

SAMPLING CHARACTERISTICS AND NET BEHAVIOR OF BONGO OBLIQUE TOWS FOR TUNA-TYPE LARVAE (DRAFT)

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SUMMARY

This report briefly describes the sampling characteristics of BONGO oblique tows for tuna larvae obtained from the 1994 "Shoyo-maru" cruise, whose activities are explained in SCRS/94/177. The report is comprised of two parts. The first part examines the net behaviors corresponding to indices monitoring them during towing or afterwards. The second part presents a preliminary comparison of sampling efficiency between day and night, and between U.S. and Japanese methods when deployed by "Shoyo-maru". All of these results, especially in the second part, are still in the preparatory stages, so please do not cite the paper without permission from the author.

RÉSUMÉ

On trouvera ci-après une description des caractéristiques de l'échantillonnage de larves de thonidés par traits obliques de filets Bongo réalisé en 1994 à bord du Shoyo-maru. On trouvera le détail de ces activités dans le document SCRS/94/177. Ce rapport se compose de deux sections : 1) un examen du comportement des filets en fonction des indices, pendant et après la pose des filets et 2) une comparaison provisoire de l'efficacité de l'échantillonnage entre le jour et la nuit et entre les méthodes japonaise et américaine utilisées par le Shoyo-maru. Ces résultats, en particulier les comparaisons, sont encore provisoires. Ils ne peuvent donc être cités sans la permission des auteurs.

RESUMEN

Este informe describe brevemente las características de muestreo de arrastre oblicuo con redes BONGO para larvas de túnidos obtenidas de la campaña del "Shoyo-maru" en 1994, cuyas actividades se explican en el SCRS/94/177. El informe se compone de dos partes. La primera examina los comportamientos de la red correspondientes a los índices de seguimiento durante el arrastre o después. La segunda parte presenta una comparación preliminar de la eficacia de muestreo entre el día y la noche, y entre los métodos estadounidenses y japoneses de despliegue utilizados por el "Shoyo-maru". Todos los resultados, especialmente en la segunda mitad, se encuentran aún en fase preparatoria, y se ruega no citarlos sin autorización del autor.

1. Problems in monitoring gear behaviors :

Net behaviors are monitored and controlled by different ways with three nations conducted collaborative larval surveys under the BYP in 1994. Though more complete comparison should be made during the Workshop, the rough comparison of towing methods is as follows :

The US deploys the net with constant wire-speed and changes ship speed to keep wire angle of 45 deg. at any moment of towing. When the wire length reaches to the expected length, wait for 30 sec to let settle the gear and retrieve the net with the same manner as deploying. The net depth is not directly monitored. The Italy keep the same ship speed as well as the same wire speed when towing net. The timing of start retrieving wire is determined based on expected wire depth with 45 deg wire angle. The depth recorder provides the gear trajectory and maximum depth after tows. The Japan utilizes the net-sonde to monitor gear depth during tow and controls ship speed in order to keep constant sinking and retrieving rate by depth. Wire speed is kept at constant but different for deploying and retrieving in order to keep more or less constant horizontal speed by compensating with ship speed.

This chapter examines several problems and potential bias and error in monitoring net behavior when following the above mentioned methods.

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1.1. Filtered volume :

Filtered volume are monitored by flowmeter set in the center of net mouth. Some time, the flowmeter is only applied to one side of net and sometimes for both sides. The flowmeter generally give similar filtered volumes for both sides of net when deploying nets with the same mesh size. The difference between two sides is less than 10 % in the case of Japanese tows for most of tows but the largest difference observed is ** %. Careful examination seems to be needed before assuming the same filtered volume to both sides of net especially when different mesh nets are used according to the side.

Flowmeter used are different according to the nation: one made by *** is used by the US and one by Tsurumi used by Japan. Both US and Japanese flowmeters were deployed in the same mouth of net next each other, and recorded volumes are compared. The comparison were made for two pairs of flowmeters. The results is shown in Fig. 1 with Japanese values in X-axis and US values in Y-axis. The straight line in Figure represent the same values between two nations. Though variance is bigger for the pair with US flowmeter #7975, both pair shows higher measures by US flowmeters than those by Japanese flowmeters. The relationship between US and Japanese measures are close to linear and US flowmeters gives about 1.2 times higher values than those by Japanese flowmeters.

