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Revised Estimates of Landings from the 4WX Herring Fisheries: 1985-1992

by

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ABSTRACT

This document summarizes a reconstruction of the catch record for the 4WX herring fisheries in the years 1985 - 1992, based on both a survey of the purse seine fleet and on back-calculation from production.

Interviews in 1992 with a high proportion of captains/owners of the purse seine fleet indicated that actual landings were 1.34 - 1.88 times those reported for the 1985 - 1991 period. Back-calculation from production, based on conversion factors obtained from the industry for each product type, suggests a level of landings similar to that derived from interviews. It appears from both initiatives that total 4WX landings have been on an order of 150,000 - 200,000 t/yr, rather than the 100,000 - 150,000 t reported record, over the period.

RÉSUMÉ

Le présent document résume la reconstitution des statistiques de prises de hareng dans 4WX de 1985 à 1992, fondée sur un relevé réalisé par la flottille de pêche à la senne coulissante et sur des rétrocalculs de la production.

Les entrevues réalisées en 1992 auprès d'une forte proportion de capitaines/propriétaires de sennes coulissantes ont révélé que les débarquements réels étaient de 1,34 à 1,88 fois supérieurs à ceux qui avaient été déclarés de 1985 à 1991. Les rétrocalculs de la production, fondés sur les facteurs de conversion fournis par l'industrie pour chaque type de produit, dénotent des débarquements du même ordre que ceux révélés par les entrevues. Les deux démarches semblent indiquer que les débarquements totaux en provenance de 4WX durant la période considérée ont été de l'ordre de 150 000 à 200 000 tonnes par an, au lieu des 100 000 à 150 000 tonnes déclarées.

INTRODUCTION

The SPA-based analytical assessments normally used to evaluate the biological status of eastern Canadian fish populations require knowledge of the total amount of fish landed in the commercial fishery each year to calculate catch at age. The catch is one of the most influential components in the analysis, and is assumed to be free of error. Obviously, errors in catch at age can compromise an analytical assessment.

The assessment of the status of 4WX herring has been compromised in recent years by perceived errors in the recorded landings. In 1984 there was agreement that the nominal catch statistics for the 4WX purse seine fisheries were low compared to actual removals (Iles et al 1984), and in 1985 the catch matrix for the period 1973 to 1984 was revised (Mace 1985; Stephenson et al. 1985). An increase in TAC (to reduce the need or incentive to misreport), increased monitoring (including hauls before landing and collation of delivery slips and logs) and a fragmented (weekly) license scheme were believed to have improved the quality of landings data in 1985 (Stephenson et al. 1986, 1987), but the situation has worsened since. There were increasing reports of misreporting but these were not verified or quantified until 1991 when roe production figures demonstrated that substantially more must have been landed in the 1990 summer fishery than was reported (Stephenson et al. 1991). The same calculation indicated a variable degree of misreporting in some previous years. The result was an inability to undertake an analytical assessment in 1991 and a large impact on the quality of advice (Anon. (CAFSAC) 1991).

In 1991, production figures again demonstrated that substantially more was landed than was reported (Stephenson et al. 1992; Anon. (CAFSAC) 1992). Further evaluation of the series by members of the department and industry was also recommended.

The previous reconstruction (1985) estimated discrepancies between recorded purse seine landings and total removals for the period 1973 - 1984 on the basis of extensive interviews with members of the fishing industry, as well as comparisons between observer information and landings statistics derived during the 1983 and 1984 seasons (Mace 1985).

This document summarizes a reconstruction of the historical catch record for the 4WX herring fisheries since 1985 through a combination of two initiatives:

- i) Survey of purse seiners, and
- ii) Back calculation from production records.

METHODS AND RESULTS

PURSE SEINER SURVEY

During interviews in February and March 1992, purse seiner organizations, owners and/or captains were briefed on the current problem, reminded of the importance of accurate catch records for the assessment, and asked to provide revised estimates of annual landings from their

own records for the period 1985 to 1991. The response was good; revised figures were obtained from 25 to 36 (between 50 and 90%) of the vessels fishing in each year. In most cases, revised figures were calculated from records of fish sold ("stocked") and this information resulted in very confident statements regarding the totals for each year. In some cases, revisions were from detailed records of fish caught. In a few cases captains/owners made only general statements about the figures for a particular year (e.g. "should be about 600t (or a percentage) higher").

