

CRUISE RESULTS

NOAA FRV *Gloria Michelle*
Gulf of Maine Northern Shrimp Survey
GM 08-02, Parts I-IV
20 July-16 August, 2008

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For further information, contact Peter Chase, NOAA Fisheries, Northeast Fisheries Science Center, Woods Hole, Massachusetts 02543-1097. Phone (508) 495-2348; Peter.Chase@noaa.gov.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

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INTRODUCTION

This report summarizes results of the 2008 survey cruise for northern shrimp, *Pandalus borealis*, in the western Gulf of Maine. This was the 25th survey conducted by the Northeast Fisheries Science Center (NEFSC) in cooperation with the Northern Shrimp Technical Committee of the Atlantic States Marine Fisheries Commission. The survey is designed to provide data required for annual stock assessments and related tasks.

METHODS

The survey cruise was conducted from 20 July-16 August 2008 aboard the FRV *Gloria Michelle*, a 72-foot, 96 gross registered ton (GRT) stern trawler powered by a 365 horsepower Caterpillar diesel engine. Fieldwork was overseen by NEFSC staff. Participants included one member of the Atlantic States Marine Fisheries Commission and other personnel from the NEFSC and state agencies of Maine and Massachusetts (see Appendix I).

A stratified random sampling design was used to select stations sampled during the survey (Figure 1). Stations were allocated to strata roughly in proportion to the area of the strata and additional non-random stations were also occupied. Field work was conducted during daylight hours in recognition of diel changes in northern shrimp availability. The survey was comprised of four parts; Part I was during 20-25 July; Part II, 28 July-1 August; Part III, 4-8 August; Part IV, 11-16 August 2008. The vessel departed Woods Hole, MA and made planned intermediate port calls in Portland, ME and Gloucester, MA, before returning to Woods Hole, MA. Locations of stations sampled during each part are given in Figure 2.

At each station, a 15 minute tow was made at a vessel speed of two knots. Gear consisted of a four-seam modified commercial shrimp trawl fished at a scope of 3:1 in depths up to and including 85 fathoms; in depths between 86-100 fathoms, 250 fathoms of wire was used; and in depths greater than 100 fathoms, the scope was 2.5:1. Reference/hull surface temperatures and meteorological observations were recorded at each station. The Vemco minilogger for Windows Base stations was used to record the bottom temperatures during the survey. Northstar Technical Inc. Netmind Trawl Monitor System was utilized to monitor trawl gear performance on most tows during the survey. Headrope height, wingspread and doorspread of the trawl were transmitted and logged electronically.

At most stations, a 2 kilogram (kg) sample of Pandalid shrimp was collected for determination of species composition. Length frequency measurements were collected for northern shrimp (mid-dorsal carapace length, rounded down to the nearest tenth of a millimeter) in addition to sex and female spawning condition (Rasmussen 1953; McCrary 1971). When less than 2 kg of shrimp were caught at a station, the entire catch was processed as described above.

For other species of invertebrates and finfish, standard NEFSC bottom trawl survey techniques (Azarovitz 1981, Grosslein 1969) were used to process the catch. Bony fish were measured to the nearest centimeter (cm) to the end of the central caudal ray; American lobsters were measured in millimeters (mm) from eye socket to end of carapace; and carapace width (cm) was recorded for crabs. Bivalves were measured by shell height (cm) and cephalopods were measured by mantle length (cm). All species weights were recorded to the nearest 0.001 kg. The remainder of the catch (miscellaneous invertebrates, trash, etc.) was recorded by volume. Total and individual weights and length information for shrimp and all other measured species were recorded directly into the Fisheries Scientific Computer System (FSCS).

RESULTS

A total of 69 stations were occupied. Northern shrimp were collected at 59 stations (Table 1). There were 16 non-random fixed stations. Strata 2, tow 3 had the highest total number of northern shrimp while the lowest number was taken in Strata 3, tow 7.

All shrimp, finfish, and select invertebrate data have been audited and archived in computer data files (total weight, number, and length frequencies). Scientific sample collections are summarized in Table 2. This information is available on request (refer to NEFSC Survey Master Data files Cruise Code 200870).

