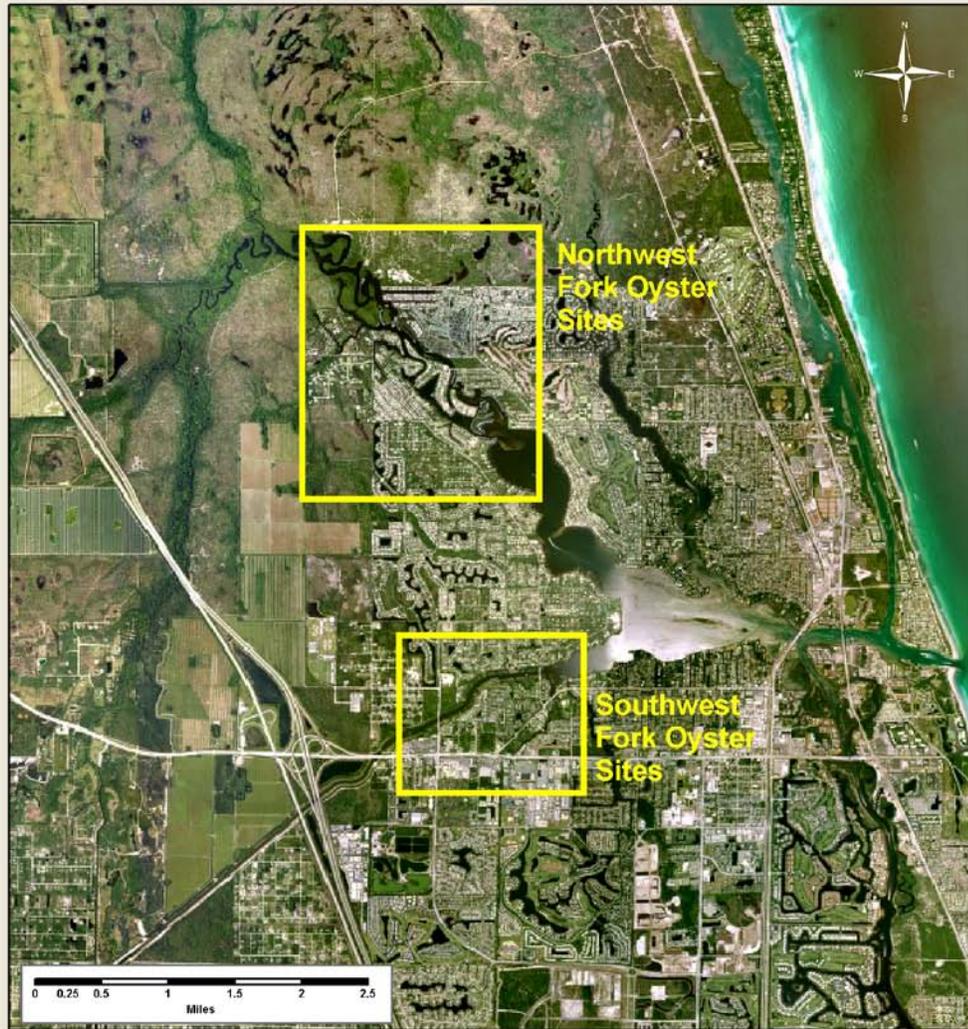


Loxahatchee River Estuary Live Oyster Locations and Mapping 2003



Distribution and Viability of Oyster Communities in the Loxahatchee River Estuary

February, 2004

**Lorene R. Bachman, Mary S. Ridler and Richard C. Dent
WildPine Ecological Laboratory
Loxahatchee River District**

Introduction and Scope of Study

Established and maintained by the blending of marine waters entering at the Jupiter Inlet and freshwater flows draining an estimated 270 square mile watershed, the estuary of the Loxahatchee River has undergone significant change over recent years. Drainage conveyances to accommodate rural, urban and agricultural development within the watershed have substantially enriched, reduced and otherwise modified the freshwater flows entering the estuary; and, maintenance dredging of the Jupiter Inlet has allowed greater volumes of water from the Atlantic Ocean to encroach further west into the estuary. While still considered a quality environmental setting with designations as a National Wild and Scenic River, an Outstanding Florida Water and an Aquatic Preserve, the hydrologic and other anthropogenic changes in the watershed have resulted in the surface waters of the river and estuary experiencing qualitative and habitat decline over recent decades.

In an effort to reverse the documented degradation in water quality and habitat, several programs designed to protect and restore the freshwater river reaches and the estuary are underway and intend to re-establish augmented, and more seasonally balanced, freshwater flows to the estuary and improve water quality and habitat conditions.

It is well recognized that the study of critical biological organisms or Valued Ecosystem Components (VEC) can provide an important snapshot of existing conditions and a benchmark for evaluating the relative effectiveness of restoration activities. The use of VEC allows scientists to assess changes to an environmental system and measure the degree of success or failure of changes within the watershed. As it relates to the Loxahatchee River and Estuary system, past research on potential biological indicators has centered on fresh and salt-water macroinvertebrates, seagrasses and certain fish assemblages. Initial determinations have selected seagrasses and oysters as VEC candidates within the estuarine portion of the watershed. This approach is consistent with similar ecosystems to the north and south.

The Loxahatchee River District (LRD) and the South Florida Water Management District (SFWMD) formed a partnership in 2003 to examine the presence and health of oysters in

the estuary. The LRD's WildPine Laboratory was assigned the responsibility for conducting research with the following primary objectives.

Identify the composition of the oyster community and record the environmental conditions present

Define and map the distribution patterns of the oysters in each of the major segments of the estuary

Evaluate the health and viability of the observed oysters by documenting oyster size, density and viability

Description of the Study Area

Figure 1, "Area of Study – Loxahatchee River Estuary", provides a map of the eastern portion of the watershed and identifies the major hydrologic features relevant to this evaluation. The Loxahatchee Estuary extends from the Jupiter Inlet westerly into the central embayment and up into the lower reaches of the three major forks of the Loxahatchee River. The upper reaches of the three forks, combined with direct discharges to the central embayment, provide the fresh water discharges to the estuary. The north prong of the Loxahatchee River originates in Jonathan Dickenson State Park and provides relatively modest flows to the estuary. Freshwater flows to the southwest fork of the estuary are sporadic and resultant from discharges through a major coastal control structure. The river's Northwest Fork is fed by natural wetlands and the drainage from agricultural and rural lands located in the northern and western portions of the watershed. The magnitude of freshwater flows tributary to the estuary varies and, when combined with tidal and other conditions, dictates the inland extent of the saline waters of the estuary. At present, depending on tides and freshwater flows, saline conditions occur at the inlet and may extend upstream, affecting all three forks of the river. Saline intrusion may be seen as far as ten miles up the Northwest Fork from the Jupiter Inlet.

