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# An Update of the Status of the Witch Flounder Resource in NAFO Subdivision 3Ps

by

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## Abstract

Catches of witch flounder in Subdiv. 3Ps during the last 10 years (except for 1977) have been less than 1000 t annually and in more recent years have been less than 500 t annually. The fishery is made up of a by-catch fishery on St. Pierre Bank by otter trawlers and a mixed groundfish fishery in Fortune Bay mainly by Scottish seiners. The maximum age in the population has declined from 22 years to 14 years between 1976 to 1986, but has been relatively stable since 1980. Biomass estimates from surveys are highly variable and do not indicate any particular trends. Mortality estimates indicate that very little fishing mortality has occurred in recent years, however, despite this the age span of the population has not increased.



## Résumé

Les prises de plie grise dans la subdivision 3Ps au cours des 10 dernières années (sauf en 1977) ont été inférieures à 1 000 t par année, et au cours des dernières années, sont tombées à moins de 500 t par année. La pêche est composée de prises fortuites sur le banc de St-Pierre par des chalutiers et une pêche mixte de poissons de fond dans la baie Fortune, surtout par la méthode de la senne écossaise. Dans les populations, l'âge maximal est passé de 22 ans à 14 ans entre 1976 et 1986, mais reste relativement stable depuis 1980. Les estimations de la biomasse faites à partir de relevés sont fortement variables et n'indiquent aucune tendance particulière. Les estimations de la mortalité indiquent qu'une très faible mortalité due à la pêche s'est manifestée au cours des dernières années, mais que la gamme d'âge de la population ne s'est pas élargie.

## The Commercial Fishery

The fishery for witch flounder was reasonably stable at about 1000 t annually during the early 1960's, however, in the late 1960's catches increased to over 4000 t then declined in general to former levels. During the last 10 years (with the exception of 1977) annual catches have been less than 1000 t and in the last 6 years have rarely exceeded 500 t. The preliminary catch figures for 1986 suggest removals of 658 t (Fig. 1 and Table 1).

This fishery on St. Pierre Bank has always been a by-catch fishery of other major groundfish species in particular cod, American plaice and redfish and as a result of declining catches of these other species it is expected that catches of witch flounder would also decline. In the Fortune Bay area of Subdiv. 3Ps there is also a small Danish and Scottish seine fishery where witch flounder is taken as part of a mixed catch of Greenland halibut, cod and redfish.

Although catches were small in 1986 an age sample from the commercial fishery was obtained. The catch at age is shown in Fig. 2. The age ranged from 5 years old to 13 years old, however, about 85% of the catch was obtained from ages 7 to 10 inclusive.

## Data From Research Vessel Surveys

Research vessel surveys using stratified-random design have been conducted on St. Pierre Bank since the early 1970's mostly by the research vessel A.T. CAMERON and usually during the months of February and March. In more recent years, however, with the retirement of the A.T. CAMERON and the acquisition of the two new sister ships ALFRED NEEDLER and WILFRED TEMPLEMAN different ships and gears have been employed to conduct the surveys and no adjustments to catch rates of the various vessels and gears have been made.

The results of the surveys presented as mean weight per 30-min. set per stratum are shown in Table 2 for the years 1976 to 1987. Although coverage has never been complete, for the more recent years the more important strata for witch flounder have generally been surveyed. The highest estimate of biomass in the series was 8090 t in 1977 despite the fact that this was one of the years of least coverage. It is also of note that 1977 was also one of the years of anomously high catch levels. Biomass estimates over the last 5 years have fluctuated between 2800 and 6200 t giving an average of about 4300 t.

## Age Composition from Research Surveys

Estimates of abundance ('000s) from surveys during 1976-1986 are presented in Table 3 with a comparison of the 1976 and 1986 catch at age shown in Fig. 3. The age span has declined from 22 years old in 1976 to 14 years in 1986. The maximum age declined systematically from 1976 to 1980, however, since 1980 the age composition has been relatively stable although recent catch levels have been well below some of the historically high levels of catch.

