OYSTER HABITAT ASSESSMENT IN LITTLE SARASOTA BAY:

FINAL REPORT

MOTE MARINE LABORATORY

Submitted by: Jay R. Leverone
Mote Marine Laboratory
1600 Ken Thompson Parkway
Sarasota, FL 34236

Submitted to: Gary Raulerson
Sarasota Bay National Estuary Program
111 S. Orange Ave., Suite 200W
Sarasota, FL 34236

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INTRODUCTION

Project Development and Rationale

Members of the Oyster Restoration Subcommittee met at Mote Marine Laboratory on Friday, April 4, 2003, to discuss the next phase of oyster restoration work. The group agreed that aerial photographs delineating historic and current oyster bed distribution in Little Sarasota Bay by John Stevely and Gus Antonini would make an outstanding starting point for the next phase of work. These photographs provided an excellent resource for locating existing oyster beds and displaying their spatial relationship to historic beds within Little Sarasota Bay. Subsequent discussion led to the recognition that no information is available on the status of Sarasota Bay oyster beds, including Little Sarasota Bay. Before a decision can be made on creating new oyster habitat or enhancing existing habitat, an evaluation of current resources should be undertaken.

In addition, the subcommittee realized that a rather extensive water quality database exists for this area as well as surrounding basins/segments of Sarasota Bay. This database should be accessed and evaluated in terms of those parameters essential to the survival and conducive for the growth of oysters in this area. The subcommittee agreed that an assessment of existing oyster beds and an analysis of water quality data should be conducted before any restoration activities are initiated. By conducting these evaluations first, subsequent restoration efforts will be based on a sound environmental and ecological foundation.

Existing Oyster Habitat Assessment

An initial field visit was made to oyster habitats in Little Sarasota Bay on Tuesday, May 13, 2003. Aerial maps produced by John Stevely were used to help locate oyster beds of concern. The study area ranged from Spanish Point to White Beach in Little Sarasota Bay. A variety of oyster habitats was encountered, and several sites were selected for further, more extensive assessment and analyses.

A follow-up field trip took place on July 7, 2003. Three locations were identified for in-depth assessment: North Creek, Turtle Beach and White Beach. At each location, a suite of physical observations and biological measurements were made.

Parameter	Measurement
Location	GPS
Area	Length vs. width (m)
Height	Vertical relief
Shape	Qualitative description
Substrate	Shell, mud, sand
SAV	Presence/absence of adjacent species
Oysters	Percent live/dead from subsample from bed (bucket)
Predators	Observations on holes in shell
Spat	Relative abundance of small (spat) oysters
Fauna	Observations of conspicuous fauna

Water Quality Data Analysis

Water quality data collected by Mote Marine Laboratory for a long term Sarasota County Water Quality Monitoring Program were retrieved and analyzed for multiple year trends in Little Sarasota Bay. This data set spans the period 1998 – 2002. Data were examined to determine if certain parameters (salinity, temperature, and dissolved oxygen) were within suitable ranges for oyster health, growth, survival and reproduction.

A Hydrolab® water quality instrument was deployed at North Creek shortly after the initial reconnaissance on May 13th and left in the field for three days. These data were analyzed for diurnal trends in water quality.

RESULTS

Oyster Habitat Assessment

Figures 1-3 display digital maps of the three sites selected for oyster habitat assessment. Each map shows the location of quadrats for oyster density and size, transect lines for oyster bed length and relief, and (White Beach) area of available oyster habitat.

Table 1 summarizes density of live and dead oysters and oyster spat from the three oyster habitat locations. North Creek had the highest density of live (25.8 / 0.25 m^2) and dead (31.0 / 0.25 m^2) adult oysters. The other two sites had roughly half as many live oysters and many fewer dead oysters. As a result, the live/dead ratio was lowest at North Creek (0.45). Oyster spat density, although highest at White Beach, was fairly similar at all sites. However, White Beach had substantially more dead oyster spat than the other two locations.

Table 2 summarizes size data from the largest oysters collected at each location. There were no appreciable differences among stations in the size of either live or dead oysters.