Historical accounts indicate that during the late nineteenth and early twentieth centuries, the Loxahatchee estuary once supported a large and robust oyster population that was located in the central embayment and within a few miles of the Jupiter Inlet. Qualitative and quantitative changes in water quality and bottom sediments over the past sixty years have served to greatly alter environmental conditions under which the oyster could propagate. In the early 1990's, Law Environmental, Inc. conducted an evaluation of live oysters within the estuary. The report documented minimal presence of oyster bars in the central embayment and the north prong and a more substantial presence near the mouths of the northwest and southwest forks.

Based on prior information and preliminary field observations that resulted in the absence of significant oysters in the north prong and the central embayment, the study design focused on more likely areas. Figure 1 exhibits the two primary areas of study for this current research effort.



Figure 1

Live Oyster Bars

Area of Study - Loxahatchee River Estuary



Methodology

Personnel from the Loxahatchee River District's WildPine Ecological Laboratory initiated the investigation in July of 2003 and concluded the fieldwork in December of 2003. The early work concentrated on a preliminary survey of the Loxahatchee Estuary to determine the general extent of live oyster beds. Prior technical reports, candidate areas based on bottom type, water depth and salinity, and local historic information were employed to define areas of major concentration. While oysters were observed throughout the study area on bulkheads and pilings and remnant oysters bars, consisting exclusively of old oyster shell were observed, these findings were not the focus of the current study. The scope of this evaluation concentrated on live oysters beds defined as areas of greater than one square meter that supported greater than five live oysters. The surveys were typically conducted at low tide and consisted of visual observations by divers with subsequent physical probing of the bottom sediments.

Once the initial survey work was completed, all areas supporting live oyster beds were established as target locations and scheduled for more intense evaluation. Identification of the oyster types observed within the estuary and conditions of the substrate and overlying water column quality were documented. Scientists from WildPine Lab mapped the location and spatial extent of the existing oyster beds. At each of the observed beds, the outer perimeter was marked and a polygon was traced using a hand-held global Positioning System (GPS) unit. The GPS unit was differentially corrected for sub-meter accuracy. The information generated by the GPS unit was then overlain on color aerial photography.

After all beds were mapped, fourteen representative points were selected for further evaluation to characterize the viability of the oyster communities within the northwest and southwest forks of the Loxahatchee estuary. At each sample point, a one-meter frame quadrat was centrally placed on the oyster bed. All oysters within the quadrat were collected and placed into containers for counting and measuring. Care was taken not to intrude into the underlying layer of dead oyster shells on which the oysters tend to build. The center of the quadrat was recorded with the GPS unit and stored for later mapping. Within each quadrat, oysters were measured in centimeters, measured from the umbro to the opposite margin of each oyster. When clumps of oysters were measured, each individual was counted and measured separately, including the spat. All live oysters were measured and hinged dead shells, representing recently deceased organisms, were also measured. Shells of dead oysters were also counted and recorded. Once counted and measured, all organisms were returned to the quadrat area. All data was recorded in the field and later entered into a computer database.

The Data Appendix is incorporated as an integral section of this report and provides the data collected during this evaluation. The data dictionary for the oyster sample points includes identifying information for each sample point, water quality and substrate data and specific information on the condition of sampled oysters including number, size and if alive or dead.

Analytical Results

Two species of oyster were observed to be living within the estuary of the Loxahatchee River, the American or Eastern Oyster, *Crassatira virginica*, and the Flat Oyster, *Isognomon alatus*. While both species were documented, the dominant species found in both the northwest and southwest forks was the American or Eastern Oyster, *Crassatira virginica*. The Flat Oyster, *Isognomon alatus*, was found closest to the inlet, within the central embayment of the estuary and not found concentrated in bars, but rather living on seawalls and pilings. Likewise, the estuarine portion of the North Fork supported no oyster beds, limiting the areas of oyster presence to the seawalls and pilings.

A total of 72 oyster beds, typically small in size and covering approximately ten acres in total, were identified and mapped. Oyster sampling points were established on twelve of the fourteen beds, eight in the Southwest Fork and four in the Northwest Fork. The species composition recorded from the beds was almost exclusively *Crassatira virginica* with *Isognomon alatus* appearing at only four sites and never contributing more than seven percent of the individuals. The data collected from the sampling points indicate that the greatest number of beds, the largest spatial distribution and the highest densities were recorded within the northwest fork. The oysters observed in both forks were generally small in size at less than 5 cm and the percentage of live oysters typically exceeded 75 percent of all individuals counted.

More detailed discussions of the findings in each of the two arms of the estuary, the northwest and southwest forks, are included in the following sections. Figure 2 and Figure 3 provide graphic illustrations of the study area for each of the forks, the spatial distribution of oyster bars and the specific sampling points from which data for analytical determinations was obtained. For specific data relative to each oyster sampling site, refer to the Appendix.

Northwest Fork

Figure 2, entitled “Oyster Beds and Selected Monitoring Points in the NW Fork of the Loxahatchee River”, describes a section of the lower reach of the rivers main fork that is located from four to seven miles upstream of the Jupiter Inlet. The graphic shows the location of the 48 oyster beds recorded during the study and describes the relative extent, approximately nine total acres, of oyster bar distribution. The figure also identifies the four oyster monitoring points or stations from which specific data was obtained.

As relates to species composition, the American Oyster, *C. virginica*, was found exclusively at each of three sampling points in the northwest fork. The Flat oyster, *I. alatus*, accounted for less than 0.5 percent of the individuals observed at station #4. Figure 4, “Densities of Live Oysters from Select Stations in the Loxahatchee River Estuary”, exhibits the relative densities, in numbers of live oysters, found at each of the

