U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center

Cruise Report

Date Submitted:

Platform:

Cruise Number:

Project Title:

Cruise Dates: -

Submitted by: Date:
      Field Party Chief

Approved by: Date:
      Lab Director

Approved by: Date:
      Director, SEFSC

CRUISE REPORT

Southeast Fishery-Independent Survey (SEFIS)

NOAA Ship *Pisces* Cruise PC-16-03

23 July 2016 (Transit)
03 – 15 July 2016 (Leg 1)
19 July – 03 August 2016 (Leg 2)

Total Number of Days At-Sea – 30
Days at-sea lost due to repairs – 3

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
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429 camera-trap deployments
75 CTD casts

INTRODUCTION

The NOAA Ship *Pisces* departed from Morehead City, NC, on 03 July 2016 for a Southeast Fishery-Independent Survey (SEFIS) research cruise in continental shelf and shelf-break waters off North and South Carolina. Departure of the cruise was delayed three days due to vessel repairs. SEFIS was created by the National Marine Fisheries Service in 2010 and operates out of the Beaufort Laboratory. This survey was created to conduct applied fishery-independent sampling and related research focusing on the assessment of spatial variability in distribution and abundance of red snapper and other reef species within the snapper-grouper complex, via data collected from fish traps, video cameras, and acoustics. During this survey, chevron trap catches and associated underwater video recordings were collected from hardbottom habitats found in Raleigh, Onslow, and Long bays, North and South Carolina. A total of 429 stations were sampled with camera-trap arrays over 30 sea days between 19 and 115 m depths.

OBJECTIVES

1. Fishery-independent sampling of randomly selected stations in North and South Carolina. Baited chevron traps, with two mounted high-definition video cameras, were utilized for (a) hardbottom reef fish community assessments, (b) collection of reef fish for biological samples (i.e., otoliths and gonads), and (c) comparative gear sampling (cameras versus traps).

2. Use video cameras on chevron traps to address trap selectivity issues, locate and describe hardbottom habitats, and provide an additional index of abundance for stock assessments.

3. Map bottom habitats using multibeam sonar to improve survey design and to expand knowledge of hardbottom habitats in the southeast US.

4. Use a CTD instrument package to collect environmental data (temperature, salinity, dissolved oxygen, turbidity) at camera-trap sampling locations, and XBTs to sample water temperature during multibeam mapping operations.

METHODS

Camera-Trap Sampling
Camera-trap gear consisted of two high definition video cameras mounted to a chevron fish trap. Chevron traps were composed of plastic-coated wire mesh. GoPro cameras (model HD Hero® H4) were attached above the mouth and nose of the trap (Figure 1). Traps were baited with Atlantic menhaden, *Brevoortia tyrannus*, and video cameras were set to record before deployment. Camera-traps were deployed at least 200 m apart on suspected or known hardbottom habitats, and soak time was targeted for approximately 90 min. Camera-traps were most often deployed in sets of six. A CTD cast (see environmental data collection) was conducted while traps were soaking. Fish catches were processed after trap retrieval. All fish were enumerated, weighed, and measured to the nearest millimeter. Individuals of many species (mostly species found in the snapper-grouper complex) were further processed for additional lengths and biological samples (otoliths, gonads, and DNA). Video files were downloaded and backed up on digital media storage devices. Biological samples and video files were brought to the Beaufort Laboratory for further processing and analysis.

Environmental Data Collection
Environmental data were collected with Seabird "Conductivity, Temperature, and Depth" instrument package

(CTD; model SBE 9) and Scientific Computer System (SCS) software. CTD casts were conducted near the middle of the camera-trap soak period; instruments were lowered to within 2 m of the bottom. Numerous water profile measurements were taken, including temperature (∘C), salinity, dissolved oxygen (mg/L), average sound velocity (m/s), fluorescence (mg/m^3), and beam transmission (%). CTD data were archived for further processing at the Beaufort Laboratory. SCS software 4.0 was used to collect specific information for each fishing and CTD event, including soak time/cast duration as well as start and end latitude, longitude, and depth (m). We also deployed expendable bathythermographs (XBTs) during the mapping shift to collect water column temperature data while the ship was underway, so that no time was lost during mapping to conduct CTD casts.

