OFFICE

CRUISE REPORT

Westward-38

Sargasso Sea, Caribbean, and Bahamas

12 February - 24 March 1978

Sea Education Association
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OVERVIEW

The Scientific program for W-38 included several diverse projects. These projects are outlined below, and preliminary results are given. Following the narrative section of this report are summaries of the scientific logs, station lists and positions, trackline plots and sighting estimates for the humpback whale census work, and the completed Gulf Stream profile.

In-House Research

Distribution and behavior of marine mammals in the Caribbean and Bahamas.

Our third year of studies in this area included the collection of distribution and sighting data, recording of underwater sounds, photo-identification of individual whales, and a simultaneous air-sea survey of humpback whales on a portion of their wintering grounds.

On this cruise, a total of 785 marine mammals of 6-7 different species were sighted (Table 1). The possible sighting of pygmy killer whales is of interest, and is being investigated further. All sighting data is added to our cumulative records on this topic.

A total of 22 listening stations and seven tape recordings were made (Table 2, Figure 1). Tapes will be analyzed with regard to species recognition in odontocetes, and dialect and signature studies on the humpback whale being conducted at the University of Rhode Island. One objective of our acoustic work is to investigate the possible presence of humpback whales in previously undiscovered areas in the Caribbean and Bahamas. As has been our experience in past years, no humpbacks were seen or heard through the Bahamas. We did, however, have several interesting positive contacts along the northeast coast of the Dominican Republic, in the Turks Island passage, and a suspected contact at Salt Cay. These areas will warrant further study.

SEA is continuing to coordinate with a program established by the College of the Atlantic which seeks to identify individual humpback whales in the western north Atlantic. Evidence suggests that pigmentation patterns and markings can be used to characterize individual whales over repeated observations. These multiple sightings in turn contribute to studies on migrations, ranges, and population dynamics. Several fluke and dorsal fin photographs have been printed, and forwarded to Scott Kraus (COA) to be included in a second edition of their catalogue of identified individuals.

This year, in our third year of humpback whale studies on Silver and Navidad Banks, Westward participated in a simultaneous air-sea survey, in cooperation with Dr. Howard Winn at the University of Rhode Island. This work was done

under contract to the Marine Mammal Commission, and involved a carefully coordinated census effort between a shipboard operation (Westward) and an aerial team (URI personnel in a twin-engine Cessna Skymaster, operated by Aero Marine Surveys, Groton, Connecticut). The study sought to critically evaluate aerial-shipboard sampling techniques, and to assess the size, distribution, and movements of humpback whales on these banks. This project, the first of its kind, was judged to be highly successful. A preliminary field report has been completed and submitted to the Marine Mammal Commission. Figures 2 and 3 contain tracklines and preliminary sighting estimates. Further data reduction is currently underway by SEA and URI staff.

Distribution of the leptocephalus larvae of the American freshwater eel, *Anguilla rostrata*.

Eels of this species are believed to spawn in the Sargasso Sea SW of Bermuda. The larvae migrate, largely through passive drift, some 2,000 km toward their adult habitats in the fresh or brackish waters of coastal areas. Many aspects of this phase of the life history of the eel are poorly known, and conclusions are often speculative. The research by SEA seeks to more precisely describe the spawning area, the nature of the migration, and to determine whether the eel larvae are truly "passive drifters", or whether behavioral mechanisms of some type may in fact result in an active contribution to the journey.

On W-38, 22 stations were made — which included a Nansen cast, BT, and one or more net tows. Stations were made through the center of the hypothetical spawning area, and in inter-island passages along its southwestern boundary (Table 3, Figure 4). The larvae caught were unevenly distributed, and quite small — averaging in the 10 mm range. July 1978 will mark the beginning of year two for this project. It is anticipated that work-up of samples and the associated hydrographic data will begin this fall.

Gulf Stream profiles.

A BT section through the Gulf Stream was made on 23 March 1978, from Great Isaac to Miami (Figure 5). The profile aroused our curiosity, since the sub-surface velocity core was located close to the Bahama Bank side of the channel — well to the right of the area of maximum surface velocity. The profile and corresponding data have been sent to Dr. Robert Molinari at the Atlantic Oceanographic and Meteorological Laboratory (NOAA) in Miami, and to Dr. Stephen Baig at the National Environmental Satellite Service Station in Coral Gables, Florida. These data may be a value in the continuing Gulf Stream studies conducted by these laboratories, and as "ground-truth" reference material for satellite observations. Correspondence on these observations is continuing.

Island effects of phytoplankton populations.

