

**MIGRATIONS STUDY AND SIZE STRUCTURE OF THE LITTLE
TUNNY (*Euthynnus alletteratus*) IN THE EASTERN CENTRAL
ATLANTIC OCEAN BASED ON CONVENTIONAL TAG
RELEASE-RECAPTURE DATA.**

Salimata Tall, Kamarel Ba and Fambaye Ngom

Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT-Senegal)

Introduction

- The conventional tag release-recapture database (July 2016 to October 2020) used in this work was built up during the AOTTP program.
- It involves several tuna species including bigeye (BET), skipjack (SKJ), yellowfin (YFT), and little tunny (LTA).
- Our presentation focuses on the latter and aims to study the distribution and migrations of this species by using all information available on the database.
- The information extracted from the database is in a format that allows (1) mapping of the species distribution and migration, in which three different areas were defined : area A (Senegal – Mauritania), area B (Guinea Bissau – Sierra Leone) and area C (Côte d'Ivoire to Gulf of Guinea); (2) describe the seasonal and zonal migratory flux and (3) analyze the individuals size structure.

Materials and methods

The minimum distance covered d (in Nm) was calculated by measuring the length of a straight line between the tagging position (re) and the recapture position (rc) (Arrizabalaga et al. 2002) using the following equation :

$$d = \cos^{-1}(\sin(lat_{re}) \times \sin(lat_{rc}) + \cos(lat_{re}) \times \cos(lat_{rc}) \times \cos(lon_{re} - lon_{rc})) \times \frac{R}{1.852}$$

R , the radius of the Earth is estimated at $R = 6378.145$ km.

The azimuth A taken by the fish once released in water was calculated using the formula :

$$A = 2 \times \arctan\left(\frac{y}{\sqrt{x^2 + y^2} + x}\right)$$

$$x = \cos(lat_{re}) \times \sin(lat_{rc}) - \sin(lat_{re}) \times \cos(lat_{rc}) \times \cos(lon_{rc} - lon_{re})$$

$$y = \sin(lon_{rc} - lon_{re}) \times \cos(lat_{rc})$$

The individuals considered in the analyses were those that have exceeded at least 15 days of liberty.

Subdivision of the study area



- **Area A** : Mauritania - Sénégal
- **Area B** : Guinea Bissau - Liberia
- **Area C** : Côte d'Ivoire - Gulf of Guinea

