

**COASTAL RECREATIONAL FISHING LICENSE  
FINAL PERFORMANCE REPORT**

June 2016

**Recipient:** Todd Kellison / NOAA Fisheries

**Tracking #:** 2013-F-008

**Grant Number:** 6260

**Grant Title:** Beaufort Bridgenet Survey

**Grant Award Period:** 1 August 2013 – 31 July 2015 (extended to 30 November 2015)

**Project Costs:**

	<u>Budgeted</u>	<u>Expenditures</u>	
	\$41,500	\$41,500	Year 1
	\$41,500	\$41,494	Year 2
TOTAL	\$83,000	\$82,994	Total

**Abstract / Executive Summary**

Our project focused on the NOAA Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP), a larval fish monitoring survey initiated in 1986. Data from the BBISP are useful to state and regional managers for assessing population trends in species targeted by commercial and recreational fisheries (e.g., spot, croaker, summer flounder, southern flounder, menhaden and mullet species) and for the American eel, which the North Carolina Division of Marine Fisheries is required to monitor annually (the BBISP satisfies that monitoring requirement). Because BBISP is a generally unfunded program, a backlog of unsorted larval fish samples had accumulated, and larval fish data were only available from samples collected from 1986-2007. CRFL funding was used to process 756 BBISP samples (26% more than anticipated in our CRFL proposal), and resulting data were incorporated into the recently revised and quality-controlled BBISP database, furthering the BBISP time series to 1986-2013. The resulting BBISP database, which contains information on 868,729 larval fish collected during 4,182 fixed-location plankton net tows during the 1986-2013 time series, is available for use by resource managers with the North Carolina Division of Marine Fisheries (NCDMF), the Atlantic States Marine Fisheries Commission, and other entities. During the course of the project, BBISP project managers organized a meeting with NCDMF stock assessment personnel to convey recent developments regarding the BBISP database and its availability for use. BBISP sampling continues to occur, and additional funds will be sought to process the growing backlog of post-2013 samples so that the most up-to-date data are available for use by resource managers.

## Introduction

The Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP) at the NOAA Beaufort facility is the longest consecutive ichthyoplankton-focused sampling program along the U.S. east coast. Initiated in 1986, fall- and winter-spawned larvae are collected weekly from mid-November through April/May at the Pivers Island Bridge (N 34°43'12.69", W 76°40'23.90"; Figure 1), representing a multi-decade time series of larval fish ingress through Beaufort Inlet. Program objectives include (1) developing fishery-independent indices of abundance for use in stock assessments, and (2) determining responses of individual species and assemblages to environmental drivers, including climate variation. Resulting data are housed within a MS Access database and made available for use in stock assessments and research (e.g., BBISP-generated data have contributed to 19 peer-reviewed manuscripts). A total of 868,729 larval fish from > 100 taxa have been identified from BBISP samples, including multiple species of recreational and management importance [e.g., Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), summer and southern flounder (*Paralichthys dentatus* and *lethostigma*, respectively), American eel (*Anguilla rostrata*), Atlantic menhaden (*Brevoortia tyrannus*) and striped mullet (*Mugil cephalus*)]. The fifteen most frequently occurring species are listed in Table 1. Example time series generated from BBISP data for species of management importance are presented in Figures 2 – 9. Appendix 1 contains a list of taxa collected during the BBISP time series (1986-2013<sup>1</sup>), sorted by frequency of occurrence.

Table 1. Fifteen most frequently occurring taxa in the BBISP time series. FO = frequency of occurrence (percentage of samples in which the taxa occurred).

Taxa	Common Name	FO	Total Abundance
<i>Micropogonias undulatus</i>	Atlantic croaker	83.61	101348
<i>Lagodon rhomboides</i>	pinfish	75.97	222101
<i>Leiostomus xanthurus</i>	spot	71.14	300113
<i>Brevoortia tyrannus</i>	Atlantic menhaden	63.94	56874
Gobiidae	true gobies	59.96	12294
<i>Myrophis punctatus</i>	speckled worm eel	57.95	30366
<i>Paralichthys albigutta</i>	Gulf flounder	51.54	13459
<i>Paralichthys lethostigma</i>	southern flounder	35.46	9022
<i>Mugil cephalus</i>	striped mullet	33.07	5919
Engraulidae	anchovies	26.82	65366
<i>Paralichthys dentatus</i>	summer flounder	26.79	3311
<i>Anguilla rostrata</i>	American eel	23.62	1604
<i>Orthopristis chrysoptera</i>	pigfish	22.83	16836
<i>Citharichthys spilopterus</i>	bay whiff	21.04	2281
Atherinopsidae	new world silversides	15.14	2391

<sup>1</sup> BBISP sampling has occurred through 2016 and is ongoing; however, samples collected subsequent to April 2013 have yet to be processed.

The NOAA-Beaufort facility does not have personnel with the expertise to process BBISP samples and to identify and enumerate the ichthyoplankton collected. Additionally, funding to support BBISP sample processing and identification is limited and in some years nonexistent. Thus, when funding allows, BBISP samples are processed in Poland<sup>2</sup> through the U.S. Poland Joint Studies Agreement. Currently, the BBISP database contains data from 1986-2013, with samples collected subsequent to 2013 having yet to be sorted due to funding limitations.

## Procedures

At the time this proposal was funded by CRFL (January 2013), BBISP samples from 1986-2007 had been processed, with resulting data from 1986-2004 incorporated into the BBISP database, and 2005-2007 data undergoing QA/QC for addition to the database. We proposed to use CRFL funding to send ~ 600 BBISP samples to Poland for processing, and to integrate the resulting data into the BBISP database.

## Results

A total of 756 BBISP samples were shipped to Poland for processing: 372 in Year 1 and 384 in Year 2. The 756 samples represented a 26% increase over the 600 samples we anticipated being able to process with the CRFL funding. Resulting data were integrated into the BBISP database. Appendix 2 lists the taxa identified from the 756 samples, sorted by frequency of occurrence (percentage of samples in which the taxa occurred). The five most frequently occurring species were Atlantic croaker (78%), pinfish (*Lagodon rhomboides*; 64%), spot (61%), Atlantic menhaden (56%) and gobies (Gobiidae; 51%). The rank order of the four most frequently occurring species from the 756 processed samples was identical to the rank order from the full time series (1986-2013), and rank orders for other frequently occurring species were consistently similar (Appendices 1 and 2). The time series includes several species that are sought by recreational fishers, including Atlantic croaker, spot and southern and summer flounders. Additionally, important forage fish (e.g. Atlantic menhaden) and bait (e.g. American eel) for recreationally targeted species are part of the BBISP time series.

Utilizing funds provided by a NERRS Science Collaborative grant to NC State University (J. Buckel, T. Kellison, C. Taylor, PIs), we were also able to perform a rigorous QA/QC review and error-check of the BBISP data set during the award period, addressing any errors or data issues identified. As a result, we now have a formal process to QA/QC the BBISP time series to ensure the highest integrity data are available for use in stock assessments and other management and research pursuits, including continued use by NCDMF for annual monitoring of American eel.

