

## PRELIMINARY ESTIMATIONS OF NON-RETAINED CATCH OF ALBACORE, *THUNNUS ALALUNGA*, IN THE SOUTHWESTERN ATLANTIC OCEAN

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### SUMMARY

*The objective of these contributions to assess the proportion of captured albacore tuna (Thunnus alalunga) that is retained on board longline fishing vessels and the proportion that is discarded back at sea based on data obtained by scientific observers. Data were recorded in Uruguayan and Japanese flagged vessels operating in Uruguayan and international adjacent waters. The number of albacore observed between 2006 and 2011 in the Uruguayan-flagged vessels was 6,190. In the Japanese-flagged vessels 85,431 individuals were observed in the period 2009-2011. Proportions of the different catch dispositions (retained, discarded dead, released alive and lost) in relation to total albacore capture are presented. These preliminary results suggest that the non-retained catch of albacore (most of it being discarded dead) may represent a considerable proportion of the total catch and could result in underestimations of fishing mortality.*

### RÉSUMÉ

*L'objectif du présent document est d'évaluer la proportion du germon (Thunnus alalunga) capturé qui est retenue à bord des palangriers et la proportion qui est rejetée à l'eau sur la base des données obtenues des observateurs scientifiques. Les données ont été consignées dans le cadre des observations à bord de navires battant le pavillon de l'Uruguay et du Japon et opérant dans les eaux uruguayennes et les eaux internationales adjacentes. Le nombre de germans observés entre 2006 et 2011 à bord des navires sous pavillon uruguayen s'élevait à 6.190. Dans le cas des navires battant le pavillon du Japon, 85.431 spécimens ont été observés entre 2009 et 2011. Les proportions des différentes dispositions de la capture (rétention, rejet mort, rejet vivant et perte) par rapport au total de la capture de germon sont présentées. Ces résultats préliminaires donnent à penser que la capture non retenue de germon (dont la majeure partie est rejetée à l'état mort) peut représenter une proportion importante de la capture totale et pourrait donner lieu à des sous-estimations de la mortalité par pêche.*

### RESUMEN

*El objetivo de estas contribuciones es evaluar la proporción de atún blanco (Thunnus alalunga) capturado que se retiene a bordo de los palangreros y la proporción que se descarta en el mar basándose en los datos obtenidos por observadores científicos. Los datos se recogieron en buques con pabellón de Uruguay y de Japón que operan en aguas uruguayas y en aguas internacionales adyacentes. El número de atunes blancos observados entre 2006 y 2011 en los buques con pabellón de Uruguay fue de 6.190. En los buques con pabellón de Japón se observaron 85.431 en el periodo 2009-2011. En el documento se presentan las diferentes disposiciones de la captura (retenida, descartada muerta, liberada viva y perdida) con respecto a la captura total de atún blanco. Estos resultados preliminares sugieren que la captura de atún blanco no retenida (la mayoría descartada muerta) puede representar una considerable proporción de la captura total y podrían tener como resultado subestimaciones de la mortalidad por pesca.*

### KEYWORDS

*Albacore tuna, Southwestern Atlantic, Catch disposition,  
Non-retained capture, Longline fisheries*

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## 1 Introduction

Classification of fishing vessel's capture as retained and non-retained (i.e. released alive, discarded dead or lost) by scientific observers can be used to perform estimations of the proportion of total catch that is not reported on logbooks. Depending on the magnitude of discards over the retained catch, this category may represent an important factor to be considered for species abundance and fishing mortality estimations, and fishing efficiency assessments (Domingo *et al.* 2011a).

The objective of this study was to assess the proportion of captured albacore that is effectively retained onboard and the proportion that is discarded back at sea.

## 2 Material and methods

Data was obtained by scientific observers from the National Observer Program on board the Uruguayan Tuna Fleet (PNOFA) between 2006 and 2011. Two longline fleets were considered, the Uruguayan longline fleet and the Japanese longline fleet.

The Uruguayan tuna fleet operates mainly in the Southwestern Atlantic in Uruguayan jurisdictional waters (UEEZ) and adjacent international waters. The effort observed between 2006 and 2011 reached 1,928,195 hooks in 53 fishing trips. Observer's coverage, in relation to the total effort of the Uruguayan tuna fleet, averaged 46.8% between 2009 and 2011 (range: 33.5-72.4%). Japanese-flagged vessels operated almost exclusively within the UEEZ with an experimental fishing license during austral autumn and winter of 2009-2011. Coverage of this fleet was 100%, representing a total effort of 2,427,395 hooks in 25 fishing trips.