Statistical analyses

Normality test of Shapiro-wilk : to check size distribution of the specimens

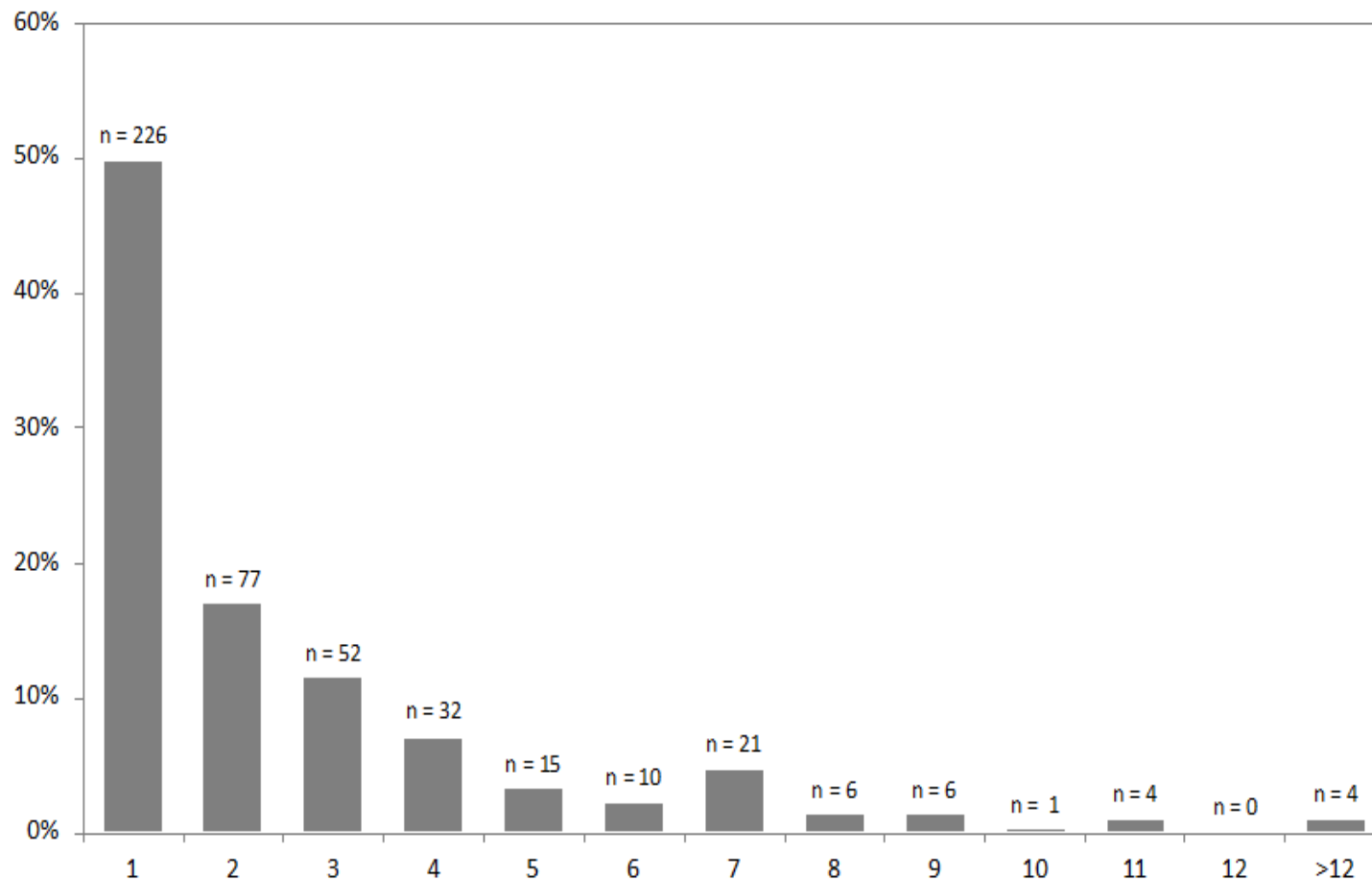
Bartlett test : for the homogeneity of variances

Wilcoxon test : to compare size distribution between tagged then recaptured specimens in each area

