

Report on the Shipwreck and Biological Survey  
Conducted Near Fleming Key, 17-20 March 1998



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## Introduction

The Florida State University (FSU) Department of Anthropology and Academic Diving Program (ADP) conducted a biological and archaeological survey on FKNMS G3001 (formerly B3001), the Fleming Key shipwreck, from 17 to 20 March 1998. This research is associated with the Department of Anthropology's course ANT 4131 – *Techniques of Underwater Site Research*, which was designed to introduce students to a variety of technologies and training in archaeology and other scientific disciplines. In recent years, one phase of the course includes a cruise aboard the R/V *Bellows*, operated by the Florida Institute of Oceanography. This annual research project allows students to work in a different environment, live aboard a boat and collect data.

The primary objective of this project was to survey a wreck near Maryland Shoals with the possibility of survey at a secondary site, the area known as Middle Ground. Unfortunately, foul weather and strong currents forced the staff and students to conduct a survey at a tertiary site suggested by David Whall from NOAA; the Fleming Key shipwreck. The wreck is located in sheltered waters on the Gulf side of Key West, near the lighthouse on Fleming Key. Its GPS coordinates are 24° xx.xxxx N, 81° xx.xxxx W. This site has been designated as FKNMS G3001 (Figure 1). Time dedicated to this operation began on the afternoon of 17 March and ended on 20 March 1998. Due to the shallow nature of the site, the R/V *Bellows* anchored near the channel while divers were ferried to and from the site utilizing a smaller Boston whaler chase boat.

Diving operations began on the afternoon of 17 March whereby six temporary, moveable datum points were established around the wreck. Measurements of the wreck and its features were taken in relation to these datum points. A biological survey was initially conducted twice each day on site, during the first and last dives. However, poor visibility at the end of each day forced the cancellation of afternoon biological surveys. From then on, only early morning biological surveys were conducted in order to take advantage of prime visibility conditions. Once the biological survey was completed each morning, archaeological survey began. Side scan sonar survey was also conducted, using a Marine Sonics 600-kHz system, in order to investigate the area around the shipwreck and Man of War Harbor, Fleming Key. A typical workday began by 0830 and concluded by 1730. Evenings on board the research vessel were spent performing data entry and analysis, tabulating biological data and reviewing side scan sonar images.

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Figure 1: Site location – Fleming Key and Man of War Harbor

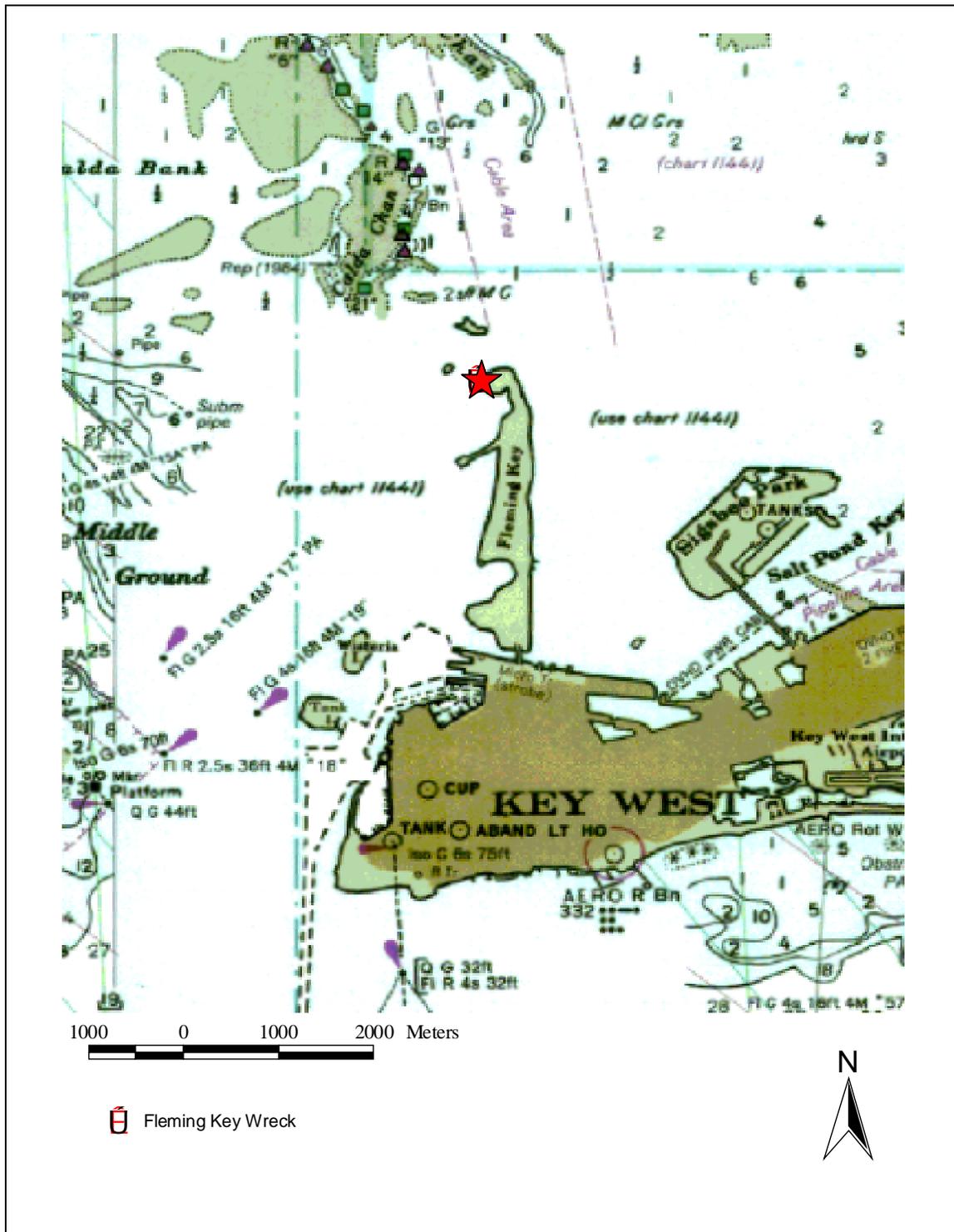
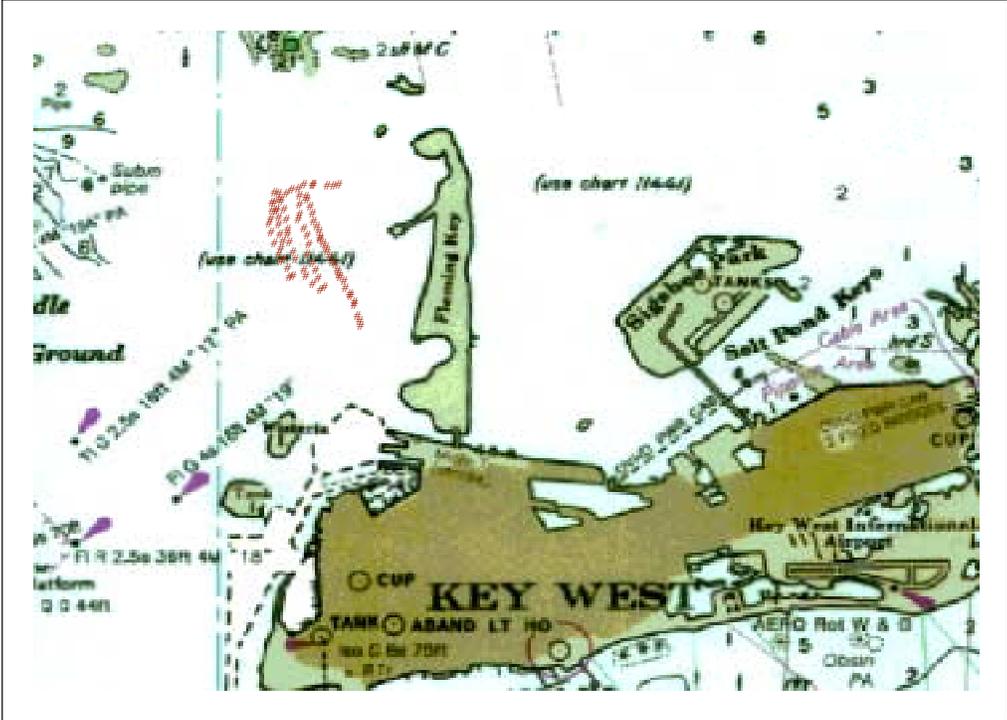


