

# FINAL CRUISE INSTRUCTIONS

## *ECO-FOCI*

NOAA Ship *Oscar Dyson*, Cruise DY-11-01  
May 10 – May 23, 2011  
Chief Scientist – William Floering, NOAA/PMEL

### 1.0 FINAL CRUISE INSTRUCTIONS

1.1 **Cruise Title** – Ecosystem and Fisheries-Oceanography Coordinated Investigations (Eco-FOCI). Bering Sea Moorings.

1.2 **Cruise Numbers: DY-11-01**

1.2.1 **Cruise Number** – DY-11-01

1.2.2 **Eco-FOCI Number** – 1DY11

1.2.3 **Cruise Dates: May 10 – May 23, 2011**

1.2.4 **Departure** – Kodiak, AK - 10 May 2011 15:00

1.2.5 **Arrival** – Dutch Harbor, AK - 23 May 2011 09:00

1.3 **Operating Area** – Eastern Bering Sea

### 2.0 CRUISE OVERVIEW

2.1 **Cruise Objectives** – The primary objective of this cruise will be mooring operations – including recoveries, deployments and searches - in the Bering Sea. Depending on ice conditions, the following mooring operations will be conducted on this cruise:

OPERATIONS	SITE	LATITUDE	LONGITUDE
Recover/Deploy 1/1	Chiniak Bay1	57° 43.20' N	152° 17.50' W
Recover/Deploy 1/1	Pavlof Bay	55° 10.87' N	161° 41.15' W
Recover/ 1	Bristol Bay (Crab) 2	56° 29.84' N	160° 59.66' W
Recover/Deploy 2/3	Mooring 2	56° 51.23' N	164° 04.54' W
Recover 2	Mooring 4	57° 50.78' N	168° 51.65' W
Recover/Deploy 2/2	Mooring 5	59° 55.00' N	171° 42.24' W
Search 1	Mooring 4	57° 50.78' N	168° 51.65' W

Secondary objectives are to obtain physical, biological, and chemical samples around the moorings and at selected stations along the 70 m isobath.

2.2 **Applicability** - These instructions, with *FOCI Standard Operating Instructions for NOAA Ship Oscar Dyson*, dated November 11, 2005, present complete information for this cruise.

### 2.3 Participating Organizations

NOAA - Pacific Marine Environmental Laboratory (PMEL)  
7600 Sand Point Way N.E., Seattle, Washington 98115-6439

NOAA – Alaska Fisheries Science Center (AFSC)  
7600 Sand Point Way N.E., Seattle, Washington 98115-6439

### 2.4 Personnel

#### 2.4.1 Chief Scientist

Name	Gender	Nationality	Affiliation	E-mail Address
William Floering	M	USA	PMEL	<a href="mailto:William.Floering@noaa.gov">William.Floering@noaa.gov</a>

#### Other Participating Scientists –

Name	Gender	Nationality	Affiliation	E-mail Address
Carol Dewitt	F	USA	PMEL	<a href="mailto:Carol.DeWitt@noaa.gov">Carol.DeWitt@noaa.gov</a>
Scott McKeever	M	USA	PMEL	<a href="mailto:Scott.McKeever@noaa.gov">Scott.McKeever@noaa.gov</a>
Dr. Peter Proctor	M	USA	PMEL	<a href="mailto:Peter.proctor@noaa.gov">Peter.proctor@noaa.gov</a>
Benjamin Bloss	M	USA	PMEL	<a href="mailto:Benjamin.Bloss@noaa.gov">Benjamin.Bloss@noaa.gov</a>
Matt. Wilson	M	USA	AFSC	<a href="mailto:Matt.Wilson@noaa.gov">Matt.Wilson@noaa.gov</a>
Jay Clark	M	USA	AFSC	<a href="mailto:Jay.Clark@noaa.gov">Jay.Clark@noaa.gov</a>
Eurico D'Sa	M	USA?	Louisiana State U	<a href="mailto:ejdsa@lsu.edu">ejdsa@lsu.edu</a>
Darren Depew	M	USA	Louisiana State U	<a href="mailto:Joker1@lsu.edu">Joker1@lsu.edu</a>
Kelly Keebler	F	USA	Lamont	<a href="mailto:kjk2135@ldeo.columbia.edu">kjk2135@ldeo.columbia.edu</a>
Natalie Monacci	F	USA	UAF	<a href="mailto:nmonacci@alaska.edu">nmonacci@alaska.edu</a>
Dan Naber	M	USA	UAF	<a href="mailto:dnaber@alaska.edu">dnaber@alaska.edu</a>
Sam Denes	M	USA	Penn. State	

