ISLANDS IN THE STREAM 2001 (BELIZE)

Summary Report
Islands in the Stream: Sustainable Seas Expedition

Project: Habitat Characterization

DIVES (A-21)

Location: Belize

Chief Scientist: **Steve Gittings**
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Research Coordinator

Overview:
The Islands in the Stream Expedition was designed to gather information on relatively unknown deep water areas within Marine Protected Areas (MPAs) and in areas being considered for marine protection from Belize to North Carolina. The expedition used a variety of technologies and methods to explore islands of habitat, and to understand how ocean currents affect and connect them. The information will be used to help scientists and natural resource managers assess habitat conditions, and to make decisions on how to manage these areas to ensure the health of the habitat and the species that depend upon it.

This report provides a brief overview of the Mission to Belize conducted from May 12-17, 2001. This mission explored a variety of shallow and deep water coral reefs and wall features. The report summarizes the activities that were undertaken and presents preliminary findings and discoveries that are qualitative in nature. Scientists and participants of this mission will assess and analyze the data over the next several months.

Purpose:
1. Characterize hard-bottom habitats in Belize, particularly habitats within which fish are known to spawn at predictable periods and in specific locations (e.g. Gladden Spit).
2. Collect coral and water samples and data for ancillary studies on the connections between regional reef systems.

Approach: Using a combination of submersible, scuba, and shipboard sampling, descriptive and quantitative information would be gathered about habitats, and samples would be collected for studies being conducted by other investigators.

Table 1. *Primary Activities.*

	McArthur Pierside	Open House	Gladden Spit	Gladden Spit	Goff s Cay	Mexico Transit	
	5/12	**5/13**	**5/14**	**5/15**	**5/16**	**5/17**	**Notes**
Fathometer Runs			⊕		⊕		
Habitat Characterization			O	⊕	⊕		
SPMD Installation	⊕						Nadia Bood
Drifter Deployment						⊕	#29571
Deep Scattering Layer			⊕	⊕	¥		EQ50
Net Tows			O				Lost on 5/14
Fin Clips/Fishing	¥	¥	¥	¥	¥	¥	Carter
Ecotoxicology Water Sample	O		⊕		⊕		Galloway
Hydrocarbon Water Sample*							Mondragon
***A. palmata* collection**	O						Miller
***M. cavernosa* collection**	⊕						Coffroth
***P. astreoides* collection**	⊕						Coffroth
Algae collection	⊕		¥	¥	¥		Fredericq
Sclerosponge collection*			¥	¥	¥		Carriquiry
Rock collection*			¥	¥	¥		Padilla
Spawning dives			⊕	⊕			Graham
Seabird or Datasonde			O	⊕	⊕		

¥ - opportunistic activity
O - planned activity
⊕ - completed activity
*** - planned for Mexico only**

Cruise Log:

5/12
Samples of two species of corals (*Montastraea cavernosa* and *Porites astreoides*) were collected for Dr. Mary Alice Coffroth, who is studying the genetics of these species. A vessel and dive team was provided by Belize s Coastal Zone Management Authority and

Institute, and samples were collected at Goff s Cay and Cay Chapel. They were processed onboard the McArthur and were forwarded to Dr. Coffroth when the ship arrived in Galveston.

Also, a semi-permeable membrane device was deployed on a reef near a small, developed island. The device was retrieved in about a month and sent to the laboratory for analysis. we are expecting the analysis to be completed sometime in the next several months.

Acropora palmata colonies were not seen during our dives. This species has experienced high levels of mortality in recent years throughout the Caribbean. Therefore, no samples could be collected for Dr. Margaret Miller s work. However, samples were collected in Mexico.

Shallow-water reef algae were collected during dives at two other reef sites. The samples were processed and were sent to Dr. Suzanne Fredericq upon arrival in the U.S.

5/13
An open house was held aboard the ship, and no sampling was conducted.

5/14
Sub ops were scratched for the day, as fathometer runs were conducted to improve local charts. The reef and the target dive sites were in close proximity, so the McArthur had to be careful on approach for sub deployment. This required an extended survey time in order to ensure a clear path for deployment and recovery.

