Essential Fish Habitat Description
Atlantic herring (*Clupea harengus*)

In its *Report to Congress: Status of the Fisheries of the United States* (September 1997), NMFS determined Atlantic herring is not currently overfished. This determination is based on the fishing mortality rate. Essential Fish Habitat for Atlantic herring is described as those areas of the coastal and offshore waters (out to the offshore U.S. boundary of the exclusive economic zone) that are designated on Figures 3.1 - 3.4 and in the accompanying table and meet the following conditions:

Eggs: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine and Georges Bank as depicted in Figure 3.1. Eggs adhere to the bottom, forming extensive egg beds which may be many layers deep. Generally, the following conditions exist where Atlantic herring eggs are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are most often found in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring eggs are most often observed during the months from July through November.

Larvae: Pelagic waters in the Gulf of Maine, Georges Bank, and southern New England that comprise 90% of the observed range of Atlantic herring larvae as depicted in Figure 3.2. Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16° C, water depths from 50 - 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 3.3. Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10° C, water depths from 15 - 135 meters, and a salinity range from 26 - 32‰.

Adults: Pelagic waters and bottom habitats in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Cape Hatteras as depicted in Figure 3.4. Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10° C, water depths from 20 - 130 meters, and salinities above 28‰.

Spawning Adults: Bottom habitats with a substrate of gravel, sand, cobble and shell fragments, but also on aquatic macrophytes, in the Gulf of Maine, Georges Bank, southern New England and the middle Atlantic south to Delaware Bay as depicted in Figure 3.4. Generally, the following conditions exist where spawning Atlantic herring adults are found: water temperatures below 15° C, depths from 20 - 80 meters, and a salinity range from 32 - 33‰. Herring eggs are spawned in areas of well-mixed water, with tidal currents between 1.5 and 3.0 knots. Atlantic herring are most often observed spawning during the months from July through November.

All of the above EFH descriptions include those bays and estuaries listed on the following table, according to life history stage. The Council acknowledges potential seasonal and spatial variability of the conditions generally associated with this species.

EFH Designation of Estuaries and Embayments
Atlantic herring (*Clupea harengus*)

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults	Spawning Adults
Passamaquoddy Bay		m,s	m,s	m,s	
Englishman/Machias Bay	s	m,s	m,s	m,s	s
Narraguagus Bay		m,s	m,s	m,s	
Blue Hill Bay		m,s	m,s	m,s	
Penobscot Bay		m,s	m,s	m,s	
Muscongus Bay		m,s	m,s	m,s	
Damariscotta River		m,s	m,s	m,s	
Sheepscot River		m,s	m,s	m,s	
Kennebec / Androscoggin Rivers		m,s	m,s	m,s	
Casco Bay	s	m,s	m,s	s	
Saco Bay		m,s	m,s	s	
Wells Harbor		m,s	m,s	s	
Great Bay		m,s	m,s	s	
Merrimack River		m	m		
Massachusetts Bay		s	s	s	
Boston Harbor		s	m,s	m,s	
Cape Cod Bay	s	s	m,s	m,s	
Waquoit Bay					
Buzzards Bay			m,s	m,s	
Narragansett Bay		s	m,s	m,s	
Long Island Sound			m,s	m,s	
Connecticut River					
Gardiners Bay			s	s	
Great South Bay			s	s	
Hudson River / Raritan Bay		m,s	m,s	m,s	
Barnegat Bay			m,s	m,s	
Delaware Bay			m,s	s	
Chincoteague Bay					
Chesapeake Bay				s	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
F ≡ The EFH designation for this species includes the tidal freshwater salinity zone of this bay or estuary (0.0 < salinity < 0.5‰).

These EFH designations of estuaries and embayments are based on the NOAA Estuarine Living Marine Resources (ELMR) program (Jury *et al.* 1994; Stone *et al.* 1994). For a detailed view of the salinity zone boundaries, as described in the ELMR reports, please see Appendix B. The Council recognizes the spatial and temporal variability of estuarine and embayment environmental conditions generally associated with this species.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Eggs