#### 2.4.2 Foreign Nationals None

### 2.5 Administration

#### 2.5.1 Ship Operations

Marine Operations Center, Pacific  
1801 Fairview Avenue East, Seattle, Washington 98102-3767  
Telephone: (206) 553-4548  
Fax: (206) 553-1109

LCDR Demian Bailey

Chief, Operations Division, Pacific (MOP1)  
Telephone: (206) 553-8705  
Cellular: (206) 518-1941  
E-mail: chiefops.MOP@noaa.gov

### 2.5.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL  
Telephone: (206) 526-6453  
E-mail: [Phyllis.Stabeno@noaa.gov](mailto:Phyllis.Stabeno@noaa.gov)

Dr. Jeffrey Napp, AFSC  
Telephone: (206) 526-4148  
E-mail: [Jeff.Napp@noaa.gov](mailto:Jeff.Napp@noaa.gov)

## 3.0 OPERATIONS

**3.1.1 Scientific Computer System (SCS)** - The ship's SCS shall operate throughout the cruise, acquiring and logging data from navigation, meteorological, oceanographic, and fisheries sensors. See **FOCI Standard Operating Instructions for NOAA Ship Oscar Dyson** (SOI 5.2) for specific requirements.

**3.2 Staging Plan** – The ship will be loaded in Seattle before the cruise. Scientists will board in Kodiak, AK on May 10, 2011. Equipment to board in Kodiak will be hand carried or lifted with the ship's crane. Scientists will be responsible for transporting it to the ship. Due to the delayed arrival in Kodiak equipment scheduled to transfer from the R/V *Thompson* and the R/V *Tiglux* on May 1<sup>st</sup> will need to be moved and stored until May 10<sup>th</sup>. We are requesting access to the NOAA Kodiak City Pier warehouse and use of the folk lift for the temporary storage.

**3.3 De-staging Plan** – The physical oceanographic equipment will be off-loaded in Dutch Harbor and barged to Seattle. The scientific party will be responsible for arranging vehicles for moving their equipment from the docks. The biological oceanographic equipment will remain on the ship for the following cruise (DY-11-02, A. Dougherty, Chief Scientist).

**3.4 Cruise Plan** – Due to the time of the year that this cruise occurs, the amount of mooring work accomplished and the order of operations will be highly dependent on ice, weather and daylight conditions. Based on the past several years, the ship may not be able to reach Bering Sea site 5 or its surrounding sites. As we work northward along the 70m isobath line from Site 2 to 4 to 5, we will occupy a series of CTD stations between the mooring sites.

**The ship will depart on Friday, April ??, 2011 for Kodiak, AK.**

- a) **Chiniak Bay** – Prior to mooring operations, a calibration CTD will be completed. Mooring operations will consist of recovering one subsurface mooring and deploying one subsurface mooring. No CTD will be required after the mooring deployment.
- b) **Pavlof Bay** – Prior to mooring operations, a calibration CTD will be completed. Mooring operations will consist of recovering one subsurface mooring and deploying one subsurface mooring. No CTD will be required after this mooring deployment.
- c) **Bristol Bay** – Prior to these mooring operations, a calibration CTD will be completed. Mooring operations will consist of recovering one subsurface mooring.
- d) **FOCI Bering Sea Site 2** – Depending on arrival timing, we will either proceed with

mooring operations or with the CTD “box”. Prior to mooring operations, calibration CTDs (with nutrient and chlorophyll samples) will be completed. Mooring operations will consist of recovering two subsurface moorings and deploying one surface and two subsurface moorings. After the completion of all mooring operations, a CTD, with nutrient and chlorophyll samples, a MARMAP Bongo tow with 20 and 60 cm bongos and triplicate CalVET tows will be completed approximately 0.3 mile from the mooring site. At the four stations surrounding Site 2, a CTD and 20/60 bongo tow will be completed, as well as a ring net (vertical ) tow.

