CRUISE REPORT - R/V GOSNOLD #74

Date: 17 August-23 September 1965

Destination: Blake Plateau and Slope - Cape Hatteras to Key West

Objective: To complete sediment sample grid on the Blake Plateau and to dredge the Blake Plateau and Slope for bed rock specimens.

Stations:
Regular Project samples 2334 through 2485
151 sediment and rock samples
10 current meter lowerings
29 camera lowerings
21 Plankton tows

Tools:
Van Veen
Chain Bag Dredge
12" pipe dredge
4" pipe dredge
Edgerton deep sea camera
Robot stereo camera
Bruce type bottom current meter
B.T.
Secchi disk and forrel color scale
Suspended sediment kit
3/4 m. plankton net
Van Doren bottles

Scientific Party:

Richard Pratt, WHOI, in charge -	entire trip
Peter McFarlin, WHOI,	entire trip
David Johnson, WHOI (summer)	Charleston-Jacksonville
H. A. Jones, SOSC	Charleston-Jacksonville
M. L. Williams, SOSC	Charleston-Jacksonville
J. Richard Jadanec, NODC	Charleston-Charleston II
Jon Naumann, USGS (Washington)	Charleston II-Jacksonville
H. A. Fehlmann, SOSC	Jacksonville-Woods Hole
Bill Walker, USNM(Washington)	Jacksonville-Woods Hole
J. T. Irving, SOSC	Jacksonville-Morehead City
Ronald J. Walton, NODC	Jacksonville-Morehead City

(NODC) National Oceanographic Data Center
(SOSC) Smithsonian Oceanographic Sorting Center
(USNM) U. S. National Museum

Time Account from Ship's Log

13 August: Moored Dytens Shipyard, Wando, S.C.
1500 Trailer from Woods Hole arrived.

14 August: 0800 crew turned to load gear for Cruise #74 off trailer
1600 knock off for day - awaiting scientists.

15 August: 0900 Sailed for Charleston
1045 Moored, S.C. Port Authorities, Pier 8
2100 Pratt, Johnson, McFarlin & Paul on board.

16 August: Preparing for sea - stores, etc.
1430 Pick up ships crew at airport.

17 August: 0728 Depart Charleston (Start of Cruise #74)

18 August: 0620 - Station #2334 (1st station)

19 August -
29 August: Working and running between stations

30 August: 0155 - Sighted Charleston Light
0750 - Moored Pier 8 Charleston

31 August: Charleston

1 September: 1254 - Depart Charleston
1600 - 1st station

2 September
3 September: Watching Hurricane "Betsy" off Jacksonville - working and running.

3 September: 1600 Sea Buoy off Jacksonville
1845 Moored Jacksonville

4 September-
8 September: Jacksonville because of hurricane

9 September: 1100 Stores aboard
1506 Sailed Jacksonville
1745 Depart sea buoy

10 Sept.: Steaming all day to get south

11 Sept.: 0745 Station 2430 (1st after Jacksonville)

12 September-
18 September: Working and running between stations

18 September: 1620 Finish station 2485 and run for Morehead to obtain fuel and water.

19 September: 1252 arrive sea buoy
1330 moored at dock at Morehead City

20 September: 1000 Depart Morehead City for Woods Hole

21 September-
22 September: Steaming steadily for Woods Hole

23 September: 0740 (0840 local time) tied up at Woods Hole
0937 Scientific party off and clear of ship (samples unloaded, etc.).

TOTAL TIME OF CRUISE:	37 days	0 hours	12 mins.
Time working and running:	21 days	5 hours	10 mins.
Time steaming in and out of port: (including into Morehead City)	3 days	23 hours	27 mins.
Time steaming home: (Morehead City to Woods Hole)	2 days	21 hours	40 mins.
Time in Port:	8 days	21 hours	55 mins.

(scheduled 4 d-00-00)
(hurricane 3 d-20-21)

Other including Morehead 1 d 1 h 34 m.

September 23, 1965
R/V GOSNOLD #74

Report and Notes on Function of Bottom Photo Units

Gosnold Cruise Number 74 was begun on August 17, from Charleston and concluded September 23 in Woods Hole. A total of twenty nine bottom camera lowerings were made at depths between 100 and 1100 meters along the continental shelf and especially the Blake Plateau. Two systems of cameras were used, a Robot 35 mm stereo unit and a single lens 35 mm Edgerton, Germeshausen & Grier Inc. unit.

Careful testing and setting of the cameras was carried out in the lab at WHOI and under water off the dock. It was found at this time that synchronization of the Robot's shutter with the E.G. & G. strobe unit would occur only when the six volt lead was connected to the "M" positions on the cameras. This was double-checked since it was a radical departure from our previous settings. No Robot manual could be found and consultation with Dave Owen proved he had had difficulties along this line with different Robot cameras, requiring the plug-in to be sometimes in the "X" position and sometimes in the "M" position under the same circumstances. Our tests were completed, the film developed and results looked good using the new "M" position.

The cruise was started from Charleston with the program including about two stereo camera lowerings per day, and after two weeks at sea we returned to Charleston and had two rolls of black and white film developed. The photos were poor, with apparently not enough light available. The settings were changed, the second leg started and more shots taken and then developed on board. The exposures were not improved by the setting changes. At this time we headed into Jacksonville, Florida to avoid hurricane "Betsy". More tests were carried out with the final conclusion that the "M" connection was not in synchronization with the strobe! Now, the "X" connection was used. Test film was developed using the new connection and showed much better results. We can find no answer to explain this radical inconsistancy.