Kruskal-Wallis test : to compare size distribution per area

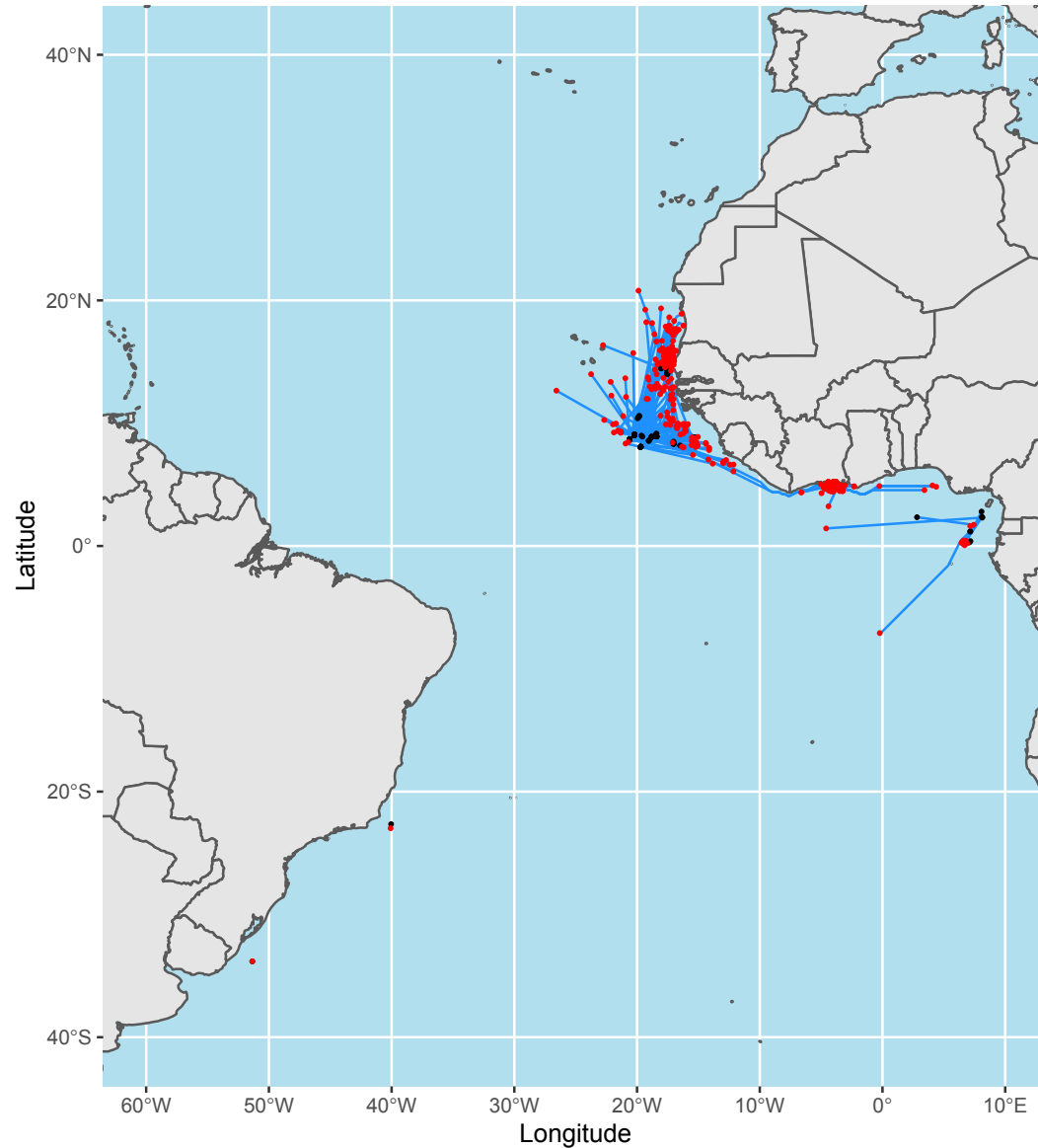
Kruskal-Wallis MC : to compare pairwise group

