J. Gibson

Northeast Fisheries Science Center

RESEARCH HIGHLIGHTS

March-April 1993

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The Northeast Fisheries Science Center's *Research Highlights* is a news bulletin on selected Center research findings. News write-ups focus on practical applications and implications of those findings to fisheries resource and habitat management. A name and telephone number have been included at the end of each write-up to contact for detailed information. Names of organisms follow--to the extent possible--the lists of scientific and common names of fishes, mollusks, and decapod crustaceans published by the American Fisheries Society. Any mention of trade names does not imply endorsement. *Research Highlights* is produced by the NEFSC Information Services Unit with the assistance of the Center's scientific staff.

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FACILITIES

Woods Hole Laboratory
National Marine Fisheries Service
166 Water Street
Woods Hole, MA 02543-1097
(508) 548-5123
Officer-in-Charge: Dr. John B. Pearce

James J. Howard Laboratory
National Marine Fisheries Service
Building 74, McGruder Road, Sandy Hook
Highlands, NJ 07732
(908) 872-3000
Officer-in-Charge: Anne L. Studholme

National Systematics Laboratory
National Marine Fisheries Service
National Museum of Natural History
10th & Constitution Avenue, N.W.
Washington, DC 20560
(202) 357-2552
Director: Dr. Bruce B. Collette

Narragansett Laboratory
National Marine Fisheries Service
28 Tarzwell Drive
Narragansett, RI 02882
(401) 782-3200
Officer-in-Charge: Dr. Kenneth Sherman

Milford Laboratory
National Marine Fisheries Service
212 Rogers Avenue
Milford, CT 06460
(203) 783-4200
Officer-in-Charge: Dr. Anthony Calabrese

Gloucester Laboratory
National Marine Fisheries Service
30 Emerson Avenue
Gloucester, MA 01930
(508) 281-9300
Officer-in-Charge: Robert J. Learson

Oxford Cooperative Laboratory
National Marine Fisheries Service
904 South Morris Street
Oxford, MD 21654
(410) 226-5193
Contact: Frederick G. Kern

INFORMATION SERVICES UNIT

Teri L. Frady, Chief
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Research Highlights

March-April 1993

SAW Gives Outlook for Several Groundfish and Bivalve Stocks

The plenary panel of the 15th Northeast Regional Stock Assessment Workshop (SAW) has issued its findings on several groundfish and bivalve mollusk stocks. The table below lists the findings on stock levels and exploitation rates, and includes selected comments by the panel.

Species (Stock/s)	Stock Level	Exploitation Rate	Selected Comments
Atlantic cod (Georges Bank)	low	over exploited	1988-91 year classes below average, 1989 & 1991 classes among weakest on record; 1993 catches will likely decline to lowest level in past 18 years
Atlantic cod (Gulf of Maine)	low	over exploited	all year classes since 1987 have been weak; 1993 catches will likely decline to lowest level in past 19 years
Acadian redfish (Gulf of Maine/ Georges Bank)	very low	probably quite low	1988 year class--strongest in past 16 years--will continue recruiting to fishery; 1993 catches will likely rise slightly
Atlantic surfclam (Middle Atlantic, Southern New England & Georges Bank)	medium	fully exploited	species takes about six years to grow to harvestable size--there has not been a strong year class since 1977; expect continued gradual decline in abundance, and moderate-strong decline in landings per unit of effort
Ocean quahog (Georges Bank to North Carolina)	high	fully exploited	species takes at least 30 years to grow to harvestable size--there has not been a strong year class in at least 30 years from Georges Bank south; expect gradual decline in abundance in Middle Atlantic (the primary fishing area), and moderate-strong decline in catch per unit of effort; fishery will likely continue expanding from New Jersey to Long Island and Southern New England waters

The panel's findings are based upon the reports of the 15th Northeast Regional Stock Assessment Workshop (15th SAW). The reports have been published as *Northeast Fisheries Science Center Reference Documents.* Copies of the documents are available upon request.

Contact Teri Frady, (508) 548-5123x378
For information on the documents
Contact Dr. Vaughn C. Anthony, (508) 548-5123x304
For information on the plenary panel's findings

Georges Bank Herring Continue Recovery, Sandlance Continue Decline

The Northeast Fisheries Science Center has concluded its five-year study of the recovery of Atlantic herring populations in the Georges Bank area. During the 1988-93 period, herring have recolonized much of the area's spawning territory from which they had been extirpated in the late 1970s due to foreign overfishing from the 1960s through the mid-1970s. Also, during the final two years of the five-year study, populations of northern sandlance (like herring, a member of the area's pelagic small-fish community) have been well below average.

