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Canadian Atlantic Fisheries
Scientific Advisory Committee

CAFSAC Research Document 90/62

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Comité scientifique consultatif des
pêches canadiennes dans l'Atlantique

CSCPCA Document de recherche 90/62

**A review of the Cod-Haddock-Pollock combined quota system for the
under 65' mobile gear sector in the Western Scotia-Fundy Region.**

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Abstract.

A new regulatory approach adopted by Scotia-Fundy Region in 1989 combined the cod, haddock and pollock quotas for mobile gear vessels under 65' fishing in Div. 4X and the Canadian portion of Subarea 5. Under this system these fleet sectors caught their allocations by June 29 and the fishery was closed to them. This "CHP strategy" is evaluated with regard to effects on discarding, on non-reporting and misreporting of quantity and species composition of landings and area of capture, and on correspondence between landings and allocations. Discarding was minimal in 1989 and non- and misreporting were greatly reduced from earlier years. Reported landings were reported to represent 90% of actual landings in contrast to 60-75% in previous years. When the stock areas are combined, the ratios of reported landings to allocations were similar or decreased in 1989 compared to 1988. Overruns were controlled. Thus, enforcement effectiveness and fishery statistics were improved. The CHP strategy was abandoned early in 1990 in favor of interim measures preparatory to a boat quota system, initially scheduled for introduction May 1, 1990.

Résumé

Une nouvelle approche de réglementation adoptée par la Région Scotia-Fundy en 1989 combinait les contingents pour la morue, l'aiglefin et le goberge (MAG) dans le cas des engins mobiles de moins de 65 pieds pratiquant la pêche dans la division 4X et dans la partie canadienne de la sous-zone 5. Selon ce système, les contingents dans ces secteurs ont été atteints dès le 29 juin et la pêche a été interrompue. Cette "stratégie MAG" est évaluée en fonction de ses effets sur le rejet sélectif, sur la non-déclaration et les erreurs de déclaration relatives à la quantité et à la composition en espèces des débarquements et l'endroit de la capture, et sur la correspondance entre les débarquements et les contingents. Le rejet sélectif a été marginal en 1989 et la non-déclaration et les erreurs de déclaration ont beaucoup diminué par rapport aux années qui ont précédé. Les débarquements déclarés correspondent à 90 % des débarquements réels, comparativement à 60-75 % les années précédentes. Lorsque les données concernant ces stocks sont combinées, les rapports des débarquements déclarés aux contingents étaient semblables ou plus faibles en 1989 qu'en 1988. Les dépassements étaient vérifiés. Ainsi, il y a eu amélioration tant du point de vue de l'efficacité de l'application de la loi que du point de vue de l'établissement des statistiques sur la pêche. La stratégie MAG a été abandonnée au début de 1990 en faveur de mesures provisoires destinées à préparer le terrain en vue de l'implantation d'un système de contingents par navire qui initialement devait entrer en vigueur le 1^{er} mai 1990.

Introduction.

In 1989 a policy was implemented for the mobile gear fleet less than 65' in Southwest Nova Scotia which combined 4X (and 5Y,Zc) cod, 4X (and 5Y,Zc) haddock and 4VWX5 pollock quotas into a single quota, the so-called CHP strategy. Unfortunately, very little data are available to form the basis of a quantitative evaluation of the impact of the combined quota system. The research survey data are not sufficiently precise to allow the resolution of the impact of the policy on the stock in terms of survivorship. The research data also suffer from annual variations in availability which are reflected in the abundance of all age classes one year being larger (or smaller) than those of an adjacent year. Survivorship estimates from such data are useless in the present context. Another problem in quantitative comparison is that a number of other factors (trip limits, market prices etc.) changed in 1989 so that there is no "control" for reference. The effect on effort distribution might be inferred from surveillance data. However, these data are not currently in condition for analysis.

A qualitative approach may shed some insights into the effects of the CHP strategy. Three questions regarding the effectiveness of the CHP strategy may be posed:

- i) Its effect on discarding.
- ii) Its effect on non-reporting and on misreporting of quantity and species composition of landings and area of capture.
- iii) Its effect on correspondence between catches and allocations.

Interviews with Port Technicians have been a valuable source of such qualitative information.

The only data included are the weekly landings from 1988 to March 1990 which have been compiled to reflect the gross activities of the under 65' mobile fleet. These data have been separated into vessels under 45' (Class C1) and those between 45 and 65' (C2). For 1990 the C1 data is further separated into generalists and specialists who had different trip limit restrictions under CHP. Only these mobile gear sectors are considered as they are the only sectors in the CHP scheme. Extracts from the Atlantic Groundfish Management Plan and conversations with personnel from the Fisheries and Habitat Management Branch have also been incorporated.

The period of review is focused on 1989 and first trimester of 1990. The CHP policy in early 1990 was perceived by the industry and Fisheries Management as being interim. Therefore, its effects and effectiveness were influenced by this point of view.

Historical perspective pre 1989.

Beginning in 1986 trip limits and seasonal quotas were set for each species stock area. On landing, a vessel could declare quantities against any and all of these species stock-area limits. This measure was intended to slow down fishing by decreasing the ratio of fishing time to time used for other activities such as transit or searching.

These restrictions encouraged dumping, misreporting of area of capture, renaming of species, under-reporting and non-reporting. Also, since a trip was not a defined time period other than simply the time from leaving port until return, vessels could shorten trip length. In extreme cases vessels made more than one trip per day. Thus, this measure was subject to the same kinds of abuse as the pre-1986 controls but encouraged these abuses on a continuing basis rather than only when stock areas were closed. It is likely that vessel efficiency was reduced, but, because of shortened and more frequent trips, not as much as expected.

Events in 1989.

