

## THE CONVENTIONAL TAGGING INFORMATION FOR SHARKS SPECIES AVAILABLE IN THE ICCAT DATABASE

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### SUMMARY

*This document provides a brief summary of the data currently available in the ICCAT database regarding shark conventional tagging.*

### RÉSUMÉ

*Le présent document fournit un bref résumé des données actuellement disponibles dans la base de données de l'ICCAT en ce qui concerne le marquage conventionnel des requins.*

### RESUMEN

*Este documento proporciona un resumen breve de los datos actualmente disponibles en la base de datos de ICCAT respecto al marcado convencional de tiburones.*

### KEYWORDS

*Tagging, Sharks, Porbeagle, Shortfin mako, Blue shark*

### Introduction

This document provides a summary of the current conventional tagging information available for shark species in the ICCAT database. The tagging of sharks using conventional tags has long been recognized as a valuable means for studying various aspects of their life history, migrations and movements, and population structure. The secretariat has received tagging information on the principal shark species dating back to 1959. The database currently contains a great deal of releases and recaptures although, unfortunately the vast majority of the information is only for the three principal shark species (Porbeagle; *Lamna nasus*, Shortfin Mako; *Isurus oxyrinchus* and blue sharks; *Prionace glauca*). Presented below are summaries of the information available which should be of use in the proposed Shark Research and Data Collection Programme (SRDCP).

### Results

#### Principle species

The great majority of tagging has been conducted on the blue shark. In total 138535 blue sharks have been tagged since 1959 with 8860 subsequent recaptures (**Table 1**). This results in a recapture rate of 6.4%. The vast majority of recaptures occurred within a year although six individuals were recaptured after 10 or more years at liberty and a further 3 after 15 years at liberty. In total 2172 porbeagle sharks have been tagged and released with 343 recaptures, representing a recapture rate of 15.8% (**Table 2**). In this case, it is likely that reports of releases are incomplete as in early years CPCs only reported releases of recaptured fish. For this species, a very similar recapture rate was noted between 1, 2 and 3 years at liberty. A total of 3 individuals were recaptured after 10 years at liberty and reports exist of several individuals remaining at liberty for longer than 15 years. For shortfin mako sharks, 9282 individuals have been tagged and released with 1241 recaptures, resulting in a recapture rate of 13.4% (**Table 3**). As with blue sharks, the majority of recaptures occurred within a year, although 3 individuals remained at liberty for over 10 years.

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For blue sharks, **Figure 1** shows the distribution of releases and recaptures as a density plot in 5x5 degree squares. The main areas of the releases are from the regions off Ireland, the US, and southern Brazil and Uruguay, while most of the recoveries are from the north central Atlantic region. For porbeagle, the majority of releases have occurred off the North Eastern coast of North America with a few releases in the Atlantic North East (**Figure 2**). Lastly, for shortfin mako sharks, almost all releases and recaptures were concentrated in the northeast coast of the US (**Figure 3**).

### **Other species**

The ICCAT database contains information for non-principal species. In total 2287 release events were recorded for 28 species groups (**Table 4**) although only 88 recaptures have been reported (**Table 5**). The majority of tags have been placed on Dusky (*Carcharhinus obscurus*) and Great Hammerhead sharks (*Sphyrna mokarran*) although these species do not have the highest number of reported recaptures. **Table 6** shows the number of years at liberty for recaptured specimen. Almost all specimens were recaptured within 7 years. For the generic code SHK, 2 individuals were reported as being recaptured after 51 years. The species identification for these individuals is unknown and the release date was submitted as 1940, and as such these are considered errors. Recapture rates are displayed in **Table 7**. If the generic SHK reports are ignored, the highest recapture rates have been recorded for Silky sharks (*Carcharhinus falciformis*) and the lowest for dusky sharks.

