CRUISE RESULTS

Gulf of Maine Northern Shrimp Survey
July 22 - August 2, 2002

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Introduction

This report summarizes results of the 2002 survey cruise for northern shrimp, *Pandalus borealis*, in the western Gulf of Maine. This was the nineteenth survey coducted 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 July 22-August 2 aboard the R/V GLORIA MICHELLE, a 65-foot, 96 gross registered ton (GRT) stern trawler powered by a 365 horsepower Caterpillar diesel engine. Fieldwork was overseen by NEFSC staff. Participants included Technical Committee members, 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). Data entry and analyses were performed at the NEFSC.

A stratified random sampling design was used (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 22-26 July; Part II, 27-30 July; Part III, 31 July-2 August 2002. The vessel departed Woods Hole, MA and headed to Boothbay Harbor, ME; Boothbay Harbor, 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 85-100 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 opportunistically when sea-state and weather permitted for the length of the survey. Headrope height, wingspread and doorspread of the trawl

were recorded to a Dell laptop computer.

In all instances where 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 0.5 millimeter) in addition to sex and female spawning condition (Rasmussen 1953; McCrary 1971). In cases in which less than 2 kg of shrimp were caught, 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 (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 0.1 kg. The remainder of the catch (miscellaneous invertebrates, trash, etc.) was recorded by weight. Total weight and sample length frequencies for each species were recorded on standard NEFSC Bottom Trawl Survey forms, which were retained for processing and computer entry.

Results

A total of 54 stations were occupied. Northern shrimp were taken at all stations (Table 1). There were 14 non-random fixed stations. Strata 1, tows 6 and 7; Strata 3, tows 10 and 11; and Strata 6 tow 5 had the highest total number of northern shrimp for the survey while the lowest number of northern shrimp were taken in Strata 4, 5, and 7. (Table 1).

All shrimp, finfish, and select invertebrate data has been key-entered, 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 2270).

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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.

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Table 1. Summary of northern shrimp data collected on the 2002 Northern Shrimp Survey in the western Gulf of Maine aboard the R/V GLORIA MICHELLE July 22 - August 2, 2002.

Stratum tow	Station	Latitude	Longitude	Depth (m)	Bottom Temp (C)	Weight (kg)	Total No.	Total >=22 mm
*01-01	36	43 06	70 15	145	5.9	38.6	5,246	2,705
*01-02	35	42 59	70 13	157	5.5	64.2	10,776	3,482
01-03	38	43 02	70 24	108	5.9	12.3	3,215	411
01-04	37	43 07	70 19	128	5.8	24.2	3,924	1,623
*01-05	42	42 49	70 28	118	5.3	59.1	11,290	2,650
01-06	41	42 50	70 24	136	5.5	79.8	17,324	2,871
*01-07	39	42 58	70 15	155	5.5	91.7	15,322	4,841
*01-08	40	42 53	70 28	117	5.5	54.5	8,904	2,971
*02-01	44	42 32	70 25	97	6.5	7.9	2,055	69
*02-02	43	42 24	70 30	89	5.8	3.9	455	247
03-01	28	43 19	69 43	177	6.7	15.3	2,738	722
03-02	21	43 33	69 36	157	6.1	33.3	8,168	804
03-03	29	43 23	69 47	155	6.7	22.8	5,346	713
03-04	33	43 07	69 52	174	7.3	16.0	3,275	639
03-05	20	43 41	69 31	126	6.4	14.8	4,098	352
03-06	27	43 11	69 47	162	7.0	27.6	5,939	889
03-07	34	43 05	69 58	167	7.3	9.7	2,123	441
03-08	22	43 29	69 32	165	6.1	15.5	3,239	580
03-09	31	43 19	69 49	174	7.0	20.1	4,155	657
*03-10	32	43 05	69 47	163	6.8	43.1	10,742	1,327
*03-11	30	43 21	69 56	158	6.4	55.1	11,570	2,156
04-01	45	42 40	70 08	110	6.3	0.2	64	0
*04-02	46	42 38	69 58	200	7.3	5.8	1,224	318
04-03	1	42 07	69 52	138	6.4	0.7	218	7
05-01	53	41 52	69 37	189	7.0	0.3	37	16
*05-02	47	42 21	69 51	231	7.7	0.8	146	35
05-03	3	42 42	69 35	256	99.9	2.9	504	206
05-04	2	42 47	69 37	220	99.9	7.7	1,435	465
06-01	4	42 49	69 15	141	99.9	14.3	3,385	453
06-02	6	42 43	69 06	146	7.1	11.7	2,515	452
06-03	7	42 46	69 03	155	7.3	17.0	3,418	703
06-04	8	42 54	69 00	137	7.0	27.0	6,146	884
06-05	25	43 20	69 16	157	6.7	47.3	12,580	899
06-06	26	43 06	69 27	165	7.0	20.0	4,013	855
06-07	12	43 04	69 01	115	6.7	5.7	1,816	18
06-08	18	43 31	69 07	130	6.4	20.3	3,876	940
06-09	19	43 28	69 14	144	6.2	34.0	8,719	613
06-10	23	43 23	69 24	165	6.5	16.7	3,555	504
*06-11	24	43 20	69 21	179	7.0	18.5	3,731	685
07-01	51	42 12	69 21	195	7.1	5.8	767	349
07-02	48	42 19	69 13	233	7.8	1.8	218	130
07-03	52	41 59	69 23	208	7.3	2.8	348	198
07-04	49	42 24	69 08	225	8.0	3.9	422	324