## Discussion

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<sup>2</sup> Plankton and Identification Sorting Center (PISC) in Szczecin, Poland ([http://www.sfi.gdynia.pl/?page\\_id=62](http://www.sfi.gdynia.pl/?page_id=62)). Multiple Science Centers within NOAA Fisheries (e.g., AFSC, NEFSC, SEFSC) utilize the PISC for ichthyoplankton sorting and identification, with subsequent use of the resulting data for generation of larval abundance indices for stock assessments.

A total of 756 BBISP samples were processed, with resulting data integrated into the BBISP database. The 756 samples represented a 26% increase over the 600 samples we anticipated being able to process with the CRFL funding, which occurred in part because we were able to support data manager time with the leveraged funds from the NERRS Science Collaborative project, and utilize CRFL funds originally planned for data manager salary to support additional sample processing.

During the course of the project, BBISP project managers organized a meeting with NCDMF stock assessment personnel to convey recent developments regarding the BBISP database and its availability for use. BBISP data through 2010 have also been made available via a web portal (<http://www.seamap.org/datapage.html><sup>3</sup>). BBISP sampling continues to occur, and additional funds will be sought to process the accumulating backlog of post-2013 samples so that the most up-to-date data are available for use by resource managers.

*Applicability of study results to CRFL Strategic Plan and priorities*

The project results, and the Beaufort Bridgenet Ichthyoplankton Sampling Program in general, align directly with the “Fish” management goal (one of the three management goals identified in the Strategic Plan), including “Biological research, surveys, and investigations that provide crucial information on the abundance and characteristics of fish stocks, ... and other information necessary for developing, implementing, and enforcing fishery management plans. Specific project examples include: sampling juvenile and adult stages of recreationally important fishes, ...”.

Given the longer time series and noticeable trends in abundance for several important species (see Figures 2-9 below), we anticipate the BBISP data being of increased importance to fisheries assessment and management in North Carolina and throughout the US east coast.

**Annual Budget expenditures**

*Year 1*

<u>Category</u>	<u>Expenditures</u>
Personnel	
Fringe	
Travel	
Equipment	
Supplies	\$1,905.99
Construction	
Contractual	
	\$38,000 (Polish Sorting Center)
Other	\$1,477.05 (sample shipping)
	\$116.96 (hazardous materials training)

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<sup>3</sup> SEAMAP is not currently funded to continue to update the data accessible via the web portal.

*Total Cumulative Expenditures: \$41,500*

*Year 2*

*Expenditures for the Period:*

<b><u>Category</u></b>	<b><u>Expenditures</u></b>
Personnel	
Fringe	
Travel	
Equipment	
Supplies	\$2,207
Construction	
Contractual	
	\$38,000 (Polish Sorting Center)
Other	\$1,167 (sample shipping)
	\$120 (hazardous materials training)

*Total Cumulative Expenditures: \$41,494*

**Budget deviations**

In Year 1 and Year 2, shipping costs (materials and supplies for shipping, freight and/or required training for hazardous materials shipping) was slightly less than the budgeted \$4,500 – in both years the cost differentials were applied to sample processing (Polish Sorting Center). Additionally, in Year 1 and Year 2, \$4,000 was budgeted for data manager support. Because data manager support was provided by a separate funding source (NERRS Science Collaborative funding), in both years the \$4,000 was applied to sample processing.



Figure 1. Location (indicated by white star) of Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP). SWMP = System-Wide Monitoring Program stations coordinated by the National Estuarine Research Reserve System.

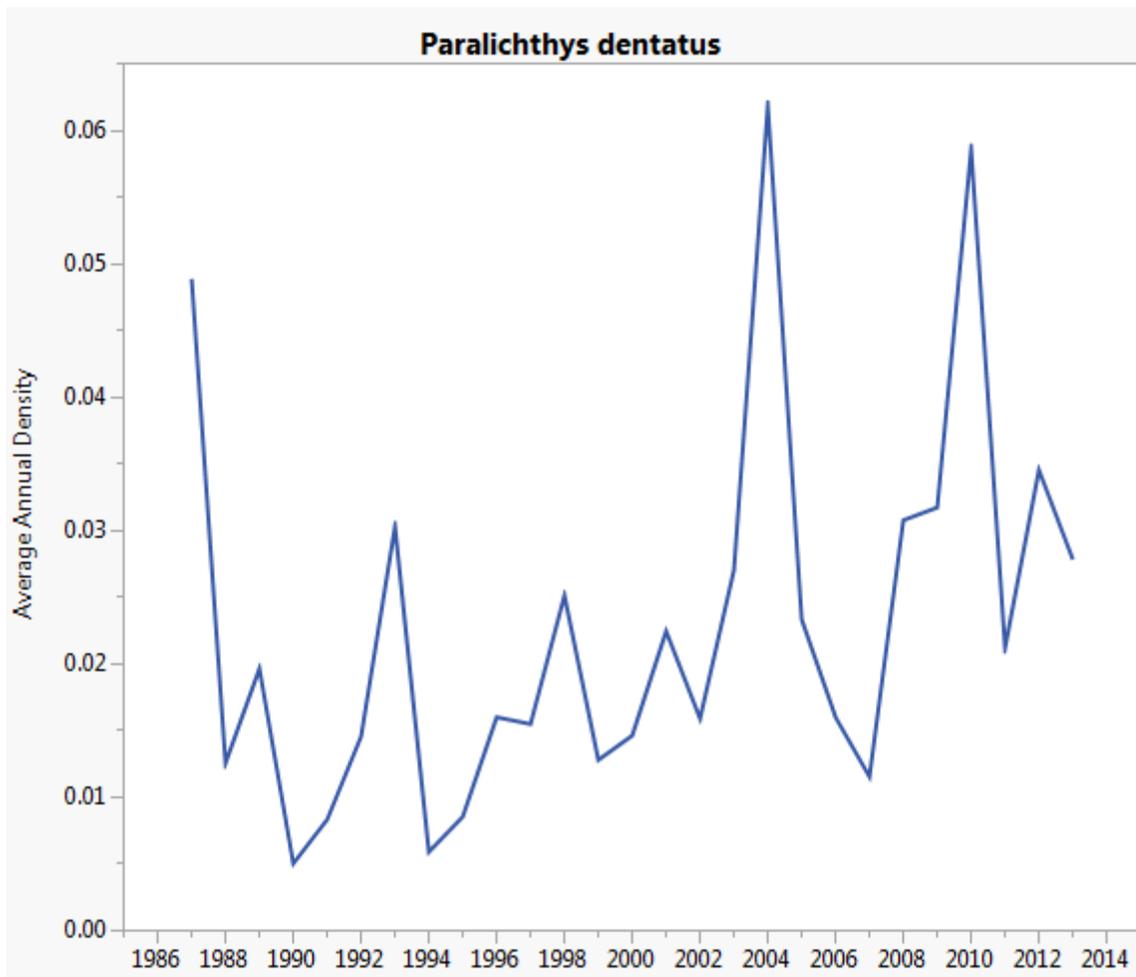


Figure 2. Average annual density (number of larvae per cubic meter averaged across samples) of summer flounder (*Paralichthys dentatus*).