A local vessel chartered by Rachel Graham came alongside and took several of the science party (Gittings, Earle, Mead, Evans, Graham, Carriquiry and LeBaron) for a dive on Gladden Spit to witness cubera and dog snapper spawning. Thousands of cubera and hundreds of dog snapper were seen spawning, and about 10 whale sharks were seen feeding on the output.

Back aboard the McArthur, we attempted to identify the depth of organisms associated with the deep scattering layer (DSL). We adjusted the EQ50 echosounder on the ship and were able to see quite a bit of sound reflectance at around 150 m in about 500 m of water. We attempted an oblique net tow, but the net contacted an uncharted pinnacle at 150 m and was lost.

A surface water sample was obtained for the ecotoxicology study.

5/15
The sub dives on 5/15 were intended to document the habitat associated with snapper spawning. Some video and fish data were collected, though camera problems precluded a complete survey. In any case, reasonable habitat descriptions can be compiled. Significant observations included the presence of whale sharks at 200-300 feet cruising along the drop-off just offshore the spawning sites, and relatively large numbers of snappers of several species in the dive area.

The scuba dives during the evening were intended to collect videotape of the spawning by snappers at Gladden Spit. John Halas and Ian Griffith collected video of dog snapper spawning.

Three Seabird casts to 200 m were conducted to document the water column structure in the area. The DSL appeared to be between 80 and 100 m, but was fairly diffuse.

5/16

Sub dives were conducted at Goff s Cay, partly because shuttles were planned for this area, and also because there is a feature just offshore Goff s Cay that is called Jewfish Bank. Our hope was to document the feature and see whether jewfish occurred on it. The fish were not found, but the feature has a wall very similar to that seen at Gladden Spit. As it protrudes out from the main axis of the barrier reef, it may be a spawning site for jewfish or other species that may not normally be seen there, but which migrate from other sites for the events.

5/17

We transited toward Mexico overnight, and deployed our first drifter buoy near the Belize/Mexico border at 0655, at 18¡10.970 N, 87¡47.086 W.

Summary of Belize surveys

The area of Gladden Spit we surveyed, which is on the northern side of the spit, consisted of a gently sloping hard bottom above 50 m descending from an emergent coral reef, followed seaward by a vertical wall that continued to about 120 m. Below that was a steeply sloping bottom consisting of sand and reef debris. There was ample evidence of slumping of sand and rubble. At Goff s Cay, a similar wall feature existed, and depths at the top and bottom of the wall were comparable.

Fish abundance was fairly low on the sand slope and most of the vertical wall. It was highest on the uppermost few meters of the wall and included some of the species known to spawn in this area. Fairly high numbers of mutton snapper, yellowtail snapper, and dog snapper were seen on the upper levels. Also, whale sharks (four sightings between 200 and 300 feet) were seen cruising over the wall, and may do this when they are in the area, but not actively feeding around the spawning aggregations. Blackfin snapper and barracuda were also in abundance. Though a relatively high number of individuals were seen for these species, no really unusual activity, such as spawning or courtship, was observed.

There was a conspicuous lack of planktivores over the features in the two areas surveyed compared to a number of other places surveyed in the past. Elsewhere, species like the roughtongue bass, red barbier, and threadnose bass swarm over deep features. Creolefish, creole wrasse, bogas, blue and brown chromis, and bluehead wrasse are seen over reefs in shallow water. In fact, planktivore schools are not limited to reefs in warm water, and they can be found in abundance over a variety of features (e.g. Cordell Bank

north of the Farallon Islands, and Sonnier Bank in the northern Gulf of Mexico). At Gladden Spit and Goff s Cay, low productivity in the water column may limit the populations of planktivores and other species that consume suspended material. This would suggest that diversity and abundance of planktivores on reefs may be, to a degree, independent of benthic development. Though substrate is essential for refuge, substrate type may be less important than water column productivity in supporting planktivore populations.

