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Spanish Investigations on Cod in Divisions 3M and 3N in 1982

by

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Introduction

Since April to August 1982 J. Fontenla was an observer on board of the PTB-4 "TERRA-NOVA", and E. J. Varela another one on board of the PTB-5 "BAHIA DE GUIPUZCOA-BAHIA DE SAN SEBASTIAN". They sampled cod lengths, got samples of otoliths and carried out many observations to improve statistics.

All the otoliths were read by Fontenla and Varela, with the aid of our colleague A. Vázquez. Spanish catch and sampling data for 3M and 3N cod in 1982 are shown in Table 1.

Results

Age composition of cod catches is shown in Table 2. Relative age composition of Spanish cod catches in Div. 3M and 3N is shown in Figure 1. In Div. 3M the most important age group is that of 4 years, fishes belonging to the 1978 annual class, and in Div. 3N those of 4 and 8 years, the last ones belonging to the 1974 annual class.

Relationship between age and length for cod sampled in 1982 is shown in Table 3. Although in Div. 3M there is rather little sampling it seems that growth rate has been greater in Div. 3M than in Div. 3N for young fish and smaller for the oldest one.

Cod catches and fishing effort in Div. 3N are shown in Table 4. The overall fishing effort of the Spanish vessels has been calculated using factors of the multiplicative model proposed by Vázquez and Larrañeta (1980). The year factor for 1982, equivalent to a catch per unit effort index, has been estimated to be 0.52. This means that if an effort of 100,000 units would be spent in the 3NO cod fishery in 1982 the catch would have been 52000 tm. As in this model 86667 units have been calculated to be 2/3 of the MSY effort, the

resulting total allowable catch will be 45067 tm. As since 1976 fishing effort is showing a rather constant level, fish density cannot be far from an equilibrium state. So, 45000 tm could be taken as a realistic point in an effort/catch-per-unit effort relationship.

Otherwise since the Spanish vessels were only fishing in the area off 200 mile limit, necessarily the most exploited segment of the 3NO cod stock, it is reasonable to suppose that a level of 45000 tm will be a minimum estimation of a total allowable catch.

Acknowledgement

We are indebted to A. Vázquez for his valuable help in reading otoliths and in calculations.

References

Vázquez, A. and M. G. Larrañeta. 1980.- Assessment of cod stock in Divisions 3NO. NAFO SCR Doc. 80/II/10.

Table 1. Spanish commercial sampling for 3M and 3N cod in 1982

| Div. | No. measured | No. aged | Samplig weight (kg) | Catch (tm) |
|------|--------------|----------|---------------------|------------|
| 3M | 2864 | 122 | 1909 | 4513 |
| 3N | 18091 | 1243 | 18094 | 14361 |

Table 2.- Age composition ($\times 10^{-3}$) of cod catches in sampled months.

| Age | 3M | 3N | 3N | 3N | 3N | 3N |
|-------|-------|-------|-------|-------|-------|--------|
| | May | April | May | June | July | August |
| 1 | - | - | - | - | - | - |
| 2 | - | 2.9 | 20.8 | 67.4 | 83.3 | 1.0 |
| 3 | 1.6 | 5.4 | 154.2 | 51.1 | 81.1 | 7.8 |
| 4 | 300.2 | 18.0 | 540.4 | 79.3 | 285.6 | 33.5 |
| 5 | 165.0 | 19.9 | 401.9 | 70.4 | 69.2 | 4.7 |
| 6 | 34.1 | 10.8 | 168.0 | 43.0 | 37.9 | 3.4 |
| 7 | 2.1 | 23.0 | 200.9 | 103.0 | 83.3 | 37.6 |
| 8 | 8.5 | 43.4 | 161.1 | 154.1 | 67.7 | 57.8 |
| 9 | 9.6 | 28.7 | 43.3 | 80.0 | 21.6 | 54.9 |
| 10 | 2.1 | 18.0 | 15.6 | 36.3 | 4.5 | 21.4 |
| 11 | - | 24.4 | 17.3 | 41.5 | 1.5 | 9.7 |
| 12 | - | 3.5 | 3.5 | 5.2 | - | 1.8 |
| 13 | - | 1.2 | 1.7 | 0.7 | 0.7 | 3.4 |
| 14 | - | 2.3 | 1.7 | 2.2 | - | 2.4 |
| 15 | - | 2.3 | 1.7 | 1.5 | - | - |
| 16+ | - | 1.2 | 1.7 | 0.7 | - | 2.4 |
| Catch | 1016 | 1110 | 4322 | 3004 | 1588 | 1289 |

Table 3.- Average sizes at ages 2-10 years, from 1982 sampling

| Age | 3M May | | 3N April-June | | 3N July-Aug. | |
|-----|--------|----|---------------|-----|--------------|----|
| | mm | N | mm | N | mm | N |
| 2 | - | - | 274 | 90 | 271 | 31 |
| 3 | 440 | 3 | 349 | 98 | 343 | 25 |
| 4 | 521 | 41 | 451 | 117 | 471 | 49 |
| 5 | 634 | 29 | 542 | 109 | 571 | 21 |
| 6 | 685 | 12 | 649 | 88 | 652 | 20 |
| 7 | 835 | 4 | 765 | 140 | 764 | 56 |
| 8 | 833 | 12 | 859 | 146 | 849 | 53 |
| 9 | 849 | 17 | 969 | 68 | 964 | 31 |
| 10 | 985 | 4 | 1035 | 33 | 1027 | 10 |

Table 4.- Fishing effort (hours) and cod Catches (tm) of the Spanish vessels in Division 3N during 1982.