Phytoplankton populations in tropical waters are generally sparse, due primarily to low nutrient concentrations. Tropical islands, however, may be a source of nutrients, and thus enhance the growth of phytoplankton in surrounding waters. On W-38 a total of 15 phytoplankton tows were made with a 0.25-meter, 60-micron mesh net. An attached flow meter was used to calculate the volume of water passing through the net. Samples were examined for correlation with distance from land based on the above premise, that nutrients from land would increase phytoplankton biomass in nearby waters. Preliminary counts ranged from 480 to 740 cells per cubic meter and showed no significant relationship between total number and distance from land. The blue-green algae *Trichodesmium* was present in all samples. Benthic diatoms were dominant in two samples towed with the dory near sandy beaches, whereas dinoflagellates were dominant in oceanic waters. Otherwise, little land effect was seen on species composition. Microzooplankton were more numerous than phytoplankton in every sample examined. It is probable that nannoplankton, which were too small to be collected in our net, account for the most numerous phytoplankton in these waters. Further studies with whole water samples will be done to examine the effect of land masses, investigating more carefully the role of oceanic nannoplankton populations.

Programs of Visiting Investigators

Seabird Observations

The purpose of the seabird project on W-38 was to identify and determine the distribution of pelagic birds in the Sargasso Sea-West Indies area during February and March (Table 4). These two months represent a relatively barren period for observing oceanic birds in the tropic and lower temperate latitudes, as it is the wrong season for migrant birds, and the winter residents are generally coastal birds.

Regular sightings of pomarine jaegers in the Sargasso Sea during February were the most significant observations of the trip. This species of jaeger winters in the tropical waters off West Africa and are generally considered to be absent from the neotropics and adjacent waters during January and February. The other sighting of importance was a Black-Legged Kittiwake off the northern coast of the Dominican Republic. Kittiwakes are an open ocean bird and winter well offshore. There are only three previously reported sightings of *Rissa tridactyla* in the West Indies, and none of the reports were from the Dominican Republic. The findings reported here are being compiled with those of other observers in an attempt to develop more accurate range maps and better estimates of seasonal distribution and abundance of pelagic birds throughout the Atlantic Ocean.

**CRUISE
SCHEDULE**

12 February	Sunday	Depart Miami
23 February	Thursday	D. Stout evacuated, Grand Turk
24-27 February	Friday-Monday	Puerto Plata, Dominican Republic
10-13 March	Friday-Monday	Grand Turk
15 March	Wednesday	Matthewtown, Great Inagua
17-19 March	Friday-Sunday	West Bay, Little San Salvador
24 March	Friday	Arrive Miami

STAFF

Sidney Miller	Captain	James Hain	Chief Scientist
Richard Farrell	1st Mate	Molly Allison	Assistant Scientist
David Stuhlbarg	2nd Mate	Mary Farmer	Assistant Scientist
Jon Becker	3rd Mate	Timothy Ramage	Visiting Investigator
John Thomson	Engineer		
Betty Sue McLeod	Steward		

STUDENTS

Elizabeth Barrett	Colby College
Kevin Beaudoin	St. John's University
Benjamin Berg	University of Massachusetts
Edward Brainard	Cornell University
Nadine Butcher	Reed College
Kelly Cunnane	Nasson College
Nancy Gottlieb	Hamilton College
Richard Crispin	Bowdoin College
Thomas Helming	University of Massachusetts
Steven Killpack	Kenyon College
Miguel Landa	Clark University
Shelly Lipman	College of Charleston
Martha Merrow	Middlebury College
William Michener	Clemson University
Barbara Moore	William Smith College
Sue O'Connor	University of Montana
Robert O'Leary	Brown University
James Oosterhoudt	Emory University
Christine Paterson	Boston University
Hal Rose	Boston University
Paul Stein	St. Lawrence University
David Stout	Ohio Wesleyan University
Cynthia Tomlinson	William Smith College
Lauren Wood	Oberlin College

NAUTICAL SCIENCE LECTURES

Fire and boat drill	Miller, Farrell
Bosun's lecture (maintenance & deck safety)	Becker
Use of the sextant	Farrell
Maneuvering Westward	Farrell
Basic electricity (shipboard applications)	Thomson
Meteorology	Stuhlbarg
Heavy weather sailing	Miller
Marine propulsion survey and history	Miller
Diesel engines (shipboard applications)	Thomson
Star sights by H.O. 249	Farrell
Day of the navigator	Farrell
Voyage planning	Stuhlbarg
Electronic navigation and communication	Farrell
Introduction to duties of the Junior Watch Officer	Miller
Commercial fishing techniques	Becker