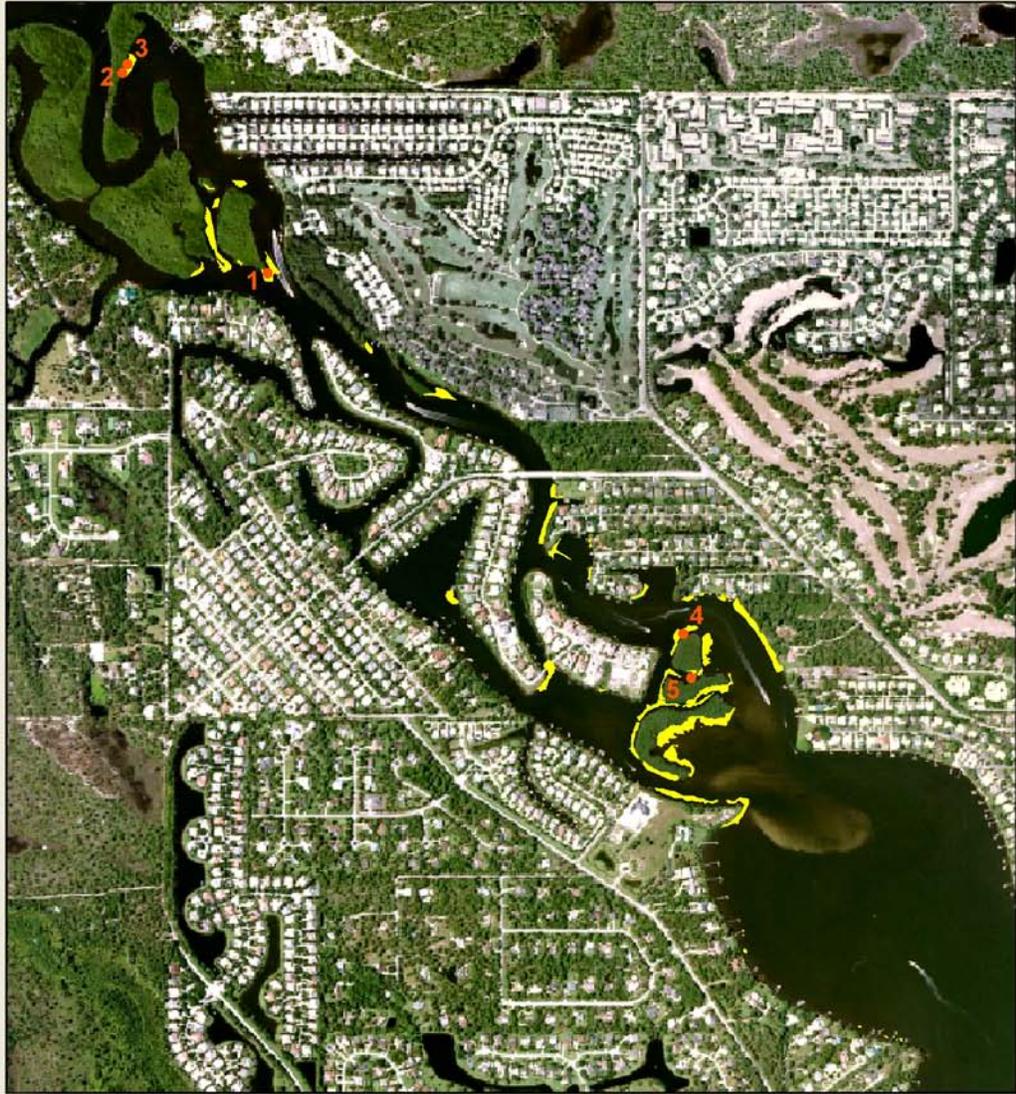
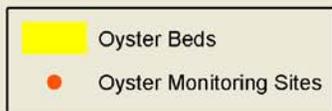


Figure 2

Oyster Beds and Selected Monitoring Sites In the Northwest Fork of the Loxahatchee River



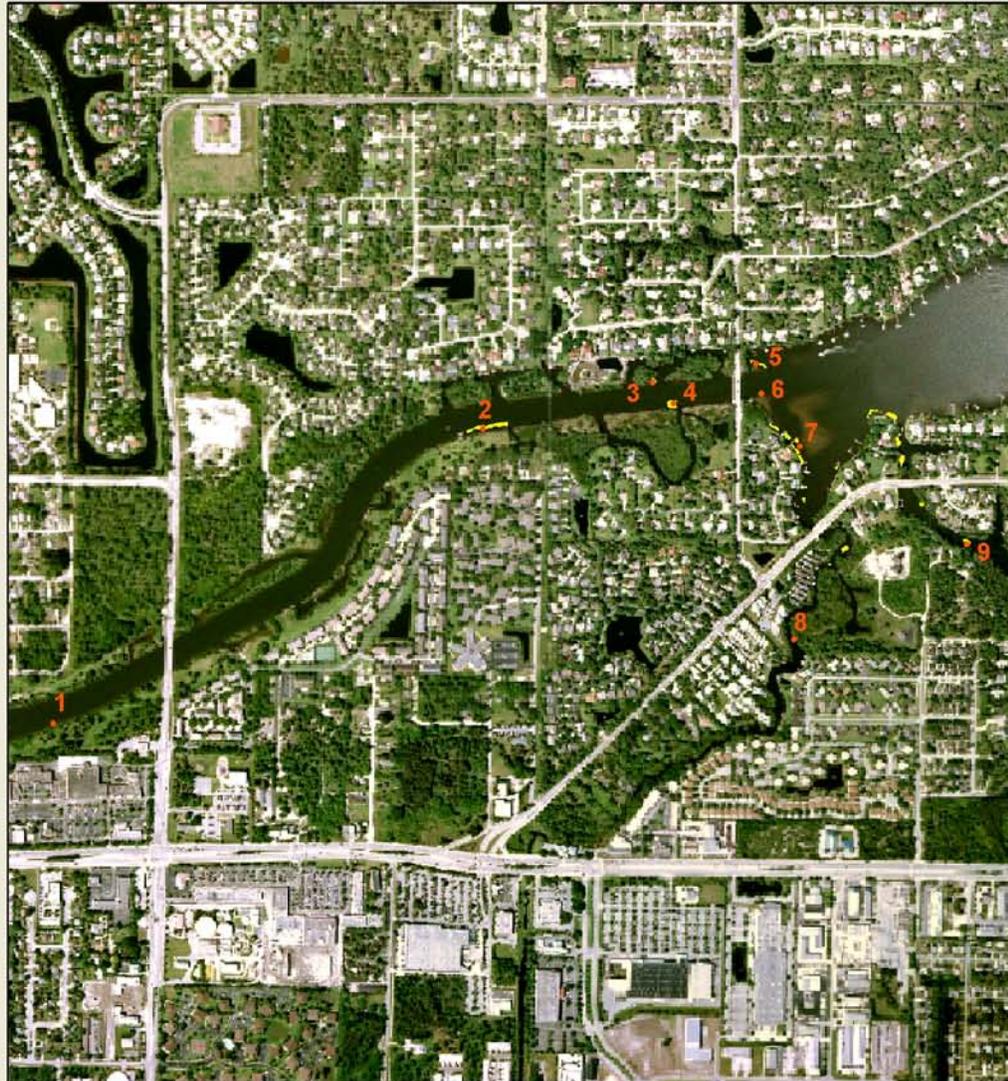
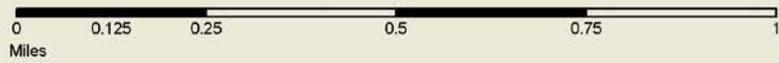
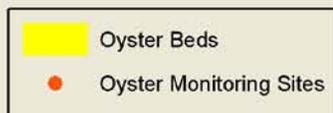
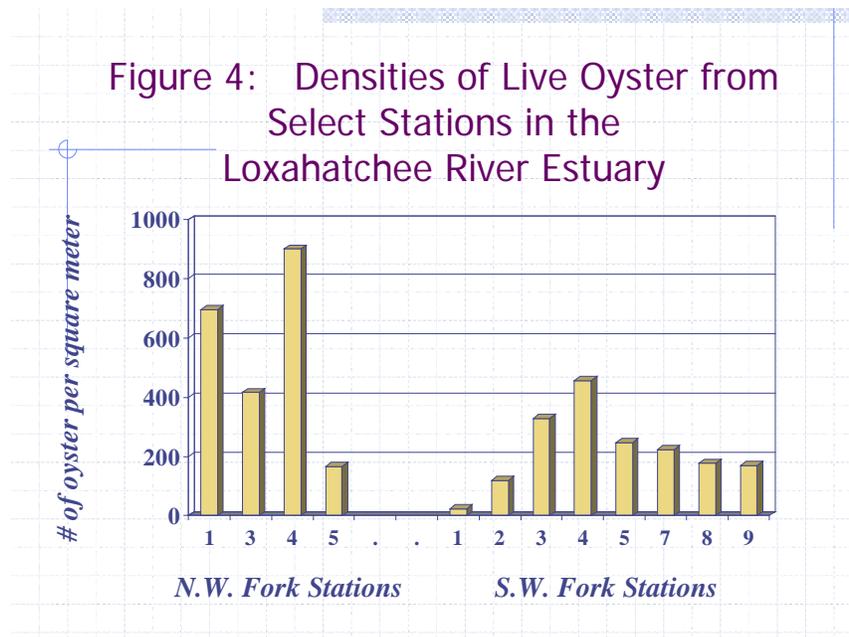