**Table 1.** Summary of conventional tag releases and recaptures for blue sharks available in the ICCAT database.

Number of tag Blue shark ( <i>Prionace glauca</i> )			Years at liberty										Unk	ERROR	% recapt*	
Year	Releases	Recaptures	< 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10+	15+						
1959	14	0														
1962	43	0														
1963	134	2	2													1.5%
1964	134	3	2		1											2.2%
1965	255	9	5	4												3.5%
1966	407	6	4		1			1								1.5%
1967	836	17	15		2											2.0%
1968	794	11	7	2	1				1							1.4%
1969	1468	53	46	6	1											3.6%
1970	505	15	7	4	2			1	1							3.0%
1971	546	16	11	5												2.9%
1972	923	25	18	5	1	1										2.7%
1973	361	12	8	3	1											3.3%
1974	630	16	13	2	1											2.5%
1975	809	40	30	5	2	1		1					1			4.9%
1976	1113	56	47	4	2	2		2					1			5.0%
1977	2843	111	92	12	4	2			1							3.9%
1978	3212	164	153	5	3	2							1			5.1%
1979	3807	138	107	20	7				1				2	1		3.6%
1980	3328	88	70	13	2	2		1								2.6%
1981	3121	109	87	9	8	1		2	2							3.5%
1982	2695	69	41	16	9	1						1	1			2.6%
1983	4274	117	59	32	14	5		1	3			1	2			2.7%
1984	2405	57	31	17	5	3							1			2.4%
1985	4471	167	128	20	12	3		2	2							3.7%
1986	2976	106	72	11	9	4		5	3				2			3.6%
1987	2780	81	48	22	8				3							2.9%
1988	3255	140	99	19	8	2		5	1				6			4.3%
1989	2779	143	98	16	11	9		1	4				4			5.1%
1990	3404	170	116	29	9	7			5				4			5.0%
1991	4661	230	162	39	11	2		5	5				6			4.9%
1992	6164	385	249	67	30	9		11	9				9	1		6.2%
1993	5494	374	249	65	19	15		6	7				12	1		6.8%
1994	5572	438	290	50	37	17		3	9			2	30			7.9%
1995	6940	567	249	137	89	33		12	12			2	1	31	1	8.2%
1996	7620	753	386	193	83	36		13	13					29		9.9%
1997	7290	713	383	159	91	34		11	5					30		9.8%
1998	4352	419	218	110	33	20		11	6					19	2	9.6%
1999	3762	343	196	87	23	17		3	8					9		9.1%
2000	3056	315	192	71	26	8		4	4			1		8	1	10.3%
2001	2635	283	151	60	33	14		2	3					19	1	10.7%
2002	2392	239	140	48	24	8		7	3			1		7	1	10.0%
2003	2670	242	121	66	26	12			2					15		9.1%
2004	2391	224	119	60	16	10		3	7					9		9.4%
2005	2198	215	116	48	18	13		5	5					10		9.8%
2006	1600	177	94	46	14	9		2	2					9	1	11.1%
2007	3051	294	148	70	40	16		6	2					11	1	9.6%
2008	3094	244	105	64	35	30		4						6		7.9%
2009	3178	216	111	63	33	7								2		6.8%
2010	3115	162	95	46	15	2								4		5.2%
2011	2113	66	51	12										2	1	3.1%
2012	861	18	17	1												2.1%
2013	4	2	2													50.0%
Grand Total	138535	8860	5260	1843	820	355		130	129		6			302	12	6.4%

**Table 2.** Summary of conventional tag releases and recaptures for porbeagle sharks available in the ICCAT database.

Number of tag Porbeagle ( <i>Lamna nasus</i> )			Years at liberty									Unk	ERROR	% recapt*
Year	Releases	Recaptures	< 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10+	15+				
1961	1	1			1									100.0%
1962	13	13	5	5	2							1		100.0%
1963	2	2	2											100.0%
1965	1	0												
1967	2	0												
1968	1	0												
1978	1	0												
1979	1	0												
1980	4	0												
1981	18	0												
1982	9	2			2									22.2%
1983	31	8	2		2		2	2						25.8%
1984	21	6			2			4						28.6%
1985	20	4				2	2							20.0%
1986	38	6	2		2			2						15.8%
1987	99	30	2	4	6		2	15				1		30.3%
1988	69	22	2	2	2	2	4	10						31.9%
1989	7	2				1						1		28.6%
1990	1	0												
1991	47	7	3	2		1		1						14.9%
1992	41	7		2	3			2						17.1%
1993	134	34	6	4	4	10	3	5		1	1			25.4%
1994	173	72	14	19	18	9	4	7			1			41.6%
1995	155	45	10	12	5	12	3		1		1	1		29.0%
1996	70	16	5	4	4	1		2						22.9%
1997	147	22	8	6	2	3	1					2		15.0%
1998	94	9	6	2		1								9.6%
1999	180	20	6	3	4			4	1			2		11.1%
2000	89	4	1			1		1	1					4.5%
2001	8	0												
2002	43	3			3									7.0%
2003	44	3	1		2									6.8%
2004	30	1			1									3.3%
2005	26	1						1						3.8%
2006	72	1			1									1.4%
2007	32	0												
2008	22	1		1										4.5%
2009	77	1										1		1.3%
2010	223	0												
2011	93	0												
2012	33	0												
<b>Grand Total</b>	<b>2172</b>	<b>343</b>	<b>75</b>	<b>66</b>	<b>66</b>	<b>43</b>	<b>21</b>	<b>56</b>	<b>3</b>	<b>1</b>	<b>9</b>			<b>15.8%</b>