MARINE SCIENCE LECTURES

The bathythermograph	Allison
Nansen bottles and reversing thermometers	Allison
Determination of salinity using chlorinity titrations	Farmer
Natural history and identification of pelagic birds	Rumage
Sargassum community ecology and identification	Allison
Biological sampling techniques	Allison
Phytoplankton ecology and diversity	Farmer
Whale identification	Hain
Underwater acoustics	Rumage
Copepods — the world's most important animals	Hain

STUDENT SEMINARS

Study of aerial survey techniques	Cunnane
Humpback whale behavior with particular emphasis on calving, mating and care-giving behaviors	Paterson
Treasure hunting on Silver Bank	Gottlieb
Aspects of the culture and history of Grand Turk	Moore
Surface current studies in the Silver/Navidad region	Brainard
Weather survey	Crispin
Distribution patterns of mesopelagic fish in the northwest Atlantic and Sargasso Sea	Helming
Lanternfish and bioluminescence	Michener
Deviation table for Westward	Berg
Sharks: Special senses and prey/predator interaction	Wood
Shark tagging techniques and migration	Landa
Hydrothermal structure of Providence channel	Tomlinson
Behavioral key to marine birds	Barrett
Biology of bony fish	Stein
Survey of attitudes toward and about marine mammals	Killpack
Ecology and culture of the blue-green algae, <i>Trichodesmium</i>	Morrow
Abundance and productivity of phytoplankton : open ocean, nearshore and harbor environments	Stout
Pelagic tar in the Sargasso Sea	Beaudoin
Fish sounds on the coral reef	O'Connor
Aspects of convergent evolution among reef fish	O'Leary
Coral zonation and identification, Grand Turk I.	Oosterhoudt
Algae on a coral reef, Grand Turk I.	Rose

OCEANOGRAPHIC LOG SUMMARY

Date	Time	Lat. (N)	Long. (W)	Operation/#	Notes
12 Feb.	1515	-	-	Depart NOAA Dock, Miami	
	2102	26°05'	79°51'	dolphins sighted: unidentified, 4-8	
	2130	26°07'	79°50'	dolphins sighted: unidentified	
	2210	26°12'	79°47'	dolphins sighted: unidentified, 12-15	
13 Feb.	1115	26°17'	78°38'	BT #1	
	1200	26°16'	78°33'	BT #2	
	1300	26°10'	78°26'	BT #3	
	1400	26°12.3'	78°21'	BT #4	
	1500	26°08'	78°16'	BT #5	
	1600	26°06'	78°10'	BT #6	
	1750	26°00.5'	78°01'	dolphins sighted: <u>Feresa attenuata</u> 7, 8-10	
	1800	26°00'	78°00'	BT #7	
	2000	25°58'	77°42'	BT #8	
	2200	25°51.5'	77°26'	BT #9	
14 Feb.	0000	25°45'	77°12'	BT #10	
	0200	25°44'	77°01.5'	BT #11	
	0400	25°44'	76°50'	BT #12	
	0600	25°42.8'	76°35.5'	BT #13	
	0800	25°42.5'	76°19.7'	BT #14	
	1155	25°44'	75°59.5'	Phytoplankton Tow	
	1325	25°46'	75°57'	Hydro Station #1	
	1420	25°47'	75°52'	BT #15	EEL STATION #1
	1500	25°47'	75°56'	Bongo Tow #1	
	1800	25°51'	75°45.5'	BT #16	
	2030	25°48.5'	75°29.5'	BT #17	
	2200	25°46'	75°25'	BT #18	

