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Comparison of Division 4VWX Silver Hake Catch Rates
from the Scotian Shelf Small Meshed Fishery

by

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INTRODUCTION

National catch and effort statistics from the Scotian Shelf silver hake fishery are compiled by NAFO from monthly and yearly reports submitted by each country. Since 1977 Canada has been actively involved in the management of the Scotian Shelf silver hake fishery. In order to meet its mandate, Canada compiles catch and effort data from weekly reports made by each nation licensed to fish on the Scotian Shelf. Further, Canada maintains an observer program which, among other activities, provides Canada with observed catch and effort estimates from these same fleets. Over the last 9 years, observer coverage by fleet has been 40% of the reported catch.

Often effort data are not available in time for the assessment of the silver hake stock in the most recent year. It would be most convenient if observed catch rates were in agreement with catch and effort subsequently reported to NAFO. This would permit the use of observed data for the catch rate in the most recent year. The agreement between observed and reported catch and effort statistics is the subject of this note.

MATERIALS AND METHODS

Directed monthly catch and associated effort data for the Soviet silver hake fishery from 1977 to 1985 were obtained from NAFO and the Canadian International Observer Program (IOP). In 1977 and again in 1978 the Soviet Union reported monthly catch and effort from mixed fisheries. In these cases directed catch was defined when silver hake constituted greater than 50% of the monthly reported catch. Since 1979 the Soviet Union has reported monthly directed silver hake catch. Observed catch data were classed as directed when greater than 50% of the observed daily catch for the IOP data. There are minor discrepancies in reported and observed catch by area. This study used monthly catch and effort only when both observed and reported data were available (Table 1).

A least squares regression was used to describe the relationship between IOP and NAFO catch rates (t/hr). The data were not transformed.

RESULTS AND DISCUSSION

The model results are presented in Table 2. There is a significant relationship of observed and reported catch rates (Figure 1). The model fit is highly significant and the slope is very close to 1 with an intercept of .01. Such a result is expected if there is good agreement between both variables.

The residual plot is presented in Figure 2 and suggests that the 1982 point may influence the slope of the line. Figure 3 shows the 95% confidence intervals for the model. Figure 4 is the same plot except that the 1982 point (circled) has been removed from the model. The 1982 point has little influence on the model.

The model's significant fit indicates that IOP data with coverage levels around 40% provides sufficient data to predict the catch rates reported by the Soviet fleet. In 1985 the observed catch from the Soviet fleet represented 38% of the reported catch (Waldron and Fanning, 1986). Therefore the use of 1985 IOP catch rates will be representative of the reported catch rates.

The close agreement between these two data sets provides fishery scientists with a useful tool for subsequent studies of this fishery. In future analysis the recent years IOP catch rates can be conveniently used in a subsequent multiplicative model for catch rate standardization.

REFERENCES

- Waldron, D. E. and P. Fanning. 1986. Assessment of the Scotian Shelf silver hake population in 1985. NAFO SCR Doc. 86/62. 29p.