REFERENCES

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- Grosslein, M. D. 1969. Groundfish survey methods. NMFS, Woods Hole, Lab. Ref. Doc. 69-2, 34p.
- McCrary, J. A. 1971. Sternal spines as a characteristic for differentiating between females of some Pandalidae. *J. Fish. Res. Board Can.*, 28: 98-100.
- Rasmussen, B. 1953. On the geographical variation in growth and sexual development of the deep-sea prawn (*Pandalus borealis* kr.). *Norway Fish. Mar. Invest. Rep.*, 10 (3); 1-160.

Table 1. Summary of station and northern shrimp collected on the 2008 northern shrimp survey in the western Gulf of Maine aboard the FRV Gloria Michelle, 20 July – 16 August, 2008.

STRATUM-TOW	STATION	LATITUDE	LONGITUDE	DEPTH (m)	BOTTOM TEMP (C)	TOTAL NO. <= 22 (mm)	TOTAL NO. > 22 (mm)	TOTAL NUMBER	TOTAL WEIGHT (kg)
2-3	1	42 23	70 31	85	4.9	16,590	4,480	21,070	100.68
2-2	2	42 32	70 25	107	--	4,826	3,388	8,214	41.90
1-1	5	42 47	70 28	100	5.8	6,904	1,192	8,096	27.70
1-3	6	43 13	70 07	143	--	10,802	6,729	17,531	101.94
3-5	7	43 19	69 47	174	5.5	6,588	7,884	14,472	100.85
3-10	9	43 31	69 46	119	5.4	9,154	5,200	14,354	87.95
3-6	10	43 24	69 52	156	5.5	5,115	6,206	11,321	83.73
3-2	11	43 40	69 32	130	5.6	2,173	2,417	4,590	34.39
6-4	12	43 37	69 24	130	5.4	3,977	3,131	7,108	50.71
6-5	13	43 29	69 22	160	5.2	2,440	6,506	8,946	74.51
6-3	14	43 24	69 22	171	5.2	2,130	6,943	9,073	70.74
6-12	15	43 20	69 21	171	5.2	1,214	7,697	8,911	75.36
6-10	16	43 22	69 04	162	5.3	1,376	4,133	5,509	45.81
6-9	17	43 29	69 11	153	5.2	2,107	4,487	6,594	53.38
6-8	18	43 34	69 03	130	5.5	3,461	4,037	7,498	54.98
8-5	19	43 37	68 56	116	6.0	628	852	1,480	10.80
8-9	20	43 32	68 48	144	6.5	1,125	2,155	3,280	26.09
8-7	21	43 38	68 38	152	6.5	1,719	3,633	5,352	43.29
10-5	22	43 35	68 29	169	6.6	119	2,694	2,813	28.84
10-2	23	43 32	68 19	188	6.7	10	1,672	1,682	17.98
10-4	24	43 16	68 20	177	6.0	36	1,702	1,738	17.55
10-3	25	43 12	68 11	193	6.4	15	3,054	3,069	29.80
10-1	26	42 52	68 01	187	7.5	0	177	177	2.05
3-7	27	43 07	69 33	115	5.2	1	3	4	0.03
3-8	28	43 12	69 57	145	5.2	8,496	1,323	9,819	39.20
3-1	29	43 08	69 58	143	5.2	2,003	531	2,534	12.03
3-3	30	43 08	69 49	171	5.2	1,771	5,284	7,055	57.31
3-11	31	43 06	69 46	161	5.7	5,981	10,256	16,237	116.66
3-9	32	42 59	69 35	162	5.7	813	1,597	2,410	18.60
6-7	33	43 06	69 25	168	5.7	547	4,888	5,435	50.29
8-6	34	43 11	68 55	167	5.8	251	1,826	2,077	19.14
6-11	35	43 09	69 09	186	5.8	132	1,122	1,254	11.52
6-15	36	43 00	69 13	204	5.8	210	6,213	6,423	59.76
6-1	37	42 56	69 03	172	5.8	195	1,120	1,315	13.00
6-13	39	42 52	69 02	189	5.4	48	1,221	1,269	13.98
8-8	40	42 59	68 50	180	5.4	154	2,798	2,952	27.59
8-1	41	42 59	68 42	178	5.4	59	1,825	1,884	19.02
8-10	43	43 01	68 35	181	5.4	178	3,614	3,792	34.53
8-4	44	42 59	68 35	182	5.4	160	3,454	3,614	33.05
8-2	45	42 38	68 44	177	6.6	38	431	469	4.46
6-6	47	42 53	69 09	172	5.4	253	1,553	1,806	17.76
7-5	48	42 38	69 14	207	5.4	19	376	395	4.21
7-3	49	42 41	69 22	211	5.4	7	1,148	1,155	12.92