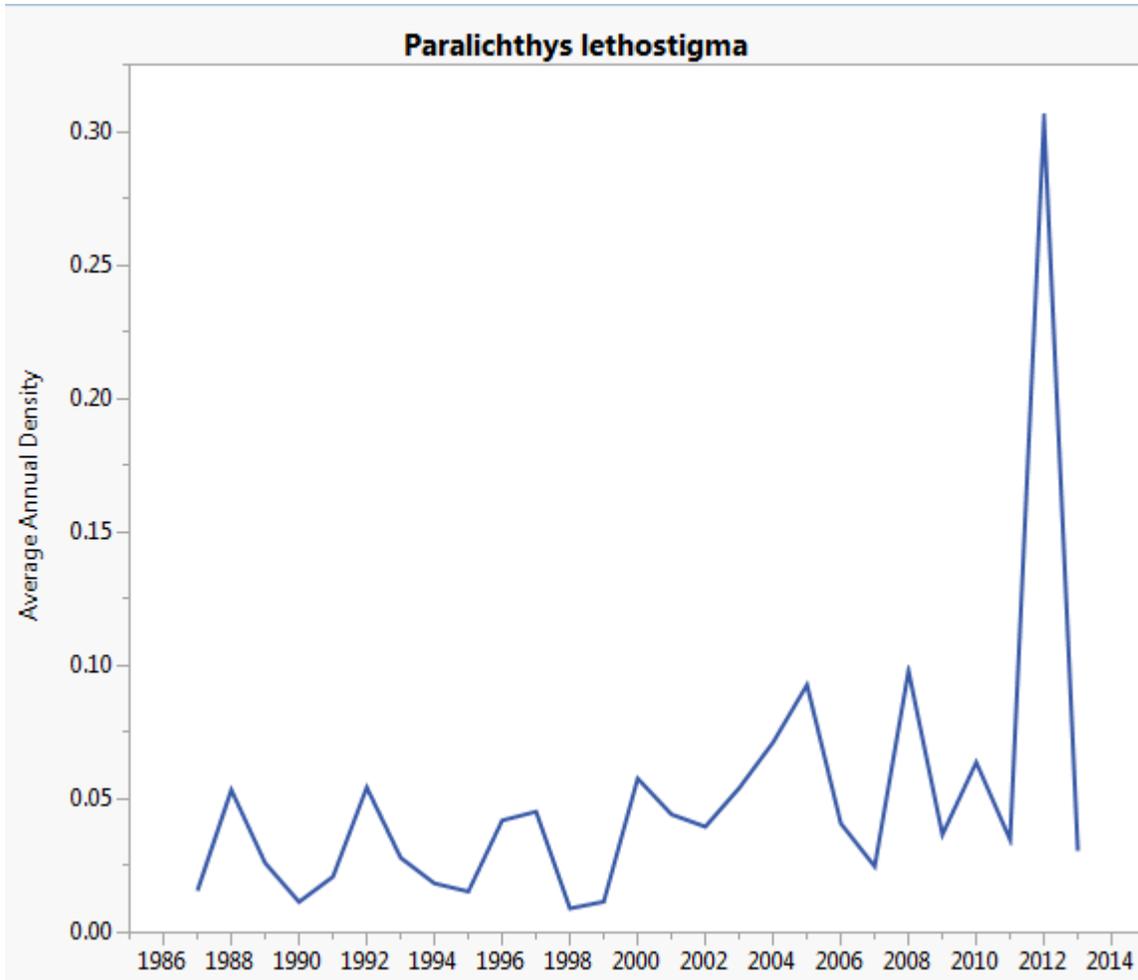


Figure 3. Average annual density (number of larvae per cubic meter averaged across samples) of southern flounder (*Paralichthys lethostigma*).

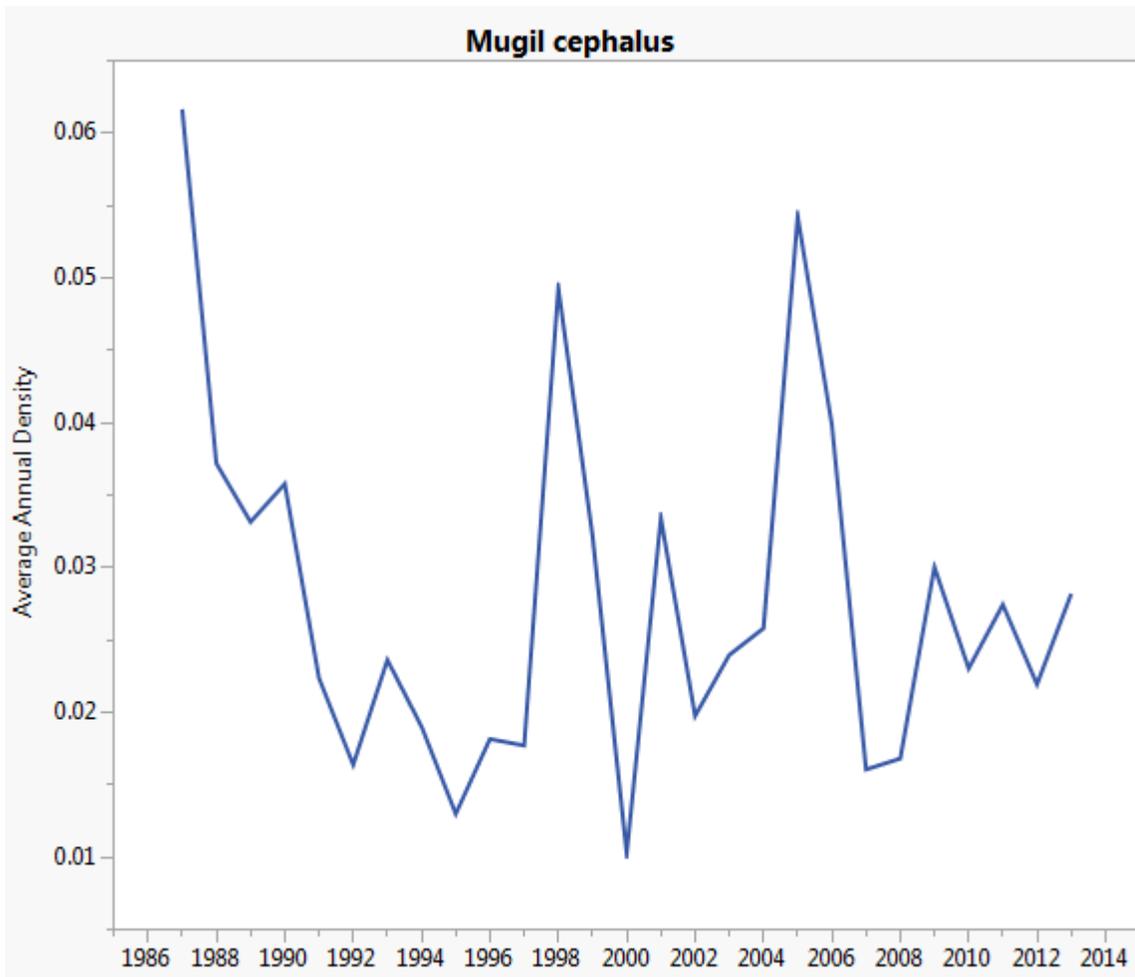


Figure 4. Average annual density (number of larvae per cubic meter averaged across samples) of striped mullet (*Mugil cephalus*).