Table 1. Catch and Effort from NAFO and IOP for 4VMX Silver Hake

Year	Area	Month	IOP			NAFO		
			Catch	Effort	CPUE	Catch	Effort	CPUE
77	460	6	24	13	1.85	1820	902	2.02
77	460	7	462	261	1.77	8723	4378	1.99
77	460	8	790	796	.99	2494	1231	2.03
77	460	9	225	128	1.76	695	460	1.51
78	450	6	1380	502	2.75	1706	705	2.42
78	460	4	527	411	1.28	2118	1498	1.41
78	460	5	1546	989	1.56	6765	5801	1.17
78	460	6	2562	1942	1.32	8731	7138	1.22
78	460	7	2411	1528	1.58	10258	7154	1.43
78	460	8	3227	1406	2.30	7410	3437	2.16
78	470	5	42	40	1.05	175	128	1.37
78	470	6	73	38	1.92	1137	687	1.66
78	470	7	40	26	1.54	67	64	1.05
79	460	5	3231	1605	2.01	12078	6479	1.86
79	460	6	6472	3326	1.95	14862	8314	1.79
79	460	7	4051	1868	2.17	11521	5816	1.98
79	460	8	514	404	1.27	2528	1742	1.45
79	470	5	115	94	1.22	854	530	1.61
79	470	6	123	140	.88	221	205	1.08
80	460	4	640	533	1.20	1531	1176	1.30
80	460	5	5406	5578	.97	9033	7902	1.14
80	460	6	6949	7610	.91	11333	9056	1.25
80	460	7	4187	2353	1.78	9018	7083	1.27
80	460	8	521	676	.77	3665	5683	.64
80	470	5	127	103	1.23	168	118	1.42
80	470	6	1256	715	1.76	1639	906	1.81
80	470	7	1441	1027	1.40	4494	2725	1.65
80	470	8	65	98	.66	66	113	.58
81	460	4	412	282	1.46	601	490	1.23
81	460	5	7738	4019	1.93	13317	6091	2.19
81	460	6	3477	3045	1.14	11804	8717	1.35
81	460	7	4310	2273	1.90	9940	7100	1.40
81	460	8	161	103	1.56	763	543	1.41
81	470	6	91	76	1.20	220	192	1.15
82	460	4	1628	293	5.56	2165	386	5.61
82	460	5	8187	1818	4.50	16644	3895	4.27
82	460	6	4935	1178	4.19	20985	5441	3.86
82	460	7	1838	722	2.55	6653	2348	2.83
83	460	4	1170	472	2.48	5134	1726	2.97
83	460	5	4509	2130	2.12	13127	6030	2.18
83	460	6	1874	1345	1.39	7110	4935	1.44
84	460	5	6109	1420	4.30	15732	3794	4.15
84	460	6	5390	2004	2.69	17276	7077	2.44

Table 2. Regression of monthly IOP CPUE (t/hr) on monthly NAFO reported CPUE (t/hr).

Parameter	Estimate	Standard Error	T Value	Prob. Level
Intercept	9.65955E-3	0.0986771	0.0978904	0.922485
Slope	0.996376	0.046306	21.5172	0

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio
Model	42.14274	1	42.14274	462.99155
Error	3.822954	42	.091023	