## Long-Term Estimates of Mortality

Since the age structure during the last 7 years has shown relative stability the abundance estimates were combined and catch curves were constructed (Fig. 4). Depending upon the age range one chooses to use for the calculations the mortality estimates can vary substantially. Using the age range of 7-12 where most of the catch now occurs the fishing mortality is probably close to half that of natural mortality. These catch curves are of course largely a reflection of events that occurred in the 1970's when catches averaged about 2000-3000 t. On the other hand, these catches were probably comprised of many age groups that no longer exist in the population. The most perplexing observation is that despite the fact that very little fishing mortality appears to have been exerted on the stock over the last 7 years the age span is not increasing as in the past. It may very well be that this stock may have reached some new equilibrium at a level much lower than in the past.

Table 1. Nominal catches of witch flounder - NAFO Subdivision 3Ps in 1986.

| Country | Month | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | U.K. | Total |
| Can(SF) | 2 | 5 | 13 | 14 | 1 | 1 | - | - | 1 | 1 | 7 | 72 | | 117 |
| Can(N) | | | | | | | | | | | | | | |
| OT | 108 | 28 | 53 | 27 | 45 | 2 | 1 | - | 1 | - | 4 | 8 | | 277 |
| DS | - | 38 | 27 | 5 | - | - | - | 3 | - | - | 4 | - | | 77 |
| GN | - | - | - | - | 2 | 1 | 11 | 14 | 3 | - | - | - | | 31 |
| Can(G) | | | | | 12 | - | 29 | 25 | 50 | 7 | 33 | | | 156 |
| France | | | | | | | | | | | | | | - |
| TOTAL | | | | | | | | | | | | | | 658 |

Table 2. Witch - average weight (kg) per 30 minute set - NAFO Subdivision 3Ps. (No. of sets shown in parentheses.)