Acoustic Data Collection
We used the *Pisces* ME-70 multibeam sonar unit approximately 12 hours each night to create hydrographic maps for improving our understanding of the distribution of hardbottom in the Southeast. Mapping information in the region is critically important for (1) expanding fishery-independent sampling of reef fish, (2) improving our understanding of marine protected areas, (3) quantifying the relationship between the trap catch or video counts of reef fish and their habitat, (4) trying to scale up relative abundance information to true abundance of reef fish, which would benefit stock assessment greatly.

SURVEY RESULTS

Camera-Trap Sampling
Four hundred and twenty nine stations were sampled with camera-trap gear (Table 1). From these traps, fish were collected and worked up for length frequency data. Various reef fish species were further processed for otolith, gonad, and DNA tissues. No gear was lost during the cruise.

Environmental Data Collection
Seventy five CTD casts (Table 1) were conducted during the cruise. CTD data will be processed with Seabird SBE Data Processing software (version 7.2), and archived in a database at the NMFS-Beaufort Laboratory for future analysis. A total of 77 XBTs were deployed during mapping operations.

Multibeam Acoustics Data Collection
We mapped 29 distinct areas totaling ~465 km^2 during PC-16-03. Many of these areas were relatively deep (> 100 m) areas that were mapped to learn more about blueline tilefish and snowy grouper habitats, while others were places where sampling points existed but maps were lacking. Patch tests were also conducted near the beginning of each leg on an obstruction ("Yancy" wreck) that has been mapped on previous cruises.

Time Lost
We were originally scheduled to depart on leg 1 on June 30, but the cruise was delayed 3 days due to generator issues. Moreover, trap-video sampling (our primary objective) was not allowed (aside from 1 set on the first day) during the first 3.5 days at-sea due to the bow thruster not working properly, resulting in a loss of additional sampling.

Table 1. Summary of station coordinates, depth (m), date, and time for each fishing event (camera-trap, Gear=324; hook and line, Gear=014) and CTD cast (Gear=298) conducted on the PC-16-03 survey. Times were recorded in Coordinated Universal Time (UTC).

Collection	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
163229	324	7/4/2016	11:32	34.00390	-77.37064	27
163230	324	7/4/2016	11:35	34.00573	-77.37383	33
163231	324	7/4/2016	11:40	34.00928	-77.37858	26
163232	324	7/4/2016	11:46	34.00612	-77.38062	32
163233	324	7/4/2016	11:52	34.00683	-77.38537	32
163234	324	7/4/2016	11:59	34.00562	-77.39367	29
163235	298	7/4/2016	12:19	34.00665	-77.39949	26
163236	324	7/4/2016	15:54	33.99255	-77.35183	29
163237	324	7/4/2016	15:58	33.99461	-77.35625	28
163238	324	7/4/2016	16:05	33.99416	-77.36473	26
163239	324	7/4/2016	16:09	33.99545	-77.36831	29
163240	324	7/4/2016	16:17	34.00309	-77.36327	25
163241	324	7/4/2016	16:20	34.00489	-77.36678	25
163242	298	7/4/2016	16:30	34.00806	-77.36640	27
163243	324	7/8/2016	11:38	33.28003	-78.41804	27
163244	324	7/8/2016	11:45	33.28228	-78.42472	27
163245	324	7/8/2016	11:49	33.27982	-78.42826	27
163246	324	7/8/2016	11:53	33.27624	-78.43204	27
163247	324	7/8/2016	11:58	33.27198	-78.43609	27
163248	324	7/8/2016	12:06	33.27043	-78.42886	27
163249	298	7/8/2016	12:15	33.27031	-78.42340	27
163250	324	7/8/2016	14:38	33.28314	-78.43014	27
163251	324	7/8/2016	14:42	33.28051	-78.43420	29
163252	324	7/8/2016	14:46	33.27938	-78.43877	27
163253	324	7/8/2016	14:51	33.27556	-78.43970	27
163254	324	7/8/2016	14:56	33.27269	-78.44575	28
163255	324	7/8/2016	15:03	33.26687	-78.44205	28
163256	298	7/8/2016	15:11	33.26865	-78.43599	28
163257	324	7/8/2016	17:09	33.28542	-78.44374	27
163258	324	7/8/2016	17:13	33.28340	-78.44839	26
163259	324	7/8/2016	17:19	33.28005	-78.44350	27
163260	324	7/8/2016	17:25	33.27660	-78.44717	27
163261	324	7/8/2016	17:28	33.27435	-78.45013	27
163262	324	7/8/2016	17:32	33.27184	-78.45483	27
163263	298	7/8/2016	17:42	33.26787	-78.45041	28
163264	324	7/9/2016	10:44	33.33176	-77.68903	28
163265	324	7/9/2016	10:46	33.32978	-77.69155	29