What has happened with herring, sandlance, and Atlantic mackerel (tl latter being another member of the pelagic small-fish community) represents what biologists call a "biomass flip." When herring and mackerel populations were high during the 1950s and 1960s, herring and mackerel not only out-competed sandlance for their shared zooplanktonic prey, but also probably preyed heavily on the planktonic eggs and larvae of sandlance themselves, keeping the sandlance population at a low level.

The foreign overfishing of the 1960s and 1970s drastically reduced herring and mackerel populations, thus reducing these sources of predation on sandlance. By the late 1970s, the tables had been turned. The sandlance population exploded; sandlance began out-competing herring and mackerel for zooplanktonic prey, and probably began preying heavily on the planktonic eggs and larvae of herring and mackerel. Thus, herring and mackerel populations were depressed to low levels.

The massive reduction in foreign fishing for herring and mackerel during the late 1970s and early 1980s set the stage for another biomass flip in dominance of the pelagic small-fish community; however, it took about 10 years for mackerel to return to high abundance, about 15 years for herring. In retrospect, it has taken a massive reduction in directed fisheries and a decade-and-a-half of healing for the pelagic community to recover to its (almost) "normal" state.

Contact Wallace G. Smith, (908) 872-3060
For information on herring recovery
Contact Dr. Kenneth Sherman, (401) 782-3210
For information on biomass flips in community dominance

Center Releases Preliminary Landings of New England Fish and Shellfish

Between 1991 and 1992, the overall commercial landings of fish and shellfish in New England increased marginally from 647 to 648 million pounds, based on preliminary data collected by the Northeast Fisheries Science Center. Although overall landings remained about the same, landings of the region's "traditional" groundfish species (Atlantic cod, haddock, and yellowtail flounder) decreased from 113 to 78 million pounds. For comparative purposes, landings of these traditional groundfish species 10 years ago (1983) were 214 million pounds. Atlantic herring--an abundant but low-economic-value pelagic species--was again the most-landed New England fish.

The following table lists landings of major species in New England for 1991 and 1992.

	Pounds (millions)			Pounds (millions)	
	1991	1992		1991	1992
Atlantic herring	106	115	Winter flounder	16	13
Atlantic cod	92	61	Yellowtail flounder	17	12
American lobster	59	54	Northern shrimp	8	8
Goosefish	18	29	Scup	8	7
Silver hake	26	28	Witch flounder	4	5
Longfin squid	23	24	Haddock	4	5
Sea scallop	24	21	Butterfish	4	5
White hake	12	19	Summer flounder	3	4
Pollock	17	16	Swordfish	2	2
Atlantic mackerel	16	15	Bluefin tuna	2	2
American plaice	9	15			

Note: Landings of scallops in meat weight; all other landings in live weight.

Copies of *Northeast Fisheries Science Center News Release* 93-1 ("Preliminary 1992 Commercial Landings and Values of New England Fish and Shellfish") are available upon request. The release lists overall landings and values on a state, major port, and major species basis, as well as landings of American lobster on a state basis.

Contact Ronnee L. Schultz, (508) 548-5123x264

Origin of Cholesterol in Oysters Found

Collaborative research between the Northeast Fisheries Science Center and the University of Maryland at College Park, with some assistance from the U.S. Department of Agriculture and Auburn University, has answered the question of how eastern oysters obtain the cholesterol they need to survive, grow, and reproduce.

All animal cells contain cholesterol, a necessary component of cell membranes. Thus, all animals must obtain cholesterol either directly from the food they eat, or indirectly by manufacturing it from the chemical compounds in that food. This presents an apparent problem for oysters, though. First, oysters feed on phytoplankton, but no phytoplankton species were known to contain more than traces of cholesterol. Second, oysters would have to convert the phytosterols found in phytoplankton into cholesterol, but those phytosterols can differ greatly from phytoplankton species to phytoplankton species, which would require oysters to have many different phytosterol conversion systems--an unlikely situation.

In screening almost 60 strains of cultured phytoplankton, though, we have now found several algal strains that do contain appreciable amounts of cholesterol. Further, our analysis of existing data on oyster growth rates and phytoplankton biochemical composition has suggested which phytosterols can be converted to cholesterol by the oyster.