Total (Corr.) 45.965698 43

Correlation Coefficient = 0.957513
Std. Error of Est. = 0.3017

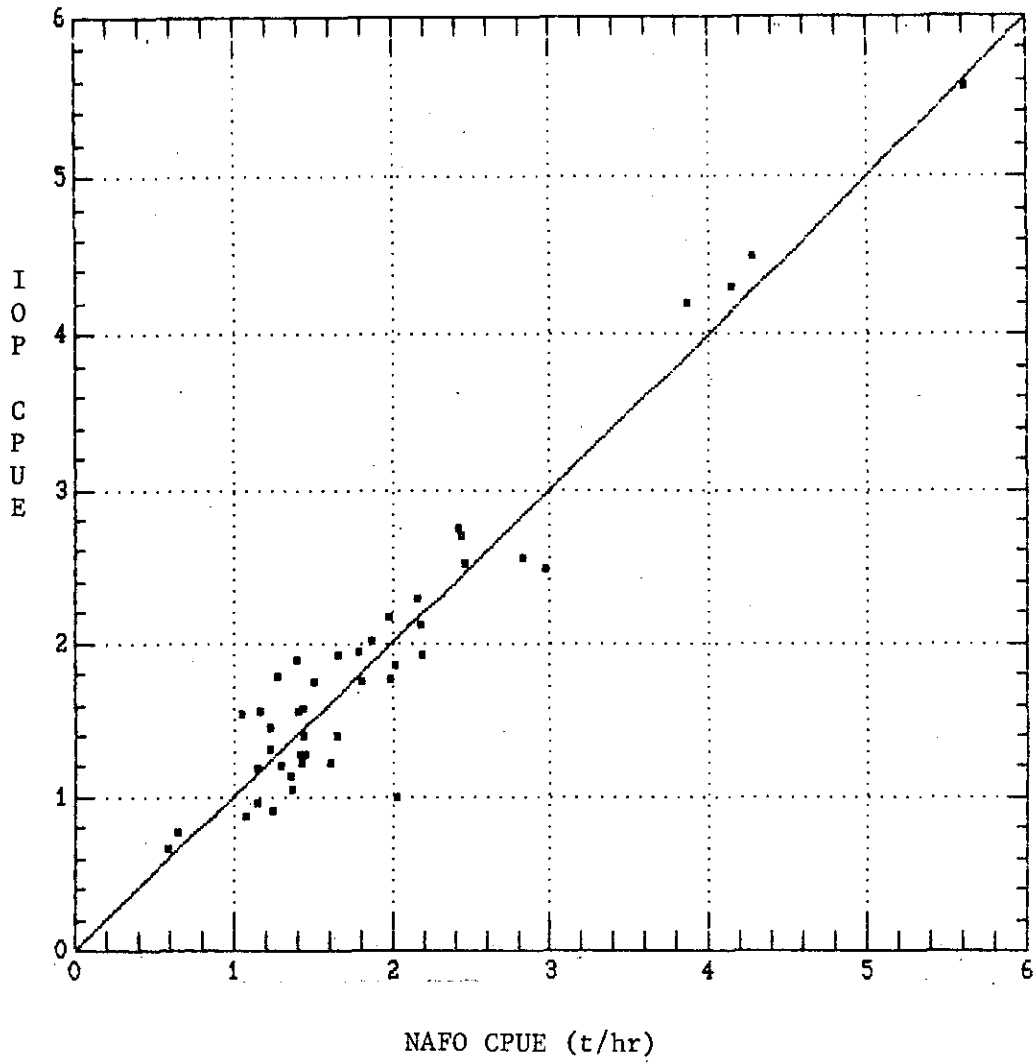


Figure 1. 4VWX silver hake monthly CPUE from IOP and NAFO during the period 1977-1984.

