

performance on most survey tows. Doorspread, wingspread, vertical opening, and bottom contact of the trawl were transmitted and logged electronically. A Seabird long-endurance CTD was attached to the headrope of the net for each tow to collect temperature, depth, and conductivity data. This was the 4th year we have collected salinity data using a net-mounted CTD during a shrimp survey and its use was considered experimental.

A 2 kilogram (kg) sample of Pandalid shrimp was collected at most stations to determine 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 lengths for shrimp and all other measured species were recorded directly into the Fisheries Scientific Computer System (FSCS), version 2.0.

RESULTS

A total of 40 representative stations were completed. Northern shrimp were collected at each representative station (Table 1). There were 7 non-random fixed stations. Stratum 1, tow 9 had the highest total weight of northern shrimp (26.633 kg) while the lowest weights were taken at Stratum 7, tow 2 (.028 kg).

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 201570).

REFERENCES

- Azarovitz, T. R. 1981. A brief historical review of the Woods Hole Laboratory trawl survey time series. *Can. Spec. Publ. Fish. Aquat. Sci.*, 58: 62-67.
- 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 stations and northern shrimp collected on the 2015 National Marine Fisheries Service, Northeast Fisheries Science Center northern shrimp survey in the western Gulf of Maine aboard FRV *Gloria Michelle*, 19 July – 15 August 2015. *Indicates non-representative tow.

STRATUM-TOW	STATION	LATITUDE	LONGITUDE	DEPTH (m)	BOTTOM TEMP (C)	TOTAL No. <= 22mm	TOTAL No. > 22mm	TOTAL NUMBER	TOTAL WEIGHT (kg)
6-14	1	42 51	69 25	155	5.5	4	2	6	0.035
6-4	2	42 59	69 23	191	5.25	5	12	17	0.174
6-11	3	42 56	69 05	171	5.2	4	4	8	0.062
6-2	4	43 08	69 05	177	6.06	131	326	457	4.62
6-16	5	43 08	69 08	183	5.22	150	418	568	5.284
6-6	6	43 09	69 16	202	5.04	109	313	422	3.949
6-10	7	43 18	69 21	165	5.01	8	344	352	3.806
6-15	8	43 19	69 22	178	5.04	130	415	545	5.036
6-5	9	43 20	69 17	165	4.98	178	342	520	4.929
6-8	10	43 30	69 19	135	5.43	379	513	892	8.28
6-7	11*	43 30	69 16	128	5.36	570	819	1389	11.804
8-8	12	43 24	68 57	127	5.28	15	72	87	0.865
8-9	13	43 31	68 48	134	6.91	14	21	35	0.378
6-1	14	43 29	69 01	141	5.82	0	4	4	0.075
6-13	15	43 35	69 04	136	6.41	172	226	398	2.97
6-9	16	43 33	69 09	143	6.28	52	174	226	2.139
3-7	17	43 19	69 34	180	5.42	47	103	150	1.386
8-1	18	43 41	68 35	148	6.64	183	401	584	5.152
10-9	19	43 43	68 26	194	6.0	19	48	67	0.693
10-7	20	43 47	68 20	151	6.64	16	96	112	1.19
10-1	21	43 46	68 02	171	6.35	2	1	3	0.041
3-4	22	43 25	69 55	156	5.23	49	444	493	5.324
3-9	23*	43 24	69 46	124	5.68	2	120	122	1.43
3-11	24	43 22	69 57	157	5.21	374	968	1342	12.567
1-4	25	43 21	70 01	160	5.28	20	741	761	7.622
1-5	26	43 14	70 02	140	5.24	96	1649	1745	18.449
1-6	27	43 15	70 07	139	5.33	12	117	129	1.625
1-3	30	43 02	70 11	179	4.89	90	1493	1583	17.736
1-9	31	42 58	70 15	165	4.39	765	2056	2821	26.633
1-2	32	42 53	70 16	161	4.31	70	799	869	10.74
3-6	33	42 55	69 37	147	5.29	0	2	2	0.035
3-3	34	42 53	69 35	173	5.79	3	82	85	0.821

STRATUM-TOW	STATION	LATITUDE	LONGITUDE	DEPTH (m)	BOTTOM TEMP (C)	TOTAL No. <= 22mm	TOTAL No. > 22mm	TOTAL NUMBER	TOTAL WEIGHT (kg)
5-2	36	42 29	69 38	238	6.27	1	4	5	0.06
5-3	37	42 13	69 46	227	6.14	3	1	4	0.041
5-5	38	42 10	69 38	234	6.24	5	8	13	0.12
5-1	39	42 03	69 38	222	5.96	1	2	3	0.04
7-4	40	42 05	69 26	209	5.46	4	6	10	0.166
7-3	41	42 01	69 20	208	5.52	5	4	9	0.091
7-5	43	41 54	69 09	212	5.7	1	5	6	0.073
7-1	44	41 57	69 17	206	5.54	22	4	26	0.188
7-2	45	42 31	69 15	228	7.1	4	0	4	0.028
7-6	46	42 39	69 23	230	6.46	4	4	8	0.06

Table 2. Miscellaneous scientific collections made on the 2015 National Marine Fisheries Service, Northeast Fisheries Science Center northern shrimp survey in the western Gulf of Maine aboard FRV *Gloria Michelle*, 19 July – 15 August 2015.