Water Quality Data Analysis

Table 3 presents monthly water quality data from February, 1998 through February, 2003 at Station 14-3. This monitoring station is in close proximity to North Creek and Turtle Beach oyster habitat locations. Data are arranged by year and separated by surface and bottom measurements for temperature, salinity and dissolved oxygen. These data are presented as monthly means (plus maximum and minimum) in Table 4. Mean monthly salinity ranged from 22.6 ppt (September) to 36.9 ppt (June). The lowest salinity recorded during this period was 10.0 ppt (surface) and 14.7 (bottom). Mean monthly temperature ranged from 17.8° C (January) to 30.4° C (July). The lowest recorded temperature during the period of record was 12.8° C. On only one occasion over the five year period did the dissolved oxygen ever fall below 4 mg/l (September, 2001; DO = 0.26). Mean monthly dissolved oxygen was always greater than 4 mg/l.

CONCLUSIONS

North Creek supports extensive, high quality oyster habitat. Numerous live oysters of all sizes may be found over large expanses of bottom throughout the area. Oyster spat is also abundant. This area could serve as a wonderful benchmark to achieve in any proposed oyster habitat restoration in other areas of Little Sarasota Bay. However, achieving such a goal may be an admirable, yet difficult goal to achieve. The point is that North Creek represents the most ideal habitat, and any restoration that produces numbers of oysters approaching this site must certainly be considered a success.

Both Turtle Beach and White Beach sites currently have oysters and oyster habitat, but this habitat is far less productive than North Creek. Based on results from the quantitative habitat assessment, both sites would benefit from restoration efforts. Each site offers unique opportunities for habitat improvements. Turtle Beach offers the opportunity to restore an intertidal fringe reef along the edge of an existing oyster bar. White Beach provides an abundant subtidal/intertidal surface to plant oyster shell. The final decision between these two sites will be based on considerations other that habitat suitability. Both sites should be considered equal in terms of biological parameters.

Water quality data analysis indicates that this section of Little Sarasota Bay is very conducive to oysters. Over the five year period of record (1998-2003), there never was a month where salinity, temperature or dissolved oxygen levels were detrimental to the survival of oysters. Even during this summer (2003), when above average rainfall fell within the watershed, salinities did not drop below 12 ppt and dissolved oxygen remained above 4 mg/l. There is no evidence to suggest that water quality will prevent efforts to restore or enhance oyster habitat in Little Sarasota Bay.

ACKNOWLEDGEMENTS

As members of the oyster habitat subcommittee, the following people have graciously committed their time, expertise and services to this project

