

IMPROVEMENT OF THE BIAS ACOUSTIC SURVEY PROCEDURES FOR ESTIMATING SPECIES AND LENGTH COMPOSITION FROM TRAWLS DATA

Presentation given at ICES WG BIFS
2006

Kasatkina S.M.

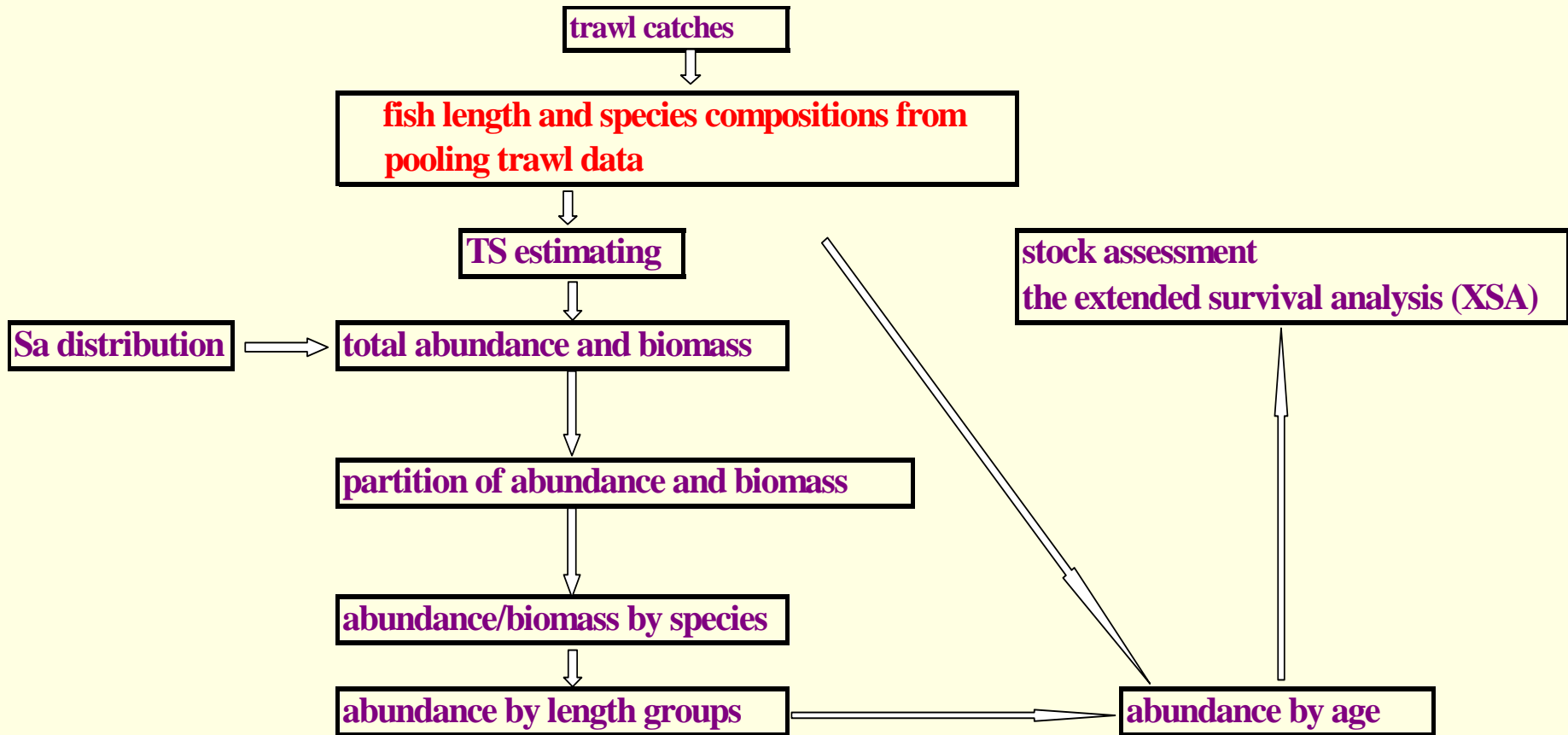
**Atlantic Research
Institute of Marine
Fisheries and
Oceanography
(AtlantNIRO), Kaliningrad,
Russia**



With support of BSRP LL On ICES Joint Open Sea Surveys

Background

The pooling procedure is an integral part of estimating fish length and species structure from catches that is the important component of acoustic survey data.