Table 2. *Submersible Dive Summary.*

Date	Dive #	Pilot	Location	Max Depth (ft)
5/11/01	A21-104	Miguel Alamilla	Jewfish Bank	N/A
5/11/01	A21-105	Liston McCord	Jewfish Bank	143
5/11/01	A21-106	Will Heyman	Jewfish Bank	93
5/15/01	A21-107	Rachel Graham	Gladden Spit	>500
5/15/01	A21-108	Steve Gittings	Gladden Spit	450
5/16/01	A21-109	Gale Mead	Goff's Cay	450
5/16/01	A21-110	Miguel Alamila	Goff's Cay	450
5/16/01	A21-111	John Halas	Goff's Cay	115
5/16/01	A21-112	Jose Carriquiry	Goff's Cay	115

Table 3. *Summary of Samples Collected.*

Date Collected	Location	Operation Type	Sample Type	Description
5/12/01	Cay Chapel	SCUBA	SPMD	Installed
5/12/01	Goff's Cay	SCUBA	Water	Triazine Sample
5/12/01	Goff's Cay	SCUBA	Coral	Porites astreoides
5/12/01	Cay Chapel	SCUBA	Coral	Montastraea cavernosa
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Brown Stypopodium
5/12/01	Gallows Point Reef	SCUBA	Algae	Halimeda
5/12/01	Gallows Point Reef	SCUBA	Algae	Red Dichtyneus occidentalus
5/12/01	Gallows Point Reef	SCUBA	Algae	Dychotiota
5/12/01	Gallows Point Reef	SCUBA	Algae	Lobophora
5/12/01	Gallows Point Reef	SCUBA	Algae	Microdychtion
5/12/01	Gallows Point Reef	SCUBA	Algae	Rhiphocephalus
5/12/01	Gallows Point Reef	SCUBA	Algae	Red Dichtyneus occidentalus
5/12/01	Gallows Point Reef	SCUBA	Algae	Dasya
5/12/01	Gallows Point Reef	SCUBA	Algae	Lorentia
5/12/01	Gallows Point Reef	SCUBA	Algae	Neomorous
5/12/01	Gallows Point Reef	SCUBA	Algae	Penicillus
5/12/01	Gallows Point Reef	SCUBA	Algae	Dychtiospheria
5/12/01	Gallows Point Reef	SCUBA	Algae	Lorentia
5/12/01	English Cay	SCUBA	Algae	Rhiphocephalus
5/12/01	English Cay	SCUBA	Algae	Derbesia
5/12/01	English Cay	SCUBA	Algae	Derbesia
5/12/01	English Cay	SCUBA	Algae	Lobophora
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	Stypopodium
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	Halimeda
5/12/01	English Cay	SCUBA	Algae	Halimeda
5/12/01	English Cay	SCUBA	Algae	Halimeda
5/12/01	English Cay	SCUBA	Algae	Halimeda
5/12/01	English Cay	SCUBA	Algae	N/A
5/12/01	English Cay	SCUBA	Algae	N/A
5/14/01	Gladden Spit	RHIB	Water	Triazine Sample
5/14/01	Gladden Spit	Net Tow	Rock	Small pebbles
5/16/01	Goff's Cay	RHIB	Water	Triazine Sample

Belize Sample Activities

Type	Gladden Spit	Goff's Cay	Cay Chapel	English Cay	Gallows Point Reef	Total
Net Tow	1	0	0	0	0	1
Hydrocast	1	1	0	0	0	2
Scuba	0	2	2	20	26	50
Total	2	3	2	20	26	53

Mexico Sample Activities

	Banco Chincorro	Cozumel	Total
Fathometer	3	0	3
Fishing	1	0	1
Hydrocast	2	2	4
Scuba	6	0	6
Total	12	2	14