- e) **FOCI Bering Sea Site 4** – If ice conditions allow, the ship will transit from FOCI Bering Sea Site 2 to FOCI Bering Sea Site 4. Depending on arrival timing, we will either proceed with mooring operations or with the CTD “box”. Prior to mooring operations, a calibration CTD (with nutrient and chlorophyll samples) will be completed. Mooring operations will consist of recovering two subsurface moorings. After the completion of all mooring operations, a CTD, with nutrient and chlorophyll samples, a MARMAP Bongo tow with 20 and 60 cm bongos and triplicate CalVET tows will be completed approximately 0.3 mile from the mooring site. At the four stations surrounding Site 2, a CTD and 20/60 bongo tow will be completed, as well as a ring net (vertical ) tow.
- f) **FOCI Bering Sea Site 5** – If ice conditions and time allow, the ship will transit from FOCI Bering Sea Site 4 to FOCI Bering Sea Site 5. Depending on arrival timing, we will either proceed with mooring operations or with the CTD “box”. Prior to mooring operations, a calibration CTD (with nutrient and chlorophyll samples), a MARMAP Bongo tow with 20 and 60 cm bongos and triplicate CalVET tows will be completed. Mooring operations will consist of recovering and redeploying two subsurface moorings. After the completion of all mooring operations, a CTD will be completed. A CTD, with nutrient and chlorophyll samples and a 20/60 Bongo tow will be completed at the four stations surrounding Site 5, as well as a ring net (vertical ) tow.
- g) **Mooring Search M4.** Depending on weather and daylight conditions, a mooring search for a subsurface mooring (09BSP-4B) will be conducted either before or after the mooring recovery/deployment operations. The mooring we will be searching for was deployed during a FREEMAN cruise in September 2009. In September 2010, the mooring did not respond and an 18 hr search was conducted. A search plan – that takes into consideration the previous search – will be provided to the ship in the final cruise instructions.
- h) **Pribilof Canyon, Cape Newenham or Unimak Pass CTD transects** – If time allows, we will complete a series of CTD transects across Pribilof canyon, or along the Cape Newenham line, or a box of stations around Unimak Pass. Which of these transects will be occupied will depend on weather and ice conditions.
- i) **70 m Isobath Line** - CTDs will be deployed at each station along the isobath with collection of samples for salinity, chlorophyll, and nutrients. 20/60 cm bongos will be deployed at every other station for collection of mesozooplankton.

**3.5 Station Locations** – See accompanying file **OD1101\_draft\_itin.xls**.

**3.6 Station Operations** - The following are operations to be conducted on this cruise. The procedures for these operations are listed in the **FOCI Standard Operating Instructions for**

**NOAA Ship Oscar Dyson** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- CTD/Water Sample Operations (SOI 3.2.1)
- Chlorophyll and Nutrient Sampling Operations (SOI 3.2.10)
- MARMAP Bongo Tows (SOI 3.2.2)
- CalVET vertical tows
- Ring Net (vertical) Tows
- Dissolved Oxygen Sampling
- SIMRAD EK-60 and 12 Khz Simrad ES-60 Scientific Echosounder Monitoring (SOI 3.2.12)
- Simrad ME-70 Downward-Facing Multi-Beam Sonar
- Recovery and deployment of surface and subsurface moorings

**3.7 Underway Operations** - The following are underway operations to be conducted on this cruise. The procedures for these operations are listed in the **FOCI Standard Operating Instructions for NOAA Ship Oscar Dyson** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- Acoustic Doppler Current Profiler (ADCP) Operations (SOI 3.2.14.1)
- Scientific Computer System (SCS) data acquisition (SOI 3.2.14.2)
- Fluorometer monitoring (SOI 5.3)
- Thermosalinograph monitoring (SOI 5.3)
- CO2 system monitoring (New installation this year)

**3.8 Applicable Restrictions** - None

**3.9 Small Boat Operations** – Small boat operations may be requested to assist with mooring operations

## **4.0 FACILITIES**

### **4.1 Equipment and Capabilities Provided by Ship**

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD
- 12 Khz hull mounted Edgetech Acoustic release transducer
- Oceanographic winch with slip rings and 3-conductor cable terminated for the SBE 19plus SEACAT for net tow operations
- Sea-Bird Electronics' SBE 911*plus* CTD system with stand each CTD system should include underwater CTD weights and pinger. There should be a deck unit for the system
- Sea-Bird Electronics' SBE-19+ SEACAT system
- 5 or 10-liter Niskin sampling bottles for use with rosette (10 plus 4 spares)
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary)
- Wire speed indicators and readout for oceanographic winches

- For meteorological observations: 2 anemometers (one R. M. Young system interfaced to the SCS) calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph
- Freezer space for storage of chemical samples (both blast and storage freezers, -20° C and -80° C) turned on and operating
- SIMRAD ES-60 and EK-60 echosounder
- Simrad ME-70 Downward-Facing Multi-Beam Sonar
- JRC JFV-200R color sounder recorder
- RD Instruments' ADCP written to CD
- Use of PCs in laboratories for data analysis
- Scientific Computer System (SCS)
- Minimum of 2 computers with internet and e-mail access
- Removable stern platform (in place)
- Laboratory space with storage space
- Seawater hoses and nozzles to wash nets
- Aft leading non-conductive wire winch
- Adequate deck lighting for night-time operations
- Navigational equipment including GPS and radar
- Safety harnesses for working on quarterdeck and fantail
- Ship's crane(s) used for loading and/or deploying

