



Reports

5-19-1999

Fish and Fisheries of the Seaside of the Eastern Shore of Virginia

John A. Musick

Virginia Institute of Marine Science

John J. Norcross

Virginia Institute of Marine Science

David Hata

Virginia Institute of Marine Science

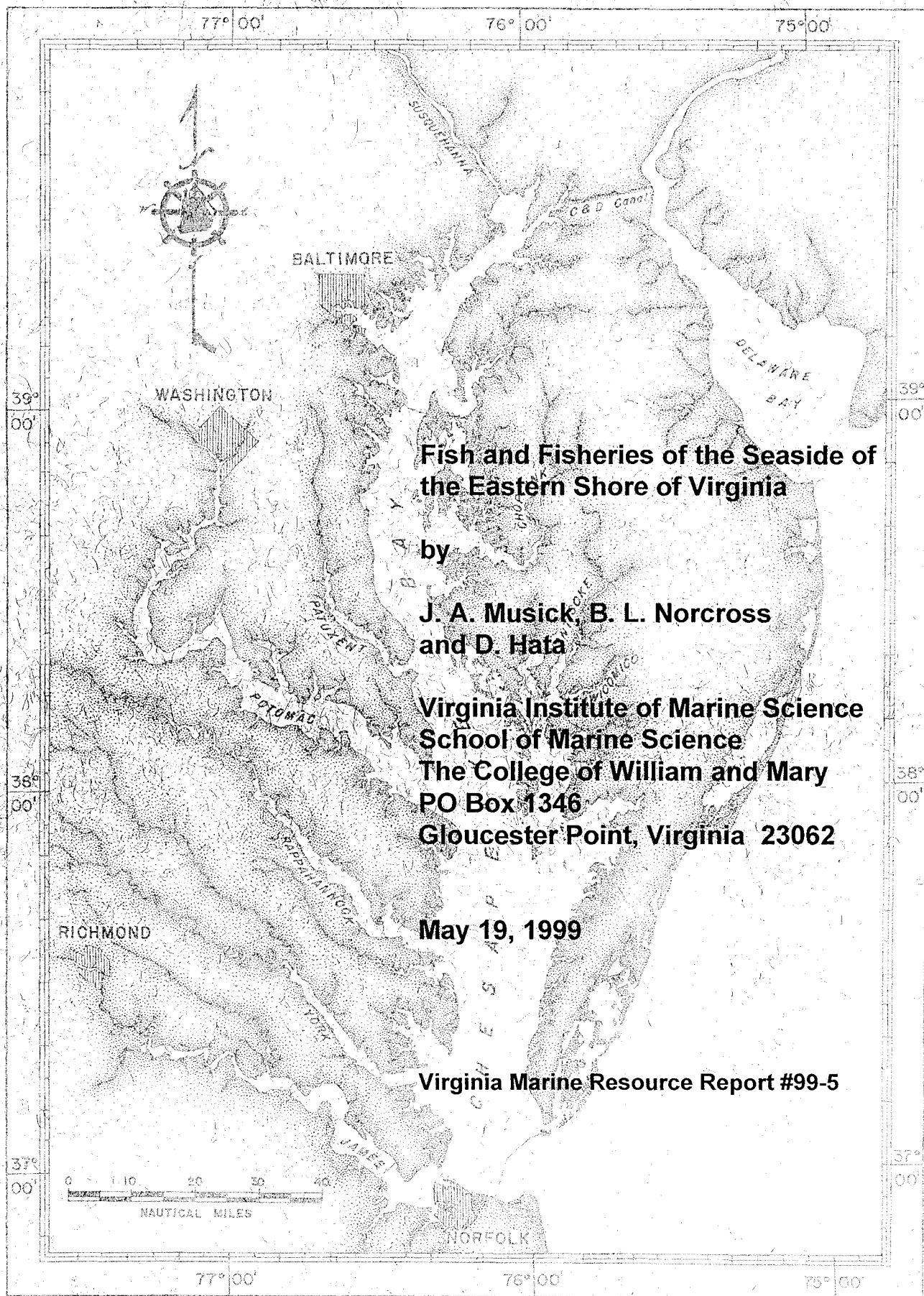
Follow this and additional works at: <https://scholarworks.wm.edu/reports>

 Part of the [Aquaculture and Fisheries Commons](#)

Recommended Citation

Musick, J., Norcross, J. J., & Hata, D. (1999) Fish and Fisheries of the Seaside of the Eastern Shore of Virginia. Marine Resource Report No. 99-5. Virginia Institute of Marine Science, College of William and Mary. <http://dx.doi.org/doi:10.21220/m2-hws5-je18>

This Report is brought to you for free and open access by W&M ScholarWorks. It has been accepted for inclusion in Reports by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.



**Fish and Fisheries of the Seaside of
the Eastern Shore of Virginia**

by

**J. A. Musick, B. L. Norcross
and D. Hata**

**Virginia Institute of Marine Science
School of Marine Science
The College of William and Mary
PO Box 1346
Gloucester Point, Virginia 23062**

May 19, 1999

Virginia Marine Resource Report #99-5

Fish and Fisheries of the Seaside of the Eastern Shore of Virginia

by

J. A. Musick, B. L. Norcross and D. Hata

Virginia Institute of Marine Science
School of Marine Science
The College of William and Mary
PO Box 1346
Gloucester Point, Virginia 23062

Virginia Marine Resource Report # 99-5

May 19, 1999

Introduction

The fish fauna of the Eastern Shore is diverse and dynamic. The shoal waters around the barrier islands have one of the most extreme annual temperature ranges known for any marine environment. Water temperatures approach 0°C in many winters and ice commonly forms. In summer, temperatures may approach 30°C in many habitats, and the pools found throughout the marshes may be even warmer. The shallowest habitats are subjected to the most extreme temperatures. This strong seasonality is responsible for the dynamic nature of the fish fauna which has a large migratory component. Warm-temperate and sub-tropical species dominate the fauna in summer, cool-temperate species are present in spring and fall, and boreal species are present in winter. A relatively small percent ($\approx 15\%$) of the fauna is resident.

Much of what is known about the fish fauna of the eastern shore has been accrued from species-specific studies (e.g. Musick & Colvocoresses 1987), site specific studies (Kimmel 1973), studies of fisheries (Hoese 1962, Richards 1965, Marshall and Lucy 1981, Burrell et al. 1972) or from information gained from local watermen. Very few studies have ever been directed at the ecology of finfish in this area. In 1965, a 12 month survey covered a broad spectrum of sites, habitats and seasons available (Richards and Castagna, 1970). A 1986-87 study (Norcross and Hata, 1990) was conducted specifically to assess the importance of the waters behind the barrier islands as a juvenile nursery area. This study repeatedly evaluated three specific sites, Wachapreague Channel, Sand Shoal Channel and Fisherman's Island in an intensive manner with biweekly sampling of the same stations for 12 months. The Norcross and Hata (1990) study provided information about post larval and juvenile fishes while Richards and Castagna (1970) more efficiently captured juveniles and larger fishes. The following discussion

is based on Richards and Castagna (1970), Kimmel (1973), Musick and Colvocoresses (1987), Norcross and Hata (1990), Norcross and Wyanski (1994), Austin, et al. (1997), and 20 years of unpublished field observation collected on Eastern Shore fishes by Musick. In addition, a list of species occurring in the waters of the Virginia Barrier Islands has been compiled (Appendix A).

