FIRST MASSIVE TAGGING OF TROPICAL TUNAS AROUND THE SIERRA LEONE RISE

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SUMMARY

In the framework of the ICCAT/AOTTP Phase 1 tagging activities, an important amount of tags was deployed around the seamounts of the Sierra Leone Rise (latitudes 6º to 9º30N, longitudes 20 to 24ºW), with a total of 17675 fish tagged from October 27th to November 16th 2016, and from February 19th to March 18th 2017. It was the first massive tuna tagging done in that region. This document describes the activities done in that region and shows some features of different seamounts in terms of species and size distributions of the tunas tagged.

RÉSUMÉ

Dans le cadre des activités de marquage de la phase 1 de l'ICCAT/AOTTP, une importante quantité de marques a été apposée autour des monts sous-marins de la Sierra Leone Rise (latitudes 6º à 9º30N, longitudes 20 à 24ºW), avec un total de 17.675 poissons marqués du 27 octobre au 16 novembre 2016, puis du 19 février au 18 mars 2017. Il s'agissait du premier marquage massif de thon effectué dans cette région. Ce document décrit les activités réalisées dans cette région et montre certaines caractéristiques de différents monts sous-marins en termes de répartition des espèces et de distribution des tailles des thons marqués.

RESUMEN

En el marco de las actividades de marcado de la fase 1 de ICCAT/AOTTP, se implantó una importante cantidad de marcas alrededor de los montes submarinos de la elevación de Sierra Leona (latitudes 6º a 9º30N, longitudes 20 a 24ºW), con un total de 17.675 peces marcados, entre el 27 de octubre y el 16 de noviembre de 2016 y entre el 19 de febrero y el 18 de marzo de 2017. Fue el primer marcado masivo histórico de túnidos hecho en esa región. Este documento describe las actividades de marcado realizadas en esta región, así como las características de diferentes montes submarinos en términos de distribución de especies y tamaños de los túnidos marcados.

KEYWORDS

Tropical tunas, tagging, Sierra Leone Rise

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1. Introduction

The Sierra Leone Rise, located in the east equatorial Atlantic (**Figure 1**), forms a discontinuous chain of seamounts extending with a general NE-SW trend from near the Sierra Leone Coast of Africa, to the St Paul fracture zone near the Mid-Atlantic Ridge (Bonté and Labeyrie 1978)

Tuna tagging was done historically (1955-1998) around some of the northern seamounts of the Sierra Leone Rise (Hallier 2005, Fonteneau, *pers.comm.*). However these tagging events were relatively isolated, and limited in terms of numbers. During the BETYP Program either, no tagging was performed in this area.

The Sierra Leone Rise is an interesting region, both for its location and its bathymetry: it is located between the central Tropical Atlantic and the Gulf of Guinea Ecosystem (Binet and Marchal 1993), which constitutes an important nursery area for juvenile tropical tunas (Hallier 2005); and seamounts in tropical areas may enhance foraging by yellowfin tunas (Fonteneau, 1991). Furthermore, according to empirical observations by baitboat skippers from Dakar, some of these seamounts might be "hub" areas, i.e. where many individuals are doing a short stop over, but quickly moving towards remote areas (Hallier and Fonteneau, 2012).

In the framework of the ICCAT-AOTTP Phase 1 tagging program, four tagging trips were led around the Sierra Leone Rise and adjacent region, during which 17675 tunas were tagged, both at FADs deployed around the seamounts by baitboat vessels from Dakar, and at two of the seamounts themselves, the Machucambo and the Rompetodo seamounts (Salmerón et al 2015).

2. Tagging trips around the Sierra Leone Rise

Four tagging trips occurred around the Sierra Leone Rise, from October 27th to November 16th 2016, and from February 19th to March 18th 2017 (**Table 1**). During these tagging trips, the locations visited as seamounts were the Machucambo and the Rompetodo. The other tagging locations corresponded to dFADs situated near other seamounts: Hirondelle, Mc Gowan, Murchison, Flanagan, Jane, Whitney, Prince Albert, Princesse Alice seamounts (**Figures 2, 3a and 3b**).