In 1989 a new formulation of trip limits was adopted for fishing in divs. 4X+5 by mobile gear sectors less than 65'. A global quota (4X + 5) limit was established for each mobile gear sector (C1 and C2) which was the sum of its species stock area allocations for cod, haddock and pollock. The fishery was to be closed for a sector when this sum was reported as being landed. The number of trips was limited to either one or two per week, and the level of the trip limit was varied during the

season through consultation with the fishermen involved. Adoption of this scheme required relaxation of the requirement to limit stock area catches by these fleet sectors to those specified in the management plan.

This measure was intended to slow down fishing while avoiding the misreporting problems of earlier years by minimizing the incentive to dump and misreport and by having a more readily enforceable regulation. Summing controls by area and species was expected to eliminate misreporting and reduce dumping (although there were still incentives to high-grade - the selective discarding of less valuable species or sizes). Under-reporting and non-reporting, while still profitable, were expected to be a great deal more difficult given improved enforcement effectiveness. This effectiveness was to result from the reduced number of landings, the need to establish only the total landed quantity, and the control imposed by the need for renewal of conditions of licence on a weekly basis. Conditions of licence establish the conditions under which a licence to fish can be utilized; it is illegal to fish without a valid conditions attachment to a licence.

While closure of the mobile gear fishery under 65' on June 29 was the earliest on record this was in part due to failure to reach agreement on seasonal fishery closures within a trimester system. Also, it can be speculated that improved reporting of quantities landed may also have resulted in quotas apparently having been taken earlier. In Div.4X reported landings reached allocations much earlier in 1989 than in 1988 for cod and haddock for both vessel classes (Fig. 1 & 2), although misreporting of area of capture in 1988 confounds this comparison. Moreover, catches also accumulated more rapidly for 4X + 5 pollock (Fig. 3). The crosses mark the approximate attainment of the annual allocation. Control of the frequency of trips to one or two per week no doubt helped to spread the season. A reduced number of trips or reduced catch limits per trip would have further extended the season but did not receive industry support. Area of capture reports, species compositions and weighouts of reported landings are thought to be highly accurate and there were few reports of significant discarding. Non-reporting of landings became an important, although localized problem in May and June when the strictest trip limits were in force. Nonetheless, reported landings are considered by management authorities to represent 90% of the total landings, the highest level of completeness for several years.

With regard to area of capture, the Canadian portion of Subarea 5 was to a large degree closed from January to May 1989 inclusive. Div. 5Y did not open at all until June 1. Subdiv. 5Zc was closed to C1s until Feb 23, opened for 2 weeks and then reclosed until June 1. For C2s Subarea 5Zc opened on Jan 26 and remained so until the first week in March, and then closed until June 1. These brief openings were in response to the early over-run of the first trimester's quota which was based on Div. 4X alone. The industry requested the Subdiv. 5Zc portion be made available for catch in 4X. These small allotments were quickly caught. Then the entire CHP fishery was closed in late June. Figures 4 and 5 show these events in Subdiv.5Zc clearly with plateaux in the 1989 landing series (dashed lines). For example, Subdiv. 5Zc cod in Figure 4b shows a plateau beginning at about week 5 and then a second one beginning at week 21. Thus, essentially only Div. 4X was open to these fleets, except for June between the opening of Subarea 5 and complete fishery closure. It is thought that the high level of both air and sea surveillance of Georges Bank for enforcement of the Canada-USA boundary and the haddock spawning area closure would have detected any widespread violation of the Subdiv. 5Zc closure. While vessels could opt to fish in divs. 4VW by replacing their Div. 4X+5 condition of licence with one for the more easterly area, few did so while the CHP fishery was open. However, 43% of the vessels did so after the CHP closure in 1989. This may be compared to a historical level of participation of about 25%, reflecting the fairly widespread practice of fishings divs. 4VW during the period of the haddock spawning area closure in divs. 4X+5. It is surmised that fishermen in these fleet sectors were purposely operating in such a way as to cause early fulfillment of their divs. 4X+5 quota to highlight disapproval of their allocations in the 1989 Groundfish Management Plan. Based on DFO responses in previous years they hoped that early fishery closure and subsequent civil protest would result in catch reallocations from other sectors or relaxation of regulations.

Whether or not there was a satisfactory match between allocations and landings in 1989 must be judged keeping in mind previous year's performances. Stock allocations and catches for 1988 and 1989 are compared in Table 1 and preliminary data for 1990 are shown in Table 2. The overruns for cod and haddock in 1989 are higher than 1988 in Div. 4X, based on recorded landings. When area of capture is ignored by combining the catches (Table 1), the recorded landings show similar over-runs for cod. The combined haddock statistics show a reduced ratio of catch to allocation for the C2's while the C1's are unchanged. This comparison also poses the question of the agreement between recorded and actual landings. It is thought by management authorities that, in the years immediately prior to 1989, reported landings by these fleet sectors may have been about 60-75% of actual landings, in contrast to the 90% cited above for 1989. While neither of these figures can be supported by documentable evidence, they indicate a clear perception on the part of enforcement personnel that a significant improvement occurred.

The 1989 trip limit system is judged by enforcement staff as making effective enforcement a tractable proposition. Given the conditions which prevailed in 1989 the level of fishery control did indeed improve markedly with a concomitant improvement in statistical accuracy. The latter point is of paramount importance as accurate fishery statistics are essential to the effective functioning of the whole management system. The primary reservation about global limits is the possibility it provides to concentrate the fishery on the economically most desirable species, haddock. This could result in haddock allocations being greatly exceeded and, in extreme circumstances, even in the dumping of other species to maximize the value of the tonnage landed.

Events in first trimester of 1990.