#### **4.2 Equipment and Capabilities Provided by Scientists**

- Fluorometer, light meter and dual oxygen sensors to be mounted on CTD
- Conductivity and temperature sensor package to provide dual sensors on the CTD (backup)
- Sea-Bird Electronics' SBE-19+ SEACAT system (backup)
- 20 cm and 60 cm Bongo sampling arrays
- CalVET sampler
- Manual wire indicator
- Surface mooring (FOCI biophysical platform)
- Subsurface moorings
- Miscellaneous scientific sampling and processing equipment
- Chlorophyll and nutrient sampling equipment
- Winkler Oxygen Analysis Rig
- pCO<sub>2</sub> system installed in flow through system

### **5.0 DISPOSITION OF DATA AND REPORTS**

**5.1** The following data products will be included in the cruise data package:

- NOAA Form 77-13d - Deck Log - Weather Observation Sheets
- Electronic Marine Operations Abstracts
- SCS backup
- Calibration Sheets for all ship's instruments used
- CTD Cast Information/Rosette Log
- ADCP Log Sheets

- ADCP CD (CD-RW)
- Ultra-cold Freezer Temperature Daily Log (SOI 5.4)

**5.2 Pre- and Post-cruise Meetings** - Cruise meetings may be held in accordance with **FOCI Standard Operating Instructions for NOAA Ship Oscar Dyson** (SOI 5.5).

## 6.0 ADDITIONAL PROJECTS

**6.1 Definition** - Ancillary and piggyback projects are secondary to the objectives of the cruise and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force.

**6.2 Ancillary Projects** - Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the **NOAA Fleet Standing Ancillary Instructions**.

**6.3 Piggyback Projects** -. Kelly Keebler from Lamont Doherty Earth Observatory at Columbia University and Eurico D'Sa from University of Louisiana, will also be collecting and analyzing water samples. A few times, they will deploy an optical package to calibrate satellite chlorophyll measurement.

**7.0 HAZARDOUS MATERIALS** The field party chief shall be responsible for complying with MOCDOC 15, Fleet Environmental Compliance #07, Hazardous Material and Hazardous Waste Management Requirements of Visiting Scientists. July 2002

### 7.1 Inventory

Chemical	CAS Number	Respondee	Org	Qty	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN #	Response Indices
Battery, Lithium	mixture	DeWitt	PMEL	*	2	2	3	General	9	II	3090	
Tributyltin Oxide	56-35-9	DeWitt	PMEL	6 oz.	3	1	0	Poison	N. R.			1
Battery, Lithium Tadiran	mixture	Strausz	PMEL	384	1	1	2	General	9	II	3090	
Formaldehyde, 37%	50-00-0	Wilson/Clark	AFSC	3, 20-L	3	2	2	Flammable	3 & 8	III	1198	1
Sodium Borate Solution, Saturated	n/a	Wilson/Clark	AFSC	20-L	1	0	0	General	Not regulated	N/A		2
Reagent Alcohol, 95%	n/a	Wilson/Clark	AFSC	2, 4 liters	3	3	1	Flammable	3	II, III	1187	1
Ethyl Alcohol, 100%, genetics grade	64-17-5	Wilson/Clark	AFSC	2, 4 liters	2	3	1	Flammable	3	II, III	1170	1

Ethylene glycol	107-21-1	Wilson/Clark	AFSC	250 ml	2	1	1	General	Not regulated	N/A	2
<b>Spill Response 1:</b> Stop the leak, if possible. Ventilate the space involved. Absorb, sweep up, and place in container for disposal. Shut off or remove all ignition sources. Prevent waterway contamination. Construct a dike to prevent spreading. Collect run-off (water) and transfer to drums or tanks for later disposal.											

\* Lithium and Alkaline battery quantities as follows:

5 Seacats each with a 3 DD cell lithium battery pack and two tributyltin oxide anti-fouling cylinders

3 ECO-fluorometers each with a 6 9V lithium battery pack

7 Microcats each with twelve 3.6V AA lithium batteries assembled in a pack and 2 anti-fouling cylinders

18 SBE-39s (each SBE-39 has one 9V lithium battery)

8 MTRs (each with a 9V alkaline battery)

384 – Lithium Tadiran TL-5930 “D” cell sized batteries  
(In 12 32 cell battery packs)

6 – Alkaline Battery Packs (126 D cell alkaline batteries in each pack) (AWCP)

48 – Hybrid Layer Capacitors (4 in each 32 cell battery pack)

Spare batteries, in a hazmat can:

12 9-V lithium batteries

1 box of 12 lithium 3.6V AA batteries (unassembled)

12 9-V alkaline batteries

12 D cell alkaline batteries

8 packs of anti-fouling cylinders

## 7.2 Material Safety Data Sheet (MSDS)

MSDSs will be forwarded separately.