| Stratum | ATC 247 and 248 1976 | ATC 261 1977 | ATC 273 and 275 1978 | ATC 287 1979 | ATC 302 1980 | ATC 316 1981 | ATC 330 1982 | A. NEEDLER 9 1983 | A. NEEDLER 26 1984 | W.T. 26 1985 | W.T. 45 1986 | W.T. 55 56 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 306 | 1.10(6) | 3.21 (6) | 1.49(9) | 2.63(5) | 1.72(2) | 2.43(3) | 0.70(3) | 3.30 (4) | 0.15(2) | 1.75 (2) | 2.78 (3) | 1.05 (4) |
| 307 | 0.34(4) | 2.21 (4) | 0.03(7) | 0.0 (4) | 0.45(2) | 0.0 (3) | 0.0 (4) | 0.38 (4) | 1.00(2) | 0.33 (3) | 0.27 (3) | 0.0 (3) |
| 308 | 0.0 (2) | 0.0 (4) | 0.0 (2) | 0.0 (4) | 0.0 (2) | 0.0 (2) | 0.0 (2) | 0.0 (3) | 0.00(2) | 0.00 (2) | 0.0 (2) | 0.0 (2) |
| 309 | 1.91(7) | 6.14 (6) | 3.38(9) | 3.97(6) | 0.0 (2) | 3.75(2) | 0.0 (2) | 3.00 (3) | 1.95(2) | 4.67 (3) | 2.50 (2) | 0.15 (2) |
| 310 | 2.84(4) | 6.94 (6) | 6.63(9) | 4.01(6) | 4.09(2) | 6.00(2) | 4.00(3) | 1.67 (3) | 3.25(2) | 5.67 (3) | 7.00 (2) | 1.60 (2) |
| 311 | 9.91(6) | 24.29 (4) | 1.25(8) | 1.47(4) | 0.22(2) | 0.25(2) | 0.0 (3) | 0.0 (3) | 3.00(2) | 0.55 (4) | 23.00 (3) | 0.17 (3) |
| 312 | 0.09(5) | 0.91 (4) | 0.0 (2) | 0.0 (3) | - | 0.0 (2) | 0.35(2) | 0.0 (3) | 0.50(2) | 0.00 (2) | 0.0 (2) | 0.0 (2) |
| 313 | 9.88(6) | 8.32(10) | 17.07(5) | 6.17(5) | 22.24(2) | 25.00(2) | 8.50(2) | 10.17 (3) | 2.50(2) | 3.85 (2) | 3.75 (2) | 1.25 (2) |
| 314 | 0.0 (2) | 0.28 (4) | 0.0 (3) | - | 0.0 (2) | 0.0 (5) | 0.0 (5) | 0.0 (7) | 0.00(4) | 0.00 (7) | 0.0 (8) | 0.0 (5) |
| 315 | 0.0 (2) | 0.34 (4) | - | 0.0 (3) | 0.0 (4) | 0.0 (2) | 0.40(3) | 1.20 (8) | 2.20(5) | 0.00 (7) | 0.75 (6) | 0.0 (8) |
| 316 | 5.45(4) | 33.33 (6) | 15.17(6) | 18.76(3) | 5.90(2) | 16.50(2) | - | 41.00 (4) | 30.50(2) | 37.17 (3) | 35.50 (2) | 33.33 (3) |
| 317 | 39.50(4) | 11.55 (4) | 6.98(4) | 0.0 (3) | 4.43(2) | 0.15(2) | 5.17(3) | 98.33 (3) | 119.75(2) | 2.00 (2) | 4.00 (2) | 0.17 (3) |
| 318 | 1.91(7) | 6.05 (6) | 5.90(2) | 14.74(2) | 7.26(2) | - | 0.95(2) | 10.07 (3) | 0.95(2) | - | 59.50 (2) | 2.13 (2) |
| 319 | 1.25(4) | 1.59 (6) | 1.82(4) | 0.91(2) | 18.84(4) | 16.50(2) | 0.93(7) | 1.00 (7) | 2.08(6) | 0.75 (2) | 2.38 (8) | 2.11 (9) |
| 320 | 0.15(3) | - | - | - | 0.0 (6) | 0.0 (2) | 0.0 (4) | 0.86(14) | 0.00(8) | 0.00 (5) | 0.0 (9) | 0.0 (11) |
| 321 | 0.68(2) | - | 0.0 (3) | - | 0.0 (5) | 0.0 (2) | 0.0 (4) | 0.0 (10) | 0.00(6) | 0.00 (7) | 0.0 (10) | 0.0 (10) |
| 322 | 0.0 (4) | - | 0.0 (2) | 0.0 (2) | 0.77(8) | 0.0 (2) | 0.31(8) | 0.18(11) | 0.44(8) | 0.00(13) | 0.09(12) | 0.0 (10) |
| 323 | 0.0 (4) | 93.36(2) | 0.15(3) | - | 0.0 (3) | 3.75(2) | 1.00(2) | 9.50 (6) | 0.38(4) | 4.33 (3) | 0.14 (5) | 1.87 (6) |
| 324 | 0.0 (2) | - | - | 0.0 (2) | 0.0 (2) | - | 0.0 (2) | 0.0 (4) | 0.00(3) | 0.00 (2) | 0.0 (5) | 0.0 (4) |
| 325 | 0.0 (2) | - | 0.0 (2) | 0.0 (2) | 0.0 (4) | 0.0 (2) | 0.0 (5) | 0.0 (8) | 0.18(5) | 0.00 (3) | 0.0 (8) | 0.0 (6) |
| 326 | - | - | 0.0 (2) | 0.0 (2) | 0.0 (2) | 0.0 (2) | 0.0 (2) | 0.0 (3) | 0.00(2) | - | 0.0 (2) | 0.0 (2) |
| 705 | 6.02(4) | 7.15(4) | 3.99(5) | 13.39(4) | 7.94(2) | 12.50(2) | - | 4.93 (3) | 3.75(2) | 6.60 (2) | 7.00 (2) | 7.00 (2) |
| 706 | 8.55(3) | 20.56(4) | 8.63(2) | 24.64(3) | 9.99(2) | 17.75(2) | 2.40(4) | 11.30 (5) | 8.50(2) | 6.07 (4) | 12.63 (4) | 15.75 (5) |
| 707 | 3.29(6) | 1.29(4) | 10.90(2) | 11.13(2) | 9.53(2) | - | - | 6.10 (3) | 5.75(2) | - | 10.50 (2) | 13.50 (2) |
| 708 | 13.77(3) | 6.23(4) | - | 4.31(2) | 0.80(2) | - | - | 2.75 (2) | 3.57(2) | - | 7.50 (2) | 8.00 (2) |
| 709 | 3.29(2) | - | - | - | - | - | - | 0.15 (2) | 0.20(2) | - | - | |