Only preliminary data and observations are available for 1990. In any case a virtually unchanged CHP scheme was in place only for the first few months of 1990 as industry and DFO prepared for the introduction of a boat quota system, initially slated for May 1, 1990. The implementation date was revised to January 1, 1991, but the interim fishing controls deviated from the CHP concept. The landings up to the 14th week of 1990 are compiled from the weekly Quota Reports. For reference the first trimester allocations and annual quotas are appended to Table 2. The trimester allocations for cod and haddock were overrun by 200-300% in the first few months of 1990. The landings of cod by the C2s already exceed the annual quota. The degree of overrun of these quotas cannot be predicted but certainly the fishing is being actively pursued when compared to Figures 1 and 2.

Industry and DFO personnel report that discarding has become a significant problem in 1990, particularly with regard to pollock which is commanding a much lower market price than haddock or cod. Misreporting in 1990 has not been perceived to be as much a problem as in the period before CHP.

Conclusions.

An appraisal of the CHP management system is constrained to chiefly qualitative analysis. Three questions were posed in the introduction. The first was the effect on discarding. It seems that in 1989 discarding was lower than in previous years. This benefit of the CHP strategy seems not to be persisting in 1990, to some degree because of the low market value of pollock relative to haddock and cod and the experience of the 1989 early closure.

The second was regarding non- and misreporting. Misreporting in 1989 seems to have been much lower than in previous years, both in terms of area of capture and species composition. Non-reporting of landings was also greatly reduced. These benefits appear to have continued into early 1990.

The third question concerned the impact of global quotas on quota overruns. An effect when comparing 1988 and 1989 is not evident. This is because many other factors are involved. The lower non- and misreporting in 1989 means that the actual overruns are reduced although

the nominal overruns are of similar magnitude. Thereby, enforcement effectiveness and statistical accuracy are both improved.

The effects of the CHP global quotas on fishing mortality have not been addressed in this paper. Reported haddock landings by C1 and C2 vessels in Div. 4X+5 in 1989 were 40% lower than in 1988. If the different extent of underreporting of landings, and reduced discards, between the two years is taken into account, the actual reduction in catches (removals) was greater than this. It is probable that less than one third of the tonnage of haddock was removed by these vessels from Div. 4X + 5 in 1989 compared to 1988. Comparisons within divisions would not be meaningful given the suspected high level of misreporting of area of capture in 1988. Thus it is likely, unless there was a very large reduction in the fishable biomass of haddock between 1988 and 1989, that the fishing mortality generated by these fleet sectors was substantially reduced.

It is important to realize that the adoption of multi-species "global" trip limits was part of a package of controls instituted for the Div. 4X + 5 mobile gear fishery. Fishermen respond to the whole implementation framework and are influenced as well by extrinsic factors. Judgements about the effectiveness of a single element of the plan cannot be isolated from the whole and, in any case, should not be. The factor of overriding importance must surely be the accuracy of statistical information. Unless this accuracy is established, fishery data cannot provide a reliable basis for evaluation of the effectiveness of regulatory measures. Research data alone are not sufficient to resolve the effects of a change in policy at the level of detail of species and stock versus global trip limits. Thus, a) it is unlikely that the impact of using global trip limits can be isolated from the other factors at play, now or in the future, and b) science concerns could more usefully focus on the issue of statistical accuracy.

As a result of the Haché Task Force Recommendations and subsequent decisions by the Minister, Scotia-Fundy Region is in the process of implementing an individual boat quota system which would include the fleet sectors reviewed above. Boat quotas presently being discussed are on a species and stock area basis. The plans may include some element of transferability. Implementation is expected for 1991. This scheme will replace the global trip limit system. Accurate statistics are of critical value to both enforcement and scientific functions in resource management. Establishing the accuracy of fishery information for stock assessment purposes under such a scheme should receive serious scientific attention.

Acknowledgement

We are grateful to G. Peacock and J. Hansen of the Resource Management Branch, and the Port Technicians, Science Branch Scotia-Fundy Region for extensive advice on the CHP regulations and their effects.

Caption to Figures.

Figures 1 to 5 contain the cumulative weekly landings for the stocks under CHP for C1 (<45') and C2 (45-65') fleets. The solid line is for 1988 and the dashed for 1989. Several figures contain x's which mark the approximate date at which the allocations are exceeded. If the x is above the line, it denotes the allocation was not met.

Table 1. Summary of annual landings and allocations for 1988 and 1989 for vessel classes C1 and C2.

| Area | Species | Length Class | 1988 | | | 1989 | | |
|------------------|----------|-----------------|-------|------------|---------|-------|------------|---------|
| | | | Catch | Allocation | % taken | Catch | Allocation | % taken |
| 4X | Cod | 1 | 4039 | 2400 | 168 | 4141 | 2235 | 185 |
| | | 2 | 354 | 1940 | 182 | 4059 | 1815 | 224 |
| 4X | Haddock | 1 | 3360 | 3978 | 84 | 2077 | 1520 | 137 |
| | | 2 | 3639 | 3476 | 105 | 1519 | 1250 | 122 |
| 4VWX,5 | Pollock* | 1 | 4015 | 3560 | 113 | 3025 | 3935 | 77 |
| | | 2 | 5148 | 5340 | 96 | 3954 | 5905 | 67 |
| 5Y | Cod | 1 | 176 | 294 | 60 | 72 | 215 | 34 |
| | | 2 | 185 | 406 | 46 | 246 | 535 | 46 |
| 5Y,Z | Haddock | 1 | 1782 | 2185 | 82 | 512 | 1685 | 30 |
| | | 2 | 2849 | 3326 | 86 | 639 | 2525 | 25 |
| 5Z | Cod | 1 | 3150 | 2694 | 117 | 689 | 1075 | 64 |
| | | 2 | 3474 | 3394 | 102 | 939 | 1285 | 73 |
| 4X+5 Combined | Cod | 1 | 7364 | 5388 | 137 | 4902 | 3525 | 139 |
| | | 2 | 7199 | 5740 | 125 | 5244 | 3635 | 144 |
| 4X+5 Combined | Haddock | 1 | 5142 | 6163 | 83 | 2589 | 3205 | 81 |
| | | 2 | 6488 | 6802 | 95 | 2158 | 3775 | 57 |

* Pollock catch is for Divs 4X + 5 only.