LOG SUMMARY P. 2

Date	Time	Lat. (N)	Long. (W)	Operation/#	Notes
15 Feb.	0345	25°46'	74°58.5'	Phytoplankton Tow #2	
	0400	25°47'	75°00.5'	Hydro Station #2	
	0500	25°45'	74°57.5'	BT #19	EEL STATION #2
	0550	25°45'	75°05'	Bongo Tow #2	
	1345	25°45'	74°25'	BT #20	
	1400	25°45'	74°23'	BT #21	
	1930	25°40'	73°54'	BT #22	
16 Feb.	0000	25°28.5'	73°35'	BT #23	
	0605	25°02'	73°15'	dolphins sighted: <u>Stenella</u> sp., 4-12	
	0810	24°51.5'	73°14'	Phytoplankton Tow #3	
	0840	24°50'	73°15'	Hydro Station #3	
	0900	24°50'	73°15'	BT #24	EEL STATION #3
	1015	24°48'	73°17'	Bongo Tow #3	
	2000	25°30'	72°37.5'	BT #25	
17 Feb.	0215	26°00'	72°13'	Phytoplankton Tow #4	
	0245	26°00'	72°13'	Hydro Station #4	
	0415	26°00'	72°17'	BT #26	EEL STATION #4
	0500	25°59'	72°18.5'	Bongo Tow #4	
	1350	26°07.3'	71°33.7'	Sargassum Weed Collected	
	1950	26°11'	71°02'	Phytoplankton Tow #5	
	2140	26°12'	71°01'	Hydro Station #5	
	2230	26°12.7'	71°06'	BT #27	EEL STATION #5
	2300	26°13'	71°08'	Bongo Tow #5	
18 Feb.	0100	26°12'	71°14'	IKMT #1	
	1815	26°14'	69°59'	Hydro Station #6	
	1910	26°16'	70°02'	BT #28	EEL STATION #6
	1945	26°20'	70°05'	Bongo Tow #6	

LOG SUMMARY P. 3

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
19 Feb.	1103	25°31'	69°01'	Phytoplankton Tow #6	
	1200	25°32'	69°00'	Hydro Station #7	
	1320	25°32'	69°00'	BT #29	EEL STATION #7
	1400	25°32'	69°00'	Bongo Tow #7	
	1945	25°25.2'	68°45.7'	Whale sighting: Minke?, 1	
	2340	25°23.2'	68°41.6'	BT #30	
20 Feb.	0050	25°23'	68°44'	Bongo Tow #8	EEL STATION #8
	0855	25°01'	68°29'	Bongo Tow #9	
	1140	25°02'	68°33'	BT #31	EEL STATION #9
	1515	24°42'	68°23'	Sargassum Weed & Fauna Collected	
	1545	24°38'	68°21.5'	Sargassum Weed & Fauna Collected	
	1745	24°30'	68°15'	Bongo Tow #10	
	2015	20°27'	68°12'	BT #32	EEL STATION #10
21 Feb.	1300	23°24'	69°17'	Whale sighting: probable Minke, 1-2	
22 Feb.	1110	21°33.6'	71°09'	Whale sighting: pilots, 12-15	
23 Feb.	0730	⚓ Salt Cay		Listen Sta. #1: positive, humpback	
	0830	⚓ Salt Cay		Tape recording #1: humpbacks	
	0840	⚓ Salt Cay		Whale sighting: suspected blows, ?	
	1142	21°18.8'	71°14'	Listen Sta. #2: negative	
24 Feb.	0340	20°35'	70°56'	Dolphin sighting: unidentified, 2	
	0930	19°57.5'	70°42.4'	Listen Sta. #3: positive, humpbacks	
	1012	19°57'	70°42.2'	Tape Recording #1C: humpbacks	
	1045	19°56.7'	70°42.2'	Tape Recording #2: humpbacks	
	1300	-	-	Arrive Puerto Plata	

LOG SUMMARY P. 4

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
27 Feb.	1400	-	-	Depart Puerto Plata	
28 Feb.	1000	19°26.3'	69°28.7'	Listen Sta. #4: positive, humpbacks	
	1026	19°26'	69°30.3'	Tape Recording #3, humpbacks	
	1122	19°27'	69°31.8'	Phytoplankton Tow #7	
1 Mar.	1015	19°58'	68°55.6'	H/T on Navidad Bank, numerous whales	
	1026	"	"	Listen Sta. #4, Rec'd #4	
	1400	19°54.7'	68°56.6'	Flipper Experiment Begun	
	1454	"	"	Flipper at 2.5 m depth, 2 flyovers	
	1510	"	"	Flipper at 10 m depth, 2 flyovers	
	1520	"	"	Flipper at 20 m depth, 2 flyovers	
	1530	19°52'	68°57.7'	Flipper at 25 m depth, 2 flyovers	
	1538	"	"	Flipper at 30 m depth, 2 flyovers	
	1545	"	"	Flipper Test Completed	
2 Mar.	0105	19°50'	68°48'	Phytoplankton Tow #8	
	0130	19°50'	68°49.5'	Hydro Station # 8	
	0205	"	"	BT #33	EEL STATION #11
	0300	19°51.3'	68°49.5'	Bongo Tow #11	
	0805	19°52.5'	68°50'	BT #34	
	0827	19°54'	68°50'	Air-sea Survey, Begin Trackline Navidad <u>B</u>	
	1056	20°06.4'	68°57.5'	End Trackline <u>B</u>	
	1345	20°09'	68°54'	Observations, photography of close-bye humpback	
	1517	20°09'	68°48'	Air-sea Survey, Begin Trackline Navidad <u>C</u>	
	1655	19°56.5'	68°49.5'	End Trackline <u>C</u>	
	1700	19°56.5'	68°49.5'	Dolphins sighted: unidentified, 2	
	1713	19°57'	68°50'	Whales sighted off bank edge	
	1750	19°57'	68°51'	BT #35	
	2040	19°56'	68°53'	Listen Sta. #6: positive, humpbacks	
	2125	"	"	Tape Recording # 5A	