Survey information for each year was compared with DFO statistics for the same vessels for that year to calculate a ratio (survey/stats), which was applied to the statistics total for the year to estimate revised landings. The results are summarized in Table 1. The number of vessels surveyed ranged from 25 (1985) to 36 (1990) and the ratio of survey to statistics data for those vessels ranged from 1.34 (1985) to 1.88 (1986). According to these calculations, purse seine landings (annual quota year totals (mt)) were between 123,544 (1985) and 166,874 (1988). The survey revealed that there was generally considered to be an additional underestimate of approximately 10% in the fish sold for traditional domestic processing due to discounts for fish of inappropriate size or quality. This may also be the case for landings to OSS vessels but is apparently not the case for fish sold to the roe market. Feedback from industry after initial presentation of these results suggested that they are much closer to what really took place - but that there may still be an underestimate in some years.

BACK CALCULATION FROM PRODUCTION RECORDS

Conversion factors to estimate round herring weight for each product type were obtained from Scotia-Fundy industry sources by interview (Table 2). Annual summaries of domestic production by product type were obtained from DFO Statistics Division, Halifax. Round fish weight was estimated by applying conversion factors to those products which were not considered to be byproducts (i.e. meal, oil, bits and pieces). Individual product information which formed the basis for conversion calculations is considered confidential, but the annual summaries are documented in Table 3.

ESTIMATES OF TOTAL HERRING LANDINGS

Revised purse seine landings were combined with landings for other geartypes (from annual assessment documents) to calculate "interview revised" stock and 4WX totals (Table 4). The impact of this revision on "stock" and total landings is shown in Table 5.

Estimates from Domestic production (Table 3) were added to OSS landings and corrected for herring transported between regions to estimate total annual herring utilization in processing (Table 6).

Comparison of interview revised landings and estimates from production analysis ("Production revised") (Fig 1) demonstrates that landings have been substantially different than recorded. Although there are substantial differences in some years, the two series are remarkably similar - considering the situation and assumptions involved. It is difficult to choose between the two series. The interview-based revision is the most thorough of its type ever conducted on this fishery, but is still considered to be an underestimate in at least some years. The estimate

from production (production revised) contains a number of potential problems (including the use of averages of conversion values known to be variable), but it is an ongoing series which should be free of misreporting. In addition, there is now a question of the comparability of the 1985-1991 revision with the previous modification for the years 1973-1984, and with the most recent, uncorrected year. These questions are being investigated further.

ACKNOWLEDGMENTS

I am especially grateful to members of the purse seine and processor sectors of the Scotia-Fundy Region herring industry for their frank and open discussions and for providing summaries of personal records during this survey. I also thank my DFO colleagues from Scotia-Fundy Region's Statistics Division and the Quota Monitoring Unit for providing numerous reports.

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Table 1. Revision of 4WX herring purse seine landings from a vessel survey undertaken in January-April 1992. Revised annual purse seine landings were calculated as:

$$\frac{\text{Total landings from } n \text{ surveyed vessels}}{\text{Statistics totals for those same } n \text{ vessels}} \times \text{Stats total for the year} = \text{Revised total for year (mt)}$$

Year	No. vessels (n)	Survey total for n vessels	Stats total for n vessels	Ratio: <u>survey</u> stats	Stats total for quota year	Revised total for quota year
1985	25	79,304	59,245	1.34	92,295	123,544
1986	32	100,995	53,621	1.88	68,217	128,487
1987	33	114,624	76,937	1.49	91,537	136,376
1988	34	143,847	98,594	1.46	114,377	166,874
1989	34	118,660	73,684	1.61	82,108	132,226
1990	36	142,590	85,214	1.67	96,499	161,473
1991	35	120,362	80,611*	1.49	92,431*	138,011

*Quota monitoring data used for 1991.

Table 2. Conversions to round herring weight from various finished products - from Scotia-Fundy herring industry sources; 1991/92.