The Uruguayan longline fishery targets mainly swordfish (*Xiphias gladius*) and tunas (bigeye tuna *Thunnus obesus* and yellowfin tuna *T. albacares*), and in some cases blue shark (*Prionace glauca*), whereas the Japanese fleet targeted mainly bigeye tuna. In both fleets, however, albacore tuna (*T. alalunga*) is taken mostly as accompanying fauna.

Data recorded for each fishing set included: effort (number of hooks), total catch (regardless of species), total albacore catch, and catch disposition. This latter category was further classified in four categories: retained, released alive, discarded dead or lost. The lost catch refers to the proportion of total capture that becomes detached from the gear at the moment of hauling. This can be caused by operating problems (i.e. the tension of the gear, if contrary to the direction of the ship, may cause the fish to be lost if the ship does not stop in time), or if the species caught is of low commercial value, in which case the skipper will not stop the vessel (Domingo 2002). The nominal CPUE was calculated as the number of individuals every 1,000 hooks (ind./1,000 hooks).

## 3 Results and discussion

Between 2006 and 2011, the Uruguayan longline fleet captured a total of 6,190 albacores (**Table 1**). Average albacore CPUE was 6.3 ind./1,000 hooks ( $\pm 7.1$  s.d.) per fishing trip, and was not statistically different among years (Kruskal-Wallis,  $\chi^2 = 3.8231$ ,  $df = 5$ ,  $p = 0.575$ ; **Figure 1**). Mean proportion of this species in the total catch per fishing trip was low, and although some variability was observed there were no significant differences between years (Kruskal-Wallis,  $\chi^2 = 5.2838$ ,  $df = 11$ ,  $p = 0.917$ ; **Figure 2**). On average, albacore captures represented 7.6% ( $\pm 7.8$ ) of total catch and only in 24.5% of all fishing trips analyzed the percentage exceeded 10% (range: 0.2-33.0%). Considering all fishing trips combined, the proportion of non-retained albacore was 12.2% (81.1% discarded dead, 12.4% lost and 6.5% released alive), comprising a total of 757 individuals. Non-retained capture per trip averaged 10.8% ( $\pm 9.6$ ) and was not significantly different among years (Kruskal-Wallis,  $\chi^2 = 9.3331$ ,  $df = 11$ ,  $p = 0.591$ ; **Figure 3**).

Fishing effort of the Japanese fleet was 1.3 times higher than that of the Uruguayan fleet, even though the former operated only from 2009 to 2011. Pooled nominal albacore CPUE of this fishery was 11 times higher than that of the Uruguayan fishery, comprising a total catch of 85,431 individuals (**Table 1**). Albacore CPUE per trip was considerably higher when compared with the Uruguayan fishery (Mann-Whitney,  $U = 1,289$ ,  $p < 0.01$ ), being on average 36.1 ind./1,000 hooks ( $\pm 18.8$ ). Mean proportion of albacore in the total catch per fishing trip was also much higher than that of the Uruguayan fleet (Mann-Whitney,  $U = 1,321$ ,  $p < 0.01$ ) and was not significantly different among years (Kruskal-Wallis,  $\chi^2 = 0.7243$ ,  $df = 2$ ,  $p = 0.696$ ; **Figure 2**). On average, albacore captures represented 47.0% ( $\pm 11.8$ ) of total catch, and in all fishing trips analyzed was higher

than 25% (range: 27.6-72.2%). Considering all fishing trips combined, the proportion of non-retained albacore was 3.6% (77.5% discarded dead, 16.5% lost and 6.0% released alive), comprising a total of 3,041 individuals. Mean non-retained albacore catch per trip ( $3.7\% \pm 1.3$ ) was lower than that of the Uruguayan fleet (Mann-Whitney,  $U = 353.5$ ,  $p < 0.01$ ) and was not significantly different among years (Kruskal-Wallis,  $\chi^2 = 4.9183$ ,  $df = 2$ ,  $p = 0.0855$ ; **Figure 3**).

Nonetheless, the differences mentioned above should be interpreted with caution as they are just gross comparisons that are most likely being affected by several factors such as fishing gear configuration, season, water temperature, fishing area and depth that have not been considered here. In this regard a more thorough and rigorous statistical analysis that considers some of all of these factors is needed to properly assess the differences among both fleets. Pons & Domingo (2012) compared catch and effort data of both fleets in the same area (UEEZ) and during the same period and found that the Japanese fleet presented almost 4 times higher catchability for albacore than the Uruguayan fleet. A higher catchability for bigeye tuna was also observed by Domingo et al. (2011b). This difference may be due to the depth at which the fishing gear operates. Uruguayan-flagged vessels set the fishing gear from 30 to 100 m deep, while the Japanese fishery set it between 100 and 200 m deep (Domingo et al. 2011b). Also, the gear configuration of both fleets is different, with the Japanese fleet using smaller hooks and much longer branchlines.