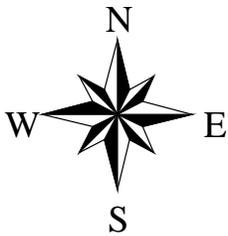
Figure 2: Side scan sonar tracklines from 1998 survey.

1998 Side Scan Sonar Survey Tracklines



2 0 2 4 Kilometers

Tracklines



## Description of the Study Area

FKNMS G3001 is located southeast of channel marker #6, on the west side of Fleming Key at 24° xx.xxxx N, 81° xx.xxxx W. The wreck sits in water from three to ten feet deep, sloping downward toward the northern end (Figure 2). It is partially exposed by low tides and metal above the water surface exhibited extreme degradation and exfoliation (Figure 3). The structural members still submerged also demonstrated degradation although they may have reached a state of equilibrium and should not deteriorate much further. Near the southern end of the wreck, two concrete I-shaped structures are located, which may be the remains of some kind of historic dock. The southwest corner of Structure 1 lies at a bearing of 350° from channel marker #5 and 330° from channel marker #6 (Figure 9). The wreck site is popular with local vendors selling skin diving trips as approximately 150 people were observed swimming, standing on, or wading on or around the wreck. These visitors were observed regularly and clearly contribute to the deterioration of the wreck and affect its structural integrity. Perhaps this action alone is enough to warrant a more aggressive management strategy for preserving this historical and cultural resource.

Figure 3: Aerial photograph of the Fleming Key wreck (image scanned from fax).



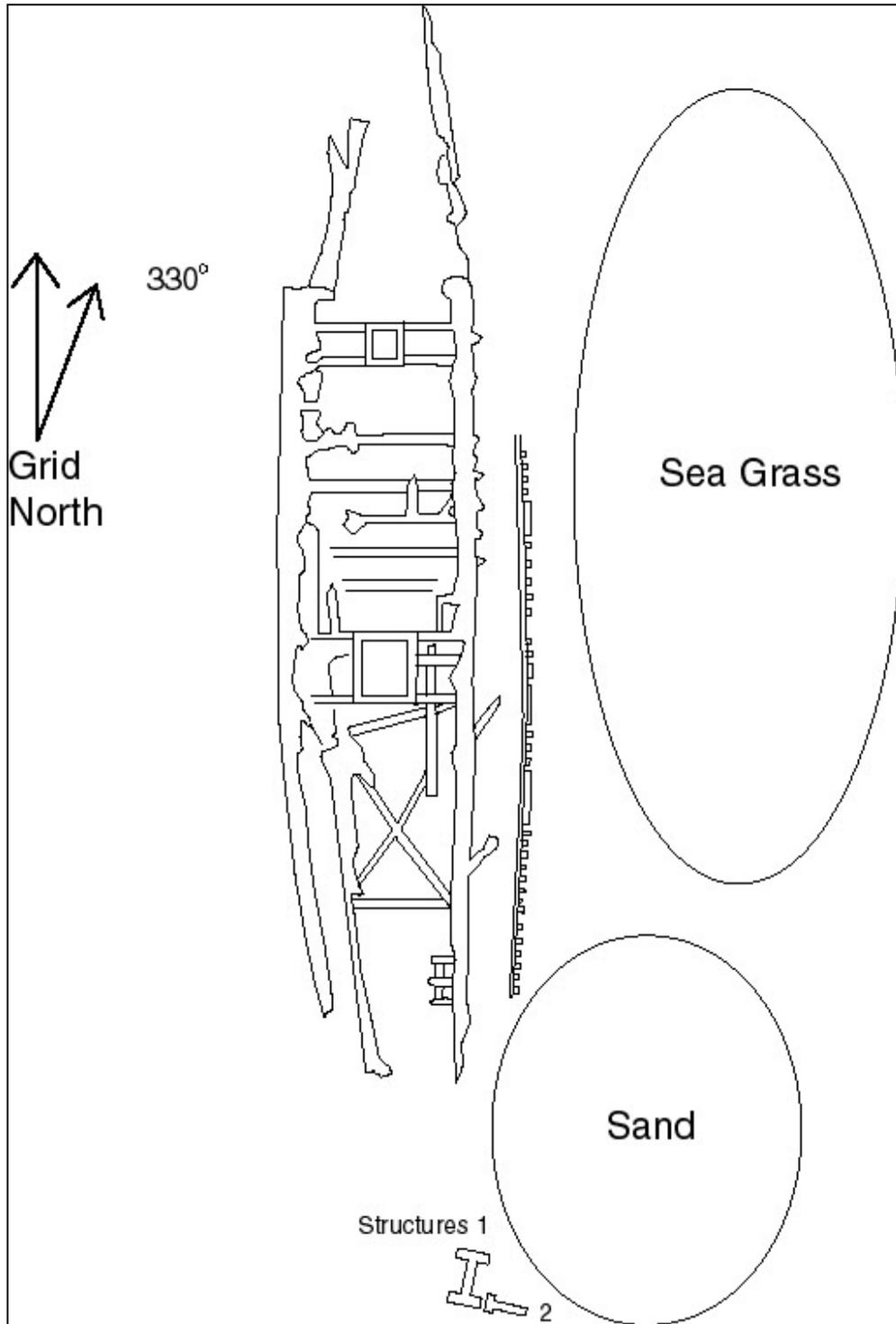
Figure 4: Scanned photograph of the site (looking toward Grid North and channel marker #6).