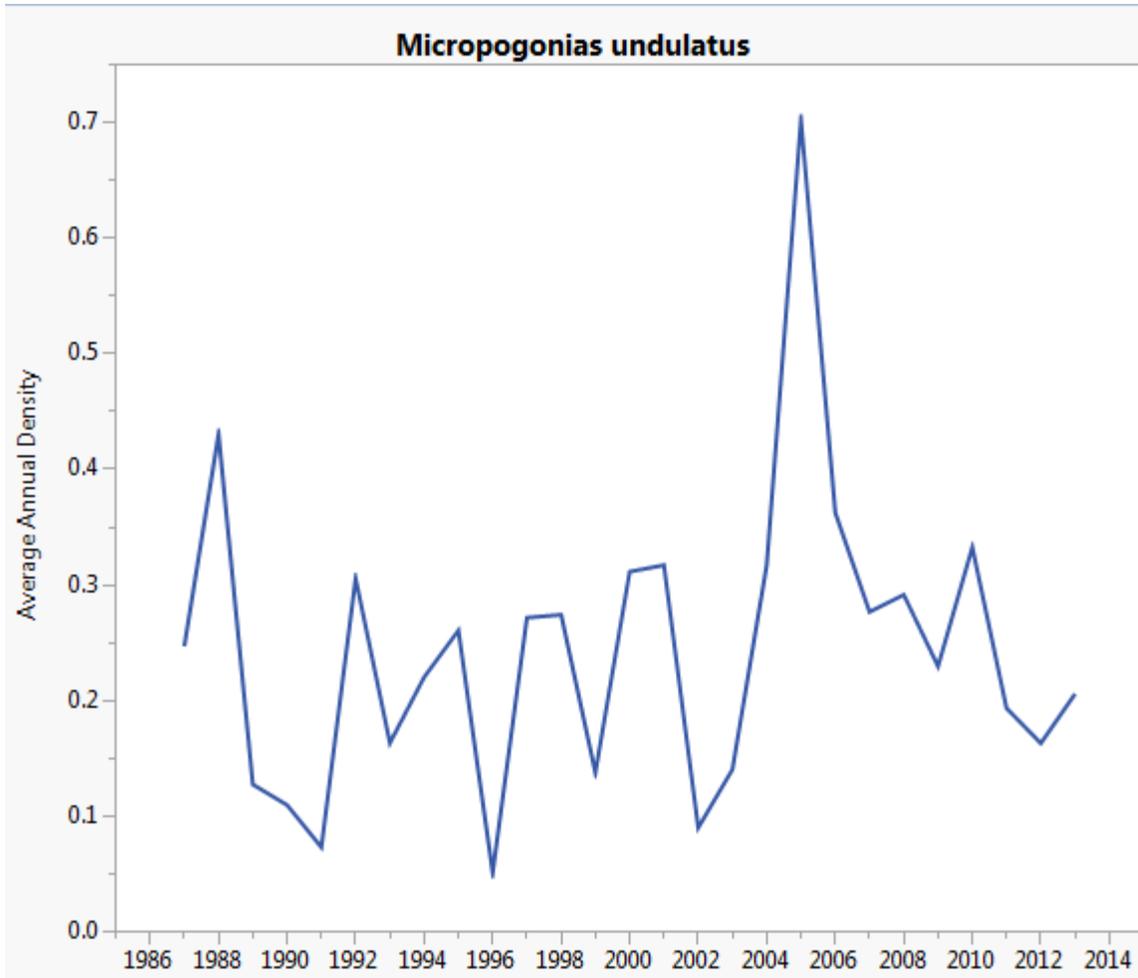


Figure 5. Average annual density (number of larvae per cubic meter averaged across samples) of Atlantic croaker (*Micropogonius undulatus*).

