



Serial No. N4114

NAFO SCR Doc. 99/55

SCIENTIFIC COUNCIL MEETING – JUNE 1999

Results of a 1998 Canadian Industry Survey for American plaice in NAFO Divisions 3LNO
with Comparisons to Results from the Canadian Fall DFO Survey

by

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Abstract

In the fall of 1998, an industry-sponsored survey was conducted for American plaice in NAFO Division 3LNO. The survey used a stratified random design with sets allocated based on area and American plaice abundance. To date, final information on wingspread and tow spread is not available so estimates of abundance and biomass cannot be calculated. Nonetheless, current information from the surveys is useful input in evaluation of this resource. The industry survey and the Canadian fall survey conducted by the Department of Fisheries and Oceans showed similar distribution of American plaice with fish being widely distributed throughout Div. 3LNO but most abundant in southern and southwestern 3NO. Comparisons of sets made at the same locations in the two surveys showed that there were not consistent results with regard to sizes of fish caught.

Introduction

Directed fisheries for American plaice in NAFO divisions 3LNO have not been permitted since 1994 due to the low stock size relative to its biomass during earlier periods. During the same period, directed fisheries for yellowtail flounder were also closed in this area. However, the yellowtail flounder fishery was re-opened in 1998 with a quota of 4,000 t, and the quota was increased to 6,000 t for 1999.

Canadian industry traditionally prosecuted a mixed fishery for yellowtail flounder and American plaice in 3LNO, most particularly in the 3NO area. Therefore, while the re-opening of the yellowtail fishery was good news, the mixed species nature of the fishery presented severe by-catch restrictions in light of the continued moratorium on American plaice.

In 1998, Canadian industry expressed interest in assisting the Department of Fisheries and Oceans in collecting additional information on the status of the American plaice resource in divisions 3LNO. As part of this exercise, Fishery Products International made resources available such that an industry survey was conducted in the area during the fall of 1998.

This paper presents preliminary results of that survey as well as comparisons with the results of the DFO survey conducted at approximately the same time.

Materials and Methods

The FPI survey was conducted following a stratified random design. Sets were allocated based on area and American plaice abundance. Existing depth strata (see Morgan et al. 1999 for stratification map) were assigned to high and low American plaice abundance based on where FPI vessels prosecuted the American plaice fishery in the past. High abundance strata were surveyed at approximately 1 set per 250 sq. nautical miles while low abundance strata were surveyed at approximately 1 set per 500 sq. nautical miles. All strata had at least 2 sets. Low abundance strata were 3L: 328, 341-346; 3N: 360-362, 374-376; 3O: 329, 331, 338, 351-353. All others were high abundance strata. In total 63 sets were allocated to low strata and 233 to high abundance strata. All strata in Div. 3LNO (except inshore Div. 3L) down to 731 m were to be surveyed.

The survey was carried out using two sister ships, the *Atlantic Olga*, and the *Atlantic Claire*. The gear employed by both was an Engel trawl with wingspread of 56.3 feet (measured by SCANMAR) and 130 mm diamond mesh in the codend (i.e. unlined). Tow speed was planned at 3.0 knots with set duration being 30 minutes. Fishing was conducted according to the standard protocol given in Appendix I. Catches were sorted on board and weighed, and length measurements of American plaice taken. Otoliths were not collected during these surveys. Instead, age-length keys derived from sampling during the DFO survey were applied in order to determine the numbers-at-age.

To date, final information on wingspread and tow spread is not available so estimates of abundance and biomass cannot be calculated. Nonetheless, some information from the surveys is useful input in evaluation of this resource. Therefore, analyses of the stratified data employing the usual methods in order to determine biomass and abundance in total and by division are not yet possible.

Because it is of interest to gain insights into the relative catchabilities of the commercial Engel trawl used by FPI and the Campelen trawl used by DFO, 20 locations were identified for extra sets during the FPI survey so as to allow comparisons of catches made at the same location during the DFO survey. It should be noted that the time of fishing at these same locations was different and separated by numbers of days or even weeks. Total catches made by each vessel/gear at each common location were compared. In addition, the mean weight of individual fish caught by each vessel/gear at each location was calculated (total weight/total numbers) in order to allow for comparison of fish size in the catches.

