Baywatchers

Newsletter of the Buzzards Bay Citizens' Water Quality Monitoring Program

Volume 1:1 December 1992

Thank you!

Thank you for participating in the Buzzards Bay Citizens' Water Quality Monitoring Program's first season! We're off to a great start—more than 100 citizens from around the Bay participated in the program in some way.

This water quality monitoring program is a collaborative effort of the Buzzards Bay Project and the Coalition for Buzzards Bay. Our goal is to create a network of volunteers to gather information to help characterize pollution in the Bay, evaluate the effectiveness of management actions, and document long-term trends in water quality. This data is vital information that environmental managers need, and it would be too costly or impossible to gather, without your assistance.

Protecting and restoring Buzzards Bay means identifying and managing the problems specific to each of the Bay's more than 30 major embayments. Consequently, our plan is to make measurements of salinity, temperature, oxygen, water transparency, nutrient concentrations, chlorophyll, periphyton, and fecal coliforms to answer embayment specific questions in an organized, coordinated way that has never before been attempted.

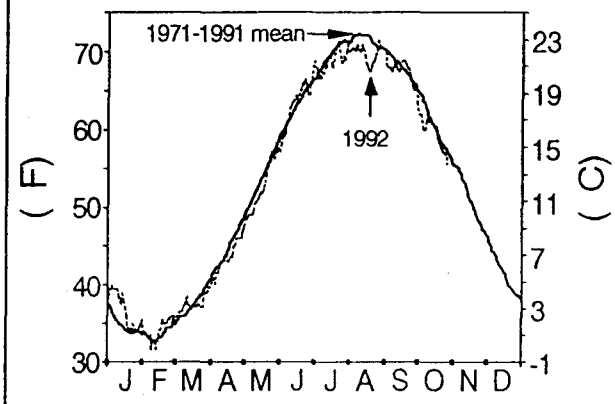
The Buzzards Bay Project has contracted with Dr. Brian Howes and his staff at the Woods Hole Oceanographic Institution to analyze water samples for nutrients, and provide technical assistance to the monitoring program. Dr. Howes brings with him a wealth of experience from his nationally recognized "PondWatchers" program in Falmouth. Barnstable County Health and Environmental Department will analyze water samples for fecal coliform bacteria, and the Massachusetts Division of Marine Fisheries will provide training on the collection of water samples for fecal coliforms.

We are also very fortunate to have Eileen Gunn at the Coalition coordinating what is one of the most ambitious citizen monitoring programs in the country. Her hard work and calm demeanor were a godsend during the start-up of this project. With Eileen's skills and the enthusiasm and your support, we know we are looking at the formula for success. Thank you !

Joseph Costa, Ph.D.
Project Manager
Buzzards Bay Project

Mimi McConnell
Executive Director
Coalition for Buzzards Bay

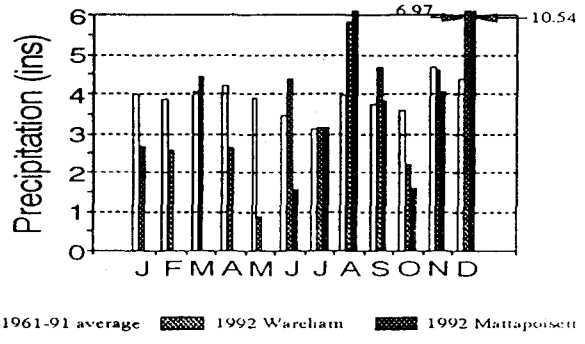
It's been a cool...



Daily water temperature data collected by the Woods Hole Oceanographic Institution will be used as a point of comparison for data collected in the Buzzards Bay Citizens' Water Quality Monitoring Program (data courtesy of Dot Rogers). Water temperature coincides with seasonal changes in air temperature but does not show as much daily variation.

Above we compare 1992 water temperature in Woods Hole to the average for the previous 20 years. As shown, 1992's winter was mild, except for a frigid 3 weeks last February, followed by a cooler than average spring and summer.

...and mostly dry year.



Until August, it was a drier than normal year. Long-term monthly averages (white bars) recorded at the UMass Cranberry Experiment Station in Wareham are compared to 1992 Cranberry Station data (grey bars, data courtesy of I. D'Moranville) and observations made by citizen monitor Ben Schneider at Antassawamock Neck, Mattapoisett (black bars). On August 8, the Buzzards Bay area experienced one of the largest single day rainfalls in decades that ranged from a low 4.5 inches at the Experiment Station to 7.2 inches at a station in New Bedford. Such variability is not uncommon, particularly during summer, when passing thunderstorms may soak one area but leave others dry. For this reason it is vital to have rain gauge stations in different parts of the bay to better evaluate pollutant loadings from storm drains and other sources.

Monitoring Program Overview

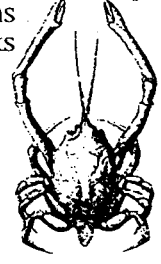
We have just completed the first season of the Buzzards Bay Citizens' Water Quality Monitoring Program. This multifaceted program will include both baseline ambient water quality monitoring and upstream identification of pollution sources. We began in April with four training sessions around the Bay on the baseline monitoring. Over 100 volunteers are participating in this task, measuring dissolved oxygen, temperature, salinity, and water transparency at 87 sites in 30 embayments. These parameters will be used to determine the health of each embayment, particularly how eutrophic each embayment has become from nitrogen inputs. Information about what these data can tell us begins on page 6. Other monitoring tasks will be added in 1993 (see page 11).

This is the first time the water quality throughout Buzzards Bay has been monitored to this degree, with measurements taken on a consistent and simultaneous basis allowing for bay-wide comparisons of data under similar weather, light, and tidal conditions. These snapshot views allow scientists to study the relative health of each embayment over time.

In addition to the routine monitoring, two rounds of samples were collected in 14 embayments for nutrient analyses at the Woods Hole Oceanographic Institution. The nutrient monitoring was conducted in embayments where volunteer availability permitted (see list on page 4).

To better characterize nutrient loading in each embayment, we are also evaluating "periphyton" growth on specially designed floats (periphyton is the brown felt-like algae that grows on objects such as boats, docks or ropes submerged in the water). Thanks to the hard work of volunteer carpenters and the busy little hands of the neighborhood kids, the Program Coordinator was able to build over 100 floats to measure periphyton. The floats were modestly constructed of wood strips to hold screening material, soda bottles, cored bricks (balast to keep the floats upright), and sand-filled milk containers for anchors. By measuring relative amounts of periphyton growth on the screen strips at each site we have an indication of the nutrient conditions since periphyton growth is related to available nutrients.

Volunteers equipped with boats and trained in sample collection and filtering techniques, deployed periphyton floats and collected water samples for nutrient analyses at several stations in their embayments. Two weeks later, the floats were retrieved so that the screening material could be analyzed for periphyton growth, and a second round of nutrient samples were collected for analysis.