At sea again after "Betsy's" passing, the first good bottom photos were developed. Although the other usual troubles persisted: non-advancing film, skipping frames and constant, fine adjustment of the solenoid arms. These outweighed the few improvements over last year's troubles. The new type strobe unit performed well until four camera stations after the "M" to "X" change, when it wouldn't work due to a broken micro-switch. To interchange the last strobe unit on the stereo camera and the E.G. & G. camera on the current meter unit would require considerable rewiring back and

forth each time. To avoid this we simply installed the other E.G. and G. camera in place of the stereo and then interchanged the last strobe case. Performance of this unit seemed very good and bottom photos of these last five stations should be satisfactory.

Indications from pictures so far developed are, as a whole, unsatisfactory. Much time and effort seem wasted on the stereo camera unit. Some improvements over last years camera problems are noted but these are not conclusively worthwhile. The Robot cameras themselves are too inconsistent and require constant attention to "de-bug" them. This is especially difficult and time-consuming at sea. The system is just not reliable. The changeover to a single-lens E.G. & G. system was advisable and the cruise finished its camera work with better results expected.

Expectations on the film's development are:

1 station with stereo B/W and color.

7-8 stations with single lens photos. Out of 29 photo stations this would be about 25% return.

Peter F. McFarlin

Peter F. McFarlin

Narrative: The story of GOSNOLD Cruise #74 starts with the shipment by truck of the laboratory Van and all our gear to Charleston, South Carolina on 11 August. This was necessitated by trouble with the propellor of the GOSNOLD which had to be fixed in dry dock. The trouble with the ship made it necessary to change our departure date from 9 August to 23 August and also to cut out planned coring and canyon sounding from Woods Hole to Cape Hatteras.

The scientific party flew to Charleston on Sunday 15 August and we spent all day Monday 16 August getting ready for sea. Russ Paul came down with us to make sure the P.G.R. (shipped from Woods Hole), and other electronic equipment, was in working order. Everything seemed to be in reasonable readiness by the end of the day.

Tuesday 17 August we departed for sea just before breakfast. The weather was good and everyone, especially the crew, was anxious to get to work. We headed northeast toward the north-east end of the Blake Plateau. Our plan was to sample as much of the outer edge of the Plateau as possible while the weather was good and save the areas closer to ports to work if a hurrican was reported.

In the evening we turned on the echo sounder; after 10 or 15 minutes the fuse blew in the Gifft Transciever and we spent half an hour finding new fuses and blowing same. Next we transferred to the other transciever but could not get the P.G.R. to run so we shifted to the P.D.R. but could get no ping out of the 2nd transciever. Things were confusing the first day with only two experienced scientists, untried gear and electronic systems that just didn't want to operate.

Next morning, 18 August, we made our first dredge station, but recovered only mud. The ORE pinger was tried but failed mid-way through the lowering, so the sample was obtained by just letting out surplus line and watching the tensiometer.

Thursday August 19 we started regular watches (4 on 8 off) and started picking up stations along the outer edge of the Blake Plateau. Things seemed very slow at first because the ship only made 2 or 3 knots against the stream. Weather was good but the sea was choppy.

From Friday August 20 until August 29 the weather remained hot and clear with very calm seas. On several days the sea was glassy, on other only a glassy low swell. Our dredging routine operated smoothly as did the camera routine but the Echo sounder and current meter were inoperative. The routine was broken on

August 21 when we chased a lone sperm whale for about half an hour and on August 23 when we tried three boomerang cores on the outer escarpment.

On the first leg of the trip we essentially made a loop, down the outer edge of the Blake Plateau to the limits of the southern sheet (U.S.G.S. base map) then along the edge of the map and north along the inner edge of the Plateau, but outside the Gulf Stream. We made as much time as possible by steaming from station to station rather than by trying to dredge specific depths and features. We felt it necessary to make hast while the weather lasted and also it would have been difficult to dredge specific areas or depths without the echo sounder. Our dredging techniques became routine after the first day and we felt the dredge really got a representative sample of the bottom. Especially impressive was the extreme uniformity of the well sorted globigerina-pteropod sand over all the outer portion of the Blake Plateau. It was not until 27 August that we dredged manganese nodules, almost in the area where they have been previously reported.

On Sunday August 29 we made progress on a northwest line toward Charleston, with much rain and thunder in the morning. Dredge hauls recovered manganese pavement material, phosphate nodules, sharks teeth, bone etc. In the afternoon we hit the Gulf Stream and experienced the roughest time of the entire trip. One freak wave came aboard; flooded the dry lab, knocked the rose bengal off the shelf and spilled half a dozen samples. The ship only made 3 to 3-1/2 knots most of the afternoon. The last station of this leg (2399) was made in the "stream" and recovered phosphate with fossils.

The ship entered Charleston bright and early on Monday August 30 and tied up at pier 8. Russ Paul showed up about 10:00 and commenced fixing the electronic equipment. The next day we rigged new dredges and shifted and stowed sample bottles and specimens. Russ Paul left about 3:30 and the new scientists arrived.

