.6	11	61.5					180.099
NHFP-2	2	51.7	12	57.9					
NHFP-2	3	53.3	13	53.6					
NHFP-2	4	53.7	14	58.5					
NHFP-2	5	53.0	15	55.9					
NHFP-2	6	53.6	16	53.5					
NHFP-2	7	62.0	17	54.7					
NHFP-2	8	59.5	18	50.0					
NHFP-2	9	49.3	19	54.6					
NHFP-2	10	53.0	20	51.7					
1-20 total							108.025	288.124	
NHFP-3	1	55.1	11	54.3					179.568
NHFP-3	2	55.4	12	55.9					
NHFP-3	3	50.9	13	59.2					
NHFP-3	4	54.3	14	54.1					
NHFP-3	5	57.9	15	59.6					
NHFP-3	6	53.1	16	59.2					
NHFP-3	7	52.1	17	56.1					
NHFP-3	8	57.8	18	51.2					
NHFP-3	9	56.4	19	56.5					
NHFP-3	10	54.6	20	53.2					
1-20 total							111.992	291.560	
NHFP-4	1	52.7	11	51.5					179.577
NHFP-4	2	57.5	12	56.5					
NHFP-4	3	53.1	13	58.1					
NHFP-4	4	52.5	14	56.1					
NHFP-4	5	54.7	15	56.0					
NHFP-4	6	53.6	16	59.7					
NHFP-4	7	57.5	17	58.8					
NHFP-4	8	58.8	18	58.3					
NHFP-4	9	57.3	19	54.4					
NHFP-4	10	57.5	20	56.2					
1-20 total							124.554	304.131	

APPENDIX C: QC REPORT FROM BATTELLE MSL

PROJECT: Gulf of Maine Batch 1
PARAMETER: Metals
LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington
MATRIX: Mussel Tissue

SAMPLE CUSTODY AND PROCESSING: Ninety-one mussel tissue samples were received at MSL on 04/29/05. All samples were received in good condition (i.e., containers were intact and cooler temperature was acceptable). The samples were collected in glass jars with metals lids. The optimal container for the analysis of metals in tissue samples is a pre-cleaned glass jar with a plastic lid or pre-cleaned plastic container. The samples are considered minimally impacted as no rust was noticed on the metal lids. All samples were transferred to a pre-cleaned, tarred plastic jar. The samples were assigned a Battelle Central File (CF) identification number (2393). All project information was entered into Battelle's laboratory information and sample tracking system.

The following lists information on sample receipt and processing activities associated with the first batch of 20 samples.

Chemistry Lab ID for this Batch:	**2393*1-11, 13, 15-22**
Description	*Mussel Tissue*
Collection dates	03/10/01 and 03/10/02
Laboratory arrival date	04/29/05
Cooler temperatures, on arrival	5.8, 1.0, and 1.0°C
Digestion (aqua regia)	05/27/05
CVAA analysis (Hg)	06/02/05
ICP-OES analysis (Al, Cr, Cu, Fe)	06/07/05
ICP-MS analysis (Ag, Cd, Ni, Pb, Zn)	06/01/05 and 06/22/05

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	SRM Accuracy	Relative Precision	Method Detection Limit (µg/g dry weight)[(a)]	Reporting Limit (µg/g dry weight)[(b)]
Silver	ICP-MS	75-125%	≤25%	≤25%	0.01	0.03
Aluminum	ICP-OES	75-125%	≤25%	≤25%	1.3	4
Cadmium	ICP-MS	75-125%	≤25%	≤25%	0.01	0.03
Chromium	ICP-OES	75-125%	≤25%	≤25%	0.1	0.3
Copper	ICP-OES	75-125%	≤25%	≤25%	0.1	0.3
Iron	ICP-OES	75-125%	≤25%	≤25%	0.5	2
Mercury	CVAA	75-125%	≤25%	≤25%	0.005	0.02
Nickel	ICP-MS	75-125%	≤25%	≤25%	0.05	0.2
Lead	ICP-MS	75-125%	≤25%	≤25%	0.02	0.06
Zinc	ICP-MS	75-125%	≤25%	≤25%	0.6	2

(a) MDL determined annually using seven replicates of a tissue matrix spiked in an appropriate concentration.
(b) RL determined as 3.18* MDL

METHODS: The samples were analyzed for nine metals including silver (Ag), aluminum (Al), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn). Tissue samples were digested according to Battelle SOP MSL-I-024, *Mixed Acid Tissue Digestion*. An approximately 500-mg aliquot of each dried, homogeneous sample was combined with nitric and hydrochloric acids (aqua regia) in a Teflon vessel and heated in an oven at 130ºC (±10ºC) for a minimum of eight hours. After heating and cooling, deionized water was added to the acid-digested tissue to achieve analysis volume and the digestates were submitted for analysis by three methods.