**Table 3.** Summary of conventional tag releases and recaptures for shortfin mako sharks available in the ICCAT database.

Number of tag Shortfin Mako ( <i>Isurus oxyrinchus</i> )												
Year	Releases	Recaptures	Years at liberty							Unk	% recapt*	
			< 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 10	10+			
1962	5	0										
1963	8	0										
1964	5	1	1									20.0%
1965	11	2	2									18.2%
1966	20	2	2									10.0%
1967	12	1			1							8.3%
1968	59	1	1									1.7%
1969	29	2	1				1					6.9%
1970	11	1	1									9.1%
1971	18	4	3				1					22.2%
1972	15	1						1				6.7%
1973	16	0										
1974	15	0										
1975	13	1		1								7.7%
1976	18	5	3	1	1							27.8%
1977	111	17	7	5	1	2	1	1				15.3%
1978	118	12	5	5				2				10.2%
1979	157	13	6	6		1						8.3%
1980	171	11	4	3	2	2						6.4%
1981	185	13	7	1	3			2				7.0%
1982	241	21	14	3		2	2					8.7%
1983	228	25	15	4	2	1	1	2				11.0%
1984	196	31	16	10	1	1	1	1	1			15.8%
1985	249	24	15	4		3	1	1				9.6%
1986	176	13	6	3	4							7.4%
1987	264	25	14	6	1	1	1				2	9.5%
1988	119	17	6	6	1	1	2			1		14.3%
1989	145	19	10	6	3							13.1%
1990	172	22	13	7	2							12.8%
1991	296	35	18	10	4	1	1				1	11.8%
1992	537	53	28	15	2	3	2	2	1			9.9%
1993	505	65	32	22	3	4	1	1			2	12.9%
1994	425	74	42	19	2	3		2			6	17.4%
1995	295	47	29	8	5	2					3	15.9%
1996	143	20	13	5	1			1				14.0%
1997	233	36	20	10	4	1	1					15.5%
1998	267	36	22	9	3	2						13.5%
1999	298	48	22	19	2		1	2			2	16.1%
2000	375	49	29	8	3			4			5	13.1%
2001	375	63	38	13	5	1	3	2			1	16.8%
2002	360	44	28	10	1	1	1	1			2	12.2%
2003	257	41	19	7	10	3					2	16.0%
2004	389	65	42	18	1			1			3	16.7%
2005	244	36	22	7	2	1	1	1			2	14.8%
2006	255	42	26	13	1			1			1	16.5%
2007	368	83	53	19	5			4			2	22.6%
2008	276	49	21	21	3	2					2	17.8%
2009	237	39	24	8	4	3						16.5%
2010	181	20	13	7								11.0%
2011	160	8	7	1								5.0%
2012	19	4	4									21.1%
<b>Grand Total</b>	<b>9282</b>	<b>1241</b>	<b>704</b>	<b>320</b>	<b>83</b>	<b>43</b>	<b>29</b>	<b>23</b>	<b>3</b>	<b>36</b>	<b>13.4%</b>	

