Hawaii Ocean Time-series
HOT-343 Cruise Plan

Cruise ID: KM 23-11
Vessel: R/V *Kilo Moana*, University of Hawaii
Master of the Vessel: Captain Christopher Amorant
Chief Scientist: Fernando Santiago-Mandujano, University of Hawaii
Marine Technicians: Trevor Young, Benjamin Duncan

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Pre-Cruise Meeting: July 31st, 2023 at 1330 via Zoom
Start pre-embarkation protocols (masking, social distancing): July 29th
COVID Testing: August 4th 0830-0900, Pier 35
Loading: August 4th at 0900, Pier 35.
Departure: August 8th at 0900 (**Science personnel at UHMC by 0800**).
Arrival: August 14th at 0800
Post-Cruise Meeting: August 16th at 1330 via Zoom

1.0 SCIENTIFIC OBJECTIVES

The objective of the cruise is to maintain a collection of hydrographic and biogeochemical data at the Hawaii Ocean Time-series (HOT) stations. Four stations will be occupied during the cruise:

1) Station 1, referred to as Station Kahe, is located at 21° 20.6'N, 158° 16.4'W and will be occupied on August 8th for about 3-4 hours.
2) Station 2, referred to as Station ALOHA, is defined as a circle with a 6 nautical mile radius centered at 22° 45'N, 158°W. This is the main HOT station and will be occupied August 9th – August 13th.
3) Station 50, the site of WHOTS-19 Mooring (anchor position 22° 46.002'N, 157° 53.958'W) will be occupied for about 3-4 hours on August 12th.
4) Station 6, referred to as Station Kaena, is located off Kaena Point at 21° 50.8'N, 158° 21.8'W and will be occupied on August 13th for about 2 hours.

1.1 SCIENTIFIC OPERATIONS

Station	Activities
Kahe (Sta. 1)	Weight Cast, Hyperpro cast, CTD cast (1000 m), Trace Metal CTD
ALOHA (Sta. 2)	Sediment traps, Primary productivity array, Gas array, Net tows, CTD operations, Trace Metal CTD casts, Be-7 cast, McLane pump
WHOTS mooring station (Sta. 50)	One CTD cast (yo-yo to 200 m), Hyperpro, surface instrument intercomparisons.
Kaena (Sta. 6)	One near-bottom CTD cast (~ 2400 m)
Underway/continuous	ADCP, thermosalinograph, fluorometry, meteorology, C-Star

2.0. SCIENCE PERSONNEL

Participant	Title	Affiliation	Citizenship
Katherine Ackerman	Graduate Student	UH	USA
Tyra Arends	Undergrad Student	UH	Canada
Eleanor Bates	Graduate Student	UH	USA
Karin Björkman	Research Specialist	UH	SWE
Brandon Brenes	Research Associate	UH	USA
Clifton Buck	Scientist	UGA	USA
Catherine Crowley	Graduate Student	U of Connecticut	USA
Benjamin Duncan	OTG	UH	USA
Dan Fitzgerald	Research Associate	UH	USA
Carolina Funkey	Research Associate	UH	USA
Julie Granger	Scientist	U of Connecticut	Canada
Charlie Kollman	Graduate Student	UGA	USA
Matthew Miller	Undergrad Student	UH	USA
Justine Murray	Undergrad Student	UH	USA
Dan Ohnemus	Scientist	UGA	USA
Sarah Nance	Undergrad Student	UH	USA
Emma Olson	Undergrad Student	UH	USA
Daniel Repeta	Scientist	WHOI	USA
Tully Rohrer	Research Associate	UH	USA
Dan Sadler	Research Associate	UH	USA
Fernando Santiago-Mandujano	Research Associate	UH	USA
Blake Watkins	Marine Engineer	UH	USA
Angelicque White	Scientist	UH	USA
Trevor Young	OTG	UH	USA

3.0. SUMMARY SCHEDULE

31 July	Pre-cruise planning meeting 1330 hrs, via Zoom.
4 Aug	Equipment loading at 0900 hrs, Pier 35.
8 Aug	Depart from Pier 35 at 0900 hrs. **Science personnel to UHMC by 0800.**
8 Aug	Station 1 Kahe Pt. operations.
9-13 Aug	Station 2 ALOHA operations, Station 50 CTD yo-yo cast, Station 6 deep cast.
14 Aug	Arrive back to Pier 35.
16 Aug	Post-cruise meeting at 1330 hrs via Zoom