The second leg of GOSNOLD Cruise #74 departed Charleston 1330 on September 1. We hoped to proceed out to the center of the Blake Plateau but hurricane warnings (Betsy) neccessitated that we stay close to a port in case we had to go in. We headed south on the shelf (to stay out of the Gulf Stream) with the thought that we could go into Jacksonville or proceed out depending on the course of the hurricane. The hurricane continued toward us through the Bahamas so on Friday September 3rd we got a pilot and went into Jacksonville. We made a line of stations, including an Amphioxus run for Nauman, on the way into Jacksonville. The weather was pretty good in spite of the pending hurricane, but we had to make a decision one way or the other and decided to play it safe and go in.

September 4 through 9 were spent in Jacksonville. The hurricane came through the Bahamas up on to the Blake Plateau (just where we had hoped to be working) stalled for a day then reversed course and hit Nassau and Miami and then New Orleans. On September 7th we decided to scratch our scheduled stop in Miami and to get supplies and change scientists in Jacksonville. This was accomplished after many phone calls and we were able to deport on the afternoon of September 9th (after making certain the hurrican would continue into the Gulf of Mexico). The most exciting thing that we did in Jacksonville was visit the new U.S.C.& G. ships "DISCOVERER" and "OCEANOGRAPHER" being built in the Jacksonville shipyard. The ANTON BRUUN also went by, headed out to sea.

On September 9th we headed out past the breakwater and found the water moderately rough but quite passable. The ship proceeded south on the shelf to get as far south as possible before hitting the Gulf Stream. We decided there was not enough time left in the cruise to warrent working south of Miami and we also cut out projected stations in the center of the Blake Plateau.

We made the 1st haul after Jacksonville on the morning of September 11 and worked slowly south all day against the Gulf Stream. All samples on the slope proved to be fine sediment although we certainly tried to obtain rock. On September 12 we headed out across the Straits of Florida from Miami and started picking up rock and coral. We worked over to the Bahamas and started a zig-zag course north so as to get maximum help from the Gulf Stream currents. Current Meter lowerings were made in the axis of the "Straits". The weather was hot and calm with occasional thunder storms. One interesting side effect of the recent hurricane was the great patches of shallow water eel grass floating about and the very muddy water next to the bank. The demarcation between the muddy slope water and the clear Gulf Stream water was very sharp.

From September 13 through the 16th we worked north with routine stations. Great quantities of coral and ocassional indurated ooze and phosphate nodules were recovered. On September 17th we again encountered Mn nodules and pavement, but time was running out so we hurriedly proceeded north (off Charleston) across a restricted submarine operating area to try and deliniate the northern most occurrence of nodules on the Blake Plateau. Nothing was recovered at the base of the slope out of Charleston but at a second and final station the largest phosphate nodules of the trip were dredged. The ship was then placed entirely in the hands of the Captain and we steamed directly for Morehead City where we fueled. We departed Morehead the next morning, September 20, and steamed for Woods Hole in a flat sea.

Our course to Woods Hole passed over deep water so we ran the echo sounder for about a day, and did pass over several canyons. The ship made excellent time, 8 knots, because of the favorable currents and flat seas. We arrived at Woods Hole early in the Morning of September 23 in dense fog and GOSNOLD Cruise 74 was terminated.

Personnel: Eleven scientists took part in GOSNOLD Cruise 74. Only two (Pratt & McFarlin) were full time employees of Woods Hole and one (Johnson) was an unpaid summer fellow at Woods Hole. The rest were from four government agencies in Washington; the Smithsonian Oceanographic Sorting Center (4), the National Oceanographic Data Center(2), Water Resources Division of the U. S. Geological Survey (1) and the U. S. National Museum (1). With one exception none of the visitors had any experience with deep water dredging and were along to get experience at sea and to observe dredging techniques. Considering the inexperience of most of the visitors and the turn over involved, the cruise ran with remarkabel efficiency. There were no accidents, illness or personality problems of any significance. Most of the people gained measurably in experience, and the trip was of direct aid in helping some of their duties in Washington.

R/V GOSNOLD: The GOSNOLD proved to be a very efficient vessel for the type of dredging operation conducted. The fact that the officer on watch, the winch operator and the scientist in charge are in direct communication with each other is a great advantage, expecially when the dredge is hung upon the bottom. The ship is light and maneuverable enough so that it can be worked over a dredge without breaking the equipment.

The big disadvantage of the GOSNOLD is her slow speed and limited cruising range. The speed is such that work near the Gulf Stream has to be planned primarily in regard to the currents; when going against the stream her speed is only about 3 knots. Also her average speed is such that long runs between stations become very time consuming. On the GOSNOLD 74 Cruise we found it necessary to cut our planned sample spacing from 30 to 15 miles in order to keep the scientists occupied efficiently. The trawl wire is now only 2100 meters in length which limits dredging ability to 1500 meters of water.

Dredges: The cruise started with three chain bag dredges and three 12" pipe dredges and one van Veen. One chain bag dredge was lost when it got hung up in the manganese pavement area and the weak link parted. On 112 out of the 151 stations a large, 36" chain bag dredge with a subsidiary 3" pipe dredge was used. The pipe was fitted with a canvas bag of 4 to 5 liter capacity and proved very efficient in collecting unconsolidated sediment. The 12" pipe dredge was fitted with an expanded mesh screen and plugged with a burlap bag; it was used to obtain large volumes of sediment in areas of globigerina ooze and to obtain rock in areas where we were afraid the chain bag dredge would get hung up. The van Veen was used to supplement dredge hauls where representative sediment samples were not obtained. As a whole the dredging seemed to be

efficient and from observing the results through so many lowering we have the feeling that our operations sampled a representative piece of the bottom.