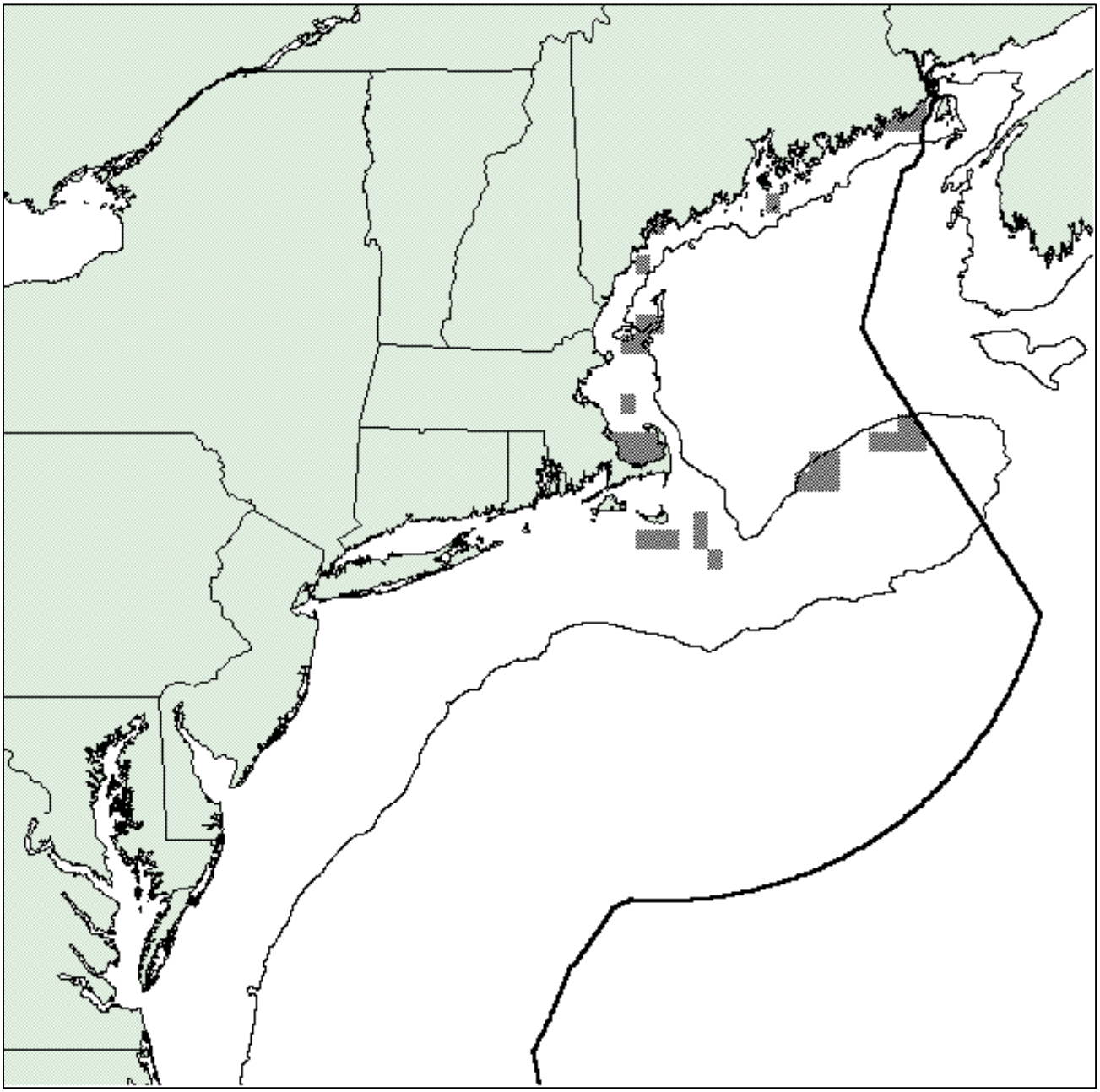

Figure 3.1: The EFH designation for Atlantic herring eggs represents 100% of the known Atlantic herring egg beds. These egg beds were identified based on a review of all available information on the current and historical herring egg bed locations. All known herring beds were identified for EFH designation to be as inclusive as possible for this critical life history stage, and because all known egg beds only represent a portion of all herring egg sites. In addition, this designation includes those bays and estuaries identified in the NOAA ELMR program as supporting herring eggs at the "rare", "common", or "abundant" level. There were no specific alternatives considered by the Council, although the Council did have the option to designate fewer than 100% of the known herring egg beds.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Larvae