4.0. OPERATIONAL PLANS

4.1. Station Kahe (21°20.6'N, 158°16.4'W)

A 1300 lb. weight-test cast to 500 m will be conducted, **including testing of the emergency systems on the docking head of the Hawboldt LARS system.** These tests will include the Manual Anti-2 Block Test, the Auto with LARS Anti 2-block test, and the Auto with LARS switch malfunction test as described in previous cruise plans. A Hyperpro cast (Sect. 4.2.8), one CTD cast to 1000 m (4.2.5), and a Trace Metal CTD cast (4.5) will be conducted at this location. The ship's A-frame, CTD winch, and TM winch will be needed for these operations. After the operations are satisfactorily completed, the ship shall proceed to Station ALOHA.

4.2. Station ALOHA (22°45'N, 158°W with 6 nm radius)

4.2.1. Upon arrival to Station ALOHA, the Sediment Trap Array (Sect 4.2.2) (*) will be deployed. Then a CTD cast will be conducted to determine the depth of the DCM (deep chlorophyll maximum) (S2C1), followed by the Be-7 cast (Sect. 4.6.1), trace metal casts, (Sect. 4.5), Seaglider recovery (Sect. 4.11), and McLane pumping (Sect. 4.6.2). The following day (August 10th) a CTD cast (S2C2) will be conducted to collect water for the primary productivity array, followed by the primary productivity array deployment (Sect. 4.2.3)..

(*) NOTE: The deployment of all drifting array must be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring.
Array tracking is facilitated through the SOEST Cruise and Drifter Tracks tool found at
http://hahana.soest.hawaii.edu/nowcast/loctable.html

4.2.2. Sediment trap array deployment

The floating sediment traps will be from the back of the deck through the A-frame and using the SeaMac winch. After deployment we request that the bridge verify that the radio transmitters are functioning and directionally correct. The Sediment Trap array will consist of one cross with 12 particle interceptor traps (PIT) at 150 m, and one cross above it with 4 traps.

The array will drift for about 70 hours before recovery. The array is equipped with 1 XEOS Iridium transmitter, 1 RockBlock Iridium beacon, strobe lights, and a radio transmitter (see section 6.0 for transmitter IDs). Assistance from the bridge is requested in plotting the drift track of the array. We request the use of the ship's radio direction finder for locating the array before recovery. Blake Watkins will direct this deployment.

4.2.3. Primary production experiment

Samples for the primary productivity experiment will be collected from the rosette. Before dawn (Sunrise 0607 hrs on August 10th), a free drifting incubation array will be deployed from the back of the deck thru the A-frame and using the SeaMac winch. The primary production incubation array will be deployed at a location within Station ALOHA to be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring. (See section 6.0 for Trasmitter IDs).

The array will be recovered around sunset (1908 hrs on August 10th). CTD operations shall continue after recovery. All radioactive waste generated by the experiment shall be returned to the University of Hawaii. Only qualified personnel shall handle radioactive material. Blake Watkins will direct this deployment.

After deployment of the Primary Production Array, the ship shall transit to the center of the station circle to conduct a bottom CTD cast, S2C3 (approximately 4740 m).

4.2.4. 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 be collected on each cast. The cast after the deployment of the Primary Productivity Array shall be made to the near bottom (approximately 4740 m). Following this cast, a series of 1000-m casts shall be made continuously every three hours for a 36-hour period, ending with a second near-bottom cast. It is highly desired that this burst sampling be done without interruption, and we request the ship to maintain position within the study area for that period, and repositioning to the center of the Station before each cast whenever possible.

Whenever pumping of the ship's tanks is needed, it must be conducted outside the circle that defines station ALOHA (Sect. 1.0). To avoid disruptions in the schedule, this operation should be coordinated with the chief scientist or the watch leaders **(Carolina Funkey and Tully Rohrer)**.

4.2.5. Lowered Acoustic Doppler Current Profiler (LADCP)

The LADCP will not be deployed on this cruise.