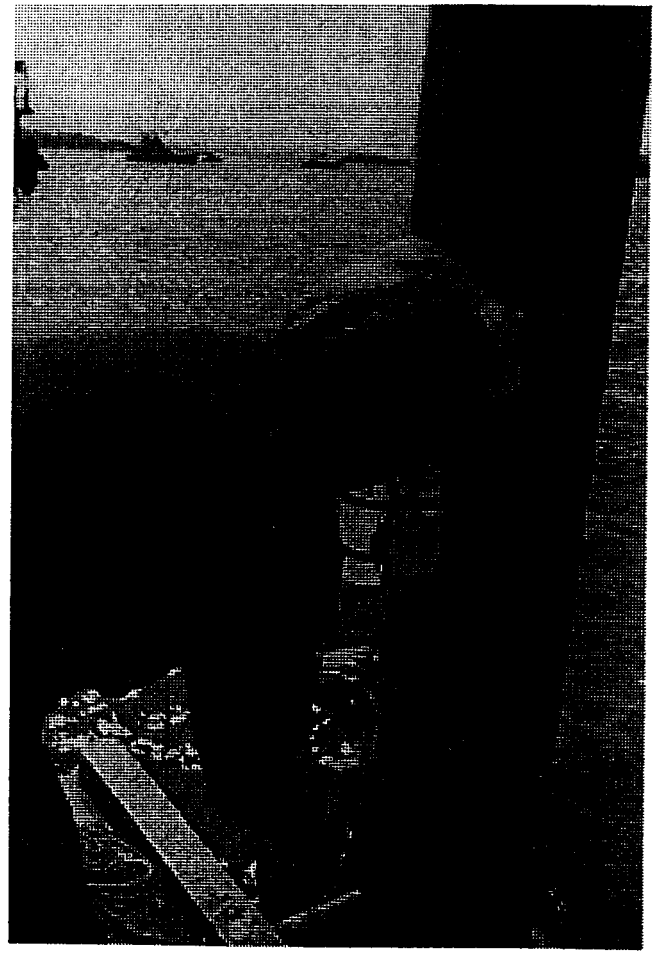


Why evaluate embayments

A mutual goal of the Buzzards Bay Project and the Coalition for Buzzards Bay is to facilitate implementation of the recommendations contained in the Buzzards Bay Comprehensive Conservation and Management Plan (CCMP). A major theme of the CCMP is that each embayment in Buzzards Bay has its own set of problems derived from differing land uses in its surrounding drainage basin.

In order to take action, or to evaluate cleanup efforts, environmental managers need reliable data characterizing pollution sources and water quality. In many Buzzards Bay embayments, some essential kinds of data have never been collected. Consequently, a major objective of the Citizens' Water Quality Monitoring Program is to fill this void.

The following pages provide a preliminary summary and evaluation of some of the data collected by the citizen volunteers. Because each embayment has different depths, flushing rates, and levels of surrounding development, a wide range of values can be observed for each parameter measured on any given day. Below each graph we explain what accounts for some of the variation observed.



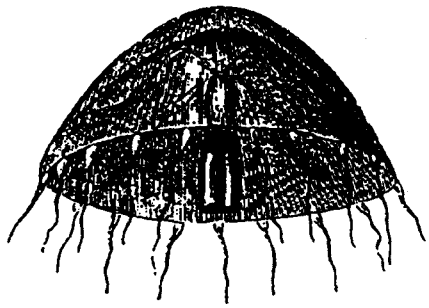
Muriel Farina sampling dissolved oxygen at Onset Pier in Wareham.

ENDECO/YSI data will assist monitoring effort

ENDECO, a subsidiary of Yellow Springs Instruments, is providing data to help the Buzzards Bay Project evaluate the citizen's monitoring program oxygen data, and will also help predict when low oxygen concentrations may strike Buzzards Bay embayments.

This summer, ENDECO/YSI–which is located in Marion–deployed a continuously recording oxygen-temperature-conductivity meter at Burrs Brothers Marina in Sippican Harbor. The data from their meter (bottom right) shows the distinct daily rise and fall of oxygen concentrations common to a shallow embayments.

Mike Lizotte, an ENDECO/YSI employee and Marion resident, is also a volunteer in the Citizens' Water Quality Monitoring Program. Mike's station is next to the ENDECO meter and his results will be used in our Quality Assurance/Quality Control evaluations. Mike has also volunteered to help maintain the six YSI oxygen meters purchased by the Project that will be used for special monitoring tasks in the coming months.



Catching those low oxygen events:

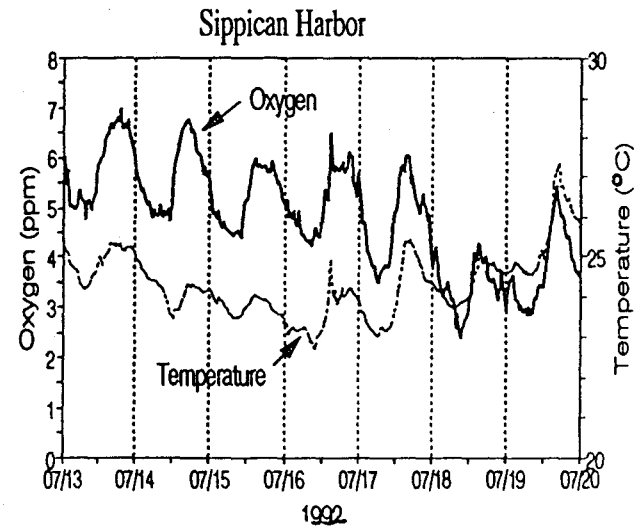
We will notify you about special summertime samplings when weather or other conditions may result in low dissolved oxygen concentrations, but we encourage you to take extra early morning measurements whenever you observe 2 or more days of overcast and calm weather, particularly during July or August.

Why measure oxygen between 5 and 9 in the morning?

Daily fluctuations of temperature and oxygen are typical of shallow Buzzards Bay embayments. Oxygen is highest in the afternoon when winds and photosynthesis raise the oxygen content of the water. During the night and into the early morning hours, calming winds, respiration by plants and animals, and the absence of photosynthesis drive down oxygen concentrations.

Temperature also fluctuates daily because of warming by the sun.

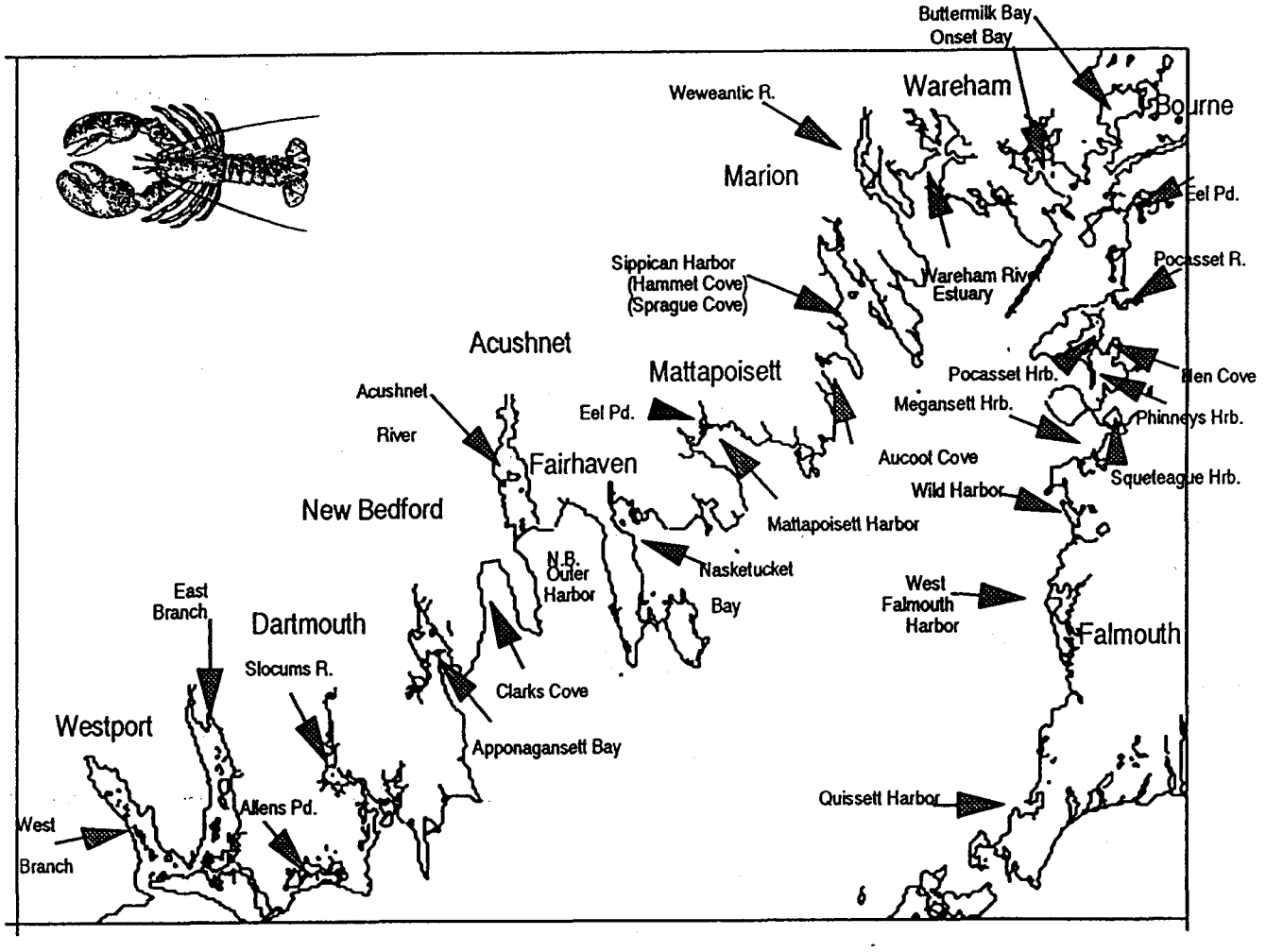
This daily fluctuation in oxygen and temperature is illustrated by the figure below of the measurements made at Sippican Harbor, Marion. During a 6-week period this summer, lowest oxygen concentrations occurred 85% of the time between 5 AM and 9 AM, and 40% of the time between between 6 and 8 AM.



