9-Offshore Borrow Area Finfish Collection

Introduction

The principal objective of the offshore borrow area trawl surveys was to collect demersal (bottom-feeding) fishes for analysis of feeding habits (See Chapter 10). Methods of collecting these data varied over the period of the study including changes in trawl size, trawl mesh-size, and the presence or absence of a trawl liner. The number of tows per site also varied among sites and collection dates. Differences in collection efficiency and sample variability resulting from these differences preclude a uniform, quantitative assessment of the finfish assemblages, however there is sufficient scope to characterize species composition and relative abundance and, to a lesser extent, detect large-scale changes in the assemblages over time.

Methods

Study Area**:** The three Belmar Borrow Areas (BBA) were designated BBA3, BBA5, and BBA6, and were located approximately 3 - 10 km offshore and roughly parallel the shoreline (Figure 9-1). Coordinates for each area are given in Table 9-1. The areas were sampled twice a year: spring (April-June) and late summer (August-September). Sampling began in May 1995 and continued through September 1999. The 1995-1996 (pre-construction) data have been previously summarized (USACE, 1998), as have during-construction (1997) and the first year of post-construction monitoring (USACE, 1999).

Sampling Methods: The otter trawl used during the 1995-1996 efforts consisted of a 100 mm mesh net with a liner in the cod end. The dimensions for the net used are as described: 29.3 m sweep which converts into a 9.8 m spread at maximum deployment with a height of 2.4 m to 3.7 m. The net used during the 1997 Spring effort was a 152 mm mesh with no liner. During the Fall 1997 effort and thereafter through the Fall 1999 effort, a 152 mm mesh with a 0.25 mm liner in the wings and cod end was employed.

Trawls were conducted within and adjacent to each of the three BBA sites. Trawls were deployed during daylight hours for 20 minutes, brought on board, and the contents emptied onto a sorting table. Bottom-feeding species were separated from the catch and were then measured [standard length (SL) in cm] and weighed (biomass in kg). Stomach contents of target species were removed, placed into labeled sample containers, and preserved with formalin. Non-target species were counted, measured [total length (TL) in mm], weighed (biomass in kg) and then released. Several taxa were grouped by genus for data analyses: *Urophycis chuss*, *U. regia*, and *U. tenuis* were grouped as *Urophycis* spp.; *Raja eglanteria*, *R. ocellata* and *R. laevis* were grouped as *Raja* spp; *Prionotus carolinus* and *P. evolans* were grouped as *Prionotus* spp. When non-target taxa were collected in large numbers, a randomly selected sub-sample of 25 individuals was measured and weighed, while the remainder was counted and the total number recorded. From these data, a total weight (biomass) was estimated. When non-target taxa were extremely abundant (making it impractical to process the catch between trawls), 25 individuals were counted and weighed, the total weight of the taxa was measured and an estimate of total abundance was made (total weight/ average weight = total number).

Observations on weather conditions, trawl deployment and retrieval times, and trawl start/end longitudes and latitudes were recorded. Water quality measurements (temperature, pH, conductivity, salinity, dissolved oxygen, turbidity) were taken with a calibrated HydroLab DataSonde® prior to trawling activities within each borrow area.

Results

A total of 84 taxa representing 44 families was collected during the study (Table 9-3). The most diverse group present was the carangids (jacks) which comprised 11 taxa, while clupeids (herrings) were represented by 7 taxa. Gadids (cods) provided 6 taxa, bothids (left-eye flounders) and sciaenids (drums) both contributed 5 taxa, and scombrids (mackerels) were represented by 4 taxa. The remaining families each contributed either one or two taxa. In general, fall samples had more taxa than those taken in the spring (Table 9-3). Of the 84 taxa, half were collected exclusively in the fall, 16 were taken only in the spring, and the remainder occurred in samples from both time periods. Jacks were found exclusively in fall samples, herring were most common in spring samples, and left-eye flounders were found in samples in both time periods.

Seasonal Assemblages: Blueback herring (*Alosa aestivalus*) dominated spring collections in three of the five years (Table 9-4). In the remaining two years, skates (*Raja* spp.) and anchovies (*Anchoa* spp.) were most abundant. Skates were also among the five most abundant taxa throughout the period 1997-1999, while anchovies were the second most abundant taxon in Spring 1998. Other taxa dominant in the spring included windowpane flounder (*Scophthalmus aquosus*), which was among the five most abundant taxa between 1995 and 1997, and scup (*Stenotomus chrysops*) which was a dominant in 1995 and again in 1998 and 1999.

