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Problems in the Collection of Catch and Effort
Data from the Newfoundland Fixed Gear Herring
Fishery - A Biologist's Perspective

by

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Abstract

As part of the continuing assessment of Newfoundland herring stocks, two programs were established in 1979-80 to determine catch per unit of effort for the gillnet component of the commercial fishery. Purchase slips were examined on an annual basis and catch rates were calculated, by stock area, both for fishermen consistent over a three to five year period and for all fishermen each year. A research gillnet program was also established to obtain CPUE independent of the commercial fishery. Selected fishermen in each stock area were contracted, on an annual basis, to fish a fleet of five gillnets, record daily catch rates and to collect samples from their catch. The results of these programs are discussed in relation to problems that have been encountered and improvements required for the future.

Résumé

En 1979-80 on mettait sur pied deux programmes dans le cadre de l'évaluation continue des stocks de harengs de Terre-Neuve, dans le but de déterminer les prises par unité d'effort de la composante filets maillants de la pêche commerciale. Les bordereaux de débarquements ont été examinés sur une base annuelle et les taux de capture calculés, par unité de stock, pour les pêcheurs qui ont pêché de manière uniforme pendant des périodes de trois à cinq ans et les pêcheurs qui ont pêché chaque année. On a également établi un programme de recherche avec filets maillants afin de déterminer les PUE indépendamment de la pêche commerciale. Un certain nombre de pêcheurs dans chaque zone furent engagés par contrat sur base annuelle pour tendre un jeu de cinq filets maillants, enregistrer les taux de capture quotidiens et prélever des échantillons de leurs prises. Nous analysons les résultats de ces programmes en rapport avec les problèmes rencontrés et les améliorations à apporter à l'avenir.

Introduction

The Newfoundland herring fishery expanded rapidly throughout the 1970's with the recruitment of a very strong 1968 yearclass and the development of the mobile ringnet fleet. Landings along the east and southeast coasts increased from 14,500 mt in 1973 to 31,000 mt in 1979. Prior to 1979, effort data were collected for the ringnet component only, through logbooks and purchase slip information. This data source became more difficult to interpret each year due to technological advances and changes in fishing patterns of the fleet. In 1979, it was felt that some measure of fixed gear effort was required due to the rapid expansion of this component of the fishery, particularly along the east coast, where inshore fixed gear landings increased from 6000 mt in 1976 to 18,500 mt in 1979. Initially, purchase slip information was examined. Subsequently, in 1980, an experimental gillnet program was begun whereby selected commercial fishermen were contracted to fish research gillnets for a period of one month each year. This paper briefly describes both the purchase slip and research gillnet programs, some of the problems that have been encountered, and some improvements required for the future.

Purchase Slips

It was felt that CPUE could be calculated for the fixed gear (i.e. gillnet) component of the herring fishery since the gillnet is a traditional, passive gear, normally set in the same location by the same fishermen at the same time each year, with very few learning factors involved.

In 1979, Statistics Branch was approached to determine in what form catch rate information could be obtained from commercial fixed gear purchase slips.

At that time, individual purchase slips were not being coded by Statistics Branch; slips were grouped by community and then coded. However, one of the underlying assumptions in the calculation of catch rates from purchase slips is that each slip represents one landing. Since this information was not available in computerized form from Statistics Branch, individual purchase slips had to be examined.

All fixed gear herring purchase slips were obtained for 1979, plus those that could be found for 1977 and 1978. This procedure was repeated in 1980, 1981, and 1982. Each year slips were grouped by statistical area (see Fig. 1). Boundaries of these statistical areas are the same as those used to define the following Newfoundland herring stock complexes: (1) Fortune Bay (303); (2) Placentia Bay-St. Mary's Bay (304, 334); (3) Conception Bay-Southern Shore (335, 336); (4) Bonavista Bay-Trinity Bay (337, 338); and (5) White Bay-Notre Dame Bay (339-342). Within each area, total monthly landings (lbs) and number of landings for individual fishermen were calculated and recorded on file cards (see Fig. 2). Several approaches were then used to calculate CPUE. Catch rates were examined both by month and by season for fishermen who fished consistently over a three to five year period. Each year these fishermen would be contacted by telephone to determine how many nets they fished that season. Standardized catch rates (catch (kg)/net/landing) were calculated and then compared from year to year. In addition, each year, monthly and seasonal catch rates of all fishermen within each statistical area were calculated. These, in turn, were adjusted from the results of the telephone survey to account for annual changes in fleet size.