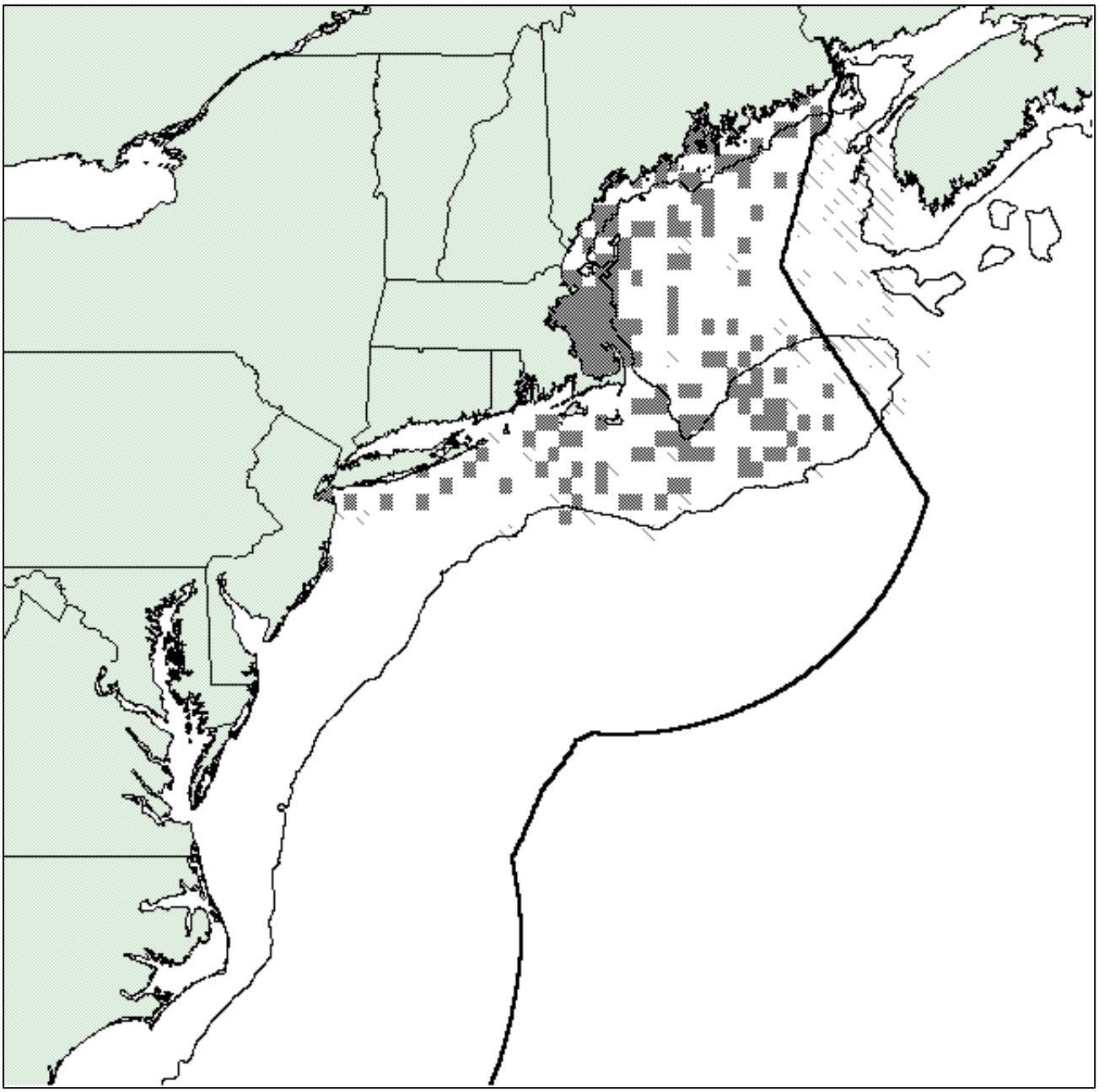

Figure 3.2: The EFH designation for Atlantic herring larvae is based upon alternative 3 for herring larvae. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic herring larvae at a "common" or "abundant" level. This alternative was selected to include all areas where herring larvae are found in relatively high concentrations, but not those areas where herring larvae are found in relatively very low concentrations. The light shading represents the entire observed range of Atlantic herring larvae.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Juveniles