LOG SUMMARY P. 5

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
3 Mar.	0706	19°59.3'	68°42'	Whale sighting: humpback breeches to port	
	0815	20°03'	68°45.5'	Air-sea Survey, Begin Trackline Navidad <u>D</u>	
	1003	20°12'	68°52.3'	End Trackline <u>D</u>	
	1335	20°13'	68°49'	Air-sea Survey, Begin Trackline Navidad <u>A</u>	
	1535	20°03'	68°53'	Mother & breaching calf close-bye	
	1715	19°54'	68°56.7'	End Trackline <u>A</u>	
4 Mar.	0340	20°31'	69°14'	BT #36	
	0400	20°32'	69°13.2'	Bongo Tow #12	EEL STATION #12
	0820	20°30'	69°26'	Hammerhead shark sighted	
	0902	20°31'	69°28'	Air-sea Survey, Trackline Silver <u>A</u> begun	
	1500	20°41'	69°55.7'	Trackline recessed	
	1635	20°41.5'	69°55.7'	Trackline resumed	
	1720	20°43.7'	69°58.7'	Trackline <u>A</u> completed	
	1825	20°44.6'	69°57.6'	Listen Sta. #7	
	1912	"	"	Phytoplankton Tow #9	
	2035	"	"	Tape Recording #58, humpbacks	
5 Mar.	0200	20°45'	70°05.5'	Hydro Station #9	
	0240	20°43.5'	70°07'	BT #37	EEL STATION #13
	0500	20°42'	70°08'	Bongo Tow #13	
	1246	20°23'	69°59.7'	Air-sea Survey, Begin Trackline Silver <u>B</u>	
	1647	20°42.3'	69°48.2'	Trackline <u>B</u> completed	
6 Mar.	1221	20°15'	69°35'	Air-sea Survey, Begin Trackline Silver <u>C</u>	
	1255	20°15'	69°41'	Trackline & lookouts secured, off edge, reposition ship	
	1430	20°18'	69°40.6'	Trackline & lookout resumed	
	1740	20°28'	69°59'	Trackline <u>C</u> completed	

LOG SUMMARY P. 6

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
7 Mar.	0930	20°17'	69°46'	School of tuna sighted close by	
	0945	20°18'	69°47'	Air-sea Survey: Begin Trackline Silver <u>D</u>	
	1530	20°47'	69°59.5'	Trackline <u>D</u> completed	
	1538	20°47'	70°00'	Birds feeding on fish (bonito?) on bank edge	
	2348	20°40.5'	70°11'	Hydro Station #10	
8 Mar.	0040	20°40'	70°11'	BT #38	EEL STATION #14
	0100	20°40.2'	70°10.2'	Bongo Tow #14	
	1745	21°06'	70°09'	BT #39	CALIBRATION FOR
	1745	"	"	Hydro Station #11X	BT #15688
	2003	21°02'	70°11'	Hydro Station #11	
	2055	21°02.7'	70°10.5'	BT #40	EEL STATION #15
9 Mar.	2135	21°02'	70°10.7'	Bongo Tow #15	
	0320	21°24'	70°16'	BT #41	
	0340	"	"	Bongo Tow #16	EEL STATION #16
	1130	21°31'	70°37.2'	BT #42	
	1220	21°32.5'	70°37.5'	Bongo Tow #17	EEL STATION #17
	2000	21°41'	71°00.5'	Bongo Tow #18	
	2150	21°36.4'	71°03'	BT #43	EEL STATION #18
	2227	21°36.5'	71°04.5'	Phytoplankton Tow #10	
	2230	"	"	Listen Sta. #8	
10 Mar.	0225	21°28'	71°13.5'	Listen Sta. #9	
	0320	21°27.5'	71°14'	Phytoplankton Tow #11	
	1100	-	-	Anchored off Grand Turk	
11 Mar.	0800	-	-	Anchorage changed to S. of English Point	