## 8.0 MISCELLANEOUS

**8.1 Communications** - Specific information on how to contact the NOAA Ship *Oscar Dyson* and all other fleet vessels can be found at:

<http://www.moc.noaa.gov/phone.htm>

## 8.2 Important Telephone and Facsimile Numbers and E-mail Addresses

### 8.2.1 Pacific Marine Environmental Laboratory (PMEL):

FOCI - Ocean Environmental Research Division (OERD2):

- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:

- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

E-Mail: FirstName.LastName@noaa.gov

### **8.2.2 Alaska Fisheries Science Center (AFSC):**

FOCI - Resource Assessment and Conservation Engineering (RACE):

- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

E-Mail: FirstName.LastName@noaa.gov

### **8.2.3 NOAA Ship Oscar Dyson - Telephone methods listed in order of increasing expense:**

United States Coast Guard - Kodiak, Alaska

- (907) 486-0553 USCG Operations

Cellular:

- CO 206-403-8433
- XO 206-295-0775
- OPS/OOD 206-295-0550

Iridium:

- 808-659-0050

INMARSAT B

- 011-872-336-995-921 ( fax)
- 011-872-336-995-920 (voice)
- 
- Dutch Harbor Cell CO 907-359-1801
- Dutch Harbor Cell XO 907-359-1802

### **8.2.4 Marine Operations Center, Pacific (MOP):**

Operations Division (MOP1)

- (206) 553-4548 (voice)
- (206) 553-1109 (facsimile)

E-Mail: FirstName.LastName@noaa.gov

E-Mail to Radio Room: Radio.Room@noaa.gov

## **8.3 Foreign National Access and Deemed Export Controls on NMAO Vessels**

None

## 9.0 APPENDICES

### 9.1 Equipment Inventory

One surface mooring donut, bridle and tower - 1,500 lbs - 8ft wide 16 ft tall.

One anchor for surface moorings - 4,500 lbs - 4ft x 3 ft

Surface mooring chain 4,500 lbs

Subsurface mooring anchors (railroad wheels):

2 X 2200 lbs

4 X 1,600 lbs

300 Khz ADCP in syn. Foam float - 600 lbs x 3

TAPS-8 instrument package in syntactic foam float - 1,000 lbs

Steel floats for subsurface moorings - 3,000 lbs

Acoustic releases 150 lbs x 9 or 10

Aurals - 100 lbs x 3

Rain gauge - 50 lbs x 1 or 2

AWCP - 300 lbs x 2

Misc instruments and cages 1,500 lbs

Equipment footlockers, shackles, chain - 200 lbs x 2

Mooring chain on spools - 400 lbs x 3

Grapple hooks and chains - 300 lbs

Bongo frames, nets, CalVET, and weight - 150 lbs

9.2 Figure 1. Proposed stations excluding the recovery/deployment site in Chiniak Bay ( Kodiak, AK). It is unlikely that ice conditions will allow us to occupy the stations north of M5 on the figure, however the field party will have sufficient supplies to occupy these stations, if possible.