Investigator & Affiliation	Samples Saved	Approximate Number
Age Samples, NMFS, NEFSC, Woods Hole, MA	White Hake	125 otoliths
Peter Chase, NMFS, NEFSC, Woods Hole, MA	Misc Inverts for ID	3 individuals
John Galbraith, NMFS, NEFSC, Woods Hole, MA	Misc fish for ID	1 individuals
Rich Langton, NMFS, NEFSC, Orono, ME	Sea Pens	8 bags

Figure 1. Northern shrimp survey strata and observed distribution of catch per tow (kg) of northern shrimp collected during the 2015 National Marine Fisheries Service, Northeast Fisheries Science Center northern shrimp survey in the western Gulf of Maine aboard FRV *Gloria Michelle*, 19 July – 15 August 2015.

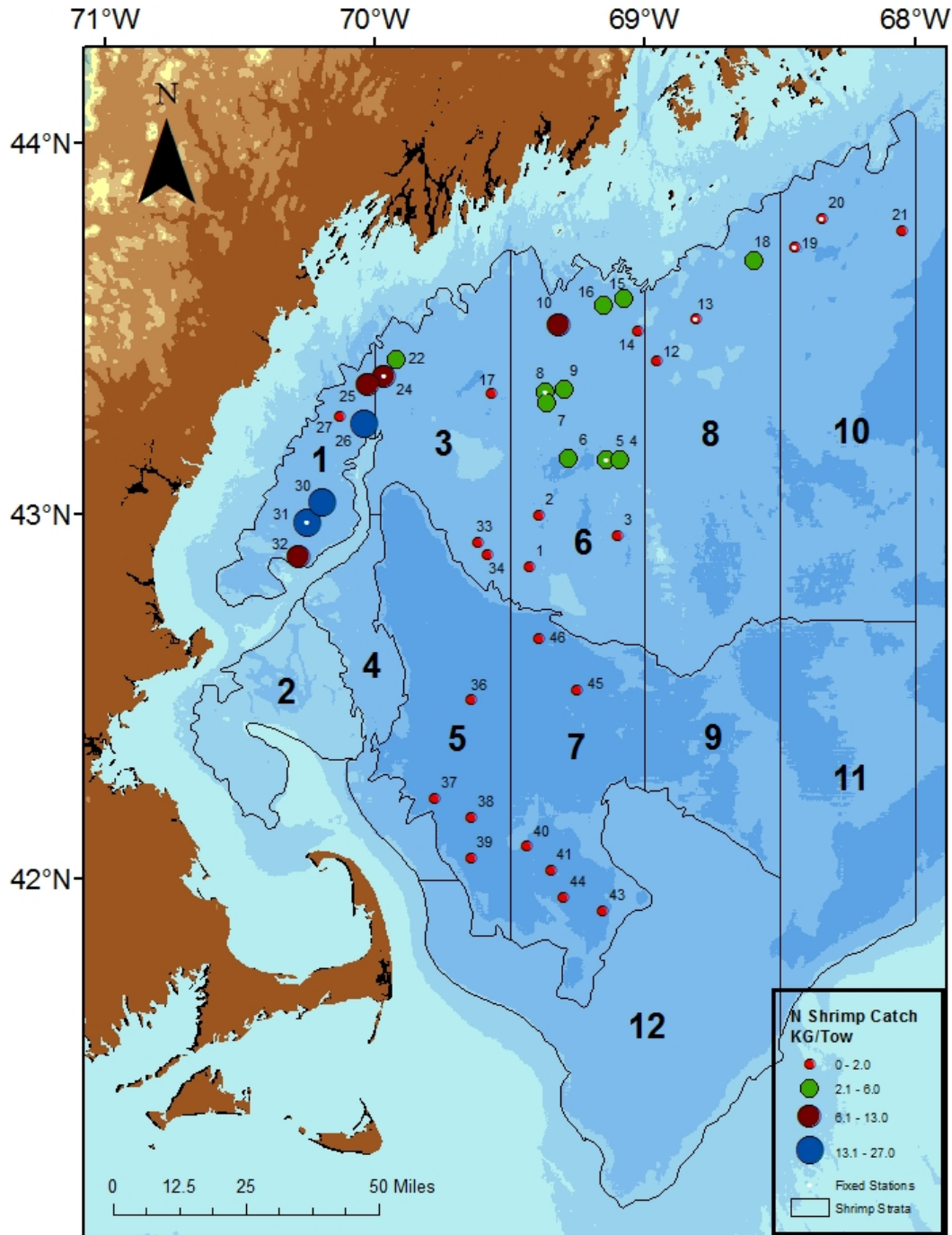
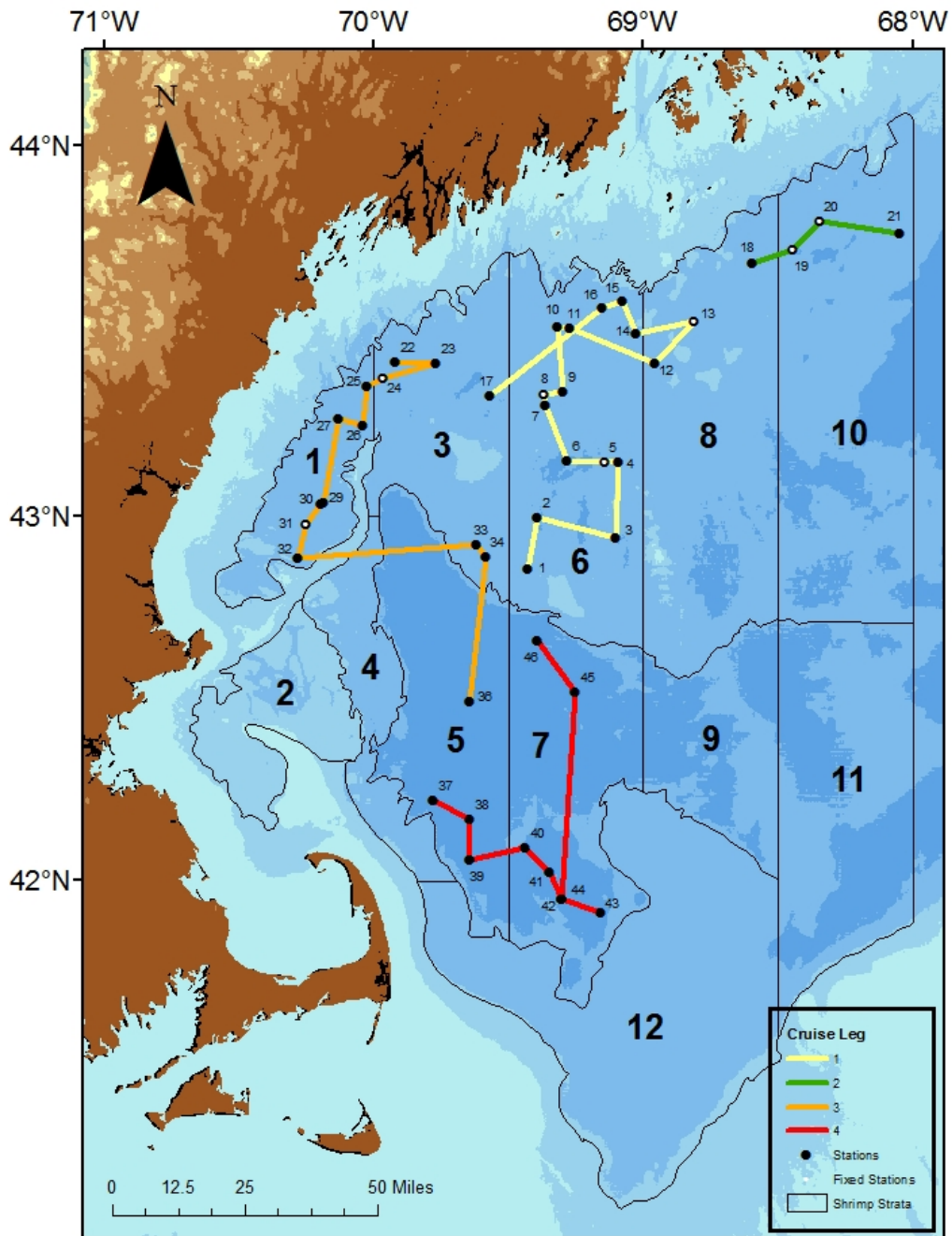