Time of Liberty



- Mean time of liberty ~62 days
- About 66% fish are recaptured within 3 month

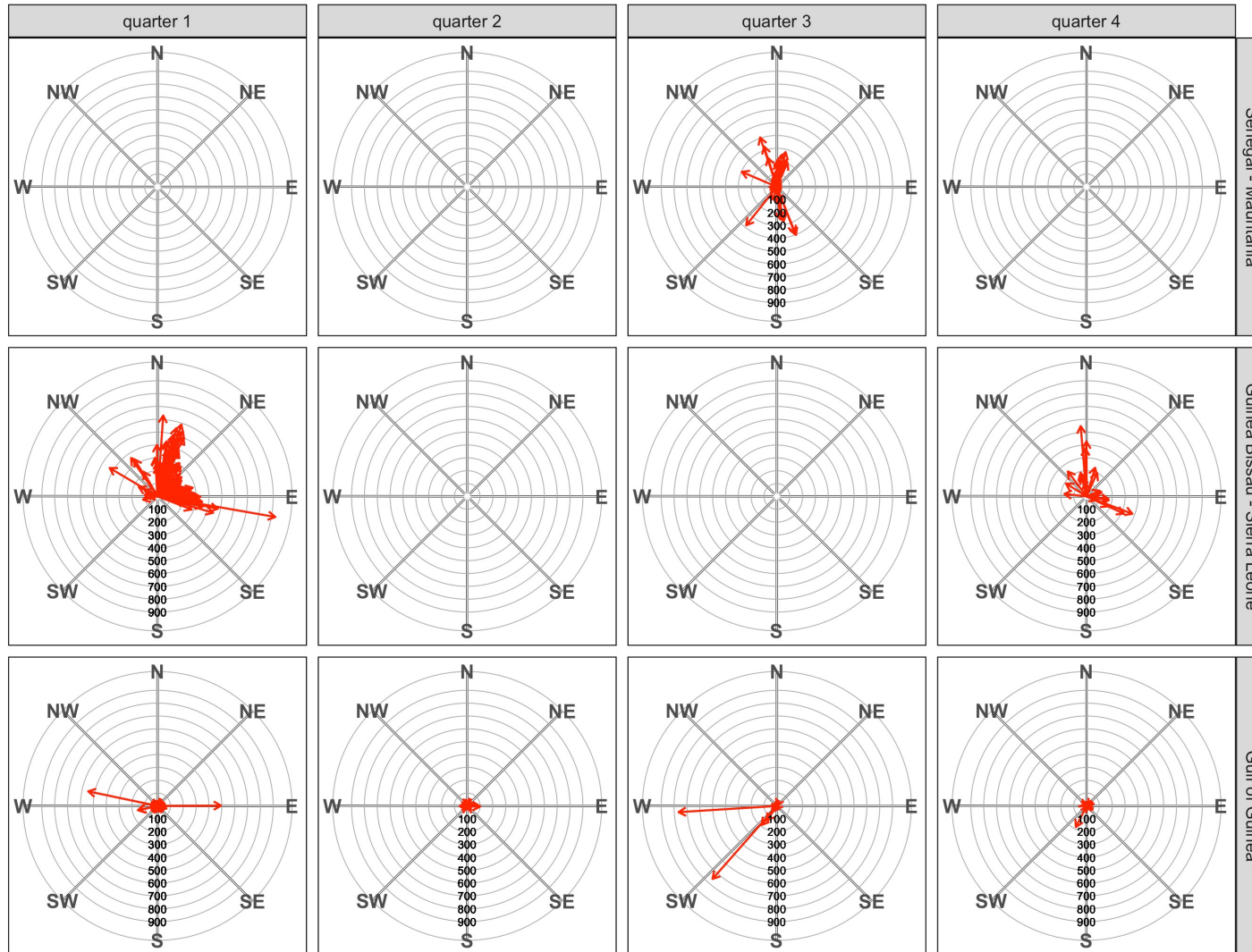
Results



- 454 tagged individuals have been recaptured including 2 isolated specimens off the Brazilian coasts, not included in the analyses;
- Individuals tagged off Côte d'Ivoire, very clustered except few;
- Northward and southward movements for specimens tagged in Senegal;
- Max distances covered by individuals tagged off Guinea

Fig. 1: Spatial distribution of tagged (black dots) and recaptured (red dots) little tunny in the Atlantic Ocean. The blue lines represent the distances covered.

Distance covered and azimuth



Up to 400 Nm, mean distance = 172.8 Nm

Mean distance covered : 306.7 Nm in 1st quarter and 228.6 Nm in 4th quarter

Mean distance covered : 31.9, 28.1, 222.2 and 22.2 Nm, respectively in 1st to 4th quarters

Fig. 3 : Distance covered and azimuth of tagged fish by area and release quarter.