4.2.6. Gas Array deployment

A free drifting incubation array will be deployed the third day of the cruise at Station ALOHA. Samples for the gas array will be collected from station 2 CTD cast 10. The gas array will be deployed from the back of the deck thru the A-frame and using the SeaMac winch. The gas array will be deployed at a location within Station ALOHA to be determined by observed local and forecasted currents to avoid possible entanglement with the WHOTS mooring. The array is equipped with GPS transmitters, strobe lights and a radio transmitter (See Section 6.0 for transmitter IDs). The ship will **not** need to keep within sight of the array until the time of the recovery, approximately 25 hours after its deployment. Assistance from the bridge is requested in plotting the drift track of the array. Blake Watkins will oversee this deployment.

4.2.7. Hyperpro

The Hyperpro is a profiling unit with one up-looking and one down-looking hyperspectral radiometer, a WET Labs ECO-BB2F triplet (measuring Chlorophyll-*a* fluorescence and backscattering in the blue and red wavelengths), temperature and conductivity sensors. This instrument also incorporates a ship mounted surface radiometer. Around 1400 on the first, third and fifth days, the Hyperpro will be deployed from the stern through a small block hung from the A-frame. The instrument is lowered and retrieved by hand. Each deployment will consist of two profiles and one yo-yo (5 x 20m) before the instrument is retrieved.

4.2.8. Underwater Vision Profiler (UVP)

The UVP will be installed on the rosette inside the frame using clamps provided by HOT. This instrument will require a modified CTD deployment procedure in which the CTD/rosette is lowered into the water and allowed to soak for one minute before being deployed to 15m as rapidly as is safe for the winch. The instrument will only turn on if the average descent rate is >18 m/min. HOT personnel will be responsible for maintaining this instrument before and after CTD casts.

4.2.9. Zooplankton Net Tows

A plankton net will be deployed from the stern and shall be towed for half-hour periods. Half-hour periods are scheduled around noon and midnight on the third, fourth and fifth days (see schedule) for a total of six slots. The A-frame and small capstan will be needed for this operation. Blake Watkins will direct these operations.

4.3 Gas Array and Sediment Trap Array recovery

In the morning of August 13th, the ship shall transit for the recovery of the Gas Array. The A-frame and the Sea-Mac winch will be needed to retrieve the array. After the Gas Array is recovered, the ship shall transit to recover the floating sediment trap array. Blake Watkins will oversee these operations. After the sediment trap array is recovered, the ship shall transit to Station 50.

4.4. Station 50 - WHOTS-19 Mooring

The anchor position of the WHOTS-19 mooring is 22° 46.002'N, 157° 53.958'W. The watch circle of the buoy is about 2 nautical miles. Generally, the buoy stays on the edge of the watch circle. The buoy can be detected via radar in good weather conditions but is harder to detect with larger sea states. Upon arrival at Station 50 on August 12th, one 200 m CTD yo-yo cast and ADCP intercomparisons will be conducted.

4.5. Trace Metal Clean Rosette

Vertical profiles between 0-600m will be conducted for trace metal analysis using a rosette package with autonomous Auto Fire Module. This mini-CTD rosette consists of a SeaBird CTD attached to a 12-place rosette with 8-liter Niskin sampling bottles. The rosette is approximately 5 ft x 5ft x 4 ft and weighs 355/565 lbs

in air empty/full. We will deploy the CTD rosette using the W2 winch, delrin block and 1/4" Amsteel line using trace metal clean procedures from the stern of the vessel using the A-Frame. Eleanor Bates will oversee this operation. **We request the ship's personnel to contact us before doing any trash burning or any cooking that would disseminate smoke to the labs or working area**.

4.6.1. Be-7 Trace Metal Cast

On August 9th a hose will be attached to the Trace Metal Clean CTD and will be held at six depths in the upper 175 m while the deck board pump (120V) fills the tanks (6 x 160-gallon plastic tanks). Each depth will take approximately 30 minutes for a total of 3 hours. The hose reel will need to be set up on deck (43"x43") near the CTD. The group from UGA will be in charge of this operation.

4.6.2. McLane Pumps

Two in-situ pump cast (which involves deployment, pumping at depth for 2-3hr, and recovery) will be conducted on August 9th and 12th. It takes 4-5hr to collect 500-1500L from 4-8 depths in the upper 1000m (with most pumps in the upper 300 m). The pumps have two flow-paths and can collect over multiple filter membranes. The group from UGA will be in charge of this operation.