## Methodology

Because the Fleming Key shipwreck was not previously researched, little information was available pertaining to its history, use and the events leading to its deposition into the archaeological record. A biological survey was conducted each morning around the Fleming Key wreck in order to determine what marine fauna inhabit the site. In-water survey of the wreck itself was conducted in order to determine the extent and nature of the site. A side scan sonar survey was implemented in order to survey the area surrounding the wreck as well as locate possible cultural remains in Man of War Harbor.

Figure 5: Map of site – facing Grid North (note I-shaped structures at bottom).



## Field Methods

Scuba diving operations were conducted on the Fleming Key wreck in order to complete two objectives. First, the biological survey team divided the wreck into three areas whereby each team member was responsible for surveying one area. Still and video cameras were used for documentation of species that could not be identified in the field. Survey data was compiled onto a master species list; however, several nocturnal species are not represented on this list because no night dives were conducted. Second, the archaeological survey team, including the biology team members, conducted a survey in order to investigate the nature and extent of the shipwreck site. From aerial photographs, the wreck measures 167 feet in length, which is too large to survey extensively in three and a half days. Project staff determined that the southern portion of the wreck would yield the greatest amount of diagnostic data, therefore this area was surveyed with as much detail as time allowed. A side scan sonar survey was also implemented in order to locate potential submerged cultural resources around the Fleming Key shipwreck and Man of War Harbor, which will be discussed below.

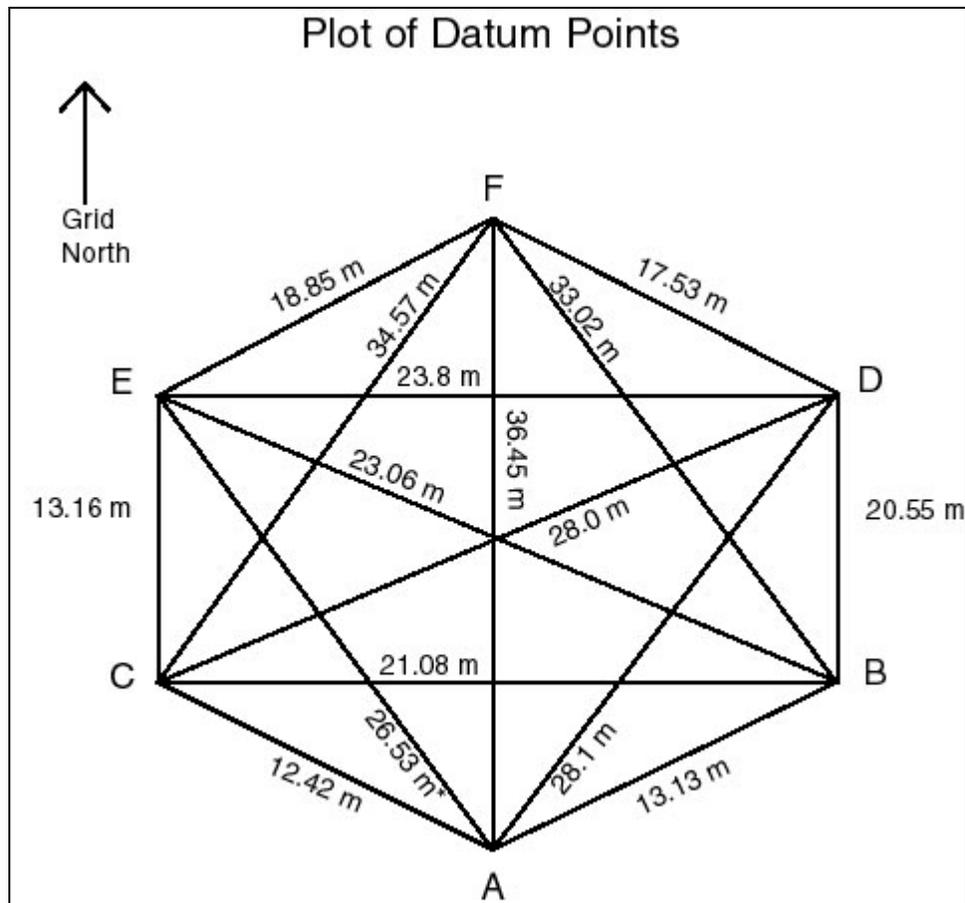
In order to map the wreck, an innovative method, using the “Web” program developed by Nick Rule, was employed. The Web software builds and verifies spatial relationships between components of a wreck and specified objects located nearby. Version 3.12 (1992) was used for this purpose. The distance and depth data recorded daily was entered into the program, which constructed a multi-lined web that described various features of the shipwreck. The program iterates on the entered raw data to perform adjustments to each datum point and direct distance measurements in order to arrive at a more accurate spatial relationship. Web operates by using at least four datum points to locate and record any point on a site. By using four points, there is three-dimensional control of the map produced from the direct survey method (Appendix – Figure 10 and Table 1).