**Table 4.** Conventional tag releases per species per year.

Year	Species																				Grand Total									
	ALV	BRO	BSK	BTH	CCB	CCE	CCL	CCP	CCS	CCT	CSN	DGS	DUS	FAL	GNC	LMA	NGB	OCS	OIL	RHN		RHT	RSK	SKH	SPJ	SPK	SPZ	TIG	WSH	
1900																								1						1
1940													2											2						4
1960																								2						2
1963																									2					2
1964												12	10	4	6			2							4	12			52	
1965								4	2	4		32		2	4	20	2	14	10						120		10		224	
1966											1		2	4															7	
1967													2																2	
1968													6																6	
1969													2																2	
1970											1																		1	
1971			2						2	2			10												2				18	
1972													4																4	
1973						2							22	2											4		2		32	
1974					2						4		24	4											4		4		46	
1975									2	12			12												4		2		32	
1976					2	2			2				6												4				16	
1977									2					4													2		8	
1978	6		2			2	2					14	3												2			31		
1979						10				1			2	3			6	6							4	4		36		
1980	2						6					16	3					2						4		2		35		
1981				2			12	2				12	2					2									6	38		
1982							2					8					64								2		2		78	
1983								2				18					38								2				60	
1984								4		1		8		2											2				17	
1985	2						4	16				6					2							4				34		
1986	2						2	6				4													6	4			24	
1987						2		4				10	5												4		8		33	
1988						10		18				22													12	4			66	
1989	4						20	8				32	8												43	4			119	
1990	6					2	8	6		1	2	26												24	2	7		84		
1991	10		4			2	16	30				55		6			6						24		28	24	2	207		
1992	8			2	6	12	38	11		1	9	2	19	4			4	4					38	2	29	15		204		
1993	4		2	4		10	30	10			9	22	5	10			4						14	8	20	14		166		
1994	2			2		8	28	8			2	2	33	4			4	3	2				7	92	8	2	21	228		
1995	2			2		4	18	14			2	13	8	1			2							4	10			80		
1996	8					4	5				4	8	2			2	2							13		4	2	54		
1997					2		4	16			7	1	2	4									2		4	5	2	49		
1998							2					4											7		4		1	18		
1999	2																							2					4	
2000				24	4	4	10			1		2			10		3						8		4			70		
2001		1										2		2			1			1				1	2	2		12		
2002						2				2		2													2				8	
2003		1				8	6																						15	
2004							2	4				3		2													4		15	
2005				1																				2					3	
2006								5				3					1			4				4	1				18	
2007													2				1										1		4	
2008				4					4				1		1		3						3		1	1			18	
Grand Total	58	2	10	41	18	82	220	197	4	45	35	20	453	86	35	11	140	46	2	1	4	3	102	116	381	26	145	4	2287	

**Table 5.** Conventional tag recoveries per species per year.

Species																
Year	BTH	CCL	CCP	CCT	CSN	DUS	FAL	GNC	OCS	RHT	SKH	SPJ	SPK	TIG	Grand Total	
1966				1											1	
1978								2							2	
1979								2							2	
1980								2							2	
1982		4													4	
1987								2							2	
1989													2		2	
1990		4											4	2	10	
1991						2					4				6	
1992		4	2		1	2							2	2	13	
1993							2	2							4	
1994					1	2						2		2	7	
1995			4			2		2	1						9	
1996			2										2		4	
1997					1	2									3	
1998											2			2	4	
2005												1			1	
2006										4		6			10	
2007	1														1	
Unc									1						1	
Grand Total	1	12	8	1	3	10	10	4	2	4	6	9	10	8	88	