3. Species and size categories tagged

A total of 17675 tunas were tagged around the Sierra Leone Rise, in a total of 22 tagging days (**Table 1**).

Among the different locations at which tunas were tagged, we could observe an important variability in terms of species and size composition. In this document, we will focus on three of them: the percentage of bigeye tuna, the percentage of little tunny, and the percentage of large (>70 cm) yellowfin and bigeye tunas. Due to the selectivity that we applied regarding skipjack tunas (in the 2nd trip) and on yellowfin tunas (in the first half of the 5th trip) so as not to exceed some partial targets, the amounts and size distributions of these two species do not fully correspond to the ones present in the region.

The abundance of little tunnies was low and their distribution was relatively heterogenous, with dFADs comprising significant amounts of little tunnies close to other ones comprising no little tunny. As a general trend, we can note that little tunnies were found mainly between latitudes 8º00' and 9º00'N (**Figure 4**), and the zones where they were found in largest amounts were situated east from the longitude 21º00'W, which is consistent with the relatively more coastal usual distribution of this species.

Bigeye tuna was present in most of the tagging locations, with highest proportions found at the Rompetodo seamount (where medium to large fish were present), and at two dFADs east of the main seamount chain (8º00'N-19º40'W and 9º00'N-19º40'W). One feature is their very low proportion in all tagging events around the Machucambo seamount (**Figure 5**), where the most represented species was the yellowfin tuna, as well as in the easternmost locations near the Guinean terrace. Bigeye tuna is known to be usually found in more offshore locations than yellowfin or skipjack, therefore its lower abundance in the easternmost locations is expectable, however its scarcity around the Machucambo seamount might be related to other features such as interspecies competition, for example if the yellowfin tuna uses more efficiently the local ecological niche. Anyway, so far, we do not have enough information to interpret this feature.

Large tunas were generally scarce during the activities led in zones A (during summer 2016) and zone B (fall 2016 through winter 2017). The main place in which we found tunas large enough to deploy pop-up tags was the Rompetodo seamount, which was also the only place where the proportion of large tunas was superior to 15% (**Figure 6**).

Other locations with significant proportions of tunas with size superior to 70cm were all located west from the longitude 21º30'W, which is consistent with the usually more oceanic distribution of large tunas *versus* juveniles.

4. Features observed on fish tagged at the Machucambo seamount

The Machucambo seamount was visited on February 20th, 23rd, March 2nd and 3rd. 458 tunas were tagged tagged on February 20th, none of them was recovered on February 23rd.

On March 2nd a massive tagging was done in the same location (**Table 1**). Among the 656 fish tagged on February 20th and 23rd (i.e. less than two weeks before, in the same location), only one was recaptured on that day.

On March 3rd on the morning the tagging occurred again at the same location. 1744 fish were tagged, among which none of the 2932 ones tagged the day before appeared.

Moreover, among the first individuals tagged on March 3rd we encountered an important proportion of large (>70cm) yellowfin tunas, whereas this size category was much scarcer the day before.

These observations suggest that the Machucambo seamount would be a "hub" zone for tunas, in which many individuals are doing a short stop over, but quickly moving towards remote areas. This would explain (1) the very low recovery rates observed in very short time-span in the same location, and (2) the observed shift in the size-categories observed on two consecutive days.

The yellowfin tuna represented 73% of the tunas tagged at the Machucambo seamount in the four days of activity in that location (68 to 95% according to the tagging day). Considering that seamounts in tropical areas may enhance foraging by yellowfin tunas (Fonteneau, 1991), we can hypothesize that this seamount would be a "feeding waypoint" for yellowfin tunas during their long-range movements.

5. Conclusive notes

The activities of the ICCAT/AOTTP Phase 1 were an interesting opportunity for an important tuna tagging in the Sierra Leone Rise, where no massive tagging was done historically. This region seems to comprise different zones in terms of size-groups and species distribution. One of the seamounts (Machucambo, located at 9º15'N - 21º20'W) apparently displays features of a "hub" zone, especially for yellowfin tunas. The future recoveries of the tunas tagged in those places will eventually help confirming this hypothesis.