A total of six temporary, moveable datum points were placed around the wreck and designated as A, B, C, D, E and F. Each datum consisted of a PVC pipe attached to a plastic laundry basket, weighted down with a 50-pound bag of concrete. Attached to each PVC pipe was a measuring tape, from which all direct survey measurements (DSM) were taken. Before fieldwork, data collection sheets for recording DSM were produced from Mylar waterproof paper. Each day, collected data was entered into a computer, using the “Web” program, and a map of the wreck was produced. The computer requires that all interdistances, the distance between the datum points, be entered first in order to determine where all the datum points are in relation to each other. Once this has been established, the computer can determine where all plotted measurement points lie in relation to the datum points. Once all datum points were measured and tapes were attached, each datum point’s location was fixed using a Trimble NT200D GPS unit from the side scan sonar. Once the positions were fixed with the GPS, the distances between the datum points were measured and are as follows:

A/B	13.13 m	B/F	33.02 m
A/C	12.42 m	C/D	28.0 m
A/D	28.1 m	C/E	13.16 m
A/E	26.53m *	C/F	34.57 m
A/F	36.45 m	D/E	23.80 m
B/C	21.08 m	D/F	17.53 m
B/D	20.55 m	E/F	18.85 m
B/E	23.06 m		

(\* measured incorrectly in the field but should be 26.53 meters based on using A/B and B/E to calculate A/E).

Figure 6: Datum point identification and location (not to scale).



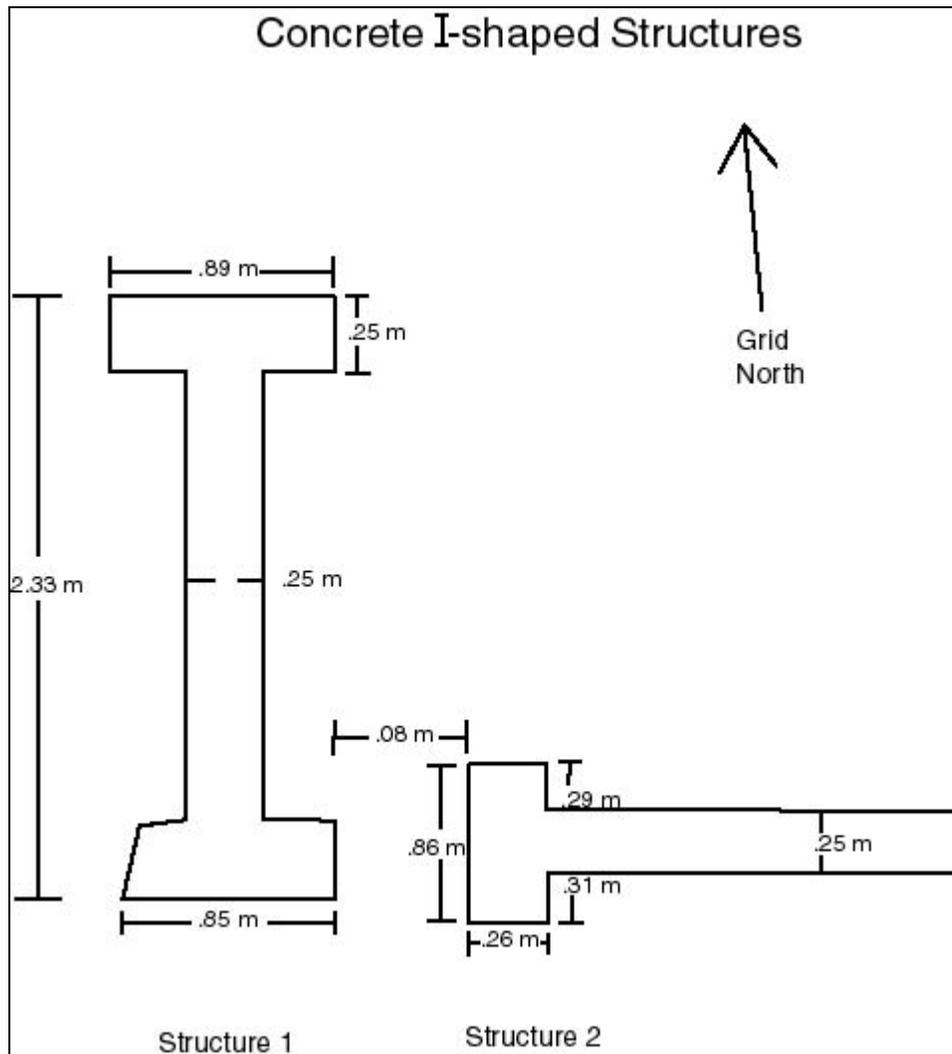
The depth below surface of the measuring tapes on each datum point was also recorded on 19 March at approximately 0945. The tidal conditions for 0930 and 1000 were just below the mean tide for the day, which was about 1.0 ft; conditions were .8 and .9 ft. respectively. The depths of the tapes below the water surface is as follows:

A	21 cm
B	0 m
C	2.21 m
D	9 cm
E	91 cm
F	2.05 m

Two concrete I-shaped structures were located to the southeast of the wreck and measured. They are included as Figure 5. The length and beam of the wreck were measured, although depth of hold was not recorded. During survey, it was postulated that the northern portion of the wreck was the bow and the southern portion was the stern. Aerial photographs indicated that the ship's length was 167', which was measured at 147' during this survey. Starting at the southern portion of the exposed wreckage, the protruding frames from south to north were labeled as well as other features on the wreck. See Table 2 for all DSM recorded data. Measurements from the aerial photographs indicate a beam measurement of 33' 10", taken north of the area that was measured during this survey. The beam measurement recorded in 1998 was taken at the 26<sup>th</sup> frame at a distance of 36' 1". The distance between frames was between .33 and .38 meters. Exposed frames are prominent on the southeastern portion of the wreck and are non-existent above the waterline on the western side. The ship appears to sit upright in the water and a debris field is scattered a fair distance around the wreck. It was not determined during this survey whether all the materials in this debris field are culturally associated with the wreck.