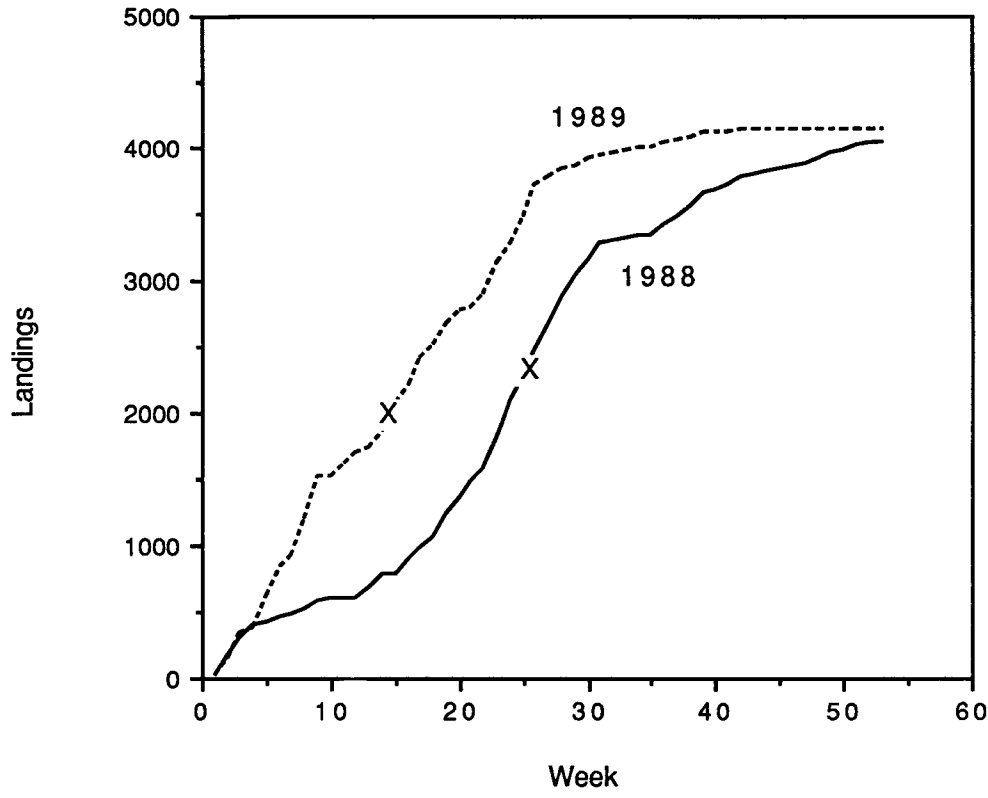
Table 2. Cumulative 1990 preliminary landings for mobile gear sectors in Div. 4X from Quota Reports. No landings by these gear sectors have been reported in 5Y or 5Zc.

| Week | Cod | | | Haddock | | | Pollock | | |
|---------|------|------|------|---------|------|-----|---------|-----|------|
| | C1S* | C1G* | C2 | C1S | C1G | C2 | C1S | C1G | C2 |
| 8 | 796 | 18 | 1510 | 559 | 13 | 802 | 136 | 0 | 299 |
| 9 | 997 | 25 | 1758 | 534 | 14 | 892 | 118 | 1 | 426 |
| 10 | 1028 | 26 | 1805 | 551 | 14 | 907 | 149 | 1 | 456 |
| 11 | 1081 | 37 | 1828 | 584 | 14 | 920 | 149 | 4 | 479 |
| 12 | 1111 | 40 | 1892 | 581 | 15 | 918 | 208 | 4 | 526 |
| 13 | 1113 | 44 | 1892 | 593 | 15 | 918 | 230 | 4 | 531 |
| 14 | 1152 | 44 | 1894 | 603 | 15 | 919 | 232 | 4 | 561 |
| Alloc** | 550 | 300 | 580 | 390 | 213 | 416 | 890 | 490 | 1740 |
| % | 209 | 15 | 327 | 195 | 7 | 221 | 26 | 1 | 32 |
| Annual | | | | | | | | | |
| Quota | 2145 | 1740 | | 1520 | 1250 | | 3480 | | 5220 |

*S denotes specialist, G denotes generalists.

** Allocation for first trimester except for generalists which is for the calendar year.

4X Cod < 45'



4X Cod 45-65'