LOG SUMMARY P. 7

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
12 Mar.	0610	⚓	off South Pier	Dolphins sighted: unidentified, 2	
13 Mar.	0545	"	"	Listen Sta. #10	
	0915	1/2 mi. W of Pier		Listen Sta. continues from dory, Tape Recording #6	
	1015	"	"	Dolphins sighted: probably <u>Tursiops</u> , 2	
	1400	-	-	Depart Grand Turk	
	1715	21°18'	71°15'	Listen Sta. #11	
	2130	21°09'	71°20'	Listen Sta. #12	
14 Mar.	0120	20°51'	71°37'	Bongo Tow #19	EEL STATION #19
	0410	20°45'	71°44.5'	BT #44,	
	0845	21°01'	71°48'	Listen Sta. 13	
	1300	21°09'	72°01'	Listen Sta. 14	
	1650	21°21'	72°16'	Listen Sta. 15	
	2330	20°53'	72°43'	BT #45	
15 Mar.	0020	20°51'	72°47'	Bongo Tow #20	EEL STATION #20
	1130	20°57.5'	73°41.5'	Anchored Matthewtown, Great Inagua to clear	
	1150	"	"	Listen Sta. #16	
16 Mar.	0400	22°27'	74°32.5'	BT #46	EEL STATION #21
	0450	22°26'	74°33'	Bongo Tow #21	
	1030	22°32.5'	74°48'	Listen Sta. #17	
17 Mar.	0145	23°23'	74°57'	Blows heard, close-bye, unidentified	
	0200	23°24'	74°57.5'	Listen Sta. #18	
	0605	23°35'	75°09'	Whales sighted: unidentified, 2	
	2115	24°34.3'	75°58'	Anchored West Bay, Little San Salvador	

LOG SUMMARY P. 8

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
18 Mar.	1000	-	-	Dories ashore, island exploration	
	1330	-	-	Dories ashore, island exploration	
19 Mar.	0845	-	-	Listen Sta. #19A	
	0900	-	-	Dories ashore, dive parties ashore	
	1330	-	-	Dories ashore, dive parties ashore	
	1500	-	-	Listen Sta. #19B	
	2015	-	-	Listen Sta. #19C	
	2120	-	-	Depart Little San Salvador	
	2320	24°40'	76°01'	BT #47	
20 Mar.	0105	24°51'	76°01'	BT #48	
	0230	25°00'	76°00'	BT #49	
	0430	25°12.5'	75°59'	BT #50	
	0600	25°23'	75°59'	BT #51	
	0740	25°33'	76°01'	BT #52	
	0905	25°40'	76°01'	BT #53	
	1050	26°51.5'	76°04.5'	BT #54	
	1215	26°02'	76°05'	BT #55	
	1245	26°02'	76°06'	Bongo Tow #22A	BEGIN 24 HR. STATION
	1455	26°07'	76°07'	Phytoplankton Tow #14	
	1530	26°06.5'	76°07'	Listen Sta. #20	
	1745	26°04.5'	76°07'	Hydro Station #12	CALIBRATION TEST
	1745	"	"	BT #56	FOR BT #15841
	1820	26°03.5'	76°07'	Bongo Tow #22B	
	2130	25°55.5'	76°06'	Bongo Tow #22C	
	2350	25°51'	76°07'	Phytoplankton Tow #15	

LOG SUMMARY P. 9

Date	Time	Lat. (N)	Long. (W)	Operation/ #	Notes
21 Mar.	0105	25°49'	76°09'	BT #57	
	0130	25°40.5'	76°09'	Bongo Tow #22D	
	0935	26°06.3'	76°44'	Dolphins sighted:	unidentified, 10
22 Mar.	0320	25°51.6'	77°52'	Listen Sta. #21	
	0520	"	"	Tape Recording #7, pilots and/or dolphins	
	0555	"	"	Dolphins sighted:	unidentified, 3
	0602	"	"	Dolphins sighted:	unidentified, 3-4
	0725	25°58.5'	77°50'	Pilot whales sighted,	4-5
	1525	26°12'	78°14'	Listen Sta. #22	
23 Mar.	0700	26°08'	79°10'	BT #58	BEGIN GULF STREAM PROFILE
	1000	26°04'	79°17'	BT #59	
	1045	26°02'	79°21'	BT #60	
	1125	26°00'	79°26'	BT #61	
	1200	25°58'	79°29'	BT #62	
	1210	25°58'	79°30'	Pilot whales sighted,	12-14
	1300	25°56'	79°35'	BT #63	
	1330	25°54'	79°38'	BT #64	
	1410	25°53'	79°42'	BT #65	
	1455	25°51'	79°46'	BT #66	
	1545	25°48'	79°51'	BT #67	
	1610	25°47'	79°54'	BT #68	
	1700	25°45'	79°59'	BT #69	PROFILE COMPLETED
	1850	-	-	Anchored in Miami turning basin	
24 Mar.	0930	-	-	Alongside NOAA Dock, Miami	