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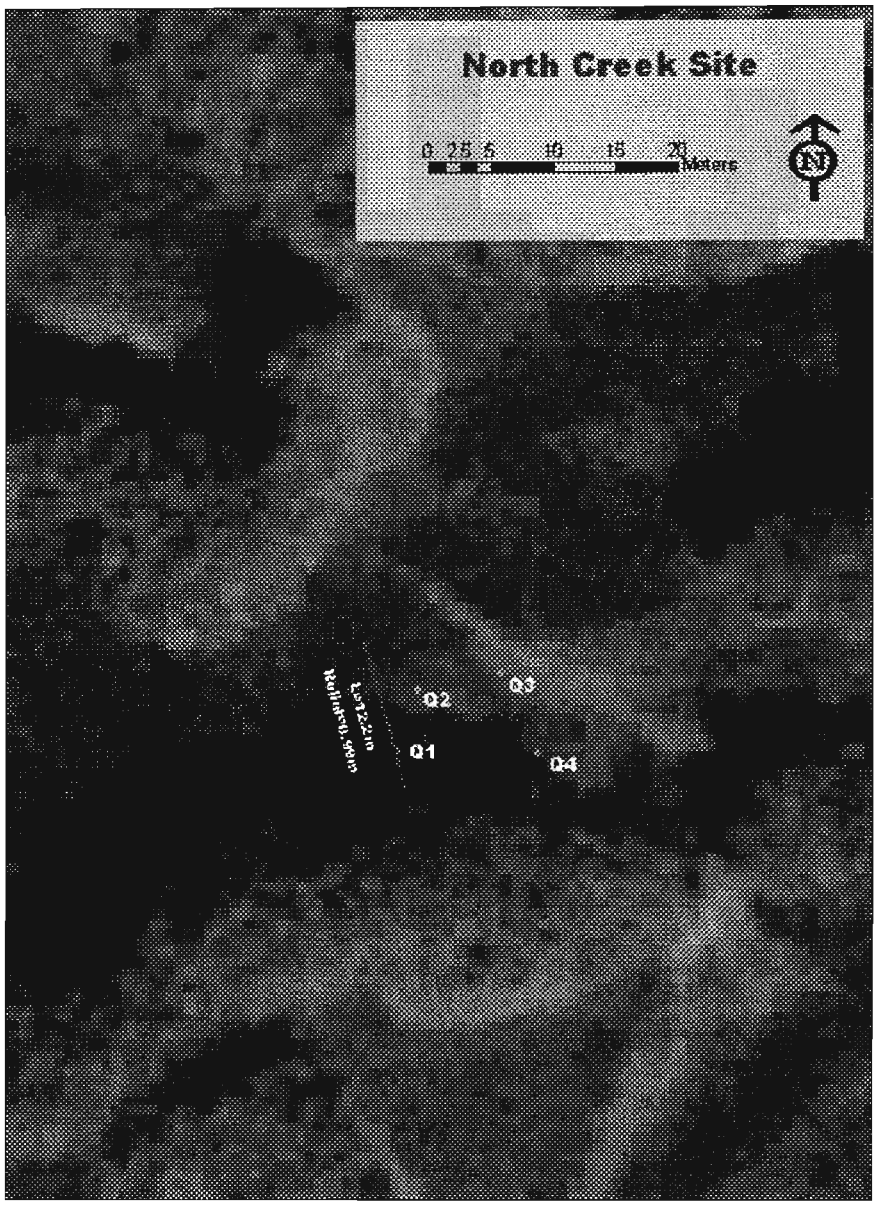

Figure 1. GIS map of North Creek oyster habitat. Q1 – Q4 represent locations of quadrats sampled for density and live/dead ratios. Red line indicates position where relative relief (in feet) of oyster bed was determined.