Belize Samples

Date Collected	Location	Operation Type	Sample Type	Description
05/12/2001	Cay Chapel	scuba	SPMD	Installed
05/12/2001	Goff's Cay	scuba	water	Triazine Bottled
05/12/2001	Goff's Cay	scuba	coral	Porites astreoides
05/12/2001	Cay Chapel	scuba	coral	Montastraea cavernosa
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Brown Stypopodium
05/12/2001	Gallows Point Reef	scuba	algae	Halimeda
05/12/2001	Gallows Point Reef	scuba	algae	Red Dichtyneus occidentalus
05/12/2001	Gallows Point Reef	scuba	algae	Dychotiota
05/12/2001	Gallows Point Reef	scuba	algae	Lobophora
05/12/2001	Gallows Point Reef	scuba	algae	Microdychtion
05/12/2001	Gallows Point Reef	scuba	algae	Rhiphocephalus
05/12/2001	Gallows Point Reef	scuba	algae	Red Dichtyneus occidentalus
05/12/2001	Gallows Point Reef	scuba	algae	Dasya
05/12/2001	Gallows Point Reef	scuba	algae	Lorentia
05/12/2001	Gallows Point Reef	scuba	algae	Neomorous
05/12/2001	Gallows Point Reef	scuba	algae	Penicillis
05/12/2001	Gallows Point Reef	scuba	algae	Dychtiospheria
05/12/2001	Gallows Point Reef	scuba	algae	Lorentia
05/12/2001	English Cay	scuba	algae	Rhiphocephalus
05/12/2001	English Cay	scuba	algae	Derbesia
05/12/2001	English Cay	scuba	algae	Derbesia
05/12/2001	English Cay	scuba	algae	Lobophora
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	Styphopodium
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	Halimeda
05/12/2001	English Cay	scuba	algae	Halimeda
05/12/2001	English Cay	scuba	algae	Halimeda
05/12/2001	English Cay	scuba	algae	Halimeda
05/12/2001	English Cay	scuba	algae	N/A
05/12/2001	English Cay	scuba	algae	N/A
05/14/2001	Gladden Spit	RHIB	water	Triazine Bottled
05/14/2001	Gladden Spit	net tow	rock	small pebbles and
05/16/2001	Goff's Cay	RHIB	water	Triazine Bottled

Dive Number	Dive Date	NOAA Tape ID	Target Area	Time Code In	Time Code Out	Fish Observations	Invertebrate Observations	Habitat Observations	Human Impacts	Person Annotating
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:02:45	0:03:00			Coarse sand and rubble on slope		Gittings
A21-108	5/15/01	A21-108-1A	Gladden Spit	0:13:00	0:14:00		Good closeup of Halimeda? sediment	sediment		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:21:00				Transect over coarse sand and rubble slope		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:22:15	0:23:50			Good image of actual slope below wall, with large boulder, rubble and cobble.		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:29:15			Gorgonian sea van, coralline algae on rocks laying on steep sand slope	rocks laying on steep sand slope		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:32:34		Blackfin snapper, mutton? snapper		base of wall around 360 feet		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:32:39		Almaco jacks				Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:39:05		Unidentified small fish (orange/yellow)				Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:41:08		Whale shark above wall, cruising north		wall		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:41:30	0:42:30	Barracudas in water column above sub				Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:44:43				Fine sediment on slope		Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:48:00		Whale shark high above				Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:49:23						Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:51:55	0:53:20					Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:53:21						Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:56:12		Tattler sea bass				Gittings
A21-108	5/16/01	A21-108-1A	Gladden Spit	0:57:50				slope		Gittings
A21-108	5/16/01	A21-108-1B	Gladden Spit	0:00:59	0:01:24			vertical wall	line	Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:01:17	0:02:37		gorgonian corals and sponges	Deep portion of wall with fine sand on ledges		Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:03:50	0:07:36			slope and wall		Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:12:50						Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:25:25						Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:26:09						Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:34:06						Gittings
A21-108	5/16/01	A21-108-2	Gladden Spit	0:37:00						Gittings
A21-109	5/16/01	A21-109-01	Goff's Caye	0:03:10	0:10:00			Hard bottom with thin layer of sand and silt		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:10:00	0:16:08		occasional soft corals			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:16:08	0:16:52	Unidentified grouper				Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:16:52	0:20:55			slope increasingly steep		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:20:55	0:22:00		soft corals	rock mound		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:22:00	0:22:25		Zoom on small basket star(?) on sea fan.			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:22:25	0:26:20			silty hard bottom		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:26:20	0:29:00	small fish	wire corals, sponges	rock formation		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:29:00	0:31:30		Using manip to collect sponge			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:31:30	0:33:00			top of rock mound and across more hard bottom.		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:33:00	0:36:30		some sponges			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:36:30	0:37:30		sponges, soft corals, algae.	Continued to transit over hard silty bottom with occasional small rocks. sponges, soft corals, algae.		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:37:30	0:42:30			rock mound, more hard bottom		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:42:30	0:47:27		sponges, assorted encrusting organisms, and occasional wire corals	steep rocky slope covered with sponges, assorted encrusting organisms, and occasional wire corals. Depth approx 300 ft.		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:47:27	0:47:36	squirrel fish	Barrel sponge			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:47:36	0:48:42			rock wall		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:48:42	0:48:55		Sea whip			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:48:55	0:49:10			Transiting along wall		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:49:10	0:49:14		small sea plume colony			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:49:14	0:49:48			More transiting along wall.		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:49:48	0:50:08	many small fish	Gorgonian, barrel sponge with small colony of black coral (Antipathes pennacea) Depth probably 230 or so.			Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:50:08	0:51:30		sponges, corals, encrusting orgs on rock wall	rock wall		Gale Mead
A21-109	5/16/01	A21-109-01	Goff's Caye	0:51:30	0:56:00	small fish: One tobaccofish (?) Numerous juvenile and a few adult sunshinefish, many little purple fish (black cap basslet?) Cherubfish, juvenile parrotfish (striped? princess?) tattler bass, some kind of hind or coney (not clear enough to tell.)				Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:00:00	0:06:50			Transiting along wall (very blue, poor vis)		Gale Mead