Continuous oxygen and temperature measurements recorded by an ENDECO/YSI 1184 SSM probe at Burr Brothers Marina in Sippican Harbor (vertical lines at midnight). Daily fluctuations of up to 5 ppm were observed at this site. (*Data courtesy of ENDECO/YSI, graphics by the Buzzards Bay Project.*)

Map of Buzzards Bay showing monitored embayments

These sites were included in the basic monitoring program where oxygen, salinity, temperature, and turbidity were meaasured. Some sites were also included in a more detailed nutrient evaluation (box inset). New fecal coliform test sites will be added this spring.



Embayments monitored for nutrient, chlorphyll concentrations and periphyton growth were:

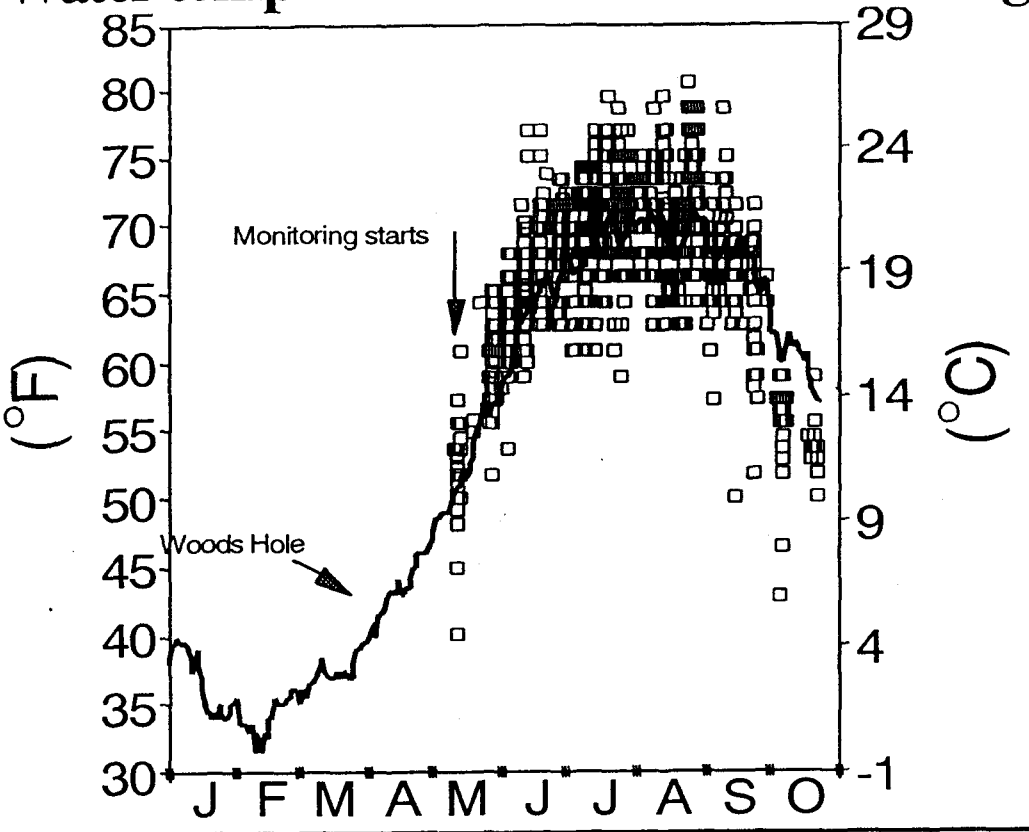
- *Hen Cove*
- *Onset Bay*
- *Broad Marsh River*
- *Wareham River Estuary*
- *Marks Cove*
- *Matapoisett Harbor*
- *Westport Rivers*
- *Apponagansett Bay*
- *Aucoot Cove*
- *Tobeys Island Inlet (Phinneys Harbor)*
- *Pocasset River*
- *Phinneys Harbor*
- *Squeteague Harbor*
- *West Falmouth Harbor*
- *Sippican Harbor (Hammett Cove) (Sprague Cove)*

Station identification and volunteers

Embayment	Station	Volunteer	Location
Quissett	QH1	Stetson, Tom	Private pier
	QH2	MacLean, Fran	Boatyard pier
		Halpin, Ann	Assn. dock
W.Falmouth	WF1	Morway Family	Town Dock
	WF2	Harvey, Lois	Snug Harbor
	WF3	Fassett,Rose/Step	Barge Mooring
	WF4	Anderson, Tanya	Chappy Bridge
Wild Harbor	WH1	Bansbach, Paul	West Ave. Inlet
	WH2	Ford, John	Outer River
Megansett	MG2	Ohnemus, Will	Boat-Central Harbor
Fiddler's Cove	FC1	Buchan, Ray	Marina Dock
Rand's Harbor	RH1	Kiebala, Betsy	Wading
Squeteague	SQ1	Mears, Don	Assn. Dock
Red Brook	RB1	Mitchell, K.W. Hiller/Latimer	Parker's dock
	RB2	Staude, Charles	Boat/Central Harbor
	RB3	Staude/Connors	Boat/Outer Harbor
Hen Cove	HC1	Cookingham, Russ	Private dock
Pocasset Harbor	PC1	Wolf, Ann	Barlows Landing
	PC3	Adelstein, Joe	Outer Harbor/dock
Pocasset River	PR1	Myers, Don/Penny	Town Marina
Phinney's Harbor	PH1	Wilson, Dorothy	RR Bridge
	PH2	Giroux, D. Pidgeon, Cheryl	Monument Beach Pier
	PH3	Szatkowski, Jim	Boat-Tobys Isl. Inlet
Back River	BR1	Wilson, Dorothy	Wading
Eel Pond	EP1	Prince, Flo/Dick	Boat
Little Buttermilk	LB2	Mulvey, Jim	Boat-Central Inlet
Buttermilk Bay	BB3	Smart, John	Wading-Miller Cove
	BB4	Greig, Richard	Bevins Marina
Taylor Point	TP1	Berger, Alice	Dock-Taylor Marina
Butlers Cove	BC1	Vogel, Jim	Dock
Onset Bay	OB1	Farina, Muriel	Town Pier
	OB2	Myers, Walter	Pt. Indep. Dock
	OB3	MacLeod, Will	Private dock
Broad/Muddy Cove	BD1	Knowlton, Richard	Dummy Bridge
East River	ER1	Connolly, John	Stonebridge Marina
Shell Pt. Bay	SP1	Dautel, Canby	Offshore
Bass Cove	BS1	White, Norma	Offshore
Bourne Cove	BNC1	Suddard, Ben	Private dock
Little Harbor	LH1	Suddard, Ben	boat
Wareham River	WR1	Clark, Eileen	Rt.6 Bridge
	WR2	Herring, Tom&Deb	Warrs Marina dock
Broad Marsh Riv.	BMR1	Reed, Kenneth	Boat-Broadmarsh Riv
Swifts Beach	SB1	Kilpatrick, Alan	Wading-Swifts Beach
Wankinco River	WK1	Freeman, Ed	Boat
Agawam River	AG1	Morrison, Sally	Route 6 Bridge
Weweantic River	WW1	Dyer, Don	off Route 6
	WW2	Littlejohn, Tom	boat
Wings Cove	WCM1	Maxwell, Sue	boat ramp