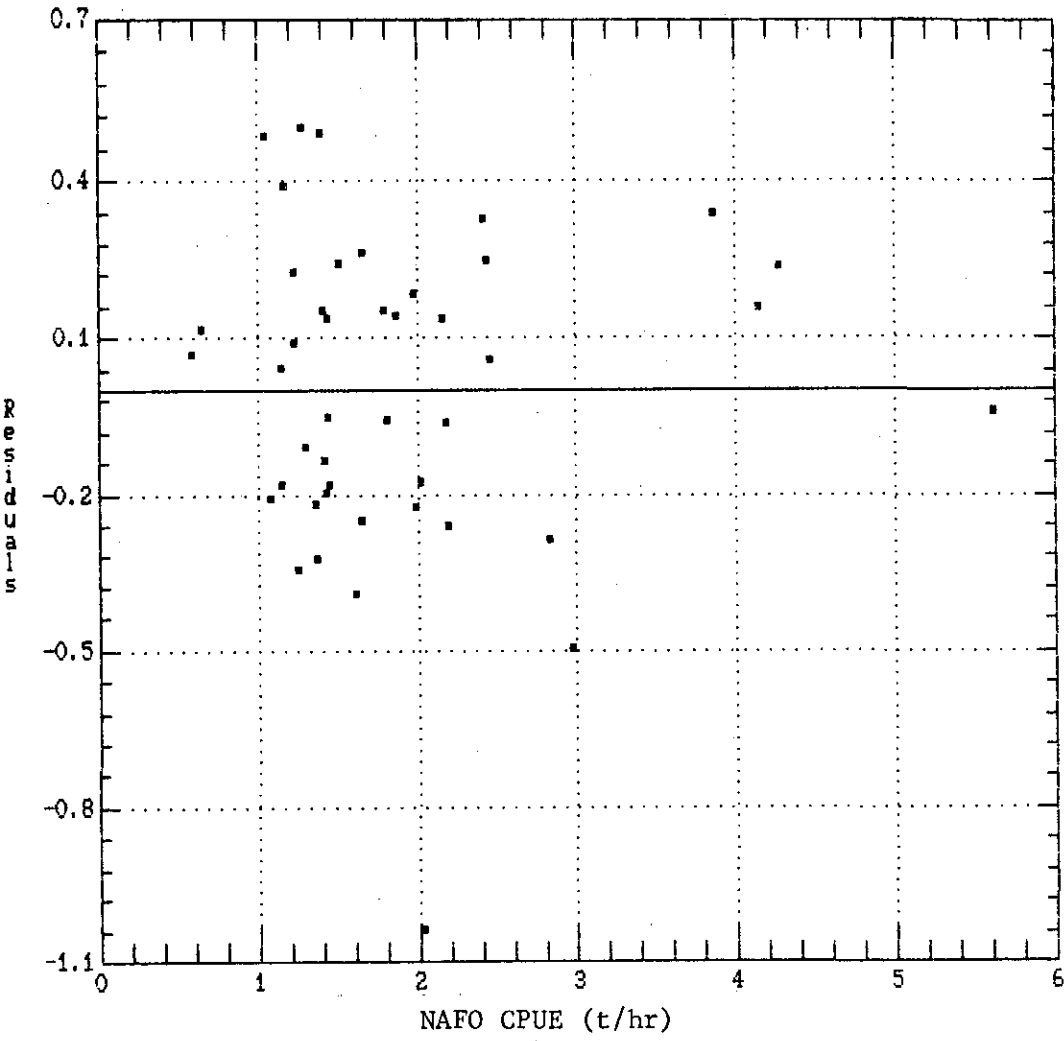
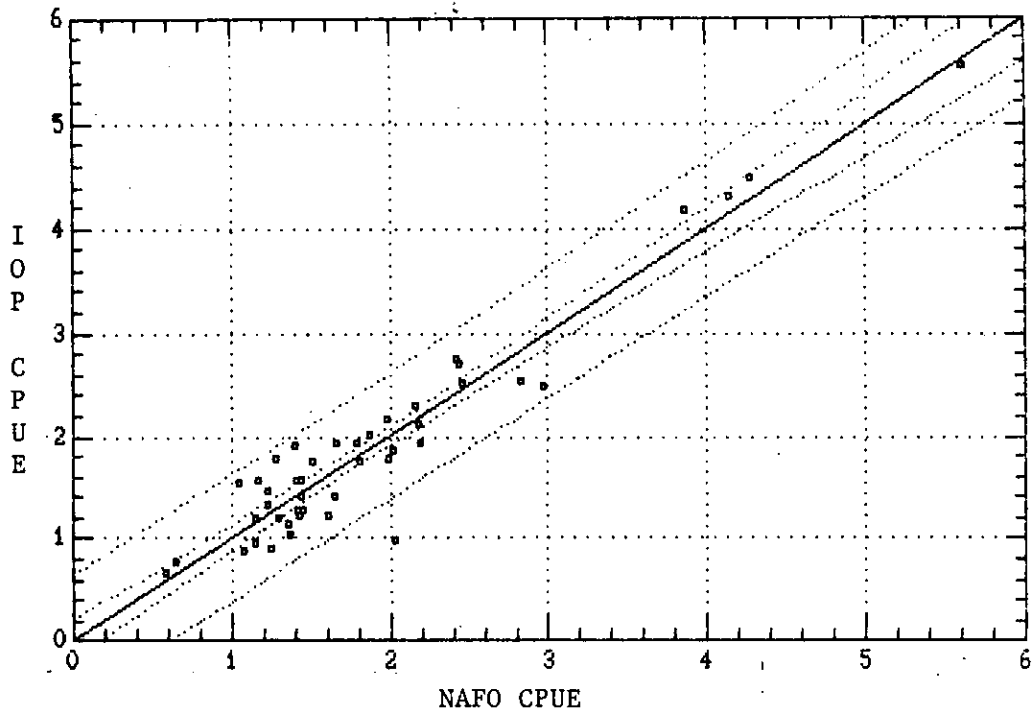
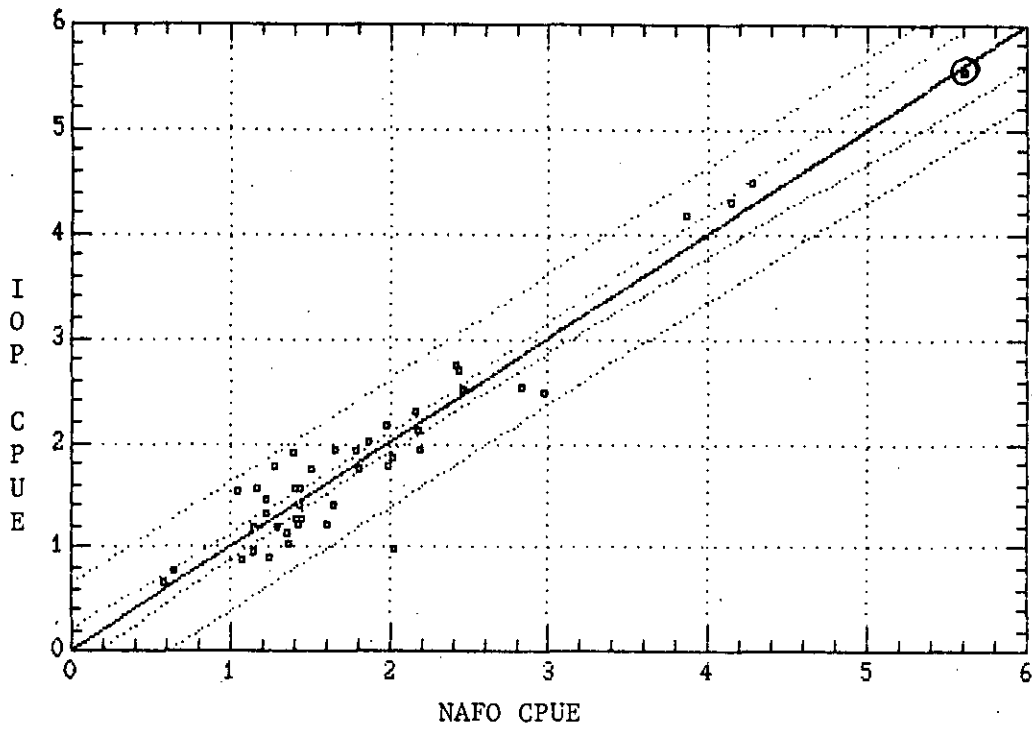


Figure 2. Residuals (observed-predicted) from regression of silver hake monthly from observed CPUE against NAFO reported CPUE.



BO: 9.6595E-3 SE: 0.098677 T: 0.09789
B1: 0.99638 SE: 0.046306 T: 21.517
CORR: 0.95751 MSE: 0.091023 DF: 42
POINTS DELETED:

Figure 3. Regression of IOP against NAFO monthly CPUE (t/hr) for 4VWX silver hake. Plot shows 95% confidence intervals for the mean response at a given value of IOPCPUE (tighter bounds) and for new observations (outer bounds).



BO: 4.8766E-4 SE: 0.11352 T: 4.2957E-3
B1: 1.002 SE: 0.057373 T: 17.465
CORR: 0.93889 MSE: 0.093177 DF: 41
POINTS DELETED: 35

Figure 4. Regression of IOP against NAFO monthly 4VWX silver hake CPUE (t/hr). Line fit after removal of largest data point (circled).