There are many problems in the use of purchase slips to calculate herring fixed gear catch rates. Firstly, it is very difficult to obtain all purchase slips each year since slips are stored by Statistics Branch according to species, and quite often more than one species is listed on a purchase slip. Therefore, it is impossible to obtain total landings by area. Secondly, quite often, a purchase slip represents more than one day's landings for an individual. Although this is illegal, it is done quite frequently for U.I. purposes, to allow a fisherman to obtain a larger 'stamp'. In such cases, it is impossible to determine how many landings are represented by a single slip and thus impossible to calculate standardized catch rates. Thirdly, purchase slips are often issued with more than one fisherman's name. This presents no problem if the fishing partners remain the same throughout the year and from year to year. However, when partners change throughout the season, and individual purchase slips are not issued, it is very difficult to determine catch rates for each fisherman. Fourthly, without contacting individual fishermen, it is impossible to determine how fleet sizes change from year to year, information critical when standardizing catch rates. Even after contacting a fisherman, one does not know if a landing on a purchase slip represents fish from all of his nets or certain nets only. The most serious problem is the time and manpower used to calculate individual catch rates in the manner described. A file card must be made for each fisherman in an area. Then, for each fisherman, daily landings must be summed and recorded by month. As an example of how time-consuming this can be, in 1979, there were 20,629 daily landings in statistical areas 335-342.

There are improvements required to calculate CPUE from herring fixed gear purchase slips. Stricter field enforcement would ensure that purchase slips are issued to individual fishermen and that the C.F.V. number is recorded on each slip. Coding of C.F.V. number, by Statistics Branch, would enable computer printouts of daily landings to be obtained for each licenced vessel. This would alleviate the problem of multiple names per slip and also ensure a complete listing of landings per fisherman (vessel) each year. The computerization of one further field per slip, i.e. number of nets hauled, would allow for more accurate calculation of CPUE, as catch rates could be adjusted to account for fleet size on a daily, rather than seasonal basis.

Research Gillnets

In 1980, a research gillnet program was established to obtain CPUE independent of the commercial fixed gear herring fishery. The concept was to have a standardized unit of effort fished in the same location, at the same time by the same fisherman, each year. In each of the stock areas, commercial fishermen were contracted to fish a fleet of five research gillnets for a period of one month, each year. In 1980, seven fishermen were contracted along the northeast coast. This program has been expanded each year and in 1983 there were nineteen fishermen in different locations along the east and southeast coasts (Fig. 1).

The mesh sizes of the five nets are as follows: 2", 2 1/4", 2 1/2", 2 3/4", and 3". This range was chosen to ensure that all mature age groups within a population have a fairly equal chance of being caught. This would not be true for the smallest and largest fish in the population due to mesh

selectivity of the 2" and 3" nets. The fisherman is required to maintain an accurate daily log record (Fig. 3) of catch and weather conditions and to collect and freeze two samples of herring per week during the course of the contract. The contract provides a lump sum payment of \$600.00 and allows the fisherman to retain those herring not required for samples. All gear (nets, floats, ropes, grapnels, etc.) is provided by the Department of Fisheries and Oceans.

Catch rates (total number of herring caught per fishing day) are calculated for individual fishermen and then combined by stock area. In addition, estimates of numbers-at-age in the catch are obtained from the samples collected by the fishermen. The fishermen collect eight samples, each sample consisting of 100 herring, 20 from each mesh size net. Fisheries personnel subsample each of these, randomly selecting, from each of the five mesh sizes, a total of 50 fish in proportion to the actual number caught per net.

Most problems associated with the research gillnet program have been logistical. In certain cases, it has been difficult to find reliable fishermen and personnel changes have been required from year to year. It has also been necessary to conduct the program along the southeast coast during the spring and along the northeast coast during the fall due to the seasonal nature of the herring fishery. In most stock areas, there are two or three fishermen under contract to the program. Catch rates have tended to fluctuate between fishermen within areas, making comparisons difficult.

Improvements have been ongoing to the program since its inception in 1980. Each year, the number of fishermen under contract has been increased in each area. However, it appears that two or three per stock area is still insufficient and will have to be increased in future. There have been no analyses to date to determine the optimum number of fishermen per area.

Conclusions

Both the purchase slip and research gillnet program provide valuable fixed gear CPUE data and have been used extensively in recent herring stock assessments (Wheeler and Winters 1982, 1983). The value of these programs will become even more important within the next two or three years, if the Newfoundland commercial herring fisheries reopen. The research gillnet program is controlled within the Research Branch and therefore can be easily modified and improved. The purchase slip program depends on data provided by the Statistics Branch and for improvements to be made, the necessary computerization changes will have to be made within that Branch.