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Table 1. Dates, locations and numbers of tunas tagged in the Sierra Leone Rise region.

trip	date	Tagging spots	Latitude [range]	Longitude [range]	Total tagged
1	27/10/2016	dFADs around Hirondelle and Mc Gowan seamounts	[8º20'-9º10'N]	[20º00'-20º40'W]	1969
1	28/10/2016	dFADs between Murchison and Flanagan seamounts	8º15'N	21º20'W	1130
1	29/10/2016	Rompetodo seamount	6º20'N	22º40'W	758
2	11/11/2016	dFAD near Jane Seamount	9º00'N	18º24'W	300
2	15/11/2016	Free schools between Whitney and Flanagan seamounts	8º45'N	21º20'W	196
2	16/11/2016	Free schools between Whitney and Flanagan seamounts	8º45'N	21º20'W	27
5	19/02/2017	dFADs between Hirondelle, Whitney and McGowan seamounts	[8º20'-9º00'N]	[20º10'-21º00'W]	1279
5	20/02/2017	Machucambo seamount	9º15'N	21º20'W	458
5	21/02/2017	Rompetodo seamount	6º20'N	22º40'W	452
5	22/02/2017	Rompetodo seamount	6º20'N	22º40'W	345
5	23/02/2017	Machucambo seamount	9º15'N	21º20'W	198
5	24/02/2017	dFADs east of the main seamount chain	[8º00'-9º00'N]	19º40'W	604
5	01/03/2017	dFAD near McGowan seamount	8º30'N	20º45'W	47
5	02/03/2017	Machucambo seamount	9º15'N	21º20'W	2932
5	03/03/2017	Machucambo seamount	9º15'N	21º20'W	1744
6	16/03/2017	dFADs near Prince Albert seamount	9º00'N	[19º30'-20º10'W]	3448
6	17/03/2017	dFADs east of Princesse Alice seamount	[8º35'-8º45'N]	[19º00'-19º50'W]	404
6	18/03/2017	Rompetodo seamount	6º20'N	22º40'W	1384

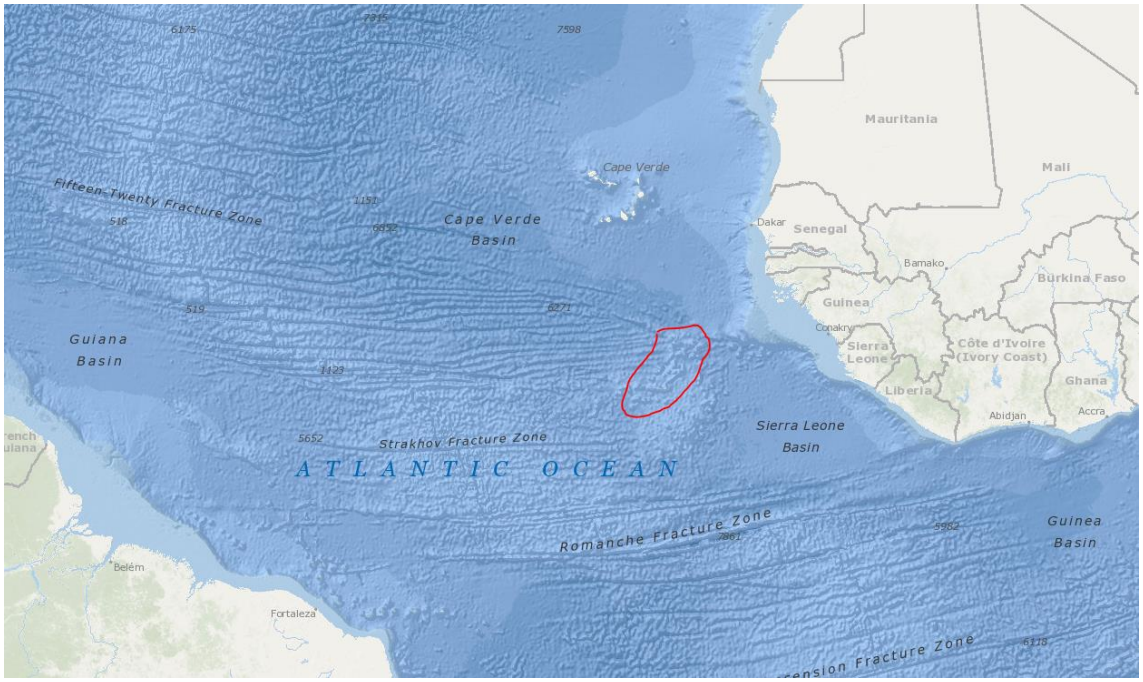

Figure 1. Location of the Sierra Leone Rise in the tropical Atlantic Ocean.