According to the Manual of BIAS

Method 1

The species frequency f_i of species i can be estimated by

$$f_i = \frac{1}{M} \sum_{k=1}^M \frac{n_{ik}}{N_k}$$

The length frequency f_{ij} in the length class j

$$f_{ij} = \frac{1}{M_i} \sum_{k=1}^{M_i} \frac{n_{ijk}}{N_{ik}}$$

where n_{ik} is the fish number of species i in the trawl k and N_k is the total fish number in this haul.

n_{ijk} is the number of fish within the length class j and N_{ik} is the total number of species i in the haul k .

According to statistical theory (Cochran, 1963; ICES WKSAD, 2004)

Method 2

$$f_i = \frac{\sum_{k=1}^M n_{ik}}{\sum_{k=1}^M N_k}$$

$$f_{ij} = \frac{\sum_{k=1}^{M_i} n_{ijk}}{\sum_{k=1}^{M_i} N_{ik}}$$

Our aims:

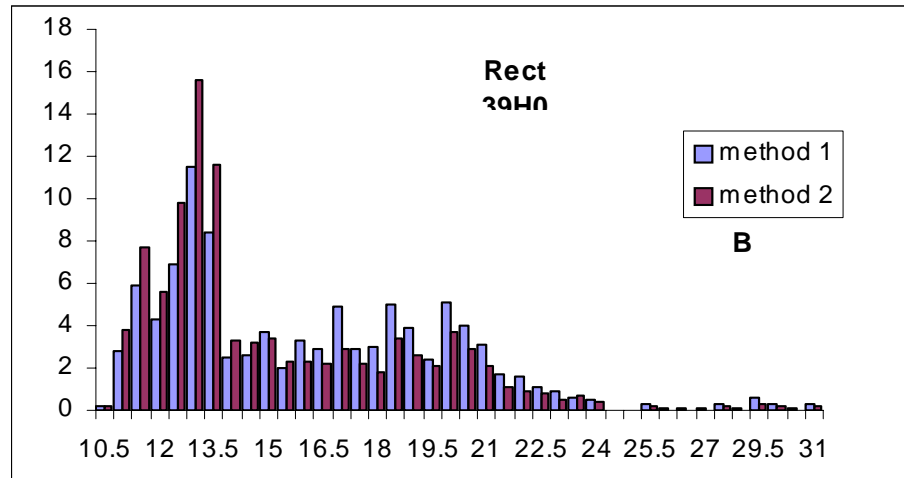
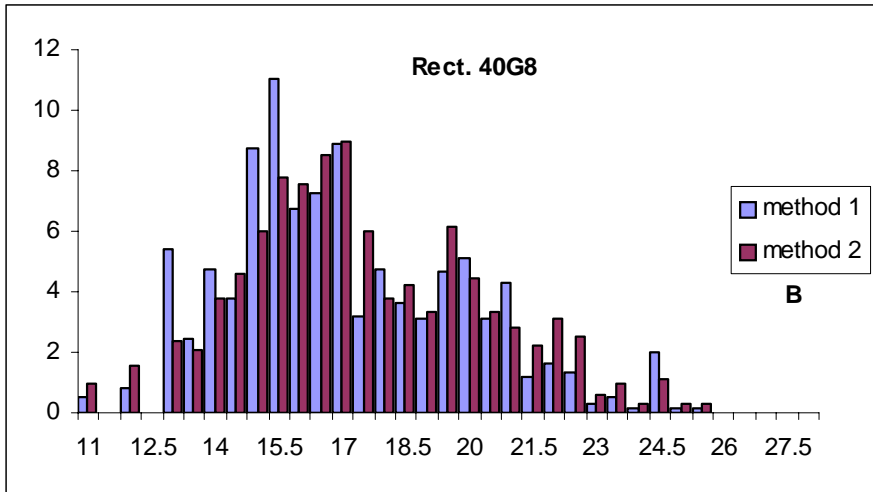
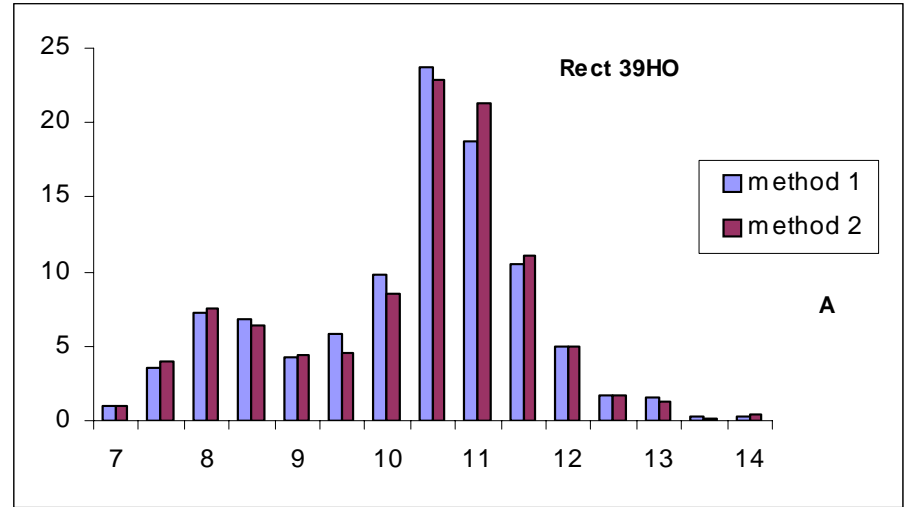
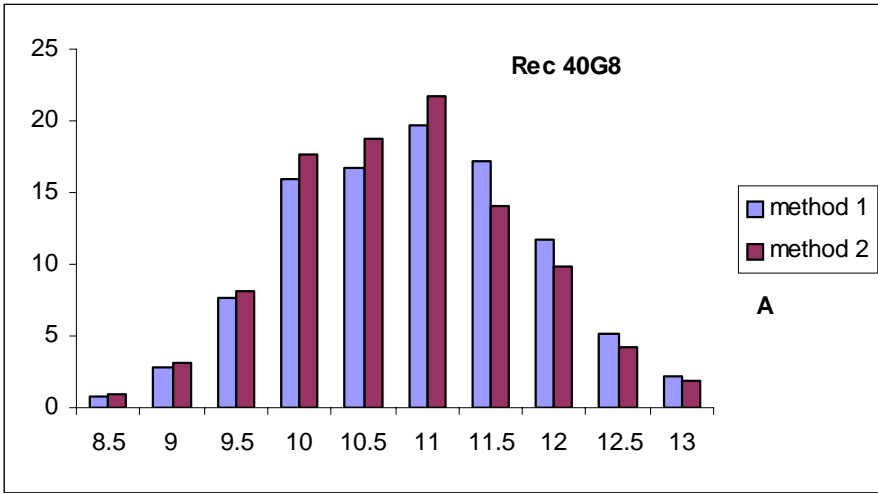
Analyze the influence of pooling trawl data procedure on the acoustic survey results

Material

Acoustic survey data in the four rectangles of Subarea 26 : 40HO, 40G9, 40G8, 39HO (October, 2004).