Embayment	Station	Volunteer	Location
Marion	WCM2	Ryder, Frank Cafarella, Mark Day, Steve	private access
Sippican Harbor			
Hammets Cove	HM1	Doherty, Mary	dock-Hammet Cove
Sippican Harbor	SH1	Lizotte, Mike	Burr Bros. dock (Inner)
	SH2	McSweeney, Brian	Private dock
Blankenship Cove	BLK1	Minton, Duane Wickendon, Rich	Private dock-Blankenship
Planting Island Cove	PL1	Sara Jackson	dock-Planting Isl. Cove
Aucoot Cove	AC1	Ford, John/Isabel	Association dock
	AC2	Hathaway, Priscilla	Creek outlet/Boat
Hillers Cove	HL1	Zeimetz, Ester	assn. dock/boat
Pine Island Pond	PI1	Bonnar, James	Wading sample
Mattapoiset Harbor	MH1	Best, Fred	Public dock-Inner
	MH3	Best, Dave	River mouth
	MH4	Best, Dave	YMCA Camp
Eel Pond	EL1	Thompson, Priscilla	Eel Pond
Brant Island Cove	BI1	Mulvey, Brian	dock
Nasketucket Bay	NR1	Tyson, Alan	River Bridge
Little Bay	LT1	Longworth, Bill	end Little Bay Rd.
West Island	WI1	Barao, Kevin	Earls Marina dock
New Bedford Harb	AR1	Vezina, George	Upper Acushnet River
	NB1	Rapoza, Paul	Fairhaven Shipyard
N.B. Outer Harbor	NB4	Oliveira, Art	Fort Phoenix
Priests Cove	PT1	Comeau, Pat	Private access/boat
Clarks Cove	CC1	Brackett, Sheila	dock/boat
Apponagansett Bay	AB3	Frazer, Robt.	Town Beach Pier
Slocums/Little River	SR1	Lloyd Center	Gaffney Rd. Land.
	SR2	Lloyd Center	Little R. Bridge
	SR3	Lloyd Center	Memorial Bridge
	SR4	Lloyd Center	Osprey Point,SE Inlet
Allens Pond	AP1	Lloyd Center	Boat/shore
Westport River, East Branch	101e	Allen, Ben	Head of Westport
	103e	Tripp, Arnold	Doctors Point
	104e	Morris, Dee	Cadman's Neck
	105e	McCarter, Peg	Drift Rd.
	106e	Neary, Steve	Cummings Lane
	108e	Canning, P&G	Westport Point
Westport River, West Branch	109e	Dexter, Owen	Lee's Wharf
	110w	Koenitzer, Geo.	Hulda Cove
	111w	Collins, Mike Jansen, Trintje	Charlton Wharf
	102w	Moss, Barbara Beede, Russ Steinke, Andrew	River Road
	112w	Prentice, B & C	Carey Boatyard
	113w	Squire, Cabot	Angeline Cove
Penikese Island	PN1	Gammans, Jim	dock
Cuttyhunk Island	CI1	Garfield, Seth	Cuttyhunk Harbor
	CI2	Garfield, Seth	Pond/Boat

Water temperatures were variable among sites



Water temperatures in Buzzards Bay embayments exhibit wider daily and seasonal variations than waters in central Buzzards Bay or further offshore. Here we show the citizens' data (boxes) compared to daily temperature recorded by the Woods Hole Oceanographic Institution (solid line). Differences observed among embayments are due to depth of the embayment, degree of flushing, and local variations in weather. Buzzards Bay embayments can get bathtub warm in summer and may be 5 to 10 °F colder than offshore water in fall and winter.

Citizens in action. From left to right: Dr. James Bonnar (Pine Island Pond, Mattapoisett), Ester Zcimetz (Hillers Cove, Mattapoisett), and Priscilla Hathaway (Aucoot Cove, Marion) review sampling procedures with Program Coordinator Eileen Gunn (not shown).

Oxygen concentrations good at most sites

Summer weather prevented fish kills

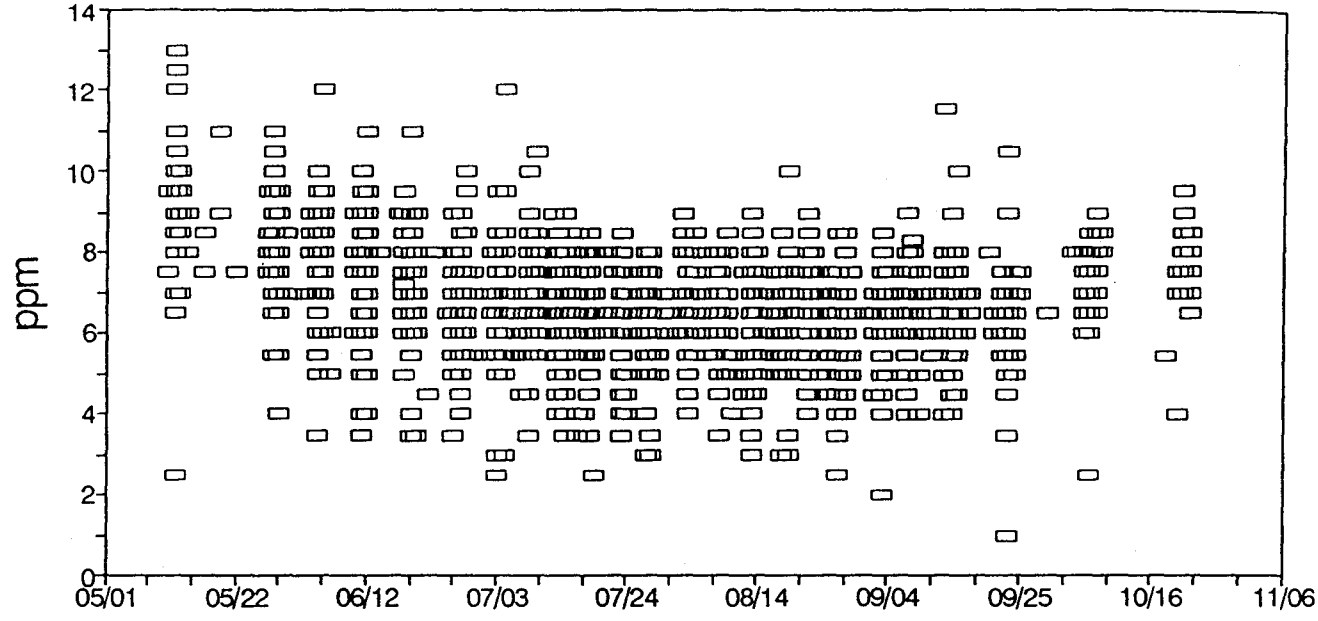
Oxygen concentrations at most monitoring sites were good this summer, and no fish kills were reported. Low oxygen concentration (anoxic or hypoxic conditions) are most likely to occur during prolonged warm, calm, overcast conditions. Our cool, sunny summer prevented low oxygen concentrations and resulting fish kills at sites that have experienced these conditions in summers past.