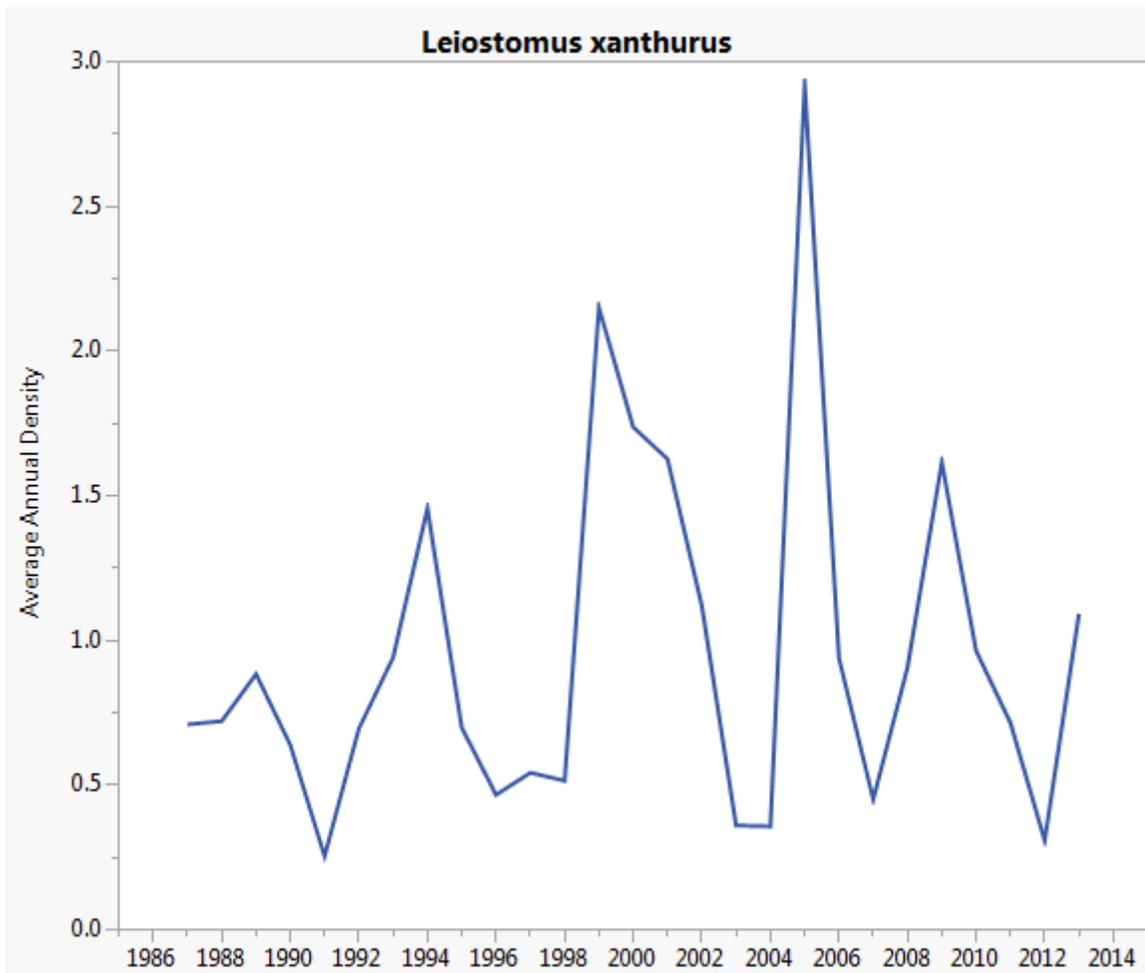


Figure 6. Average annual density (number of larvae per cubic meter averaged across samples) of spot (*Leiostomus xanthurus*).

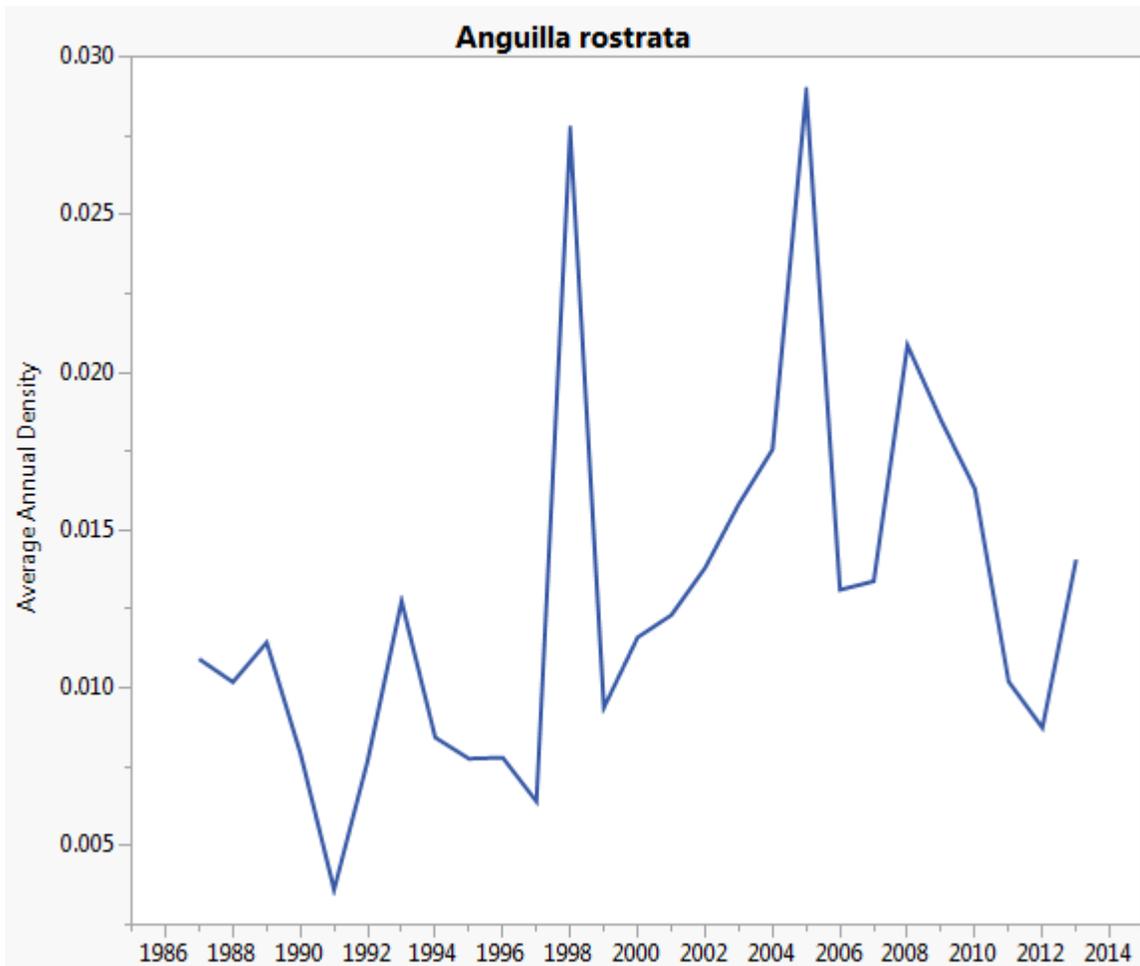


Figure 7. Average annual density (number of larvae per cubic meter averaged across samples) of American eel (*Anguilla rostrata*).

