

**SUPER HI-CA Transit**  
Survey of Underwater Plastic and Ecosystem Response  
**General Cruise Plan**

Vessel: R/V *Kilo Moana*, University of Hawaii  
Master of the Vessel: Captain Brian Wehmeyer  
Chief Scientist: Tara Clemente, University of Hawaii  
OTG Marine Technicians: Timothy McGovern and Elly Speicher

*Kilo Moana* phone number: 842-9817, cell # 864-0065

Marine Center phone number: 842-9813

Tara Clemente phone number: 389-0544

Loading: August 23, 2008 @ 1000

Departure: August 25, 2008 @ 0730

Arrival: September 5, 2008 @ 1000

## 1.0 SCIENTIFIC OBJECTIVES

The objective of the cruise is to locate and sample the microbial communities and biogeochemical properties associated with the Pacific plastic patch. Hydrographic and biogeochemical data will be collected to characterize the upper water column. A Manta trawl will be used to map the horizontal and vertical distribution of the plastic patch. Weather forecasts, shipboard ADCP data and satellite images will be used to help us locate the plastic patch which in the past has been located in regions of calm weather between 30-35° N Latitude and 150-130° W Longitude. We plan to occupy two CTD/Trawl stations per day in hopes of locating the plastic patch with approximately 16 stations occupied en route to Port Hueneme, CA. Once the plastic patch has been located we would like to engage in higher resolution sampling with the intent of canceling scheduled CTD/Trawl stations as necessary to ensure an on time arrival in Port Hueneme, CA.

## 1.1 SCIENTIFIC OPERATIONS

<u>Station</u>	<u>Activities</u>
Stations 1-16	CTD (0-150m)/ Manta Trawl/ Optics Operations
Underway Stations 1-14	Various biogeochemical parameter sampling from uncontaminated seawater system
Underway/Continuous	ADCP, Thermosalinograph, fluorometry, pCO <sub>2</sub>

## 2.0 SCIENTIFIC PERSONNEL

<u>Participant</u>	<u>Title</u>	<u>Affiliation</u>
Tara Clemente	Chief Scientist	UH
Jeffery Ernst	Research Associate	AMRF
Allison Fong	Graduate Student	UH
Lucy Marcus	Photo/Videographer	UH
Barbara Mayer	Teacher	Kamehameha

Timothy McGovern	Marine Technician	OTG
Ari Patz	Volunteer	Styrophobia
Elly Speicher	Marine Technician	OTG
Brett Updyke	Research Technician	UH
Donn Viviani	Graduate Student	UH
Kim Weersing	Marine Educator	UH
Jay Wheeler	Research Associate	UH
Angel White	Research Associate	OSU

### 3.0 SUMMARY SCHEDULE

19 August	Pre-cruise Meeting, MSB 305, 1500 hrs
23 August	Ship loading starting at 1000 hrs
25 August	Depart from Snug harbor at 0700 hrs. Science personnel on-board by 0600 hrs
26 Aug – 4 Sept	UW stations 1-14 and Stations 1-16 operations
4 September	Pack, clean labs
5 September	Arrive Port Hueneme, CA. ETA (1000). Offload.

### 4.0 OPERATIONAL PLANS

#### 4.1 UW Stations 1-14

Underway stations will be conducted using the uncontaminated seawater supply system. Water samples for biogeochemical measurements will be collected at each UW station.

#### 4.2 Stations 1-16

Upon arrival on station, a Manta trawl (see section 4.2.1) will be deployed. After the manta trawl operation is complete, a CTD cast to 150m for water column measurements will occur (see section 4.2.2) followed by a PRR cast (see section 4.2.3).

##### 4.2.1 Manta Trawls

A Manta trawl will be deployed for about 120 minutes off the stern. The ship will need to maintain a speed of 1-3 kts while the trawl is in the water. The A-Frame and capstan will be needed for this operation. The Manta trawl is rectangular with an opening of 0.9m x 0.15m and 3.5m long. Wake effects will need to be minimized during this operation.

##### 4.2.2 Water column measurements

Vertical profiles of temperature, conductivity and dissolved oxygen will be made with an instrument package consisting of a Sea-Bird CTD attached to a 24-place rosette with 12 liter sampling bottles. We will need the ship's CTD winch and crane for these operations. Water samples for biogeochemical measurements will also be collected on each cast. All CTD casts will be to 150m with a total of 6 depths sampled per cast.

##### 4.2.3 HYPERPRO Profiling Radiometer

At each station a HYPERPRO profiling radiometer will be deployed from the main deck using the A-frame. This instrument is configured as a free-falling profiler with a detachable float for near surface measurements. The descent rate is ~0.3 m/sec and is set by the amount of weight mounted on the nose cone. The instrument is readied for

deployment on board (powered on) and lowered by hand into the water. We will want to make sure we minimize ship shadow by orienting the ship relative to the sun prior to deployment. If the ship is drifting, Satlantic recommends that the instrument be deployed on the windward side and the cable be paid out by hand slowly; the instrument will be brought to the surface by hand.

#### 4.2.4 Small Boat

We request that the small boat be used to collect large pieces of plastic if found. It is understood that small boat operations are dependent on the wind and sea state conditions.

#### 4.2.5 Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profiler (ADCP) will be in operation during the duration of the cruise. An OTG marine technician will be in charge of the ADCP system. The ADCP data will be used to help locate the plastic patch.