163266	324	7/9/2016	10:51	33.32812	-77.69451	30
163267	324	7/9/2016	10:53	33.32865	-77.69804	28
163268	324	7/9/2016	10:59	33.32562	-77.70084	29
163269	324	7/9/2016	11:02	33.32325	-77.69735	31
163270	298	7/9/2016	11:10	33.32239	-77.69024	29
163271	324	7/9/2016	14:16	33.38231	-77.60835	26
163272	324	7/9/2016	14:19	33.37950	-77.61116	27
163273	324	7/9/2016	14:23	33.37795	-77.61436	26
163274	324	7/9/2016	14:38	33.36512	-77.63651	28
163275	324	7/9/2016	14:46	33.36176	-77.64691	26
163276	324	7/9/2016	14:53	33.35551	-77.65683	27
163277	298	7/9/2016	15:00	33.35323	-77.66135	28
163278	324	7/9/2016	17:22	33.40910	-77.60625	27
163279	324	7/9/2016	17:29	33.40311	-77.61351	25
163280	324	7/9/2016	17:45	33.38667	-77.59566	24
163281	324	7/9/2016	17:48	33.38549	-77.59985	25
163282	324	7/9/2016	17:51	33.38447	-77.60436	26
163283	298	7/9/2016	18:09	33.39067	-77.60976	24
163284	324	7/9/2016	20:48	33.44618	-77.65330	23
163285	324	7/9/2016	20:54	33.44217	-77.65823	23
163286	324	7/9/2016	21:00	33.44486	-77.66215	27
163287	324	7/9/2016	21:08	33.44503	-77.66582	26
163288	324	7/9/2016	21:14	33.44973	-77.65737	26
163289	298	7/9/2016	21:43	33.44974	-77.64663	25
163290	324	7/10/2016	10:45	33.41964	-77.18151	42
163291	324	7/10/2016	10:50	33.41835	-77.18793	42
163292	324	7/10/2016	11:01	33.41528	-77.20013	44
163293	324	7/10/2016	11:05	33.41123	-77.19836	42
163294	324	7/10/2016	11:08	33.40867	-77.20046	43
163295	324	7/10/2016	11:12	33.40898	-77.20488	43
163296	298	7/10/2016	11:22	33.41260	-77.21006	42
163297	324	7/10/2016	14:19	33.37935	-77.16077	52
163298	324	7/10/2016	14:27	33.37354	-77.16815	52
163299	324	7/10/2016	14:33	33.36905	-77.17183	63
163300	324	7/10/2016	14:38	33.36654	-77.17834	52
163301	324	7/10/2016	14:42	33.36517	-77.18313	52
163302	324	7/10/2016	14:49	33.36044	-77.18905	53
163303	298	7/10/2016	14:55	33.35675	-77.19116	57
163304	324	7/10/2016	17:15	33.32832	-77.23222	70
163305	324	7/10/2016	17:22	33.32643	-77.23562	65
163306	324	7/10/2016	17:28	33.32361	-77.23858	62
163307	324	7/10/2016	17:35	33.31993	-77.24365	61
163308	324	7/10/2016	17:45	33.31480	-77.25466	59