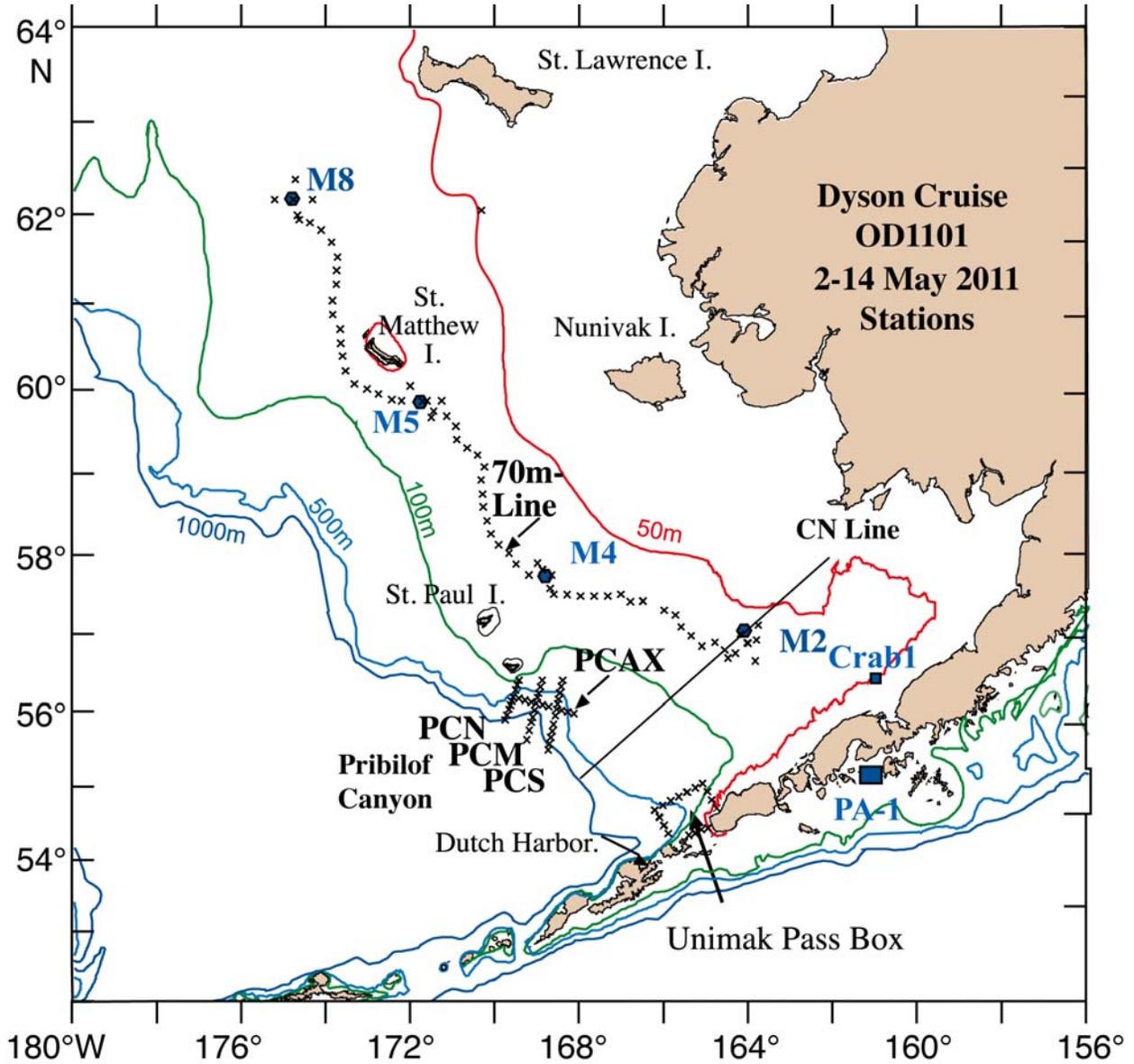


Table 1. Activities around the mooring sites

Area	Activity	Latitude			Longitude		
Chiniak Bay	CTD at 10CB-1A	57	43.2	N	152	17.5	W
	Recover 10CB-1A	57	43.2	N	152	17.5	W
	Deploy 11CB-1A	57	43.2	N	152	17.5	W
Pavlof Bay	CTD at 10PA-1A	55°	10.9	N	161°	41.2	W
	Recover 10PA-1A	55°	10.9	N	161°	41.2	W
	Deploy 11PA-1A	55°	10.9	N	161°	41.2	W
Bristol Bay	CTD at 10KC-2A	56°	30.0	N	161°	00.0	W
	Recover 10KC-2A	56°	30.0	N	161°	00.0	W
BS Site 2	CTDs (2) at site 2 chlorophylls, O2 and nutrients <b>0.3 mi away fm mrg site</b>	56°	52.500'	N	164°	03.000'	W
	Recover 10BS-2C	56°	51.8'	N	164°	03.7'	W
	Recover 10BSP-2B	56°	51.6'	N	164°	03.8'	W
	Deploy 11BSM-2A	56°	52.0'	N	164°	03.0'	W
	Deploy 11BSP-2A	56°	52.0'	N	164°	03.0'	W
	Deploy 11BST-2A	56°	52.0'	N	164°	03.0'	W
	20/60 cm bongo (150/333 nets) - site 2	56°	52.500'	N	164°	03.000'	W
	CalVET (triplicate) - site 2	56°	52.500'	N	164°	03.000'	W
	CTDs (3) at site 2 chlorophylls, O2 and nutrients <b>0.3 mi away fm mrg site</b>	56°	52.500'	N	164°	03.000'	W
	CTD - site 2/south chlorophylls	56	40.00	N	163	52.00	W