The Resident Fauna

The resident fauna is dominated by estuarine species which are adapted to the extreme seasonal ranges in temperature. Most of these species are small (< 6") to medium (< 12") in size. Important families include anchovies (Engraulidae), the killifishes (Cyprinodontidae), silversides (Atherinidae), blennies (Bleniidae), gobies (Gobiidae), toadfishes (Batrachoididae), Clingfishes (Gobiesocidae), tonguefishes (Cynoglossidae), and hogchokers (Soleidae). Many of these fishes may occupy shallow habitats in summer and deeper channel areas in winter where the cold temperatures are moderated by warm salty ocean water near the bottom.

The Migratory Fauna

The most common component of the fish fauna is comprised of warm-temperate and sub-tropical species which migrate into the area in spring, spend the summer foraging, and migrate south and/or offshore in autumn. In general the larger species and larger, older individuals within species migrate further than smaller species and individuals. Important groups of summer visitors include sharks (Carcharhinidae), stingrays (Dasyatidae), menhaden (Clupeidae), needlefishes (Strongyluridae), sea bass (Serranidae), bluefish (Pomatomidae), drums, croaker, weakfish and their relatives (Sciaenidae), flounder (Bothidae), puffers

(Tetraodontidae), and scarobins (Triglidae). Most of this summer component enters the area in May and departs by October. The exact times of arrival and departure for each species may vary by more than a month each year depending on seasonal changes in water temperature. In addition, different life history stages may have different migratory schedules. Thus, juveniles and adults of the same species might arrive (or depart) at different times. Some migratory species use the Eastern Shore estuarine habitats primarily as nursery grounds.

The spring and especially the fall are times of high fish diversity on the Eastern Shore because elements of both the warm-water and boreal faunas may be present, along with a group of cool-temperate species which enter the inlets and channels to forage then, but find water temperatures there too warm in mid-summer and too cold in mid-winter. The most important members of this group are gadoid hakes (*Urophycis* and *Merluccius*) and wrasses (Labridae).

In winter the fish fauna reaches a low point in diversity. Shallower habitats are virtually devoid of fish life. The deepest habitats are occupied by spiny dog-fish sharks (Squalidae) and juveniles of the anadromous herrings (Alosinae) and hakes (Gadidae). There are moderate runs of winter flounder (Pleuronectidae) in some areas, and striped bass (Moronidae) are found in the surf in some winters. Sea herring (Clupeidae), mackerel (Scombridae), and adult river herrings migrate past along the beach on their way north in late winter and early spring (March, early April).

Habitats

The rigid classification of habitats that follows is in part artificial because even though the ecotone between some adjacent habitats as marsh and tidal creeks may be abrupt, the

transitions between other habitats (i.e. large tidal creeks/channels, lagoonal flats/channels) may be gradual. The ebb and flow of the tide inextricably interconnects all of these habitats, and in these connections lies the key to the major flow of energy in the system. Much of the following discussion focuses on the behavior and distribution of fishes in the warmer months because the fish fauna in winter is so depauperate and restricted in distribution.

Marshes

Fishes utilize virtually all estuarine and marine habitats on the Eastern Shore where there is water. Even high marsh and temporarily flooded inter-tidal habitats are used. In the high marsh, shallow puddles and the thin layer of water in the interstices of the root systems of *Spartina patens* and other marsh plants are occupied by the diminutive killifish, *Fundulus luciae*, and mosquitofish, *Gambusia affinis*. These areas also provide nursery habitat for small juveniles of other cyprinodontids like the mummichog, *Fundulus heteroclitus*. In the lower intertidal marsh where *Spartina alterniflora* predominates, mummichogs, striped killifish (*F. majalis*), sheepshead minnow (*Cyprinodon variegatus*), rainwater killifish (*Lucania parva*) and the Atlantic silverside (*Menidia menidia*) and striped mullet (*Mugil cephalus*) invade to forage on detritus and small invertebrates with each high tide. With the falling tide these species retreat to tidal creeks.

Tidal Creeks

In addition to the suite of small species noted above, tidal creeks provide important nursery habitat for juvenile menhaden (*Brevoortia tyrannus*), spot (*Leiostomus xanthurus*), and

summer flounder (*Paralichthys dentatus*), as well as for limited numbers of black drum (*Pogonias cromis*). Small planktivorous, bay anchovies (*Anchoa mitchilli*), as well as fishes of moderate size which feed on the shrimps (*Neomysis* and *Crangon*), crabs and smaller fishes may forage into tidal creeks on high tides. Among the higher predators are needlefish (*Strongylura marina*), summer flounder, small blue fish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), small red drum (channel bass) (*Sciaenops ocellata*), and small sandbar sharks (*Carcharhinus plumbeus*), the last of which use the creeks, lagoons and channels for nursery grounds. The energetic coupling of marsh and subtidal habitats through fishes in the foodweb is probably the most important pathway by which marsh grass production may be transported to the sea (through seasonal fish emigration).

Lagoons

The vast estuaries behind the barrier islands of the Eastern Shore are dominated by large shallow lagoons, many of which may be intertidal. The bottoms of these broad shallow expanses may be composed of sand and sandy mud, or oyster reefs. Conspicuously rare in these areas are eel grass (*Zostera marina*) meadows which were extirpated by an epizootic in the 1930's. Currently, attempts are underway by VIMS scientists to reestablish this important sea grass. The fish fauna in these lagoonal areas includes many of the same species found in the tidal creeks but also includes a very special community associated with areas of oyster reef habitat. This community is composed of small and medium-sized territorial species such as blennies (*Chasmodes bosquianus*, *Hypsoblennius hentzi*), gobies (*Gobiosoma bosci*, *G. ginsburgi*), the skilletfish (*Gobiesox strumosus*), oyster toadfish (*Opsanus tau*), juvenile black sea bass

(*Centropristis striata*), and spadefish (*Chaetodipterus faber*). Larger species may forage over the lagoonal flats at high tide. Among those are the rare bull shark (*Carcharhinus leucas*) and lemon shark (*Negaprion brevirostris*), (both of which prey on small sandbar sharks and stingrays), tarpon (*Megalops atlanticus*), and a group of fishes that often feed on oysters (*Crassostrea virginica*), soft clams (*Mya arenaria*) and other bivalves. These mollusk-eaters include the cownose and bullnose rays (*Rhinoptera bonasus*, *Myliobatis freminvillei*) and larger black drum (*Pogonias cromis*).