The picture is not completely rosy, however. Some sites, frequently had low early morning dissolved oxygen concentrations. The Barlows Landing station had the worst track record with concentrations often below 3 ppm. The majority of low % saturation values were observed during the July 13-18, August 17-22, and September 22 sampling runs. Overcast conditions on July 4th and Labor Day weekends depressed oxygen concentrations at many sites.

Even if low oxygen concentrations were not observed at your site this summer, if concentrations were consistently below the normal range at unpolluted sites, this may indicate that your embayment may experience a low oxygen event during adverse weather conditions.

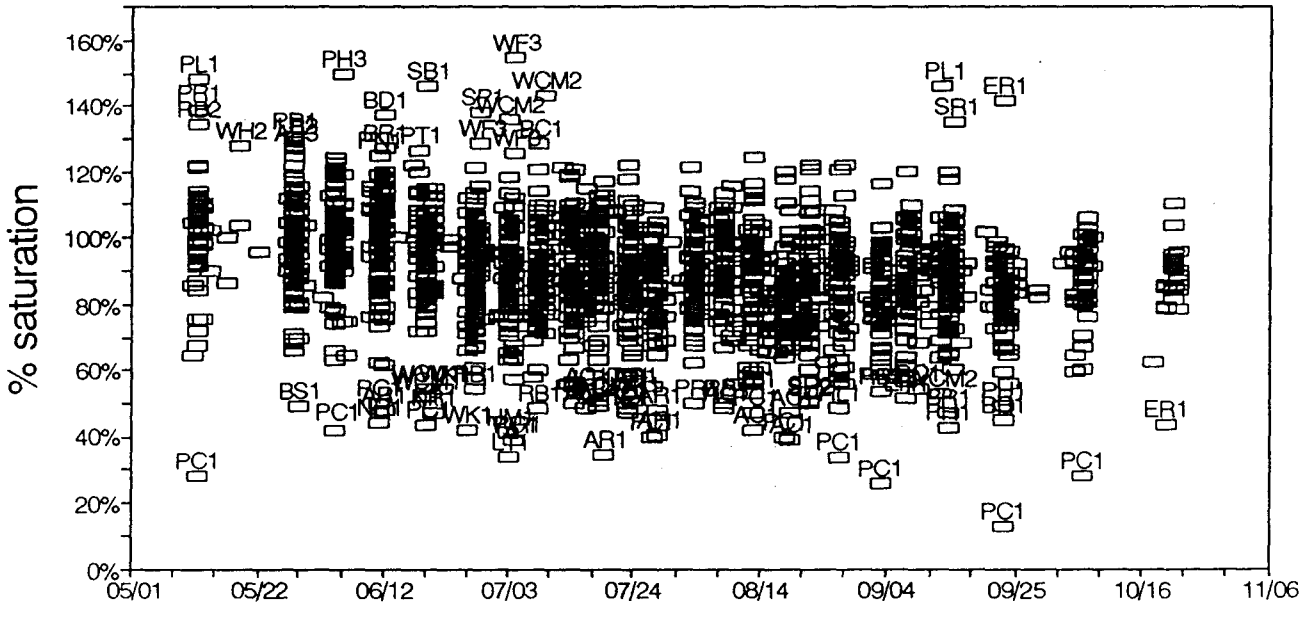
On the following page we show all data collected to November 1 both as actual concentrations and percent of saturation. This data was used in the embayment rankings shown on page 9. On page 12 we also show data from individual sites.

Oxygen Concentrations observed at all stations:



Oxygen concentrations are highest in winter since cold water can hold more dissolved oxygen and lowest in summer when warm waters and biological activity combine to reduce concentrations. Variation observed among stations are due to differences in salinity, temperature, and biological conditions among and within embayments.

Oxygen concentrations shown as percent saturation



For every given temperature and salinity of water, a certain amount of oxygen will be dissolved under ideal conditions. This is the "100% saturation" value. To make sense out of your oxygen concentrations, and make comparisons among embayments, we converted your oxygen concentrations to % saturation using the temperature and salinity that you reported (see % oxygen saturation table in your manual). Readings above 100% could indicate aeration of waters by high winds or high early morning photosyntheis rates by algae. Readings below 100% indicate biological activity(organic matter decomposing, plants and animals breathing). With increased nutrient loading, oxygen concentrations in an embayment may decline. In the figure above we label stations that show oxygen concentration more than 25% above or below expected 100% saturation value. Among the embayments with the worst oxygen concentrations observed were stations in at Barlows Landing, Acushnet River, upper Aucoot Cove, Sippican Harbor, and Wankinko River. See the table on page 5 to identify sites. Data is still undergoing review and is subject to revision.

A *preliminary* evaluation of water quality data collected through the Citizens' Water Quality Monitoring Program.

On the following pages, we summarize water quality conditions observed in Buzzards Bay embayments included in the monitoring program between June 1 and September 30, 1992. We have used this data to rank each embayment using a Eutrophication Index developed by the Buzzards Bay Project. This spring this index will be combined with a Shellfish Closure Index, and both indexes will be combined into an overall Water Quality Index. **Because both the data and the index are under review and subject to change, we urge that the results presented here be used cautiously.** In our next issue we will show you plots of individual stations and explain more about what is happening at each site. This table, however, does show how your embayment compares to other Buzzards Bay embayments.