Although the Japanese fleet had an overall higher percentage of retention (96.4%) than the Uruguayan fleet (87.8%), in terms of number of individuals discarded dead, the former discarded 4 times more than the latter (**Table 1**). However, given the much lower observer coverage and the on average higher percentage of non-retained albacore catch by the Uruguayan longline fishery, this difference might in fact be smaller.

In any case, these preliminary results suggests that the non-retained catch of albacore (most of it being discarded dead) may indeed represent a considerable proportion of the total catch, which at the same time is not being reflected in logbooks and landing reports. In the case of vessels with an indoor fishing deck this proportion might be even greater because of the difficulty to observe the lost catch. Thus, depending on the magnitude of this category in relation to the total catch, estimations such as fishing mortality, fishing efficiency and relative abundance might be underestimated. This issue should be studied in better detail in order to assess if it should be incorporated in future stock evaluations.

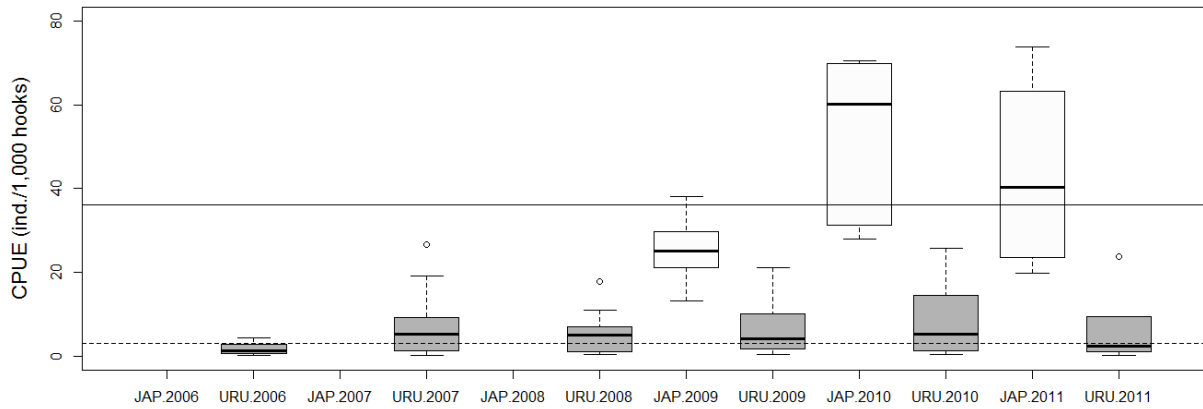
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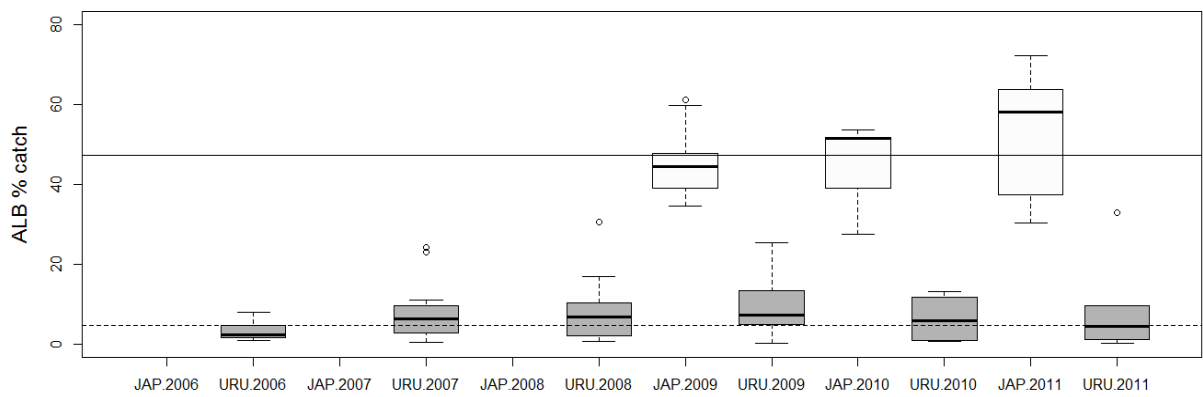
**Table 1.** Albacore catch statistics and disposition for the Japanese and Uruguayan pelagic longline fleet operating in Uruguayan jurisdictional waters and adjacent international waters.

