CRUISE RESULTS

NOAA FRV *GLORIA MICHELLE*
Gulf of Maine Northern Shrimp Survey
(Parts I-III)
23 July – 11 August, 2006

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INTRODUCTION

This report summarizes results of the 2006 survey cruise for northern shrimp, *Pandalus borealis,* in the western Gulf of Maine. This was the 23rd 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 between 23 July – 11 August 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 to account for diel changes in northern shrimp availability. The survey was comprised of three parts; Part I was during 23-28 July; Part II, 30 July – 4 August; Part III, 6-11 August 2006. The vessel departed Woods Hole, MA and headed to Portland, ME; Portland, ME to Gloucester, MA; and Gloucester, MA 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 for most tows during the survey. Headrope height, wingspread and doorspread of the trawl were transmitted and logged electronically.

When feasible, 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 from the nearest centimeter (cm) to the end of the central caudal ray; American lobster 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 54 stations were occupied. Northern shrimp were taken at 41 stations (Table 1). There were 13 non-random fixed stations. Strata 1, tow 7 had the highest total number of northern shrimp while the lowest number was taken in Strata 4, tow 1.

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 (200670).

REFERENCES

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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 2006 northern shrimp survey in the western Gulf of Maine aboard the FRV GLORIA MICHELLE, 23 July – 11 August 2006.

Stratum – Tow	Station	Latitude	Longitude	Depth (m)	Bottom Temp (C)	Total No. <= 22 (mm)	Total No. > 22 (mm)	Weight (kg)	Total Number
08 – 03	1	42 57	68 41	190	7.7	7472	3082	65.42	10554
08 – 08	2	42 59	68 50	178	7.5	5099	2218	45.11	7317
08 – 01	3	43 11	68 52	177	7.4	10197	3067	71.49	13264
08 – 05	4	43 17	68 55	148	7.0	9710	2221	64.58	11931
08 – 07	5	43 16	68 45	147	7.1	24869	1197	123.19	26066
10 – 02	7	43 35	68 29	173	7.4	2305	2903	42.25	5208
08 – 02	8	43 38	68 40	149	7.5	9799	2788	75.88	12587
06 – 01	10	43 32	69 04	113	6.5	9467	431	42.53	9898
03 – 06	13	43 24	69 35	170	6.7	8722	4581	85.72	13303
03 – 04	14	43 10	69 44	137	6.3	3542	1837	34.86	5379
03 – 02	15	43 14	69 31	146	6.2	25369	9169	191.84	34538
06 – 07	16	43 15	69 22	177	6.8	10709	4419	97.52	15128
06 – 03	17	43 14	69 09	178	7.0	2125	506	12.67	2631
06 – 02	20	43 02	69 17	178	6.5	13243	5873	120.95	19116
06 – 08	21	42 56	69 19	155	6.4	18657	5533	143.04	24190
06 – 10	22	42 57	69 21	179	6.4	14481	5504	128.05	19985
06 – 09	23	42 53	69 27	162	6.7	7889	1914	57.83	9803
03 – 07	24	42 50	69 33	171	7.0	9264	3038	76.33	12302
05 – 02	25	42 47	69 38	217	7.4	3722	3450	52.71	7172
03 – 01	26	43 06	69 47	162	6.9	19989	4934	140.77	24923
03 – 09	27	43 07	69 51	174	7.1	13400	6298	126.69	19698
03 – 03	28	43 05	69 57	181	7.3	5715	5677	87.30	11392
03 – 08	29	43 14	69 51	174	7.3	6063	5170	89.88	11233
03 – 05	30	43 21	69 56	154	6.2	25759	8960	202.88	34719
01 – 07	33	43 14	70 04	152	6.1	42300	15480	344.74	57780
01 – 05	34	43 10	70 07	153	6.1	33929	9825	247.78	43754
01 – 01	35	43 03	70 18	138	5.8	25080	6555	175.16	31635
01 – 02	36	42 59	70 15	165	5.8	16200	9931	269.43	26131
01 – 06	37	42 55	70 19	150	5.9	11315	6441	115.97	17756
02 – 02	38	42 24	70 30	89	6.8	35276	5302	182.07	40578
02 – 01	39	42 32	70 26	101	6.5	8340	480	20.93	8820
04 – 01	40	42 41	70 08	113	6.0	255	35	1.43	290
04 – 03	41	42 38	69 55	179	7.2	6361	3404	66.68	9765
04 – 02	42	42 36	69 56	170	7.2	5178	1173	37.92	6351
05 – 01	43	42 52	69 56	208	7.4	7198	4415	84.31	11613
05 – 03	44	42 53	69 46	216	7.4	646	2222	28.75	2868
07 – 07	46	42 40	69 24	223	7.7	1830	2540	36.78	4370
07 – 05	47	42 38	69 15	211	7.7	1857	1746	27.09	3603
07 – 06	50	42 26	69 06	223	8.1	401	990	12.34	1391
08 – 06	51	42 34	68 57	206	8.1	791	1224	18.33	2015
08 – 04	52	42 38	68 40	194		1614	1597	23.65	3211