References

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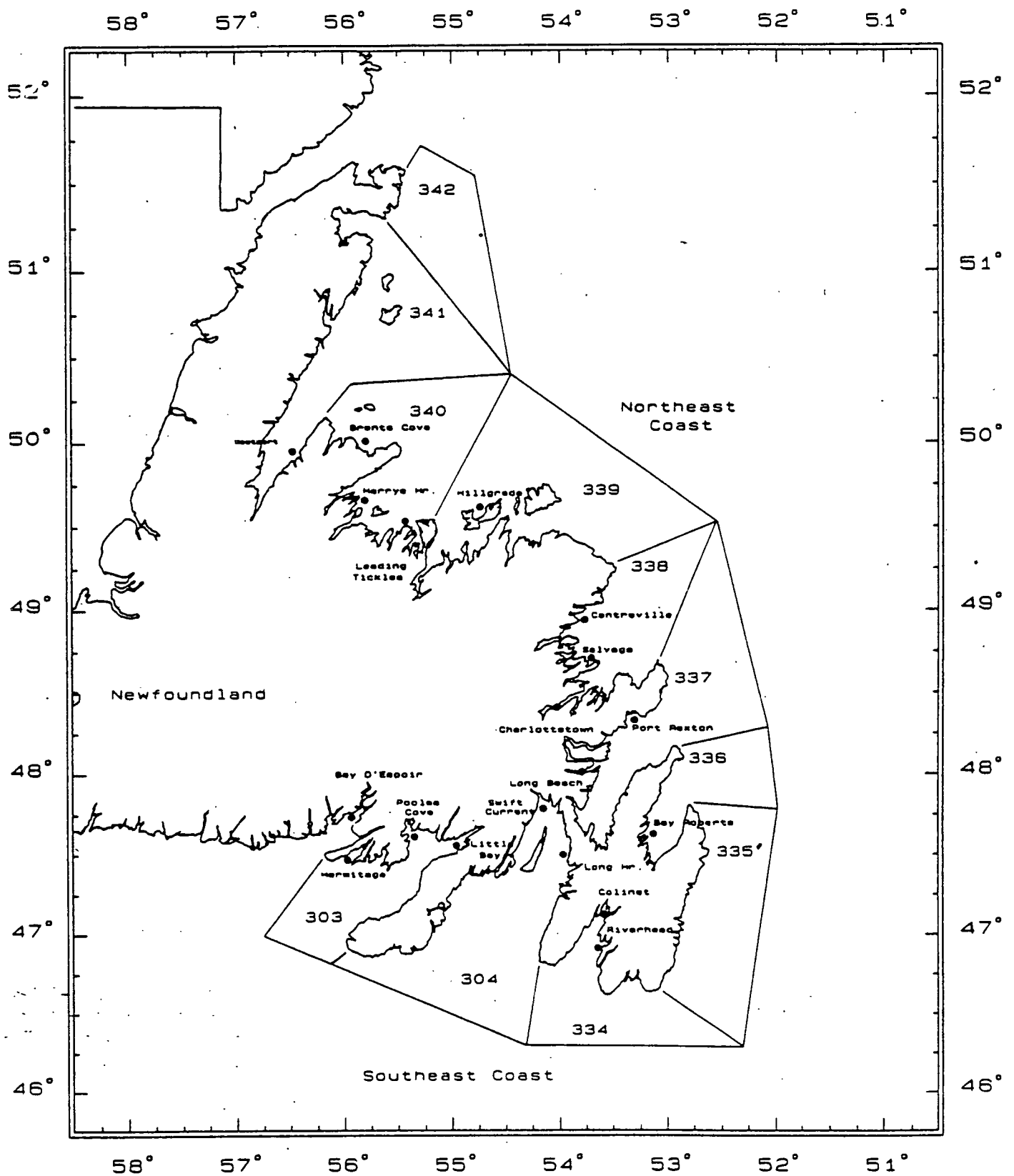


Fig. 1. Area map indicating statistical sections and locations of fishermen involved in research gillnet program.

AREA		NAME						ADDRESS					
339		John Doe						Joe Batt's Arm					
		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
	1977												
	1978				2152 <u>12</u>	7531 <u>6</u>					10355 <u>16</u>	3020 <u>5</u>	
	1979				762 <u>4</u>	3810 <u>12</u>					7563 <u>13</u>		
	1980			375 <u>2</u>	1650 <u>8</u>	180 <u>1</u>					5320 <u>15</u>	810 <u>3</u>	
	1981				632 <u>5</u>	4395 <u>15</u>	232 <u>3</u>				3112 <u>10</u>		
	1982				2801 <u>19</u>								
	1983				1350 <u>15</u>	438 <u>5</u>					1893 <u>5</u>		
	1984												
	1985												
	1986												

Fig. 2. Example of file card used to record monthly landings (lbs) and number of landings for individual fishermen.

Date:	Time Nets Hauled:	
Location of gear:	Depth of Head-rope:	Water depth:

Total number of herring caught:	Number of herring per mesh size					
	2"	2 1/4"	2 1/2"	2 3/4"	3"	Misc.

Other species - numbers caught			
Mackerel	Squid	Cod	Other (please specify)

Was a sample taken today?		If so, how many fish?	Sample No.
Yes	No		

Weather conditions:		
Wind direction:	Wind speed:	Air temperature:
REMARKS:		

Fig. 3. Daily log sheet used in the research gillnet program.