4.7. Station Kaena (21° 50.8'N, 158° 21.8'W) *TBD*

A near-bottom CTD cast (~2500 m) will be conducted at this location in the evening of August 13th. Once the CTD cast is complete, the ship shall return to Pier 35.

4.8. Acoustic Doppler Current Profiler

The ship's acoustic Doppler current profilers (ADCP) will be in operation during the duration of the cruise. The OTG technicians will oversee the ADCP system.

4.9. Thermosalinograph, Fluorometer and pCO_2

The ship's thermosalinograph, fluorometer and pCO_2 sampling the uncontaminated seawater supply system will be in operation during the duration of the cruise while the ship is outside of Honolulu Harbor. Salinity samples to calibrate the thermosalinograph will be taken from the intake hose at about 4-hour intervals throughout the duration of the cruise by the science personnel. The ship's meteorological system shall be in operation throughout the cruise. Access to real-time underway data through the ship's network will be required. The OTG technicians will oversee the thermosalinograph, fluorometer, and meteorological suite operations.

4.10. Inline C-Star Transmissometer and IFCB

In addition to the continuous thermosalinograph and fluorometer sampling, the inline C-Star Transmissometer will sample continuously from the uncontaminated seawater supply system throughout the duration of the cruise while the ship is outside of Honolulu Harbor. The Imaging Flow CytoBot (IFCB) will also be used on this cruise. Access to real-time underway data through the ship's network is required. UH personnel will oversee these instruments and operations.

4.11. Seaglider 511 Recovery

Seaglider 511 will be recovered on this cruise and if needed acoustic ranging: Interrogate Freq: 12.5kHz, Reply 11.5kHz. B. Watkins will oversee these operations.

Seaglider Location information is auto sent to the tracker web site - https://hahana.soest.hawaii.edu/hot/trackmap/TrackMap.html (however be aware the fix positions update is delayed by approximately 10 mins)

Procedures generally are as follows:

Pickup will need to be scheduled during daylight hours with coordination and timing communicated between the Chief Scientist and the pilot on shore - Steve Poulos, in consultation with Blake Watkins and Captain. **Depending on the strength of the anti-cylonic eddy currents in the area there may be some transiting time to reach the Seaglider**. The intended track of both of the Seaglider will be to profile in or near Station ALOHA, but that is dependent on the currents in the area.

4.12. Video Plankton Recorder (VPR) Cast

A digital autonomous Video Plankton Recorder (VPR) will be deployed multiple times during the cruise. Tow speed 1.5 knots, payout/recovery speed 30 meters per minute using the SeaMac winch. The system should be continuously oscillated between the surface and the maximum line out depth. The orange synthetic Dyneema line shall be used for this deployment. Deployments should be at least 45 minutes in the water. A two-hour block will allow for 3 profiles.

5.0 EQUIPMENT

5.1. The HOT science party shall be bringing the following:

1. Seabird CTD system, all sensors, deck boxes and computer CTD acquisition systems
2. One 20 ft. laboratory van (#23) with assorted equipment for radioisotope and general use, the OTG Rad Van, and one trace metal 20 ft van (#581).
3. Distilled, deionized water and all required chemicals and isotopes
4. Large vacuum waste containers
5. Liquid nitrogen dewars
6. Drifting sediment trap array with strobe lights, satellite and radio transmitters, floats, weights, line, sediment traps and crosses.
7. Drifting primary production array with strobe lights, satellite and radio transmitters, floats, weights, line primary production bottles and spreader bars.
8. Drifting gas array with strobe lights, satellite and radio transmitters, floats, weights, line, 4 L bottles and short mounting bars.
9. Oxygen titration system
10. Plankton nets and towing lines
11. Desktop and laptop personal computers
12. Assorted tools
13. All required sampling bottles
14. Pertinent MSDS
15. SeaFlow
16. Inline C-Star Transmissometer
17. Trace metal clean rosette with 8L Niskin bottles and programmable CTD
18. Underwater Vision Profiler (UVP)
19. Video Plankton Recorder (VPR)
20. Two incubator, baby blue, stored on 02 Deck
21. Hose Reel (43” x 43”)
22. 6 x 160-gallon plastic tanks (3’ diameter)
23. 4 McLane Pumps (32” x15” footprint, total13 sq feet)
24. 3 Caron incubators
25. 24-place rosette, and 24 12-l water sampling bottles (**to be used as primary system**)