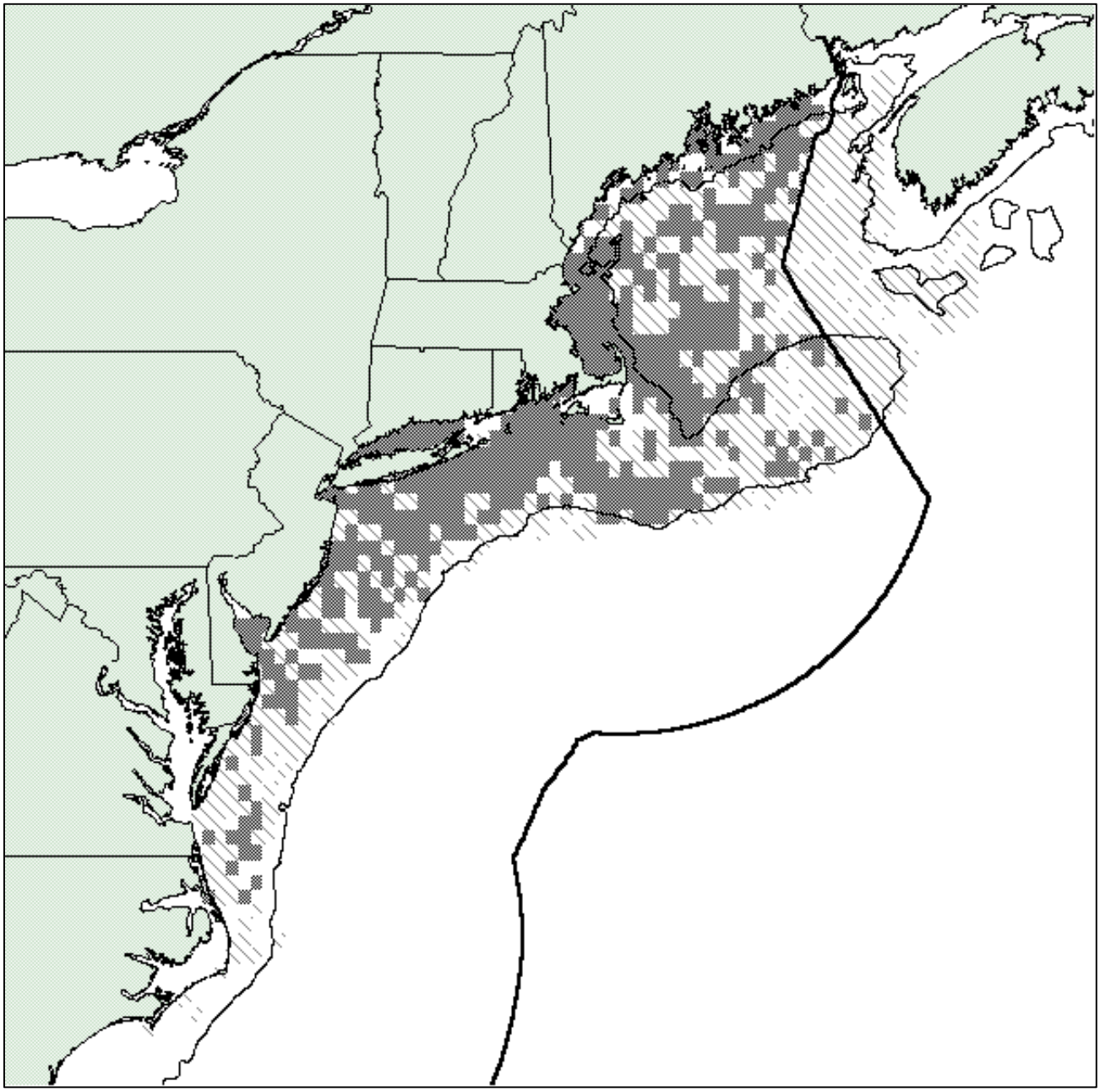

Figure 3.3: The EFH designation for juvenile Atlantic herring is based upon alternative 2 for juvenile herring, plus areas of relatively high concentrations of juvenile herring from the State of Massachusetts inshore trawl survey. This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting juvenile Atlantic herring at a "common" or "abundant" level. This alternative was selected to ensure inclusion of all areas where herring occur in relatively high concentrations. The other alternatives were not selected because they either include too little area (less than half of the range of the species) or include areas where herring occur in relatively low concentrations. The light shading represents the entire observed range of juvenile Atlantic herring.