Echo Sounding: Echo sounding on GOSNOLD 51 was subsidiary to our primary mission of sampling. No soundings were taken the first leg because of the trouble with the Gifft Transciever; it was necessary to obtain sample depths from the wire meter or from the chart. On the rest of the cruise the PGR worked well on the 400 to 500 fathom scales. It ran continously. The PDR had the old troubles of double keying and paper ripping along the side so it was not used. As a whole the soundings checked well with existing charts. The only straight echo sounding run was made on the way home when the ship passed over some of the continental rise from Cape Hatteras to Hudson Canyon and several of the canyon extensions were observed.

Boomerang Coreers: The coring program, using the new "Boomerang" cores, developed by Benthos Company, was restricted to one run on the outer escarpment. This was designed to supplement the JOIDES core holes on the Blake Plateau. Three cores were dropped in a line on the steepest part of the slope about 1 mile apart. The first core was lost, the second recovered about 3-1/2 feet of sediment and the third about 1-1/2 feet. The material at the bottom of both cores was very well indurated and we suspect the first core hit rock and fell over before being released. The cores were hung over the side on the crane and released with an easy release hook as the ship steamed along. Their flashing light upon surfacing was very easy to spot and on one was even spotted before it reached the surface. Inspite of loosing one out of three cores, the method seems to be a very efficient means of taking short cores in deep water especially where closely spaced samples are desirable.

Pingers: Two ORE bottom finders were purchased for the trip. The first one stopped working mid-way through the first lowering but the second one worked the entire trip with only one battery change and proved very efficient and easy to use. The timing on these instruments is very good and is stable enough so that the drift of the ship away from an instrument on bottom can be detected. It was necessary to use the pingers with the PGR as their 1 second repetition rate is not compatible with the PDR. The main problem with using the pingers is clearing up the noise in the receiving system, mainly the Gifft Transciever. Because of the problem with noise on the GOSNOLD it is doubtfull if the ORE pingers would be usable at oceanic basin depths. The pinger was used on all camera and current meter lowerings but we found it unnecessary to use the pinger on the dredge lowering because the tensiometer worked so well.

Cuurent Measurements: Ten attempts were made to measure bottom currents with a photographic recording device that sits on the bottom. While loading the film for the first lowering we found that the lense and half the shutter were missing from the camera. The camera was put back together but because of a poor contact in the shutter

sync mechanism the strob light functioned intermittently for most of the lowerings. On this trip lowerings were made on the big trawl wire rather than neutrally buoyant polypropolene line. The operation was very much easier and faster with the trawl wire but on at least one lowering bottom drag made the reading unusable. Out of the ten lowering only one seems to have been perfect although several more may give usuable current values.

Suspended Sediment: In conjuction with the current measurments, and as part of the more extensive program, suspended sediment measurements were made of both bottom and surface water. Bottom samples were collected with a van Doran bottle mounted on the current meter frame and rigged to close when the device hit bottom, Surface samples were taken with a bucket. From tests of the bottles on deck and the fact that they went down open and came up closed we feel that they really sampled the bottom water but the large amount of sediment in the bottom bottle on several lowerings leads to the suspicion that sediment may have been stirred up by the meter.

An interesting side observation made on this trip was the extreme turbidity of the shelf water following hurricane Betsy. Turbid water was also noted on the Bahama Banks side of the Straits of Florida with an extremely sharp line of demarcation with the normally clear Gulf Stream water.

Amphioxus Runs: Samples sections with two mile sample intervals were made in shallow water coming out of Jacksonville and Charleston by Jon Nauman. The sections were taken as a continuing program to define a zone rich in a small fish called Amphioxus. They burrow in the sand. For these stations we used a small bucket dredge, (Pierce Dredge) towed behind a hydro weight. It usually collected 10 to 15 liters of sediment and in some places hundreds of the little fish. A pint of original material was saved for geology in case need arises to supplement our original 10 mile grid pattern, but the rest was discarded after sieving out the fish.

Biological Observations: On GOSNOLD #74 the biological material was handled entirely by the people from the Sorting Center. The biology like the geologic samples ocnsists of two portions. 1) volumetrically representative material collected with the sediment in the small pipe dredge, and 2) 4 cm or larger animals collected with the rocks in the chain bag. The chain bag material gives an idea of the fauna, especially the sessile organisms but is in no way quantitative because of the dredging methods used in deep water. Except for the sessile organisms the bottom fauna seemed to be sparce, probably reflecting the sterility of the Gulf Stream water.

Other creatures observed were long snouted dolphins, bottle nose dolphins, common dolphins, black fish, one sperm whale and two ocean sunfish.

Station List Gosnold #74 Blake Plateau 17 Aug. - 23 Sept.