Stat ID	Station Name	mean secchi (m)	mean salinity surf	mean salinity bott	mean oxygen (% sat)	oxygen relative comparis.	worst oxygen (% sat)	mean chl a H2O	mean DIN (uM)	mean org. N (uM)	Eutrophic. Index	Shellfish Closure Index
AB3	Apponaganset	1.22	31	31	83	3	75	5.1	9.8	176.3	53.5	I
AC1	Aucoot Cove	1.18	31	32	59	4	39	1.4	1.8	75.0	71.6	N
AC2	Aucoot Cove	1.55	30	32	89	2	70					C
AG1	Agawam River	1.09	6	NA	75	4	55					O
AP1	Allens Pond	NA	29	NA	87	3	60					M
AR1	Acushnet River	1.13	19	24	56	4	35					P
BB3	Buttermilk Bay	NA	NA	31	92	2	71					L
BB4	Buttermilk Bay	INC.					85					E
BC1	Butler Cove	NA	32	33	73	4	54					T
BD1	Broad Cove	2.10	31	31	93	1	73					E
BI1	Brant Isl. Cove	INC.					87					
BLK1	Blankinship Cove	1.50	34	34	92	2	72					
BMR1	Broad Marsh R.	1.80	28	29	94	1	73	4.5	6.2	157.5	66.0	
BNC1	Bourne Cove	NA	31	NA	90	2	63					
BR1	Back River	NA	31	NA	85	3	45					
BS1	Bass Cove	NA	NA	34	91	2	63					
CI1	Cuttyhunk Harbor	2.50	33	33	92	2	85					
EL1	Eel Pond/Mattap.	0.78	24	NA	82	3	53					
EP1	Eel Pond/Bourne	1.75	29	31	98	1	75	3.5	4.8	150.3	70.8	
ER1	East River	1.96	32	32	89	2	43					
FC1	Fiddler's Cove	1.84	29	31	91	2	71					
HC1	Hen Cove	1.73	33	31.5	93	1	77	2.4	1.4	120.2	81.2	
HL1	Hillers Cove	0.55	32	33	83	3	48					
HM1	Hammett Cove	INC.					41	4.0	1.3	181.9		
LB2	L.Buttermilk Bay	1.16	30.5	31	93	1	55					
LH1	Little Harbor	NA	31	NA	90	2	64					
LT1	Little Bay	NA	32	NA	72	4	33					
MG2	Megansett Hbr.	1.97	31	31	99	1	87	1.4	0.5	82.4	93.8	
MC	Marks Cove	INC.					71	4.9	1.9	147.7		
MH1	Mattapoisett Hbr	1.87	31	31	90	2	71	2.8	1.3	99.8	83.0	
MH3	Mattapoisett R.	NA	26	NA	81	3	60					
MH4	Mattapoisett Hbr.	INC.										
NB1	New Bedford(In)	1.90	32	32	90	2	73					
NB4	New Bedford(Out)	INC.					91					
NR1	Nasketucket R.	INC.					44					
OB1	Onset Bay	2.30	31	32	96	1	81	3.4	1.4	120.4	82.3	
OB2	Onset Bay	2.10	33	33	91	2	82					
OB3	Onset Bay	1.90	31	32	95	1	76					
PC1	Pocasset Hbr.	1.70	30	31	56	4	26					
PC3	Pocasset Hbr.	INC.					97					
PH1	Phinneys Harbor	NA	32	NA	79	4	43	3.6	2.1	94.0		
PH2	Phinneys Harbor	2.00	31	31	99	1	82					
PH3	Phinneys-Tobey Isl.	INC.					105	2.5	1.2	124.2		
PI1	Pine Isl. Pond	NA	32	NA	86	3	56					
PL1	Planting Isl.Cove	1.82	34	NA	108	1	88					
PN1	Penikese Isl.	NA	33	33	96	1	78					
PR1	Pocasset River	2.60	27	30	75	4	50	2.4	6.3	113.1	71.3	
PT1	Priests Cove	1.50	34	34	100	1	61					
QH1	Quissett Harbor	NA	32	32	97	1	73					
QH2	Quissett Harbor	NA	32	32	91	2	72					
RB1	Red Brk./Parkers	1.90	30	31	72	4	49					
RB2	Red Brook/Central	2.50	32	32	80	4	54	1.9	0.9	84.7	86.9	
RB3	Red Brook/Outer	2.50	32	32	79	4	60					
RH1	Rands Harbor	NA	30	NA	92	2	76					
SB1	Swifts Beach	NA	29	NA	93	1	76					
SG1	Spragues Cove	INC.					77	2.5	0.7	101.8		
SH2	Sippican Hbr.	1.20	31	31	69	4	50	3.2	1.7	167.2	59.9	

Stat ID	Station Name	mean secchi (m)	mean salinity surf	\ bott	mean oxygen (% sat)	oxygen relative comparis.	worst oxygen (% sat)	mean chl a H2O	mean DIN (uM)	mean org. N (uM)	Eutrophic. Index	Shellfish Closure Index
SP1	Shell Point Bay	1.70	32	33	91	2	77					I
SQ1	Squeteague Hbr.	1.70	29	30	91	2	75	2.8	1.2	142.8	76.3	N
SR1	Slocums River	NA	24	NA	94	1	75					C
SR2	Slocums River	NA	29	NA	74	4	50					O
SR3	Slocums River	NA	29	30	82	3	65					M
SR4	Slocums River	NA	28	NA	86	3	68					P
TP1	Taylors Point	2.80	31	32	85	3	47					L
WCM1	Wings Cove(Inner)	0.45	34	NA	80	4	52					E
WCM2	Wings Cove(Outer)	1.30	34	34	77	4	53					T
WF1	W. Falmouth Hbr.	1.80	30	32	86	3	65	3.1	2.3	152.9	70.9	E
WF2	W. Falmouth Hbr.	NA	28	NA	95	1	65					
WF3	W. Falmouth Hbr.	NA	33	33	104	1	67					
WF4	W. Falmouth Hbr.	NA	28	NA	86	3	73					
WH1	Wild Harbor	NA	29	30	85	3	66					
WH2	Wild Harbor	NA	29	30	88	3	67					
WK1	Wankinco R.	1.40	9	24	73	4	42					
WR1	Wareham River	1.70	22	25	84	3	39	3.8	4.6	138.3	66.6	
WR2	Wareham River	1.70	25	27	82	3	58					
WPR	Westport River											
	Upp. East Branch	0.97	20	NA	77	4	36	5.8	9.0	178.9	48.4	
	Upp. West Branch	1.51	29	NA	83	3	39	2.0	4.6	128.4	70.7	
	Lower Estuary	2.20	32	NA	85	3	45	1.5	2.1	86.4	87.4	

Notes: NA = Not Available
INC. = Incomplete data set
% sat = percent saturation
DIN = Dissolved inorganic nitrogen
org. N = Organic nitrogen (both dissolved and particulate
chl a = water column chlorophyll concentrations in mg/l

The Eutrophication Index was modeled after a water quality index developed by the Hillsborough County Environmental Protection Commission (Tampa, FL). It is calculated from weighted scores of mean summertime oxygen saturation (40%), secchi disk depth (15%), DIN concentration (15%), chlorophyll a (15%), and organic nitrogen concentration (15%).

What does it all mean?

This first phase of the citizen monitoring program has focussed on evaluating the degree of coastal eutrophication from human inputs of nitrogen. Our shellfish closure index will be developed this spring.

To evaluate relative coastal eutrophication, pay particular attention to the columns with the arrows over them. These are the most important indexes for comparing the relative health of different Buzzards Bay embayments. Oxygen mean percent saturation shows the mean summertime early morning oxygen concentrations observed. In the column labeled "Oxygen relative comparison" we assign the embayments a relative rank of mean oxygen percent concentrations (1 = highest 25%, 4 = lowest 25%). The column titled "worst oxygen (% saturation)" shows the single worst oxygen concentration observed by the citizen monitor at that station. The six stations with the lowest summertime mean oxygen (% saturation) concentrations were Pocasset Harbor at Barlows Landing (PC1), Acushnet River (AR1), the upper portion of Aucoot Cove (AC1), Sippican Harbor (SH2), Little Bay (Fairhaven, LT1), and Red Brook Inner Harbor (RB1).

Oxygen is not the whole story, and can even be misleading if data is collected too late in the morning, or if we have few cloudy periods. With increased coastal eutrophication there is typically more phytoplankton in the water (numbers in the "mean chl a H20" column can be expected to go up), water transparency (secchi disk) will decrease, and the various measures of nitrogen (DIN, organic nitrogen) will go up. We have assigned scores to these indicators of coastal eutrophication as well as embayment oxygen concentrations to create a "Eutrophication Index". Because fewer citizens were able to participate in the nutrient monitoring program, we only evaluated 17 sites. Of these, the upper East Branch of the Westport River, Apponagansett Bay and Sippican Harbor had the worst scores of Eutrophication Index (best possible score was 100, lower score indicates greater degrees of eutrophication). The well flushed waters of central Megansett Harbor (Bourne-Falmouth) were the least enriched by nitrogen.