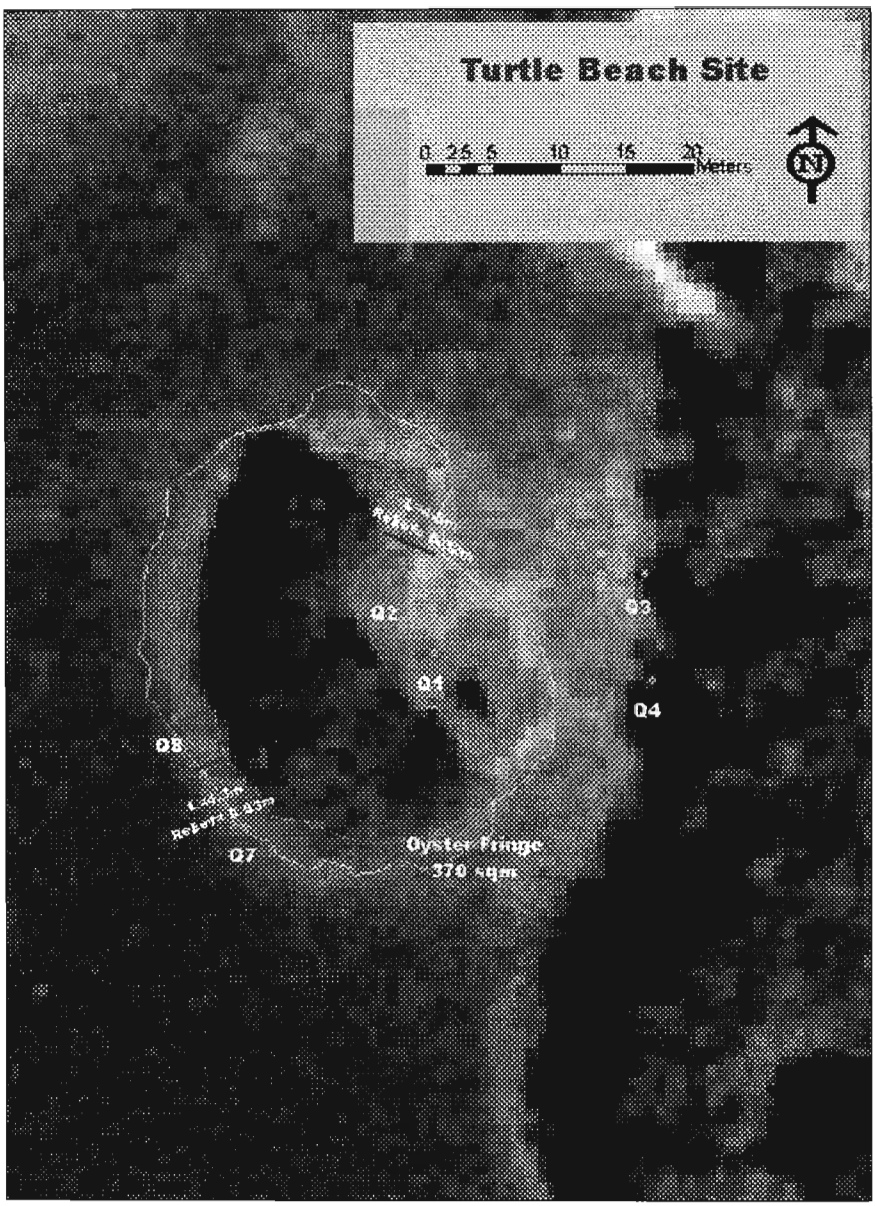

Figure 2. GIS map of oyster habitat near the entrance channel to Turtle Beach, Little Sarasota Bay. The white line delineates oyster bar surrounding a mangrove island. Q1 – Q8 represent locations of quadrats sampled for oyster densities and live/dead ratios. Red lines indicate areas where relative relief (feet) of oyster bed was determined.