Digested samples were analyzed for Hg by cold-vapor atomic absorption spectroscopy (CVAA) according to Battelle SOP MSL-I-016, *Total Mercury in Tissues and Sediments by Cold Vapor Atomic Absorption*, which is based on EPA Method 245.6, *Determination of Mercury in Tissue by Cold Vapor Atomic Absorption Spectrometry*.

Digested samples were analyzed for Al, Cr, Cu, and Fe using inductively coupled plasma optical emissions spectroscopy (ICP-OES) according to Battelle SOP MSL-I-033, *Determination of Elements in Aqueous and Digestate Samples by ICP-OES*. This procedure is based on two methods modified and adapted for analysis of low level samples: EPA Method 6010B and 200.7.

Digested samples were analyzed for Ag, Cd, Ni, Pb, and Zn using inductively coupled plasma-mass spectrometry (ICP-MS) according to Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP/MS*. This procedure is based on two methods modified and adapted for analysis of low-level solid sample digestates: EPA Method 1638, *Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma-Mass Spectrometry* and EPA Method 200.8, *Determination of Trace Elements in Water and Wastes by Inductively Coupled Plasma – Mass Spectrometry*.

All results were determined and reported in units of µg/g on a dry-weight basis.

HOLDING TIMES: Samples were archived frozen prior to arrival at MSL. The samples were freeze dried within 30 days of receipt and analyzed within six months.

DATA QUALIFIERS: Sample concentrations were evaluated and flagged to the following criteria:

- U Analyte not detected greater than the MDL, MDL reported with qualifier
- J Analyte detected greater than the MDL, but less than the RL
- * Duplicate analysis not within QC criterion of =25% relative percent difference.
- N QC sample outside QC criterion of ±25% recovery

METHOD BLANK: One method blank was analyzed with this batch of samples. Analytes were not detected above the RL.

LABORATORY CONTROL SAMPLE/BLANK SPIKE ACCURACY:

One blank spike/laboratory control sample (LCS) was analyzed with this set of samples. LCS recoveries ranged from 96% to 122% and were within the QC acceptance criterion of 75-125% recovery for all metals.

MATRIX SPIKE ACCURACY:

One tissue sample was selected for a matrix spike sample. Matrix spike recoveries ranged from 89% to 107% and were within the QC acceptance criterion of 75-125% recovery for all metals.

REPLICATE PRECISION:

One set of laboratory duplicates was analyzed with this set of samples. Precision was expressed as the relative standard difference (RPD) between replicate results. The RPD values ranged from 0% to 10% and were within the QC criterion of ≤25% for all metals.

STANDARD REFERENCE MATERIAL ACCURACY:

Standard reference material (SRM) accuracy was expressed as the percent recovery between the measured and certified concentrations. Reference values are provided for evaluation purposes.

SRM 2976 Mussel Tissue and SRM DORM-2 Dogfish Tissue were digested and analyzed with this set of samples. Multiple SRMs were selected because no single SRM is certified for all metals of interest at appropriate concentration ranges.

SRM 2976 is certified for Cd, Cu, Fe, Hg, Pb, and Zn. The percent recoveries ranged from 88% to 118% and were within QC acceptance criterion of 75-125% recovery for all metals.

The metals in SRM DORM-2 certified greater than the RL are Ag, Al, Cd, Cr, Cu, Fe, Hg, Ni, and Zn. The percent recoveries ranged from 89% to 119% and were within the QC acceptance criterion for all metals except Al (566%). The anomalously high Al value was attributed to laboratory contamination. The high value was confirmed by a secondary analysis. The entire batch was re-viewed and the contamination was isolated to the SRM. All other measures of accuracy and precision were within the QC criteria.

