

LENGTH AND AGE COMPOSITION PER SET OF BLUEFIN TUNA (*Thunnus thynnus*)  
FROM UNITED STATES NORTHWEST ATLANTIC PURSE SEINE VESSELS

by

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SUMMARY

Size and age composition data for school bluefin tuna (*Thunnus thynnus*), from northwest Atlantic purse seine catches during tagging operations, show that 1-year old fish often school together exclusively, and that 2-, 3- and 4-year olds are more frequently found in mixed schools.

RESUME

Les données de composition de taille et de structure démographique pour le thon rouge (*Thunnus thynnus*) en bancs, dans les prises effectuées à la senne dans l'Atlantique nord-ouest au cours d'opérations de marquage, indiquent que les poissons de 1 an se concentrent de façon exclusive, alors que ceux de 2,3 et 4 ans se trouvent plus fréquemment en bancs mélangés.

RESUMEN

Los datos de talla y de estructura demográfica de atunes (*Thunnus thynnus*) en cardumenos obtenidos de las capturas con cerco efectuadas en el Atlántico N.O. en el curso de operaciones de marcado, indican que los peces de edad 1 tienden a agruparse en exclusiva, mientras que los de edad 2, 3, y 4 se encuentran a menudo mezclados.

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## INTRODUCTION

During July, August and September 1974, July 1976, and July 1977, scientists from the Southeast Fisheries Center of the U.S. Department of Commerce, National Marine Fisheries Service, NOAA, Miami, Florida, and/or its contractee, the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, caught and tagged school bluefin tuna, *Thunnus thynnus*, aboard United States purse seiners off the northeastern coast of the United States (Mason, 1975; Mason, [Mather], Baglin, 1977; and Baglin, Mason, Mather, and Freeman, MS.<sup>1</sup>). Most of the tagged fish were measured for length, as were some other fish from various sets. This paper presents the age composition per set and shows the degree of heterogeneity of the age composition of individual purse seine sets during tagging operations.

## MATERIALS AND METHODS

The bluefin tuna were measured to the nearest centimeter fork length then tagged and released. Also, length measurements were taken from a few of the fish that were not in suitable condition for tagging. These measurements were combined for each set. Age was estimated by comparing lengths to the age-length relationship of Mather and Schuck (1960), and Berry<sup>2</sup> (pers. comm., 1977). Length ranges for small bluefin (ages 1 through 4) show little or no overlap. During the 1976 and 1977 tagging operations, special efforts were made to tag specific age groups. Therefore, the size frequency-per-set data presented in this paper are not representative of the overall purse seine fishery. These data, however, allow the degree of heterogeneity within the selected schools of bluefin to be determined.

## RESULTS AND DISCUSSION

School bluefin tuna, totaling 5,601, were measured (Table 1) from 88 purse seine sets (Table 2). There was a large range in size in some schools (Table 1). For example, a set on July 9, 1976 consisted of ages 1, 2, and 3 and had a range in fork length of 53-102 cm. Other schools, however, consisted of only one age with a small range in size, such as the July 4, 1977 set, consisting of only 2-year-old fish with a range in fork length of 73-82 cm. Over half the sets studied consisted of only 1-year-old fish, or a mixture of 2- and 3-year-old fish (Table 2).

Ages 1, 2, 3, and 4 were present in 50%, 61%, 48%, and 12% of the sets, respectively (Table 2). When a given age was present, the following mixtures (Figure 1) were found:

The 1-year-old fish were found in homogeneous (single year class or age component) schools in 57% of the sets which contained age 1 fish. They were found mixed with ages: 2; 2 and 3; and 2, 3, and 4 in 16%, 16%, and 11% of these sets, respectively.

The 2-year-old fish were found in homogeneous schools in 20% of the sets which contained age 2 fish. They were found mixed with ages: 1; 3; 4; 1 and 3; 3 and 4; and 1, 3, and 4 in 13%, 39%, 2%, 13%, 4%, and 9% of these sets, respectively.

The 3-year-old fish were found in homogeneous schools in 14% of the sets which contained age 3 fish. They were found mixed with ages: 2; 4; 1 and 2; 2 and 4; and 1, 2, and 4 in 50%, 2%, 17%, 5%, and 12% of these sets, respectively.

The 4-year-old fish were found in homogeneous schools in 18% of the sets studied which contained age 4 fish. They were found mixed with ages: 2; 3; 2 and 3; and 1, 2, and 3 in 9%, 9%, 18%, and 45% of these sets, respectively.

<sup>1</sup>Update on United States Atlantic bluefin tuna tagging. ICCAT SCRS (Madrid, 1977).

<sup>2</sup>National Marine Fisheries Service, NOAA, 75 Virginia Beach Drive, Miami, Florida, 33149.

The average number of recordings of lengths per set was about 64 fish. In many cases there were only a few individuals younger or older than the predominant age groups. In the following calculations, I disregarded these minority individuals to better emphasize the predominate age composition of each set, and when a particular age occurred as 5% or less of the individuals of the total sampled per set, that age was eliminated.

Ages 1, 2, 3, and 4 were present in 40%, 54%, 42%, and 8% of the sets, respectively, when a 5% tolerance limit was used (Table 2). Incorporating this tolerance limit of 5% into the calculations, the following mixtures (Figure 2) were found:

The 1-year-old fish were found in homogeneous schools in 71% of the sets which contained age 1 fish. Mixtures of 1-, 2-, and 3-year-olds formed the remaining 29% of the schools.

The 2-year-old fish occurred in homogeneous schools in 40% of the sets which contained age 2 fish. Mixtures of 2- and 3-year-olds were present 33% of the time. In the remaining 27% of the sets containing 2-year-olds, there were mixtures of 1- and 2-year-olds, and 1-, 2-, and 3-year-olds, and 2-, 3-, and 4-year-olds.

The 3-year-old fish occurred in homogeneous schools in 30% of the sets which contained age 3 fish. Mixtures of 2- and 3-year-olds were present in 43% of these sets, while 3- and 4-year-olds, and 1-, 2-, and 3-year-olds, and 2-, 3-, and 4-year-olds occurred in the remaining 27% of the sets.

The 4-year-old fish occurred in homogeneous schools in the same number of sets as did mixtures of 3- and 4-year-olds, both being 28%; and a mixture of 2-, 3-, and 4-year-olds occurred in 43% of the sets with age 4 present.

One-year-old fish often (57% of the time or 71% when using a 5% tolerance limit) school together exclusively. Other ages were more frequently found mixed. Ages 2, 3, and 4 were found in homogeneous schools in 20%, 14%, and 18% of the sets studied which contained these age fish (40%, 30%, and 28% when a 5% tolerance limit was used).

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