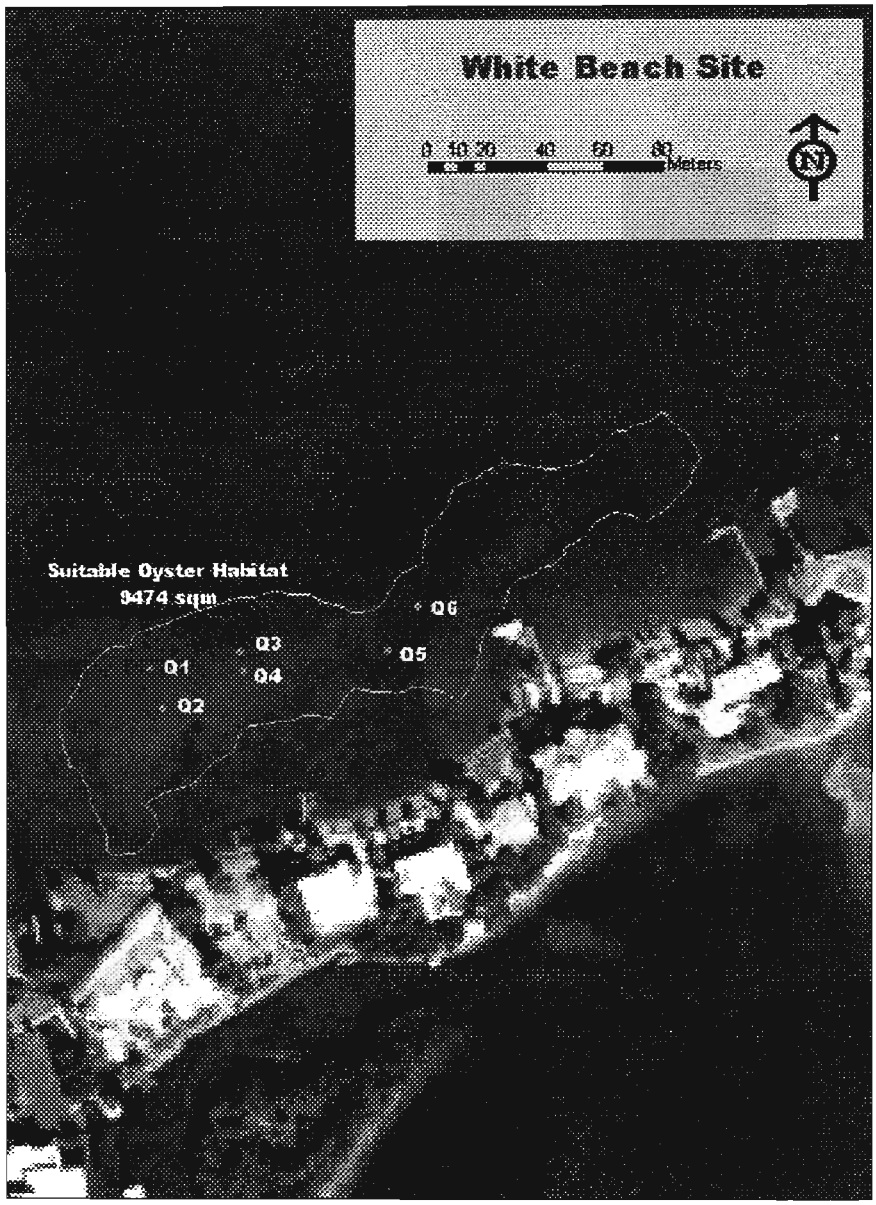

Figure 3. GIS map of oyster habitat near White Beach, Little Sarasota Bay. The white line delineates area of oyster habitat. Q1 – Q6 represent locations of quadrats sampled for oyster densities and live/dead ratios. Total area of oyster habitat was 9,474 square meters.

Table 1. Oyster densities (number/0.25 square meter) from three locations in Little Sarasota Bay. Live and dead oyster and oyster spat and live/dead ratios. Survey date: July 7, 2003

	Adults		Spat	
North Creek	Live	Dead	Live	Dead
Mean	25.8	31.0	5.5	1.8
S.D.	11.73	15.77	3.70	2.36
Live/Dead Ratio	0.45		0.76	

Turtle Beach	Live	Dead	Live	Dead
Mean	12.8	5.0	2.7	1.1
S.D.	19.52	6.30	4.86	1.73
Live/Dead Ratio	0.72		0.71	

White Beach	Live	Dead	Live	Dead
Mean	14.8	3.3	8.8	26.8
S.D.	11.99	3.08	6.37	22.64
Live/Dead Ratio	0.82		0.25	

Table 2. Shell length (cm) of adult oysters) from three locations in Little Sarasota Bay. Live and dead oysters measured separately. Survey date: July 7, 2003

	North Creek		Turtle Beach		White Beach	
	LIVE	DEAD	LIVE	DEAD	LIVE	DEAD
Mean	8.45	9.21	8.49	9.13	8.12	8.67
S.D.	0.92	0.88	1.09	1.08	0.50	0.99

Table 3. Monthly water quality measurements from Station 14-3. Data from Sarasota County Water Quality Monitoring Program.. Station 14-3 is within close proximity to North Creek and Turtle Beach oyster monitoring sites.