Butterfish (*Peprilus triacanthus*) was the most abundant fish species in fall collections between 1995 and 1998, and was fifth most abundant in 1999 (Table 9-4). Searobins (*Prionotus* spp.) were among the five most abundant taxa in four of the five fall sample periods (all but 1997), while skates and windowpane flounder were dominants in three of the five collections (1995, 1996, and 1999).

Taxa Distributions Among Borrow Areas: Species composition was similar among the borrow areas within seasons and years (Table 9-5). Although the rank order of dominance changed between sites and over time, many of the same species were consistently among the five most abundant taxa at all three areas. For instance, blueback herring, windowpane flounder, and hake (*Urophycis* spp.) were among the most abundant taxa in all three areas in the spring of 1995. Blueback herring and windowpane flounder were among the dominants again in Spring 1996. Skates, windowpane flounder, and summer flounder (*Paralichthys dentatus*) were the most abundant taxa at all three areas in Spring 1997, while in Spring 1998 and 1999 butterfish, skates, and scup were among the dominants. Species composition of fall collections was more predictable with butterfish, searobins, and summer flounder consistently among the most abundant taxa at all three areas (Table 9-5).

Catch-Per-Unit-Effort: With the exception of 1995, catch-per-unit-effort (CPUE) was higher during the fall than the spring (Figure 9-2). This pattern was particularly evident in 1997 when spring catches averaged less than 200 fish/trawl, while fall CPUE averaged above 3,000 fish/trawl. Overall, spring CPUE averaged 414 fish/trawl, whereas fall CPUE averaged 1,654 fish/trawl (Table 9-6). In 1995, fall catches at BBA5 and BBA6 were less than those of BBA3 or the 1995 spring catches (Figure 9-3). Conversely, the fall catch at BBA5 in 1998 was less than one third that at the other borrow areas, while the spring BBA3 catch in this year was 4-5 times that of the other borrow areas. In 1999, the catch at BBA6 was lower than the other borrow areas during both spring and fall.

Water Quality: Prior to trawling activities within any given borrow area, water quality measurements were recorded including water depth, pH, temperature, specific conductance, salinity, dissolved oxygen (DO) and turbidity (Tables 9-12; 9-13). Spatial and temporal variability of water quality parameters was low between stations within each of the seasonal sampling efforts. Water temperature ranged from 9.19 C in Spring 1998 to 24.3 C in Fall 1998; salinity ranged from 28 ppt in Spring 1996 to 35.1 ppt in Spring 1997; and dissolved oxygen concentrations varied between 2.3 mg in the fall of 1997 and 10.3 mg/l in the spring of 1996. Spring values were generally higher than those from fall sampling efforts and surface water concentrations were usually higher than those from bottom waters. Dissolved oxygen values were particularly low (< 4 mg/l) in the bottom waters of BBA6 during dredging in the fall of 1997 (Table 9-13). Similar values were found in the bottom waters of all three borrow areas in the fall of 1998.

Conclusions

Taxonomic composition of the finfish assemblage present at the offshore borrow areas was similar in most regards to that described by Grosslein and Azarovitz (1982) for inshore areas between Delaware Bay and Martha's Vineyard. They reported the most commonly encountered species (in order of frequency of occurrence) in the spring to be windowpane and winter flounder, silver hake, skate, hake, ocean pout, yellowtail flounder, sculpin, and summer flounder (Table 9-14). Cluepids such as alewive, American shad, and blueback and Atlantic herring were also common in spring samples. Taxa most frequently encountered in autumn collections included butterfish, smooth dogfish, searobins, summer and windowpane flounder, and silver hake. Carangids such as crevalle jack and mackeral scad also tended to be most common in fall collections. These results closely match those from the New Jersey borrow areas in regards to the species present and their seasonal periodicity and relative importance. Specifically, the strong association between winter flounder and clupeids with spring collection periods, the equally strong association between summer flounder, carangids, and butterfish in the fall, and the presence of windowpane flounder, skate, smooth dogfish, and searobins throughout the year is the same as reported by Grosslein and Azarovitz (1982).

There was no great difference in species composition or CPUE among areas within any given collection period. Likewise, there was no evidence of a dramatic change in assemblage structure or catch after dredging at any of the sites in 1997 or 1999. The overall conclusion from this portion of the study is that the offshore finfish assemblage typical of that previously described for the region and that no large scale change in the composition or abundance of the assemblage occurred in relation to dredging of the borrow areas.

Literature Cited

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