The Japanese flowmeters are standardized by towing 100 m vertically by 1 m/sec in calm sea, at the start and end of each leg as long as possible. One occasion, the effect of towing speed was examined by changing a retrieving wire speed. Fig. 2 shows the results in value to finally adapted standardized value and each mark corresponds to different flowmeter. The results shows the Japanese flowmeters become less reliable for towing speeds at least slower than 0.3 m/sec which is not expected to occur under the ordinary towing condition.

The biggest difference between the US and Japanese flowmeters is that the Japanese flowmeters have a mechanism to prevent back rotation. However, this does not explain a higher estimated value by the US flowmeters. In any sense, it will be preferable to establish the standard way to set a calibration for flowmeters.

1.2. Depth of gear :

While Japan and Italy monitored the depth of gear, there was no measurement made about the depth of gear by the US. During the operation in the Mediterranean, the wire length and angle were measured in the middle points of both deploying and retrieving nets as well as at the bottom to estimate the gear depth which was then compared with the actual depth at that moment monitored by net sonde. Fig. 3 shows the frequency distribution of ratio between estimated and

actual depths of gear.

Though there are some difference among towing phase, the estimation based on wire length and angle gives about 1.5 times deeper depth in average than actual gear depth. Since the US uses heavier flame and slower ship speed than Japan, this might not be the case. However, it should be recommended to deploy some depth meter to assure the accuracy of data on depth range covered.

1.3. Gear trajectory :

(to be incorporated later)

2. Comparison of sampling efficiency.

To compare the sampling efficiency for bluefin tuna larvae and develop correction factors among different nations is one of the primary objectives of collaborative surveys held in 1994 under the BYP. Since the comparison among nations requires data from the other nations, here we concentrate on the comparison between day and night.

Table 1 shows the day/night comparison of catch of bluefin larvae and *Thunnus* larvae in general. Upper figure of each cell shows a proportion of positive tows and lower figure the average number of larvae in 1000 m³ in positive tows. The figures in parenthesis correspond to the number of observations. For the Mediterranean, only stations east of Sardinia are included in the analysis. Also, the data of station where more than a thousand bluefin were collected is also excluded. Fig. 4 also shows the same information.

For bluefin tuna larvae, while the proportion of positive tows is only slightly higher during nighttime than during daytime, the number of larvae caught shows more significant difference. The difference is much more obvious in the Mediterranean than in the Gulf of Mexico. This is caused by the lower number of observations connecting with one station with the highest catch within the Gulf of Mexico by Japanese BONGO during daytime. When all tunas combined, the difference becomes less distinctive. Different response to gear by species might explain this.

Size frequency of bluefin tuna caught is shown in Fig. 5 for both day and night time. Significant differences are not be observed in size distribution of larvae caught.

Table 1. Day/Night Comparison of Catchability.

		Daytime	Nighttime	Dusk/Dawn
<i>BFT</i>				
G. Mex	Jap Bongo	11.90 (42) 21.11	12.50 (48) 8.87	18.18 (10) 38.87
	US Bongo	13.64 (22) 6.88	20.69 (29) 5.71	14.29 (7) 2.73
	Total	12.50 (66) 15.77	15.58 (77) 7.29	16.67 (17) 26.82
Med (East)	Jap Bongo	7.14 (217) 13.31	11.26 (142) 31.68	7.69 (23) 7.52
<i>All tunas combined</i>				
G. Mex	Jap Bongo	45.24 (42) 14.22	50.00 (48) 11.52	45.45 (10) 21.94
	US Bongo	40.91 (22) 5.23	41.38 (29) 7.10	42.86 (7) 6.79
	Total	43.75 (66) 11.33	46.75 (77) 10.04	44.44 (17) 16.26
Med (East)	Jap Bongo	36.61 (217) 19.55	49.67 (142) 20.82	30.77 (23) 18.83