Table 2 (Cont'd.)

| Stratum | ATC 247 and 248 1976 | ATC 261 1977 | ATC 273 and 275 1978 | ATC 287 1979 | ATC 302 1980 | ATC 316 1981 | ATC 330 1982 | A. NEEDLER 9 1983 | A. NEEDLER 26 1984 | W.T. 26 1985 | W.T. 45 1986 | W.T. 55 56 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 710 | - | - | - | - | - | - | - | 1.79 (3) | 1.50(2) | 1.00 (2) | 3.00 (2) | |
| 711 | 12.49(2) | - | - | - | 4.77(2) | 7.30(2) | 2.95(2) | 5.49 (8) | 4.40(5) | 4.89 (8) | 8.28 (9) | 5.71 (7) |
| 712 | 2.73(2) | - | - | 8.39(2) | 6.13(2) | 10.25(2) | 1.30(3) | 3.73 (7) | - | 7.02 (6) | 7.50 (9) | 3.50 (4) |
| 713 | - | - | - | - | 4.31(2) | 2.67(6) | 1.20(2) | 2.48 (7) | - | 2.99 (8) | 5.60 (5) | 9.63 (4) |
| 714 | 2.39(2) | - | 4.20(2) | - | 4.54(2) | 5.70(8) | 1.32(6) | 1.31(10) | - | - | 11.90 (5) | 4.38 (4) |
| 715 | 3.81(5) | 2.67(4) | 9.08(6) | 4.69(3) | 3.29(2) | 2.35(2) | 1.50(2) | 6.33 (3) | 2.25(2) | - | 5.50 (2) | 5.00 (2) |
| 716 | 4.09(2) | 8.32(6) | 4.47(6) | 8.11(4) | 3.63(2) | 11.25(4) | 1.50(2) | 5.00 (4) | 4.47(3) | 7.44 (5) | 16.57 (4) | 10.20 (3) |
| Total tons | 3396 | 8090 | 2052 | 2983 | 4330 | 5475 | 1124 | 4955 | 3738 | 2835 | 6223 | 3863 |

Table 3. Abundance estimates (000's) of witch flounder from research vessel surveys in Div. 3Ps.