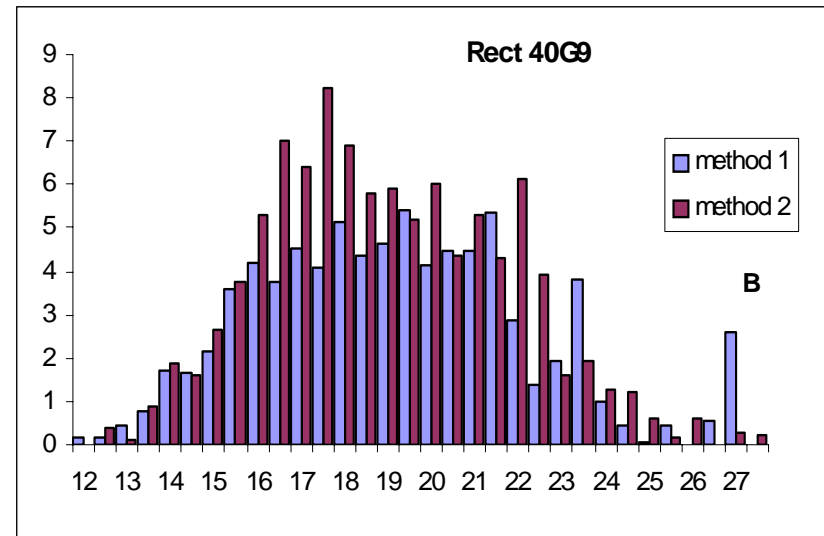
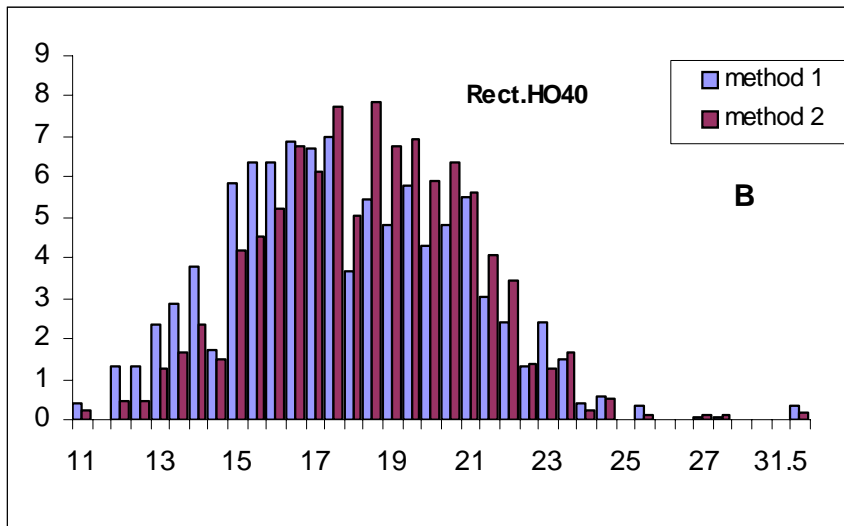
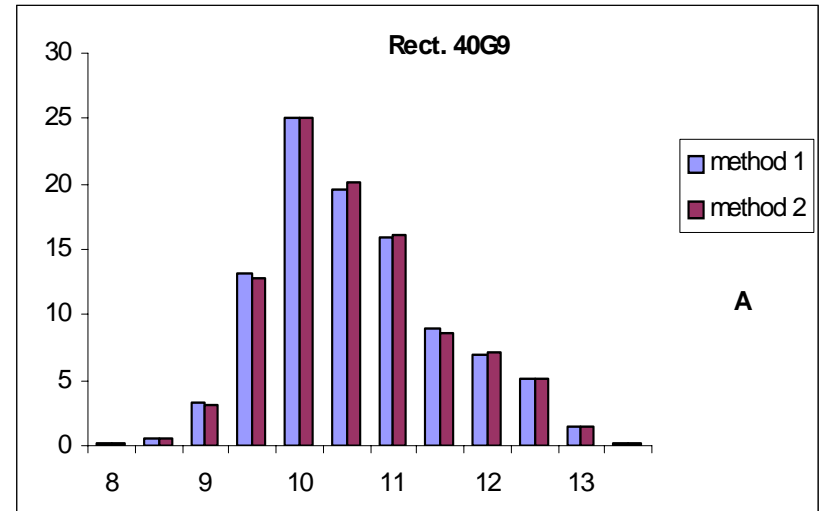
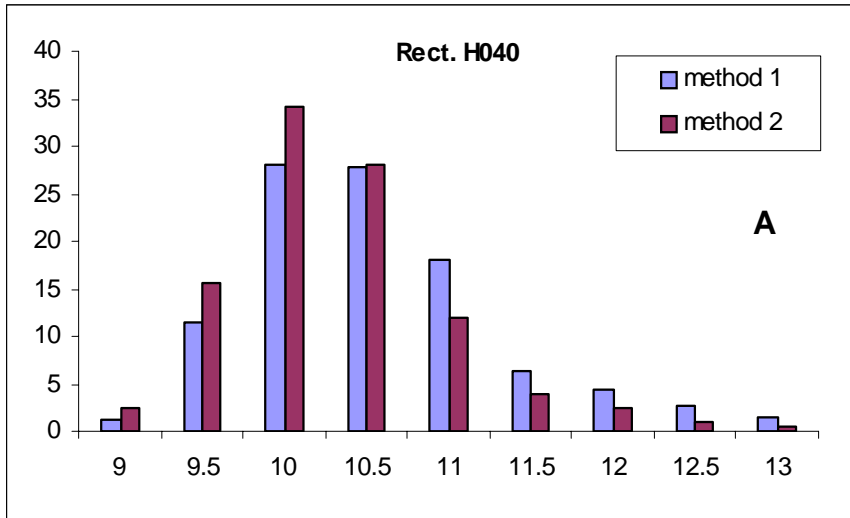
Acoustic survey data proceeding was made according to Manual of BIAS with using two pooling procedure.