Channels and Inlets

Channels provide habitats for estuarine as well as migratory marine species of all sizes. Consequently, channel habitats support the highest fish diversity in the Eastern Shore-ecosystem. The inlets provide the portals through which all elements of the migratory fauna must pass. Some fishes do so twice a year entering in the spring, departing in the fall. Others may do so on a daily basis, coming and going with the tide. Size seems to be the principal factor determining residence time. Juveniles who use the seaside estuaries as nurseries (i.e. summer flounder, black sea bass, spot, menhaden) usually enter in the spring and leave in the fall. Many large predators like large weakfish, large bluefish, adult sandbar sharks, juvenile dusky sharks (*C. obscurus*) and tarpon may enter with the flood and leave with the receding tide. Yet adults of some other species like summer flounder may have even more complex estuarine movements which change during the summer.

The diverse complex of species which uses the channels and inlets includes all those mentioned above (save the marsh species) and a host of other species as well. Dominant among

these are the stingrays (*Dasyatis sayi* and *D. americana*), the butterfly rays (*Gymnura altavela*, *G. micrura*), the clearnose skate (*Raja eglanteria*), the inshore lizardfish (*Synodus foetens*), blacktip, sharpnose, and sand tiger sharks (*C. limbatus*, *Rhizoprionodon terraenovae*, *Carcharias taurus*), butterflyfish (*Peprilus triacanthus*), croakers (*Micropogonias undulatus*), weakfish, silver perch (*Bairdiella chrysoura*), channel bass of all sizes, (kingfish) whittings (*Menticirrhus saxatilis*, *M. americanus*, *M. littoralis*), striped and northern searobins (*Prionotus evolans*, *P. carolinus*), northern puffer (*Sphoeroides maculatus*), etc.

The inlets are particularly dynamic areas in summer because of the influx of relatively cool ocean water at high tide, and a strong thermocline which can lead to a difference of $>10^{\circ}\text{C}$ between surface and bottom. Cold bottom water ($\approx 12 - 15^{\circ}\text{C}$) may be pulled into the inlets after long periods of sustained southwest winds (which predominate during the summer). Thus, at high tide the bottom temperature gradient from the inlet up into the shoaling channels behind the barrier islands may be as much as $10 - 15^{\circ}\text{C}$ over a couple of kilometers. During these periods the demersal sub-tropical elements of the fauna (carcharhinid sharks, stingrays, etc.), are restricted and apparently can't pass through the deeper inlets except at the surface. This doesn't appear to be true for the shallower inlets (like New Inlet) where the water stays mixed and warm and the larger members of the fauna (tarpon, blacktip sharks, and stingrays) are the same as those found in the passes of Georgia, Florida and along the Gulf of Mexico. The fish fauna within the cold water in the inlets often includes cool-temperate species like the spotted hake (*Urophycis regia*) and silver hake (*Merluccius bilinearis*) as well as eurythermal warm-temperate elements such as clearnose skate (*Raja eglanteria*), searobins, sciaenids and summer flounder. Thus, the fauna may change drastically over the distance of a kilometer or two.

Channel and inlet habitats are the focus for the most important recreational fisheries on the Eastern Shore. A flotilla of private boats, rental outboards, charter and headboats sails out of Oyster, Chincoteague, Wachapreague and other seaside ports from late April through early October primarily in pursuit of summer flounder, but also of weakfish, croakers, bluefish, black drum and channel bass. Fisheries for the first three of these tend to move from the channels into the inlets and ocean as summer progresses. Fisheries for black drum tend to be local and focused near deep oyster reefs in specific inlets during late spring. Channel bass tend to enter the Smith Island Flats area in late spring and spread out to deeper channels and surf habitats in summer. They migrate south along the beach in fall along with the other sciaenids and most of the rest of the summer migratory fauna.

Nearshore Ocean Habitats

The shallow shifting sand bars and surf zone along the beach provide seasonal habitat to all the migratory marine species mentioned above. The surf zone is a sometimes violent specialized habitat occupied by kingfishes (*Menticirrhus* sp.), pompano (*Trachinotus carolinus*), channel bass, summer flounder, spot, clearnose skate, bluefish, sandbar sharks, juvenile dusky sharks and sand tiger sharks, all of which provide sport to the recreational surf fisherman, especially in late spring and early fall. Hickory shad may be available to surf fishermen in the spring. In addition, the recreational fleet fishes this nearshore area from mid summer to fall for summer flounder, croaker, weakfish and bluefish. Amberjacks (*Seriola zonata*) and cobia (*Rachycentron canadum*) are often caught by trolling past the buoys that mark the approaches to the various Eastern Shore inlets. Wrecks and an artificial reef off Wachapreague provide fishing

for black seabass and tautog. The larger vessels in the recreational fleet (> 25') often make trips 10 miles and more offshore for bluefin tuna (*Thunnus thynnus*) in June, and dolphin (*Coryphaena hippurus*), yellowfin tuna (*Thunnus albacares*) and other scombrids, later in the summer. Some boats travel all the way to Washington and Norfolk submarine canyons to fish for tunas, blue and white marlin (*Makaira nigricans*, *Tetrapturus albidus*) and wahoo (*Acanthocybium solanderi*). The recreational fisheries are of particular importance to the economies of Chincoteague and Wachapreague. In late winter and early spring sea herring (*Clupea* sp.), river herring (*Alosa* sp.) and "Boston" mackerel (*Scomber scombrus*) migrate past the barrier islands on their way to the north. The mackerel may be pursued by recreational fishermen, and watermen who catch them in gill nets. In recent years an active gill net fishery has been developed for spiny dogfish (*Squalus acanthis*) in winter and early spring and for smooth dogfish (*Mustelus canus*) in late spring.

Seasonal Patterns - The Details

Seasonal patterns of juvenile fish abundance are well shown in the Norcross and Hata (1990) paper and we shall summarize them here. Pooled results of the number of species, at all sizes and lifestages, collected by seine and trawl in 1986-87 plotted by month show a strong seasonal component with the diversity lowest in February and highest in October (Figure 1). These seasonal fluctuations can be readily seen when data are grouped into 3-month seasons: Fall = October, November, December; Winter = January, February, March; Spring = April, May, June; Summer = July, August, September (Table 1). While many species are present in low numbers during almost all times of the year, the relative importance of each species varies

seasonally. Only two species are present in large numbers during all seasons, Atlantic silverside (*Menidia menidia*) and bay anchovy (*Anchoa mitchilli*). The remainder of the top ranking species fluctuate according to season, with several only being important during one 3-month period. These are a result of season-specific influx of young-of-the-year recruits, e.g. croaker in the fall, spotted hake and summer flounder in the winter, spot and summer flounder in the spring, and spot and weakfish in the summer.