| Age | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1980-86 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | 36 | 4 | - | 6 | 116 | 41 | - | 18 | - | 22 | - | 197 |
| 3 | 192 | 22 | - | 27 | 324 | 676 | 39 | 33 | 14 | 16 | - | 1102 |
| 4 | 445 | 13 | 89 | 116 | 241 | 775 | 477 | 186 | 32 | 85 | 139 | 1935 |
| 5 | 373 | 108 | 158 | 141 | 499 | 613 | 845 | 697 | 153 | 278 | 572 | 3657 |
| 6 | 1298 | 56 | 144 | 149 | 922 | 1219 | 659 | 1255 | 562 | 1472 | 2957 | 9046 |
| 7 | 725 | 238 | 194 | 752 | 2101 | 3338 | 527 | 2294 | 1401 | 1947 | 4198 | 15806 |
| 8 | 942 | 478 | 340 | 1355 | 1728 | 3590 | 629 | 2556 | 2112 | 1640 | 3184 | 15439 |
| 9 | 2194 | 776 | 535 | 1342 | 1125 | 2421 | 779 | 2902 | 2446 | 878 | 1920 | 12471 |
| 10 | 2271 | 1675 | 803 | 1520 | 1111 | 2190 | 620 | 2193 | 2348 | 810 | 1722 | 10994 |
| 11 | 2184 | 2174 | 973 | 1290 | 1330 | 1743 | 268 | 1213 | 962 | 553 | 970 | 7039 |
| 12 | 1380 | 2964 | 807 | 784 | 983 | 675 | 292 | 248 | 325 | 562 | 311 | 3396 |
| 13 | 748 | 1845 | 599 | 293 | 461 | 46 | 212 | 23 | 86 | 191 | 88 | 1107 |
| 14 | 337 | 1577 | 483 | 138 | 78 | 9 | 11 | | 18 | 16 | 9 | 141 |
| 15 | 242 | 1000 | 203 | 18 | - | - | - | - | - | - | | |
| 16 | 245 | 508 | 127 | 10 | - | - | - | - | - | - | | |
| 17 | 55 | 409 | 52 | - | - | - | - | - | - | - | | |
| 18 | 93 | 254 | 30 | - | - | - | - | - | - | - | | |
| 19 | 28 | 120 | 1 | - | - | - | - | - | - | - | | |
| 20 | 35 | 54 | - | - | - | - | - | - | - | - | | |
| 21 | 20 | - | - | - | - | - | - | - | - | - | | |
| 22 | 4 | - | - | - | - | - | - | - | - | - | | |
| Total | 13847 | 14275 | 5538 | 7941 | 11019 | 17336 | 5358 | 13618 | 10459 | 8470 | 16070 | 82330 |