| Month | OTB2-4 | | PTB-4 | | PTB-5 | |
|-------|--------|-------|--------|--------|--------|--------|
| | Effort | Catch | Effort | Catch | Effort | Catch |
| Jan | | | 239 | 79.7 | | |
| Feb | | | 464 | 124.7 | 37 | 46.9 |
| Mar | | | 796 | 261.9 | 1798 | 686.7 |
| Apr | 253 | 86.7 | 2146 | 667.4 | 1260 | 355.4 |
| May | 188 | 36.0 | 3382 | 2194.6 | 3150 | 2092.1 |
| Jun | 94 | 5.1 | 1742 | 1526.0 | 2248 | 1472.8 |
| Jul | 63 | 8.7 | 300 | 295.6 | 1340 | 1283.6 |
| Aug | | | 420 | 331.1 | 939 | 958.3 |
| Sep | | | 272 | 167.1 | 148 | 48.1 |
| Oct | | | 361 | 221.8 | 100 | 50.5 |
| Nov | | | 1087 | 655.5 | 825 | 353.9 |
| Dic | | | 275 | 47.3 | 383 | 303.8 |
| Total | 598 | 136.5 | 11484 | 6572.7 | 12228 | 7652.0 |

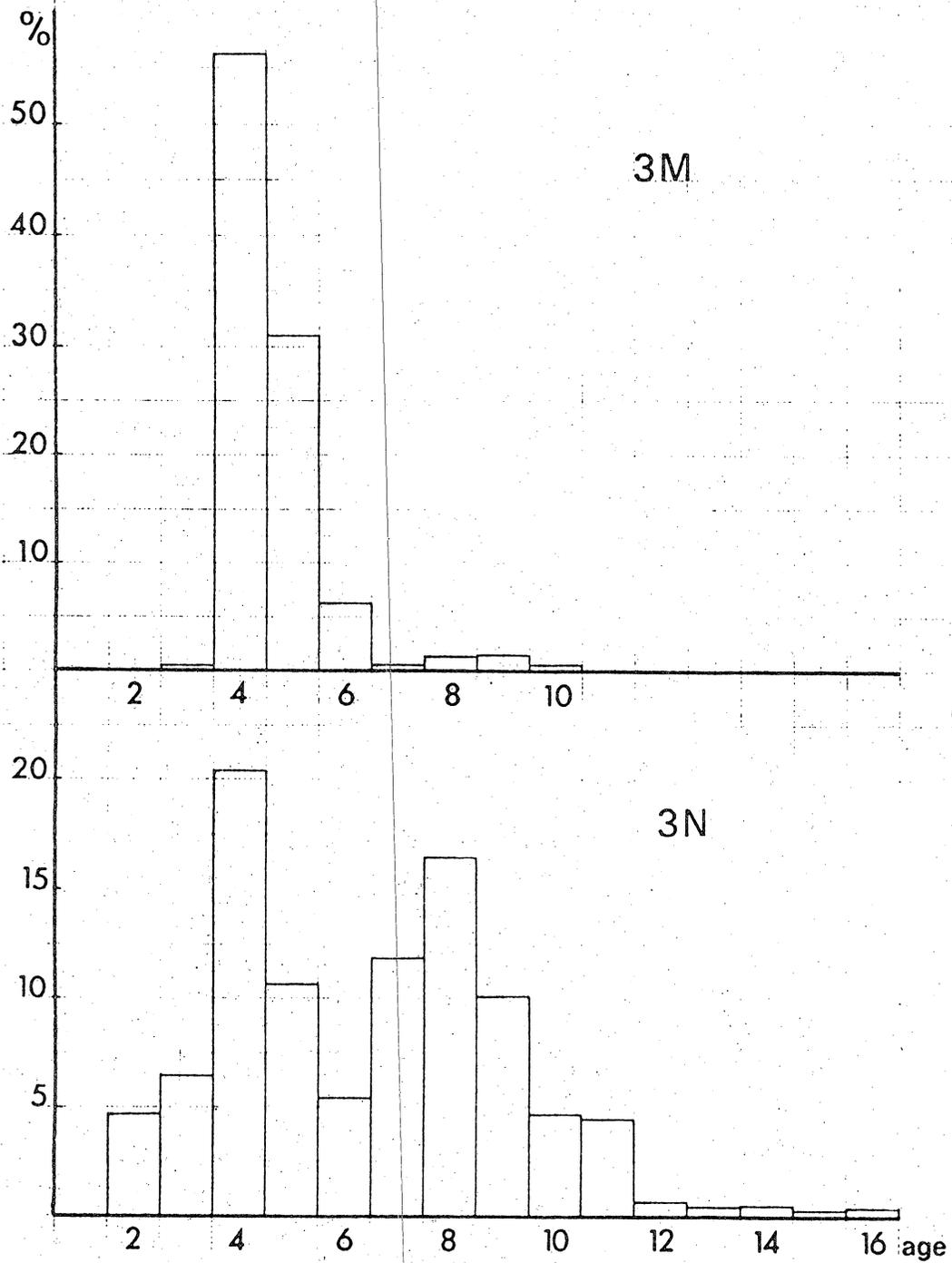


Figure 1.- Age composition of cod catches in Div. 3M and 3N, in 1982. From Spanish vessels.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both primary and secondary data collection techniques. The primary data was gathered through direct observation and interviews with key stakeholders. Secondary data was obtained from existing reports and databases.

The third section details the results of the data analysis. It shows a clear trend of increasing activity over the period studied. The data indicates that the majority of transactions occur during the middle of the day, with a significant peak in the afternoon.

Finally, the document concludes with a series of recommendations based on the findings. It suggests that the current processes are largely effective but could be improved by implementing more robust data security measures. Additionally, regular audits should be conducted to ensure the integrity of the records.