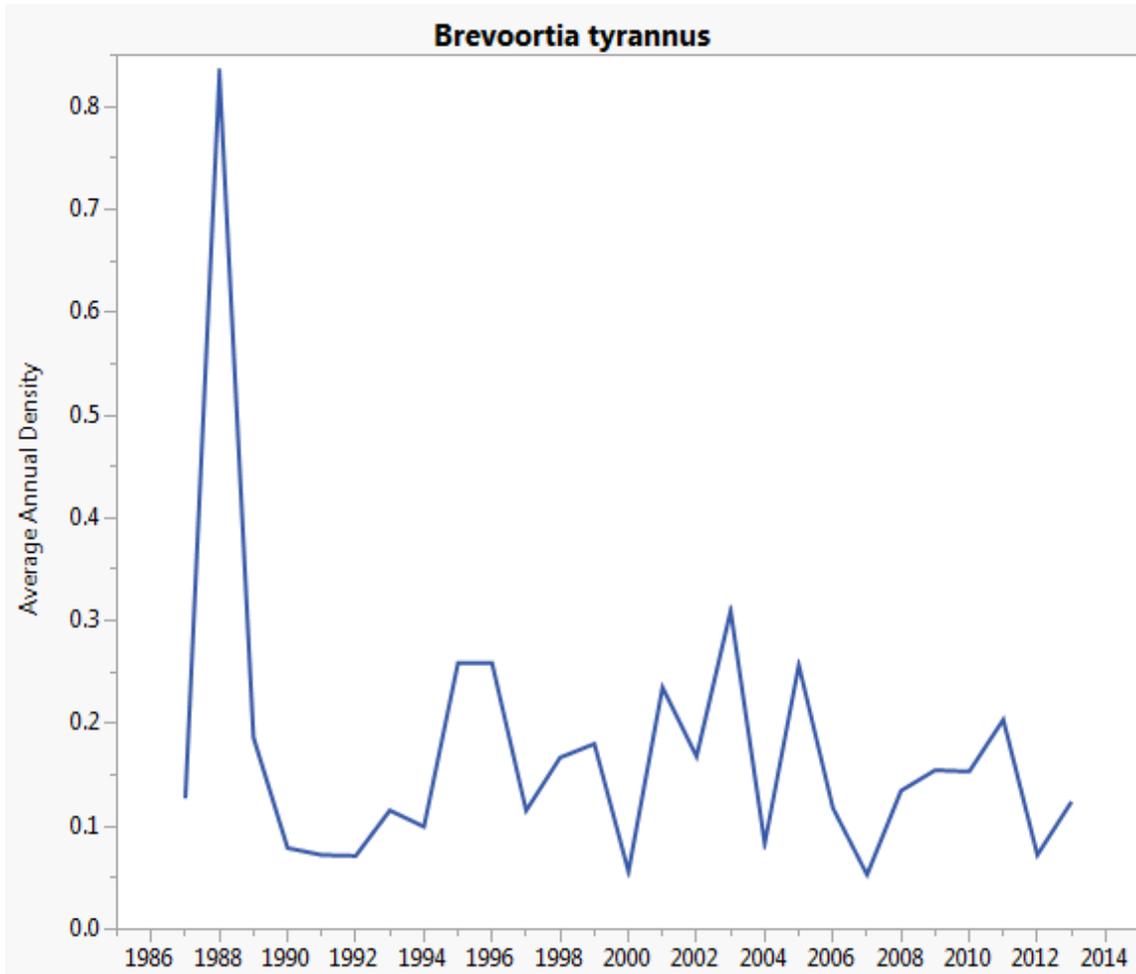


Figure 8. Average annual density (number of larvae per cubic meter averaged across samples) of Atlantic menhaden (*Brevoortia tyrannus*).

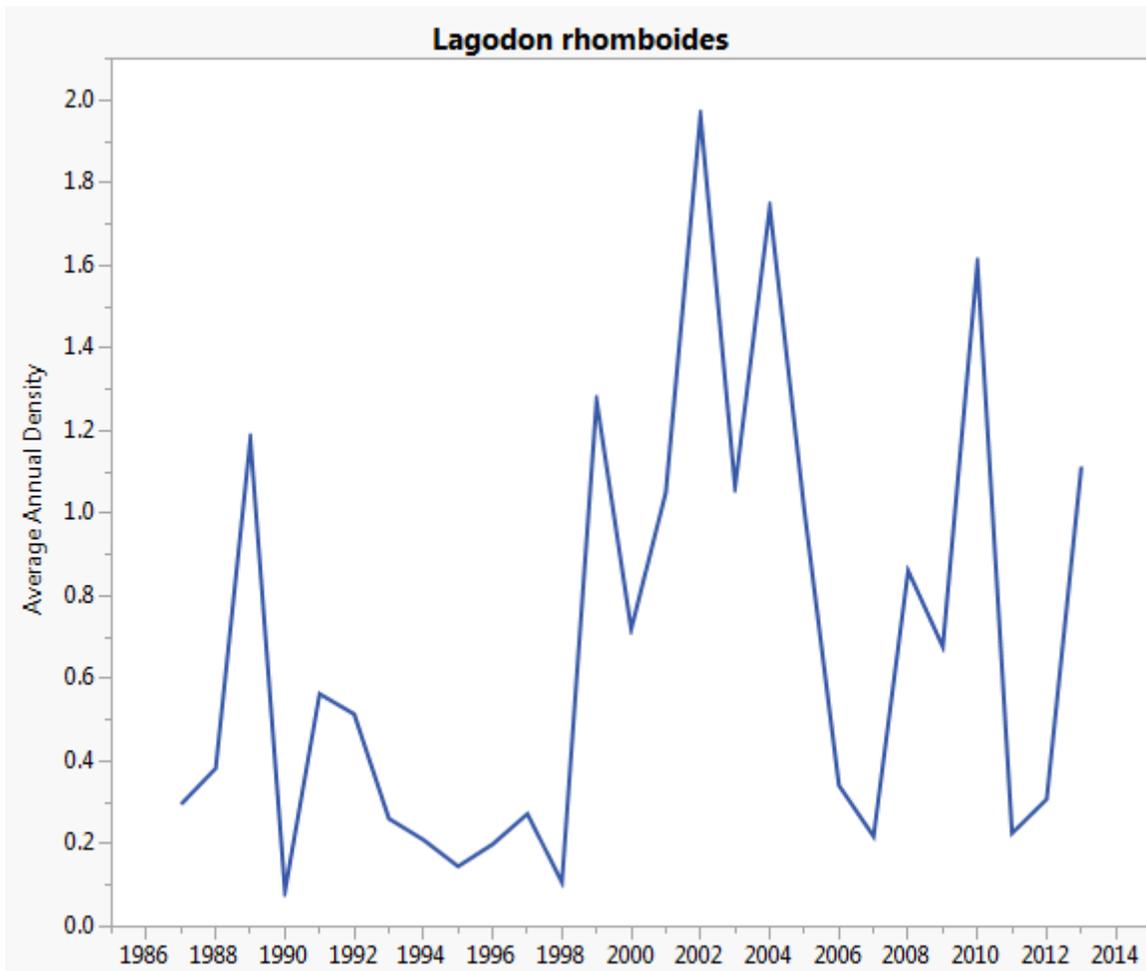


Figure 9. Average annual density (number of larvae per cubic meter averaged across samples) of pinfish (*Lagodon rhomboides*).

**Appendix 1:** Taxa collected during the BBISP time series (1986-2013), sorted by frequency of occurrence (FO; percentage of samples in which the taxa occurred). Total abundance = total number collected during the time series.

Taxa	Common Name	FO	Total Abundance
<i>Micropogonias undulatus</i>	Atlantic croaker	83.61	101348
<i>Lagodon rhomboides</i>	pinfish	75.97	222101
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Gobiidae	true gobies	59.96	12294
<i>Myrophis punctatus</i>	speckled worm eel	57.95	30366
<i>Paralichthys albigutta</i>	Gulf flounder	51.54	13459
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<i>Mugil cephalus</i>	striped mullet	33.07	5919
Engraulidae	anchovies	26.82	65366
<i>Paralichthys dentatus</i>	summer flounder	26.79	3311
<i>Anguilla rostrata</i>	American eel	23.62	1604
<i>Orthopristis chrysoptera</i>	pigfish	22.83	16836
<i>Citharichthys spilopterus</i>	bay whiff	21.04	2281
Atherinopsidae	new world silversides	15.14	2391
Unidentified	unidentified	10.40	1646
Syngnathidae	pipefishes	9.17	658
<i>Eucinostomus</i>	mojarras	8.54	1283
<i>Elops saurus</i>	ladyfish	8.42	598
<i>Syngnathus</i>	seaweed pipefishes	8.32	514
Triglidae	searobins	8.07	964
<i>Symphurus plagiusa</i>	blackcheek tonguefish	7.16	391
<i>Mugil curema</i>	white mullet	6.82	974
Elopidae	tenpounders	5.43	316
Blenniidae	blenny	5.28	515
Clupeiformes		5.15	8216
<i>Prionotus</i>	sea robin	4.52	234
<i>Menidia menidia</i>	Atlantic silverside	4.37	637
<i>Paralichthys</i>	flounder	3.99	309
<i>Cynoscion</i>	weakfishes	3.86	2185
Sciaenidae	drums	3.80	1399
<i>Scophthalmus aquosus</i>	windowpane	3.49	157
<i>Urophycis regia</i>	spotted hake	3.27	182
Congridae	congers	3.08	361
<i>Symphurus civitatum</i>	offshore tonguefish	2.98	141
<i>Menticirrhus</i>	kingfishes	2.76	186