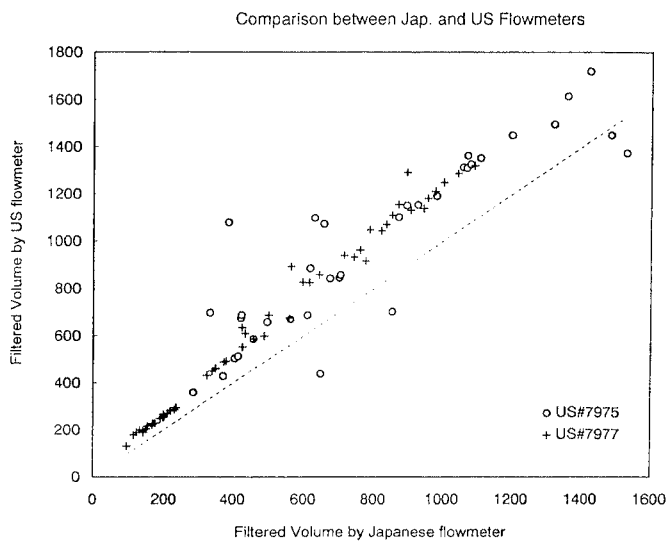


Fig. 1 US flowmeter vs Jap flowmeter

Effect of towing speed

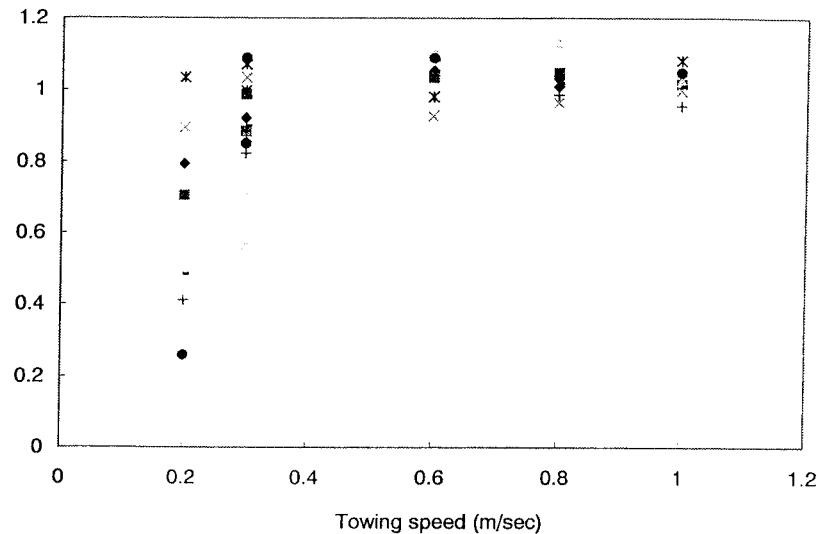


Fig. 2 Effect of Towing speed

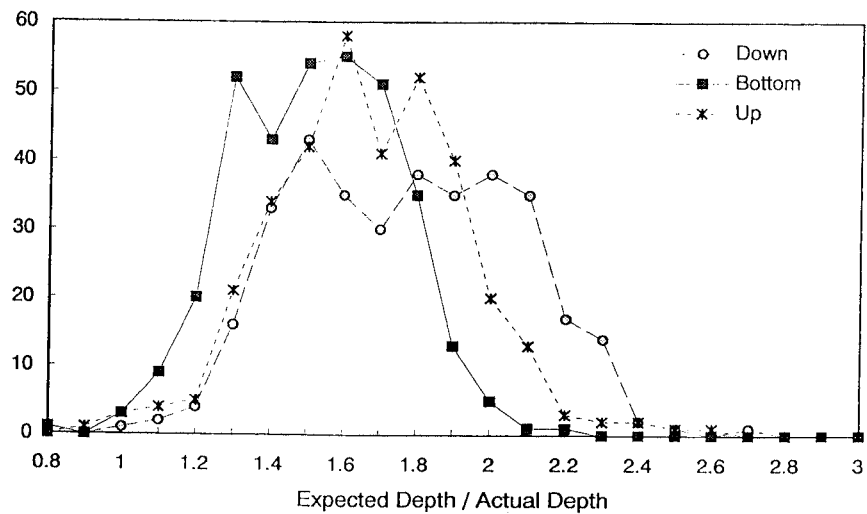
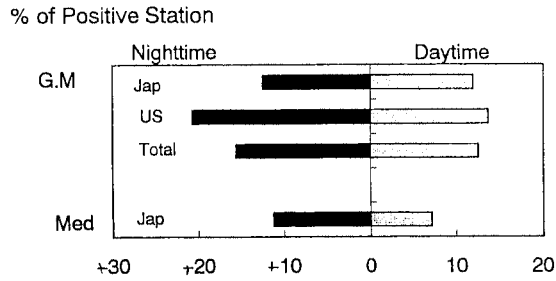