	SURFACE MEASUREMENTS				BOTTOM MEASUREMENTS			
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Jan-99	29.7	12.76	9.08	0.2	29.7	12.76	9.08	0.3
Jan-00	32.3	20.95	7.94	0.2	32.3	20.95	7.94	0.2
Jan-01	34.7	16.96	7.29	0.2	34.6	16.46	7.62	0.9
Jan-02	30.8	22.54	6.10	0.2	30.7	22.53	5.89	1.2
Jan-03	26.4	16.71	7.95	0.2	26.9	16.07	7.61	1.0
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Feb-98	15.5	19.94	9.49	0.2	15.8	18.90	8.86	1.5
Feb-99	30.8	24.22	6.28	0.2	32.1	24.60	5.51	1.7
Feb-00	35.0	20.00	6.55	0.2	35.2	19.56	6.74	1.5
Feb-01	36.3	22.35	5.78	0.2	36.6	21.73	5.43	1.6
Feb-02	30.3	19.41	6.46	0.2	30.1	18.58	6.34	1.6
Feb-03	30.6	17.34	7.63	0.2	30.9	17.07	6.77	1.5
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Mar-98	23.1	18.84	7.75	0.2	23.1	18.81	7.87	0.9
Mar-99	32.7	20.81	7.06	0.2	32.7	20.62	7.15	0.9
Mar-00	35.7	21.35	7.77	0.2	35.7	21.35	7.77	0.3
Mar-01	34.8	17.97	7.16	0.2	34.8	17.98	7.18	0.8
Mar-02	32.0	26.95	7.17	0.2	32.0	26.84	7.29	0.8
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Apr-98	24.4	22.15	7.36	0.2	24.5	22.07	7.30	1.1
Apr-99	33.4	24.96	7.15	0.2	33.6	24.87	6.96	0.9
Apr-00	35.8	22.57	7.35	0.2	35.7	21.35	7.77	0.3
Apr-01	31.4	26.28	6.11	0.2	31.6	26.23	6.05	0.8
Apr-02	34.9	28.73	7.34	0.2	35.0	28.45	7.84	0.9
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
May-98	28.7	25.50	5.82	0.2	28.8	25.09	6.28	0.9
May-99	36.2	28.47	6.44	0.2	36.4	27.53	7.94	0.8
May-00	35.5	26.91	7.15	0.2	35.7	26.30	12.16	0.9
May-01	35.3	27.28	6.38	0.2	35.2	27.29	6.94	0.8
May-02	38.3	28.82	8.58	0.2	38.4	28.84	8.80	1.0
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Jun-98	33.5	30.75	6.12	0.2	33.5	30.74	6.29	0.8
Jun-99	37.4	30.78	5.66	0.2	37.4	30.78	5.62	0.9
Jun-00	37.8	29.80	6.30	0.2	37.8	29.64	6.09	1.1
Jun-01	38.3	30.84	8.30	0.2	38.5	30.65	8.07	0.8
Jun-02	37.3	30.45	7.92	0.2	37.5	29.90	7.21	1.2

DATE	SAL	TEMP	DO	DEPTH	SAL	TEMP	DO	DEPTH
Jul-98	29.7	28.81	5.38	0.2	32.3	29.90	4.70	1.3
Jul-99	27.7	31.92	7.14	0.2	27.7	31.88	7.63	0.7
Jul-00	32.8	30.06	6.63	0.2	32.8	30.08	6.98	0.7
Jul-01	16.8	28.77	8.41	0.2	21.4	28.32	8.68	0.8
Jul-02	28.6	31.63	6.57	0.2	28.6	31.67	8.77	0.9
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Aug-98	28.4	30.91	6.18	0.2	28.6	30.43	5.88	0.6
Aug-99	23.3	30.67	7.52	0.2	26.3	30.39	9.10	1.1
Aug-00	28.7	30.58	7.56	0.2	28.9	30.62	9.07	0.6
Jul-01	16.8	28.77	8.41	0.2	21.4	28.32	8.68	0.8
Aug-02	31.4	30.32	7.54	0.2	31.4	30.25	7.94	0.6
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Sep-98	28.8	27.23	5.69	0.2	28.8	27.22	5.61	0.8
Sep-99	20.7	27.93	7.45	0.2	20.7	27.92	7.99	0.6
Sep-00	24.8	26.34	8.36	0.2	25.0	26.32	7.58	0.6
Sep-01	10.0	29.53	8.28	0.2	14.7	28.14	0.26	1.0
Sep-02	23.4	30.59	8.02	0.2	23.6	29.44	6.72	1.2
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Oct-98	25.0	28.59	5.18	0.2	25.4	28.58	5.60	1.2
Oct-99	21.6	28.23	4.76	0.2	25.4	27.48	4.48	1.2
Oct-00	28.9	24.22	6.53	0.2	31.3	23.15	6.90	0.9
Oct-01	27.0	27.65	4.63	0.2	29.6	26.47	4.86	1.1
Oct-02	30.0	27.64	5.71	0.2	29.9	27.64	5.76	1.8
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Nov-98	27.0	26.15	5.11	0.2	27.4	25.86	5.12	1.2
Nov-99	28.4	21.04	7.29	0.2	28.5	20.98	7.46	1.1
Nov-00	34.3	23.52	6.57	0.2	34.4	23.36	6.92	1.3
Nov-01	30.0	21.42	5.96	0.2	30.2	21.46	5.75	1.1
Nov-02	31.5	21.66	6.77	0.2	31.5	21.66	6.65	1.3
DATE	**SAL**	**TEMP**	**DO**	**DEPTH**	**SAL**	**TEMP**	**DO**	**DEPTH**
Dec-98	29.0	23.35	5.27	0.2	29.4	23.32	5.31	0.9
Dec-99	33.4	20.57	5.83	0.2	33.4	20.59	5.99	0.5
Dec-00	34.1	15.42	6.61	0.2	34.2	15.40	6.60	1.2
Dec-01	33.6	24.70	5.58	0.2	33.5	24.71	5.51	0.6
Dec-02	25.9	20.74	7.19	0.2	30.7	19.84	4.72	2.1