PRODUCT	CONVERSION
Fresh or frozen:	
Round, whole	1.0
Bait	1.0
Animal feed	1.0
Dressed; head on	1.2
Knobbed; guts in, head off	1.3 (1.25-1.3)
Dressed; head off	1.7
Smoked kippers	2.5
Fillets; butterfly	2.7 (2.2-3.3)
Fillets; boneless	2.7
Fillets; skin off	3.0 (estimate)
Roe	20.0 (17.0-20.0)
Milt	20.0
Canned:	
Ovals	2.0
Sardines; regular can	3.0 (2.5-6.1)
Steaks	3.0
Sardines; deep can	3.2
Fillets; snacks	3.2
Centre cut	3.3
Sardine; two fish	3.4
Cures and others:	
Salted bait	1.1
Salted barrel	1.1 (STACAC=1.5)
Pickled dressed/split	1.9
Pickled fillets	2.7
Vinegar cured fillets; skin off	2.7?
Bloaters	2.5
Boneless smoked	4.0
Meal	5.0

Table 3. Scotia-Fundy Region herring production conversion to round herring equivalent. Production figures are from DFO Statistics Division.

Year	Round equivalence (mt)
1985	175,730
1986	123,022
1987	166,635
1988	207,479
1989	110,763
1990	187,851
1991	133,632
1992	152,811

Table 4. Calculation of "Interview" revised "stock" and revised total 4WX herring landings after revision of purse seine figures. 'Revised purse seine' totals are from survey results (Table 1); totals for other gear types are from assessment documents (Stephenson et al. 1986, 1987, 1988, 1989, 1990, 1992, 1992).

Year	"STOCK"				REVISED STOCK TOTAL	"NON-STOCK"		INTERVIEW REVISED 4WX TOTAL
	Revised purse seine	Gillnet	4Xr weir + trap	4Xs midwater trawl		4Xs weir + shutoff	4WX misc.	
1985	123,544	5584	5366	98	134,602	27,863	1612	164,077
1986	128,487	3533	2254	28	134,302	27,886	268	162,456
1987	136,376	2289	7226	17	145,908	27,320	959	174,187
1988	166,874	695	8802	406	176,777	33,421	1785	211,983
1989	132,226	95	3430	783	136,534	44,112	839	181,485
1990	161,473	243	4232	871	166,819	38,778	715	206,312
1991	138,011	538	1555	5	140,109	24,576	1391	166,076

Table 5. Influence of the "Interview" revised purse seine figures (from survey; Table 1) on 4WX "stock" and total landings data ('000 t).

	Stock			Total		
Year	Revised	Nominal	<u>Revised</u> <u>Nominal</u>	Revised	Nominal	<u>Revised</u> <u>Nominal</u>
1985	134.6	112.4	1.20	164.1	141.9	1.16
1986	134.3	73.7	1.82	162.5	101.8	1.60
1987	145.9	101.2	1.44	174.2	130.2	1.34
1988	176.8	124.7	1.42	212.0	159.9	1.33
1989	136.5	84.5	1.62	181.5	129.4	1.40
1990	166.8	101.9	1.64	206.3	141.4	1.46
1991	140.1	97.0	1.44	166.1	121.6	1.37

Table 6. Estimates of 4WX herring landings from production and transfers, 1985-91 ('000 t) (product revised).

Year	Estimate from domestic production (S-F Region) ¹	+	OSS ²	+	Estimate tracked to Gulf Region	-	Estimate of fish acquired from other regions	=	Estimated 4WX landings (total)	-	Nonstock plus misc. ³	=	Stock estimated from production
1985	175.7		12.8		7.0		1.0		194.5		29.5		165.0
1986	123.0		3.2		7.0		5.0		128.2		28.2		100.0
1987	166.6		6.8		7.0		5.0		175.4		28.3		147.1
1988	207.5		26.3		7.0		6.0		234.8		35.2		199.6
1989	110.8		33.7		5.0		7.0		142.5		45.0		97.5
1990	187.9		24.5		5.0		5.0		212.4		39.5		172.9
1991	133.6		23.2		5.0		5.0		156.8		26.0		130.8
1992	152.8		15.5		5.0		5.0		168.3		32.3		136.0

¹From Table 3.