Other indefinable aspects of the wreckage were not surveyed in detail due to time restriction. This area includes the debris field to the west of the wreck, a potentially associated mast and the boiler to the north. It is interesting to note that the debris field and the boiler are a fair distance from the main portion of the wreck, yet, the main portion seems to sit upright. Had the hull listed to one side, with a debris field scattered from that area, it would facilitate explanation of the site formation processes. However, at the Fleming Key shipwreck, the debris field is located in the northwest portion, the boiler is to the north and the mast is to the southwest. Prepared drawings of the mast and some features of the debris field were not produced. Without a complete structural drawing of the ship, and extensive survey of the entire site, it is difficult to postulate what is and is not culturally associated with the wreck.

Figure 7: Drawing of possible concrete dock feature (not to scale).

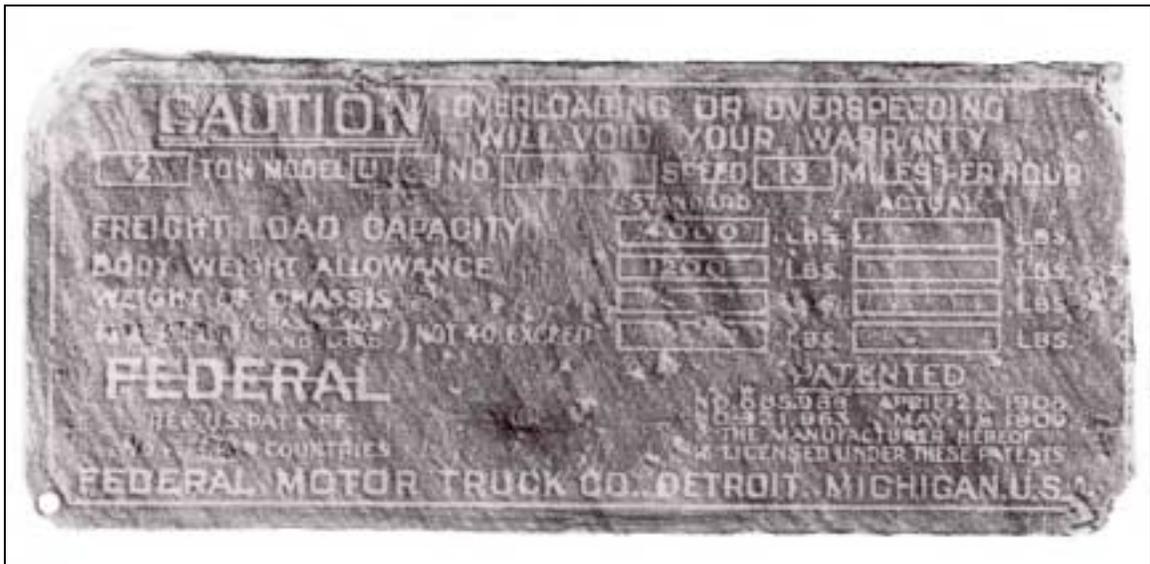


Only one diagnostic artifact was analyzed, giving a date, which has not been unequivocally associated with the wreck. A copper plate, measuring 9.8 cm by 23.4 cm, was recovered on the northern portion of the wreck by Mark Butler and was cleaned and analyzed by Elizabeth Kamerick (Figures 6 and 7). The plate bears the insignia of the U.S. Navy and the name of the Federal Motor Truck Company, Detroit, Michigan, USA. The plate relates warranty and usage information about a truck transmission that was later located. The patent numbers are 885986 (28 April 1908) and 921963 (18 May 1909). While an association between the plate and the shipwreck cannot be stated unequivocally, the dates on the plate and the form of ship construction seem to be relatively contemporaneous. The combination of a boiler and mast suggests a ship that combined both sail and steam propulsion.

Figure 8: Copper plate.



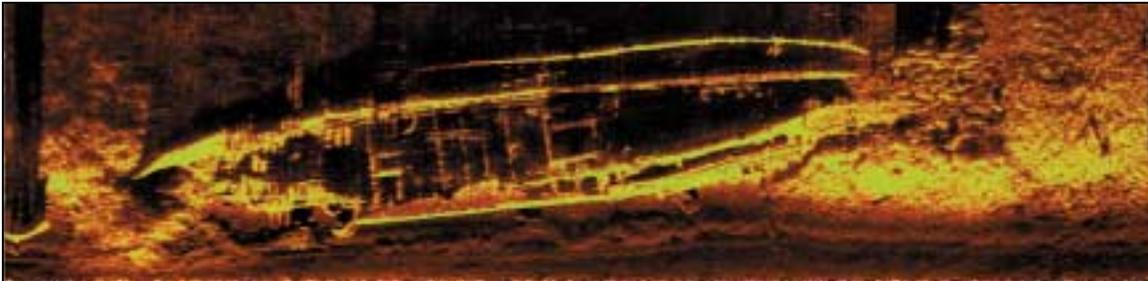
Figure 9: Scan of pencil rubbing of copper plate (not to scale).