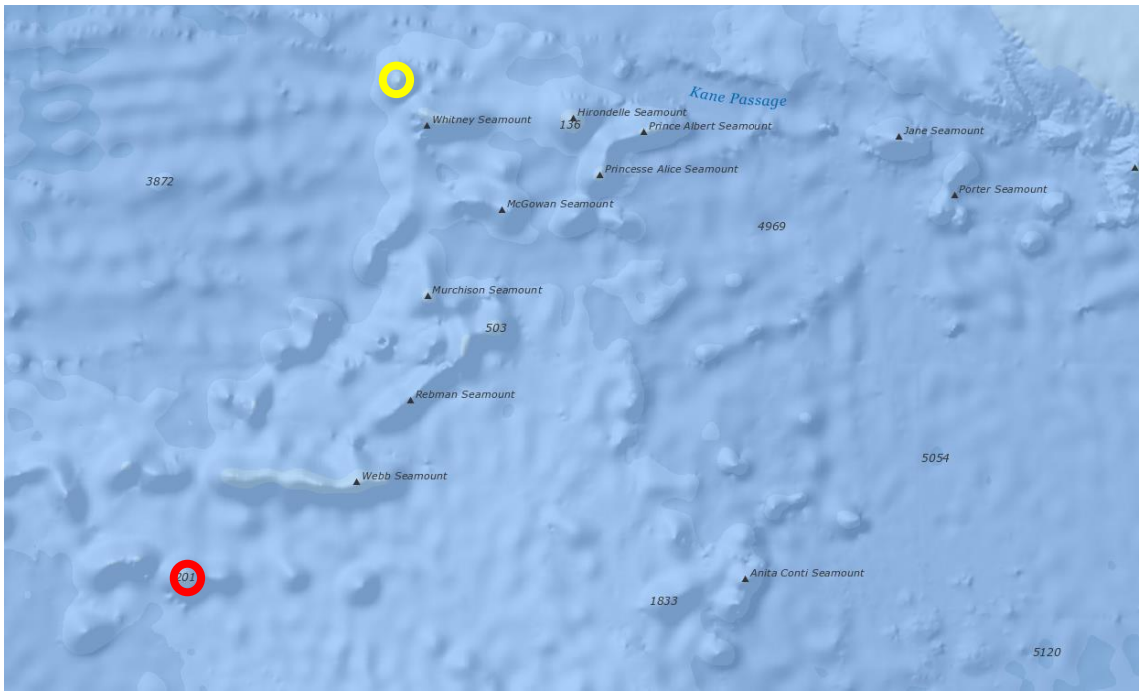

Figure 2. Detail of the seamounts of the Sierra Leone Rise. Rompetodo and Machucambo seamounts indicated with the red and yellow circle, respectively.