Fleet	Effort	Tot. Catch	ALB Tot. Catch	CPUE	% ALB	n Ret.	% Ret.	n Non-Ret.	% Non-Ret.	n Disc.	% Disc.	n Lost	% Lost	n RA	% RA	
Japan	Total	2427395	180657	85431	35.19	47.3	82390	96.4	3041	3.6	2357	77.5	502	16.5	182	6.0
	Mean	97095.80	7226.28	3417.24	36.10	46.95	3295.60	96.26	121.64	3.74	94.28	77.0	20.08	16.5	7.28	6.5
	s.d.	40911.03	3642.49	2185.54	18.78	11.75	2116.98	1.27	80.35	1.27	63.72	13.75	22.96	13.33	11.25	8.77
Uruguay	Total	1928195	129968	6190	3.21	4.8	5433	87.8	757	12.2	614	81.1	94	12.4	49	6.5
	Mean	36381.04	2452.23	116.79	6.32	7.58	102.51	89.24	14.28	10.76	11.58	78.78	1.77	14.63	0.92	6.58
	s.d.	53336.50	3142.84	155.99	7.12	7.80	143.61	9.58	19.97	9.58	17.13	26.99	3.29	21.74	2.84	18.12

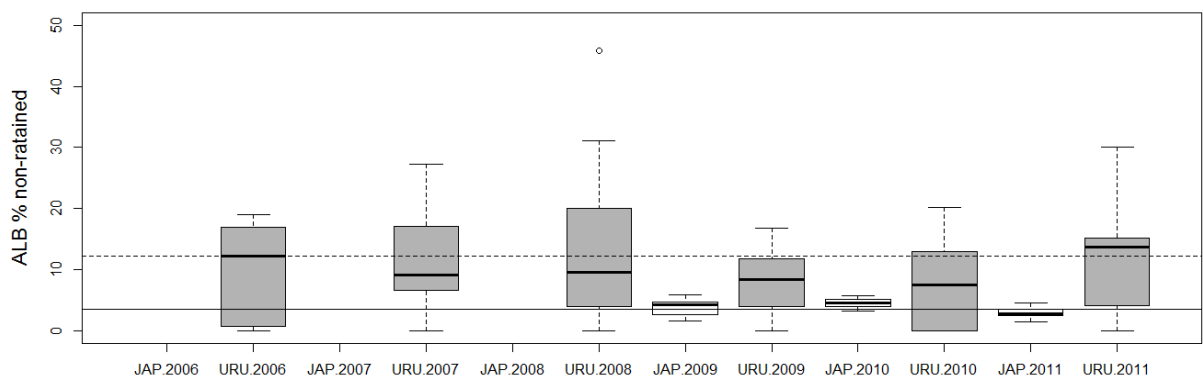
**Tot. Catch:** fleet total catch; **ALB Tot. Catch:** albacore total catch; **CPUE:** albacore nominal catch per unit of effort (ind./1,000 hooks); **% ALB:** percentage of total catch represented by albacore; **n Ret.:** number of albacore retained on board; **% Ret.:** percentage of total albacore catch that was retained on board; **n Non-Ret.:** number of albacore captured but not retained on board; **% Non-Ret.:** percentage of total albacore captured that were not retained on board; **n Disc.:** number of albacore discarded dead; **% Disc.:** percentage of total albacore captured but not retained that were discarded dead; **n Lost:** number of albacore lost during hauling; **% Lost:** percentage of total albacore captured but not retained that were lost during hauling; **n RA:** number of albacore released alive; **% RA:** percentage of total albacore captured but not retained that were released alive.



**Figure 1.** Albacore tuna CPUE by year for the Uruguayan longline fishery (grey boxes) and Japanese longline fishery (white boxes). Solid and dashed horizontal lines indicate the overall mean for the Japanese and Uruguayan fisheries, respectively.



**Figure 2.** Percentage of Albacore tuna over total catch for the Uruguayan longline fishery (grey boxes) and Japanese longline fishery (white boxes). Solid and dashed horizontal lines indicate the overall mean for the Japanese and Uruguayan fisheries, respectively.



**Figure 3.** Proportion of total Albacore tuna captured by the Uruguayan longline fishery (grey boxes) and Japanese longline fishery (white boxes) that was not retained on board. Solid and dashed horizontal lines indicate the overall mean for the Japanese and Uruguayan fisheries, respectively.