<i>Synodus foetens</i>	inshore lizardfish	2.51	604
<i>Stephanolepis hispidus</i>	planehead filefish	2.17	222
Synodontidae	lizardfishes	2.14	189
<i>Hippocampus</i>	seahorses	1.76	76
<i>Peprilus triacanthus</i>	butterfish	1.70	89
<i>Mycteroperca microlepis</i>	gag	1.66	122
Percoidei		1.60	256
<i>Ahlia egmontis</i>	key worm eel	1.51	91
<i>Opisthonema oglinum</i>	Atlantic thread herring	1.48	271
Haemulidae	grunts	1.35	199
<i>Astroscopus</i>	electric stargazers	1.16	37
<i>Sciaenops ocellatus</i>	red drum	1.04	134
Achiridae	soles	0.88	31
<i>Peprilus burti</i>	Gulf butterfish	0.88	31
Clupeidae	herrings	0.85	262
<i>Symphurus</i>	straightmouth toungefishes	0.85	36
<i>Trachinotus</i>	pompanos	0.82	38
<i>Gobiesox strumosus</i>	skilletfish	0.79	26
<i>Stephanolepis</i>	filefish	0.75	51
<i>Mugil</i>	gray mullets	0.72	39
Tetraodontidae	puffer	0.66	27
<i>Pomatomus saltatrix</i>	bluefish	0.63	29
Anguilliformes		0.57	38
<i>Pogonias cromis</i>	black drum	0.50	24
Uranoscopidae	stargazers	0.47	16
Epinephelinae		0.44	16
Ophidiidae	cusk eel	0.44	17
<i>Urophycis chuss</i>	red hake	0.41	16
Exocoetidae	flyingfish	0.35	19
<i>Urophycis</i>	codlings	0.35	27
<i>Dormitator maculatus</i>	fat sleeper	0.31	14
<i>Lutjanus griseus</i>	gray snapper	0.31	15
Batrachoididae	toadfish	0.28	10
<i>Cynoscion nebulosus</i>	spotted seatrout	0.28	12
<i>Decapterus punctatus</i>	round scad	0.28	14
<i>Diaphus</i>	lantern fish	0.28	17
Lutjanidae	snappers	0.28	11
Sparidae	porgies	0.28	27
<i>Harengula jaguana</i>	scaled sardine	0.25	17
Monacanthidae	filefishes	0.25	13

<i>Cynoscion arenarius</i>	sand seatrout	0.22	14
<i>Fundulus</i>	mummichogs	0.22	8
Hemiramphidae	halfbeaks	0.22	7
Paralichthyidae	lefteye flounders	0.22	14
<i>Bregmaceros</i>	codlets	0.19	19
Cyprinodontidae	toothcarps	0.19	6
Scorpaenidae	scorpionfish	0.19	9
<i>Sphyraena</i>	barracudas	0.19	6
<i>Albula vulpes</i>	bonefish	0.16	6
Carangidae	jacks	0.16	7
<i>Etropus</i>	flounder	0.16	8
Gadidae	true cods	0.16	9
<i>Hippocampus erectus</i>	lined seahorse	0.16	7
<i>Lophius Americanus</i>	goosefish	0.16	7
Perciformes		0.16	9
<i>Cynoscion regalis</i>	weakfish	0.13	5
Fundulidae	killifishes	0.13	6
Labridae	wrasses	0.13	4
<i>Lutjanus</i>	snappers	0.13	5
Myctophidae	lantern fish	0.13	4
<i>Sphoeroides</i>	swellfishes	0.13	5
<i>Tautoga onitis</i>	tautog	0.13	4
<i>Archosargus probatocephalus</i>	sheepshead	0.09	4
<i>Bentosema</i>	lantern fish	0.09	3
<i>Caranx</i>	crevallies	0.09	4
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	0.09	3
<i>Citharichthys</i>	whiffs	0.09	3
Gerreidae	mojarra	0.09	7
Ostraciidae	boxfishes	0.09	3
<i>Paralichthys squamilentus</i>	broad flounder	0.09	3
<i>Sardinella</i>	sardine	0.09	7
<i>Stephanolepis setifer</i>	pygmy filefish	0.09	4
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	0.09	8
<i>Ancylopsetta ommata</i>	ocellated flounder	0.06	2
<i>Bairdiella chrysoura</i>	silver perch	0.06	15
<i>Coryphaena hippurus</i>	dolphinfish	0.06	3
<i>Lobotes surinamensis</i>	triple tail	0.06	2
<i>Mycteroperca bonaci</i>	black grouper	0.06	2
<i>Oligoplites saurus</i>	leatherjacket	0.06	2
Ophichthidae	worm eels	0.06	19
<i>Ophichthus cruentifer</i>	snake eel	0.06	2

<i>Ophichthus rex</i>	king snake eel	0.06	2
Pleuronectiformes		0.06	3
<i>Sardinella aurita</i>	scad	0.06	5
<i>Selar crumenophthalmus</i>	bigeye scad	0.06	2
<i>Sphyraena borealis</i>	northern sennet	0.06	2
<i>Archosargus</i>	sheepshead porgies	0.03	1
<i>Auxis</i>	frigate mackerels	0.03	1
Balistidae	triggerfishes	0.03	1
Belonidae	needlefishes	0.03	1
Callionymidae	scooter blennies	0.03	1
<i>Caranx crysos</i>	blue runner	0.03	1
<i>Centropristis</i>	sea basses	0.03	1
<i>Ceratoscopelus</i>	lantern fish	0.03	1
<i>Ceratoscopelus maderensis</i>	lantern fish	0.03	1
<i>Citharichthys gymnorhinus</i>	angelfin whiff	0.03	1
Cottidae	sculpins	0.03	1
Cyclopteridae	snailfishes	0.03	1
<i>Cynoscion nothus</i>	silver seatrout	0.03	1
Elopiformes		0.03	4
<i>Epinephelus itajara</i>	goliath grouper	0.03	1
<i>Etropus crossotus</i>	fringed flounder	0.03	1
<i>Etropus microstomus</i>	smallmouth flounder	0.03	1
Gonostomatidae	gonostomatidae	0.03	1
<i>Lutjanus apodus</i>	schoolmaster	0.03	1
<i>Lutjanus campechanus</i>	red snapper	0.03	1
Malacanthidae	tilefish	0.03	1
<i>Megalops Atlanticus</i>	tarpon	0.03	1
Moridae	codling	0.03	1
Muraenidae	moray eel	0.03	1
<i>Peprilus paru</i>	northern harvestfish	0.03	1
Pomacentridae	damsel fishes	0.03	1
Scaridae	parrotfishes	0.03	1
Scombridae	tunas	0.03	1
<i>Seriola</i>	yellowtails	0.03	1
<i>Stellifer lanceolatus</i>	star drum	0.03	1
<i>Trachurus lathami</i>	rough scad	0.03	1

**Appendix 2:** Taxa contained in the samples processed with CRFL funding (2007-2013; n = 756) during the BBISP time series (1986-2013), sorted by frequency of occurrence (FO; percentage of samples in which the taxa occurred). Total abundance = total number collected during the time series.