BELIZE INOTATIONS

Dive Number	Dive Date	NOAA Tape ID	Target Area	Time Code In	Time Code Out	Fish Observations	Invertebrate Observations	Habitat Observations	Human Impacts	Person Annotating
A21-109	5/16/01	A21-109-02	Goff's Caye	0:06:50	0:07:35	A few small fish with yellow tails and a few little purple fish	closeup moving along section of wall with sponges, scraggly little bits of wire coral and sea whips,	wall		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:07:35	0:11:48			wall		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:11:48	0:14:20	More of those fish with yellow tails (they look like yellowtail snapper but seem too small to be that species), queen(?) angelfish	sponge-covered outcrop	sponge-covered outcrop		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:14:20	0:16:20			wall		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:16:20	0:17:35		sponges	rock outcrop covered with sponges		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:17:35	0:17:45		Black coral colony (Antipathes n. sp.). Depth approx 200.			Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:17:45	0:18:02		Second black coral colony (Antipathes pennacea)			Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:18:02	0:18:42		rock w/ many sponges & encrusting orgs.	rock		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:18:42	0:18:50		Another small Antipathes pennacea colony			Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:18:50	0:23:15			wall		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:23:15	0:24:30			base of wall (depth approx 300 ft)		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:24:30	0:28:30			wall face near base		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:28:30	0:30:57	school of little fish	sponges, Halimeda, encrusting orgs,	closer shot of wall near base		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:30:57	0:36:00			wall		Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:36:00	0:39:40					Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:39:40	0:41:55					Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:41:55	0:42:10	Hammerhead shark (depth 175 ft)				Gale Mead
A21-109	5/16/01	A21-109-02	Goff's Caye	0:42:10	0:49:00					Gale Mead

Belize

Date	Dive #	Pilot	Location	Max Depth (ft)
05/11/2001	A21-104	Miguel Alamilla	Jewfish Bank	N/A
05/11/2001	A21-105	Liston McCord	Jewfish Bank	143
05/11/2001	A21-106	Will Heyman	Jewfish Bank	93
05/15/2001	A21-107	Rachel Graham	Gladden Spit	>500
05/15/2001	A21-108	Steve Gittings	Gladden Spit	450
05/16/2001	A21-109	Gale Mead	Goff's Cay	450
05/16/2001	A21-110	Miguel Alamila	Goff's Cay	450
05/16/2001	A21-111	John Halas	Goff's Cay	115
05/16/2001	A21-112	Jose Carriquiry	Goff's Cay	115