The Eutrophication Index was not calculated unless nutrient data and mean summertime oxygen concentrations were available. Where there is more than one site in an embayment, station #1 represents the uppermost station. A further discussion of individual sites,as well as the results of the periphyton sampling will be in the next issue.

News and Updates...

Shellfish closure story mixed

During the past year and a half, shellfish bed closure news has been mixed (see bottom graph), and may be getting worse.

Mother nature twice intervened, first with Hurricane Bob in 1991, which forced the state to essentially close down the whole bay because of potentially high coliforms and oil and sewage spills. Then this August, a rare, exceptionally heavy rain similarly resulted in heavy pollutant loads and widespread closures.

In New Bedford's Clarks Cove, 605 acres of shellfish beds were opened April 1st, most for the first time since 1904. This advance was offset by a subsequent 330 acres of new closures in the Westport River which continues to show widespread water quality declines, and other new closures in around the Bay.

Below: First of the month shellfish resource area closures, 1989 to present, and mean summertime closures during selected earlier years as reported by the Massachusetts Division of Marine Fisheries. Closures include both permanently closed and "conditionally" closed areas (those that are typically closed during summer).

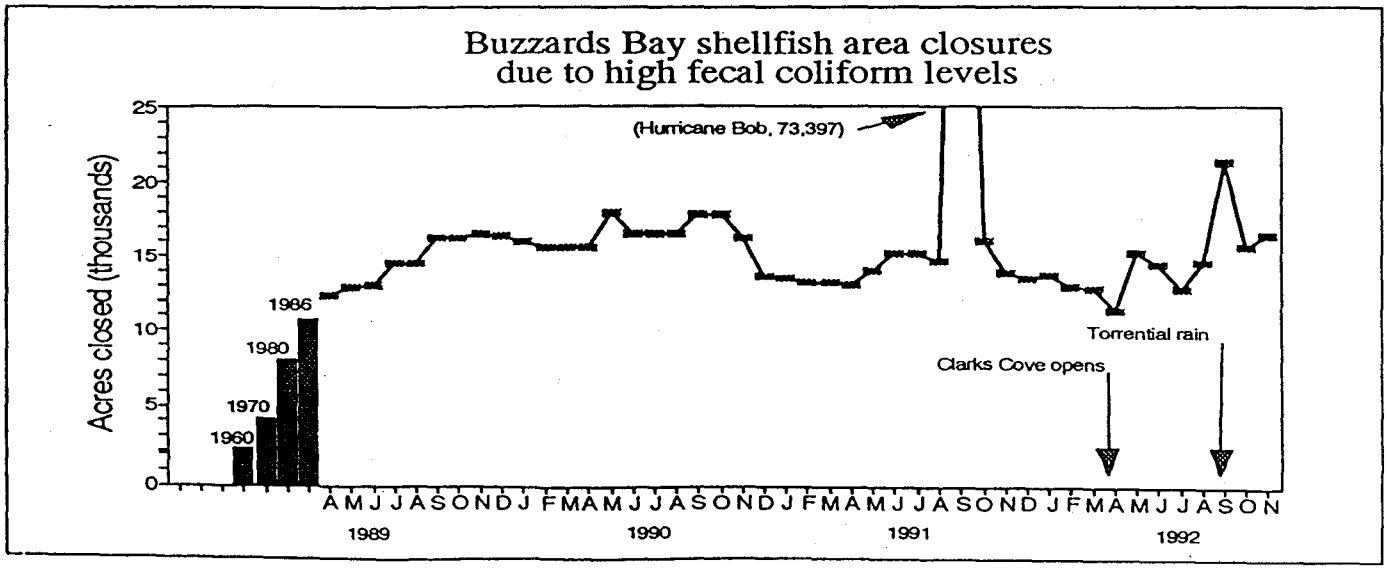
Coalition seeks River Monitors

The Coalition for Buzzards Bay is seeking volunteers to record stream/river heights in their area. The data will be used in conjunction with water quality data currently being collected to estimate river and stream flow volumes, which together with pollutant concentration data will help quantify pollutant loadings to each embayment. Stream/river staffs already in place are listed below:

RIVER/STREAM	NEAR ADDRESS	TOWN
Destruction Brook	107 Slades Corner Rd.	Dartmouth
Buttonwood Brook	Slocum Road	Dartmouth
Paskamanset R.	Tannery Rd.-Dam	Dartmouth
Acushnet R.	Hamlin Rd.	Acushnet
Mattapoisett R.	off River Rd.	Mattapoisett
Sippican R.	County Rd.	Marion
Weweantic R.	Fearing Hill Rd.	Wareham
Wankinko R.	Rt.28/Tremont Nail Co.	Wareham
Agawam R.	Rt.28/Rt.6-near Elks Club	Wareham
Red Brook	Red Brook Rd.	Plymouth

We need volunteers to record streams/river heights on a weekly basis (or as frequently as possible), and especially after heavy rainfall and storm events. The data will be recorded on data sheets provided by the Coalition.

If you would like to be a River Monitor or know of someone who would, please contact the Citizens' Water Quality Monitoring Program Coordinator, Eileen Gunn, at 759-1440 or 748-3600, for more information.



Bacteria monitoring training to begin this winter

A new facet of the Buzzards Bay Citizens' Water Quality Monitoring Program, bacteria testing, is in the works. Bacterial contamination on November 1st closed roughly 16,000 acres of shellfish beds in Buzzards Bay, and has also caused some beach closures in New Bedford this year. The main sources of these closures are bacteria from stormwater discharges, sewage outfalls, failing or improperly working septic systems, illegal pipes, boat wastes, and animal wastes. The Division of Marine Fisheries (DMF), the state agency responsible for closing shellfish beds, does not have the manpower or resources to collect data to identify upsteam sources of pollution causing many of these closures. In other areas, additional sampling could aid DMF and municipalities in developing rainfall conditional classifications.

Local boards of health are responsible for closing public and private bathing beaches if bacteria levels are too high; however, in many cases they do not have the resources to do any testing. The Antassawamock Association of Mattapoisett is a citizen group that has taken things into their own hands by sampling their bathing beach. Three years of bacteria testing has shown high levels of bacteria at the mouth of a nearby creek, the source of which is unknown. We will be working with these citizens to develop a monitoring plan that will identify the source or sources of this problem. Monitoring of other bathing beaches may also be included in our program depending upon community interest.

The Coalition for Buzzards Bay and the Buzzards Bay Project met with the DMF in late summer to discuss plans for involving citizen volunteers in a fecal coliform bacteria testing program. The DMF identified 16 priority sites where citizen involvement could help identify sources of bacteria pollution and in some cases assist in allowing conditional openings.

These sites are:

- *Slocum/Little River, Dartmouth*
- *Little Bay, Fairhaven*
- *Weweantic River, Marion/Wareham*
- *Back River/Eel Pond, Bourne*
- *Barlows Landing, Bourne*
- *West Falmouth Harbor,*
- *Wild Harbor & River, Falmouth*
- *Wareham River*
- *Mattapoisett River*
- *Aucoot Cove, Marion/Mattapoisett*
- *Apponagansett River, Darmouth*
- *Wings Cove, Marion*
- *Little Bay, Bourne*
- *Squeteague Harbor, Bourne*
- *Bourne's Cove/Little Harbor, Bourne*
- *Hiller's Cove, Marion*

We will be developing monitoring plans for each study area and seeking dedicated volunteers this winter. Initially 3 or 4 embayments will be monitored in the spring, with the other sites added during summer and fall. Selection of locations and frequencies of sampling will be site specific and made under the guidance of DMF. In some situations we will need teams of volunteers to collect samples during or after rainfall events.

