



**NOAA Teacher at Sea
Clare Wagstaff
Onboard NOAA Ship *Nancy Foster*
September 11 – 18, 2009**

NOAA Teacher at Sea: Clare Wagstaff

NOAA Ship *Nancy Foster*

Mission: Florida Keys coral reef disease and condition survey

Geographical Area: Florida Keys - Dry Tortugas National Park

Date: Monday, September 13, 2009 (Day 3)

Contact Information

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Weather Data from the Bridge (information taken at 12 noon)

Weather: Sunny with scattered showers and thunderstorms

Visibility (nautical miles): 10

Wind Speed (knots): 14

Wave Height (feet): 1-2

Sea Water Temp ($^{\circ}$ C): 29.8

Air Temp ($^{\circ}$ C): 32

Science and Technology Log

Today the dive plan was to survey some of the deeper sites in the FKNMS (Florida Keys National Marine Sancturay) Tortugas Ecological Reserve, referred to as Sherwood Forest. The dive depth varied between 65 to 80 feet. That meant that snorkeling would probably result in me observing very little. My slightly sunburned forehead, needing to get some of my logs composed in more detail, as well as the diving situation, gave me a prime opportunity to stay on the boat for the majority of the day.

So this morning after the dive brief I waved off the team and set out to do some exploring of the ship and do a little more research about what happens before the team actually gets into the water.

The survey teams are planning on making two separate dives on each site to complete the whole of the radial arc transect. The amount of gas each diver requires, depends on a number of variables, including depth, level of physical fitness and amount of activity undertaken in the water. Scuba diving is also limited by a number of factors such as available air, blood nitrogen level, etc.

What is scuba diving?

Scuba is an acronym for Self Contained Underwater Breathing Apparatus. The first commercially successful scuba was developed by Emile Gagnan and Jacques-Yves Cousteau, in 1943 and is now widely used around the world as a recreational sport. Sports divers are normally restricted to 130ft, where as technical deep divers can reach depths much greater. During this trip the maximum dive site depth will not exceed 80ft.

Dive brief – Safety First!

Before each dive the cruise's Dive Master, Sarah Fangman gives the scuba divers a brief run through of the priorities for today's diving. As usual, this means safety is the top priority and Sarah highlights important factors, such as watching your air consumption and making sure that each diver returns with at least 500psi, that each team goes over their dive plan (how deep, for how long, what they will do during the dive), check that all equipment is functioning correctly, and that all the dive data is being recorded. This means prior to the divers getting into the water, their tanks air pressure, Nitrox percentage, name, and time of entry into the water must be logged. Once the dive has ended and the divers are back on the boat, they must once again record their tank air pressure (must be more than 500psi), their bottom depth and sometimes time in the water. Even after the dive is done, the whole team is responsible for each other and has to monitor everyone's condition for at least the next 30 minutes.

What do the divers breath?

The divers are breathing Nitrox. Regular scuba has a very specific ratio of nitrogen to oxygen; it tries to mimic the air found on the surface of the Earth as closely as possible. Nitrox diving, on the other hand, tweaks this mixture to maximize bottom time (i.e., the diver's time spent underwater) and minimize surface intervals (i.e., the time the diver must stay on the surface before diving back in). Before each dive, the individual diver must check his or her own tank for the gases composition and record the oxygen content on their tank. This is because at depths oxygen can actually become toxic.

Science Data Processing

There are two main areas on the *Nancy Foster* designated for the science research, the wet lab and the dry lab. The dry lab is where the computers for data entry and processing are located. It is here that the survey team meetings happen every morning and afternoon to discuss which dives site will be surveyed and how the data entry process is going.



The Wet Lab on the *Nancy Foster*

Lauri MacLaughlin is the ship's resident expert on each dive site and gives a detailed map of each site. This includes compass bearings relating to certain underwater features and the GPS coordinates. The wet lab, is just as the name suggests, wet! This is where any experiments can be carried out and also where the scuba tanks are refilled with Nitrox.