Examining monthly distribution patterns of the most abundant forage species reveals that silversides, anchovy and killifishes occur in an order of magnitude greater abundance than the other species. (Figure 2). The extremely high numbers exhibited are due to spawning locally and consequent juvenile recruitment. Though silversides, anchovies, mummichogs and killifish may not migrate out of these waters, their abundance decreases in the winter as they become less available to the sampling gear. Yet while their numbers are greatly reduced in the winter, relative to other species, these forage fishes remain abundant. The only exception to this pattern of decreased winter abundance is spotted hake which spawns offshore in the fall and winter, providing new recruits to the barrier island waters from fall through spring. These juvenile hake then migrate offshore in the summer.

The next most abundant group of fishes are the commercially and recreationally important sciaenids (drums). Distinct patterns of juvenile recruitment are apparent from the seasonal rankings in Table 1 and the monthly plot of abundance (Figure 3). Croaker ranked number one in the fall of 1986, but were only present in small numbers in the winter and summer. Spot recruitment in the spring attained a rank of 3, and while not consistent

month-to-month, they remained abundant throughout the summer. Newly recruited weakfish appeared in very high numbers in the late summer, but were sporadically present the rest of the year. Another sciaenid, silver perch, recruited as young juveniles in late summer and fall but was not as abundant as the other 3 species. It is apparent from these seasonal patterns, that the waters behind the barrier islands are utilized as a nursery area by at least one species of juvenile sciaenid throughout the year.

The remainder of the most abundance species are flatfishes. With the exception of summer flounder, these species are small and not commercially important. In general, the abundance of these flatfish decreases in the winter (Figure 4) as the adult flounders and tonguefish migrate offshore and hogchokers migrate to fresh water. However, some life stage of each remains over almost all seasons. Summer flounder spawn offshore in the fall and winter and recruitment of juveniles takes place from fall through winter and spring. Spring also is the time of a large influx of adult flounder which supports the recreational fishery. The barrier island area appears to be a very important habitat for this species, thus the claim by Wachapreague as "The Flounder Capital Of The World".

SUMMARY

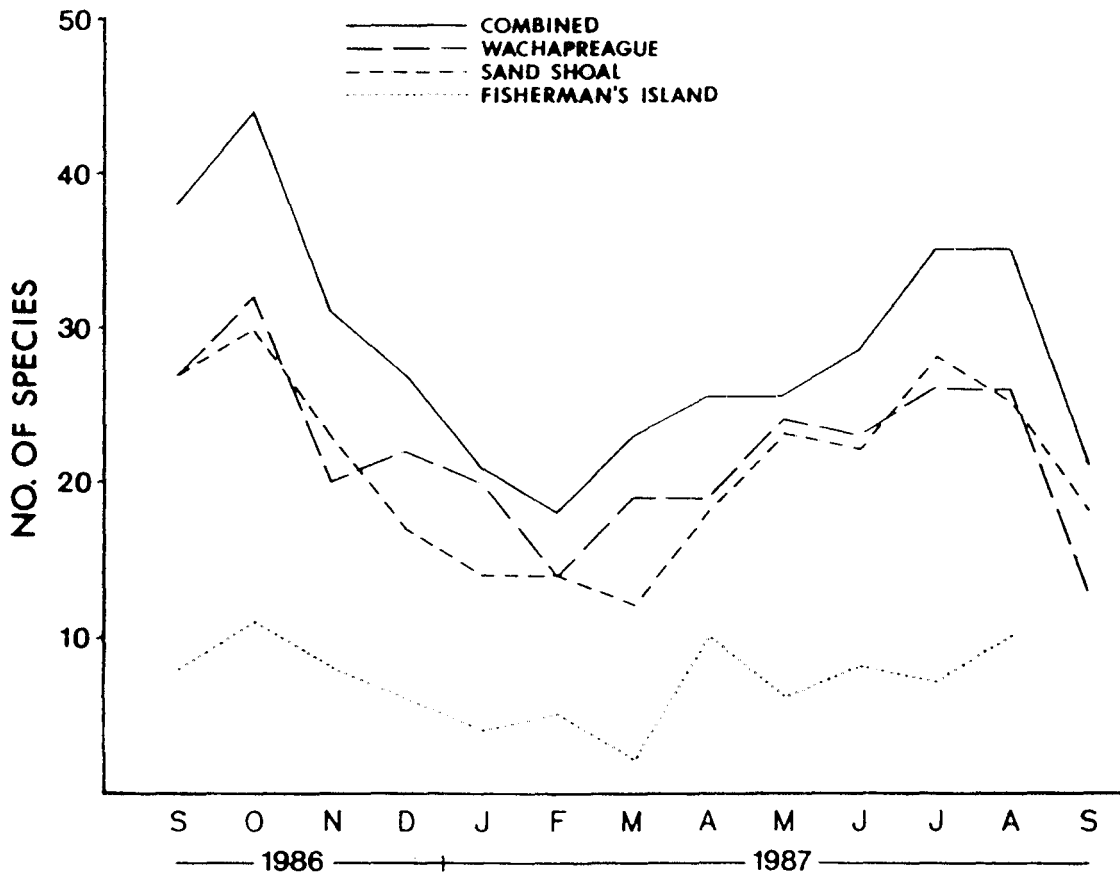
The seaside of the Eastern Shore provides critical habitat to a diverse and seasonally dynamic fish fauna. The vast network of estuaries behind the barrier islands supports not only many important adult fishes (and their related fisheries), but also provides nursery grounds for many species of fishes which support fisheries from North Carolina to southern New England.