Table 4. Water Quality Data: Monthly Averages (Bottom measurements) for the Five Year Period, February, 1998 through February, 2003 from Station 14-3.

January	*SAL*	*TEMP*	*DO*
Mean	**30.8**	**17.8**	**7.6**
Min	26.9	12.8	5.9
Max	34.6	22.5	9.1

February	*SAL*	*TEMP*	*DO*
Mean	**30.1**	**20.1**	**6.6**
Min	15.8	17.1	5.4
Max	36.6	24.6	8.9

March	*SAL*	*TEMP*	*DO*
Mean	**31.7**	**21.1**	**7.5**
Min	23.1	18.0	7.2
Max	35.7	26.8	7.9

April	*SAL*	*TEMP*	*DO*
Mean	**32.1**	**24.6**	**7.2**
Min	24.5	21.4	6.1
Max	35.7	28.5	7.8

May	*SAL*	*TEMP*	*DO*
Mean	**34.9**	**27.0**	**8.4**
Min	28.8	25.1	6.3
Max	38.4	28.8	12.2

June	*SAL*	*TEMP*	*DO*
Mean	**36.9**	**30.3**	**6.7**
Min	33.5	29.6	5.6
Max	38.5	30.8	8.1

July	*SAL*	*TEMP*	*DO*
Mean	**28.6**	**30.4**	**7.4**
Min	21.4	28.3	4.7
Max	32.8	31.9	8.8

August	*SAL*	*TEMP*	*DO*
Mean	**27.3**	**30.0**	**8.1**
Min	21.4	28.3	5.9
Max	31.4	30.6	9.1

September	*SAL*	*TEMP*	*DO*
Mean	**22.6**	**27.8**	**5.6**
Min	14.7	26.3	0.3
Max	28.8	29.4	8.0

October	*SAL*	*TEMP*	*DO*
Mean	**28.3**	**26.7**	**5.5**
Min	25.4	23.2	4.5
Max	31.3	28.6	6.9

November	*SAL*	*TEMP*	*DO*
Mean	**30.4**	**22.7**	**6.4**
Min	27.4	21.0	5.1
Max	34.4	25.9	7.5

December	*SAL*	*TEMP*	*DO*
Mean	**32.2**	**20.8**	**5.6**
Min	29.4	15.4	4.7
Max	34.2	24.7	6.6