Figure 3

Oyster Beds and Selected Monitoring Sites In the Southwest Fork of the Loxahatchee River



stations in both the northwest and southwest forks. Specific to the northwest fork, the recorded densities ranged from 167 to 901 oysters per square meter of oyster bar habitat.

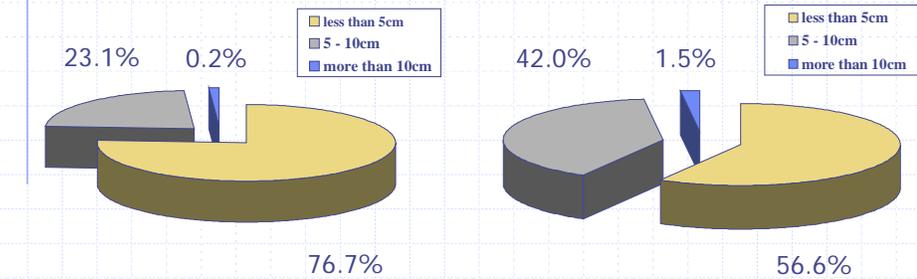


Two factors were employed in assessing the health and viability of oysters; oyster size and the percentage of live organisms compared to total count of live oysters and oyster shell. Figure 5, “Size Distribution of Live Oyster in the Loxahatchee River Estuary”, presents the findings in terms of the percent of total live organisms and indicates that over three-quarters of the oysters observed at the four monitoring sites fell into the smallest category. More specifically, 1672 of the individual live oysters at these sites measured less than 5 cm, 503 organisms were sized between 5cm and 10 cm and only four individuals were greater than 10 cm in size. The relationship of live vs. dead oysters for the four oyster monitoring stations combined is shown in Figure 6 “Comparison of Live Oyster to Shell Remnants in the Loxahatchee River Estuary”. An evaluation of individual stations shows a range of from 61 % live oysters found at station #5 to 88 % of live oysters recorded at station #4.

Southwest Fork

The observed oyster beds and the specific sampling points located in the southwest fork of the Loxahatchee Estuary and associated tributaries of Jones Creek and Sims Creek are shown in Figure 3 “Oyster Beds and Selected Monitoring Points in the SW Fork of the Loxahatchee River”. The eastern most beds in this study area are located approximately 3.5 miles from the Jupiter Inlet. The exhibit identifies the 24 oyster beds recorded during the study and highlights the eight oyster monitoring stations from which specific analyses were conducted. These oyster beds, substantially smaller than those observed in the Northwest Fork and covering less than one acre in total, are mainly distributed within a

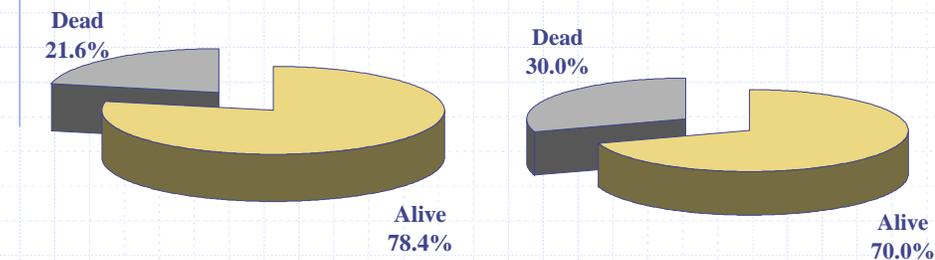
Figure 5 - Size Distribution of Live Oysters in the Loxahatchee River Estuary



Northwest Fork

Southwest Fork

Figure 6 - Comparison of Live Oysters to Shell Remnants in the Loxahatchee River Estuary



Northwest Fork

Southwest Fork

0.5 mile reach of the channelized portion of the southwest fork of the estuary and approximately 0.3 miles into two tributary waters. One very small bed was found an additional 0.5 miles upstream and identified as Station #1.

The American oyster, *C. virginica*, is the predominant species found within this reach and is the sole species identified at five of the eight stations. A very limited population, consisting of less than seven percent, of the Flat oyster, *I. alatus*, was identified at Stations #3, #5 and #7. The densities, in numbers of live oysters, recorded at each of the eight monitoring stations in the Southwest Fork and tributary streams are displayed on Figure 4 and range from 23 to 457 organisms per square meter.