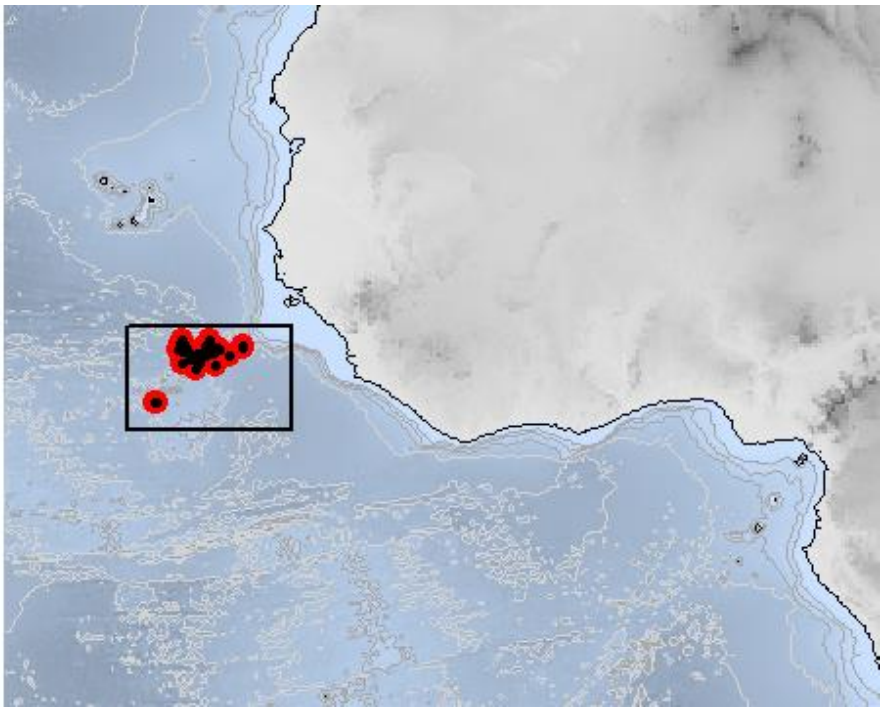

Figure 3a. Release locations of the tunas tagged in the Sierra Leone Rise region.

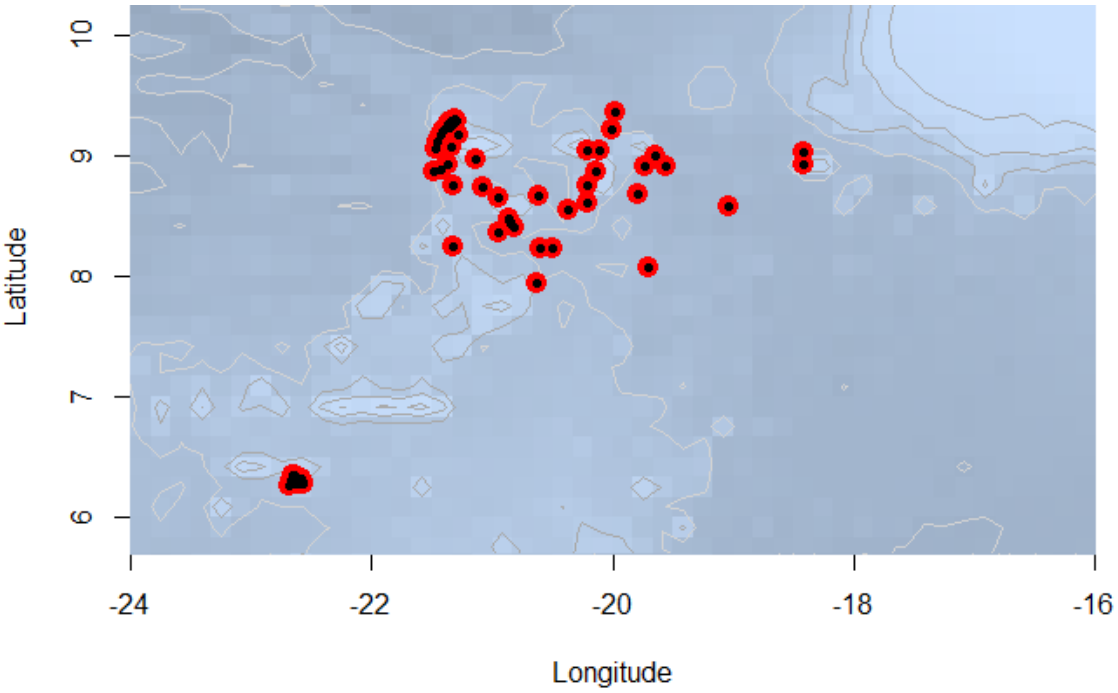

Figure 3b. Release locations of the tunas tagged in the Sierra Leone Rise region (zoom).

