

JAPANESE PROGRESS REPORT ON ICCAT BLUEFIN YEAR PROGRAM (BYP)

Suzuki, Z., S. Tsuji

*National Research Institute of Far Seas Fisheries,
5-7-1 chome Orido, Shimizu, Shizuoka 424, Japan*

SUMMARY

Japan has actively participated in the BYP since the beginning of the program in 1992, mainly for genetic studies and larval surveys. The Japanese government provided special funds for the BYP and the Japanese industry has cooperated in various samplings of biological materials during the BYP program. For most of the studies, analyses are still in a data processing state, but preliminary results of the analyses were obtained for some aspects of the studies. Progress and relevant information of the Japanese studies related to the BYP are summarized.

RESUMÉ

Le Japon a participé de façon active au Programme BYP depuis ses débuts en 1992, surtout en ce qui concerne les études génétiques et la prospection larvaire. Le gouvernement japonais a concédé un financement spécial au BYP, et l'industrie japonaise a coopéré en nous remettant divers échantillons d'éléments d'étude biologiques pendant le Programme. L'analyse de la plupart des études est encore en cours, mais des résultats préliminaires ont été obtenus pour quelques aspects des études. Le déroulement des études japonaises dans le cadre du BYP, ainsi que l'information pertinente, sont récapitulés dans le présent rapport.

RESUMEN

Japón participó activamente en el Programa Año del Atún Rojo (BYP) desde su inicio en 1992, sobre todo en cuanto se refiere a estudios genéticos y prospección de larvas. El Gobierno de Japón facilitó fondos especiales para el BYP y la industria japonesa cooperó con diversas muestras de materiales biológicos durante el período del programa. Los análisis de la mayor parte de estos estudios siguen aún en la etapa de proceso de datos, si bien se obtuvieron resultados preliminares de los análisis en algunos aspectos de los estudios. Se resumen aquí los progresos y la información mas relevante de los estudios japoneses relacionados con el BYP.

1) Improvement of statistics and other data bases

Cross-check of import/export statistics

Japanese import/export statistics used not to separate southern bluefin tuna from northern bluefin tuna but from 1993, the statistics of those two species have become separated so that the Japanese statistics are more suitable to check any unreported catches of bluefin tunas. Those statistics should further be cross-checked to those of ICCAT bluefin statistical documents which trace transaction of all bluefin tunas imported to Japan not only frozen fish (from 1993) but also fresh fish (from 1994).

Improvement of logbook form

Longlining, currently only one type of tuna fishing method operated in the Atlantic by Japan, has a long history on which substantial scientific studies are based. The logbook of the Japanese longline fishery was modified in 1993 to include information on sea surface temperature and kind of materials used in making several parts of longline gear. The improved logbook form is expected to provide useful information on several aspects of fisheries biology of tunas.

2) Stocks

Genetic study

Six samples for genetic analysis on stock structure were collected (Table 1). Genetic study on these samples was carried out by means of restriction fragment length polymorphism (RFLP) analysis on mitochondrial gene amplified by polymerase chain reaction (PCR). Preliminary analysis showed that for mitochondrial D-loop region there appears to be difference in frequency of the restriction patterns for certain combinations of comparison between the samples. Unfortunately, the PCR method did not amplify any sufficient amount of mtDNA for larvae taken from the Gulf of Mexico for unknown reason. As the numbers of samples so far analyzed in the NRIFS is small and needed to be increased for future comprehensive analysis, it should be pursued arrangement in encouraging exchange of the samples and information so that the study could be improved efficiently.

Development of abundance index

In CPUE standardization with the General Linear Model assuming log normal error distribution, treatment of zero catch data has been putting difficulty in the computation because of difficulty in finding a reasonable constant required to be added to observed CPUE when the observed CPUE is zero. Among several attempts made getting away from this problem, a trial of standardizing the Japanese longline CPUE which explicitly accounts for zero catch data was made assuming Poisson distribution as error structure (Miyabe 1994). This approach showed better fit to VPA than that by previous method assuming log normality and adding a constant when zero catch observation was encountered. Further studies continue to investigate to see the robustness of this method including longline data, assuming other error structures and simulation study on data set with known statistical characteristics.

Information on stock restocking

Recently, there has been a substantial progress in Japan in successfully obtaining fertilized eggs from pen cultured adult bluefin tuna and rearing juveniles from those eggs for a few months up to 4-5 cm in the order of several thousands. Among several critical problems to be solved for mass culturing of the seedlings, control of dietary factors and prevention of cannibalism appear to be urgently studied.

3) Biology

Reproductive biology

For the purpose of studying reproductive biology, age and growth and stock structure, Japan has collected biological samples of bluefin tuna, ranging from 84 to 290 cm in FL, caught by the Japanese longline boats that operated within the Canadian 200 miles zone, between 41° and 43° N and between 46° and 63° W during the period of October 16, 1992 to January 24, 1993, with the cooperation of Canadian observers on-board the Japanese boats. Summary of the sample sizes obtained from that activity are shown as follows:

Sampling year/month	Gonad	Dorsal spine	Vertebra
1992 October	0	4	4
November	39	82	78
December	114	219	244
1993 January	33	55	79
Total	186	360	405

In total, the gonads of 175 bluefin tuna ranging from 89 to 290 cm FL were sectioned for histological analysis. All of those gonads were immature or at the resting stage, containing mainly peri-nucleous oocytes smaller than 0.2 mm in diameter. Some gonads contained a few atretic oocytes but no oocytes with clear vitellogenesis were observed. Dorsal spines and vertebrae have not yet analyzed for aging purpose due to lack of time available to Japanese scientists. However, those hard parts can be made available to any scientists in a cooperative basis.