As relates to the size of the oysters recorded from the beds, Figure 5, in part, presents the data in terms of the percent of total live organisms in each of three size categories. Approximately 58% of the individuals fell into the less than 5 cm group with nearly 40 % in the 5cm to 10cm category. In the Southwest Fork of the estuary, 1.9% of the oysters were greater than 10 cm in size, a small percentage but a substantially larger relative presence than observed in the Northwest Fork.

A portion of Figure 6 presents a comparison of live oysters observed at the combined Southwest Fork monitoring stations to the shell remnant evidence of dead oysters. With the exception of the far west station #1 where dead oysters outnumbered live by nearly three to one, all individual stations exhibited a majority percentage of viable organisms with a range of from 60% to 80%.

Conclusion

The health, distribution and abundance of valued ecosystem components such as oysters provide a valuable indication of the status of the estuary's ecosystem. Finfish have the ability to move out of an area in response to extreme changes in environmental conditions, but benthic indicators, such as oysters, represent a valuable sentinel for environmental shifts. An important part of the Comprehensive Everglades Restoration Program will be to continue to monitor the oyster populations within the Loxahatchee and document their increases and viability as programs and projects are undertaken to protect and restore the vitality of the Loxahatchee River.

Distribution and Viability of Oyster Communities in the Loxahatchee River Estuary

February, 2004

**Lorene R. Bachman, Mary S. Ridler and Richard C. Dent
WildPine Ecological Laboratory
Loxahatchee River District**

Data Appendix

**Oyster Polygon Map Details of the NW Fork
Oyster Point Data Dictionary of the NW Fork**

**Oyster Polygon Map Details of the SW Fork
Oyster Point Data Dictionary of the SW Fork**

**Water Quality from RiverKeeper Data
NW Fork Station # 62 SW Fork Station # 72**

**Oyster Polygon Map Details
for the Northwest Fork of the Loxahatchee River**

ID_Description	Date	Time	Tide_Stage	Reach	ID_Number	Max_PDOP
L-101	9/4/2003	11:24:57am	DL	NW Fork	24	3.9
L-102	9/4/2003	10:53:53am	DL	NW Fork	23	4.6
L-103	9/4/2003	10:41:47am	DL	NW Fork	22	3.9
L-104	11/17/2003	12:15:13pm	DL	NW Fork	71	2.1
L-105	9/22/2003	12:48:48pm	Ebb	NW Fork	33	4.3
L-106	9/22/2003	12:38:17pm	Ebb	NW Fork	32	3.8
L-107	11/17/2003	12:40:32pm	DL	NW Fork	72	2.6
L-108	9/22/2003	12:10:37pm	Ebb	NW Fork	31	3.9
L-109	9/4/2003	10:09:30am	DL	NW Fork	21	4.5
L-110	11/17/2003	01:25:19pm	Flood	NW Fork	73	4.8
L-111	11/17/2003	01:50:55pm	DL	NW Fork	74	3.9
L-112	11/17/2003	02:20:45pm	Flood	NW Fork	75	4.8
L-113	11/17/2003	02:54:52pm	DL	NW Fork	76	4.3
L-114	12/19/2003	12:14:18pm	DL	NW Fork	91	4.1
L-115	12/19/2003	12:48:44pm	DL	NW Fork	92	2.2
L-116	12/19/2003	02:30:55pm	DL	NW Fork	99	3.9
L-117	10/31/2003	12:25:11pm	DL	NW Fork	68	2.2
L-118	12/19/2003	01:15:13pm	DL	NW Fork	93	2.5
L-119	12/19/2003	01:24:13pm	DL	NW Fork	94	3.6
L-120	12/19/2003	01:32:43pm	DL	NW Fork	95	2.8
L-121	12/19/2003	01:39:15pm	DL	NW Fork	96	2.1
L-122	12/19/2003	01:45:27pm	DL	NW Fork	97	3.2
L-123	12/19/2003	01:52:37pm	DL	NW Fork	98	4.8
L-124	9/5/2003	09:26:23am	DL	NW Fork	11	3.8
L-125	9/5/2003	09:45:11am	DL	NW Fork	12	3.8
L-126	10/21/2003	01:34:51pm	DL	NW Fork	42	5.6
L-127	10/21/2003	11:39:43am	DL	NW Fork	51	4.1
L-128	9/5/2003	10:03:20am	DL	NW Fork	13	4.0
L-129	9/5/2003	10:06:17am	DL	NW Fork	14	4.5
L-130	10/21/2003	12:06:26pm	DL	NW Fork	52	4.0
L-131	9/5/2003	10:17:16am	DL	NW Fork	15	4.1
L-132	9/5/2003	10:18:54am	DL	NW Fork	16	4.5
L-133	10/21/2003	01:02:15pm	DL	NW Fork	41	4.2
L-134	9/5/2003	11:31:51am	DL	NW Fork	17	5.0
L-135	10/31/2003	11:43:09am	DL	NW Fork	67	3.6
L-136	10/31/2003	09:33:00am	Flood	NW Fork	61	4.5
L-137	10/31/2003	10:29:56am	Flood	NW Fork	62	2.2
L-138	10/31/2003	11:27:41am	Flood	NW Fork	66	4.0
L-139	10/31/2003	10:34:37am	Flood	NW Fork	63	3.9
L-140	10/31/2003	10:46:39am	DL	NW Fork	64	2.3
L-141	10/31/2003	11:09:08am	DL	NW Fork	65	4.5
L-142	12/22/2003	12:35:33pm	DL	NW Fork	81	3.7
L-143	12/22/2003	01:01:48pm	DL	NW Fork	82	3.4
L-144	12/22/2003	01:30:43pm	DL	NW Fork	83	1.9
L-145	12/22/2003	01:35:51pm	DL	NW Fork	84	2.3
L-146	12/22/2003	01:53:19pm	DL	NW Fork	85	2.7
L-147	12/22/2003	01:58:43pm	DL	NW Fork	86	4.1
L-148	12/22/2003	02:04:51pm	DL	NW Fork	87	4.9