2. We will need the use of the following ship's equipment:
   1. A-frame
   2. A-frame block assembly

3. CTD winch
4. Electric power
   -440/480 VAC, 3 phase 60Hz, 60amp for winches
   -208 VAC single phase at 60 amps for lab vans
5. Space on upper 01 deck port side for one 10 ft van **(Equipment van)**
6. Space on upper 01 deck port side for OTG Rad Van
7. Space on upper 01 deck starboard side for trace metal 20 ft van (**#581**)
8. Space on 02 deck for two incubators
9. Space on deck for ~4 deck baskets of array gear
10. Space on deck to secure 6x160-gallon plastic tanks
11. Small capstan (~ 10 m/min)
12. SeaMac Winch
13. W2 winch
14. Radio direction finder
15. Hand-held VHF transceivers
16. Shackles, sheaves, hooks and lines
17. Precision depth recorder
18. Shipboard Acoustic Doppler Current Profiler
19. Thermosalinograph, pCO_2 system, and Fluorometer
20. Meteorological suite
21. Grappling hooks and line
22. Navlink2 PC or equivalent
23. Running fresh water and seawater, hoses
24. Uncontaminated seawater supply
25. Source of compressed air for Trace Metal pump
26. -80°C Freezer
27. 4°C Refrigerator and -20°C Freezer
28. Distilled, deionized water system
29. Email system
30. GPS system
31. Underway/on-station data acquisition system for meteorological instruments, ADCP, thermosalinograph, fluorometer, SeaFlow, and inline C-Star transmissometer and access to real-time data through the network.
32. OTG's 24-place rosette, and 24 12-l water sampling bottles (**to be used as backup**)
33. ~1300 lb weight
34. Remote CTD dbar pressure display in the winch operator area.
35. Monitor in CTD Lab displaying ship coordinates, bottom depth and GMT.
36. OTG's transmissometer
37. OTG's altimeter
38. Trace metal free block
39. Amsteel Line (1/4") for trace metal clean work

6.0 Satellite Position Transmitters Summary

Array Name	RockBlock ID	XEOS ID	Argos ID	Radio Frequency
Sediment Trap (ST)	06	268		CH.68 (156.425 MHz)
Primary Production (PP)	08	266		CH.74 (156.725 MHz)
Gas Array (GA)	08	266		CH.74 (156.725 MHz)

NOTE: Array tracking is facilitated through the SOEST Cruise and Drifter Tracks tool found at http://hahana.soest.hawaii.edu/nowcast/loctable.html

Ship: R/V *Kilo Moana* **HOT 343 CTD CASTS** **Date: August 8-14, 2023**

Cast		Samples	#Bottles
Kahe Pt.			
s1c1	1000 m	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, Chl a, Salts	15
Station ALOHA			
s2c1	200 m	**JG** (8@euphotic zone (TBD)), Salts	10
s2c2	1000 m	Primary Production (3@ 5, 25, 45, 75, 100, 125, 150, 175) Chl a, FCM, Salts	24
s2c3	4740 m (PO-1)	O_2, Temp, DOC, DIC/Alk, pH, Ref Si, Nuts, Salts	24
s2c4	1000 m (PO-2)	O_2, Temp, DOC, DIC/Alk, pH, Nuts, Ref Si, Salts **JG** (pb@5 to 800)	24
s2c5	1000 m	PC/PN, **DL** (pb@5,25,45,75,100,125,150,175), Salts,	22
s2c6	1000 m	PPO4, **DR** (10@DCM(*)), Salts	24
s2c7	1000 m (BEACH)	O_2, Temp, DIC/Alk, pH, Nuts, LLN, LLP, DOC, Keeling, Quay, Salts	23
s2c8	1000 m	Open, **JG** (8@euphotic zone (TBD)), Salts	10
s2c9	1000 m	Gas Array (3@5,25,45,75,100,125), Salts	20
s2c10	1000 m	**MC** (1@5, 25, 45, 75, 100, 125, 150, 175), Salts	10
s2c11	1000 m	PSi, Salts	10
s2c12	1000 m	Open, **JG** (8@euphotic zone (TBD)), Salts	10
s2c13	1000 m	ATP, **SD** (6@20-25(Mixed Layer), Salts	17
s2c14	1000 m	Open, **DR** (12@DCM(*)), Salts	14
s2c15	1000 m	HPLC, Chl a, Salts	14
s2c16	4740 m (PO-3)	Oxygen, Salts	9
WHOTS Mooring			
s50c1	200 m yo-yo	**KM**(1@ 5, MLD, DCM)	3
Kaena			
s6c1	2400 m	Chl a, Salts	13