A third aspect of this project included the systematic survey of Man of War Harbor and the area surrounding the wreck, utilizing a Marine Sonic 600-kHz side scan sonar. This remote sensing device was deployed on two occasions. First, on 17 March, a survey was

conducted in the Man of War channel. Transect lanes were established along roughly north-south bearings. These results were mixed in their interpretation. There are features in the channel; however, none of the features appear to be shipwrecks, yet, they indicate use or misuse (blast holes from prop washes) of the area. On 19 March, the side scan sonar was deployed around the Fleming Key wreck in order to produce a sonar image of the wreck itself (Figure 8).

Figure 10: Side scan sonar image of Fleming Key wreck (looking east).



## Conclusions and Recommendations

Presently, the historical name of this wreck is unknown. If the hypothesis is accurate, that the plate is associated with the wreck, the ship is likely to have sunk after 1909 and may have carried Navy cargo. The exact cause of the wrecking event remains unknown at this time. There is a breach in the hull on the eastern side, toward the stern, that could be the result of a collision with a dock or intentional sinking. The wreck lies in shallow water, which is an advantage for access to the site but also a disadvantage due to its relatively unprotected state and repetitive exposure to air. The wreck can provide valuable information pertaining to ship construction and can be a useful tool for education. There is more historical background research that needs to be completed in order to fully understand the history of this cultural resource. Should the history of this vessel be significant, the wreck could be a beneficial addition to the shipwreck trail through the Florida Keys as it is presently a tourist attraction.

Biological species that were observed on the wreck are listed in Table 3. No nocturnal species are listed as they were not surveyed during this project. The abundance and diversity of these species indicate that the Fleming Key wreck is a dynamic reef system, providing food and habitation for aquatic life. Continued monitoring of the appearance, disappearance and modification of floral and faunal densities will demonstrate how tourism and natural degradation of the wreck affect these species.

## References

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- 1849 Admiralty Final Record Book for U.S. District Court for the Southern District of Florida, Roll 4, page 350.

### Hambright, Tom

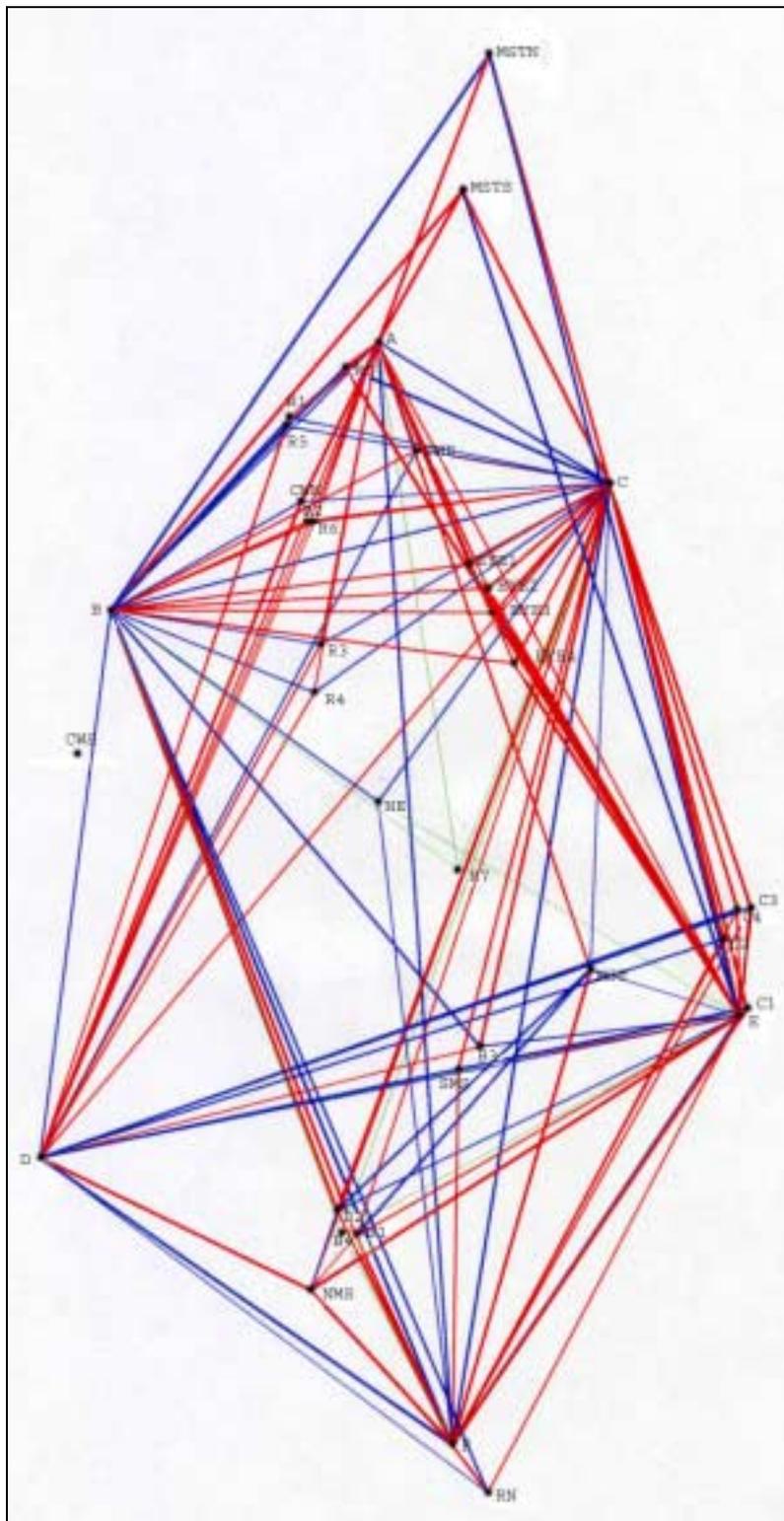
- 1988 Shipwreck Index May 1828 to May 1911, unpublished. Based on the Admiralty Final Record Book for U.S. District Court for the Southern District of Florida, Volume 2 – 19, Microfilm Copy Number 1360, Roll 2 – 9.