Area	Activity	Latitude			Longitude		
	20/60 cm bongo (150/333 nets) - site 2/south	56	40.00	N	163	52.00	W
	CTD - site 2/east chlorophylls	56	56.50	N	163	50.01	W
	CTD - site 2/north chlorophylls	57	01.00	N	164	13.00	W
	20/60 cm bongo (150/333 nets) - site 2/north	57	01.00	N	164	13.00	W
	20/60 cm bongo (150/333 nets) - site 2/west	56	46.00	N	164	20.00	W
	CTD - site 2/west chlorophylls	56	46.00	N	164	20.00	W
BS Site 4	CTDs (2) at site 4 chlorophylls and nutrients <b>0.3 mi away fm mrg site</b>	57°	52.200'	N	168°	53.000'	W
	Recover 10BS-4B	57°	51.0'	N	168°	52.5'	W
	Recover 10BSP-4B	57°	51.0'	N	168°	52.0'	W
	20/60 cm bongo (150/333 nets) - site 4	57°	51.500'	N	168°	53.000'	W
	CalVET (triplicate) - site 4	57°	51.500'	N	168°	53.000'	W
	20/60 bongo - site 4 south	57°	39.200	N	169°	1.200	W
	CTD - site 4 south chlorophylls	57°	39.200	N	169°	1.200	W
	20/60 bongo - site 4 east	57°	46.000	N	168°	28.000	W
	CTD - site 4 east chlorophylls	57°	46.000	N	168°	28.000	W
	CTD - site 4 north chlorophylls	58°	4.000	N	168°	43.800	W

BS Site 5	20/60 bongo - site 4 north	58°	4.000	N	168°	43.800	W
	CTD - site 4 west chlorophylls	57°	55.600	N	169°	19.300	W
	20/60 bongo - site 4 west	57°	55.600	N	169°	19.300	W
	20/60 bongo - site 5 south	59°	42.000	N	171°	30.000	W
	CTD - site 5 south chlorophylls	59°	42.000	N	171°	30.000	W
	20/60 bongo - site 5 east	59°	53.880	N	171°	15.500	W
	CTD - site 5 east chlorophylls	59°	53.880	N	171°	15.500	W
	CTD - site 5 north chlorophylls	60°	4.500	N	172°	0.000	W
	20/60 bongo - site 5 north	60°	4.500	N	172°	0.000	W
	CTD - site 5 west chlorophylls	59°	53.880	N	172°	10.000	W
	20/60 bongo - site 5 west	59°	53.880	N	172°	10.000	W
	CTDs (2) at site 5chlorophylls and nutrients <b>0.3 mi away fm mrg site</b>	59°	54.998'	N	171°	42.244'	W
	Recover 10BS-5B	59°	54.6'	N	171°	42.0'	W
	Recover 10BSP-5B	59°	54.6'	N	171°	42.5'	W
	Deploy 11BSP-5A	59°	55'	N	171°	42.00'	W
	Deploy 11BS-5A	59°	55'	N	171°	42.0'	W
	CTDs (2) at site 5 chlorophylls and nutrients <b>0.3 mi away fm mrg site</b>	59°	54.998'	N	171°	42.244'	W
	20/60 cm bongo (150/333 nets) - site 5	59°	54.998'	N	171°	42.244'	W
	CalVET (triplicate) - site 5	59°	54.998'	N	171°	42.244'	W

Table 2. The proposed Itinerary for OD1101.

Sta Name	Activity	Lat.	lat-min	H	Long	lon-min	H	CTD Depth (m)
Kodiak Is	DEPART	57	43.4297	N	152	31.53	W	
Chiniak Bay1	CTD/MRG	57	43.25	N	152	17.51	W	
wpt	wpt	57	43.200	N	152	0.00	W	
wpt	wpt	56	50.000	N	153	0.00	W	
wpt	wpt	56	25.000	N	154	0.00	W	
Pavlof Bay1	CTD/MRG	55	10.9	N	161	41.2	W	
Unimak Pass	on Transit	54	16.000	N	165	0.00	W	
Bristol Bay	CTD/MRG	56	30.0	N	161	0.0	W	
CTD - M2E	CTD/BON	56	56.500	N	163	50.010	W	65
CTD - M2N	CTD/BON	57	1.000	N	164	13.000	W	68
CTD - M2W	CTD/BON	56	46.000	N	164	20.000	W	70
CTD -M2S	CTD/BON	56	40.000	N	163	52.000	W	68
70M2/M2	Mooring	56	52	N	164	3.0	W	69
70M2/M2	3 CalVETs	56	54.000	N	164	3.200	W	68
70M2/M2	CTD/BON	56	54.000	N	164	3.200	W	68
70M3	CTD/BON	56	48.500	N	164	35.000	W	68
70M4	CTD	56	54.560	N	164	49.650	W	67
70M5	CTD/BON	56	51.540	N	165	7.370	W	68
70M6	CTD	56	59.610	N	165	22.650	W	67
70M7	CTD/BON	57	6.400	N	165	36.800	W	65
70M8	CTD	57	15.730	N	165	44.830	W	65
70M9	CTD/BON	57	19.260	N	166	0.670	W	65
70M10	CTD	57	19.340	N	166	19.580	W	65
70M11	CTD/BON	57	26.280	N	166	30.750	W	65
70M12	CTD	57	25.720	N	166	48.720	W	65
70M13	CTD/BON	57	31.340	N	167	2.290	W	65
70M14	CTD	57	29.960	N	167	20.650	W	66
70M15	CTD/BON	57	30.070	N	167	39.910	W	67
70M16	CTD	57	30.040	N	167	59.170	W	66
70M17	CTD/BON	57	31.210	N	168	18.240	W	74
70M18	CTD	57	31.440	N	168	36.810	W	73