STRATUM-TOW	STATION	LATITUDE	LONGITUDE	DEPTH (m)	BOTTOM TEMP C	TOTAL NO. <= 22 (mm)	TOTAL NO. > 22 (mm)	TOTAL NUMBER	TOTAL WEIGHT (kg)
2-6	51	42 32	70 22	132	6.0	11,731	2,601	14,332	61.84
1-4	52	42 53	70 28	113	5.2	13,682	1,954	15,636	55.45
4-1	54	42 31	69 56	168	5.9	1,560	617	2,177	11.34
4-3	55	42 37	69 57	172	5.8	1,718	875	2,593	14.25
5-1	56	42 29	69 52	209	6.6	235	969	1,204	11.15
5-3	57	42 21	69 31	223	6.5	4	113	117	1.51
7-4	58	42 19	69 24	222	6.4	2	277	279	3.85
7-6	59	42 28	69 02	217	7.0	70	820	890	9.23
9-1	60	42 32	68 47	197	7.1	12	382	394	4.28
9-3	61	42 14	68 40	193	5.9	44	324	368	3.58
9-2	62	42 16	68 40	199	6.1	48	458	506	4.98
7-1	64	42 09	69 11	188	6.1	109	802	911	8.55
7-2	65	42 07	69 19	200	6.4	94	848	942	9.50
5-5	66	42 08	69 34	225	6.7	6	377	383	4.95
5-4	67	42 10	69 41	231	6.7	8	68	76	3.02
5-2	68	42 12	69 48	214	6.5	8	109	117	1.16

Table 2. Miscellaneous scientific collections made on the 2008 northern shrimp survey in the western Gulf of Maine aboard the FRV *Gloria Michelle*, 20 July – 16 August, 2008.

Investigator & Affiliation	Samples Saved	Approximate Number
Age Samples, NMFS, NEFSC, Woods Hole, MA	Goosefish	16 vertebrae
Age Samples, NMFS, NEFSC, Woods Hole, MA	White Hake	182 otoliths
John Galbraith, NMFS, NEFSC, Woods Hole, MA	Various species	1 indiv.
Michelle Staudinger, U. of Massachusetts, Amherst, MA	Illex squid	132 indiv.
Mark Wuenschel, NMFS, NEFSC, Woods Hole, MA	Various species	147 indiv.

Figure 1. Northern shrimp survey strata and observed distribution of catch per tow (kg) of northern shrimp collected during the 2008 survey in the western Gulf of Maine aboard the FRV *Gloria Michelle*, 20 July to 16 August, 2008. Stations 3, 4, 8, 38, 42, 46, 50, 53 and 63 were bad tows due to gear problems and not shown in this figure.