Results

Fishing sets were distributed throughout the 3LNO area (Figure 1). In division 3L, catches were widely distributed but small, although larger catches generally occurred in the deeper areas. Distributions of catches in 3N and 3O also tended to be greater along the edge although large catches also occurred in shallower areas of 3O. Clearly, the largest catches overall, were in 3O. The fall survey conducted by DFO in 1998 also showed that American plaice were widely distributed with largest catches occurring in southern 3NO (Morgan et al. 1999).

Stratum/depth summaries by Division (Tables 1, 2, and 3) also indicate the largest catches in the deeper strata in Division 3L, whereas in 3N while the overall tendency was for larger catches in deeper waters, the largest catches were in 183-274 fathoms. In Division 3O, the largest catches were generally in the shallower strata.

Sixteen of 20 locations identified for comparisons were fished during the FPI survey. Results (Figure 2) were quite variable. Sometimes the DFO gear caught a higher weight of fish than FPI gear, but sometimes it was the other way round. In terms of mean weight of the individual fish in the catches, fish, for 3 sets the Campelen had a higher mean fish weight while for 5 sets the Engel had a higher mean fish weight. Many of the differences were small. This suggests that there was no consistent difference in the size of fish caught by the two different gears

Conclusions

Both the industry and DFO surveys showed similar distribution of American plaice. The industry survey is conducted without a liner in the codend, and therefore gives information on the exploitable portion of the stock. The comparisons of sets conducted in the same location do not indicate a consistent difference between the surveys in either the catches or the sizes of fish taken. Additional comparative fishing work would be required to resolve the apparent differences.

References

- Brodie, W.B., D. Maddock Parsons, D. McFadden, D. Orr, and S.J. Walsh. 1998. Results of surveys directed at yellowtail flounder in NAFO Divisions 3NO, conducted on a Canadian commercial trawler, 1996-1998. NAFO SCR Doc. 98/73, 34 p.
- Morgan, M.J., W.B. Brodie, and W.R. Bowering. 1999. An assessment of American plaice in NAFO Divisions 3LNO. NAFO SCR Doc. 99/40. 55p.

Table 1a: Summary of catch numbers by depth and stratum in Division 3L from industry survey.

STRATUM	DEPTH METERS	NO. SETS	STRATUM TOTAL	AV./SET
350	91	7	9.00	1.29
363	91	4	21.00	5.25
371	91	3	6.00	2.00
372	91	8	43.00	5.38
384	91	3	21.00	7.00
341	183	2	8.00	4.00
342	183	2	1.00	0.50
343	183	2	5.00	2.50
348	183	6	18.00	3.00
349	183	8	16.00	2.00
364	183	10	38.00	3.80
365	183	3	28.00	9.33
370	183	2	23.00	11.50
385	183	6	46.00	7.67
390	183	5	19.00	3.80
347	274	2	5.00	2.50
344	274	2	3.00	1.50
386	274	3	23.00	7.67
389	274	2	19.00	9.50
391	274	2	30.00	15.00
345	366	3	12.31	4.10
346	366	2	53.00	26.50
387	366	2	36.00	18.00
388	366	2	27.00	13.50
392	366	2	18.00	9.00
366	374	4	7.00	1.75
369	374	3	21.00	7.00
729	549	2	80.00	40.00
731	549	2	137.00	68.50
733	549	2	22.00	11.00
735	549	2	60.00	30.00
730	731	2	143.00	71.50
732	731	2	31.00	15.50
734	731	2	157.00	78.50
736	731	2	9.00	4.50

Table 1b: Summary of catch weight by depth and stratum in Division 3L from industry survey.

STRATUM	DEPTH METERS	NO. SETS	STRATUM TOTAL	AV./SET
350	91	7	5.50	0.79
363	91	4	12.00	3.00
371	91	3	2.00	0.67
372	91	8	31.00	3.88
384	91	3	12.00	4.00
341	183	2	2.20	1.10
342	183	2	0.07	0.04
343	183	2	0.45	0.23
348	183	6	3.69	0.62
349	183	8	11.40	1.43
364	183	10	12.65	1.27
365	183	3	9.98	3.33
370	183	2	6.45	3.23
385	183	6	22.50	3.75
390	183	5	8.50	1.70
347	274	2	0.90	0.45
344	274	2	1.61	0.81
386	274	3	7.50	2.50
389	274	2	8.00	4.00
391	274	2	15.50	7.75
345	366	3	3.24	1.08
346	366	2	16.81	8.41
387	366	2	15.00	7.50
388	366	2	12.00	6.00
392	366	2	8.00	4.00
366	374	4	3.31	0.83
369	374	3	7.49	2.50
729	549	2	32.00	16.00
731	549	2	55.50	27.75
733	549	2	9.50	4.75
735	549	2	19.08	9.54
730	731	2	83.00	41.50
732	731	2	19.00	9.50
734	731	2	69.50	34.75
736	731	2	4.09	2.05

Table 2a: Summary of catch numbers by depth and stratum in Division 3N from industry survey.