APPENDIX D: 2003-2004 NHEP GULFWATCH DATA FOR BLUE MUSSEL TISSUE

StationID	StartDate	ActivityID*	Parameter	ResultUnits	ROUTINE SAMPLE	LAB DUPLICATE
MECC	10/02/2003	MECC1N20031002	ALUMINUM	MG/KG-dw	423.000	
			CADMIUM	MG/KG-dw	1.980	
			COPPER	MG/KG-dw	8.310	
			DDT, TOTAL	UG/KG-dw	10.464	
			IRON	MG/KG-dw	575.000	
			LEAD	MG/KG-dw	7.320	
			MERCURY	MG/KG-dw	0.312	
			NICKEL	MG/KG-dw	2.030	
			PAH, TOTAL	UG/KG-dw	96.010	
			PCB, TOTAL	UG/KG-dw	31.495	
			PESTICIDES, TOTAL	UG/KG-dw	16.977	
			SILVER	MG/KG-dw	0.051	
			ZINC	MG/KG-dw	104.000	
			PERCENT SOLIDS	%	10.800	
		MECC2N20031002	ALUMINUM	MG/KG-dw	474.000	
			CADMIUM	MG/KG-dw	1.530	
			COPPER	MG/KG-dw	8.540	
			DDT, TOTAL	UG/KG-dw	13.856	
			IRON	MG/KG-dw	703.000	
			LEAD	MG/KG-dw	4.360	
			MERCURY	MG/KG-dw	0.244	
			NICKEL	MG/KG-dw	1.910	
			PAH, TOTAL	UG/KG-dw	123.905	
			PCB, TOTAL	UG/KG-dw	36.030	
			PESTICIDES, TOTAL	UG/KG-dw	19.827	
			SILVER	MG/KG-dw	0.054	
			ZINC	MG/KG-dw	87.500	
			PERCENT SOLIDS	%	9.100	
		MECC3N20031002	ALUMINUM	MG/KG-dw	367.000	
			CADMIUM	MG/KG-dw	1.740	

			COPPER	MG/KG-dw	11.300	
			DDT, TOTAL	UG/KG-dw	12.347	
			IRON	MG/KG-dw	748.000	
			LEAD	MG/KG-dw	3.780	
			MERCURY	MG/KG-dw	0.258	
			NICKEL	MG/KG-dw	2.450	
			PAH, TOTAL	UG/KG-dw	121.380	
			PCB, TOTAL	UG/KG-dw	36.796	
			PESTICIDES, TOTAL	UG/KG-dw	17.832	
			SILVER	MG/KG-dw	0.046	
			ZINC	MG/KG-dw	85.700	
			PERCENT SOLIDS	%	12.400	
		MECC4N20031002	ALUMINUM	MG/KG-dw	309.000	
			CADMIUM	MG/KG-dw	1.840	
			COPPER	MG/KG-dw	7.500	
			DDT, TOTAL	UG/KG-dw	12.361	
			IRON	MG/KG-dw	465.000	
			LEAD	MG/KG-dw	3.680	
			MERCURY	MG/KG-dw	0.258	
			NICKEL	MG/KG-dw	2.000	
			PAH, TOTAL	UG/KG-dw	137.590	
			PCB, TOTAL	UG/KG-dw	40.775	
			PESTICIDES, TOTAL	UG/KG-dw	18.367	
			SILVER	MG/KG-dw	0.044	
			ZINC	MG/KG-dw	100.000	
			PERCENT SOLIDS	%	12.900	
	10/19/2004	MECC1N20041019	ALUMINUM	MG/KG-dw	293.736	
			CADMIUM	MG/KG-dw	1.720	
			CHROMIUM	MG/KG-dw	2.391	
			COPPER	MG/KG-dw	7.853	
			IRON	MG/KG-dw	440.502	
			LEAD	MG/KG-dw	3.630	
			MERCURY	MG/KG-dw	0.281	