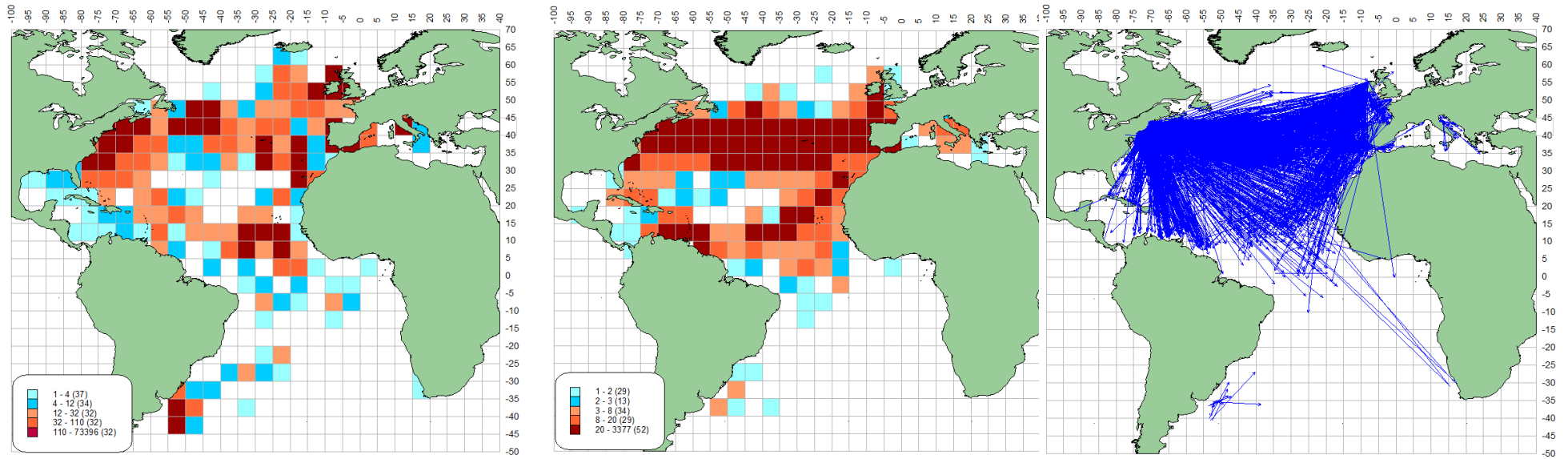
**Table 6.** Summary of conventional tag releases and recaptures for all non-principle shark species available in the ICCAT database.

Species	Year	Years at liberty							
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	7+
BTH	2005			1					
CCL	1981		4						
	1989		2						
	1990	2							
	1992	4							
CCP	1988					2			
	1991					2	2		
	1994		2						
CCT	1965		1						
CSN	1992	1							
	1993		1						
	1997	1							
DUS	1991	2	2					2	
	1993		2						
	1994		2						
FAL	1977		2						
	1979	2							
	1980	2							
	1987	2							
	1992		2						
GNC	1993	2		2					
OCS	1994		1						
RHT	2006	4							
SKH	1940								2
	1991	2							
	1998	2							
SPJ	1994	2							
	2005		2						
	2006	4							
SPK	1986					2			
	1989		2						
	1990	2							
	1992	2							
	1996	2							
TIG	1990	2							
	1991		2						
	1994	2					2		

**Table 7.** Recapture rates for non-principle shark species.

	BTH	CCL	CCP	CCT	CSN	DUS	FAL	GNC	OCS	RHT	SKH	SPJ	SPK	TIG
Recaptures	1	12	8	1	3	10	10	4	2	4	6	9	10	8
Releases	41	220	197	45	35	453	86	35	46	4	102	116	381	145
% Recoveries	2.44	5.45	4.06	2.22	8.57	2.21	11.63	11.43	4.35	100.00	5.88	7.76	2.62	5.52