Depending on the pooling method, essential discrepancies may arise between the estimates of fish length and species structure from the same catches



**Upper fig –sprat,
lower fig -herring**

**Method 1 – according to Manual BUFS
Method 2 – according to statistical theory**



**Upper fig –sprat,
lower fig -herring**

**Method 1 – according to Manual BUFS
Method 2 – according to statistical theory**

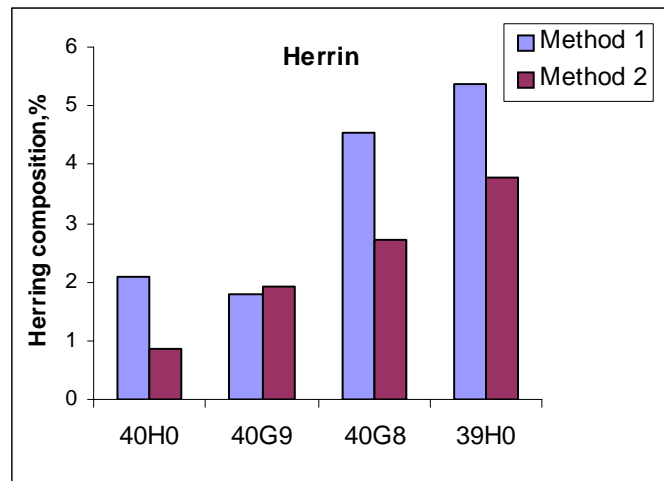
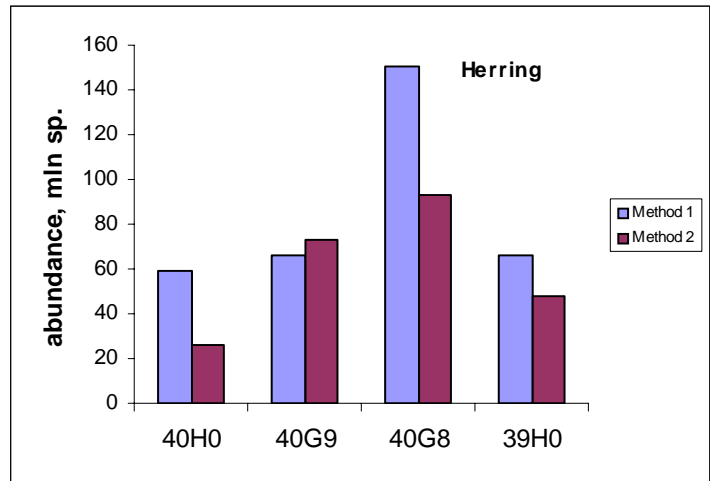
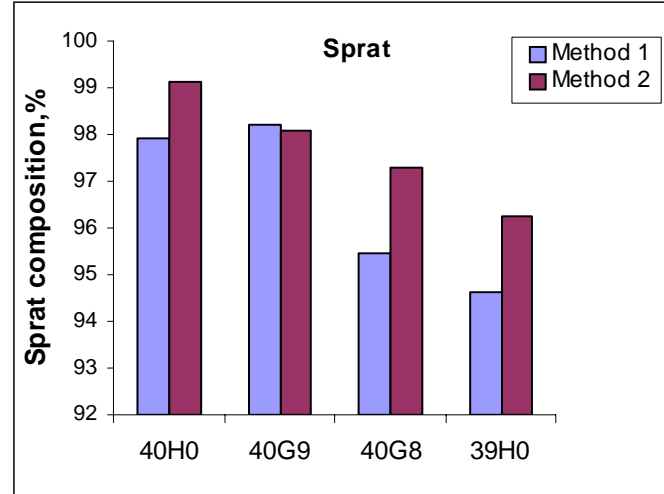
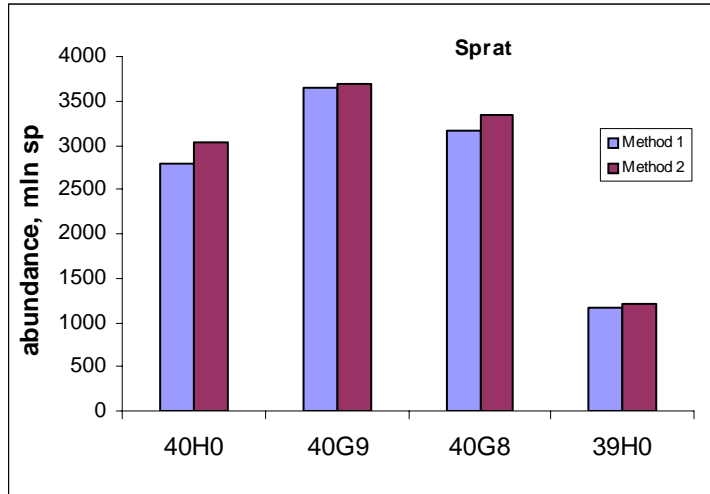
Abundance and species compositions in rectangles based on two pooling methods