			NICKEL	MG/KG-dw	1.870	
			PAH, TOTAL	UG/KG-dw	195.019	
			SILVER	MG/KG-dw	0.037	
			ZINC	MG/KG-dw	92.900	
			PERCENT SOLIDS	%	14.200	
		MECC2N20041019	ALUMINUM	MG/KG-dw	458.220	
			CADMIUM	MG/KG-dw	1.920	
			CHROMIUM	MG/KG-dw	2.710	
			COPPER	MG/KG-dw	8.635	
			IRON	MG/KG-dw	614.599	
			LEAD	MG/KG-dw	4.290	
			MERCURY	MG/KG-dw	0.274	
			NICKEL	MG/KG-dw	2.150	
			PAH, TOTAL	UG/KG-dw	138.349	
			SILVER	MG/KG-dw	0.047	
			ZINC	MG/KG-dw	97.400	
			PERCENT SOLIDS	%	14.600	
		MECC3N20041019	ALUMINUM	MG/KG-dw	446.654	
			CADMIUM	MG/KG-dw	1.820	
			CHROMIUM	MG/KG-dw	2.531	
			COPPER	MG/KG-dw	8.229	
			IRON	MG/KG-dw	527.025	
			LEAD	MG/KG-dw	3.180	
			MERCURY	MG/KG-dw	0.280	
			NICKEL	MG/KG-dw	2.010	
			PAH, TOTAL	UG/KG-dw	137.622	
			SILVER	MG/KG-dw	0.048	
			ZINC	MG/KG-dw	105.000	
			PERCENT SOLIDS	%	14.100	
		MECC4N20041019	ALUMINUM	MG/KG-dw	347.669	
			CADMIUM	MG/KG-dw	1.930	
			CHROMIUM	MG/KG-dw	2.185	
			COPPER	MG/KG-dw	7.304	

			IRON	MG/KG-dw	456.517	
			LEAD	MG/KG-dw	2.880	
			MERCURY	MG/KG-dw	0.231	
			NICKEL	MG/KG-dw	1.520	
			PAH, TOTAL	UG/KG-dw	45.023	
			SILVER	MG/KG-dw	0.057	
			ZINC	MG/KG-dw	88.800	
			PERCENT SOLIDS	%	14.700	
NHDP	10/01/2003	NHDP1N20031001	ALUMINUM	MG/KG-dw	235.000	
			CADMIUM	MG/KG-dw	1.960	
			CHROMIUM	MG/KG-dw	3.710	
			DDT, TOTAL	UG/KG-dw	3.851	
			IRON	MG/KG-dw	310.000	
			LEAD	MG/KG-dw	1.770	
			MERCURY	MG/KG-dw	0.295	
			NICKEL	MG/KG-dw	1.800	
			PAH, TOTAL	UG/KG-dw	178.473	
			PCB, TOTAL	UG/KG-dw	24.931	
			PESTICIDES, TOTAL	UG/KG-dw	3.851	
			SILVER	MG/KG-dw	0.046	
			ZINC	MG/KG-dw	105.000	
			PERCENT SOLIDS	%	12.500	
		NHDP2N20031001	ALUMINUM	MG/KG-dw	246.000	
			CADMIUM	MG/KG-dw	1.810	
			CHROMIUM	MG/KG-dw	4.180	
			DDT, TOTAL	UG/KG-dw	3.871	
			IRON	MG/KG-dw	300.000	
			LEAD	MG/KG-dw	1.840	
			MERCURY	MG/KG-dw	0.309	
			NICKEL	MG/KG-dw	1.690	
			PAH, TOTAL	UG/KG-dw	163.850	
			PCB, TOTAL	UG/KG-dw	25.144	
			PESTICIDES, TOTAL	UG/KG-dw	3.871	

