

HIGH RECOVERY RATES OF SMALL BLUEFIN TUNA (THUNNUS THYNNUS L.)
TAGGED IN THE NORTHWEST ATLANTIC

by

J. S. Beckett

SUMMARY

The recovery rate of 194 small bluefin released from purse seines is examined in relation to the relative time of release after initiation of tagging. The rate declined sharply, presumably due to increasing mortality. Recoveries of fish released in the first five minutes averaged 55%, declining to zero for releases later than 20 minutes after initiation. The true recovery rate is therefore apparently twice the overall rate.

RESUME

Le présent rapport examine le taux de récupération de 194 petits thons rouges relâchés par des senneurs par rapport au temps écoulé entre le marquage et le relâchage. Ce taux a baissé brusquement, sans doute à cause d'un accroissement de la mortalité. Les récupérations de poissons relâchés au cours des cinq premières minutes se sont élevées à 55%. Ce taux était de 0% après vingt minutes. Le taux réel de récupération est donc apparemment le double du taux d'ensemble.

RESUMEN

Se analiza la tasa de recuperación de 194 atunes pequeños, marcados desde una embarcación de cerco, con respecto al tiempo relativo transcurrido desde que se inició la operación de marcado. La tasa descendió bruscamente, quizás debido al aumento de mortalidad. El promedio de las recapturas de peces soltados durante los primeros cinco minutos fué del 55%, bajando hasta cero en los ejemplares soltados al cabo de más de 20 minutos después de iniciarse la operación de marcado. La verdadera tasa de recuperación es, por lo tanto, el doble de la tasa de recuperación global.

The overall recovery rate of small (under 50 kg) bluefin (*Thunnus thynnus*) tagged in the nursery area off the mid-Atlantic coast of the United States has ranged as high as 41% in a number of programmes operated since 1963 (FAO 1968, Tibbo and Beckett 1973). The higher values in the range have resulted, however, from programmes involving the release of fish after capture by sports fishermen, while releases of fish caught by purse seine have generally produced lower recovery rates, in the order of 25%. This note re-examines one set of data (Tibbo and Beckett op. cit.) for fish released from purse seines and shows that the overall recovery rate (25%) can be sub-divided into release components ranging from 0% to 55% or higher.

Methods

When tagging from purse seines, tuna were dip-netted from the seine once it had been recovered sufficiently to drive them close to the surface, then measured (fork length), tagged and released. The actual start of tagging varied relative to the process of retrieving the seine, largely depending on whether the net remained open throughout the process so that fish could come to the surface. At times, particularly when the total catch was large or the wind very light, fish could be dip-netted for a considerable time before "brailing" (transferring the catch from net to seiner) commenced. At other times, tagging could only be started shortly before brailing. In all cases, tagging was discontinued once the fish showed obvious signs of distress.

During 1971, bluefin tuna were obtained from 12 purse seine sets off the coast of New Jersey, U.S.A., and 268 fish double-tagged and 3 single-tagged. Known recoveries at the end of October 1973 numbered 69. However, the time of release was only recorded during 8 of the 12 sets, for which the relevant numbers are 194 releases and 51 recoveries. The data were tabulated by releases during consecutive 5-minute intervals (Table) and show clearly that there is a very considerable decline in the recovery rate between successive intervals, ranging from about 55% for the first 5 minutes to 0% for the fifth interval (20-25 minutes). Examination of the recapture rates of fish released during the first interval (5 minutes) of individual sets shows that they varied from 33 to 100%. While the numbers were small (3-12 fish per interval) the results do show that the return rates were higher (75-100%) for the 3 sets when tagging continued longest (more than 20 minutes), i.e. when fish were available relatively early during the recovery of the net. Thus mortality was apparently higher during even the first 5 minutes of tagging when fish were not available until relatively late in the set.

In order to utilize all the 12 sets, the data were also regrouped by equal proportion (25%) of the total number released. This method does not strictly reflect the chronological distribution of releases since fish could be dip-netted more readily towards the latter part of any set, when they were more confined and forced closer to the surface. However, the results showed the same pattern of decline as for the 5-minute intervals, with the overall recapture rates in the 4 quarters being 55%, 34%, 12% and 4%.

The substantial tagging mortality indicated by these results could be immediate or delayed. Recovery data from the 8 timed sets were separated into those for fish recaptured during the year of release (recoveries within 2 months) and those for 11 months or more at liberty (Table). The recovery rates in the first two 5-minute interval groups were similar during the year of release, but the rate in the second interval was only half that of the first in subsequent years, suggesting that part of the mortality was relatively long term although rapid losses still occurred in fish released more than 10 minutes after tagging started.

This analysis indicates that small bluefin released from purse seines are subject to a high mortality due, probably, to the confinement within the seine, and that this mortality increases with retention time prior to release. Return rates of the first few fish released from seines are similar to, or higher than, those obtained from releases after capture on rod and line. Furthermore there is some indication that even this first, most favourable subdivision of fish released from purse seines is subject to considerable mortality when fish are not available until shortly before brailing is started. Thus the actual recapture rate of survivors probably exceeds even the 55% indicated by this study.

Recoveries (%) of small bluefin tuna tagged and released from purse seine catches, grouped by 5-minute intervals of release.

Time of release:	Minutes after start of tagging					Total recoveries
	0-5	6-10	10-15	15-20	20+	
1971	19.6%	20.7%	4.4%	5.9%	0	25
1972 & 3	43.9*	15.2*	2.1*	0*	0	26
Total	54.9	32.8	6.5	5.9	0	51
Number tagged	51	58	46	17	22	

* Adjusted for known 1971 removals (recoveries)

References

- F.A.O. 1972. Final report of the Working Party on tuna and billfish tagging in the Atlantic and adjacent seas. F.A.O. Fish Rept. #118, Supp. 1.
 Tibbo, S. H. and J. S. Beckett. 1973. Canadian Research Report 1972-3, ICCAT SCRS/73/