STRATUM	DEPTH	NO. SETS	STRATUM	AV./SET
	METERS		TOTAL	
375	55	3	40.00	13.33
376	55	2	121.00	60.50
360	91	4	556.00	139.00
361	91	3	104.00	34.67
362	91	3	63.00	21.00
373	91	9	93.00	10.33
374	91	2	30.00	15.00
383	91	3	32.00	10.67
359	183	2	2,166.00	1,083.00
377	183	2	2,316.00	1,158.00
382	183	3	344.00	114.67
358	274	2	197.00	98.50
378	274	2	205.00	102.50
381	274	2	190.00	95.00
357	366	3	194.00	64.67
379	366	3	132.69	44.23
380	366	2	188.00	94.00
723	549	2	46.00	23.00
725	549	3	140.00	46.67
727	549	2	929.00	464.50
728	731	2	592.00	296.00

Table 2b: Summary of catch weight by depth and stratum in Division 3N from industry survey.

STRATUM	DEPTH	NO. SETS	STRATUM	AV./SET
	METERS		TOTAL	
375	55	3	23.13	7.71
376	55	2	102.51	51.26
360	91	4	399.77	99.94
361	91	3	75.30	25.10
362	91	3	39.02	13.01
373	91	9	51.48	5.72
374	91	2	20.41	10.21
383	91	3	18.15	6.05
359	183	2	1,516.18	758.09
377	183	2	1,597.12	798.56
382	183	3	177.81	59.27
358	274	2	218.18	109.09
378	274	2	115.66	57.83
381	274	2	88.45	44.23
357	366	3	99.06	33.02
379	366	3	61.46	20.49
380	366	2	95.71	47.86
723	549	2	24.49	12.25
725	549	3	72.57	24.19
727	549	2	453.59	226.80
728	731	2	300.28	150.14

Table 3a: Summary of catch numbers by depth and stratum in Division 3O from industry survey.

STRATUM	DEPTH	NO. SETS	STRATUM	
	METERS		TOTAL	AV./SET
330	91	10	1,269.00	126.90
331	91	2	154.00	77.00
338	91	3	288.00	96.00
340	91	6	31.00	5.17
352	91	5	487.00	97.40
353	91	3	456.00	152.00
329	183	4	240.00	60.00
332	183	4	492.00	123.00
337	183	4	212.00	53.00
339	183	2	51.00	25.50
354	183	2	3,966.00	1,983.00
333	274	3	23.00	7.67
336	274	2	39.00	19.50
355	274	2	3,679.00	1,839.50
334	366	3	11.00	3.67
335	366	2	4.62	2.31
356	366	2	152.00	76.00
717	549	3	56.77	18.92
719	549	2	2.00	1.00
718	731	2	2.00	1.00

Table 3b: Summary of catch weight by depth and stratum in Division 3O from industry survey.

STRATUM	DEPTH	NO. SETS	STRATUM	
	METERS		TOTAL	AV./SET
330	91	10	837.20	83.72
331	91	2	95.45	47.73
338	91	3	211.82	70.61
340	91	6	18.18	3.03
352	91	5	346.82	69.36
353	91	3	336.81	112.27
329	183	4	110.62	27.66
332	183	4	399.09	99.77
337	183	4	158.18	39.55
339	183	2	17.73	8.87
354	183	2	3,296.16	1,648.08
333	274	3	10.45	3.48
336	274	2	26.81	13.41
355	274	2	2,618.14	1,309.07
334	366	3	7.72	2.57
335	366	2	2.10	1.05
356	366	2	121.36	60.68
717	549	3	42.67	14.22
719	549	2	1.82	0.91
718	731	2	0.45	0.23