DMF will also assist the Project and Coalition in training the volunteers and quality control/quality assuarance protocols will be strictly adhered to.

Tips and suggestions

To ensure good quality data and to help us simplify data entry, please follow these guidelines:

- *Take the surface sample before taking the bottom sample to prevent oxygenating the surface sample when the stoppers are pulled for the bottom sample or contaminating nutrient samples with stirred up sediments.*
- *Double check to see you have filled out all pertinent entries in the data sheet (don't forget sample depth).*
- *Include the year when you record the date on the data sheet since this is a multi-year program.*
- *Only fill in one number for the Beaufort scale. If it is drizzling do not circle overcast in addition to drizzle.*
- *Your station name and i.d. should appear on every data sheet. If you are covering for someone and are unsure, please refer to your master station list.*
- *If the secchi does not dissappear, just circle "no" and do not fill in any depth. Do not enter the bottom depth in this place unless the secchi disk really disappears there.*

Opinion

Don't just talk, do something

The Coalition for Buzzards Bay is giving people who are worried about the environment a chance to do something about it.

The coalition is looking for 140 citizen volunteers to help in a project that will monitor the bay.

Volunteers will record river and stream heights, measure storm water flows and participate in special sampling and clean up events.

Eileen Gunn, coordinator of the project, said the work of the volunteers will help pinpoint sources of pollution that, in turn, will aid cleanup efforts. Volunteers will test for dissolved oxygen, temperature, salinity, specific gravity, transparency, fecal coliform and nutrients.

There's no doubt about the need with than 13,000 acres of shellfish beds now close

And there's no doubt much work is needed to implement the recommendations contained in the report of the Buzzards Bay Pro

With limited fun teers inv

Calling All Volunteers

The Coalition for Buzzards Bay wants you.

Eileen Gunn is coordinating a massive volunteer effort aimed at mobilizing citizens to monitor health.

looking for 140 volun- s. Gunn said. With kits by Woods Hole Ocean- Institution, volunteers ained how to test for oxygen, salinity, spe- ity, and on occasion, nd bacteria in local

nn said she started people in December, "It'll take time to get

the latest effort to for wa

start soon. it'll start in March, a

WHOI Will Train Volunteers To Monitor Water Quality In Buzzards Bay

graphic Institution was contracted by the Buzzards Bay Project to train volunteers ide technical sup-

sources of pollution and eventually lead to the restoration of the bay's health.

Information gathered will become part of a database for Bay Project

Coalition For Buzzards Bay Volunteers Needed To Test Water Quality

By JOHN A. NICHOLSON

The Coalition for Buzzards Bay is seeking 140 volunteers to monitor water quality along 28 embayments around Buzzards Bay.

Under the program, which is sponsored by the Coastal Zone M Office and

Volunteers will record river and stream heights, measure storm water flows and participate in special sampling and clean up events.

Eileen Gunn, coordinator of the project, said the work of the volunteers will help pinpoint sources of pollution that, in turn, will aid cleanup efforts. Volunteers will test for dissolved oxygen, temperature, salinity, specific gravity, transparency, fecal coliform and nutrients.

There's no doubt about the need with than 13,000 acres of shellfish beds now close

And there's no doubt much work is needed to implement the recommendations contained in the report of the Buzzards Bay Pro

With limited fun teers inv

Each volunteer will re- water sampling kit ed in its use as portance of

graphic tracted by th Project to train and provide technical port.

unteers will receive. Th purpose of the program studying and determinin sources of pollution. The next phase would be remedi tion," Ms. Gunn said has assisted with lity such as Falmouth gram.

be done s Bay will mpled from Westport to Js Hole," Ms. Gunn said. "In Bourne, we will be working with Bourne Pollution Task Force. Some of the testing areas will include all of Buttermilk Bay. Hens Cove and the other em bayments between Butter milk Bay and Cataumet."

The coalition hopes an analysis of the bay's water will help locate pollution and the resto

Volunteers make Buzzards Bay pollution project work

Citizen Volunteers Needed To Monitor Buzzards Bay Water Quality

Bay Volunteers Test For Nitrogen

By JOHN A. NICHOLSON

The Coalition for Buzzards Bay citizen water monitoring program is about to enter its second phase.

The program, which is funded by the Coastal Zone Management Office, the EPA and the Executive Office of Environmental Affairs, BUZZARDS

monitor coordinator Eileen ting is being done each week, be

unteers at the Woods Hole Oceanographic Institution, ne Massachusetts Maritime ne Academy in Buzzards Bay, n Marion Town Hall and in y haven at the fire station. a L. Howes of the Oceanographic contract and

Volunteers will also be asked to record the flow rate of rivers, streams and storm runoff entering the bay.

Brian Howes of the Woods H Oceanographic Institution f training and technical support fo the project.

Without volunteers, Ms. Gunn said, the program would not be possi She estimated it would cost $200,000 per year to paid consultant gather at 30 different

Buzzards Bay water to be tested Aug. 25

Bay project finds eager volunteer

Buzzards Bay plan relies on citizens to monitor pollution

By GWENN FRISS STAFF WRITER

Water samples gathered Aug. 10 are still being analyzed at the Woods Hole Oceanographic Institution under a contract with the Ms. Gunn said. The new samples said.

nutrients.

nformation will give scien- periodic snapshot of the bay can be used to see if pollution- control measures — like the vention of storm runoff at Cove in Bourne — are work Changes in the bay can also sound a warning. If dissolved oxygen dips, for example, scientists would know to look for sewage other nutrients that may b ing upstream.

Organizers tem in pl Ms

Bay water test results ready for study

By Paul Gately
Standard-Times correspondent

MARION — The second round of testing for nutrients in coastal inlets around Buzzards Bay will be conducted Tuesday.

Areas to be sampled are the east and west branches of the Westport River, Apponagansett Bay in South Dartmouth, Aucoot Cove in Marion, the Wareham River estuary including Broad Marsh Cove, Onset Bay, the Pocasset River, Eel Pond, Phinneys Harbor in Bourne, and West Falmouth Harbor.

The testing is part of the Buzzards Bay Pro attempts to determine how much are in Buzzards Bay, dinator of the

towns along conclusions being bay's condition, notably its te ity, water clarity and nitroge "The latest round will s data to help us get a baseli there, just what's out there trying to determine oxygen and identify trends — al areas."

Ms. Gunn said recent h results may skew test results b into the bays. dicate mor

Baywatchers

Baywatchers is jointly written and produced by the Buzzards Bay Project and the Coalition for Buzzards Bay. The Coalition for Buzzards Bay is a non-profit, tax exempt organization founded in 1987 to inform and involve the public in the clean-up, restoration, and strict protection of Buzzards Bay. The Buzzards Bay Project is jointly funded and administerd by the Massachusetts Executive Office of Environmental Affairs through the Coastal Zone Management Office and the U.S. Environmental Protection Agency. The contents of this document do not necessarily reflect the views or policies of EPA or the Commonwealth of Massachussetts. For more information about the Buzzards Bay Project call (508) 748-3600. For more information about the Coalition for Buzzards Bay call (508)759-1440. Correspondence regarding *Baywatchers* should be directed to C.B.B., P.O. Box 268, Buzzards Bay, MA 02532, Attn: Eileen Gunn.

Buzzards Bay Project Manager:
Joseph E. Costa, Ph.D

Coalition Citizens' Coordinator:
Eileen Gunn

Baywatchers
P.O. Box 268
Buzzards Bay, MA 02532