Days in liberty and azimuth

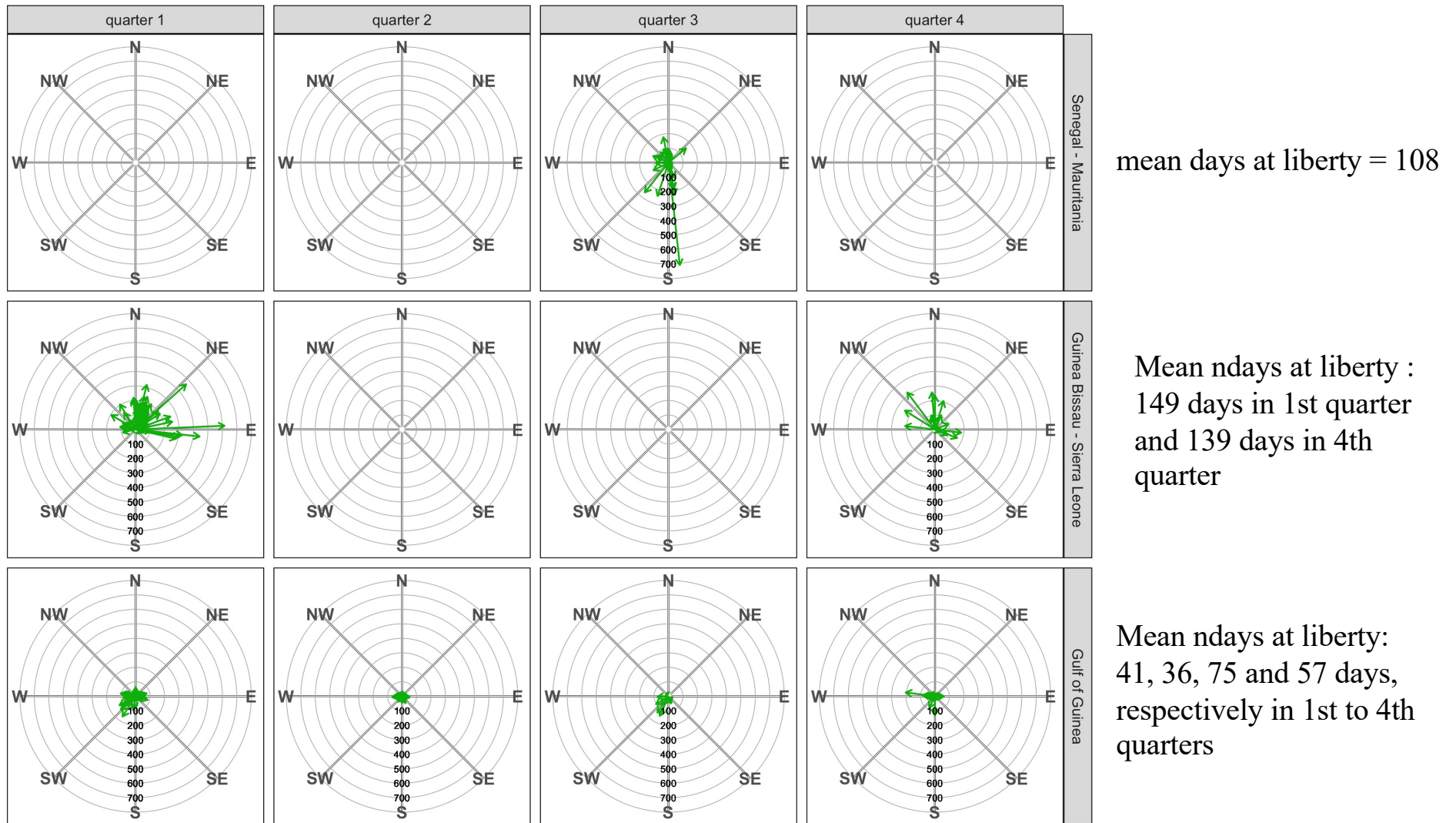
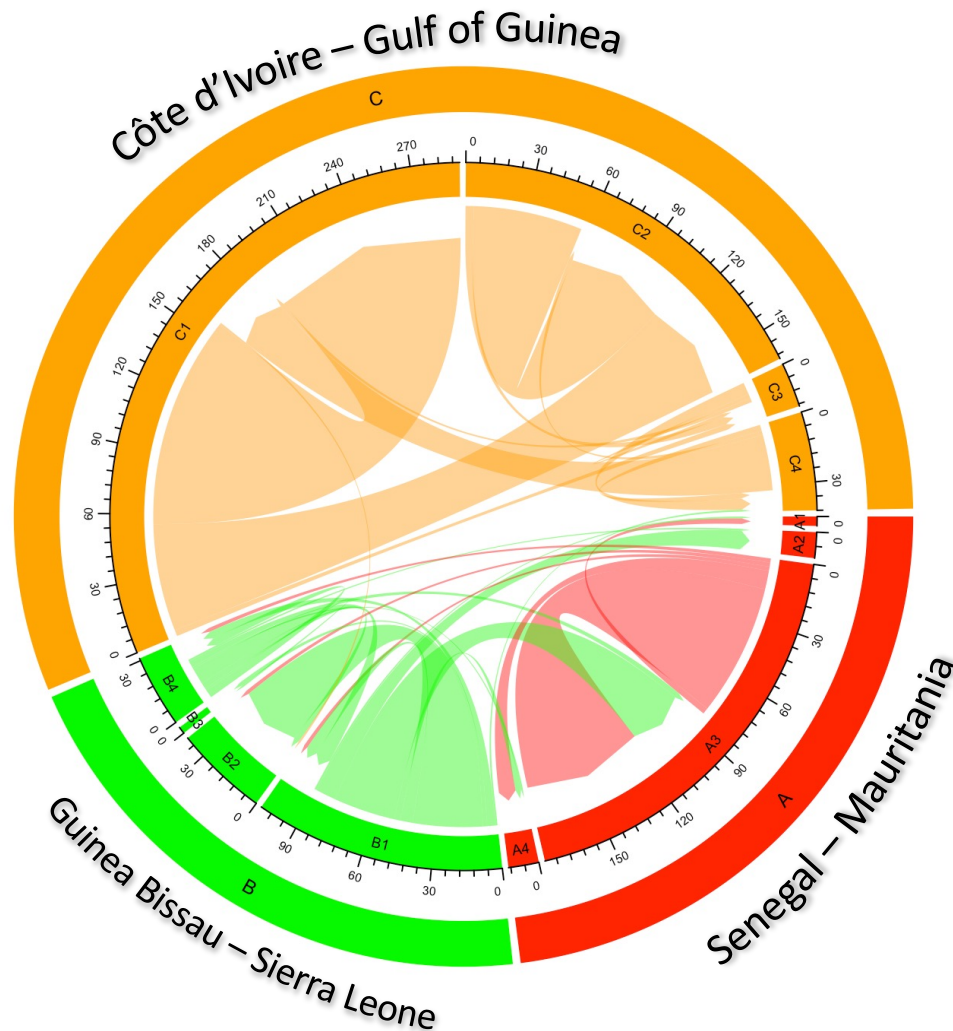