Essential Fish Habitat
Atlantic herring (*Clupea harengus*) Adults

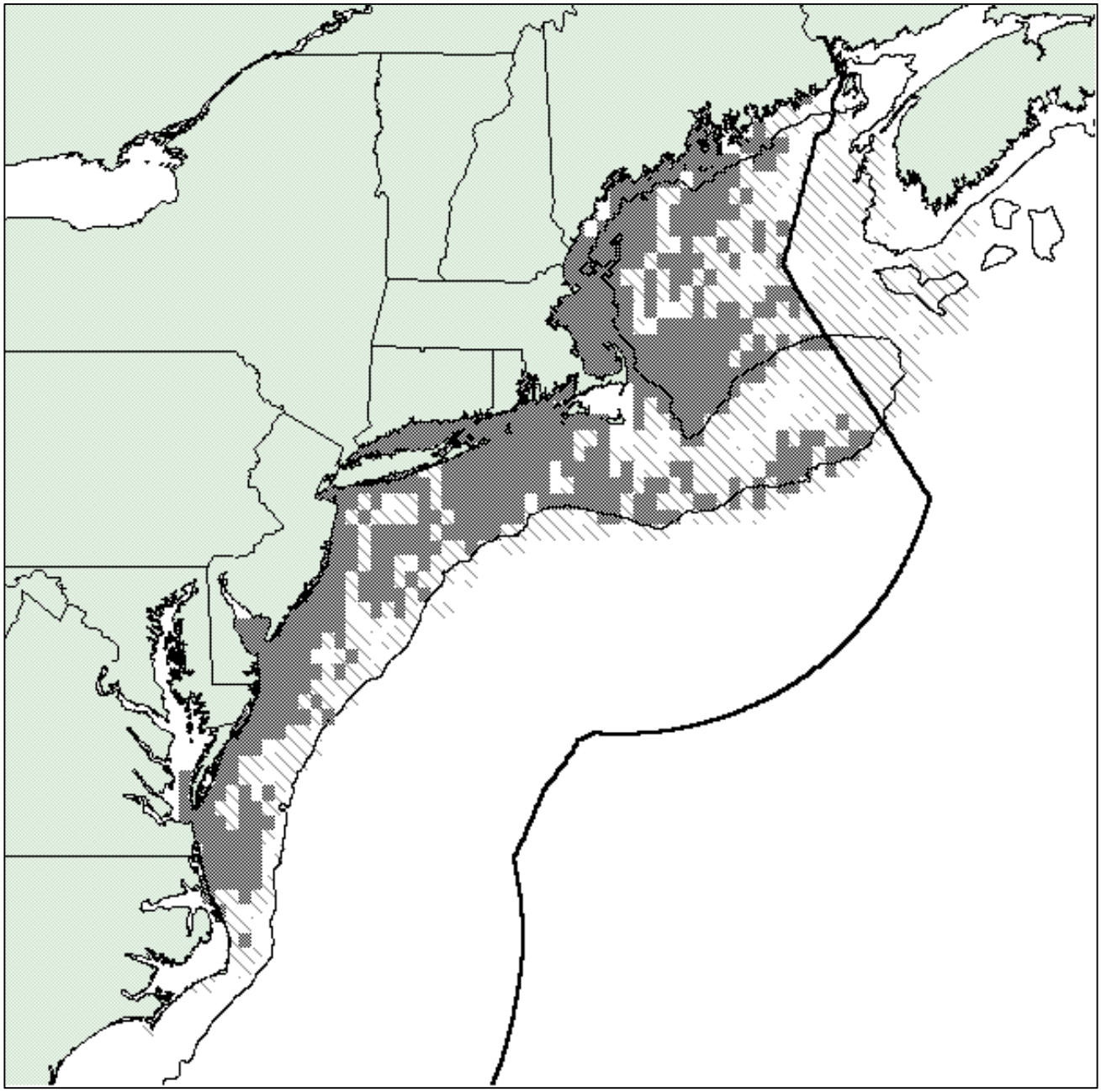

Figure 3.4: The EFH designation for adult Atlantic herring is based upon alternative 2 for adult herring, combined with the 50% alternative of the 1997 recorded catch data. This designation also includes information from the fishing industry and those bays and estuaries identified by the NOAA ELMR program as supporting adult Atlantic herring at a "common" or "abundant" level. This alternative was selected to ensure inclusion of all areas where herring occur in relatively high concentrations. The other alternatives were not selected because they either include too little area (less than half of the range of the species) of include areas where herring occur in relatively low concentrations. The light shading represents the entire observed range of adult Atlantic herring.