EXPLORING FOR SCHOOLING PELAGIC FISHES IN MIDDLE ATLANTIC BIGHT

Jackson Davis

An exploration for schooling pelagic fishes was conducted by the Virginia Institute of Marine Science (VIMS), Gloucester Point, Virginia, in the waters of the continental shelf between Cape Hatteras, North Carolina, and Block Island, Rhode Island, during Feb. 9-May 14, 1969. It was done under research grant sponsored by the Bureau of Commercial Fisheries, Washington, D.C.

Fish schools detected by sonar were small and transitory. Rough seas, especially in February and March, make two-boat purse seining of doubtful practicality.

The exploration was conducted from the menhaden vessel 'W. T. James Jr.' under charter to VIMS. The 187-foot, 500-ton James was equipped with a Simrad SK3 sonar and CK2 scope. A skiff, powered by an outboard motor, was equipped with a Simrad Basdic. Fishing gear was a purse seine 250 fathoms long and 1500 meshes, 1.5 inch stretched, deep rigged as is usual for menhaden purse seines. The net was fished by the technique standard in the menhaden industry: half the net is set from each of 2 purse boats traveling in a semicircle around a school. The purse boats were 37 feet long overall and 10 feet wide, powered by diesel engines--and equipped with hydraulic masts and booms, and Marco model 29A power blocks to handle the net.

Area Explored

Different portions of the Mid-Atlantic Bight were explored in 7 cruises about 10 days each. Cruise tracks were developed in response to the prevailing weather as each cruise progressed. To the extent allowed by weather, the entire shelf was examined, but little time was spent in water deeper than 40 fathoms.

In February and early March, the major concentration of fish was in 15 to 30 fathoms between Cape Hatteras and Cape Henry, Virginia. A secondary concentration was in 10 to 15 fathoms between Parramore Banks ($37^{\circ}30'$ N) and Jack's Spot ($38^{\circ}10'$ N). Fish were detected by sonar but usually not caught--because they were not schooled, or because rough seas precluded setting the net. However, both fish behavior and scanty observations of the catches by foreign trawlers indicated they were mostly herring and mackerel.

A fleet of 75 to 125 or more Soviet and Polish trawlers fished these concentrations and followed the migrating herring and mackerel during March, April, and May as they moved northeasterly along the 30-fathom curve. The foreign fleet apparently had good information concerning the whereabouts of fish. We found by steaming through and around the fleet that the distribution of trawlers on the surface very closely approximated the distribution of fish beneath the surface. Usually the fish were in a band 5 to 10 miles wide and 30 to 50 miles long in 25 to 35 fathoms.

Fish Behavior & Purse Seining

Purse seining was practical only twice each day when fish were schooled briefly. At other times, they were too dispersed to be caught in a purse seine. For an hour or a little more before dawn, fish were schooled and the schools were in suitable position to be caught by seining. However, with the first light of dawn, the schools broke up and the fish settled to the bottom individually and in small groups. In late afternoon, fish regrouped into schools which stayed deep in the water until sunset, when they rose rapidly to the surface and dispersed. Thus fish were schooled and in suitable position to be caught in purse seines for two periods, each of two hours or less, in each 24 hours. During the 20 or more hours that fish were not available to a purse seine, they appeared to be suitably positioned for capture with a universal trawl.

Mr. Davis is associated with the Virginia Institute of Marine Science, Gloucester Point, Virginia 23062.
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Fish remained schooled only briefly, so it was necessary to set the net quickly. Our technique was first to locate a school with the sonar. Then we sent the basdic-equipped skiff to relocate the school and stay above it. The skiff served as a target for the purse boats to set the net around. Unfortunately, relocating the school by basdic operator in the skiff was time-consuming, despite radio communication between the ship's pilot house and the skiff's basdic operator. It seems that setting the seine from purse boats would be more efficient. On several occasions, schooled fish dispersed while the basdic operator was attempting to position the skiff over them. Dispersal seemed to be in response to changing light intensity, rather than to the presence of the skiff. We believe this is so because we also observed dispersal of schools at dawn and dusk when the skiff was not overboard.

Perhaps schooling behavior would be somewhat different if a large trawler fleet were not present. Schools might be larger and they might maintain their integrity better. The largest school detected in 1969 was about 60 yards wide. But, in 1966 and 1967, when only 25 or fewer foreign trawlers were working, we detected several schools larger than 50 yards and one at least 6.5 miles.

1969 Program's Aim

The field program in 1969 was aimed at finding resources that could be harvested by the menhaden fleet during its off-season. Therefore, it was terminated in mid-May when menhaden fishing usually begins. Information acquired from various sources, mostly Coast Guard-BCF surveillance flights, suggests that herring become more vulnerable to purse seines in May and June. An observer sighted schools of fish, probably herring, south of Long Island in mid-May. Near June, the USSR added to its fleet about 40 purse seiners that fished on Georges Bank.

Sea conditions are important to the success of a purse-seining operation. Purse boats are not suited to winter's rough seas. The number of days at sea were: February-15; March-23; April-17; and May-10. In February, seas were calm enough to operate purse boats only 20% of the days at sea. In March, 40% of the days were suitable. As spring progressed, conditions improved. In April, 60% of the days were suitable and, in May, 70%. These percentages reflect the fact that it was often possible to work near shore when seas were too rough in deeper water. Working conditions were less favorable along the 30-fathom curve where fish were most abundant.