70m19-M4S	CTD/BON	57	36.000	N	168	42.000	W	70
CTD - M4E	CTD/BON	57	46.000	N	168	40.000	W	69
70M21/M4	3 CalVETs	57	50.000	N	168	53.201	W	68
70M21/M4	CTD/BON	57	50.000	N	168	53.201	W	68
70M21 M4-go1 mi away	M4 mooring site	57	51.0	N	168	52.5	W	68
CTD - M4N	CTD/BON	57	55.000	N	169	0.000	W	66
70M23	CTD/BON	57	54.420	N	169	30.000	W	65
70M24	CTD	58	2.530	N	169	40.350	W	64
70M25	CTD/BON	58	8.830	N	169	55.090	W	66
70M26	CTD	58	16.920	N	170	5.680	W	67
70M27	CTD/BON	58	26.770	N	170	11.140	W	68
70M28	CTD	58	37.020	N	170	16.530	W	67
70M29	CTD/BON	58	46.460	N	170	17.620	W	66
70M30	CTD	58	56.900	N	170	19.640	W	67
70M31	CTD/BON	59	6.410	N	170	14.810	W	64
70M32	CTD	59	14.820	N	170	24.730	W	63
70M33	CTD/BON	59	20.120	N	170	39.350	W	65
70M34	CTD	59	26.140	N	170	54.360	W	81
70M35	CTD/BON	59	35.700	N	170	55.370	W	80
70M36	CTD	59	42.930	N	171	8.390	W	79
70M37	CTD/BON	59	46.620	N	171	26.980	W	78
M5E	CTD/BON	59	53.880	N	171	15.500	W	76
CTD - M5S	CTD/BON	59	42.000	N	171	30.000	W	75
70m38/M5	3 CalVETs	59	53.500	N	171	42.660	W	74
70m38/M5	M5 mooring site	59	54.6	N	171	42.0	W	74
70m38M5	CTD/BON	59	54.580	N	171	42.460	W	74
70M38 - M5N	CTD/BON	60	4.500	N	172	0.000	W	72
70M39 M5W	CTD/BON	59	53.880	N	172	10.000	W	71
70M40	CTD	59	54.690	N	172	26.110	W	72
70M41	CTD/BON	59	58.690	N	172	44.770	W	73
70M42	CTD	60	2.230	N	173	0.390	W	74

70M43	CTD/BON	60	6.030	N	173	19.000	W	75
70M44	CTD	60	15.100	N	173	31.300	W	65
70M45	CTD/BON	60	25.500	N	173	35.500	W	55
70M46	CTD	60	34.310	N	173	38.370	W	63
70M47	CTD/BON	60	44.330	N	173	38.880	W	67
70M48	CTD	60	54.440	N	173	49.480	W	78
70M49	CTD/BON	61	3.940	N	173	49.760	W	74
70M50	CTD	61	14.990	N	173	44.450	W	70
70M51	CTD/BON	61	24.640	N	173	44.170	W	70
70M52	CTD	61	33.610	N	173	42.730	W	67
70M53	CTD/BON	61	43.640	N	173	51.280	W	66
70M54	CTD	61	51.730	N	174	5.656	W	66
70M55	CTD/BON	61	56.600	N	174	21.850	W	68
70M56	CTD	62	1.590	N	174	39.520	W	69
m8-S	CTD/BON	61	58.5	N	174	37.02	W	65
M8	CALVETS	62	12	N	174	45	W	65
M8	CTD/BON	62	12	N	174	45	W	65
M8-N	CTD/BON	62	25.3	N	174	42	W	75
M8W	CTD/BON	62	12	N	175	12	W	75
M8E/SL12a	CTD/BON	62	12	N	174	18	W	65
M8	NOT a Station-Moorng site-	62	11.6	N	174	40.1	W	66
M8	CTD	62	11.6	N	174	40.1	W	65