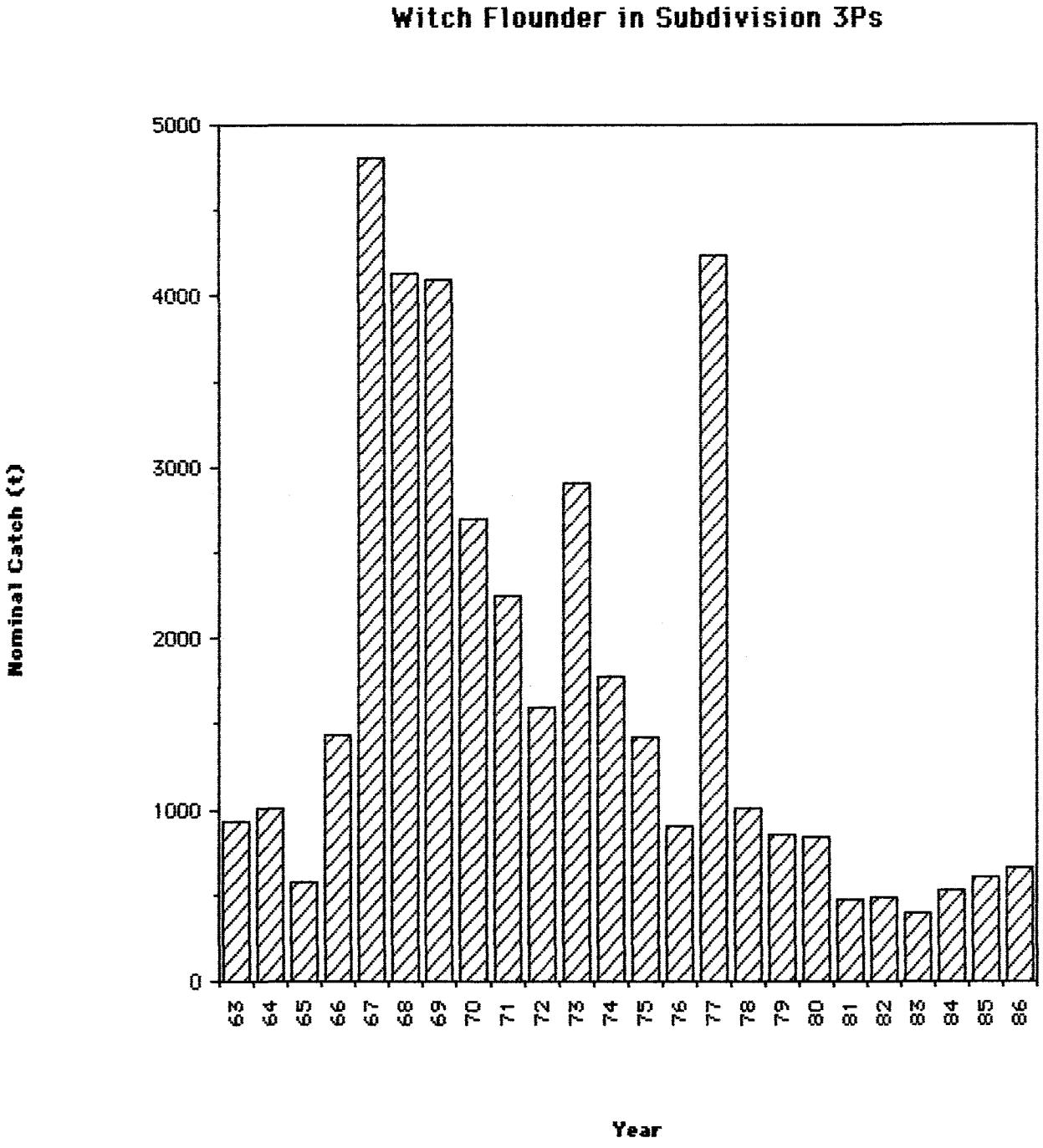



Fig1. Nominal catches of witch flounder by all countries in NAFO Subdivision 3Ps during 1963-86.