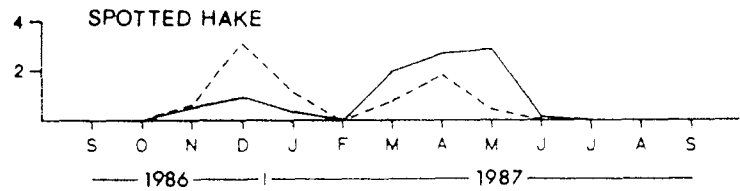
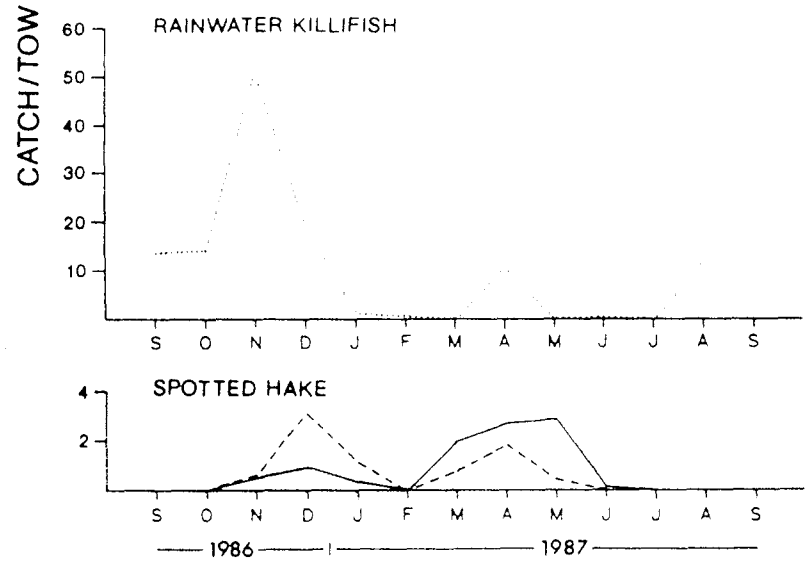
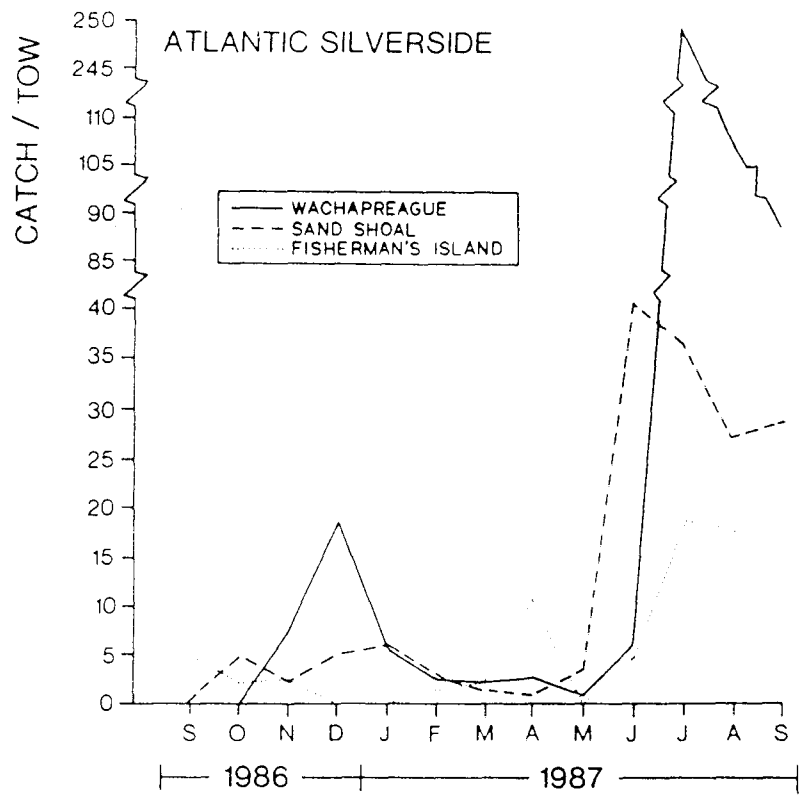
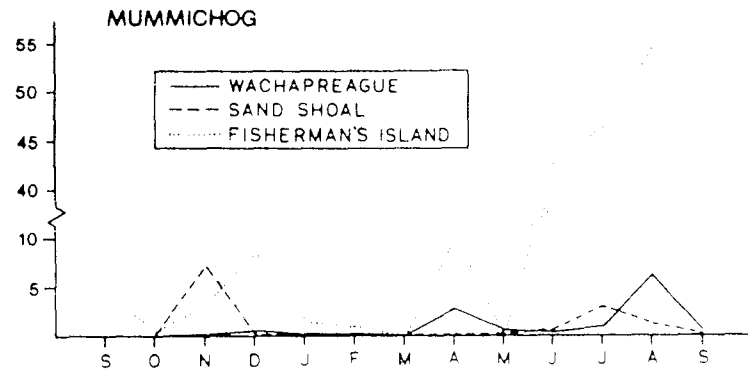
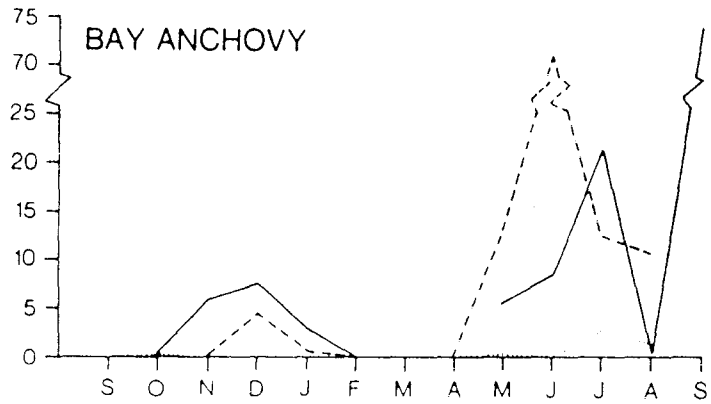
Thus perturbations to this fragile ecosystem may have impacts not only on local fisheries but on fisheries that may span the entire middle-Atlantic seaboard.

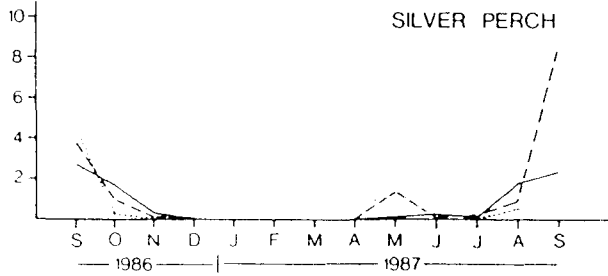
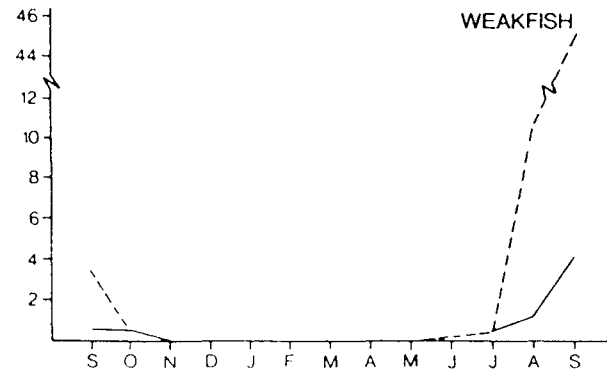
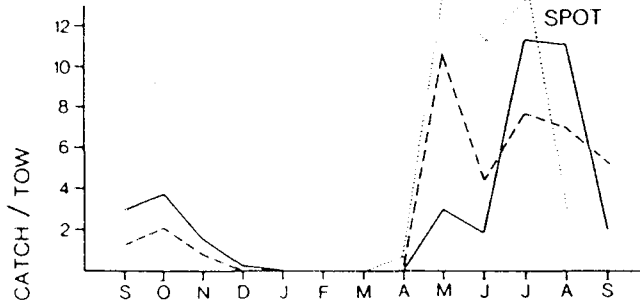
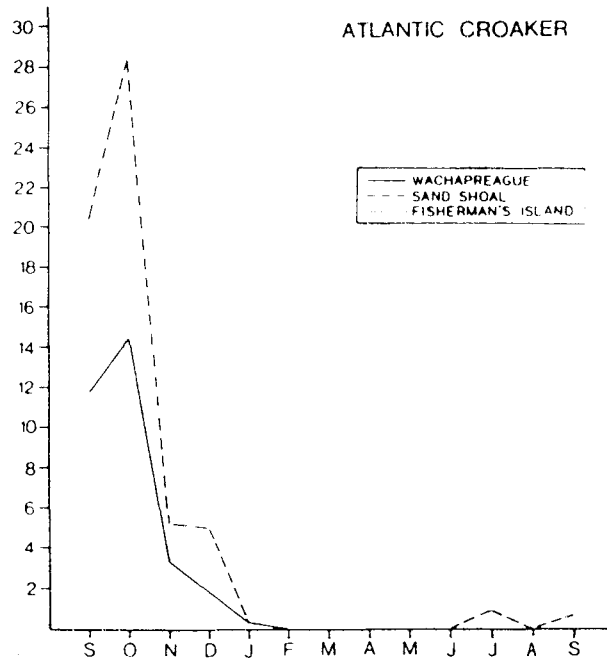
Table 1. Top 25 most abundant species per season. Number is rank, dot indicates presence without rank in top 12, blank mean species not captured that season. Overall is rank yearly abundance. (After Norcross and Hata, 1990).