163309	324	7/10/2016	17:51	33.31207	-77.26086	61
163310	298	7/10/2016	18:00	33.31639	-77.26239	53
163311	324	7/10/2016	20:45	33.44804	-77.19305	42
163312	324	7/10/2016	20:53	33.44905	-77.20440	41
163313	324	7/10/2016	21:03	33.43918	-77.20343	41
163314	324	7/10/2016	21:06	33.43523	-77.20351	41
163315	298	7/10/2016	21:36	33.44933	-77.18409	41
163316	324	7/11/2016	16:53	34.53397	-76.34605	23
163317	324	7/11/2016	16:58	34.52999	-76.34633	24
163318	324	7/11/2016	17:06	34.52663	-76.35374	24
163319	324	7/11/2016	17:13	34.52289	-76.34914	25
163320	324	7/11/2016	17:20	34.52051	-76.35393	23
163321	324	7/11/2016	17:26	34.51789	-76.35072	24
163322	298	7/11/2016	17:33	34.51658	-76.34481	27
163323	324	7/11/2016	19:19	34.51580	-76.35473	23
163324	324	7/11/2016	19:24	34.51300	-76.35220	24
163325	324	7/11/2016	19:32	34.51085	-76.35577	22
163326	298	7/11/2016	19:39	34.50789	-76.35883	24
163327	324	7/12/2016	12:30	34.48010	-75.89335	73
163328	324	7/12/2016	12:35	34.47698	-75.89683	73
163329	324	7/12/2016	12:47	34.46601	-75.91026	72
163330	324	7/12/2016	12:53	34.46067	-75.91261	72
163331	324	7/12/2016	13:01	34.45506	-75.91889	72
163332	324	7/12/2016	13:10	34.44754	-75.92547	73
163333	298	7/12/2016	13:18	34.44625	-75.93195	70
163334	324	7/12/2016	17:33	34.47076	-75.88267	88
163335	324	7/12/2016	17:36	34.47435	-75.88335	82
163336	324	7/12/2016	17:43	34.47619	-75.87912	84
163337	324	7/12/2016	17:49	34.48002	-75.87416	89
163338	324	7/12/2016	17:54	34.48449	-75.87336	83
163339	324	7/12/2016	18:04	34.48590	-75.86920	88
163340	298	7/12/2016	18:12	34.49036	-75.86811	84
163341	324	7/12/2016	20:24	34.46806	-75.88660	85
163342	324	7/12/2016	20:35	34.46846	-75.89265	80
163343	324	7/12/2016	20:40	34.46349	-75.89628	82
163344	324	7/12/2016	20:46	34.45908	-75.90387	81
163345	298	7/12/2016	20:58	34.45649	-75.90925	77
163346	324	7/13/2016	11:41	35.01414	-75.46288	50
163347	324	7/13/2016	11:47	35.00941	-75.46069	50
163348	324	7/13/2016	11:51	35.00733	-75.46451	49
163349	324	7/13/2016	12:03	35.00195	-75.45507	50
163350	324	7/13/2016	12:11	35.00080	-75.46386	50
163351	324	7/13/2016	12:15	34.99760	-75.46610	50