### National Archives

- 1797 New York Enrollment Records, File for the Maryland. Record Group 36, Box 105. No. 45. National Archives, Washington, D.C.
- 1808 New York Enrollment Records, File for the Maryland. Record Group 41, Volume 12724, No. 232. National Archives, Washington, D.C.
- 1815 New York Enrollment Records, File for the Maryland. Record Group 41, Volume 12744, No. 140. National Archives, Washington, D.C.

Appendix 1

Figure 11: Web program constructed image of Fleming Key wreck and datum points.



The Web program constructed lines between measured points based on distances entered into the program. The green lines represent distances that are within a tolerance level that was autobalanced by the software (roughly 1/2 meter). Blue lines represent measurements that are too near (relative to the surrounding measurements) and red lines represent measurements that are too close. Thicker lines also demonstrate decreased accuracy based on algorithms within the program.

Table 1: Identification of points on the Web-created site map.

Name	Feature
SMP	Southern Most Point
SMS	Southern Most Stanchion
NMP	Northern Most Point
NMS	Northern Most Stanchion
R1 through R7	Ribs (frames)
B1 through B4	Box near datum F
CWN	Counterweight North
CWS	Counterweight South
A through F	Datum Points (artificial anchored datum points)
MSP	Mid Ship Platform
EYE 1 through EYE 4	Iron Eyes
MSTS	Mast South
MSTN	Mast North
NE	North End

## Appendix 2

Table 2: Measurements from datum points to features

Position on Ship	Datum Point Used	Measurement
Northern Most Stanchion (NMS)	F	3.19 m
	D	5.28 m
	E	14.77 m
	C	24.92 m
Southern Most Stanchion (SMS)	C	17.84 m
	F	10.90 m
	E	10.19 m
	D	12.59 m
Mid ships Platform (MSP)	A	20.52 m
	C	14.75 m
	E	9.38 m
	F	14.11 m
Box Near Datum E - C1	C	15.43 m
	D	23.58 m
	E	3.91 m
	F	13.86 m
Box Near Datum E - C2	C	14.93 m
	D	22.05 m
	E	3.67 m
	F	16.93 m
Box Near Datum E - C3	C	14.07 m
	D	24.05 m
	E	2.42 m
	F	18.52 m
Box Near Datum E - C4	C	13.86 m
	D	23.40 m

<b>Position on Ship</b>	<b>Datum Point Used</b>	<b>Measurement</b>
	E	2.02 m
	F	18.52 m
Iron Ring - North	A	4.40 m
	B	8.03 m
	C	12.42 m
	D	20.91 m
Iron Ring - South	B	8.61 m
	A	3.78 m
	C	12.64 m
	D	6.02 m
Iron Eye #4	C	7.56 m
	A	8.54 m
	B	12.07 m
	E	59.5 m
Iron Eye #3	C	13.31 m
	A	10.35 m
	E	11.95 m
	B	39.3 m
Iron Eye #2	A	7.52 m
	C	7.81 m
	B	11.89 m
	E	39.3 m
Iron Eye #1	A	6.66 m
	B	10.71 m
	C	7.47 m
	E	39.84 m
Mast - South End	E	34.65 m
	A	11.05 m
	C	1.32 m
	B	20.87 m

Position on Ship	Datum Point Used	Measurement
Mast - North End	B	27.04 m
	C	8.26 m
	A	15.97 m
	E	39.32 m
North Rigging	F	1.07 m
	D	17.04 m
	E	17.08 m
	B	31.04 m
South Rigging	B	11.56 m
	C	23.24 m
	E	20.8 m
	A	1.38 m
"4" on North End	C	13.46 m
	E	13.28 m
	B	11.89 m
	F	20.03 m
E1	A	7.04 m
	C	7.49 m
	B	11.46 m
	F	15.13 m
E2	B	11.63 m
	A	7.92 m
	E	14.40 m
	C	7.37 m
E3	A	8.76 m
	B	11.89 m
	C	7.47 m
	E	13.61 m
E4	A	10.69 m

Position on Ship	Datum Point Used	Measurement
	B	12.65 m
	C	8.28 m
	E	12.09 m
Box 2 - North Corner	F	5.03 m
	E	13.60 m
	B	18.92 m
	C	24.75 m
Box 2 - East Corner	F	6.08 m
	E	12.39 m
	B	18.24 m
	C	23.44 m
Box 2 - South Corner	E	11.85 m
	B	19.53 m
	C	23.11 m
	D	19.00 m
Box 2 - West Corner	F	6.30 m
	E	13.18 m
	B	20.13 m
	C	23.96 m
29th Frame (from South)*	B	13.18 m
	A	16.45 m
	C	14.35 m
25th Frame	B	11.26 m
	A	14.22 m
	C	13.03 m
21st Frame	D	19.46 m
	B	9.91 m
	A	12.35 m
	C	12.36 m

<b>Position on Ship</b>	<b>Datum Point Used</b>	<b>Measurement</b>
17th Frame	B	8.84 m
	A	10.74 m
	D	16.60 m
	C	11.90 m
13th Frame	A	9.09 m
	B	8.01 m
	D	18.12 m
	C	11.75 m
10th Frame	D	21.51 m
	B	7.63 m
	A	5.73 m
	C	11.66 m
5th Frame	C	12.30 m
	A	3.74 m
	B	8.65 m
	D	23.88 m
Southern Most Point (SMP)	A	2.46 m
	B	10.15 m
	C	12.50 m
	D	26.02 m

### Appendix 3

Table 3: Biological species surveyed on Fleming Key wreck.