Mexico

Date	Dive #	Pilot	Location	Max Depth (ft)
05/19/2001	A22-113	Gale Mead	Banco Chincorro	N/A
05/19/2001	A22-114	Claudia Padilla	Banco Chincorro	320
05/19/2001	A22-115	Laddie Akins	Banco Chincorro	375
05/20/2001	A22-116	John Halas	Banco Chincorro	300
05/20/2001	A22-117	Claudia Padilla	Banco Chincorro	320
05/21/2001	A22-118	Claudia Padilla	Punta Herradura	330
05/21/2001	A22-119	Steve Gittings	Punta Herradura	450
05/23/2001	A22-120	Laddie Akins	Isla Cozumel	515

Belize Activities

Date	Type	Objectives	Location
05/11/2001	Sub Dive A21-104	Miguel Alamilla	Jewfish Bank
05/11/2001	Sub Dive A21-105	Liston McCord	Jewfish Bank
05/11/2001	Sub Dive A21-106	Will Heyman	Jewfish Bank
05/12/2001	Scuba	Collect algae and coral samples	English Cay
05/12/2001	Scuba	Collect algae and coral samples	Goff's Cay
05/12/2001	Scuba	Collect algae and coral samples	Cay Chapel
05/12/2001	Scuba	Collect algae and coral samples	Gallow's Point
05/14/2001	Echosounding	detect deep scattering layer. Layer found 60-100m down	Gladden Spit
05/14/2001	Fishing	collect fish fins from fishermen, however steering was lost on AR1	Gladden Spit
05/14/2001	Hydrocast	Collect water sample	Gladden Spit
05/14/2001	Net Tow	Collect mid-water samples, net tow aborted due to discovery of unmapped pinnacle features	Gladden Spit
05/15/2001	Sub Dive A21-107	Rachel Graham	Gladden Spit
05/15/2001	Sub Dive A21-108	Steve Gittings	Gladden Spit
05/15/2001	Scuba	observe and video tape dog snapper spawning and whale sharks	Gladden Spit
05/15/2001	Sea-Cat	depth profiles for temp and salinity near Gladden Spit	Gladden Spit
05/16/2001	Sub Dive A21-109	Gale Mead	Goff's Cay
05/16/2001	Sub Dive A21-110	Miguel Alamila	Goff's Cay
05/16/2001	Sub Dive A21-111	John Halas	Goff's Cay
05/16/2001	Sub Dive A21-112	Jose Carriquiry	Goff's Cay
05/16/2001	Hydrocast	Collect water sample	Goff's Cay

Belize Annotations

Dive Number	Dive Date	NOAA Tape ID	Target Area	Time Code In	Time Code Out	Fish Observations	Invertebrate Observations	Habitat Observations	Human Impacts	Person Annotating
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:02:45	00:03:00			Coarse sand and rubble on slope		Gittings
A21-108	05/15/2001	A21-108-1A	Gladden Spit	00:13:00	00:14:00		Good closeup of Halimeda? sediment	sediment		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:21:00				Transect over coarse sand and rubble slope		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:22:15	00:23:50			Good image of actual slope below wall, with large boulder, rubble and cobble.		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:29:15			Gorgonian sea van, coralline algae on rocks laying on steep sand slope	rocks laying on steep sand slope		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:32:34		Blackfin snapper, mutton? snapper		base of wall around 360 feet		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:32:39		Almaco jacks				Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:39:05		Unidentified small fish (orange/yellow)				Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:41:08		Whale shark above wall, cruising north		wall		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:41:30	00:42:30	Barracudas in water column above sub				Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:44:43				Fine sediment on slope		Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:48:00		Whale shark high above				Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:49:23						Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:51:55	00:53:20					Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:53:21						Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:56:12		Tattler sea bass				Gittings
A21-108	05/16/2001	A21-108-1A	Gladden Spit	00:57:50				slope		Gittings
A21-108	05/16/2001	A21-108-1B	Gladden Spit	00:00:59	00:01:24			vertical wall	line	Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:01:17	00:02:37		gorgonian corals and sponges	Deep portion of wall, with fine sand on ledges		Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:03:50	00:07:36			slope and wall.		Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:12:50						Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:25:25						Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:26:09						Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:34:06						Gittings
A21-108	05/16/2001	A21-108-2	Gladden Spit	00:37:00						Gittings
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:03:10	00:10:00			Hard bottom with thin layer of sand and silt		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:10:00	00:16:08		occasional soft corals			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:16:08	00:16:52	Unidentified grouper				Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:16:52	00:20:55			slope increasingly steep		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:20:55	00:22:00		soft corals	rock mound		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:22:00	00:22:25		Zoom on small basket star(?) on sea fan.			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:22:25	00:26:20			silty hard bottom		Gale Mead