TABLE 1
MARINE MAMMAL SIGHTINGS
(other than Humpbacks on Silver and
Navidad Banks)

DATE	TIME	LAT.	LONG.	SIGHTING/I.D./NO'S.
12 Feb	2102	26°05'	79°51'	dolphins sighted: unidentified, 4-8.
	2130	26°07'	79°50'	dolphins sighted: unidentified
	2210	26°12'	79°47'	dolphins sighted: unidentified, 12-15.
13 Feb	1750	26°00.5'	78°01'	dolphins sighted: 8-10, identification inconclusive - pygmy killer whale, <i>Feresa attenuata</i> ?
16 Feb.	0605	25°02'	73°15'	dolphins sighted: <i>Stenella sp.</i> , 4-12.
19 Feb.	1945	25°25.2'	68°45.7'	whale sighting: Minke?, 1.
21 Feb	1300	23°24'	69°17'	whale sighting: probably Minke, 1-2.
22 Feb	1110	21°33.6'	71°09'	whale sighting: pilots, 12-15.
23 Feb	0840	anchored Salt Cay		whale sighting: unidentified blows
24 Feb.	0340	20°35'	70°56'	dolphin sighting: unidentified, 2.
2 Mar.	1700	19°56.5'	68°49.5'	dolphins sighted: unidentified, 2.
12 Mar.	0610	anchored Grand Turk		dolphins sighted: unidentified, 2.
13 Mar.	1015	anchored Grand Turk		dolphins sighted: probably <i>Tursiops</i> , 2.
17 Mar.	0605	23°35'	75°09'	marine mammal sighting: distant, unidentified, 2.
21 Mar.	0935	26°06.3'	76°44'	dolphins sighted: unidentified, 10.
22 Mar.	0555	25°53.6'	77°52'	dolphins sighted: unidentified, 3.
	0602	25°53.6'	77°52'	dolphins sighted: unidentified, 3-4.
	0725	25°58.5'	77°50'	whale sighting: pilots, 4-5.
23 Mar.	1210	25°58'	79°30'	whale sighting: pilots, 12-14.

TABLE 2
LISTENING STATIONS - W38

STA.NO.	DATE	TIME	LAT.	LONG.	CONTACTS	TAPE/NO.
1	23 Feb.	0730	Anchored SE of Salt Cay		Pos. (Humps)	1A, 1B
2	23 Feb.	1142	21°19'	71°14'	Neg.	—
3	24 Feb.	0930	19°57.5'	70°42.4'	Pos. (Humps)	1C, 2
			(Off Puerto Plata)			
4	28 Feb.	1000	19°26.3'	69°28.7'	Pos.(Humps)	3
			(Escocesa Bay)			
5	1 Mar	1015	19°58'	68°55.6''	Pos.(Humps)	4
			(Navidad Bank)			
6	2 Mar.	2040	19°56'	68°53'	Pos.(Humps)	5A
			(Off Navidad Bank)			
7	4 Mar.	2030— 2130	20°44.6'	69°57.6'	Pos.(Humps)	5B
			(Edge of Silver Bank)			
8	9 Mar.	2230— 2250	21°36.5	71°04.5'	Neg.	—
9	10 Mar.	0230— 0250	21°28'	71°13.5'	Neg.	—
10 A,B,C.	13 Mar.	0545, 0915, 1010	Anchored SW of Grand Turk		A. Neg. B,C Pos. (Humps, Dolphins)	6
11	13 Mar.	1715— 1730	21°19'	71°15'	Neg.	—
12	13 Mar.	2135— 2200	21°09'	71°23'	Neg.	—
13	14 Mar.	0915— 0940	21°01'	71°48'	Neg.	—
14	14 Mar.	1255— 1345	21°09'	72°01'	Neg.	—
15	14 Mar.	1700— 1745	21°21'	72°16'	Neg.	—
16	15 Mar.	1150— 1215	20°57.5'	73°41.5'	Neg.	—
			(Anchored SW of Gr. Inagua)			

(continued)