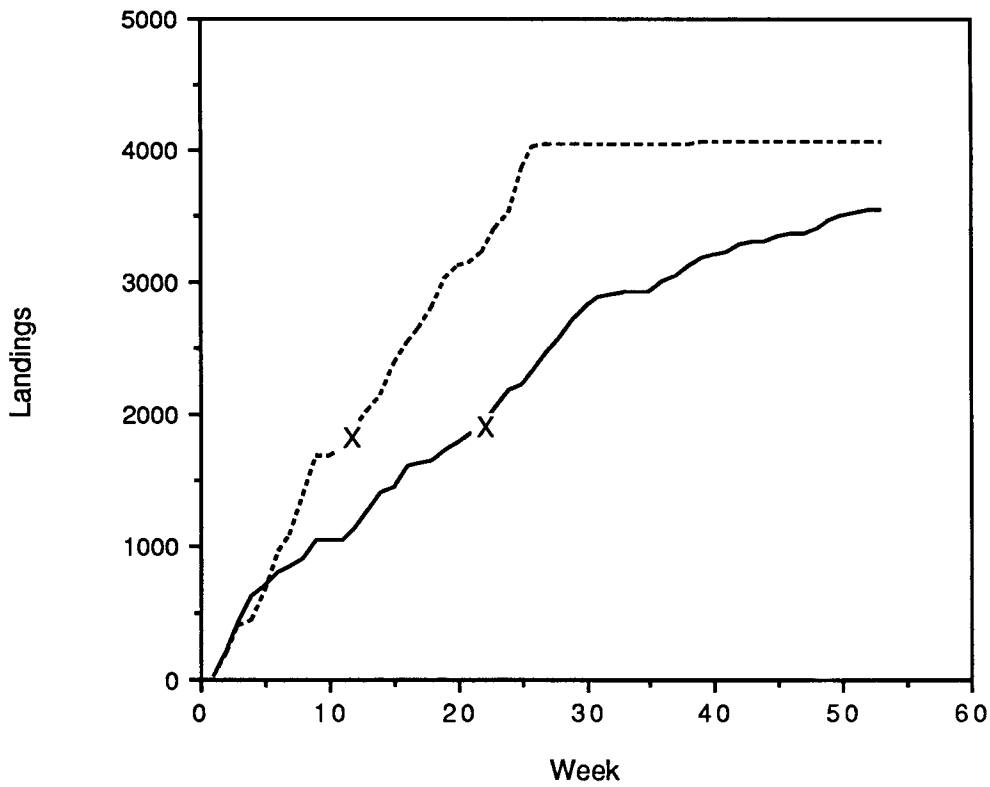
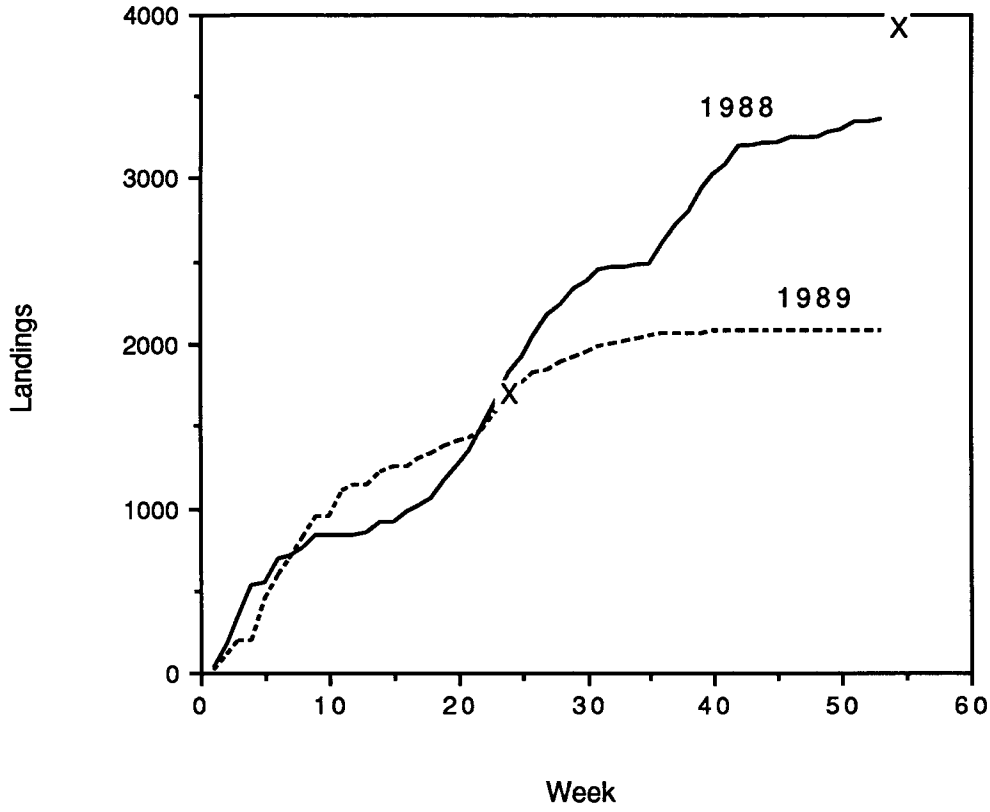


Figure 1a and b. Weekly 1988 and 1989 landings for 4X cod.

4X Haddock < 45'



4X Haddock 45 - 65'