SPECIES	OVERALL	FALL	WINTER	SPRING	SUMMER
Atlantic silverside	1	2	1	2	1
Bay anchovy	2	3	2	1	2
Atlantic croaker	3	1	.	.	.
Spot	4	7	.	3	3
Mummichog	5	5	10	6	4
Summer flounder	6	8	4	4	6
Blackcheek tonguefish	7	6	.	5	9
Hogchoker	8	8	.	9	7
Rainwater killifish	9	4	.	.	9
Weakfish	10	.	.	.	5
Smallmouth flounder	11	10	8	8	.
Spotted hake	12	11	3	7	.
Silver perch	13	12	.	.	8
Seaboard goby	14	.	7	.	.
Windowpane	15	.	6	.	.
Black sea bass	16	.	.	11	.
Northern searobin	17	.	.	10	.
Northern pipefish	18	.	.	12	.
Naked goby	19	.	.	.	11
Striped killifish	20	.	5	.	.
Striped cusk eel	21
Oyster toadfish	22	.	.	.	12
Striped mullet	25	.	11	.	.
Red hake	27	.	9	.	.
American eel	34	.	12	.	.

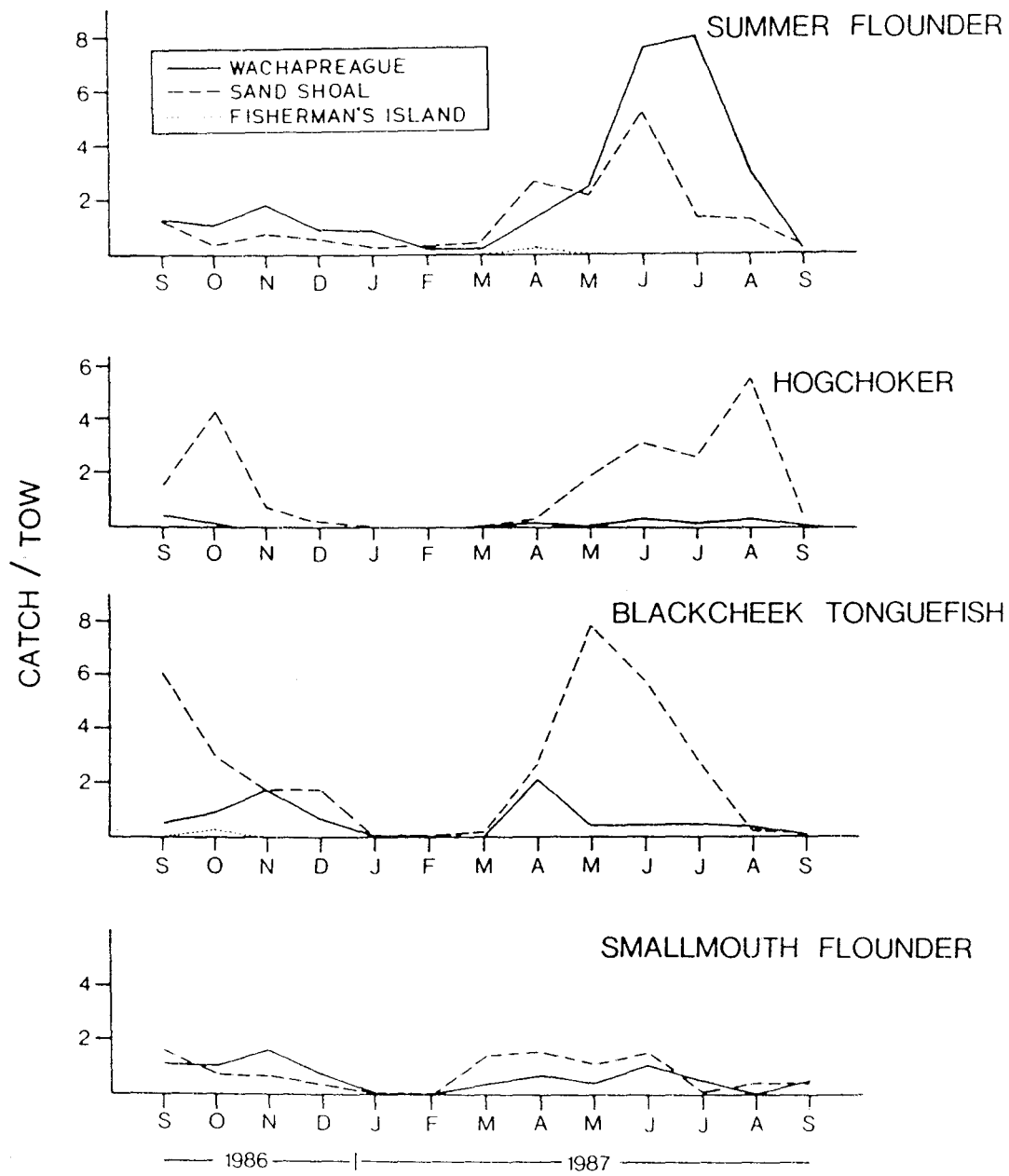
- Figure 1. Number of species of all sizes and lifestages collected monthly September 1986 through September 1987. (After Norcross & Hata, 1990)
- Figure 2. Monthly catch-per-unit-effort for important forage species, September 1986 through September 1987. (After Norcross & Hata, 1990)
- Figure 3. Monthly catch-per-unit-effort for four sciaenids, September 1986 through September 1987. (After Norcross & Hata, 1990)
- Figure 4. Monthly catch-per-unit-effort for four flatfish species, September 1986 through September 1987. (After Norcross & Hata, 1990)