Larval survey

A Japanese research boat carried cooperative survey for bluefin larvae in the Gulf of Mexico and in the Mediterranean Sea in 1994 (Tsuji et al. 1994). Data processing and analysis are now underway which include chlorophyll and nutrient analysis, genetic comparison between the spawning grounds, inter-calibration of sampling efficiency of larvae among different research boats and mapping of tuna larvae distribution. Preliminary result of stations with positive tows by the Japanese boat during the expedition is shown in Figure 1.

4) Environment

Very little study was made by Japanese scientists about influence of environmental factors on bluefin tuna during the BYP period. The study of sea surface temperature on CPUE of bluefin caught by the Japanese longline showed no significant relationship in the Mediterranean Sea (Miyabe 1993) although further study based on more detailed time-area strata may reveal significant relation. Suda (1994) showed that cold current flowing from the north Atlantic to offshore areas of Canadian and US coasts may act as a barrier to separate bluefin fishing ground of the Japanese longline boats between the coastal and offshore central north Atlantic.

5) National budget used for BYP (unit:\$US)

Cruise cost for larval survey:	450,000 (Salary of the crew is not included)
Sorting of bluefin larvae:	45,500 (Outside order, @65 x 700 bottles)
Histological samples of gonad	42,000 (Outside order, @24 x 175 samples)

Genetic study : (All analyses were made by the NRIFSF staff)

PCR-PFLP analysis: 4,500 (@15 x 300 sample)

Nucleotide sequencing: 1,000 (@50 x 20 samples)

Total	543,000
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References

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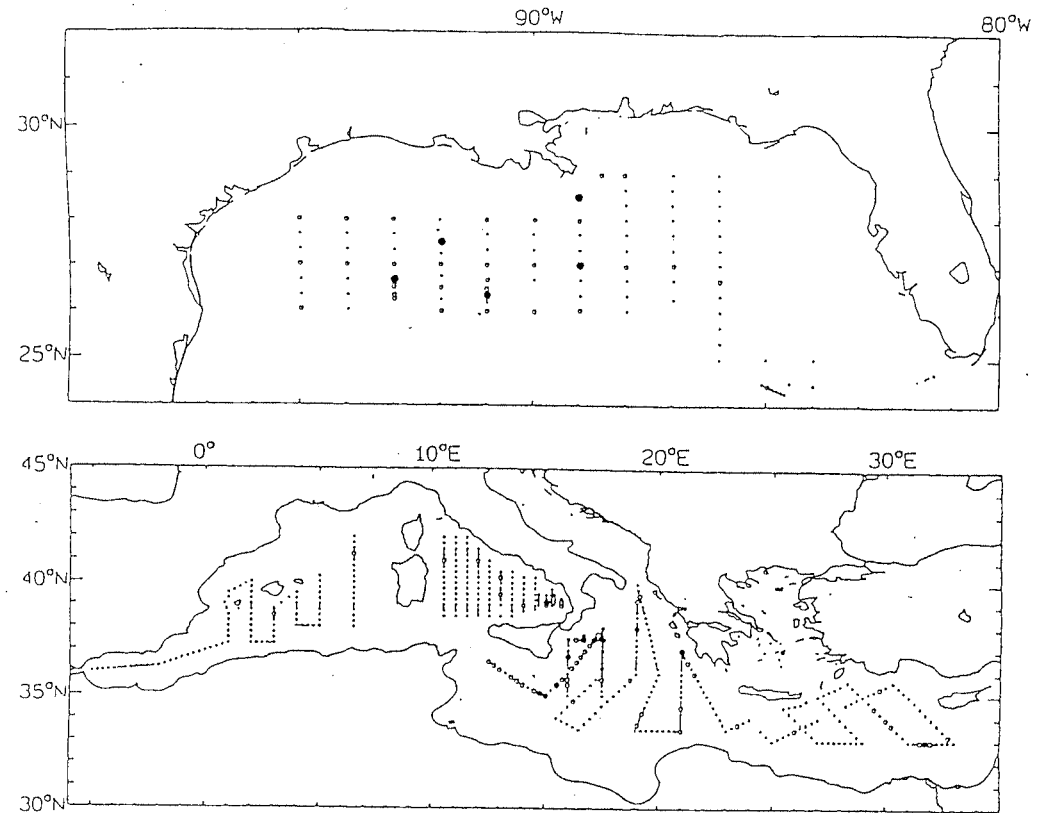


Figure 1. Bluefin tuna positive stations. Solid circles show stations where bluefin tuna larvae caught. Open circles and plus signs correspond to sorted and unsorted stations, respectively. (Tsuji et al. 1994)

Table 1. Catch locality and year, and size of of the Atlantic northern bluefin tuna samples used.

Sample*	Area	Locality	Year	Size	No. fish
WA1	Western Atlantic	"Off New York"	1991 (winter)	Adults (size not available)	36
WA2	Western Atlantic	W46-65°, N41-43°	1992 (winter)	Adults (112-256cm, FL)	106
CA1	Central Atlantic	W33-43°, N42-51°	1993 (winter)	Adults (151-274cm, FL)	49
MA1	Mediterranean	Mediterranean	1994 (spring)	Adults (size not available)	54
MJ1	Mediterranean	Mediterranean	1994 (autumn)	Juveniles (36.5-45.2cm, FL)	40
ML1	Mediterranean	Mediterranean	1994 (summer)	Larvae (3.6-10.1mm, BL)	29

*WA1 was collected in Tokyo Fish Market; WA2 and CA1 were collected by Federation of Japan Tuna; MA1 was collected by Mr. A. DiNatale, Aquastudio; MJ1 was collected by Dr. H. Fushimi, Japan Sea Farming Center; ML1 was collected during research cruise by RV Shoyo-Maru in the Mediterranean.