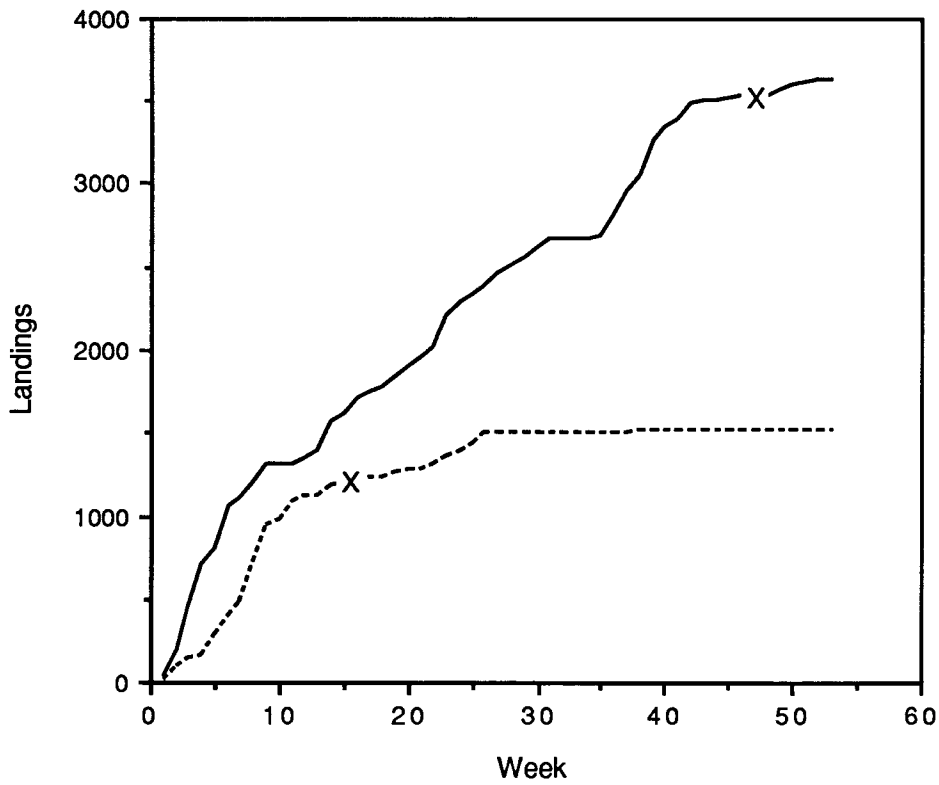
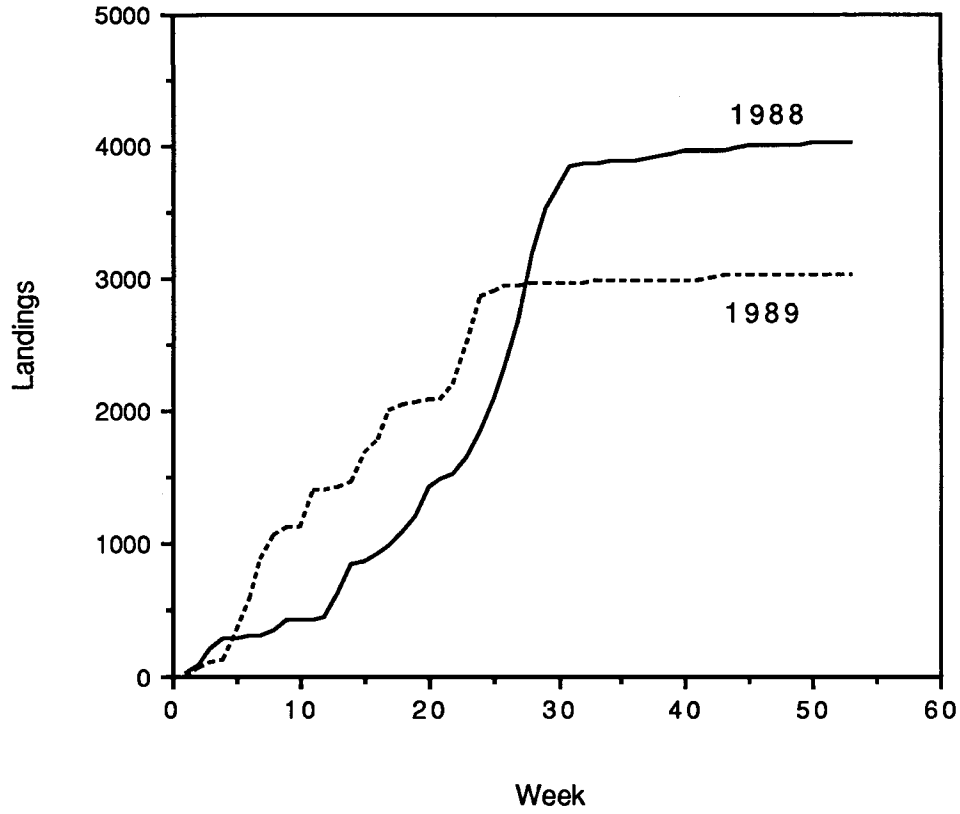


Figure 2a and b. Weekly 1988 and 1989 landings for 4X haddock.

4X,5YZc Pollock <45'



4X,5YZc Pollock 45 - 65'