163352	298	7/13/2016	12:39	35.01430	-75.46564	48
163353	324	7/13/2016	14:17	34.99731	-75.46101	50
163354	324	7/13/2016	14:20	34.99367	-75.46085	51
163355	324	7/13/2016	14:33	34.99327	-75.45542	52
163356	324	7/13/2016	14:41	34.98642	-75.46260	52
163357	324	7/13/2016	14:45	34.98206	-75.46323	52
163358	324	7/13/2016	14:50	34.97767	-75.46108	53
163359	298	7/13/2016	14:59	34.97548	-75.45507	59
163360	324	7/13/2016	19:14	34.93690	-75.45439	64
163361	324	7/13/2016	19:22	34.93311	-75.46201	62
163362	324	7/13/2016	19:28	34.93018	-75.45786	66
163363	324	7/13/2016	19:39	34.92741	-75.46583	63
163364	324	7/13/2016	19:43	34.92481	-75.47004	63
163365	324	7/13/2016	19:47	34.92084	-75.47013	64
163366	298	7/13/2016	19:55	34.91753	-75.47016	71
163367	324	7/14/2016	11:31	34.92695	-75.51220	55
163368	324	7/14/2016	11:36	34.92690	-75.51756	54
163369	324	7/14/2016	11:44	34.92015	-75.52112	54
163370	324	7/14/2016	11:48	34.91845	-75.52603	53
163371	324	7/14/2016	11:53	34.92020	-75.53145	52
163372	324	7/14/2016	11:58	34.92352	-75.52924	52
163373	298	7/14/2016	12:10	34.92933	-75.52050	53
163374	324	7/14/2016	14:14	34.92198	-75.50658	55
163375	324	7/14/2016	14:20	34.91889	-75.49886	59
163376	324	7/14/2016	14:29	34.91733	-75.50766	56
163377	324	7/14/2016	14:38	34.90959	-75.51378	57
163378	324	7/14/2016	14:44	34.90561	-75.51686	56
163379	324	7/14/2016	14:48	34.90356	-75.51894	58
163380	298	7/14/2016	14:56	34.90203	-75.51337	61
163381	324	7/14/2016	17:08	34.87184	-75.50705	58
163382	324	7/14/2016	17:13	34.87144	-75.51138	59
163383	324	7/14/2016	17:21	34.86813	-75.52009	59
163384	324	7/14/2016	17:26	34.86607	-75.52605	61
163385	324	7/14/2016	17:33	34.86312	-75.53195	58
163386	324	7/14/2016	17:41	34.85824	-75.52995	59
163387	298	7/14/2016	17:49	34.85856	-75.52386	61
163388	324	7/14/2016	19:40	34.86573	-75.51465	56
163389	324	7/14/2016	19:46	34.85997	-75.51995	61
163390	324	7/14/2016	19:52	34.85511	-75.52586	58
163391	298	7/14/2016	19:59	34.85195	-75.52984	75
163392	324	7/20/2016	10:57	34.54315	-76.40102	22
163393	324	7/20/2016	11:00	34.54052	-76.40185	22
163394	324	7/20/2016	11:03	34.53862	-76.40138	21

163395	324	7/20/2016	11:07	34.53720	-76.40378	20
163396	324	7/20/2016	11:11	34.53402	-76.40319	20
163397	324	7/20/2016	11:16	34.52903	-76.40488	19
163398	298	7/20/2016	11:23	34.52929	-76.41111	19
163399	324	7/20/2016	14:16	34.59570	-76.32314	28
163400	324	7/20/2016	14:23	34.59485	-76.31420	27
163401	324	7/20/2016	14:35	34.58755	-76.31721	28
163402	324	7/20/2016	14:38	34.58792	-76.31321	28
163403	324	7/20/2016	14:42	34.58597	-76.30943	29
163404	324	7/20/2016	14:48	34.58384	-76.31580	28
163405	298	7/20/2016	14:59	34.58536	-76.32894	27
163406	324	7/20/2016	17:51	34.56541	-76.33516	29
163407	324	7/20/2016	17:55	34.56529	-76.33060	28
163408	324	7/20/2016	18:03	34.55733	-76.33831	25
163409	324	7/20/2016	18:08	34.55149	-76.33942	27
163410	324	7/20/2016	18:12	34.54637	-76.34145	25
163411	324	7/20/2016	18:15	34.54363	-76.34251	26
163412	298	7/20/2016	18:22	34.54352	-76.34838	26
163413	324	7/20/2016	20:43	34.52060	-76.26258	36
163414	324	7/20/2016	20:48	34.51863	-76.25750	37
163415	298	7/20/2016	20:53	34.51666	-76.25329	37
163416	324	7/21/2016	10:59	34.53287	-76.21486	40
163417	324	7/21/2016	11:03	34.53432	-76.21069	40
163418	324	7/21/2016	11:08	34.53692	-76.21385	39
163419	324	7/21/2016	11:16	34.53910	-76.21001	40
163420	324	7/21/2016	11:21	34.54307	-76.20836	40
163421	324	7/21/2016	11:25	34.54673	-76.20413	41
163422	298	7/21/2016	11:33	34.54990	-76.20486	40
163423	324	7/21/2016	14:37	34.62273	-76.13714	40
163424	324	7/21/2016	14:43	34.62390	-76.14657	40
163425	324	7/21/2016	14:47	34.62619	-76.15276	40
163426	324	7/21/2016	14:59	34.61509	-76.16452	39
163427	324	7/21/2016	15:04	34.61093	-76.16853	39
163428	324	7/21/2016	15:09	34.60612	-76.17116	40
163429	298	7/21/2016	15:17	34.60318	-76.17633	40
163430	324	7/21/2016	17:24	34.60533	-76.18928	38
163431	324	7/21/2016	17:29	34.59954	-76.19622	38
163432	324	7/21/2016	17:41	34.58164	-76.21129	37
163433	324	7/21/2016	17:44	34.57877	-76.21655	37
163434	324	7/21/2016	17:49	34.57381	-76.22501	37
163435	324	7/21/2016	17:52	34.57046	-76.22525	37
163436	298	7/21/2016	17:58	34.56650	-76.22205	37
163437	324	7/21/2016	20:30	34.54979	-76.24149	37