			SILVER	MG/KG-dw	0.046	
			ZINC	MG/KG-dw	68.400	
			PERCENT SOLIDS	%	11.600	
		NHDP3N20031001	ALUMINUM	MG/KG-dw	257.000	
			CADMIUM	MG/KG-dw	2.210	
			CHROMIUM	MG/KG-dw	4.750	
			DDT, TOTAL	UG/KG-dw	3.224	
			IRON	MG/KG-dw	364.000	
			LEAD	MG/KG-dw	2.330	
			MERCURY	MG/KG-dw	0.280	
			NICKEL	MG/KG-dw	4.110	
			PAH, TOTAL	UG/KG-dw	175.947	
			PCB, TOTAL	UG/KG-dw	21.378	
			PESTICIDES, TOTAL	UG/KG-dw	3.224	
			SILVER	MG/KG-dw	0.063	
			ZINC	MG/KG-dw	101.000	
			PERCENT SOLIDS	%	9.900	
		NHDP4N20031001	ALUMINUM	MG/KG-dw	232.000	212.000
			CADMIUM	MG/KG-dw	2.730	2.540
			CHROMIUM	MG/KG-dw	6.100	6.080
			DDT, TOTAL	UG/KG-dw	5.118	4.429
			IRON	MG/KG-dw	308.000	302.000
			LEAD	MG/KG-dw	2.720	2.530
			MERCURY	MG/KG-dw	0.301	0.300
			NICKEL	MG/KG-dw	2.170	1.960
			PAH, TOTAL	UG/KG-dw	190.850	210.231
			PCB, TOTAL	UG/KG-dw	32.437	28.186
			PESTICIDES, TOTAL	UG/KG-dw	5.118	4.429
			SILVER	MG/KG-dw	0.121	0.112
			ZINC	MG/KG-dw	138.000	128.000
			PERCENT SOLIDS	%	13.100	13.100
	10/19/2004	NHDP1N20041019	ALUMINUM	MG/KG-dw	331.179	
			CADMIUM	MG/KG-dw	2.660	

			CHROMIUM	MG/KG-dw	2.722	
			COPPER	MG/KG-dw	7.959	
			DDT, TOTAL	UG/KG-dw	6.997	
			IRON	MG/KG-dw	425.621	
			LEAD	MG/KG-dw	2.490	
			MERCURY	MG/KG-dw	0.301	
			NICKEL	MG/KG-dw	2.170	
			PAH, TOTAL	UG/KG-dw	216.572	
			PCB, TOTAL	UG/KG-dw	32.760	
			PESTICIDES, TOTAL	UG/KG-dw	8.498	
			SILVER	MG/KG-dw	0.056	
			ZINC	MG/KG-dw	86.400	
			PERCENT SOLIDS	%	13.400	
		NHDP2N20041019	ALUMINUM	MG/KG-dw	362.449	398.356
			CADMIUM	MG/KG-dw	2.480	2.460
			CHROMIUM	MG/KG-dw	2.564	2.591
			COPPER	MG/KG-dw	8.337	8.245
			DDT, TOTAL	UG/KG-dw	7.150	
			IRON	MG/KG-dw	470.828	479.520
			LEAD	MG/KG-dw	2.360	2.370
			MERCURY	MG/KG-dw	0.306	0.302
			NICKEL	MG/KG-dw	1.810	2.040
			PAH, TOTAL	UG/KG-dw	205.196	
			PCB, TOTAL	UG/KG-dw	30.290	
			PESTICIDES, TOTAL	UG/KG-dw	11.086	
			SILVER	MG/KG-dw	0.064	0.060
			ZINC	MG/KG-dw	105.000	100.000
			PERCENT SOLIDS	%	13.200	13.200
		NHDP3N20041019	ALUMINUM	MG/KG-dw	374.919	
			CADMIUM	MG/KG-dw	2.330	
			CHROMIUM	MG/KG-dw	2.736	
			COPPER	MG/KG-dw	8.157	
			DDT, TOTAL	UG/KG-dw	6.990	

			IRON	MG/KG-dw	425.511	
			LEAD	MG/KG-dw	2.160	
			MERCURY	MG/KG-dw	0.299	
			NICKEL	MG/KG-dw	1.790	
			PAH, TOTAL	UG/KG-dw	194.419	
			PCB, TOTAL	UG/KG-dw	31.140	
			PESTICIDES, TOTAL	UG/KG-dw	10.058	
			SILVER	MG/KG-dw	0.060	
			ZINC	MG/KG-dw	98.900	
			PERCENT SOLIDS	%	13.700	
		NHDP4N20041019	ALUMINUM	MG/KG-dw	448.394	
			CADMIUM	MG/KG-dw	2.580	
			CHROMIUM	MG/KG-dw	2.904	
			COPPER	MG/KG-dw	8.095	
			DDT, TOTAL	UG/KG-dw	9.859	
			IRON	MG/KG-dw	502.785	
			LEAD	MG/KG-dw	2.620	
			MERCURY	MG/KG-dw	0.336	
			NICKEL	MG/KG-dw	2.070	
			PAH, TOTAL	UG/KG-dw	201.190	
			PCB, TOTAL	UG/KG-dw	39.969	
			PESTICIDES, TOTAL	UG/KG-dw	14.064	
			SILVER	MG/KG-dw	0.065	
			ZINC	MG/KG-dw	101.000	
			PERCENT SOLIDS	%	13.300	
NHHS	10/01/2003	NHHS1N20031001	ALUMINUM	MG/KG-dw	260.000	
			CADMIUM	MG/KG-dw	1.290	
			CHROMIUM	MG/KG-dw	1.970	
			DDT, TOTAL	UG/KG-dw	6.412	3.799
			IRON	MG/KG-dw	290.000	
			LEAD	MG/KG-dw	1.780	
			MERCURY	MG/KG-dw	0.113	
			NICKEL	MG/KG-dw	1.280	