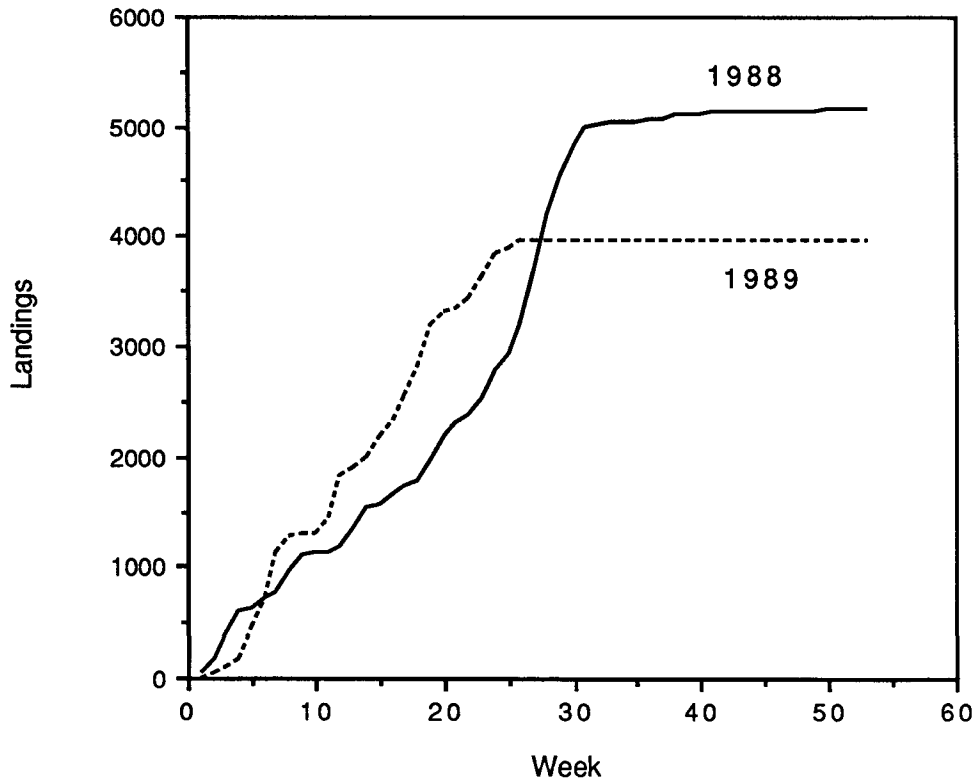
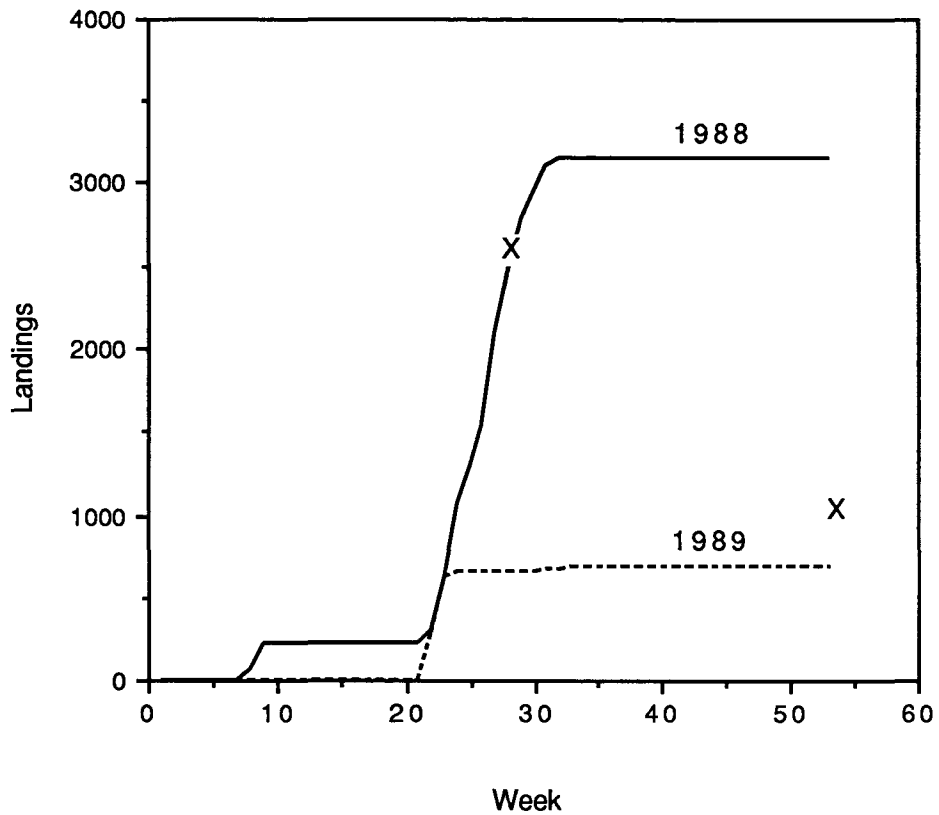


Figure 3a and 3b. Weekly 1988 and 1989 landings for 4X, 5YZc pollock.

5Zc Cod < 45'



5Zc Cod 45 - 65'