*07-05	5	42 38	69 12	183	99.9	4.9	741	306
*07-06	50	42 26	69 03	211	7.7	0.9	108	68
08-01	14	43 11	68 54	175	7.8	26.2	5,844	1,197
08-02	11	43 06	68 41	183	7.8	11.6	2,418	366
08-03	16	43 36	68 42	150	7.3	23.8	6,579	275
08-04	15	43 18	68 59	148	7.1	12.9	2,798	479
08-05	13	43 08	69 00	161	7.4	21.7	3,188	1,359
*07-06	50	42 26	69 03	211	7.7	0.9	108	68
08-07	17	43 39	68 39	137	7.3	8.2	1,438	272
08-08	10	42 55	68 44	192	8.3	4.0	793	173
12-01	54	41 60	69 45	157	6.7	1.7	433	13

* Non-random tow

Table 2. Miscellaneous scientific collections made on the 2002 northern shrimp survey in the western Gulf of Maine aboard the R/V GLORIA MICHELLE, July 22-August 2,2002.

Investigator & Affiliation	**Samples**	**Approximate Number**
Aquarium, NMFS, NEFSC Woods Hole, MA	Shrimp	2 boxes
John Burnett NMFS, NEFSC, Woods Hole, MA	Goosefish vertebrate	401 individuals
Chris Chambers, NMFS, NEFSC, James Howard Lab, Highlands, NJ	Whole goosefish	38 individuals
Kathy Sosebee, NMFS, NEFSC, Woods Hole, MA	White hale otoliths	273 samples

Figure 1. Northern shrimp survey strata and observed distribution of catch per tow (kg) of northern shrimp collected during 2002 survey in the western Gulf of Maine aboard the FRV Gloria Michelle, July 22 – August 2, 2002.