**Oyster Polygon Map Details
for the Northwest Fork of the Loxahatchee River**

ID_Description	Corr_Type	Rcvr_Type	Datafile
L-101	Realtime WAAS Corrected	Pro XR	OY090410A.SSF
L-102	Realtime Corrected	Pro XR	OY090410A.SSF
L-103	Realtime Corrected	Pro XR	OY090410A.SSF
L-104	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-105	Realtime Corrected	Pro XR	OYNWPOLY092212A.SSF
L-106	Realtime Corrected	Pro XR	OYNWPOLY092212A.SSF
L-107	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-108	Realtime Corrected	Pro XR	OYNWPOLY092212A.SSF
L-109	Realtime Corrected	Pro XR	OY090410A.SSF
L-110	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-111	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-112	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-113	Realtime Corrected	Pro XR	OYNWBED031117A.SSF
L-114	Realtime Corrected	Pro XR	OY301219.SSF
L-115	Realtime Corrected	Pro XR	OY301219.SSF
L-116	Realtime Corrected	Pro XR	OY301219.SSF
L-117	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-118	Realtime Corrected	Pro XR	OY301219.SSF
L-119	Realtime Corrected	Pro XR	OY301219.SSF
L-120	Realtime Corrected	Pro XR	OY301219.SSF
L-121	Realtime Corrected	Pro XR	OY301219.SSF
L-122	Realtime Corrected	Pro XR	OY301219.SSF
L-123	Realtime Corrected	Pro XR	OY301219.SSF
L-124	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-125	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-126	Realtime Corrected	Pro XR	OYPP102113A.SSF
L-127	Realtime Corrected	Pro XR	OYPP102111A.SSF
L-128	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-129	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-130	Realtime Corrected	Pro XR	OYPP102111A.SSF
L-131	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-132	Realtime WAAS Corrected	Pro XR	OYNWF090509A.SSF
L-133	Realtime Corrected	Pro XR	OYPP102113A.SSF
L-134	Realtime Corrected	Pro XR	OYNWF090509A.SSF
L-135	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-136	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-137	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-138	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-139	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-140	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-141	Realtime Corrected	Pro XR	OYNWBED103109A.SSF
L-142	Realtime Corrected	Pro XR	OYNF03122212A.SSF
L-143	Realtime Corrected	Pro XR	OYNF03122212A.SSF
L-144	Realtime Corrected	Pro XR	OYNF03122212A.SSF
L-145	Realtime Corrected	Pro XR	OYNF03122212A.SSF
L-146	Realtime Corrected	Pro XR	OYNF03122212A.SSF
L-147	Realtime WAAS Corrected	Pro XR	OYNF03122212A.SSF
L-148	Realtime Corrected	Pro XR	OYNF03122212A.SSF

**Oyster Polygon Map Details
for the Northwest Fork of the Loxahatchee River**

ID_Description	Unfilt_Pos	Filt_Pos	GPS_Area	GPS_Perime	Avg_Vert_P	Avg_Horz_P	Area_ID
L-101	96	95	0.266	571.294	0.7	0.4	47
L-102	64	64	0.042	309.313	0.8	0.4	46
L-103	66	66	0.123	348.369	0.8	0.4	45
L-104	31	31	0.081	260.714	0.6	0.3	20
L-105	224	224	0.645	1455.700	0.9	0.5	43
L-106	58	56	0.041	370.174	1.0	0.6	42
L-107	46	46	0.115	442.725	0.6	0.3	21
L-108	47	47	0.026	172.813	0.9	0.6	41
L-109	121	121	0.388	834.054	0.7	0.4	44
L-110	40	40	0.093	316.215	0.8	0.5	22
L-111	61	61	0.283	767.575	0.9	0.6	23
L-112	63	63	0.129	475.282	1.1	0.5	24
L-113	69	68	0.354	848.258	0.6	0.4	25
L-114	97	97	0.167	783.946	0.7	0.5	3
L-115	53	53	0.032	227.826	0.6	0.3	4
L-116	31	31	0.051	340.485	0.7	0.5	11
L-117	58	58	0.185	450.318	0.5	0.4	33
L-118	44	44	0.115	461.281	0.6	0.3	5
L-119	17	15	0.016	180.267	0.7	0.4	6
L-120	29	28	0.072	259.123	0.6	0.4	7
L-121	28	28	0.026	159.500	0.5	0.4	8
L-122	46	46	0.048	478.739	0.6	0.4	9
L-123	135	135	0.825	1628.076	0.7	0.5	10
L-124	195	195	0.334	875.077	0.6	0.4	34
L-125	150	150	0.398	857.987	0.6	0.4	35
L-126	107	107	0.349	794.807	0.8	0.4	50
L-127	165	140	0.215	923.668	0.9	0.4	1
L-128	27	27	0.042	207.522	0.8	0.5	36
L-129	89	89	0.040	326.816	0.7	0.4	37
L-130	51	51	0.039	274.659	1.2	0.4	2
L-131	12	12	0.002	48.330	1.2	0.5	38
L-132	265	262	0.438	1362.678	0.9	0.4	39
L-133	43	43	0.030	188.265	0.6	0.4	49
L-134	208	204	0.281	1381.017	0.7	0.4	40
L-135	48	48	0.124	452.927	0.8	0.5	32
L-136	281	280	1.207	2118.629	0.9	0.5	26
L-137	12	12	0.003	53.676	0.6	0.3	27
L-138	87	87	0.217	736.232	1.1	0.4	31
L-139	123	123	0.449	953.401	0.7	0.4	28
L-140	17	17	0.012	101.650	0.6	0.3	29
L-141	97	97	0.307	816.096	0.8	0.4	30
L-142	130	130	0.445	1221.151	0.6	0.3	12
L-143	132	132	0.363	1167.460	0.6	0.3	13
L-144	15	15	0.003	62.355	0.5	0.3	15
L-145	19	19	0.028	129.384	0.5	0.4	16
L-146	17	17	0.011	86.342	0.7	0.4	17
L-147	21	21	0.015	126.428	0.7	0.5	18
L-148	33	33	0.018	220.313	0.9	0.6	19

Total Area in Acres 9.493

**Oyster Point Data Dictionary
for the Northwest Fork of the Loxahatchee River**

ID#	Date	Time	Tide_Stage	Reach	ID_Descrip
1	9/22/2003	10:31:12am	Ebb	NW Fork	riverbend
2	9/22/2003	10:58:17am	Ebb	NW Fork	upsteam end
3	9/22/2003	11:36:03am	Ebb	NW Fork	boy scout camp
4	10/21/2003	11:11:13am	Ebb	NW Fork	best site
5	10/21/2003	12:35:09pm	DL	NW Fork	backwater

ID#	Area_Sampled	Oy Present	Total_Depth	Secchi_Dep	Substrate	Muck_Depth
1	1 sq Meter	Yes	0.4	CTB in 0-1 m	Oyster Bar/Shell	0
2	1 sq Meter	Yes	0.8	0.5-1.0 m	Firm Mud	10 – 20 cm
3	1 sq Meter	Yes	0.6	CTB in 0-1 m	Oyster Bar/Shell	0
4	1 sq Meter	Yes	0.5	CTB in 0-1 m	Oyster Bar/Shell	1 – 2 cm
5	1 sq Meter	Yes	0.1	CTB in 0-1 m	Oyster Bar/Shell	50 – 100 cm