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of rock
18 Aug.								
2334	33°01'.0	76°29'.0	755	CB & pipe	1 1/2	0	Grn. gry. poorly sorted glob. ooze.	
2335	32°52.8	76°50.0'	610	CB & pipe	4	0	Lt. gry. brn. glob. ooze.	
	current meter;camera;plkton.							
19 Aug.								
2336	32°15.0	76°53.0	990	Big 12" pipe dredge	60	0	Olive-gry. poorly sorted glob. ooze with pleropods	
2337	32°11.0'	77°17.5'	762	Big 12" pipe dredge	20	0	Lt. gry-grn. glob. ooze with ptar. & coral.	
	camera							
2338	32°01.0	77°16.0	825	Big Pipe dredge	45	0	Globigerine ooze	
	plkton tow							
2339	31°54.5	77°24.8	775	Chain Bag & pipe	1	Full 200L.	Glob. ooze.	Much coral-some alive-Mn, P_2O_5 mod.
	coral bumps							
20 Aug.								
2340	31°29.0	77°20.0	1029	C B & Small Pipe	c	1/2 full 100-190 L.	Cream sticky mud & glob. ooze.	MN-Phos. nodules all shapes.
2341	31°18.4	77°39.5	0818	CB with pipe	5	0	Lt. brn. well sorted glob. pter. sd.	
	current meter							
2342	31°00.0	77°31.5	930	CB & pipe	5	15	Crm. to Lt. brn. fair sorted glob. sd.	Soft black Mn nodules
	current meter; camera							
2343	30°48.0	77°31.5	898	CB & Small pipe	5	0	Crm to lt. brn. well sorted glob ooze.	
	camera; plkton							

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of rock
21 Aug.								
2344	30°28.5	77°29.3	882	Chain bag and small pipe	4	1/2 full 150 L.	Tan to brn. well sorted glob ooze & sd.	Coral
2345	30°14.5	77°16.0	1000	Chain bag and small pipe	5	0	Lt. gry. brn. med. glob. sd.	Strange animal
2346	30°01.3 camera	76°59.8	977	Chain bag and small pipe	5	0	Lt. brn. well sorted glob sd. & swell concretion	
2347	29°55.1 chain bag & big pipe both	76°40.5	1382	Chain bag & Big 12" pipe	60	0	Tan-gry glob pter ooze	
2348	29°45.2 plankton camera	76°51.0	1034	Chain bag and small pipe	5	0	Lt. tan poorly sorted glob ooze	
2349	29°28.7	56°59.4	1036	Chain bag and pipe	4	1/2	Brn. well sorted glob. sd. & concretions	3 coral bits
22 Aug.								
2350	29°36.5	77°11.5	905	Chain bag and pipe	5	0	Gry-brn well sorted glob-pter. sd.	
2351	29°30.0	77°29.5	951	Chain bag and pipe	4	0	Lt. gry-brn. glob ooze	
2352	29°16.0 camera	77°35.3	915	Chain bag and pipe	5	0	Brn. fair sorted glob. sd.	
2353	29°00.5	77°29.7	1065	Chain bag and pipe	4	0	Lt. gry. brn silty glob sd.	

Sta No.	Lat.	Long.	Depth (corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of rock
Aug. 22								
2354	28°52.0	77°15.0	1070	CB & Pipe	5	0	Lt. brn. glob. fair sorted sd.	
	plankton camera							
2355	29°00.1	76°43.8	1)lost	Boomerang	1)lost		Brn & Tan mud	hd. on bottom
	28°59.8	76°43.3	2)3330	cores	2)31/2 ft.			
			3)3463		3)1-1/2 ft.			
23 Aug								
2356	28°59.5	76°56.0	1095	CB & pipe	5	0	Lt. grey muddy glob. pter. ooze	
2357	28°45.0	76°53.0	1295	CB	5	0	Lt. brn. muddy glob. ooze	
2358	28°31.0	77°02.0	1075	CB & pipe	5	0	Brn. fair sorted glob. sd.	
	camera							
2359	28°14.5	77°14.8	1097	CB & pipe	4	0	Gry.-brn. glob sd.	
2360	27°59.5	77°30.7	1126	CB & pipe	4	0	Brn. fair sorted glob. ooze	
	plkton camera							
2361	27°47.8	77°41.7	1178	CB & pipe	6	0	Cream to brn. glob ooze & mud streaked	
24 Aug.								
2362	27°51.0	78°01.5	1080	CB & pipe	6	0	Gry.-brn. fair sorted glob sd.	
2363	28°00.8	78°13.8	1078	CB & pipe	5	0	Brn glob.-pter. well sorted sd.	
2364	28°10.0	78°30.0	972	Chain Bag and Pipe	4	0	Lt. gry-brn glob. sd.	
	camera							
2365	28°16.0	78°45.4	919	Chain Bag w/pipe	5	0	Gry-brn sandy glob-pter. ooze	
2366	28°29.3	79°00.5	841	Chain Bag and Pipe	2	2	Tan well sorted sandy glob-pter ooze	Coral
2367	28°45.0	78°45.2	848	Chain Bag and Pipe	5	0	Lt. brn-muddy glob ooze	
	camera; plkton Ton							