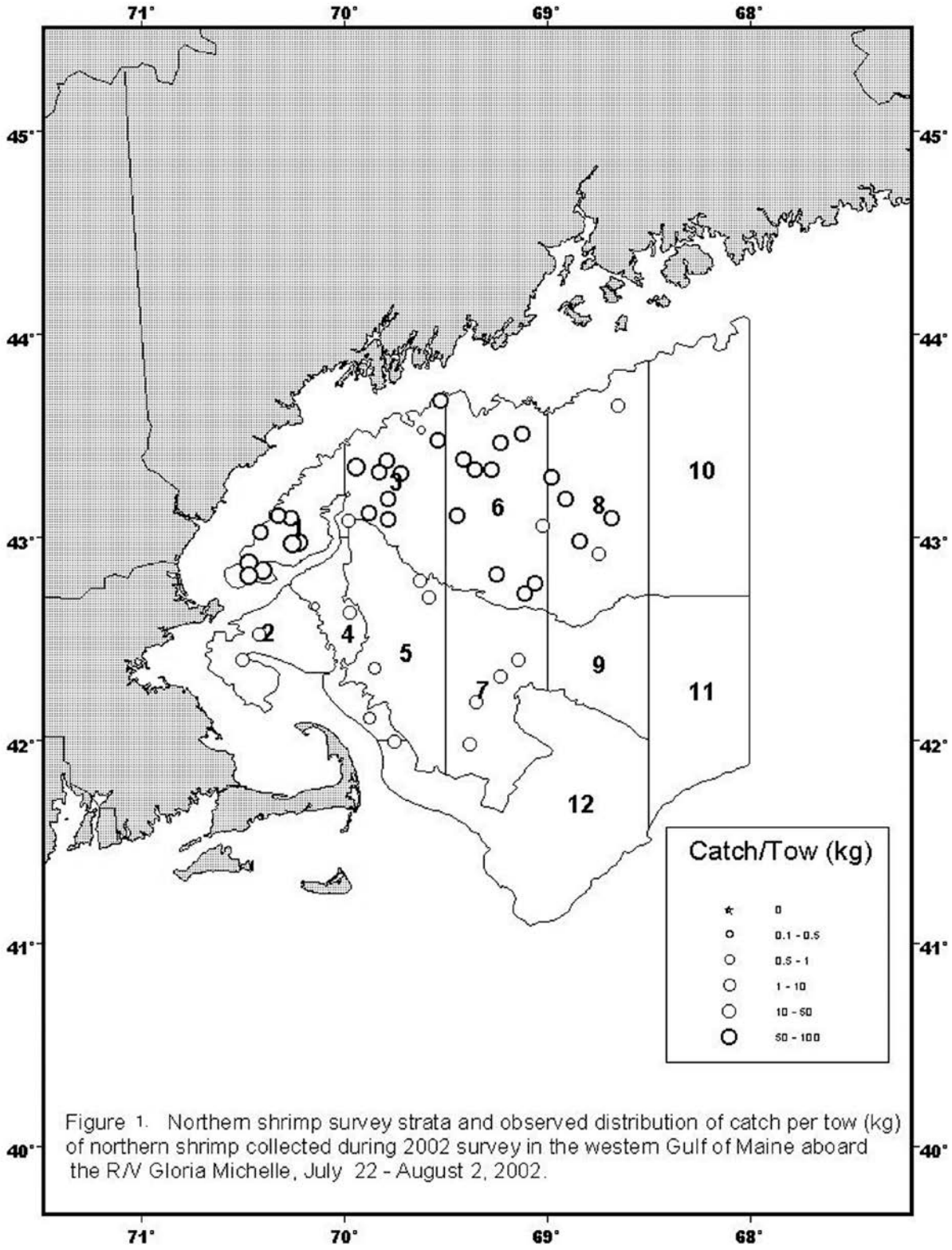

Figure 2. Trawl hauls made from the FRV Gloria Michelle, during National Marine Fisheries Service, Northeast Fisheries Science Center summer northern shrimp survey (01-12), July 23 – August 4, 2001.