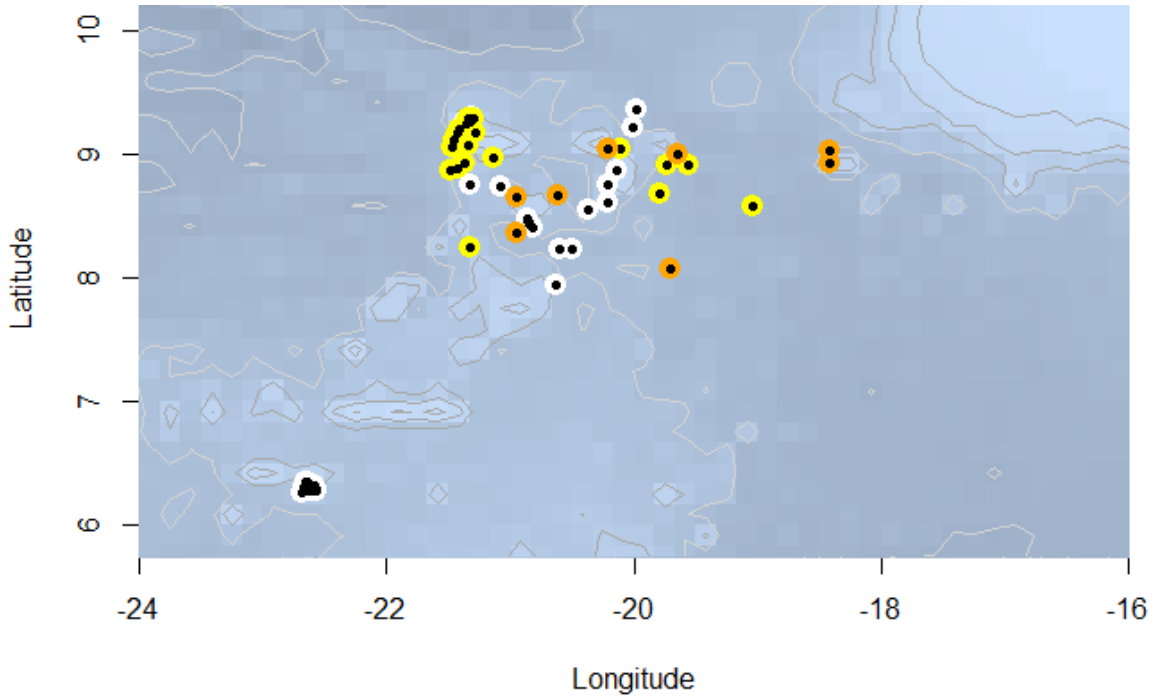

Figure 4. Proportion of little tunny in the tunas tagged in the Sierra Leone Rise region: 0% (white dots), <5% (yellow dots), 5 to 15% (orange dots).