Fig. 4 : Number of days at liberty and azimuth of tagged fish by area and release quarter.

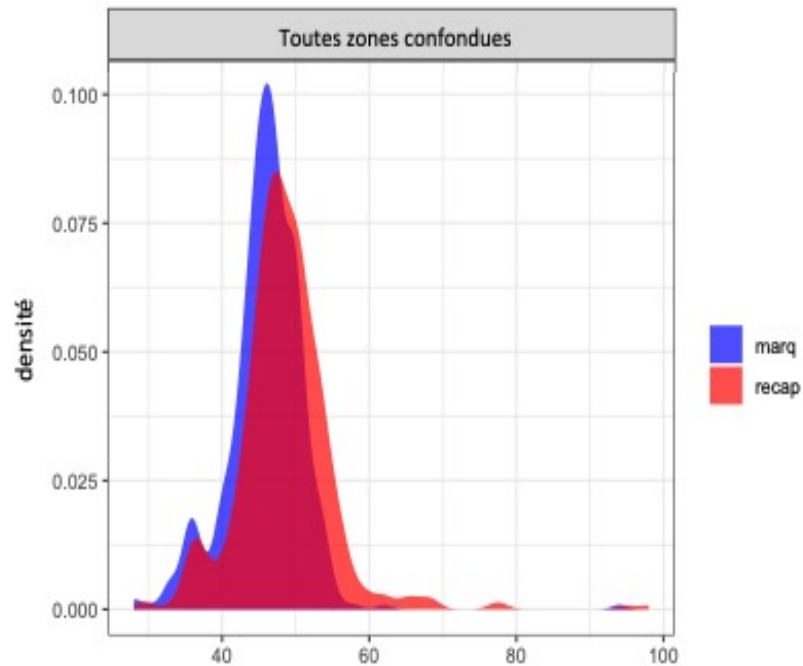
Spatiotemporal migratory flow of little tunny