According to the Method 2					
ICES Rect.	abundance, mln			Species composition (%)	
	total	herring	sprat	herring	sprat
40H0	3055.3	26.1	3029.2	0.9	99.1
40G9	3765.9	72.6	3693.2	1.9	98.1
40G8	3438.1	92.9	3345.2	2.7	97.3
39H0	1264.8	47.6	1217.2	3.8	96.2
	11524.1	239.3	11285	2.1	97.9
According to the Method 1					
ICES Rect.	abundance, mln			Species composition (%)	
	total	herring	sprat	herring	sprat
40H0	2848.0	59.2	2788.9	2.1	97.9
40G9	3712.6	66.0	3646.6	1.8	98.2
40G8	3317.5	150.2	3167.3	4.5	95.5
39H0	1224.3	65.8	1158.5	5.4	94.6
	11102.5	341.1	10761	3.1	96.9

It is revealed, almost 30% (101.8 mln sp) over estimates of herring (or 42% relative to correct estimate) and 5% (523.5 mln sp) of underestimation of sprat with the use of the recommended method as opposed to the used method.

Estimates based on two pooling procedures

Abundance, mln sp



Species compositions

Pooling procedure may have a greater impact on acoustic estimates of herring abundance and biomass than those of sprat.

Conclusion

Incorrectness of the pooling trawl data method applied to all the area covered by BIFS, may unexpectedly prove to be very significant for estimating the herring stock.

Incorrectness of pooling trawl data procedure used to date in the practice of the BIAS is one of the sources of uncertainty in the estimates of fish abundance by age as initial information for VPA tuning.

The pooling trawl data procedure needs to be improved and the Manual for surveys duly corrected in accordance with the statistical method of data processing to which the pooling procedure recommended in this study related.

THANK YOU FOR ATTENTION