163438	324	7/21/2016	20:35	34.55167	-76.23228	38
163439	324	7/21/2016	20:38	34.55217	-76.22832	38
163440	324	7/21/2016	20:44	34.55741	-76.21661	39
163441	324	7/21/2016	20:50	34.55856	-76.20554	38
163442	324	7/21/2016	20:55	34.56275	-76.19904	39
163443	298	7/21/2016	20:59	34.56418	-76.19676	40
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163445	324	7/22/2016	11:32	34.19100	-76.12566	72
163446	324	7/22/2016	11:36	34.18713	-76.13079	71
163447	324	7/22/2016	11:39	34.18544	-76.13398	72
163448	324	7/22/2016	11:43	34.18193	-76.13680	65
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9

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163711	298	8/1/2016	16:04	33.47393	-77.21507	44
163712	324	8/1/2016	20:16	33.52715	-77.17442	43
163713	324	8/1/2016	20:21	33.52288	-77.17030	43
163714	324	8/1/2016	20:28	33.51748	-77.17837	43
163715	324	8/1/2016	20:37	33.50664	-77.17033	44
163716	324	8/1/2016	20:41	33.50315	-77.16577	43
163717	324	8/1/2016	20:44	33.50373	-77.16238	43
163718	298	8/1/2016	20:49	33.50534	-77.15917	43
163719	324	8/2/2016	11:01	33.77415	-77.47908	39
163720	324	8/2/2016	11:06	33.77478	-77.48692	31
163721	324	8/2/2016	11:09	33.77624	-77.49322	30
163722	324	8/2/2016	11:12	33.77707	-77.49674	29
163723	324	8/2/2016	11:18	33.77949	-77.49277	32
163724	324	8/2/2016	11:24	33.78321	-77.49706	31
163725	298	8/2/2016	11:31	33.78717	-77.50045	33
163726	324	8/2/2016	14:43	33.81676	-77.63918	27
163727	324	8/2/2016	14:47	33.81264	-77.63643	24
163728	324	8/2/2016	14:54	33.81253	-77.64316	24
163729	324	8/2/2016	14:56	33.81310	-77.64660	24
163730	324	8/2/2016	15:03	33.80931	-77.64220	26
163731	324	8/2/2016	15:06	33.80716	-77.63784	26
163732	298	8/2/2016	15:40	33.82081	-77.63594	27

Figure 1. Chevron trap with video cameras used to sample reef fish on the PC-16-03 survey.

CRUISE PARTICIPANTS

Name / Title / Organization

Leg 1
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Kevan Gregalis / Scientist-Deck watch / SEFIS JHT
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Note: The use of trade, product, industry, or firm names, products, software, or models, whether commercially available or not, is for informative purposes only and does not constitute an endorsement by the U.S. Government or the National Oceanic and Atmospheric Administration.