— 1986 — | — 1987 —



BIBLIOGRAPHY

- Austin, H. M., D. M. Seaver, and C. M. Wagner. 1997. Monitoring juvenile recreational fishes on the ocean beaches and Eastern Shore of Virginia with special focus on developing a bluefish, *Pomatomus saltatrix* young-of-the-year index in Virginia. Contract report submitted by Virginia Institute of Marine Science to Virginia Marine Resources Commission, Contract #RF-96-09: 115 pp.
- Burrell, V. G., M. Castagna and R. K. Dias, (Editors). 1972. A study of commercial and recreational fisheries of the Eastern Shore, Virginia, Accomack and Northampton Counties; History review and recommendations for improvement. VIMS SCRAMSOE 20. 187 p., illustrated.
- Hoese, H. D. 1962. Sharks and rays of Virginia's seaside bays. Ches. Sci. 3(3): 166-172.
- Kimmel, J. J., III. 1973. Food and feeding of fishes in Magothy Bay, Virginia, Master of Science Thesis, Old Dominion University, Norfolk, Va.
- Marshall, A. R. and J. A. Lucy. 1981. Virginia's charter and head boat fishery: analysis of catch and socioeconomic impacts. VIMS Spec. Rep. App. Mar. Sci. Ocean Engineering No. 253: 90 pp.
- Musick, J. A. and J. A. Colvocoresses. 1987. Seasonal recruitment of subtropical sharks in Chesapeake Bight, USA. IOC/FAO Workshop on recruitment in tropical coastal demersal communities. Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986. Intergovernmental Oceanographic Commission Workshop Report No. 44-Supplement.
- Norcross, B. L. and D. Hata. 1990. Seasonal composition of finfish in waters behind the Virginia barrier islands. Virginia J. Sci. 41: 441-461.
- Norcross, B. L. and D. M. Wyanski. 1994. Internannual variation in the recruitment pattern and abundance of age-0 summer flounder, *Paralichthys dentatus*, in Virginia waters. Fish. Bull., U.S. 92: 591-598.
- Richards, C. E. 1965. Availability patterns of marine fishes caught by charter boats operating off Virginia's Eastern Shore, 1955-1962, Ches. Sci. 6(2): 96-108.
- Richards, C. E. and M. Castagna. 1970. Marine fishes of Virginia's Eastern Shore (Part I. Inlet and Marsh, Seaside Waters). Ches. Sci. 11(4): 235-248.

Appendix A. Fishes collected from estuarine and inlet and nearshore coastal waters of the seaside of the Eastern Shore of Virginia (compiled from Austin et al. ,1997; Hoese, 1962; Kimmel, 1973; Musick, unpublished; Musick and Colvocoresses, 1987; Norcross and Hata, 1990; and Richards and Castagna,1970).

Species name	Common name	
<i>TRIAKIDAE</i>	Smoothhound sharks	
<i>Mustelus canis</i>	smooth dogfish	A
<i>CARCHARHINIDAE</i>	Requiem Sharks	
<i>Negaprion brevirostris</i>	lemon shark	C
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	A
<i>Carcharhinus acronotus</i>	blacknose shark	R
<i>Carcharhinus brevipinna</i>	spinner shark	U
<i>Carcharhinus isodon</i>	finetooth shark	R
<i>Carcharhinus leucas</i>	bull shark	R
<i>Carcharhinus limbatus</i>	blacktip shark	C
<i>Carcharhinus plumbeus</i>	sandbar shark	A
<i>Carcharhinus obscurus</i>	dusky shark	C
<i>SPHYRNIDAE</i>	Hammerhead Sharks	
<i>Sphyrna lewini</i>	scaloped hammerhead	C
<i>ODONTASPIDAE</i>	Sand Tigers	
<i>Carcharias taurus</i>	Sand tiger	C
<i>SQUALIDAE</i>	Dogfish sharks	
<i>Squalus acanthias</i>	spiny dogfish	A
<i>RAJIDAE</i>	Skates	
<i>Raja eglanteria</i>	clearnose skate	A
<i>Raja erinacea</i>	little skate	U
<i>DASYATIDAE</i>	Stingrays	
<i>Dasyatis sayi</i>	bluntnose stingray	A
<i>Dasyatis americana</i>	southern stingray	C
<i>Dasyatis centroura</i>	rougtail stingray	U
<i>Gymnura micrura</i>	smooth butterfly ray	C
<i>Gymnura altavela</i>	spiny butterfly ray	C

<i>MYLIOBATIDAE</i>	Eagle rays	
<i>Myliobatis fremenvillei</i>	bullnose ray	C
<i>Rhinoptera bonasus</i>	cownose ray	C
<i>ELOPIDAE</i>	Tarpons	
<i>Elops saurus</i>	ladyfish	U
<i>Megalops atlanticus</i>	tarpon	C
<i>ANGUILLIDAE</i>	Freshwater eels	
<i>Anguilla rostrata</i>	American eel	C
<i>CONGRIDAE</i>	Conger eels	
<i>Conger oceanicus</i>	conger eel	U
<i>CLUPEIDAE</i>	Herrings	
<i>Alosa aestivalis</i>	blueback herring	A
<i>Alosa mediocris</i>	hickory shad	C
<i>Alosa pseudoharengus</i>	alewife	C
<i>Alosa sapidissima</i>	American shad	C
<i>Brevoortia tyrannus</i>	Atlantic menhaden	A
<i>Clupea harengus</i>	Atlantic herring	C
<i>Opisthonema oglinum</i>	Atlantic thread herring	C
<i>ENGRAULIDAE</i>	Anchovies	
<i>Anchoa hepsetus</i>	striped anchovy	C
<i>Anchoa mitchilli</i>	bay anchovy	A
<i>SYNODONTIDAE</i>	Lizardfishes	
<i>Synodus foetens</i>	inshore lizardfish	C
<i>BATRACHOIDIDAE</i>	Toadfishes	
<i>Opsanus tau</i>	oyster toadfish	A
<i>GOBIESOCIDAE</i>	Clingfishes	
<i>Gobiesox strumosus</i>	skilletfish	A
<i>LOPHIIDAE</i>	Goosefishes	
<i>Lophius americanus</i>	goosefish	C
<i>GADIDAE</i>	Codfishes	
<i>Urophycis chuss</i>	red hake	C
<i>Urophycis regia</i>	spotted hake	A
<i>Urophycis tenuis</i>	white hake	U
<i>Pollachius virens</i>	pollack	U