Among the interesting implications of these findings is that--in an oyster aquacultural operation--the phytoplanktonic diet could theoretically be tailored in order to give the oyster just enough consumed phytosterols for it to manufacture the cholesterol it needs to survive, grow, and reproduce, but to deny the oyster any excess consumed cholesterol to keep its overall cholesterol level relatively low. Such a "low-cholesterol" oyster would likely have marketing advantages.

Contact Gary H. Wikfors, (203) 783-42?

Similarity among Sites for Year-to-Year Water Temperature Variation

Our analysis of 1977-87 data for the Northeast Continental Shelf shows a similarity among all sites in the area between Chesapeake Bay and the east end of Long Island with respect to how those sites' summer surface water temperatures vary from year to year. Such a similarity has also been shown among all sites in the area encompassing the western Gulf of Maine and Southern New England waters westward to the east end of Long Island. One implication of these findings is that we may be able to monitor the year-to-year variations of these two broad areas by sampling only a few select sites in each.

Contact Dr. David G. Mountain, (508) 548-5123x271, or
Maureen Taylor, (508) 548-5123x325

Research Briefs

- In 1992, the 100,000th shark was tagged in the 30-year-old NMFS Cooperative Shark Tagging Program, and a record number of sharks were tagged (8,451) and recaptured (506). **Contact John G. Casey,** (401) 782-3320.

- The Northeast Fisheries Science Center will prepare a biological characterization of Newark (NJ) Bay for the U.S. Army Corps of Engineers who propose to build a subterranean tunnel to relieve chronic flooding of the Passaic River watershed in north-central New Jersey. **Contact Stuart J. Wilk,** (908) 872-3008.

Recent Scientific Publications and Reports

Northeast Fisheries Science Center authors are indicated in all capital letters in the list below. Unless otherwise indicated, single copies of the listed reports are available from the Center by writing to: Information Services Unit, Northeast Fisheries Science Center, National Marine Fisheries Service, 166 Water St., Woods Hole, MA 02543-1097 USA.

BENWAY, R.L; JOSSI, J.W.; THOMAS, K.P.; GOULET, J.R. 1993. Variability of temperature and salinity in the Middle Atlantic Bight and Gulf of Maine. *NOAA Tech. Rep. NMFS* 112; 108 p.

FOGARTY, M., editor. 1992. Changes in biomass, production and species composition of the fish populations in the Northwest Atlantic over the last 30 years, and their possible causes. *J. Northw. Atl. Fish. Sci.* 14; 147 p.

FOGARTY, M. 1992. Report of special session. *J. Northw. Atl. Fish. Sci.* 14: 9-11.

GABRIEL, W.L. 1992. Persistence of demersal fish assemblages between Cape Hatteras and Nova Scotia, Northwest Atlantic. *J. Northw. Atl. Fish. Sci.* 14: 29-46.

Hostetter, E.B.; MUNROE, T.A. 1993. Age, growth, and reproduction of tautog *Tautoga onitis* (Labridae: Perciformes) from coastal waters of Virginia. *Fish. Bull. (U.S.)* 91(1): 45-64.

JEARLD, A., Jr.; Sass, S.L.; Davis, M.F. 1993. Early growth, behavior, and otolith development of the winter flounder *Pleuronectes americanus*. *Fish. Bull. (U.S.)* 91(1): 65-75.

MAYO, R.K.; FOGARTY, M.J.; SERCHUK, F.M. 1992. Aggregate fish biomass and yield on Georges Bank, 1960-87. *J. Northw. Atl. Fish. Sci.* 14: 59-78.

MURAWSKI, S.A.; IDOINE, J.S. 1992. Multispecies size composition: a conservative property of exploited fishery systems? *J. Northw. Atl. Fish. Sci.* 14: 79-85.

SHERMAN, K.; Laughlin, T.L., editors. 1992. The large marine ecosystem (LME) concept and its application to regional marine resource management. *NOAA Tech. Mem. NMFS-F/NEC*-91; 37 p.

SINDERMANN, C.J. 1992. Disease risks associated with importation of nonindigenous marine animals. *Mar. Fish. Rev.* 54(3): 1-10.

STILLWELL, C.E.; KOHLER, N.E. 1993. Food habits of the sandbar shark *Carcharhinus plumbeus* off the U.S. northeast coast, with estimates of daily ration. *Fish. Bull. (U.S.)* 91(1): 138-150.

Information Services Unit
Northeast Fisheries Science Center
National Marine Fisheries Service
166 Water Street
Woods Hole, MA 02543-1097

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