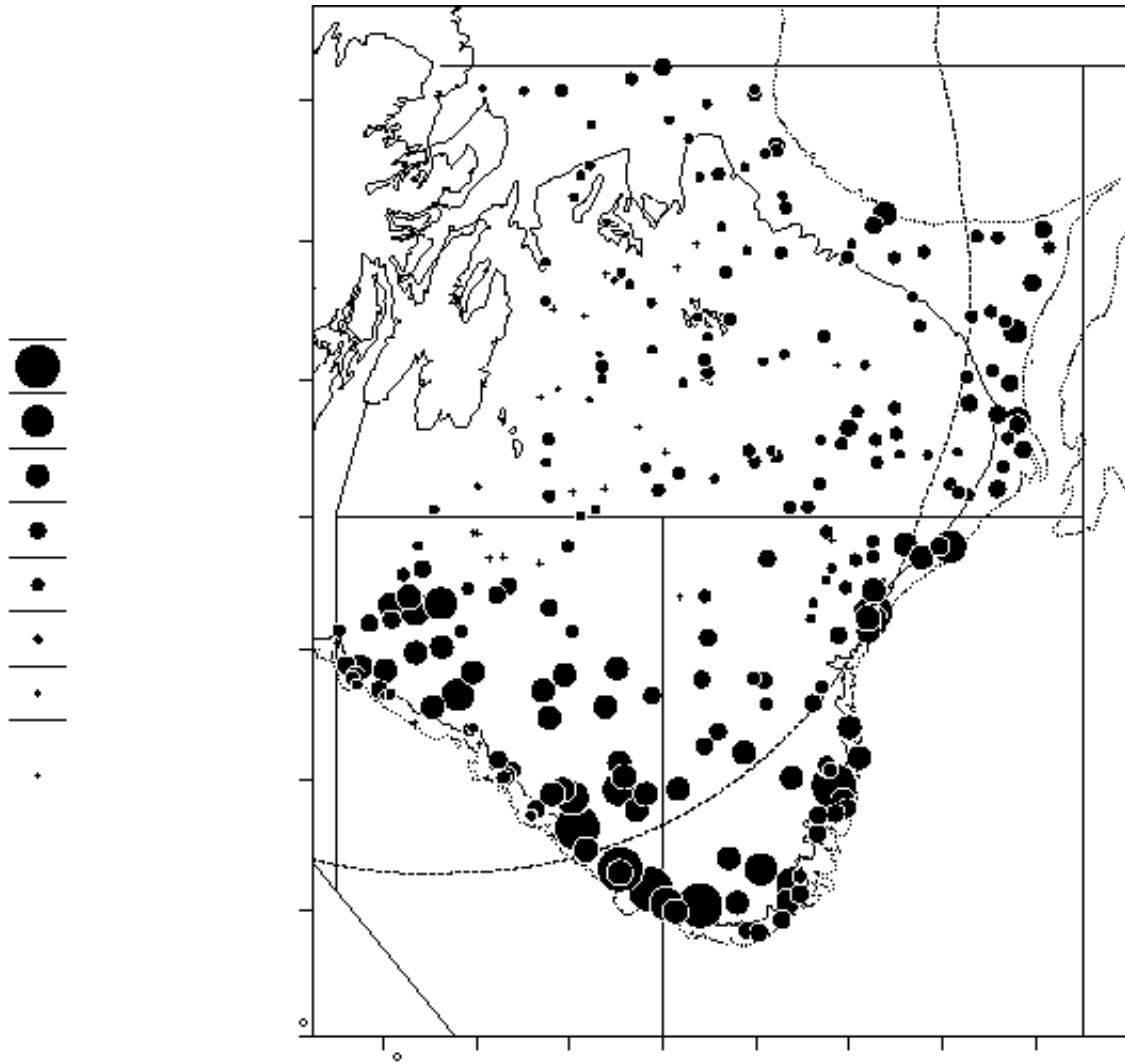


Figure 1: Distribution of catches of American plaice during industry survey in Divisions 3LNO.