Fig. 3. Estimated vs Actual Depth of gear

BLUEFIN TUNA



All Tuna Combined

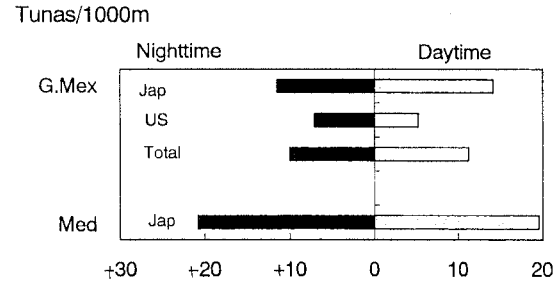
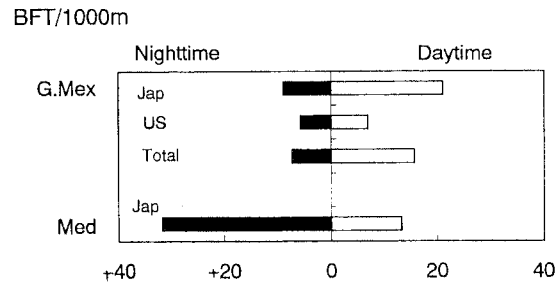
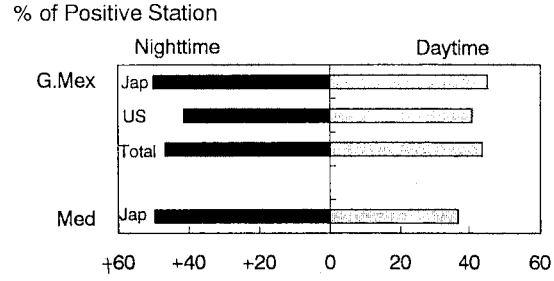
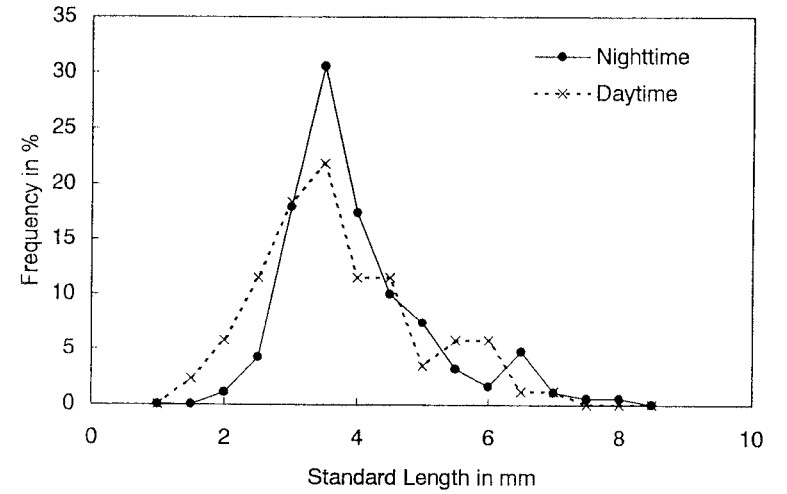


Fig.4 Day/Night Comparison of catchability

Size Distribution of BFT caught between day and night time



Day/Night Comparison of Size Distribution of BFT caught