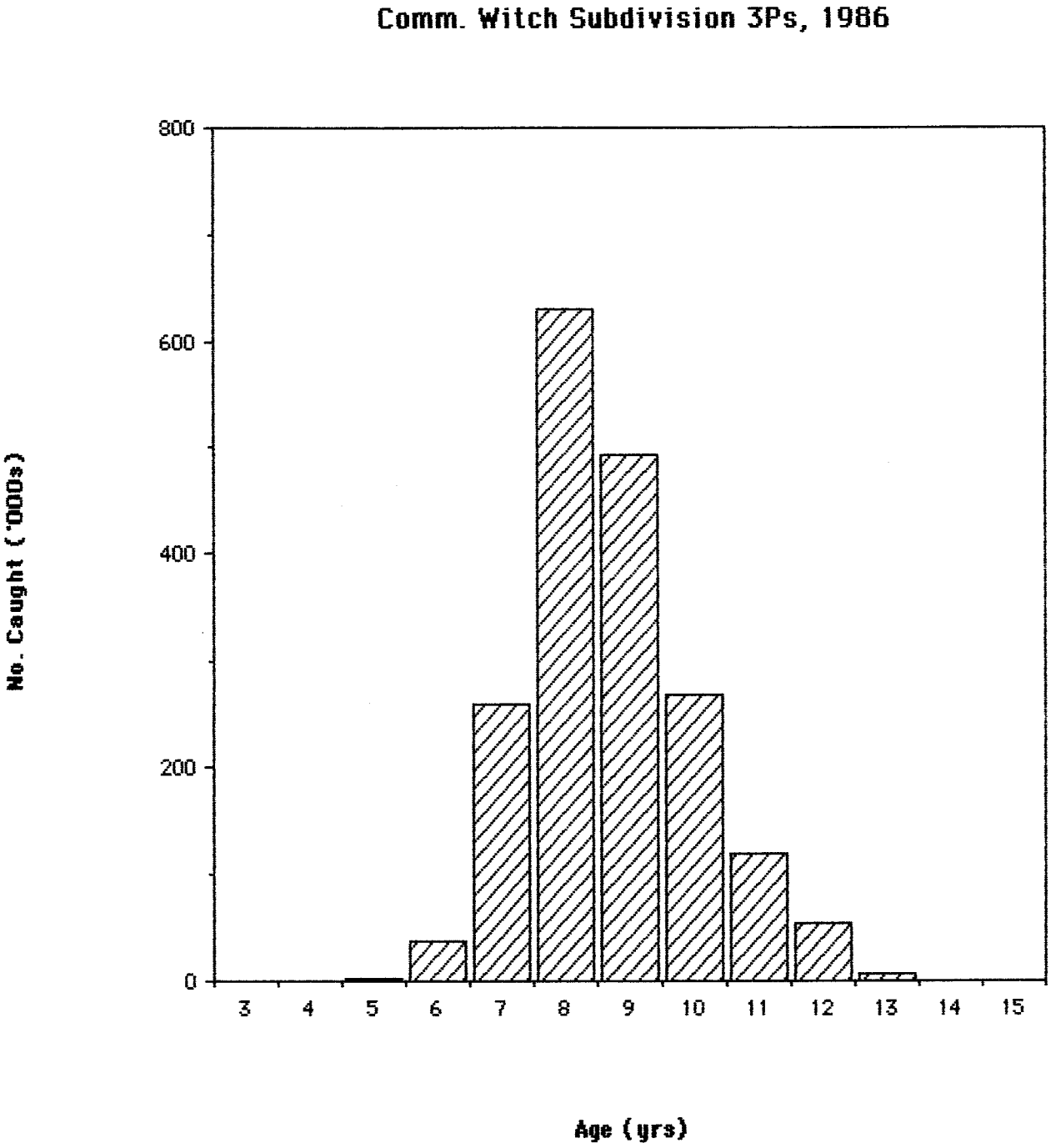
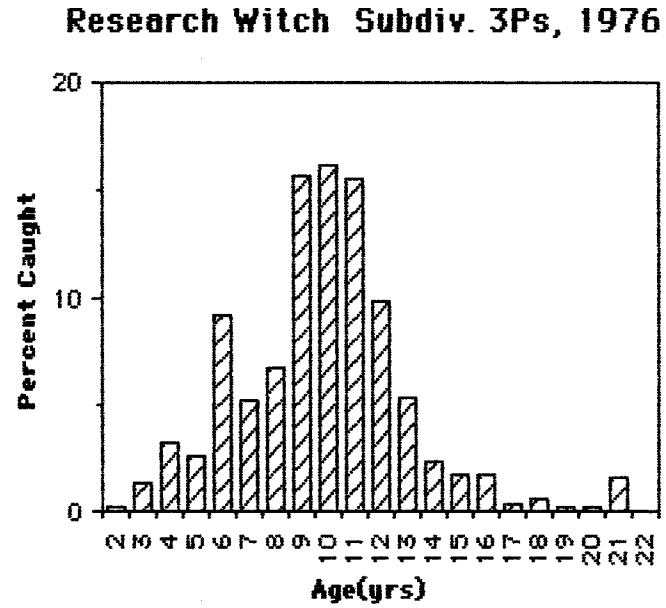



Fig 2. Catch at age of witch from the 1986 commercial fishery.