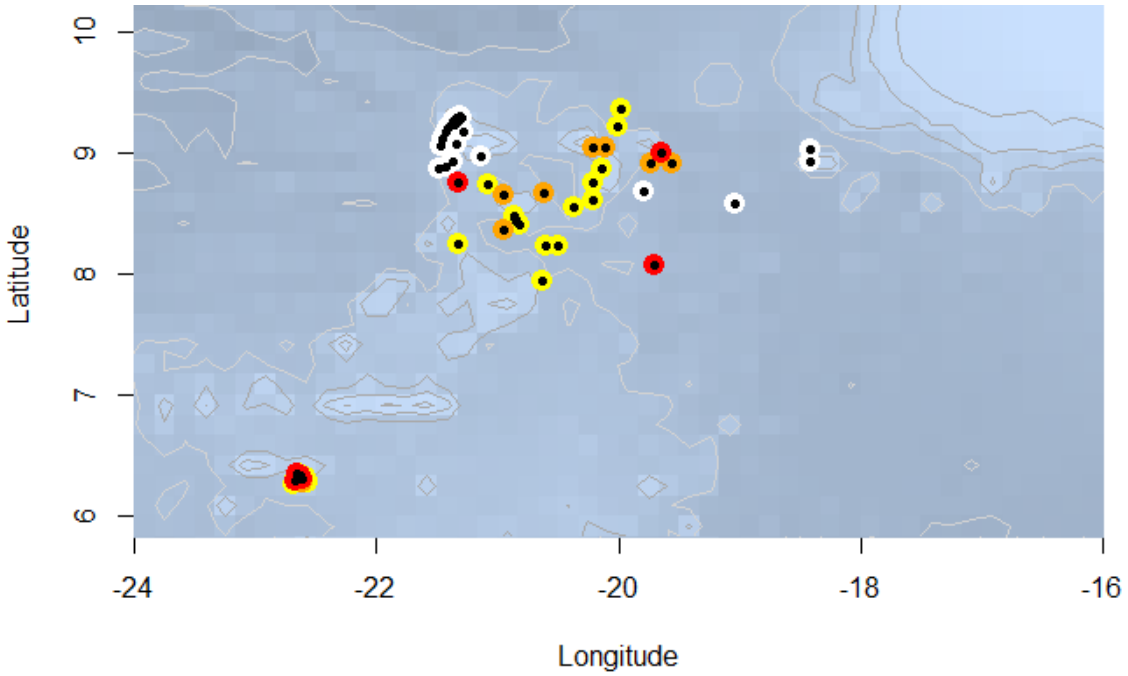

Figure 5. proportion of bigeye tuna in the tunas tagged in the Sierra Leone Rise region: <5% (white dots), 10 to 20% (yellow dots), 30 to 50% (orange dots), over 50% (red dots).

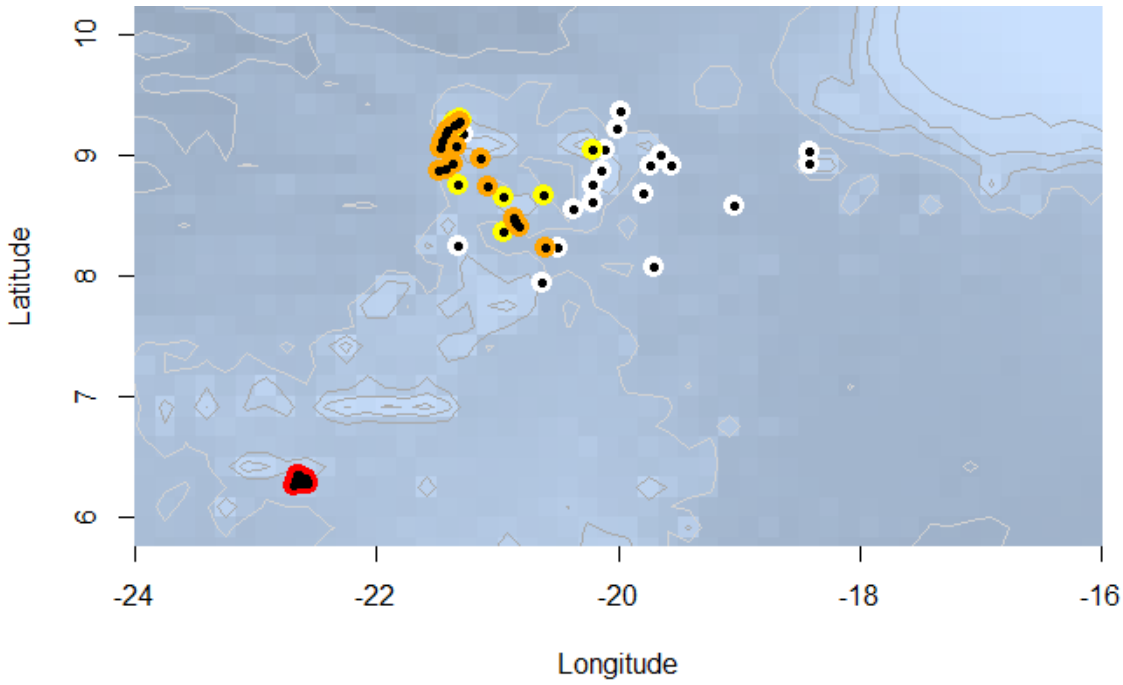

Figure 6. Proportion of large yellowfin and bigeye tuna in the tunas tagged in the Sierra Leone Rise: <1% (white dots), 1 to 10% (yellow dots), 10 to 15% (orange dots), over 15% (red dots).