Data entry

Each of the scientists has to transcribe all the data they observed at each dive site. Underwater, the two scientists that are recording data each have a clipboard with the relevant waterproof data forms attached. These forms have a standardised and detailed table, which they then write on using a regular pencil. The data collected on three sheets refers to coral disease, coral bleaching count (for quantity of each species and percentage of bleaching) and coral measurements.

Coral Bleaching Count Data

Date: 9/11/2012 Observer: LAURI MACLAUGHLIN Page 1 of 1 Pages

Site: 44 m (ft) Approach: host-specific disease-specific non-specific Survey Method: Reef 300m grid area

Notes: 93 Surveys

Coral (host) species	Bleaching with death	counts			
		Paling	10-50% Bleaching	50-100% Bleaching	
<i>Acropora cervicornis</i>					
<i>Acropora palmata</i>					4
<i>Agaricia agaricites</i>		(4)	(3)	(5)	35
<i>Colpophyllia natans</i>					
<i>Dendrogyra cylindrus</i>					
<i>Diploria clivosa</i>		(1)			
<i>Dichocoenia stokesii</i>					
<i>Diploria labyrinthiformis</i>					
<i>Diploria strigosa</i>		(2)			2
<i>Gorgonia sp.</i>					34
<i>Montastraea annularis</i>		(2)	(1)		4
<i>Montastraea cavernosa</i>		(12)			27
<i>Montastraea faveolata</i>		(4)			5
<i>Montastraea franksi</i>		(1)			2
<i>Mycetophyllia danaana</i>					
<i>Mycetophyllia ferox</i>					
<i>Mycetophyllia imarckiana</i>					
<i>Porites astreoides</i>					
<i>Siderastrea sidera</i>		(3)			
<i>Solenastrea bournoni</i>		(7)			
<i>Stephanocoenia michelini</i>		(1)			
<i>Pocillopora</i>		(1)			

A coral species count and bleaching data sheet showing the tally of *Montastraea annularis*



Tally charts and acronyms are a plenty, making it difficult for me to understand the hand-jotted notes of the various scientist. Each of them describes the species of coral by its scientific name. However, my limited knowledge is based upon the common name for most species.

I did help Lauri input some of her data today. The tally charts of the number of observed specie are simple enough that I can read and enter the data, along with the size of the first ten individuals of each species. However, after that, the real experts need to get involved!



Geoff Cook entering data from his dive onto a central database in the dry lab.

This data must be entered after each dive into a spreadsheet database so that all the information can be collaborated and processed by the end of the cruise.

Personal Log

This evening our group had the chance to go for a night snorkel around the sea wall of Fort Jefferson. This used to be a fort during the civil war and in more recent years it has been a prison. The objective of the snorkel trip was to hopefully witness the coral spawn. Scientists' observations indicate a strong connection between the coral spawn and seasonal lunar cycles. Though the polyp release cannot be guaranteed to happen on an

exact date, approximately three to ten days after the full moon in late August, early September, the majority of corals in the Caribbean spawn in the late evening. Spawning is when the male and female polyps release their gametes (sperm and eggs). This synchronizing means that there is a greater chance of fertilization. Clues that spawning may take place are swelling that appears at the polyps mouth/anus, where the gametes are released from, as well as brittle stars and fire worms gathering in readiness for a feeding frenzy!

Unfortunately, we did not witness the spawning but we did observe a green moray eel, two Caribbean reef squid, a conch, a scorpion fish, and multiple sea urchins, sea stars, and moon jellyfish.



Clare Wagstaff barely visible behind two Caribbean Reef Squid. Photo courtesy of Mike Henley.

Perhaps one of the most unusual sights of the night was witnessed on our way back to the dock after our snorkel. We observed a tree trunk covered in hundreds of hermit crabs, varying in size. They made a horrible crunching sound as they climbed over each other on their way up the tree and as we accidentally stepped on them in the dark!



Hermit crabs at Fort Jefferson

One of my lasting memories of the evening will be the night sky. It was the most brilliant picture I have ever seen. With no light pollution for miles and a clear evening sky, it made the most perfect picture. It looked like there wasn't a clear inch in the sky for any more stars to fit in it. It was just beautiful and a great way to end the day!