Dive Number	Dive Date	NOAA Tape ID	Target Area	Time Code In	Time Code Out	Fish Observations	Invertebrate Observations	Habitat Observations	Human Impacts	Person Annotating
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:26:20	00:29:00	small fish	wire corals, sponges	rock formation		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:29:00	00:31:30		Using manip to collect sponge			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:31:30	00:33:00			top of rock mound and across more hard bottom.		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:33:00	00:36:30		some sponges			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:36:30	00:37:30		sponges, soft corals, algae.	Continued to transit over hard silty bottom with occasional small rocks, sponges, soft corals, algae.		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:37:30	00:42:30			rock mound, more hard bottom		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:42:30	00:47:27		sponges, assorted encrusting organisms, and occasional wire corals	steep rocky slope covered with sponges, assorted encrusting organisms, and occasional wire corals. Depth approx 300 ft.		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:47:27	00:47:36	squirrel fish	Barrel sponge			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:47:36	00:48:42			rock wall		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:48:42	00:48:55		Sea whip			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:48:55	00:49:10			Transiting along wall		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:49:10	00:49:14		small sea plume colony			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:49:14	00:49:48			More transiting along wall.		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:49:48	00:50:08	many small fish	Gorgonian, barrel sponge with . small colony of black coral (Antipathes pennacea) Depth probably 230 or so.			Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:50:08	00:51:30		sponges, corals, encrusting orgs on rock wall	rock wall		Gale Mead
A21-109	05/16/2001	A21-109-01	Goff's Caye	00:51:30	00:56:00	small fish: One tobaccofish (?) Numerous juvenile and a few adult sunshinefish, many little purple fish (black cap basslet?) Cherubfish, juvenile parrotfish (striped? princess?) tattler bass. some kind of hind or coney (not clear enough to tell)				Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:00:00	00:06:50			Transiting along wall (very blue. poor vis)		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:06:50	00:07:35	a few small fish with yellow tails and a few little purple fish	closeup moving along section of wall with sponges, scraggly little bits of wire coral and sea whips.	wall		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:07:35	00:11:48			wall		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:11:48	00:14:20	More of those fish with yellow tails (they look like yellowtail snapper but seem too small to be that species). queen(?) angelfish	sponge-covered outcrop	sponge-covered outcrop		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:14:20	00:16:20			wall		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:16:20	00:17:35		sponges	rock outcrop covered with sponges		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:17:35	00:17:45		Black coral colony (Antipathes n. sp.). Depth approx 200.			Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:17:45	00:18:02		Second black coral colony (Antipathes pennacea)			Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:18:02	00:18:42		rock w/ many sponges & encrusting orgs.	rock		Gale Mead

BELIZE ANNOTATIONS

Dive Number	Dive Date	NOAA Tape ID	Target Area	Time Code In	Time Code Out	Fish Observations	Invertebrate Observations	Habitat Observations	Human Impacts	Person Annotating
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:18:42	00:18:50		Another small Antipathes pennacea colony			Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:18:50	00:23:15			wall		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:23:15	00:24:30			base of wall (depth approx 300 ft)		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:24:30	00:28:30			wall face near base		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:28:30	00:30:57	school of little fish	sponges, Halimeda, encrusting orgs,	closer shot of wall near base		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:30:57	00:36:00			wall		Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:36:00	00:39:40					Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:39:40	00:41:55					Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:41:55	00:42:10	Hammerhead shark (depth 175 ft)				Gale Mead
A21-109	05/16/2001	A21-109-02	Goff's Caye	00:42:10	00:49:00					Gale Mead