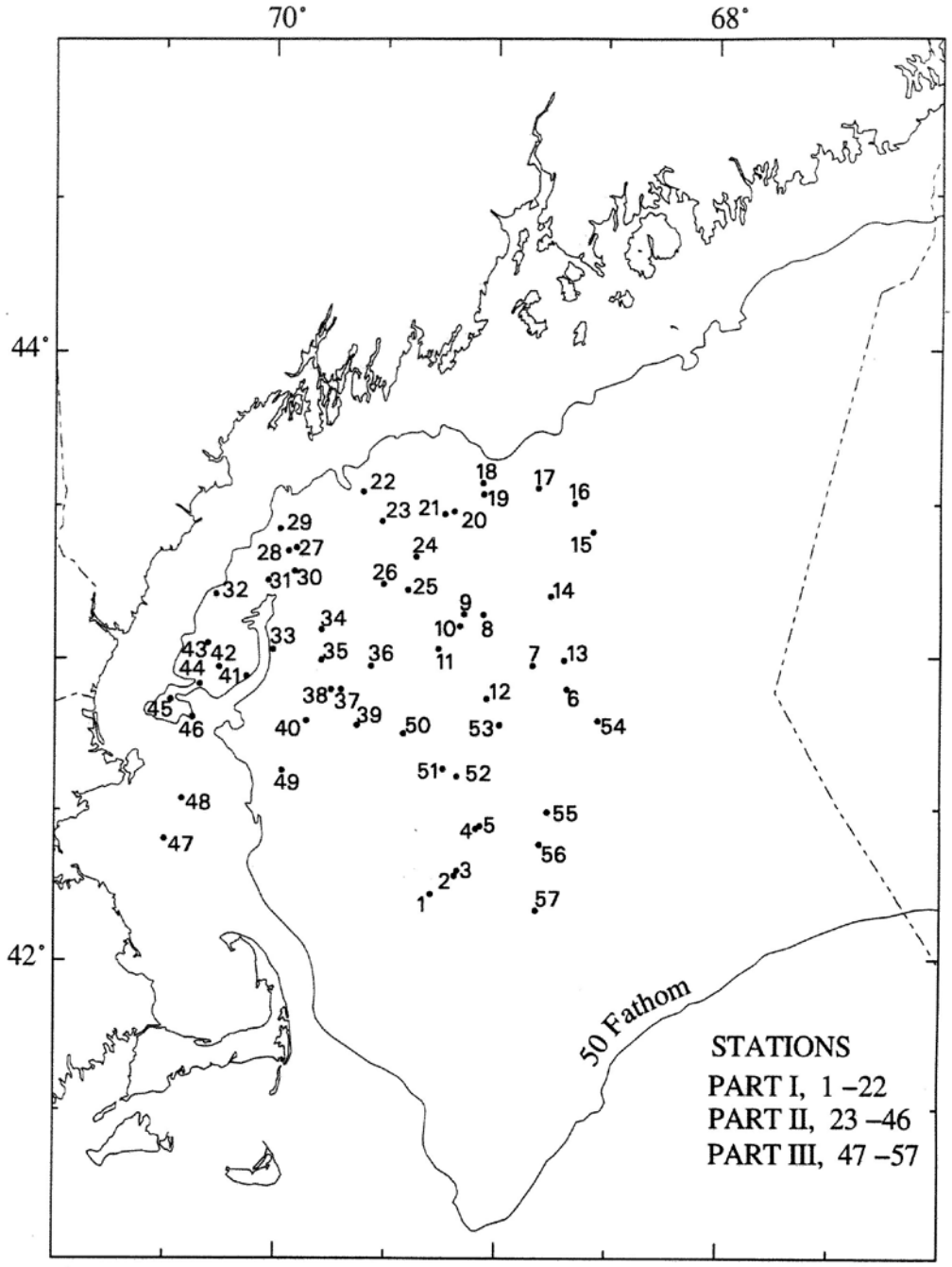

Figure 2. Trawl hauls made from the R/V GLORIA MICHELLE, during National Marine Fisheries Service, Northeast Fisheries Science Center summer northern shrimp survey (01-12), July 23-August 4, 2001.

Appendix I. Participants on the 2002 northern shrimp survey cruise in the western Gulf of Maine, aboard the R/VGLORIA MICHELLE, July 22-August 2, 2002.

National Marine Fisheries Service, NEFSC, Woods Hole, MA
Paul Kostovick, Chief Scientist, Part III - 31 July-2 August
Paul Nitschke, II
Sandra Sutherland, I, II
Vaughn Silva, III

MA Division of Marine Fisheries, Pocasset, MA
Jeremy King, Chief Scientist, Part I - 22-26 July
Robert Glenn, Chief Scientist shared Part I - (23-24 July)
Melanie Griffin, I
Rebecca Jones, II
Dennis Nault, I
Mark Rousseau, III
Mark Syzmanski, I

ME Department of Marine Resources, West Boothbay Harbor, ME
Daniel Schick, Chief Scientist, Part II - 27-30 July
Kohl Kanwit, II
Heidi Ryder, III
Kelly O'Brien, III

ME Department of Marine Resources, Hallowel, ME
Deidre Gilbert, Part I

Atlantic States Marine Fisheries Commission, Washington, DC
Michael Lewis, III

National Marine Fisheries Service, NEFSC, Highlands, NJ
Fred Farwell, Lead Fisherman, I, II, III

NOAA Corps, Highlands, NJ
LT Scott Sirois, Commanding Officer, I, II, III
LTJG Russell Haner, Executive Officer, I, II, III
ENS Chad Brown, I, II, III