#### 4.2.6 Thermosalinograph, Fluorometer and $p\text{CO}_2$

The ship's thermosalinograph, fluorometer and  $p\text{CO}_2$  sampling the uncontaminated seawater supply system will be in operation during the duration of the cruise while the ship is outside of Snug harbor. An OTG marine technician will be in charge of the thermosalinograph, fluorometer and  $p\text{CO}_2$  operations.

## 5.0 EQUIPMENT

### 5.1 The SUPER HI-CAT science party shall bring the following:

1. One Laboratory van with assorted equipment for radioisotope and general use
2. All required sampling bottles
3. All required chemicals and isotopes
4. Large vacuum waste container
5. One chest freezer  $-20^\circ\text{C}$  (already onboard KM)
6. Dissolved oxygen titration system
7. Pressure filtration system
8. Desktop and laptop personal computers
9. Pertinent MSDS
10. Manta Trawl and towing lines
11. Deck incubation system
12. Assorted laboratory supplies
13. HYPERPRO Optical measuring instrument
14. dissecting microscopes
15. LISST to be mounted on the CTD

### 5.2 We will need to use the following ship's equipment:

1. A-frame
2. A-frame block assembly
3. Port Crane
4. Appleton crane and winch with conducting wire for CTD
5. Electric power for winches (440 VAC, 3 phase, 60 Amp breaker) and vans (208 VAC single phase at 60 amps for lab van, 110 VAC 10 amps for equipment van)
6. Space on upper deck for one lab van port side.

7. Space on upper deck for incubators
8. Hand-held VHF transceivers
9. Precision depth recorder
10. Shackles, sheaves, hooks and lines
11. Shipboard Acoustic Doppler Current Profiler
12. Thermosalinograph,  $p\text{CO}_2$  system, and Fluorometer
13. Copy machine
14. Navlink2 PC or equivalent
15. Running fresh water and seawater, hoses
16. Electronic mail system
17. GPS system
18. Uncontaminated seawater supply
19. Small capstan ( $\sim 10$  m/min)
20. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer,  $p\text{CO}_2$
21. OTG's 24-place rosette, and 24 12-l water sampling bottles.
22. Remote CTD decibar pressure display in the winch operator cabin.
23. OTG's Seabird CTD system, all sensors, deck boxes and computer CTD acquisition systems

**Ship: R/V *KILO MOANA***

**SUPER HI-CA CTD CASTS**

**Aug. 25 – Sept. 5 2008**

Cast		Samples	#Bottles
s1c1	350 m	Mixing Experiment (20@30, 4@350)	24
s2c1- s17-1	150 m	O <sub>2</sub> , Temp, DIC/Alk, Nuts, LLN, LLP, DOC, FCM, ATP, HPLC PC/PN, PPO <sub>4</sub> , P <i>S</i> i, AF (DNA/RNA), DV (BP/Respiration) (4@5, 15, 25, 45, 75, DCM)	24

TIME	Mon. 8/25	Tue. 8/26	Wed. 8/27	Thurs. 8/28	Fri. 8/29
0000					
0100					
0200					
0300					
0400					
0500					
0600	Sci. Personnel onboard				
0700	Depart Snug for Fuel Pier				
0800			Manta Trawl-1	Manta Trawl-3	Manta Trawl-5
0900					
1000		UW-2	S2C1 (150m) HYPERPRO	S4C1 (150m) HYPERPRO	S6C1 (150m) HYPERPRO
1100					
1200					
1300		S1C1 (350m)			
1400					
1500	Depart Fuel Pier		Manta Trawl-2	Manta Trawl-4	Manta Trawl-6
1600					
1700			S3C1 (150m) HYPERPRO	S5C1 (150m) HYPERPRO	S7C1 (150m) HYPERPRO
1800					
1900					
2000					
2100					
2200	UW-1	UW-3	UW-4	UW-5	UW-6
2300					

TIME	Sat. 8/30	Sun. 8/31	Mon. 9/1	Tue. 9/2	Wed. 9/3
0000					
0100					
0200					
0300					
0400					
0500					
0600					
0700					
0800	Manta Trawl-7	Manta Trawl-9	Manta Trawl-11	Manta Trawl-13	Manta Trawl-15
0900					
1000	S8C1 (150m) HYPERPRO	S10C1 (150m) HYPERPRO	S12C1 (150m) HYPERPRO	S14C1 (150m) HYPERPRO	S16C1 (150m) HYPERPRO
1100					
1200					
1300					
1400					
1500	Manta Trawl-8	Manta Trawl-10	Manta Trawl-12	Manta Trawl-14	Manta Trawl-16
1600					
1700	S9C1 (150m) HYPERPRO	S11C1 (150m) HYPERPRO	S13C1 (150m) HYPERPRO	S15C1 (150m) HYPERPRO	S17C1 (150m) HYPERPRO
1800					
1900					
2000					
2100					
2200	UW-7	UW-8	UW-9	UW-10	UW-11
2300					

TIME	Thurs. 9/4	Fri. 9/5	Sat. 9/6	Sun. 9/7	Mon. 9/8
0000					
0100					
0200					
0300					
0400					
0500					
0600					
0700					
0800					
0900					
1000	UW-12	UW-14			
1100					
1200					
1300					
1400					
1500		Arrive: Port Hueneme, CA (?)			
1600					
1700					
1800					
1900					
2000					
2100					
2200	UW-13				
2300					