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PRINCIPAL SPAWNING AREAS AND TIMES OF MARINE FISHES, CAPE SABLE TO CAPE HATTERAS

The purpose of this compendium is to summarize spawning areas and seasons of the more abundant marine fishes of the continental shelf between Cape Sable, N.S., and Cape Hatteras, N.C., as an aid to the identification of fish eggs and larvae and planning and scheduling ichthyoplankton surveys. We have used the term "marine" to encompass fishes which spawn at sea (in contrast to estuarine spawners), although some of the species included spawn in both environments contingent on geographic location (e.g., winter flounder which spawn exclusively in estuaries in the Middle Atlantic Bight and offshore in the Gulf of Maine and Atlantic menhaden which spawn in estuaries along southern New England and in the New York Bight and offshore in the lower Middle Atlantic Bight and in the South Atlantic Bight).

The Gulf of Maine is defined as the oceanic bight bounded by Nantucket Shoals and Cape Cod on the west (long. 70°W) and Cape Sable on the east (long. 65°W) including Georges and Browns Banks and waters out to the 200-m contour (Colton 1964). The Middle Atlantic Bight is the area

inshore of the continental slope bounded by Cape Cod and Nantucket Shoals to the east (long. 70°W) and Cape Hatteras to the south (lat. 35°N). The New York Bight, as defined in the MESA New York Bight Atlas Monograph Series (Bowman and Wunderlich 1977), is the offshore water area in the

bend of the Atlantic coastline from Long Island (long. 71°30'W) to New Jersey (lat. 38°30'N). A chart of the Gulf of Maine and Middle Atlantic Bight and the names of places and areas referred to in the spawning summary are given in Figure 1.