Table 2. Miscellaneous scientific collections made on the 2006 northern shrimp survey in the western Gulf of Maine aboard the FRV GLORIA MICHELLE, 23 July – 11 August, 2006.

Investigator & Affiliation	Samples Saved	Approximate Number
Aquarium, NMFS, NEFSC, Woods Hole, MA	Shrimp	48 bags
Peter Chase, NMFS, NEFSC, Woods Hole, MA	Wolffish	3 indiv.
Jay Burnett, NMFS, NEFSC, Woods Hole, MA	Goosefish vertebrae	10 indiv.
Steven Searcy, UMASS, Dartmouth, MA	Alewife	14 indiv.
Katherine Sosebee, NMFS, NEFSC, Woods Hole, MA	White hake otoliths	75 indiv.

Figure 1. Northern shrimp survey strata and observed distribution of catch per tow (kg) of northern shrimp collected during the 2006 survey in the western Gulf of Maine aboard the FRV GLORIA MICHELLE, 23 July – 11 August, 2006.

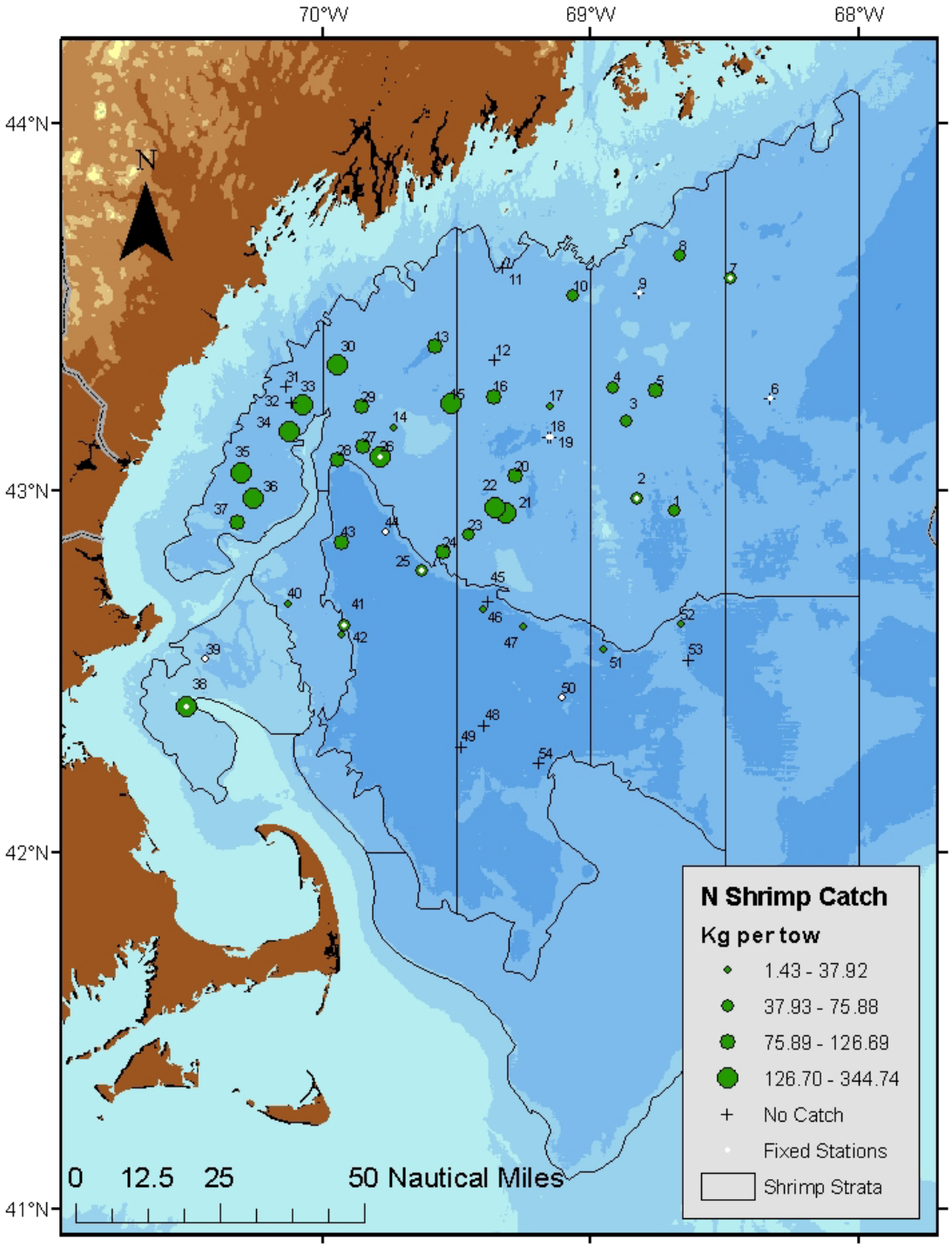
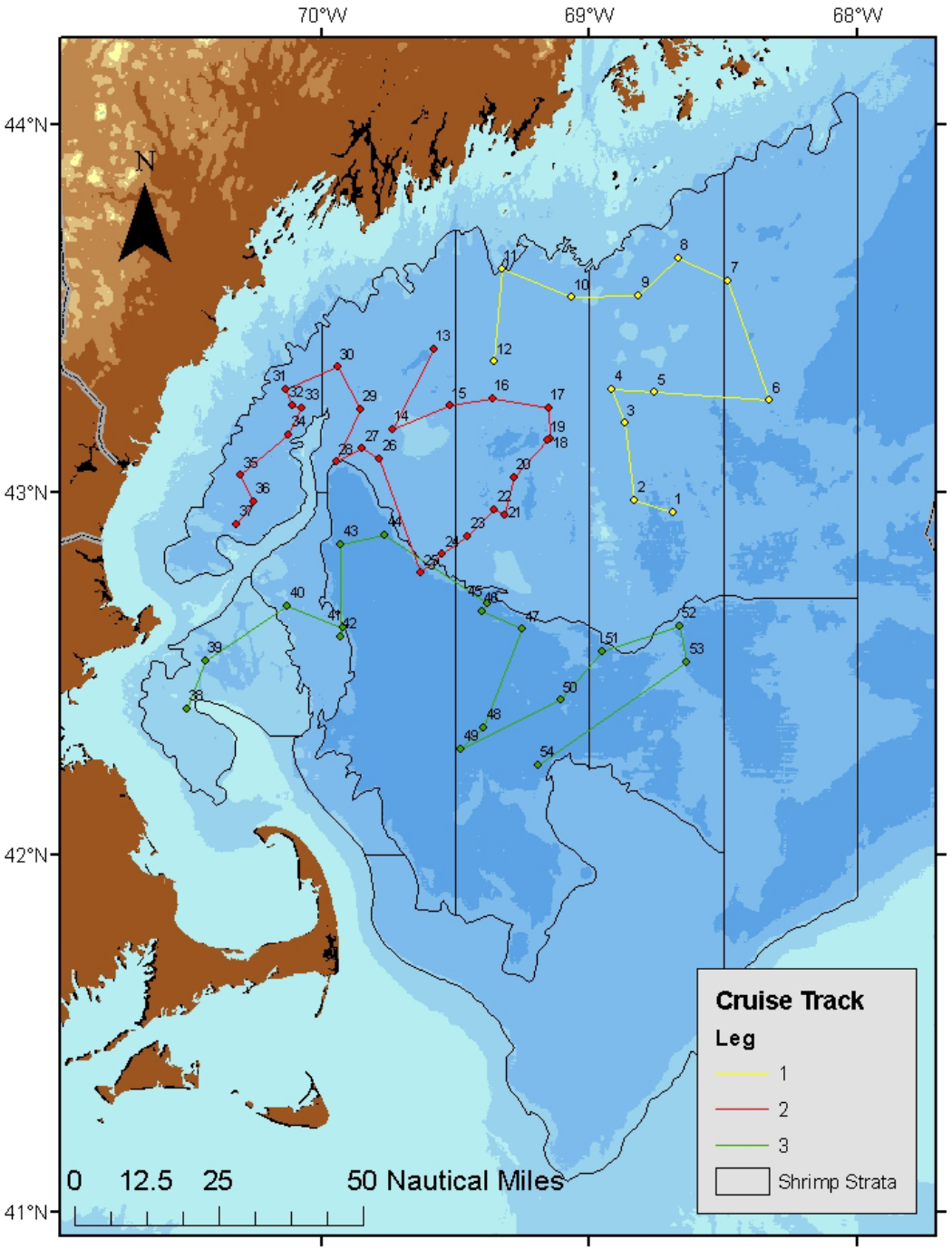