			PAH, TOTAL	UG/KG-dw	35.312	36.643
			PCB, TOTAL	UG/KG-dw	6.565	6.538
			PESTICIDES, TOTAL	UG/KG-dw	8.174	5.228
			SILVER	MG/KG-dw	0.034	
			ZINC	MG/KG-dw	76.500	
			PERCENT SOLIDS	%	12.900	
		NHHS2N20031001	ALUMINUM	MG/KG-dw	317.000	
			CADMIUM	MG/KG-dw	1.460	
			CHROMIUM	MG/KG-dw	3.300	
			DDT, TOTAL	UG/KG-dw	6.029	
			IRON	MG/KG-dw	331.000	
			LEAD	MG/KG-dw	2.060	
			MERCURY	MG/KG-dw	0.108	
			NICKEL	MG/KG-dw	2.240	
			PAH, TOTAL	UG/KG-dw	37.497	
			PCB, TOTAL	UG/KG-dw	6.168	
			PESTICIDES, TOTAL	UG/KG-dw	8.123	
			SILVER	MG/KG-dw	0.051	
			ZINC	MG/KG-dw	102.000	
			PERCENT SOLIDS	%	16.000	
		NHHS3N20031001	ALUMINUM	MG/KG-dw	292.000	
			CADMIUM	MG/KG-dw	1.530	
			CHROMIUM	MG/KG-dw	1.790	
			DDT, TOTAL	UG/KG-dw	5.763	
			IRON	MG/KG-dw	340.000	
			LEAD	MG/KG-dw	1.850	
			MERCURY	MG/KG-dw	0.116	
			NICKEL	MG/KG-dw	1.600	
			PAH, TOTAL	UG/KG-dw	30.431	
			PCB, TOTAL	UG/KG-dw	6.120	
			PESTICIDES, TOTAL	UG/KG-dw	7.619	
			SILVER	MG/KG-dw	0.046	
			ZINC	MG/KG-dw	96.400	

			PERCENT SOLIDS	%	13.900	
		NHHS4N20031001	ALUMINUM	MG/KG-dw	213.763	
			CADMIUM	MG/KG-dw	1.610	
			CHROMIUM	MG/KG-dw	2.038	
			DDT, TOTAL	UG/KG-dw	6.315	
			IRON	MG/KG-dw	264.283	
			LEAD	MG/KG-dw	1.830	
			MERCURY	MG/KG-dw	0.098	
			NICKEL	MG/KG-dw	1.520	
			PAH, TOTAL	UG/KG-dw	32.881	
			PCB, TOTAL	UG/KG-dw	6.142	
			PESTICIDES, TOTAL	UG/KG-dw	8.093	
			SILVER	MG/KG-dw	0.054	
			ZINC	MG/KG-dw	87.200	
			PERCENT SOLIDS	%	14.400	
	10/19/2004	NHHS1N20041019	ALUMINUM	MG/KG-dw	212.142	
			CADMIUM	MG/KG-dw	1.700	
			CHROMIUM	MG/KG-dw	1.254	
			COPPER	MG/KG-dw	6.575	
			DDT, TOTAL	UG/KG-dw	7.110	
			IRON	MG/KG-dw	297.425	
			LEAD	MG/KG-dw	1.920	
			MERCURY	MG/KG-dw	0.132	
			NICKEL	MG/KG-dw	1.210	
			PAH, TOTAL	UG/KG-dw	98.856	
			PCB, TOTAL	UG/KG-dw	6.710	
			PESTICIDES, TOTAL	UG/KG-dw	7.110	
			SILVER	MG/KG-dw	0.018	
			ZINC	MG/KG-dw	81.800	
			PERCENT SOLIDS	%	17.400	
		NHHS2N20041019	ALUMINUM	MG/KG-dw	159.932	
			CADMIUM	MG/KG-dw	1.350	
			CHROMIUM	MG/KG-dw	1.117	