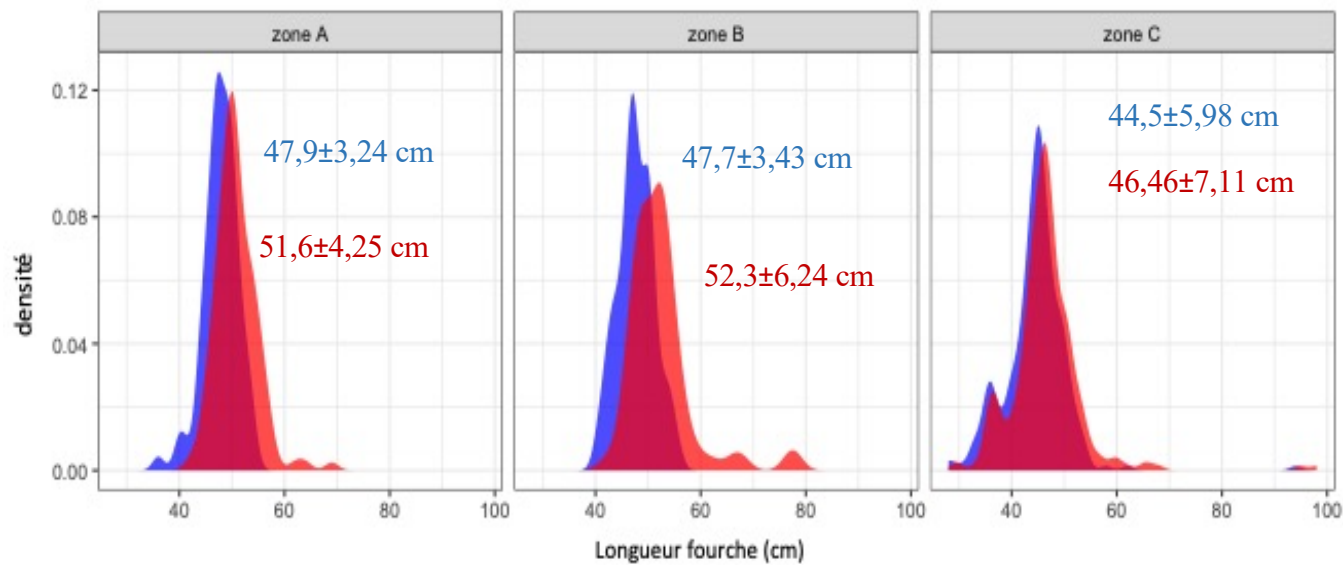
from	to quarter	area A				area B				area C			
		1	2	3	4	1	2	3	4	1	2	3	4
area A	3	3		64	9	2	2		2				
	4												
area B	1	1	10	30	3	6	34	2	4				1
	2												
	3												
	4		1	3	1	8	3	1	4				
area C	1						1			103	52	3	
	2										53	4	
	3									2		2	6
	4									27	2		3

Area A = Senegal-Mauritania, area B = Guinea Bissau-Sierra Leone and area C = Côte d'Ivoire-Gulf of Guinea.

Size structure



Area	Obs. Diff	Seuil critique	Difference
A-B	12,45372	45,44992	Non
A-C	104,95514	39,64340	Oui
B-C	92,50142	35,38589	Oui



Thank you