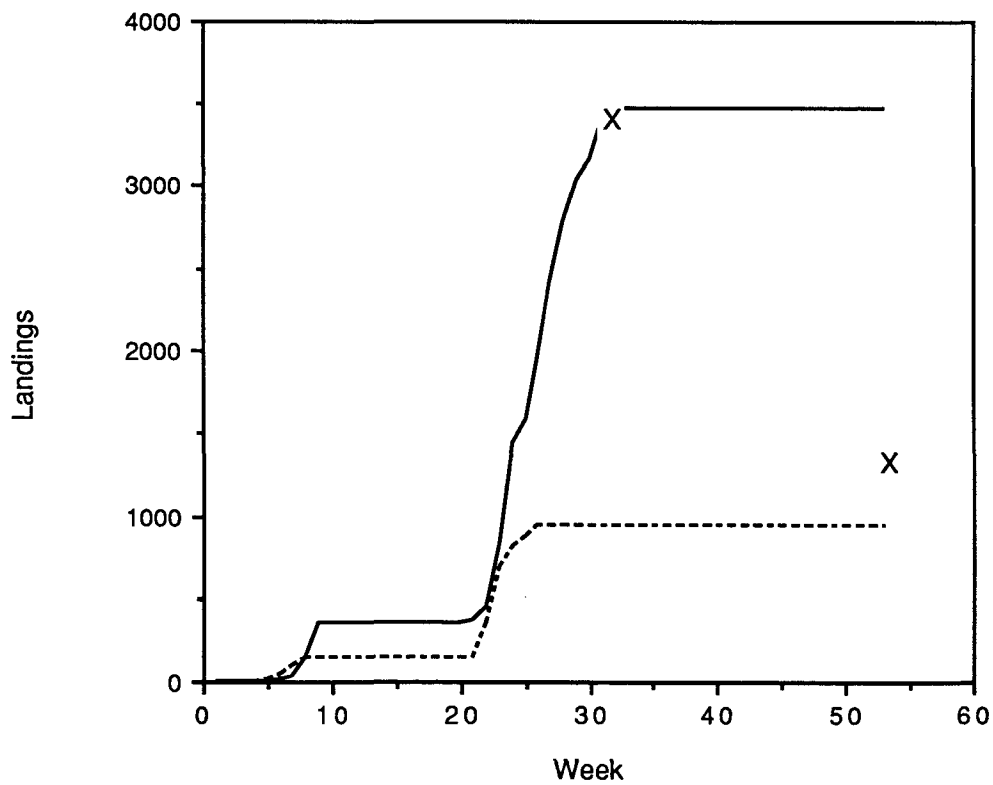
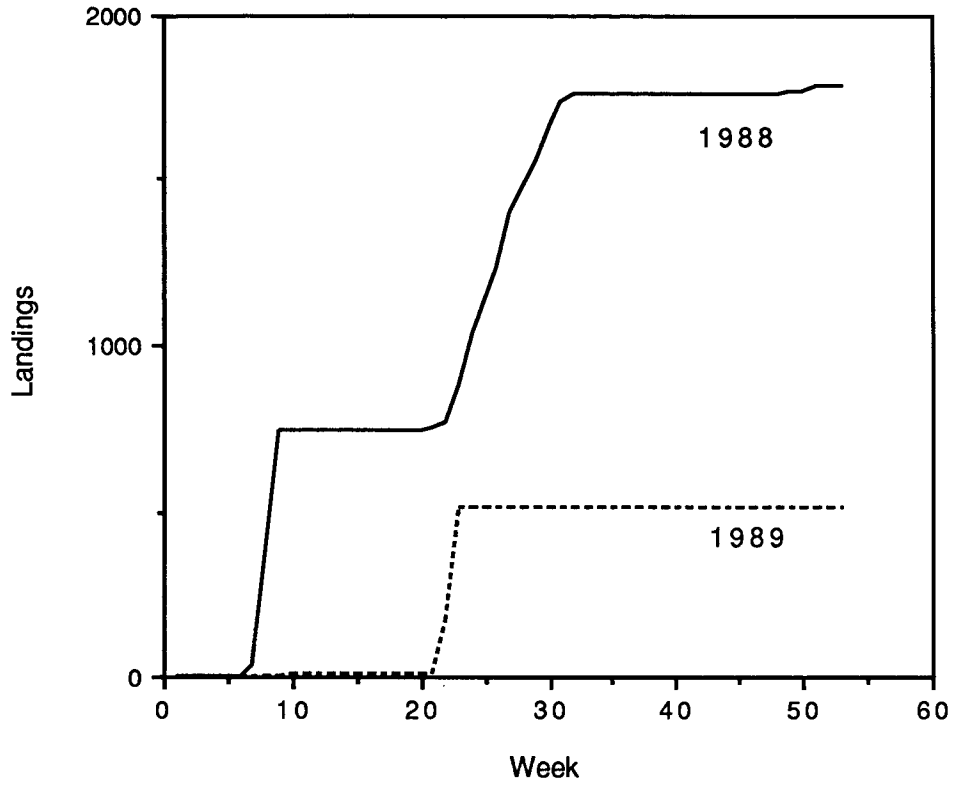


Figure 4a and 4b. Cumulative weekly landings for 5Zc cod.

5YZc Haddock < 45'



5YZc Haddock 45 - 65'

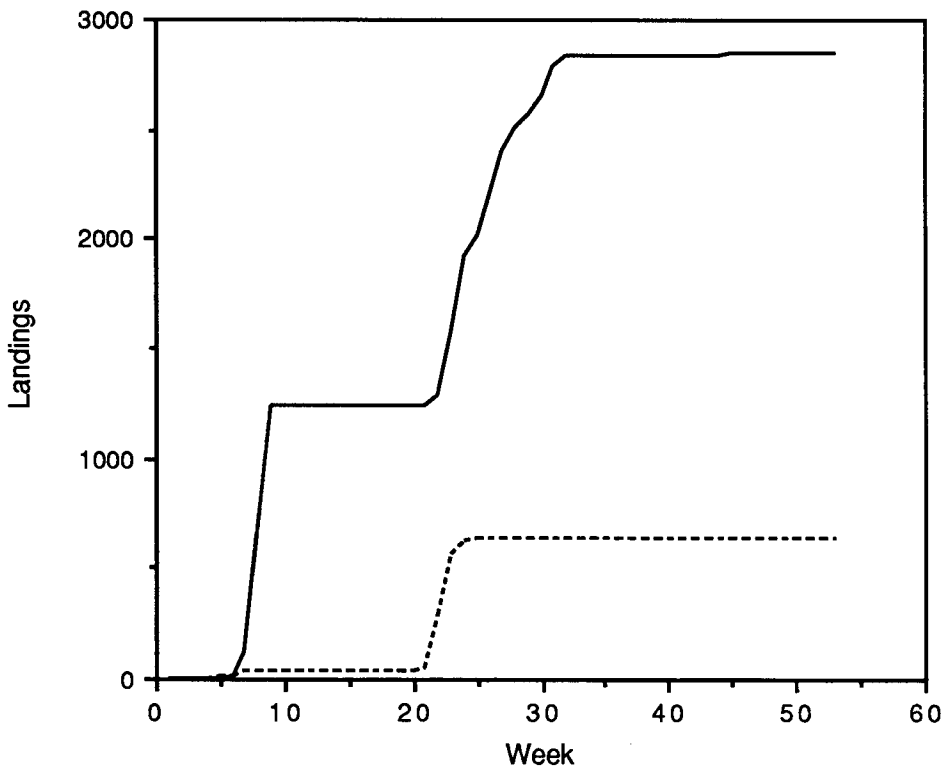


Figure 5a and 5b. Cumulative weekly landings for 5Y,Zc haddock.