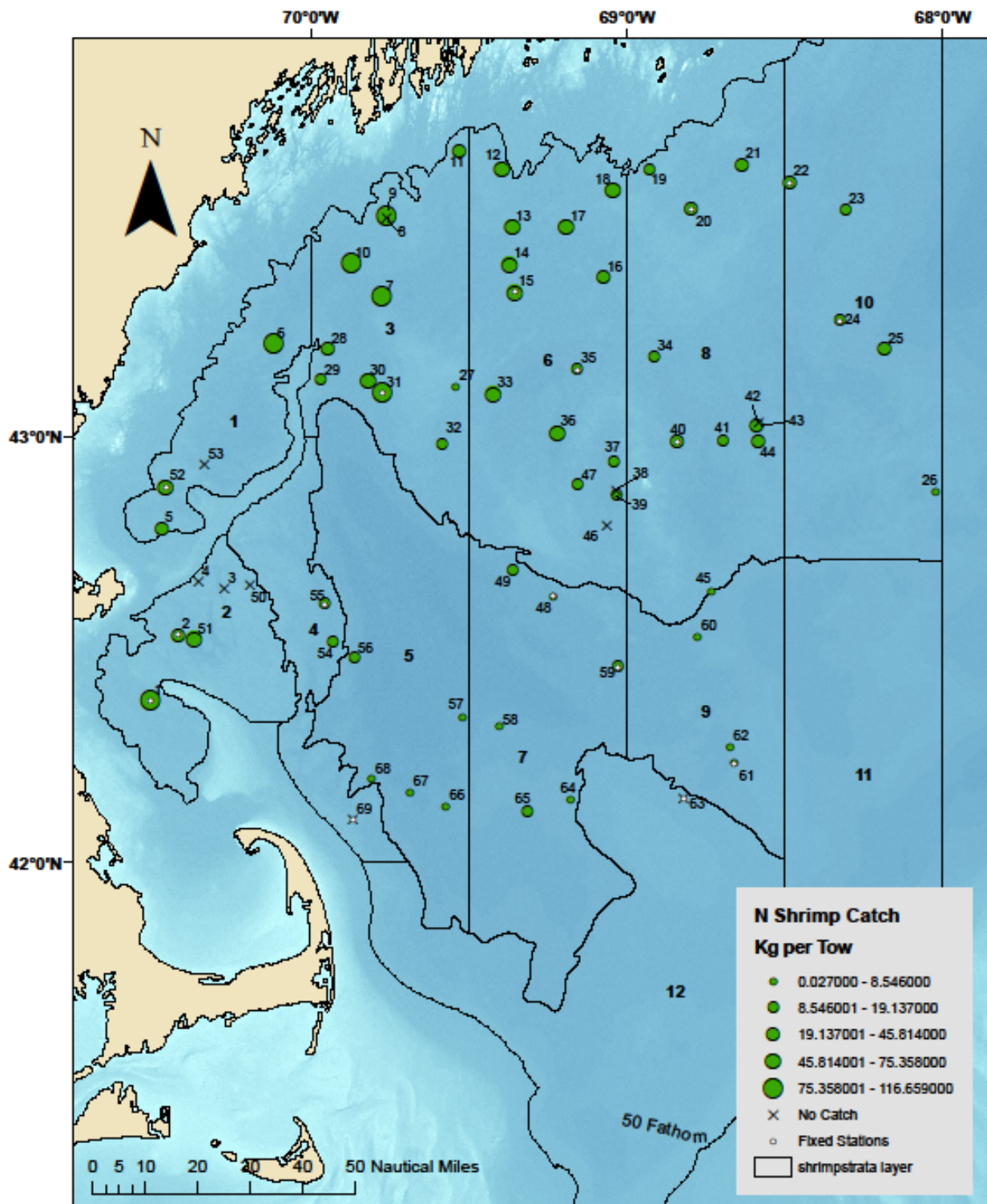
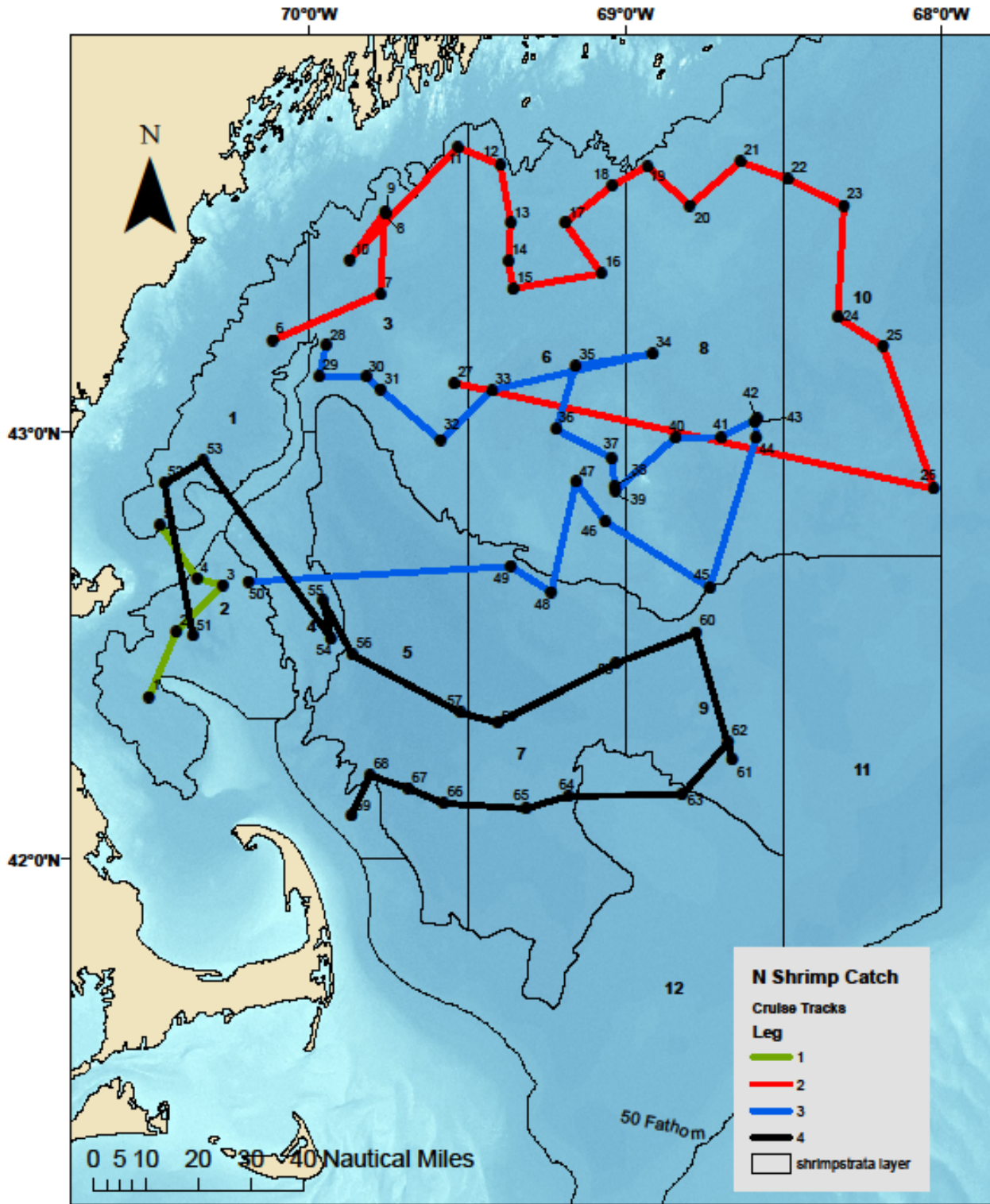