COMMON NAME	AGE + # OBSERVED	LATIN NAME
<b>CORAL</b>		
Branching Fire Coral	M	<i>Millepora alicicornis</i>
Lesser Starlet Coral	M	<i>Sideerastrea radians</i>
Sinuuous Cactus Coral		<i>Isophylla sinuosa</i>
Golfball Coral	M	<i>Favia fragum</i>
Knobby Star Coral		<i>Solenastrea hyades</i>
Rose Coral		<i>Manicina areolata</i>
Elliptical Star Coral		<i>Dichocoenia stokesii</i>
Mustard Hill Coral		<i>Porites astreoides</i>
Fragile Saucer Coral		<i>Agaricia fragilis</i>
Symmetrical Brain Coral		<i>Diplora strigosa</i>
<b>FISH</b>		
Sergeant Major	J, A, M	<i>Abudefduf saxatilis</i>
Grey (Mangrove) Snapper	M	<i>Lutjanus griseus</i>
Schoolmaster Snapper	J, M	<i>Lutjanus apodus</i>
French Angelfish	A, M	<i>Pomacanthus paru</i>
Red Grouper	M	<i>Epinephelus morio</i>
Green Moray		<i>Gymnothorax funebris</i>
Great Barracuda	J, A, M	<i>Sphyraena barracuda</i>
Hogfish	J, A, M	<i>Lachnolaimus maximus</i>
Blue Striped Grunt	M	<i>Haemulon sciurus</i>
Flagfin Mojarra	M	<i>Eucinostumus melanopterus</i>
Hovering Goby	*	<i>Ioglossus helenae</i>
Blue Goby	*	<i>Ioglossus calliurus</i>
Bermuda Chub	M	<i>Kyphosus sectatrix</i>
Lane Snapper	M	<i>Lutjanus synagris</i>
Porkfish	J, A, M	<i>Anisotremus virginicus</i>
Rainbow Parrotfish	M, I	<i>Scarus guacamaia</i>
Yellowhead Jawfish		<i>Opistoganthus aurifrons</i>
White Grunt	M	<i>Haemulon plumieri</i>
Spanish Grunt		<i>Haemulon macrostomum</i>

COMMON NAME	AGE + # OBSERVED	LATIN NAME
Princess Parrotfish		<i>Scarus taeniopleurus</i>
Neon Goby		<i>Gobiosoma oceanops</i>
Four Eye Butterfly Fish	M	<i>Chaetodon capistratus</i>
Bridled Goby	M	<i>Coryphopterus glaucofaenum</i>
Striped Parrotfish	J	<i>Scarus croicensis</i>
Yellowfin Mojarra	M	<i>Gerres cinereus</i>
Blue Tang	M	<i>Acanthurus coeruleus</i>
French Grunt	J, A, M	<i>Haemulon flavlineatum</i>
Doctor Fish	M	<i>Acanthurus chirurgus</i>
Grey Angelfish	J, A, M	<i>Pomacanthus arcuatus</i>
Sandperch	M	<i>Diplectrum formosum</i>
Nurse Shark	2	<i>Ginglymostoma cirratum</i>
Pinfish	M	<i>Lagodon rhomboides</i>
<b>INVERTEBRATES</b>		
Caribbean Spiny Lobster	M	<i>Panulirus argus</i>
Channel Clining Crab	M	<i>Mithrax spinosissimus</i>
Penderson Cleaner Shrimp		<i>Periclimenes pedersoni</i>
Horseshoe Crab		<i>Limulus polyphemus</i>
Spotted Sea Hare	M	<i>Aplysia dactylomela</i>
Banded Coral Shrimp		<i>Stenopus hispidus</i>
Star Horseshoe Worm	M	<i>Pomatostegus stellatus</i>
Brown Variable Sponge	M	<i>Anthosigmella varians</i>
Viscous Sponge	M	<i>Plakortis angulospiculatus</i>
Loggerhead Sponge	M	<i>Speciospongia vesparium</i>
Queen Conch		<i>Strombus gigas</i>
Black Condominium Tunicate	M	<i>Eudistoma obscuratum</i>
White Condominium Tunicate	M	<i>Eudistoma</i>
Red Boring Sponge	M	<i>Cliona delitrix</i>
Rough File Clam	M	<i>Lima scabra</i>
American Star Snail	M	<i>Lithopoma americanum</i>
Christmas Tree Hydroid	M	<i>Halocordyle disticha</i>
Red Banded Hermit Crab	M	<i>Paguristes erythrops</i>
Stocky Cerith	M	<i>Cerithium litteratum</i>
Shy Feather Duster		<i>Megalomma sp.</i>
Variegated Feather Duster		<i>Bispira variegata</i>

COMMON NAME	AGE + # OBSERVED	LATIN NAME
Pale Anemone	M	<i>Aiptasia tagetes</i>
Porcelan Crab	*	<i>Porcellanidae</i>
Variiegated Urchin		<i>Lytechinus variegatus</i>
Stone Crab	J	<i>Menippe mercenaria</i>
Ornate Chiton		<i>Toniicia schrammi</i>
Caribbean Slender Chiton		<i>Stenoplax purpurascens</i>
Flat Tree Oyster	M	<i>Isognomon alatus</i>
Mangrove Upside-down Jellyfish	M	<i>Cassiopea xamachana</i>
Upside-down Jellyfish		<i>Cassiopea frondosa</i>
Giant Hermit Crab		<i>Petrochirus diogenes</i>
Sessile Barnacles		<i>Cirripecta</i>
Splitcrown Feather Duster		<i>Anamobaea orstedii</i>
Corkscrew Anemone		<i>Bartholomea annulata</i>
Netted Flatworm		<i>Pseudoceros texarus</i>
Spaghetti Worm		<i>Eupolymnia crassicornis</i>
Bearded Fireworm		<i>Hermodice carunculata</i>
Blackball Sponge		<i>Ircinia strobilinia</i>
Southern Lugworm	M	<i>Arenicola cristata</i>
Sea Cucumber		
<b>PLANTS</b>		
Water Cress Algae	M	<i>Halimeda opuntia</i>
Lavender Crust Algae	M	<i>Titanoderma sp.</i>
Turtle Grass	M	<i>Thalassia testudinum</i>
Manatee Grass	M	<i>Siringodium fileforme</i>
White Scroll Algae		
<b>KEY:</b>		
J=Juvenile	A=Adult	I=Intermediate Phase
M=Multiple Sightings (>3)		*=Questionable