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of Rock
25 Aug.								
2368	29°00.0	79°01.2	803	Chain Bag and Pipe	2	0	Cream well sorted sandy glob ooze	
2369	29°15.2	78°44.8	848	Chain Bag and Pipe	5	0	Lt. gry-brn glob. ooze	
2370	29°31.3 Camera	79°00.1	787	Chain Bag and Pipe	5	1	Brn. well sorted glob. sand.	Coral
2371	29°45.1	78°45.0	793	Chain Bag and Pipe	5	0	Cream glob. sd.	
2372	30°01.0	79°00.0	798	Chain Bag and Pipe	4	0	Gry-Brn well sorted globerium sd.	
2373	30°15.8 Camera; Plkton	78°45.0	804	Chain Bag and Pipe	4	0	Brn. to gry. well sorted glob. sd.	
26 Aug.								
2374	30°31.0 Camera	79°01.3	876	Chain Bag and Pipe	2 l	1/2 full 200 l	Gry-Brn well sorted glob ooze	Mn nodules Indurated ooz
2375	30°48.3	78°45.0	949	Chain Bag and Pipe	1	10	Limi lith. crz. glob ooze	Mn & phosphate
2376	30°30.8 Camera	78°30.0	806	Chain Bag and Pipe	1	0	Brn well sorted glob. sand.	
2377	30°21.5	78°09.0	813	Chain Bag and Pipe	2	0	Tan clean glob sd.	
2378	30°26.5	78°06.0	829	Chain Bag and Pipe	3		Lt. Brn. med. glob. ooze	Semi-indurated form pters.rock
2379	30°28.5 Camera; plkton	78°04.0	825	Chain Bag and pipe	4	0	Lt. gry-brn glob. ptero. ooze	Few indurated glob sd ch?
2380	30°49.8	78°04.5	949	Chain Bag and Pipe	4	0	Dk. brn. well sorted glob ptero. ooze	
27 Aug.								
2381	31°04.2	78°08.5	849	Chain Bag and Pipe	2	1/2 full 200	Brn-gry well sorted glob sd.	Lith glob. ooze well rded Mn Nodules

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
27 Aug.								
2382	31°01.6	78°18.8	851	Chain Bag and Pipe	1	130	Brn. cra. well sorted glob. sd.	Well rded Mn nodules to 20 cn
2383	30°56.4 Camera	78°34.3	845	Chain Bag and Pipe	4	200	Brn. well sorted glob ooze	Plotz block M nodules to 30 cn
2384	30°54.5	78°43.0	843	Chain Bag and Pipe	2	1/2 full 50 L	Gry.-brn clear glob. sd.	Well rded Mn nodules & plates
2385	30°57.2	78°54.6	802	Chain Bag and Pipe	4	25	Brn. glob. sd.	Black Mn slab to 25 cn
2386	31°00.2 camera; plkton	79°00.0	782	Chain Bag and Pipe	4	1	Lt. brn. well sorted glob sd. and pters.	1 plot nodule run
2387	31°15.2	78°59.0	546	Chain Bag and Pipe	1	Full 300	Dk. brn glob sd.	Black Mn slab to 80 cn
28 Aug.								
2388	31°32.0	78°58.0	494	Chain Bag and Pipe	0	Full 300		Plats & rded Mn nodules & Sponges
2389	31°23.0	78°40.0	512	Chain Bag and Pipe	4	Full	Brn. foram sd.	Mn phosphate slabs to 75cn
2390	31°12.8	78°29.0	648	Chain Bag and Pipe	0	1/2 full 150		Mn slabs to 70cn
2391	31°24.2 cb dredge	78°18.2	621	Pipe dredge 12"	0	1		1 rock cord hd. bottom
2392	31°29.0	78°00.0	649	12" pipe	20	5	Brn. to gry glob. sd & pteropods	Mn plates small
2393	31°38.8 camera; plkton	77°46.8	610	12" pipe	20	5	Dk. well sorted glob. sd.	Platy run nodules
2394	31°47.0	77°36.9	751	12" pipe	30	0	Brn. well sorted globs. ptero. sd.	
29 Aug.								
2395	31°49.0	77°44.0	693	12" pipe	20	10	Gry-brn. poorly sorted glob. sd.	Platy Mn nodules to 20c

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
29 Aug.								
2396	31°53.6	77°58.2	648	12" pipe	100	0	Lt. Brn. well sorted glob sd.	
2397	31°59.7 Camera	78°15.4	651	12" pipe	7		Brn. well sorted glob. pter. sd.	Phosphate nodules & fossils
2398	32°05.0	78°27.0	489	12" pipe	0	50-100		Rock fragment platy Mn nodule to 40 cm
2399	32°10.6 plkton ton	78°46.0	423	12" pipe		15		Brn & Blk. mottled nodul & fossils&bon
Charleston								
1 Sept.								
2400	32°34.8 Amphioxus Run	79°57.0	18	Pierce	15		Gry. sand	
2401	32°33.5 Amphioxus Run	79°55.6	20	Pierce	15		Gry. sand	
2402	32°31.8 Amphioxus Run	79°54.6	21	Pierce	15		Gry. sand	
2403	32°30.5 Amphioxus Run	79°53.6	23	Pierce	15		Gry. sand	
2404	32°28.0 Amphioxus Run	79°52.5	27	Pierce	15		Gry Sd. & shell	
2405	32°27.2 Amphioxus Run	79°50.8	29	Pierce	15		Gry Sd. & shell	
2406	32°25.8 Amphioxus Run	79°50.8	27	Pierce	15		Gry Sd. & shell	