<b>Taxa</b>	<b>Common Name</b>	<b>FO</b>	<b>Total Abundance</b>
<i>Micropogonias undulatus</i>	Atlantic croaker	77.65	17518
<i>Lagodon rhomboides</i>	pinfish	64.29	41614
<i>Leiostomus xanthurus</i>	spot	61.38	46692
<i>Brevoortia tyrannus</i>	Atlantic menhaden	55.69	7401
Gobiidae	true gobies	51.19	2411
<i>Paralichthys albigutta</i>	Gulf flounder	44.71	2176
<i>Myrophis punctatus</i>	speckled worm eel	44.44	1614
Engraulidae	anchovies	35.58	26884
<i>Paralichthys lethostigma</i>	southern flounder	28.31	2206
<i>Orthopristis chrysoptera</i>	pigfish	28.17	3611
Atherinopsidae	new world silversides	26.06	871
<i>Mugil cephalus</i>	striped mullet	24.21	615
<i>Paralichthys dentatus</i>	summer flounder	22.35	821
Triglidae	searobins	19.05	490
<i>Citharichthys spilopterus</i>	bay whiff	16.14	274
Unidentified	unidentified	15.34	669
<i>Eucinostomus</i>	mojarras	14.95	499
<i>Anguilla rostrata</i>	American eel	13.89	220
Syngnathidae	pipefishes	12.57	220
<i>Syngnathus</i>	seaweed pipefishes	11.51	151
<i>Mugil curema</i>	white mullet	11.38	297
Blenniidae	blenny	10.32	241
Clupeiformes		8.99	1748
<i>Cynoscion</i>	weakfishes	7.67	717
Elopidae	tenpounders	6.22	97
<i>Ahlia egmontis</i>	key worm eel	5.82	86
<i>Elops saurus</i>	ladyfish	5.69	85
<i>Menticirrhus</i>	kingfishes	5.42	80
<i>Symphurus plagiusa</i>	blackcheek tonguefish	5.16	48
Synodontidae	lizardfishes	4.76	142
<i>Opisthonema oglinum</i>	Atlantic thread herring	4.23	154
Sciaenidae	drums	4.23	132
<i>Hippocampus</i>	seahorses	3.97	41
<i>Paralichthys</i>	flounder	3.70	66
<i>Stephanolepis</i>	filefish	2.65	40

<i>Symphurus</i>	straightmouth toungefishes	2.51	22
<i>Trachinotus</i>	pompanos	2.25	25
Achiridae	soles	2.12	17
<i>Mugil</i>	gray mullets	2.12	30
<i>Scophthalmus aquosus</i>	windowpane	2.12	18
<i>Sciaenops ocellatus</i>	red drum	1.72	24
<i>Gobiesox strumosus</i>	skilletfish	1.59	13
<i>Urophycis</i>	codlings	1.46	27
<i>Stephanolepis hispidus</i>	planehead filefish	1.32	12
Anguilliformes		1.06	11
Lutjanidae	snappers	1.06	10
Clupeidae	herrings	0.93	23
<i>Cynoscion nebulosus</i>	spotted seatrout	0.93	10
Epinephelinae		0.93	8
<i>Peprilus burti</i>	Gulf butterfish	0.93	8
Percoidei		0.93	77
<i>Tetraodontidae</i>	puffer	0.79	8
Uranoscopidae	stargazers	0.79	6
<i>Cynoscion arenarius</i>	sand seatrout	0.66	8
Hemiramphidae	halfbeaks	0.66	5
Paralichthyidae	lefteye flounders	0.66	11
Perciformes		0.66	9
<i>Pomatomus saltatrix</i>	bluefish	0.66	6
<i>Urophycis regia</i>	spotted hake	0.66	7
Congridae	congers	0.53	9
Cyprinodontidae	toothcarps	0.53	4
Exocoetidae	flyingfish	0.53	8
<i>Harengula jaguana</i>	scaled sardine	0.53	13
<i>Lutjanus</i>	snappers	0.53	5
Monacanthidae	filefishes	0.53	9
Ophidiidae	cusk eel	0.53	4
<i>Decapterus punctatus</i>	round scad	0.40	3
Labridae	wrasses	0.40	3
<i>Lutjanus griseus</i>	gray snapper	0.40	5
Ostraciidae	boxfishes	0.40	3
<i>Pogonias cromis</i>	black drum	0.40	3
<i>Trichiurus lepturus</i>	Atlantic cutlassfish	0.40	8
<i>Albula vulpes</i>	bonefish	0.26	2
<i>Citharichthys</i>	whiffs	0.26	2
<i>Coryphaena hippurus</i>	dolphinfish	0.26	3

<i>Etropus</i>	flounder	0.26	2
<i>Peprilus triacanthus</i>	butterfish	0.26	3
Scorpaenidae	scorpionfish	0.26	2
<i>Sphyraena</i>	barracudas	0.26	2
<i>Stephanolepis setifer</i>	pygmy filefish	0.26	2
<i>Urophycis chuss</i>	red hake	0.26	2
Balistidae	triggerfishes	0.13	1
Belonidae	needlefishes	0.13	1
<i>Bregmaceros</i>	codlets	0.13	1
Callionymidae	scooter blennies	0.13	1
<i>Caranx</i>	crevallies	0.13	1
<i>Centropristis</i>	sea basses	0.13	1
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	0.13	1
Elopiformes		0.13	4
<i>Etropus microstomus</i>	smallmouth flounder	0.13	1
Gerreidae	mojarras	0.13	1
<i>Lobotes surinamensis</i>	tripletail	0.13	1
<i>Megalops Atlanticus</i>	tarpon	0.13	1
<i>Oligoplites saurus</i>	leatherjacket	0.13	1
Ophichthidae	worm eels	0.13	18
<i>Ophichthus rex</i>	king snake eel	0.13	1
Pleuronectiformes		0.13	1
Pomacentridae	damsel fishes	0.13	1
Scombridae	tunas	0.13	1
<i>Seriola</i>	yellowtails	0.13	1
Sparidae	porgies	0.13	1