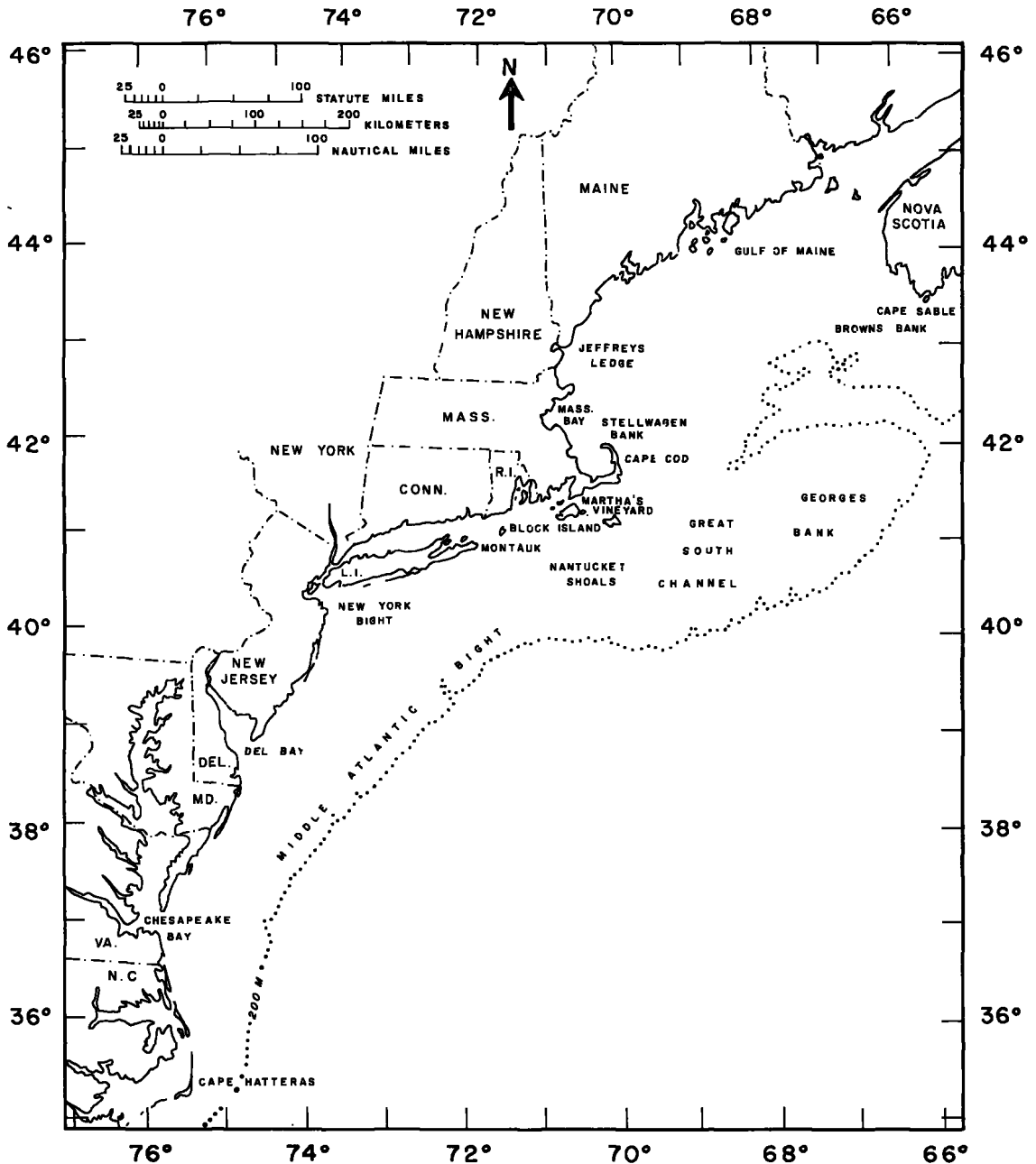


FIGURE 1.—Orientation chart of the Gulf of Maine and Middle Atlantic Bight.

In this summary (Table 1) we have treated the Gulf of Maine and the Middle Atlantic Bight separately for there is an abrupt general division between the biological and physical properties of water east and west of Cape Cod. The boreal waters over most of the Gulf of Maine are well mixed by strong tidal currents, while the circulation of the warmer shelf waters west of Cape Cod is more sluggish, and its chemical and physical properties are less complex (Colton 1964). The offing of Cape Cod also appears to be a definite transition zone

(probably thermal) for some northern and southern species of fishes and invertebrates, both pelagic and benthic (Colton 1964). The species composition and abundance of fishes vary markedly between the two regions, with boreal, non-migratory species dominating the Gulf of Maine and warmwater, migratory species prevailing in the Middle Atlantic Bight. The bulk or total spawning of many species of fishes is restricted to areas east (e.g., haddock, pollock, redfish) or west (e.g., bluefish, menhaden, anchovies) of Nantuck-

TABLE 1.—Principal spawning areas and times of marine fishes, Cape Sable to Cape Hatteras.

Family	Species	Common Name	Gulf of Maine												Middle Atlantic Bight												
			Sub Area	J	F	M	A	M	J	J	A	S	O	N	D	Sub Area	J	F	M	A	M	J	J	A	S	O	N
Clupeidae	<i>Brevoortia tyrannus</i>	Atlantic menhaden																							*	*	*
	<i>Clupea harengus harengus</i>	Atlantic herring	Georges Bank											*	*												*
			Western Nova Scotia											*	*												
			Jeffries Ledge & Stellwagen Bank																								
Engraulidae	<i>Anchoa hepsetus</i>	striped anchovy	Nantucket Shoals																								
	<i>Engraulis eurystole</i>	silver anchovy																									
Gadidae	<i>Brosme brosme</i>	cusk					*	*																			
	<i>Enchelyopus cimbrius</i>	fourbeard rockling						*	*																		
	<i>Gadus morhua</i>	Atlantic cod	Georges Bank		*																						
			Browns Bank					*																			
			Nantucket Shoals	*																							
		<i>Melanogrammus aeglefinus</i>	haddock	Georges Bank		*	*																				
				Browns Bank					*	*																	
				South Channel			*																				
		<i>Merluccius albidus</i>	offshore hake																								
		<i>Merluccius bilinearis</i>	silver hake	NE Georges & Cent. Gulf						*	*															*	
				Southern Georges						*	*																
		<i>Pollachius virens</i>	pollock	Mass. Bay Stellwagen South Channel	*										*	*											
		<i>Urophycis chesteri</i>	long finned hake																								
	<i>Urophycis chuss</i>	red hake	S. Georges Nant. Shoals					*	*																*	*	
	<i>Urophycis regius</i>	spotted hake																							*		
	<i>Urophycis tenuis</i>	white hake																							*	*	
Pomatomidae	<i>Pomatomus saltatrix</i>	bluefish																							*	*	
Sciaenidae	<i>Leiostomus xanthurus</i>	spot	Ches. Bay-Cape Hatteras																							*	
	<i>Micropogon undulatus</i>	Atlantic croaker	Ches. Bay-Cape Hatteras																						*	*	
	<i>Cynoscion regalis</i>	weakfish	Ches. Bay-Montauk, LI																								

TABLE 1.—Continued.