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
1 Sept.								
2407	32°24.2	79°48.6	32	Pierce	15		Sand & gvl.	
	Amphioxus Run							
2408	32°22.8	79°47.3	36	Pierce	15		gry sd.	
	Amphioxus Run							
2409	32°21.0	79°45.6	38	Pierce	15		Gry sd.	
	Amphioxus Run							
2410	32°19.4	79°44.4	40	Pierce	15		Gry sd.	
	Amphioxus Run							
2411	32°17.8	79°43.0	40	Pierce	15		Gry sd.	
	Amphioxus Run							
2 Sept.								
2412	30°31.0	80°07.0	43	Chain Bag and Pipe	4	0	Med dk. gry-brn crd. clean gtz. sd.	Fish & Biol.
	camera current meter							
2413	30°14.8	79°44.4	640	Chain Bag and Pipe	3	20	Lt. gry-brn poorly sorted glob. ooze	Coral biol
3 Sept.								
2414	30°16.0	79°55.1	510	Chain Bag and Pipe	4	1/8 full 20	Lt. brn. well sorted glob. sd.	Coral Dk. ? Phosphate
2415	30°18.0	80°07.7	217	Chain Bag and Pipe	4	0	Grn. med,well sorted sand.	
2416	30°16.5	80°18.7	55	Chain Bag and Pipe	0	10		Biology
2417	30°18.8	80°30.5	41	Chain Bag and Pipe	1	3	Gry grs grained gtz. sd.	Biology
2418	30°19.8	80°42.2	33	Chain & Pipe	2	15	Gry fine uniform speckled sd & shell	Biology

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
3 Sept.								
2419	30°20.0	80°47.7	33	Chain & Pipe	3	10	Lt. gry. speckled uniform gry. gtz. sd.	Biology
2420	30°21.2	80°53.5	28	Chain Bag and Pipe	20	0	Gry fine sort- ed clean speck- led gtz sd.	Biology
	Amphioxus Run							
2421	30°21.0	80°56.0	26	Pierce Dredge	15		Sd & shell	
	Amphioxus Run							
2422	30°21.4	80°58.7	24	Pierce Dredge	15		Fine gry. sd.	
	Amphioxus Run							
2423	30°21.8	81°01.5	24	Pierce Dredge	15		Gry-brn. cra to med fine gtz sd.	
	Amphioxus Run							

Sta. No.	Lat.	Long.	Depth (Corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of rock
3 Sept. 1965								
2424	30°22.0	81°03.5	21	Pierce	15		Fine-med. gtz-sd.	
	Amph Run							
2425	30°22.4	81°06.1	22	"	15		Gry.-brn fn sd. & shell	
	Amph Run							
2426	30°22.5	81°08.5	19	"	15		Crs grained gtz.-shell sd.	
	Amph Run							
2427	30°22.0	81°10.4	22	"	15		Med crs shel	
	Amph Run							
2428	30°22.0	81°12.8	22	"	15		Gry fine Sd. some shell	
	Amph Run							
2429	30°23.1	81°15.0	23	"	15		Gry fine snd	
	Amph Run End							
Jacksonville 11 Sept. 1965								
2430	27°00.5	79°55.0	203	Ch. B. & Pipe	2	0	Grn. gry silty fn.sd. mostly qtz	
	Next Station after Jacksonville							
2431	26°46.1	79°58.4	157	"	3	0	Grn. gry silty fn. sd.	
2432	26°35.9	80°00.0	136	"	1	1	Grn gry silty fn sd & shell	Coral
2433	26°26.1	79°58.1	228	"	2	0	Lt. gry-brn well sorted sd.	
2434	26°16.0	80°02.9	106	"	4	1	grn.gry-brn,crs. sd & shell	"reef" limst.
	Camera Plankton							
2435	26°04.9	80°01.3	231	"	3	0	gry-brn uniform gtz-carbonate sd	
12 September 1965								
2436	25°44.9	80°03.9	46	"	2	2	Gry well sorted fine cals sd	cemented shell cora "reef" roc
2437	25°35.2	79°59.8	341	"	2	0	Brn-gry fn.sd.	
2438	25°37.5	79°54.8	383	"	1	300	Brn. sd.&grvl	Brn irreg. cobbles of phosphorite

Sta. No.	Lat.	Long.	Depth (Corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of sediment	Description of rock
12 Sept. 1965								
2439	25°42.4	79°48.3	818	Ch. Bag & sm.Pipe	0	100	Brn. glob.pters sd.	coral
2440	25°56.0	79°45.5	828	"	1	80	Lt. brn fair sorted glob ptero. sd.	coral Phosphate & brn crs s
2441	26°00.0	79°34.0	753	"	1	3	Gry-brn glob ptero sd & shell	coral,
	current meter camera							
12 Sept. 1965								
2442	26°07.9	79°19.4	532	"	4	0	Tan uniform stiff glob. sd.	
	Plankton							
13 Sept. 1965								
2443	26°24.6	79°11.4	526	"	2	0	Tan glob ooze well sorted fn.	
2444	26°29.9	79°00.1	697	"	2	0	Tan well sorted fn glob. ptero ooze	
2445	26°38.8	79°09.6	720	"	4	0	Cream-brn glob. sd. & shells	
2446	26°45.4	79°15.9	673	"	4	75	Tan varigated carbonate mud glob ooze	chunks of white-tan limst.
2447	26°53.5	79°10.2	516	"	4	10	Tan fair sorted uniform glob sd	Tan irr. flt. lims
	Camera							
2448	27°01.0	79°15.8	584	"	2	0	Lt.brn. fair sorted glob-ptero sd.	
2449	27°04.2	70°28.2	753	"	4	4	Tan well sorted glob ptero. ooze	Biology
	Current Meter							
2450	27°10.5	79°39.8	478	"	2	0	Tan poorly sorted muddy glob ooze	
	Plankton Camera							
2451	27°21.5	79°41.0	462	"	5	0	Lt. gry-brn poor sorted uniform glob ooze	