Figure 2. Trawl hauls made during the 2015 National Marine Fisheries Service, Northeast Fisheries Science Center northern shrimp survey in the Gulf of Maine aboard FRV *Gloria Michelle*, 19 July – 15 August 2015.



Appendix I. Participants on the 2015 National Marine Fisheries Service, Northeast Fisheries Science Center northern shrimp survey cruise in the western Gulf of Maine aboard FRV *Gloria Michelle*, 19 July to 15 August 2015.

National Marine Fisheries Service, NEFSC, Woods Hole, MA

Peter Chase, Chief Scientist ^{1,2}	Kristen Gustafson ³
Catherine Fillo ² , Chief Scientist ³	TK Arbusto ^{1,4}
Tasha O'Hara ³ , Chief Scientist ⁴	Anne Richards ¹
Adam Poquette ^{1,2}	Sandy Sutherland ⁴
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Volunteers

Katherine Thompson^{1,2}
Josh Richards²
Caroline Lawrence⁴

Gloria Michelle Crew

LTJG Douglas Pawlishen^{1,2,3,4}
ENS Andrew Reynaga^{2,3,4}
Captain Steven Wagner¹
George Morton^{1,2,3,4}
Harvey Walsh¹
LCDR Nicholas Chrobak²
Enrico Picozza^{3,4}

¹ 19 – 24 July

² 27 – 31 July

³ 3 – 7 August

⁴ 10 – 15 August