²From DFO Scotia-Fundy Region Quota Monitoring Unit.

³N.B. weir + shutoff + 4WX misc.

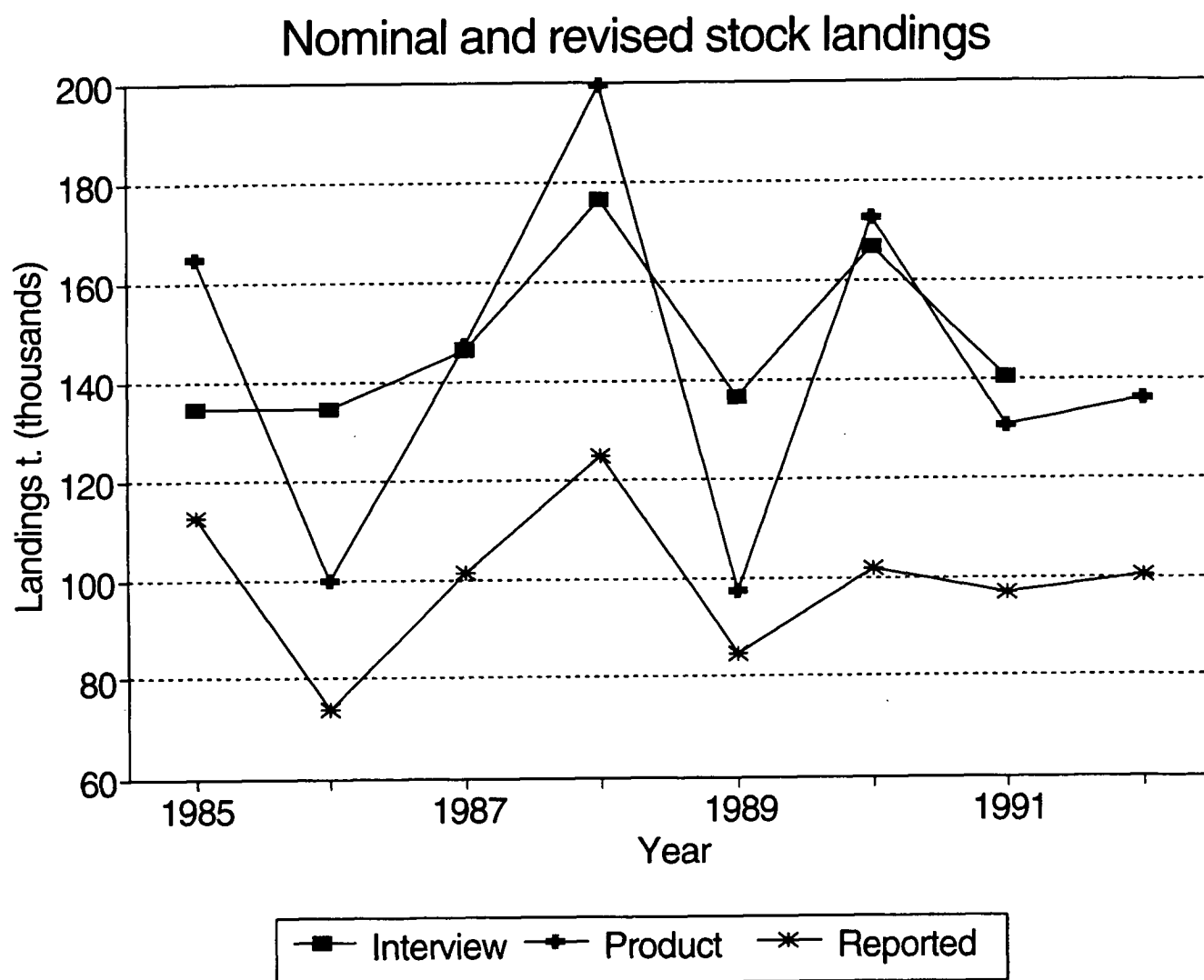


Fig. 1 . Comparison of interview and product revised estimated stock landings with nominal (reported) landings - 1985 to 1992.