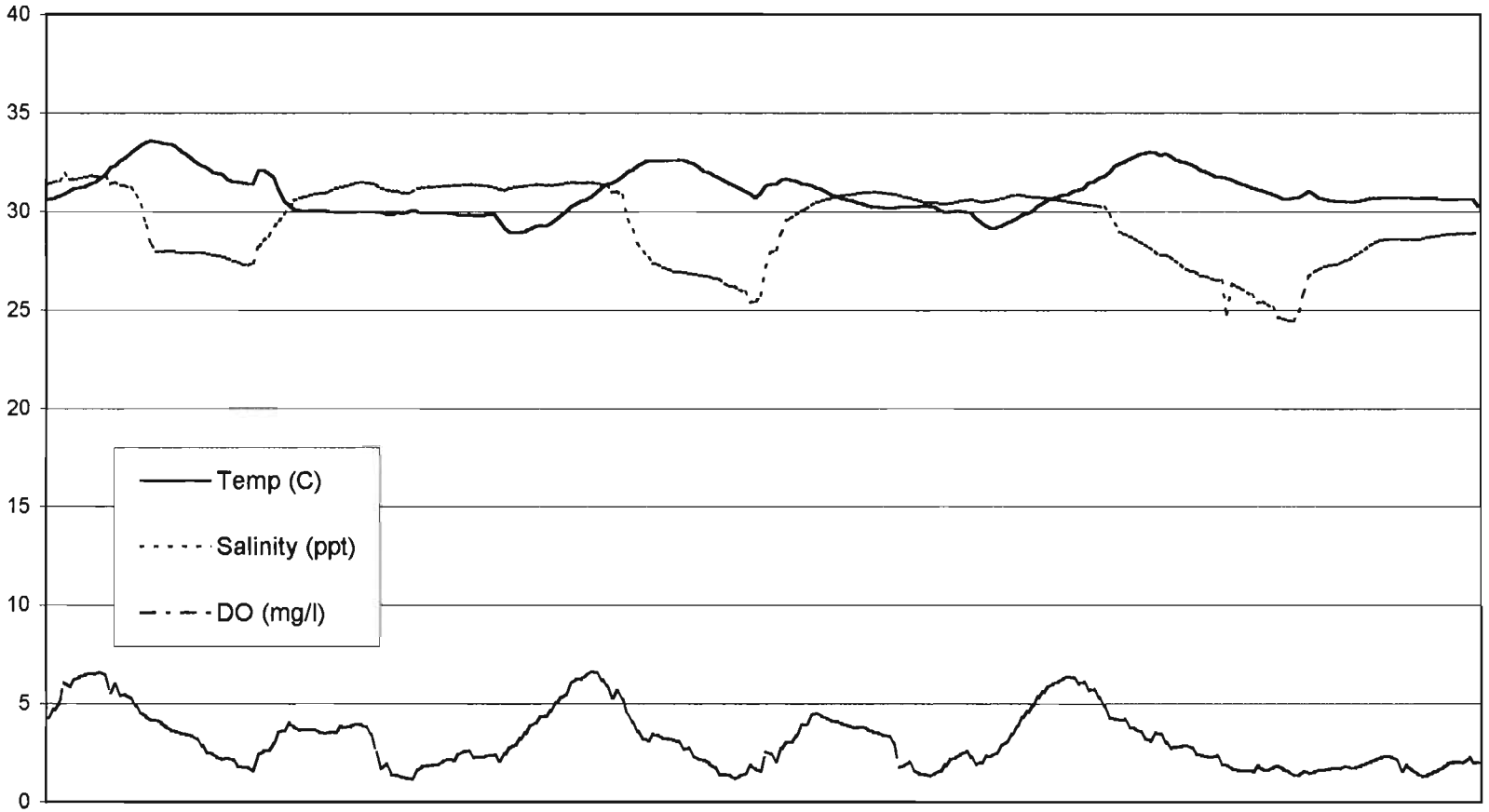

Figure 4. Three day profiles of temperature, salinity and dissolved oxygen at the North Creek oyster habitat station. Measurements made every fifteen minutes with a Hydrolab® water quality instrument deployed from May 13 through May 16, 2003.