ID#	# Live Oys	# Live < 5cm	# Live 5-10cm_	# Live > 10cm	Size_Live_
1	695	487	204	4	Most < 5 cm
2	2	2	0	0	All < 5 cm
3	416	376	40	0	Most < 5 cm
4	901	660	241	0	Most < 5 cm
5	167	149	18	0	Most < 5 cm

ID#	# Dead Oys	# Dead < 5cm	# Dead 5-10cm	# Dead > 10cm	Size_Dead_
1	201	147	53	1	Most < 5 cm
2	10	10	0	0	All < 5 cm
3	168	150	18	0	Most < 5 cm
4	127	35	62	0	Most < 5 cm
5	105	83	12	0	Most < 5 cm

ID#	Datafile	Comment
1	OYNWF092210A.SSF	lots of live spat, mussels, bg algae, tannin stain
2	OYNWF092210A.SSF	invalid site not included in data evaluation
3	OYNWF092210A.SSF	stinky bg algae, tannin stain, mussels
4	OYNFDD.SSF	lots of spat, 4 flat small
5	OYDD102112A.SSF	poor flushing

ID#	Northing	Easting	Rcvr_Type	Max_PDOP	Corr_Type
1	963317.594	936533.534	Pro XR	2.9	Realtime Corrected
2	965027.584	935290.966	Pro XR	3.5	Realtime Corrected
3	965105.054	935334.885	Pro XR	3.6	Realtime Corrected
4	960242.631	940085.171	Pro XR	2.3	Realtime Corrected
5	959863.033	940148.758	Pro XR	2.5	Realtime Corrected

**Oyster Polygon Map Details
for the South Fork of the Loxahatchee River**

ID#	Date	Time	Tide_Stage	Reach	ID_Descrip	Max_PDOP
1	8/25/2003	10:45:16am	Ebb	S Fork	storm drain	5.3
2	8/25/2003	10:59:16am	Ebb	S Fork	Palm Site	5.6
3	8/25/2003	11:15:32am	Ebb	S Fork	sw bridge	4.0
4	8/25/2003	11:28:41am	Ebb	S Fork	nw bridge	3.0
5	8/25/2003	11:40:27am	Ebb	S Fork	ne bridge	5.4
6	8/25/2003	11:56:48am	Ebb	S Fork	Sims 1	2.8
7	8/25/2003	12:12:40pm	Ebb	S Fork	Sims 8	2.2
8	8/25/2003	12:15:13pm	Ebb	S Fork	Sims 10	2.1
9	8/25/2003	12:25:07pm	Ebb	S Fork	Sims 9	2.0
10	8/25/2003	12:47:55pm	Ebb	S Fork	west side of jones mouth	5.6
11	8/25/2003	12:52:33pm	Ebb	S Fork	east corner of sims mouth	5.2
12	8/25/2003	01:04:07pm	Ebb	S Fork	jones 1	3.4
13	8/25/2003	01:08:17pm	Ebb	S Fork	jones 2	3.4
14	8/25/2003	01:16:35pm	Ebb	S Fork	jones 3	4.4
15	8/25/2003	01:22:24pm	DL	S Fork	jones 4	3.6
16	8/8/2003	01:41:40pm	DL	S Fork	sims 13	4.7
17	8/8/2003	12:27:35pm	DL	S Fork	sims 7	4.3
18	8/8/2003	12:04:31pm	DL	S Fork	sims 5	2.9
19	8/8/2003	12:07:52pm	DL	S Fork	sims 3	2.9
20	8/8/2003	12:11:10pm	DL	S Fork	sims 2	3.0
21	8/8/2003	12:14:41pm	DL	S Fork	sims 4	2.8
22	8/8/2003	12:17:22pm	DL	S Fork	sims 6	2.8
23	8/8/2003	01:55:33pm	DL	S Fork	sims 12	5.1
24	8/8/2003	02:41:36pm	DL	S Fork	sims 11	4.4

**Oyster Polygon Map Details
for the South Fork of the Loxahatchee River**

ID#	Corr_Type	Rcvr_Type	Datafile	Unfilt_Pos	Filt_Pos
1	Realtime Corrected	Pro XR	OYPOLY0825.SSF	26	26
2	Realtime Corrected	Pro XR	OYPOLY0825.SSF	138	138
3	Realtime Corrected	Pro XR	OYPOLY0825.SSF	81	81
4	Realtime Corrected	Pro XR	OYPOLY0825.SSF	44	44
5	Realtime Corrected	Pro XR	OYPOLY0825.SSF	74	74
6	Realtime Corrected	Pro XR	OYPOLY0825.SSF	20	20
7	Realtime Corrected	Pro XR	OYPOLY0825.SSF	19	19
8	Realtime Corrected	Pro XR	OYPOLY0825.SSF	27	27
9	Realtime Corrected	Pro XR	OYPOLY0825.SSF	43	43
10	Realtime Corrected	Pro XR	OYPOLY0825.SSF	21	21
11	Realtime Corrected	Pro XR	OYPOLY0825.SSF	51	51
12	Realtime Corrected	Pro XR	OYPOLY0825.SSF	31	31
13	Realtime Corrected	Pro XR	OYPOLY0825.SSF	34	34
14	Realtime Corrected	Pro XR	OYPOLY0825.SSF	45	44
15	Realtime Corrected	Pro XR	OYPOLY0825.SSF	33	33
16	Realtime Corrected	Pro XR	JERRY POLY.SSF	30	30
17	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	32	32
18	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	14	14
19	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	22	22
20	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	24	24
21	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	22	22
22	Realtime Corrected	Pro XR	OYDAY3POLY.SSF	31	31
23	Realtime Corrected	Pro XR	JERRY POLY 2.SSF	22	22
24	Realtime WAAS Corrected	Pro XR	JERRY POLY 2.SSF	119	115

**Oyster Polygon Map Details
for the South Fork of the Loxahatchee River**

ID#	GPS_Area	GPS_Perime	Avg_Vert_P	Avg_Horz_P
1	0.002	49.077	1.0	0.5
2	0.160	695.684	1.0	0.5
3	0.073	270.934	0.7	0.4
4	0.020	181.511	0.8	0.4
5	0.040	323.552	0.8	0.4
6	0.028	179.424	0.8	0.4
7	0.006	79.841	0.6	0.3
8	0.003	64.134	0.6	0.3
9	0.012	128.290	0.5	0.3
10	0.051	213.374	1.0	0.4
11	0.034	400.484	1.0	0.4
12	0.037	184.888	0.9	0.4
13	0.042	211.170	0.9	0.4
14	0.018	130.439	1.1	0.5
15	0.043	192.487	0.8	0.4
16	0.008	90.380	1.1	0.5
17	0.010	99.099	0.8	0.4
18	0.003	49.877	0.8	0.4
19	0.015	100.406	0.8	0.4
20	0.027	156.174	0.8	0.4
21	0.028	219.438	0.8	0.4
22	0.040	238.159	0.8	0.4
23	0.005	73.479	1.0	0.5
24	0.034	305.345	0.8	0.5