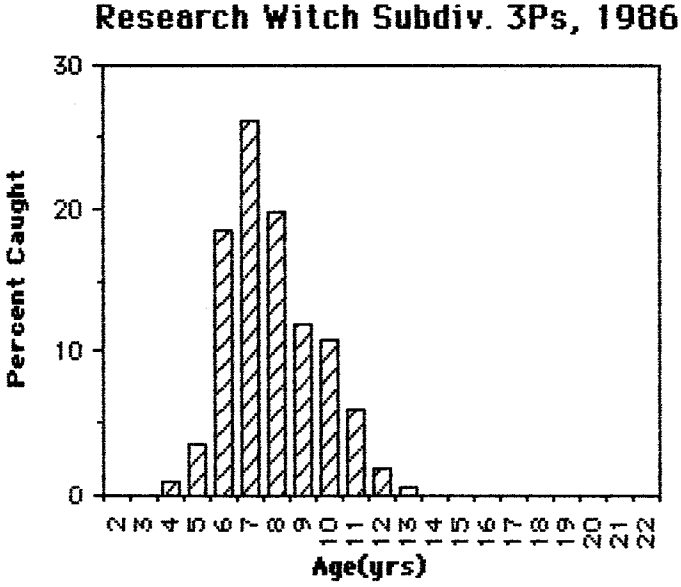




Fig3Catch at age of Witch Flounder from research surveys in 1976 and 1986 in NAFO Subdivision 3Ps.

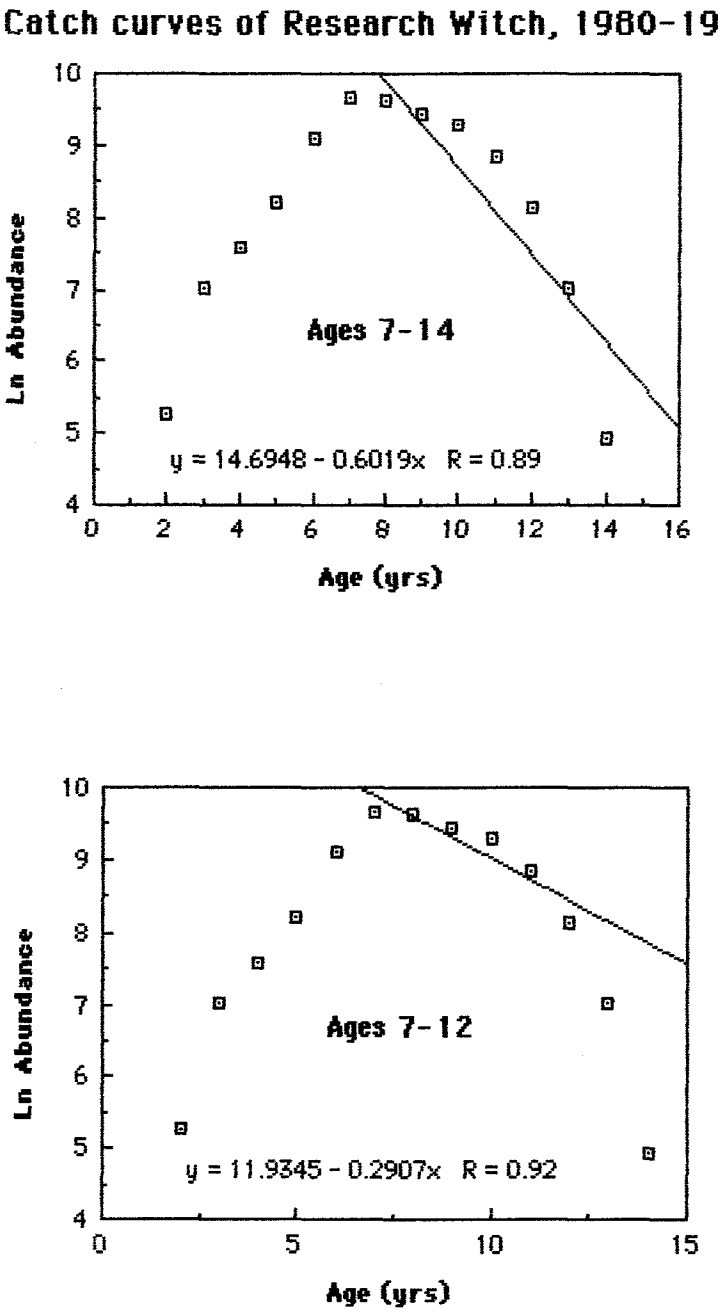



Fig 4. Catch curves of research Witch in NAFO Subdivision 3Ps from 1980-1986.