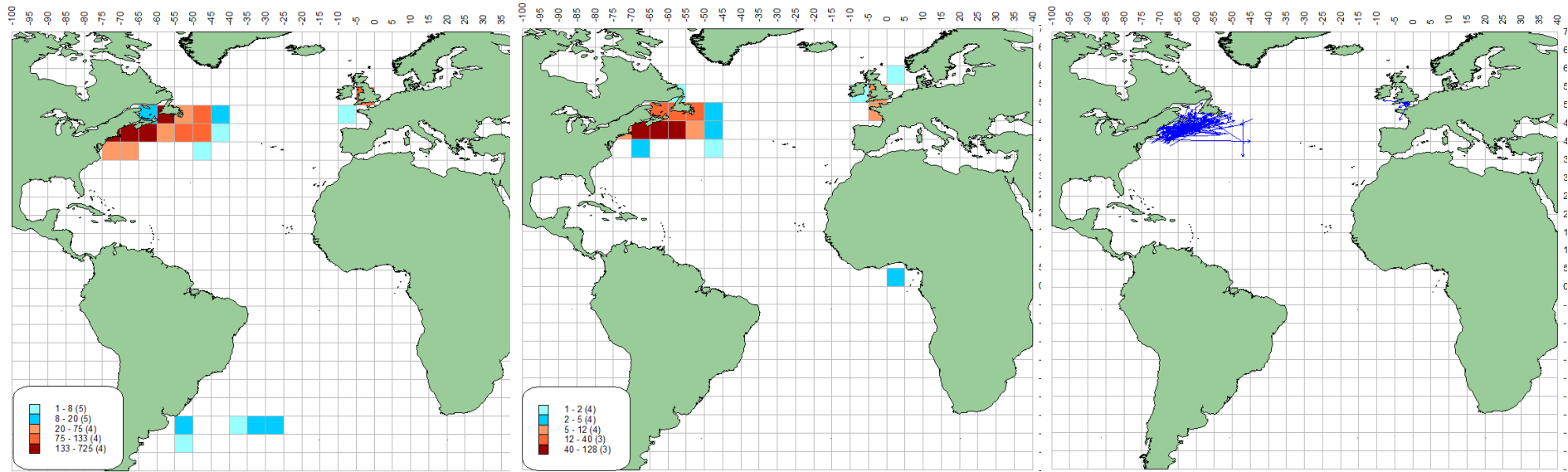


a)-Density of releases.

b)-Density of recoveries.

c)-Straight displacement between release and recovery locations.

**Figure 1.** Blue shark tagging information in the Atlantic and Mediterranean.

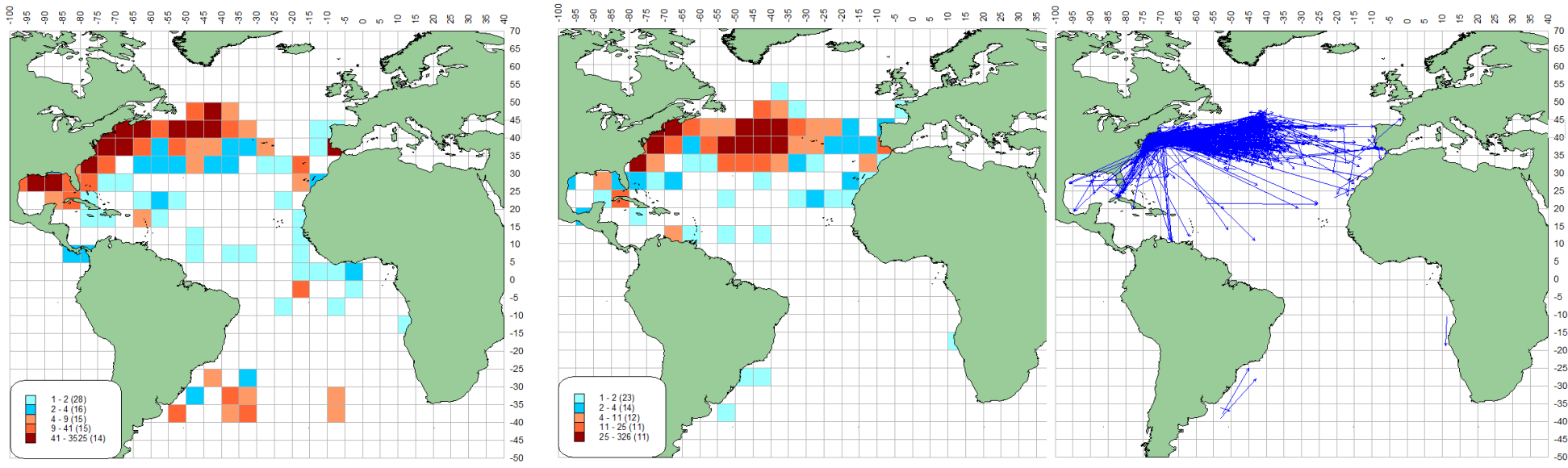


a)-Density of releases.

b)-Density of recoveries.

c)- Straight displacement between release and recovery locations.

**Figure 2.** Porbeagle shark tagging information in the Atlantic and Mediterranean.



a) Density of releases.

b) Density of recoveries.

c) Straight displacement between release and recovery locations.

**Figure 3.** Shortfin mako shark tagging information in the Atlantic and Mediterranean.