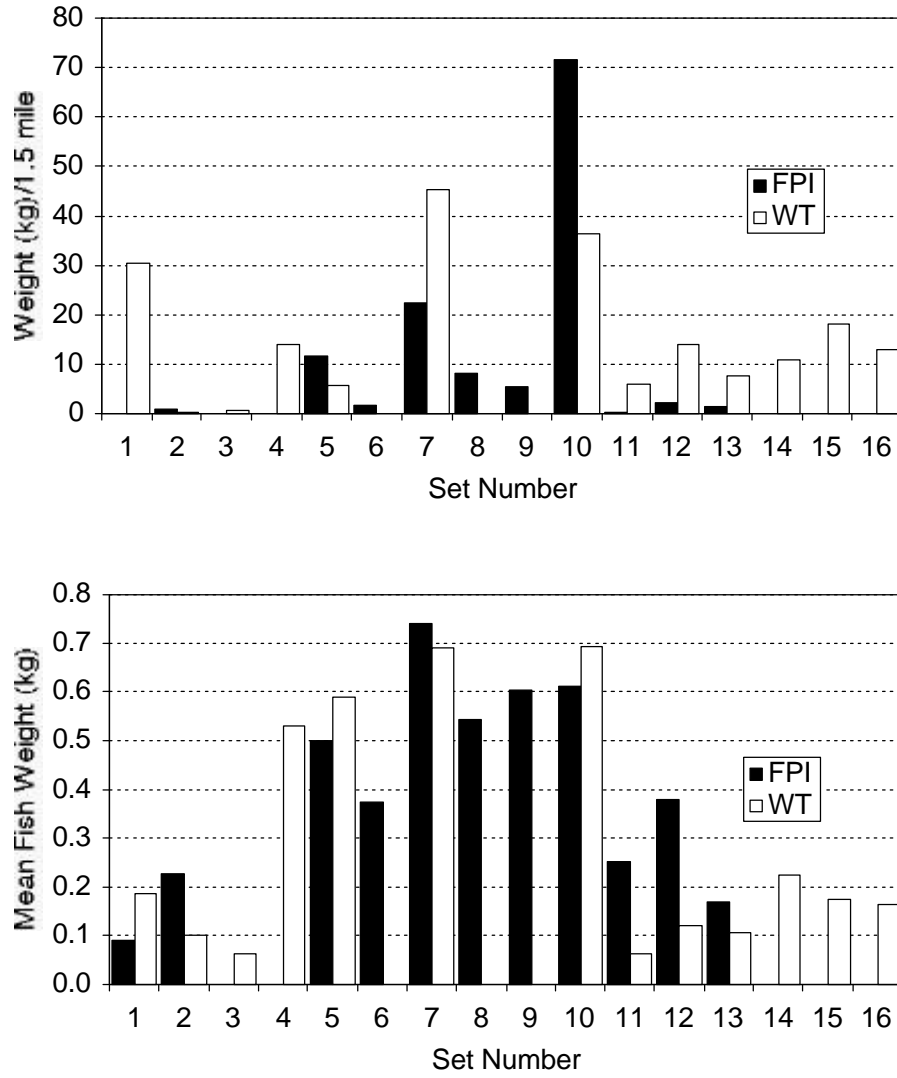


Figure 2: Comparison of industry and DFO catches of American plaice at selected comparative fishing locations in 3LNO, showing mean catch weight (top) and mean fish weight (bottom).

APPENDIX I**Standardization of Survey Procedures**

1. Measure survey gear
 - before leaving port or before first fishing set of trip
 - after every major tear up
 - ensure measurements remain the same throughout the trip and between trips
2. Scope ratio
 - strict adherence to scope ratio
 - if a particular ratio is unacceptable, replace it with an acceptable one, but then stay with that one for all sets in that depth from then on.
3. Speed of tow
 - standard speed – always use GPS
 - bridge officer to record actual speed every 5 minutes
4. Duration of tow
 - 30 minutes, record actual value in set details
 - bottom contact determined by SCANMAR – bridge officer to record start and end times, as well as sink time in log
 - power lift off around 29 minute mark (varies with depth)
 - for tows where SCANMAR signals not received, use sink times from previous tows in similar depths to estimate bottom contact
5. Direction of tow
 - towards next station when possible
 - along contour on slope
 - in high winds tow is made with or against the wind
 - in high cross currents, alter course to tow into or with the current
6. Untrawlable bottom
 - search for good bottom, if unavailable use alternate tow
 - if untrawlable areas are known prior to survey, exclude from selection
7. Gear damage and repeat criteria
 - tows less than 20 minutes are to be considered unsuccessful and should be repeated
 - severe damage to large sections of lower wings, bellies and codends
 - broken bridles, groundropes and footgear
 - two or more tears comprising 20% of the meshes in that panel
 - anything that impairs the fishing efficiency of the trawl
 - no SCANMAR sensors working at the beginning – usually indicates foul gear
8. Selection of starting position
 - one mile from station – shoot towards station
 - take depth contours into account so that entire tow is in the appropriate depth range