Total Area in Acres 0.739

**Oyster Point Data Dictionary
for the South Fork of the Loxahatchee River**

ID#	Date	Time	Tide_Stage	Reach	ID_Descrip
1	8/1/2003	10:22:38am	Flood	S Fork	storm drain south shore
2	8/1/2003	11:58:04am	Flood	S Fork	2 palms south shore
3	7/22/2003	12:47:13pm	DL	S Fork	nw 72 bridge
4	7/22/2003	11:52:54am	DL	S Fork	sw 72 bridge
5	7/22/2003	09:38:15am	DL	S Fork	ne 72 bridge
6	7/22/2003	10:45:50am	DL	S Fork	se 72 bridge
7	8/8/2003	11:54:00am	DL	S Fork	Sims mouth
8	8/8/2003	01:35:28pm	DL	S Fork	Sims South
9	8/25/2003	01:28:49pm	DL	S Fork	Jones South

ID#	Area_Sampled	Oy Present	Total_Depth	Secchi_Depth	Substrate	Muck_Depth
1	1 sq Meter	Yes	0.5	0.5-1.0 m	Muck	20 – 50 cm
2	1 sq Meter	Yes	0.3	0.5-1.0 m	Oyster Bar/Shell	5- 10 cm
3	1 sq Meter	Yes	0.5	0.5-1.0 m	Oyster Bar/Shell	1 – 5 cm
4	1 sq Meter	Yes	0.0	CTB in 0-1 m	Oyster Bar/Shell	1 – 5 cm
5	1 sq Meter	Yes	0.0	CTB in 0	Oyster Bar/Shell	1 – 5 cm
6	1 sq Meter	Yes	0.1	CTB in 0	Muddy Sand	0 cm
7	1 sq Meter	Yes	0.0	CTB in 0	Oyster Bar/Shell	1 – 2 cm
8	1 sq Meter	Yes	0.0	0-0.5 m	Oyster Bar/Shell	5- 10 cm
9	1 sq Meter	Yes	0.2	CTB in 0-1 m	Oyster Bar/Shell	5- 10 cm

ID#	# Live Oys	# Live < 5cm	# Live 5-10cm_	# Live >10cm	Size_Live_
1	23	19	4	0	Most < 5 cm
2	118	101	17	0	Most < 5 cm
3	328	150	172	6	Most 5-10 cm
4	457	259	186	12	Most < 5 cm
5	247	196	51	0	Most < 5 cm
6	0				NA
7	224	89	129	6	Most 5-10 cm
8	177	55	120	2	Most 5-10 cm
9	169	116	53	0	Most < 5 cm

ID#	# Dead Oys	# Dead < 5cm	# Dead 5-10cm	# Dead >10cm	Size_Death_
1	63	37	22	4	Most < 5 cm
2	80	74	6	0	Most < 5 cm
3	85	60	24	1	Most < 5 cm
4	120	78	32	10	Most < 5 cm
5	178	128	50	0	Most < 5 cm
6					NA
7	91	30	55	6	Most 5-10 cm
8	58	15	43	0	Most 5-10 cm
9	72	50	21	1	Most < 5 cm

**Oyster Point Data Dictionary
for the South Fork of the Loxahatchee River**

ID#	Datafile	Comment
1	OYSTER DAY 2.SSF	
2	OYSTER DAY 2.SSF	
3	OY DAY ONE.SSF	live flat=18
4	OY DAY ONE.SSF	
5	OY DAY ONE.SSF	live flat=29
6	OY DAY ONE.SSF	invalid site not included in data evaluation
7	OY DAY 3.SSF	live flat=9 dead flat=6
8	OY DAY 3B.SSF	
9	OYPOINT0825.SSF	

ID#	Northing	Easting	Rcvr_Type	Max_PDOP	Corr_Type
1	947235.842	937527.545	Pro XR	5.6	Realtime Corrected
2	949287.544	940513.818	Pro XR	5.5	Realtime Corrected
3	949610.267	941695.950	Pro XR	2.3	Realtime Corrected
4	949464.258	941841.611	Pro XR	2.1	Realtime Corrected
5	949739.848	942412.686	Pro XR	3.9	Realtime Corrected
6	949531.899	942451.542	Pro XR	2.1	Realtime Corrected
7	949164.694	942718.269	Pro XR	2.9	Realtime Corrected
8	947822.219	942678.947	Pro XR	3.4	Realtime Corrected
9	948482.808	943880.479	Pro XR	4.1	Realtime Corrected

Water Quality Stations

RiverKeeper Data - NW Fork Station #62 - SW Fork Station #72

	St # 62	St # 62	St # 72	St # 72
	9/17/2003	11/20/2003	9/18/2003	11/19/2003
Depth Meters	0.3	0.3	0.3	0.3
Temp Deg. C	29.53	23.07		24.23
pH units	7.30	7.24	7.44	7.52
Alkalinity mg/L	125	105	127	121
Conductivity umho/cm	10,610	3,380	29,490	30,000
Salinity ppt	6.0	1.8	18.0	18.3
Secchi Meters	1.9	1.5	1.0	1.1
Turbidity NTU	1.33	2.44	3.02	3.05
TSS mg/L	3.6	3.6	5.2	< 0.8
Color Units	60	60	30	55
DO mg/L	4.64	5.21	6.3	3.59
DO % Sat	63.4	61.8		50.0
BOD mg/L	< 2.0	< 2.0	2.2	2.0
F-Coliform CFU/100ml	82	112	90	200
T-Coliform CFU/100ml	500	500	400	200
Org. N mg-N/L	1.98		2.43	
NH3 mg-N/L	0.095		0.051	
TKN mg-N/L	2.07	1.79	2.48	1.56
NO2+NO3 mg-N/L	0.058	0.121	0.006	0.088
Total N mg-N/L	2.13	1.91	2.49	1.65
Total P mg-P/L	0.046	0.061	0.039	0.066
CHL A ug/L	7.3	0.4	23.2	18.5
% Light 1 meter	5.9	11.9	37.0	33.3
% Light 2 meters	0.4	1.4	14.0	11.1
TOC mg/l	14.0		9.2	
Ortho P mg-P/L	0.020	0.023	0.003	0.010