17 A,B,	16 Mar.	1025, 1230	22°32.5' 73°41.5' (On Diana Bank)	Neg.	—
18	17 Mar.	0200— 0230	23°24' 74°57.5'	Neg.	—
19 A,B,C,	19 Mar.	0845, 1500, 2015	24°34' 75°56' (Anchored SW of Little San Salvador)	Neg.	—
20	20 Mar.	1530— 1550	26°06.5' 76°07'	Neg.	—
21	22 Mar.	0320— 0415	25°53.6' 77°52'	Pos. (Dolphins/ Pilots)	7
22	22 Mar.	1525— 1540	26°12' 78°14'	Neg.	—

SHIPBOARD CENSUS TRACKS

R/V Westward

Navidad Bank

March 1978

TRACKLINE	DATE	WHALES SIGHTED
A	3 Mar.	71
B	2 Mar.	54
C	2 Mar.	40
D	3 Mar.	46

SHIPBOARD CENSUS TRACKS

R/V Westward

Silver Bank

March 1978

TRACKLINE	DATE	WHALES SIGHTED
A	4 Mar.	161
B	5 Mar.	125
C	6 Mar.	68
D	7 Mar.	120

NOTE: Bank edge varies from charted positions as shown.

TABLE 3
EEL STATIONS - W38

STA. NO.	DATE	TIME	LAT.	LONG.
1	14 Feb.	1330-1630	25°47'	75°52'
2	15 Feb.	0400-0630	25°45'	75°00'
3	16 Feb.	0900-1130	24°50'	73°15'
4	17 Feb.	0300-0630	26°00'	72°17'
5	17 Feb.	2130-0030	26°12'	71°05'
6	18 Feb.	1830-2130	26°16'	70°02'
7	19 Feb.	1200-1530	25°32'	69°00'
8	20 Feb.	2330-0100	25°23'	68°42'
9	20 Feb.	0900-1200	25°01'	68°31'
10	20 Feb.	1800-2030	24°28'	68°14'
11	2 Mar.	0130-0430	19°50'	68°50'
12	4 Mar.	0330-0530	20°32'	69°14'
13	5 Mar.	0200-0630	20°43'	70°07'
14	8 Mar.	0000-0230	20°40'	70°11'
15	8 Mar.	2000-2300	21°02'	70°11'
16	9 Mar.	0330-0530	21°24'	70°16'
17	9 Mar.	1130-1400	21°32'	70°37'
18	9 Mar.	2000-2200	21°39'	71°02'
19	14 Mar.	0130-0400	20°48'	71°40'
20	15 Mar.	2330-0200	20°52'	72°45'
21	16 Mar.	0400-0630	22°26'	74°33'
22	20 Mar.	1230-2300	26°00'	76°07'

GULF STREAM PROFILE

Great Isaac to Miami

23 March 1978

TABLE 4

Identification and distribution of seabirds by territorial waters or by water mass.

COMMON NAME	SPECIES	LOCATION OF OBSERVATIONS					
		USA	SARGASSO SEA	GRAND TURK	SILVER/ NAVIDAD BANKS	DOMINICAN REPUBLIC	BAHAMAS
Black Capped Petrel	<i>Pterodroma hasitata</i>		•		•		
Audubon's Shearwater	<i>Puffinus iherminieri</i>				•		• 1
Leach's Petrel	<i>Oceanodroma leucorhoa</i>						• 1
White-Tailed Tropic-Bird	<i>Phaethon lepturus</i>		•		•		
Red-Billed Tropic-Bird	<i>Phaethon aethereus</i>			•			
Brown Pelican	<i>Pelecanus occidentalis</i>	•		•			
Magnificent Frigatebird	<i>Fregata magnificens</i>			•	•		•
Blue-Faced Booby	<i>Sula dactylatra</i>						• 1
Brown Booby	<i>Sula leucogaster</i>				•		
Spotted Sandpiper	<i>Actitis macularia</i>						•
Pomarine Jaeger	<i>Stercorarius pomarinus</i>		•				
Herring Gull	<i>Larus argentatus</i>	•					•
Laughing Gull	<i>Larus atricilla</i>	•					•
Bonaparte's Gull	<i>Larus philadelphia</i>						•
Black-Legged Kittiwake	<i>Rissa tridactyla</i>					•	
Bridled Tern	<i>Sterna acaethetus</i>				•		
Caspian Tern	<i>Thalasseus caspia</i>			•			
Black Skimmer	<i>Rynchops nigra</i>						
Chuck-Will's Widow	<i>Caprimulgus carolinensis</i>						• 2

1 These birds were sighted NE of Eleuthera Island

2 Although not a seabird, one member of this species did alight upon the ship.