Figure 2. Trawl hauls made from the FRV *Gloria Michelle*, during the National Marine Fisheries Service, Northeast Fisheries Science Center summer northern shrimp survey (GM 08-02), 20 July to 16 August, 2008.



Appendix I. Participants on the 2008 northern shrimp survey cruise in the western Gulf of Maine, aboard the FRV *Gloria Michelle*, 20 July to 16 August, 2008.

National Marine Fisheries Service, NEFSC, Woods Hole, MA

Peter Chase, Chief Scientist^{1,2}
Rob Johnston, Chief Scientist⁴
Kevin McIntosh, Chief Scientist^{3, participant 1}
Paul Kostovick^{1,4}
Alicia Long³
Sandy Sutherland²
Grace Thornton³

MA Division of Marine Fisheries, Gloucester, MA

Bill Hoffman⁴
Brant McAfee²
Mark Rousseau⁴

MA Division of Marine Fisheries, New Bedford, MA

Robert Glenn³
Tracy Pugh³
Derek Perry²
Kelly Whitmore³
Steve Wilcox¹

ME Department of Health and Human Services, Augusta, ME

Judith Angsten⁴
Paul Gregory²

ME Department of Marine Resources, Boothbay, ME

Caitlin Cleaver⁴
Lessie White¹

Atlantic States Marine Fisheries Commission, Washington, DC

Toni Kerns²
Brad Spear¹

Deckhands

Andrew Hall⁴
Carl Rhodes¹⁻³
William Sutter¹⁻⁴

NOAA, NEFSC, Woods Hole, MA
NOAA, NWFSC, Seattle, WA
Wiscasset, ME

¹ 20-25 July, Part I

² 28 July-1 August, Part II

³ 4-8 August, Part III

⁴ 11-16 August, Part IV