<i>MERLUCCIIDAE</i>		
<i>Merluccius bilinearis</i>	silver hake	C
<i>OPHIDIIDAE</i>	Cusk-eels	
<i>Ophidion marginatum</i>	striped cusk-eel	C
<i>EXOCOETIDAE</i>	Halfbeaks & flying fishes	
<i>Hyporhamphus meeki</i>	American halfbeak	C
<i>BELONIDAE</i>	Needlefishes	
<i>Strongylura marina</i>	Atlantic needlefish	C
<i>Tylosurus crocodilus</i>	Houndfish	C
<i>CYPRINODONTIDAE</i>	Killifishes	
<i>Cyprinodon variegatus</i>	sheepshead minnow	A
<i>Fundulus diaphanus</i>	banded killifish	C
<i>Fundulus heteroclitus</i>	mummichog	A
<i>Fundulus luciae</i>	spotfin killifish	C
<i>Fundulus majalis</i>	striped killifish	A
<i>Lucania parva</i>	rainwater killifish	C
<i>POECILIIDAE</i>	Livebearers	
<i>Gambusia affinis</i>	mosquitofish	C
<i>ATHERINIDAE</i>	Silversides	
<i>Membras martinica</i>	rough silverside	C
<i>Menidia beryllina</i>	inland silverside	C
<i>Menidia menidia</i>	Atlantic silverside	A
<i>GASTEROSTEIDAE</i>	Sticklebacks	
<i>Gasterosteus aculeatus</i>	threespine stickleback	U
<i>Apeltes quadracus</i>	fourspine stickleback	C
<i>SYNGNATHIDAE</i>	Pipefishes	
<i>Hippocampus erectus</i>	lined seahorse	C
<i>Syngnathus floridae</i>	dusky pipefish	C
<i>Syngnathus fuscus</i>	northern pipefish	C
<i>Syngnathus louisianae</i>	chain pipefish	R

<i>TRIGLIDAE</i>	Searobins	
<i>Prionotus carolinus</i>	northern searobin	A
<i>Prionotus evolans</i>	striped searobin	A
<i>Prionotus tribulus</i>	bighead searobin	R
<i>MORONIDAE</i>	Temperate basses	
<i>Morone americana</i>	white perch	A
<i>Morone saxatilis</i>	striped bass	A
<i>SERRANIDAE</i>	Seabasses	
<i>Centropristis striata</i>	black seabass	A
<i>POMATOMIDAE</i>	Bluefishes	
<i>Pomatomus saltatrix</i>	bluefish	A
<i>RACHYCENTRIDAE</i>	Cobias	
<i>Rachycentron canadum</i>	cobia	C
<i>CARANGIDAE</i>	Jacks	
<i>Selene vomer</i>	lookdown	C
<i>Caranx hippos</i>	crevalle jack	C
<i>Trachinotus falcatus</i>	permit	C
<i>Trachinotus carolinus</i>	Florida pompano	C
<i>Trachurus lathami</i>	rough scad	R
<i>LUTJANIDAE</i>	Snappers	
<i>Lutjanus griseus</i>	gray snapper	R
<i>GERREIDAE</i>	Mojarras	
<i>Eucinostomus argenteus</i>	spotfin mojarra	U
<i>Eucinostomus gula</i>	silver jenny	U
<i>HAEMULIDAE</i>	Grunts	
<i>Orthopristis chrysoptera</i>	pigfish	C
<i>SPARIDAE</i>	Porgies	
<i>Stenotomus chrysops</i>	scup	C
<i>Lagodon rhomboides</i>	pinfish	U
<i>Archosargus probatocephalus</i>	sheepshead	U
<i>EPHIPPIDAE</i>	Spadefishes	
<i>Chaetodipterus faber</i>	spadefish	C

<i>SCIAENIDAE</i>	Drums	
<i>Bairdiella chrysoura</i>	silver perch	A
<i>Cynoscion nebulosus</i>	spotted seatrout	C
<i>Cynoscion regalis</i>	weakfish	A
<i>Leiostomus xanthurus</i>	spot	A
<i>Menticirrhus americanus</i>	southern kingfish	C
<i>Menticirrhus saxatilis</i>	northern kingfish	C
<i>Menticirrhus littoralis</i>	gulf kingfish	U
<i>Micropogonias undulatus</i>	Atlantic croaker	A
<i>Pogonias chromis</i>	black drum	C
<i>Sciaenops ocellata</i>	red drum	C
<i>MULLIDAE</i>	Goatfishes	
<i>Mullus auratus</i>	red goatfish	U
<i>CHAETODONTIDAE</i>	Butterflyfishes	
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	U
<i>LABRIDAE</i>	Wrasses	
<i>Tautoga onitis</i>	tautog	C
<i>Tautoglabrus adspersus</i>	cunner	U
<i>MUGILIDAE</i>	Mulletts	
<i>Mugil cephalus</i>	striped mullet	C
<i>Mugil curema</i>	white mullet	U
<i>SPHYRAENIDAE</i>	Barracudas	
<i>Sphyraena borealis</i>	northern sennet	U
<i>URANOSCOPIDAE</i>	Stargazers	
<i>Astroscopus guttatus</i>	northern stargazer	C
<i>BLENNIIDAE</i>	Combtooth blennies	
<i>Chasmodes bosquianus</i>	striped blenny	A
<i>Hypsoblennius hentzi</i>	feather blenny	A
<i>AMMODYTIDAE</i>	Sand Lances	
<i>Ammodytes americanus</i>	American sand lance	C

GOBIIDAE	Gobies	
<i>Gobionellus boleosoma</i>	darter goby	R
<i>Gobiosoma bosci</i>	naked goby	A
<i>Gobiosoma ginsburgi</i>	seaboard goby	A
<i>Microgobius thalassinus</i>	green goby	R
SCOMBRIDAE	Mackerels	
<i>Scomber scombrus</i>	Atlantic mackerel	C
<i>Scomberomorus maculatus</i>	Spanish mackerel	C
STROMATEIDAE	Butterfishes	
<i>Peprilus alepidotus</i>	harvestfish	C
<i>Peprilus triacanthus</i>	butterfish	A
BOTHIDAE	Lefteye flounders	
<i>Etropus crossotus</i>	fringed flounder	U
<i>Etropus microstomus</i>	smallmouth flounder	A
<i>Paralichthys dentatus</i>	summer flounder	A
<i>Scophthalmus aquosus</i>	windowpane	A
PLEURONECTIDAE	Righteye flounders	
<i>Pseudopleuronectes americanus</i>	winter flounder	U
SOLEIDAE	Soles	
<i>Trinectes maculatus</i>	hogchoker	A
CYNOGLOSSIDAE	Tonguefishes	
<i>Symphurus plagiusa</i>	blackcheek tonguefish	A
BALISTIDAE	Filefishes	
<i>Aluterus schoepfi</i>	orange filefish	C
<i>Monacanthus hispidus</i>	planehead filefish	U
TETRAODONTIDAE	Puffers	
<i>Sphoeroides maculatus</i>	northern puffer	A
DIODONTIDAE	Porcupinefishes	
<i>Chilomycterus schoepfi</i>	striped burrfish	C