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Sta. No.	Lat.	Long	Depth (Corr)	Dredge type	Vol. Sediment	Vol. rock in dredge	Description of Sediment	Description of Rock
14 Sept. 1965								
2452	27°24.5	79°29.5	715	Ch. bg. & sm. pipe	2	250	Lt. gry poorly sorted glob sd.	coral biology
2453	27°27.1	79°12.1	403	"	4	100	Cream-med to fn carbonate sd.	Limstn. & coral
2454	27°30.1	79°03.5	372	Ch. bg. Van Veen	9	0	Cream sticky uniform carbonate mud	Sea Cucumber
2455	27°32.5	78°44.5	568	"	7	0	Lt. Tan uniform stiff glob-ptero ooze	
2456	27°37.6	78°31.0	893	12" Pipe	2	0	Tan poorly sorted glob. ooze	
2457	27°52.6	78°32.0	1029	"	15	0	Lt. bn. med fn glob pterop. ooze	
	Plankton							
2458	27°54.5	78°45.4	874	"	150	0	Tan cream uniform glob pterop ooze	
14 Sept. 1965								
2459	28°00.3	78°59.4	832	"	75	1	Tan cream fair sorted glob ooze	Mn nodules
15 Sept. 1965								
2460	28°08.0	79°15.8	742	Ch.bg. small pipe	2	0	Tan pterop glob ooze	
2461	28°14.3	79°30.2	874	"	5	100	Poorly sorted glob sd.	Semi ind. Limst.coral
2462	28°26.6	79°44.8	454	"	6	0	Grn.gry.uniform sticky mud	
2463	28°33.3	79°36.6	739	"	20		Tan glob ooze	ooze in ch. gab
	current meter							

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
15 Sept.								
2464	28°39.5	79°26.0	828	Chain Bag & Small Pipe	2	3	Ton glob plerop.ooze	Coral & brkn shell
	current meter							
2465	28°44.8	79°14.5	843	Chain bag & Small Pipe	2	100	Lt. gry brn glob plerop. sd.	Coral-Churke of coral limst
	Plankton current meter							
2466	29°01.0	79°31.6	760	Chain Bag & Small Pipe	5	100	Brn. fine sorted crs. glob. sd.	coral gravl.
16 Sept.								
2467	29°15.5	79°12.8	790	Chain Bag & Small Pipe	2	4	Brn. poorly sorted glob. pterp.ooze.	Cement cale.ss coral
2468	29°25.0	79°40.0	803	Chain Bag & Small Pipe	4	30	Crm. gry cab- orate ooze	Coral & chunk cemented coral
16 Sept.								
2469	29°43.8	79°51.9	659	Chain Bag & Small Pipe	3	0	Brn. well sorted glob. plerop.ooze.	
	Camera(Edgerton)							
2470	29°55.3	79°34.2	930	Chain Bag & Small Pipe	2	200	Brn. crz.glob. plerop. sd.	Cemented cora coral & Biol.
2471	30°04.0	79°40.7	894	Chain Bag & small Pipe	3	100	Creamy glob ooze	Coral small pierce limst.
2472	30°08.5	79°32.7	776	Chain Bag & Small Pipe	5	40	Lt. Brn. glob sd. & shell.	Coral chunks of limst.
	Cameras; plankton							
2473	30°15.1	79°14.6	830	Chain Bag & Small Pipe	2	50	Brn. glob. pterop. sd.	Coral & cement cale rock.
17 Sept.								
2474	30°34.3	79°31.5	828	Chain Bag and Pipe	2	40	Cra dk. coral fragments	Loozo coral limst & chunk foram ooze
2475	30°41.0	79°31.4	900	Chain Bag and Pipe	3	200		Limst. frags. much coral
2476	30°51.8	79°10.1	743	Chain Bag and Pipe	4	50	Tan Brn. well sorted uniform glob. ooze	Tan glob ss phosphate to 10-19 cm

Sta. No.	Lat. (N)	Long. (W)	Depth (corr)	Dredge type	Vol. Sediments	Vol. rock in dredge	Description of Sediment	Description of Rock
17 Sept.								
2477	31°00.5	79°19.4	684	Chain Bag and Pipe	0	2		Much Biol. "Tree"
2478	31°08.0 camera	79°07.5	649	Chain Bag and Pipe	2	300	Lt. gry. glob pterop sd. & concretions	Platy Mn slab cale orenite biol.
2479	31°23.0 Current Meter; plankton	79°09.0	491	Chain Bag and Pipe	3	250	Lt. brn glob fossil sd.	Limst. coral coral rock
2480	31°35.9 cameras	79°04.2	501	Chain Bag and pipe	0	200		Dark red brn irregular nodules sponges
18 Sept.								
2481	31°40.8	78°48.0	543	12" pipe sm. pipe	0	3		1 large Mn sla coral
2482	31°55.3	78°34.7	444	12" pipe sm. pipe	0	2		2 Mn slabs phosphate
2483	32°08.8	78°35.6	449	Chain Bag & sm. pipe	2	200	Gry clay	Rd. weathered phosphate conglomerate
2484	32°36.5 Camera	78°21.3	229	Chain Bag	0	0		
2485	32°35.9 plankton	77°57.6	992	Chain Bag Van Veen	10	100		Lark boulder phosphate rock