Family	Species	Common Name	Gulf of Maine												Middle Atlantic Bight																												
			Sub Area	J	F	M	A	M	J	J	A	S	O	N	D	Sub Area	J	F	M	A	M	J	J	A	S	O	N	D															
Labridae	<u>Tautoga onitis</u>	tautog																			*																						
	<u>Tautoglabrus adspersus</u>	cunner	Mass. Bay S. Georges Nant. Shoals						*	*												*																					
Scorpaenidae	<u>Scomber scombrus</u>	Atlantic mackerel	W. Gulf Cape Cod Bay						*												*																						
Scorpaenidae	<u>Sebastes marinus</u>	redfish	Scottian Shelf & Cent. Gulf						*	*																																	
Triglidae	<u>Prionotus carolinus</u>	northern searobin																																									
Cottidae	<u>Myoxocephalus octodecemspinosus</u>	longhorn sculpin			*																																						*
Ammodytidae	<u>Ammodytes</u> sp.	sand lance			*	*																*										*											*
Stromateidae	<u>Pephrilus triacanthus</u>	butterfish	SW Georges Nant. Shoals						*	*																												*	*				
Bothidae	<u>Citharichthys arctifrons</u>	Gulf Stream flounder	SW Georges Nant. Shoals							*																										*							
	<u>Hippoglossina oblonga</u>	fourspot flounder	Nant. Shoals-South							*																											*						
Pleuronectidae	<u>Paralichthys dentatus</u>	summer flounder	Nant. Shoals-South																																			*					
	<u>Scophthalmus aquosus</u>	windowpane	Georges Bank Nant. Shoals-South							*	*																											*					
	<u>Glyptocephalus cynoglossus</u>	witch flounder							*	*																										*	*						
	<u>Hippoglossoides platessoides</u>	American plaice				*	*																														*						
	<u>Limanda ferruginea</u>	yellowtail flounder	Browns Bank Georges Bank Nant. Shoals-South							*	*																										*	*					
	<u>Pseudopleuronectes americanus</u>	winter flounder	Georges Bank						*	*																										*	*						

———— Known spawning season.
 - - - - - Uncertain spawning season.
 *Peak spawning.

et Shoals, although there are exceptions to this general rule (notably, yellowtail flounder and silver hake).

The spawning summaries are based primarily on published data collected on Bureau of Commercial Fisheries (now National Marine Fisheries Service) ichthyoplankton surveys of the Gulf of Maine and Middle Atlantic Bight made in the 1950's and 1960's and listed in the References. Published data from earlier studies (e.g., Fish 1929; Walford 1938; Pearson 1941; Sette 1943; Bigelow and Schroeder 1953) and some unpublished information from more recent National Marine Fisheries Service ichthyoplankton surveys have also been utilized. We have not attempted to make the bibliography encyclopedic.

However, the papers cited include references to all pertinent spawning summaries. Spawning areas and seasons were determined on a basis of the occurrence of eggs and/or early stage (yolk-sac) larvae. The families are arranged in phyletic sequence (Greenwood et al. 1966) and the species are listed in alphabetical order. Common names follows those recommended by Bailey et al. (1970).

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RECENT SIGHTINGS OF THE BLUE WHALE, *BALENOPTERA MUSCULUS*, IN THE NORTHEASTERN TROPICAL PACIFIC

The blue whale, *Balenoptera musculus*, in the North Pacific, migrates to the Gulf of Alaska and Aleutians in the summer for feeding (Nishiwaki 1966). It is believed to migrate to tropical waters in winter for calving, but sightings of blue whales in lower latitudes are rare (Tomilin 1957). In mid-July 1928, Cruikshank reported seeing "... several blue whales ..." at lat. 11°32'N and long. 91°58'W (Kellogg 1929). A Peruvian fishery reported taking 247 blue whales between December 1925 and March 1926 (Ingebrigtsen 1929). Potentially these were from a North Pacific stock, since the Southern Hemisphere blue whale is most numerous in the Antarctic at this time. Volkov and Moroz (1977) noted an abundance of baleen