DR=Dan Repeta, **MC**=Matt Church**, SD** = Sonya Dyhrman, **DL** = Debbie Lindell, **KM**= Kelsey McBeain, **JG**=Julie Granger

(*) 2 bottles above the DCM, 2 below, and 6-8 in the DCM

Ship: R/V *Kilo Moana* HOT 343 Date: August 8 – 14, 2023

TIME	Tuesday 8/8	Wednesday 8/9	Thursday 8/10	Friday 8/11	Saturday 8/12
0000		Arrive ALOHA	Transit to Pump Tanks	VPR Cast	
0100		Deploy Sed Traps			
0200		S2C1 200m cast	S2C2 PP	S2C9 Gas Array	
0300		UGA– Be-7 Pumping			Transit Gas Array
0400			Deploy PP Array	Deploy Gas Array	
0500			S2C3 PO-1 (Deep)	S2C10 Open	Recover Gas Array
0600				Transit to pump tanks Incinerator	Transit Sed Traps
0700		Kite Sampling			Recover Sed Traps
0800	All Sci. Aboard	Trace Metal- D.Repeta 1		S2C11 PSi	Transit to WHOTS
0900	Depart Pier 35	VPR Cast	Kite Sampling	Kite Sampling	
1000			Trace Metal-EB 3	Trace Metal- D.Repeta 2	S52C1 WHOTS
1100		Recover Seaglider 511	S2C4 PO-2 (Begin 36 hr)	S2C12 Open	Kite Sampling
1200	Arrive Kahe Weight Cast		Net Tow	Net Tow Net Tow	
1300	Hyperpro		Hyperpro		Hyperpro
1400	S1C1 Kahe	Transit to Pump Tanks	S2C5 PC/PN	S2C13 ATP	D. Repeta pump
1500	Trace Metal-Olson		Kite Sampling	Trace metal net tows - EB	
1600	Trace Metal- EB 1		Transit to Pump Tanks	Kite Sampling	
1700	Transit to ALOHA	Kite Sampling	S2C6 PPO4	S2C14 Open	
1800		UGA– McLane Pumps1	Transit to PP array Recover PP array	Trace Metal – EB 4	New CTD test cast
1900			Kite Sampling	Pump Tanks	Kite Sampling
2000			S2C7 BEACH	S2C15 HPLC	Transit to pump tanks Incinerator
2100					UGA- McLane Pumps 2
2200	Pump Tanks		Net Tow Net Tow	Net Tow	
2300		Trace Metal- EB 2	S2C8 Open	S2C16 PO-3 (Deep) (end 36 hours)	

August 10th: Sunrise 0607, Sunset 1908

TIME	Sunday 8/13	Monday 8/14
0000		
0100		
0200		
0300		
0400		
0500	New CTD test cast	
0600	Transit to Seaglider	
0700	Transit to pump tanks Incinerator	Arrive to Pier 35
0800	Recover Seaglider 511 (if not recovered earlier)	
0900		
1000		
1100		
1200	VPR Cast	
1300		
1400	Transit to Kaena	
1500		
1600		
1700		
1800		
1900		
2000	S6C1 Kaena	
2100		
2200		
2300		

6.0 HOT-342 Watch Schedule

0300-1500

Dan Fitzgerald
Carolina Funkey- Watch Leader
Dan Sadler – Water Boss
Tyra Arends

1500-0300

Karin Björkman – Water Boss
Brandon Brenes
Tully Rohrer – Console, Watch Leader
Sarah Nance

0900-2100

Fernando Santiago-Mandujano
Justine Murray

At Large

Angelicque White
Eleanor Bates
Charlie Kollman
Clifton Buck
Dan Ohnemus
Blake Watkins
Dan Repeta
Katherine Ackerman
Matthew Miller
Julie Granger
Catherine Crowley
Emma Olson

OTG

Benjamin Duncan
Trevor Young (lead)