			COPPER	MG/KG-dw	7.223	
			DDT, TOTAL	UG/KG-dw	7.612	
			IRON	MG/KG-dw	254.466	
			LEAD	MG/KG-dw	1.390	
			MERCURY	MG/KG-dw	0.140	
			NICKEL	MG/KG-dw	1.010	
			PAH, TOTAL	UG/KG-dw	113.324	
			PCB, TOTAL	UG/KG-dw	9.609	
			PESTICIDES, TOTAL	UG/KG-dw	7.612	
			SILVER	MG/KG-dw	0.022	
			ZINC	MG/KG-dw	82.700	
			PERCENT SOLIDS	%	18.400	
		NHHS3N20041019	ALUMINUM	MG/KG-dw	236.957	
			CADMIUM	MG/KG-dw	1.990	
			CHROMIUM	MG/KG-dw	1.414	
			COPPER	MG/KG-dw	8.082	
			DDT, TOTAL	UG/KG-dw	5.198	
			IRON	MG/KG-dw	327.351	
			LEAD	MG/KG-dw	2.120	
			MERCURY	MG/KG-dw	0.151	
			NICKEL	MG/KG-dw	1.390	
			PAH, TOTAL	UG/KG-dw	101.917	
			PCB, TOTAL	UG/KG-dw	5.099	
			PESTICIDES, TOTAL	UG/KG-dw	5.198	
			SILVER	MG/KG-dw	0.019	
			ZINC	MG/KG-dw	117.000	
			PERCENT SOLIDS	%	16.200	
		NHHS4N20041019	ALUMINUM	MG/KG-dw	158.723	
			CADMIUM	MG/KG-dw	1.850	
			CHROMIUM	MG/KG-dw	1.098	
			COPPER	MG/KG-dw	7.010	
			DDT, TOTAL	UG/KG-dw	6.358	
			IRON	MG/KG-dw	265.458	

			LEAD	MG/KG-dw	2.040	
			MERCURY	MG/KG-dw	0.149	
			NICKEL	MG/KG-dw	1.100	
			PAH, TOTAL	UG/KG-dw	106.639	93.012
			PCB, TOTAL	UG/KG-dw	7.127	
			PESTICIDES, TOTAL	UG/KG-dw	6.358	
			SILVER	MG/KG-dw	0.022	
			ZINC	MG/KG-dw	93.500	
			PERCENT SOLIDS	%	17.200	

*Note: There is an unique ActivityID for each replicate sample. The first four characters of the ActivityID are the station. The fifth character is the replicate number. The sixth character is “N” to denote that the samples are from indigenous mussels. The remaining characters are the collection date in YYYYMMDD format.
** Concentrations are reported on a dry-weight basis.

APPENDIX E: DEVALIDATED SAMPLES FROM 2003-2004 NHEP GULFWATCH SAMPLES

StationID	StartDate	ActivityID	Parameter	ResultUnits	ROUTINE SAMPLE	LAB DUPLICATE
MECC	10/02/2003	MECC1N20031002	CHROMIUM	MG/KG-dw	13.300	
		MECC2N20031002	CHROMIUM	MG/KG-dw	24.000	
		MECC3N20031002	CHROMIUM	MG/KG-dw	64.200	
		MECC4N20031002	CHROMIUM	MG/KG-dw	14.100	
NHDP	10/01/2003	NHDP1N20031001	COPPER	MG/KG-dw	53.100	
		NHDP2N20031001	COPPER	MG/KG-dw	125.000	
		NHDP3N20031001	COPPER	MG/KG-dw	11.900	
		NHDP4N20031001	COPPER	MG/KG-dw	69.600	69.900
NHHS	10/01/2003	NHHS1N20031001	COPPER	MG/KG-dw	41.100	
		NHHS2N20031001	COPPER	MG/KG-dw	58.000	
		NHHS3N20031001	COPPER	MG/KG-dw	22.300	
		NHHS4N20031001	COPPER	MG/KG-dw	9.486	