Figure 2. Trawl hauls made from the FRV GLORIA MICHELLE, during the National Marine Fisheries Service, Northeast Fisheries Science Center summer northern shrimp survey (06-70), 23 July – 11 August, 2006.



Appendix I. Participants on the 2006 northern shrimp survey cruise in the western Gulf of Maine, aboard the FRV GLORIA MICHELLE, 23 July – 11 August, 2006.

National Marine Fisheries Service, NEFSC, Woods Hole, MA
Peter Chase, Chief Scientist[1,2]
Stacy Rowe, Chief Scientist[3]
Charles Keith[1]
Alicia Long[3]
Tiffany Vidal[2]
Kevin McIntosh[1]
Sandra Sutherland[2]

MA Division of Marine Fisheries, Gloucester, MA
Mark Rousseau[3]

MA Division of Marine Fisheries, Pocasset, MA
Robert Glenn[2]
Jeremy King[1]

ME Department of Marine Resources, West Boothbay Harbor, ME
Judith Angsten[3]
Laurice Churchill[3]
Lessie White[1]
Charles Woodbury[3]

Atlantic States Marine Fisheries Commission, Washington, DC
Brad Spear[1]

National Marine Fisheries Service, Northeast Regional Office, Gloucester, MA
Sarah Thompson[2]

University of New Hampshire, Durham, NH
Megan Heidenreich[2]

Deckhands
Matthew P. Berg[1]NOAA Corps, Pascagoula, MS
Erich Bohaboy[2,3]NOAA SW Region, Santa Rosa, CA
William Sutter[1,2,3]Boothbay Harbor, ME

[1] 23 – 28 July, Part I
[2] 30 July – 4 August, Part II
[3] 6 – 11 August, Part III