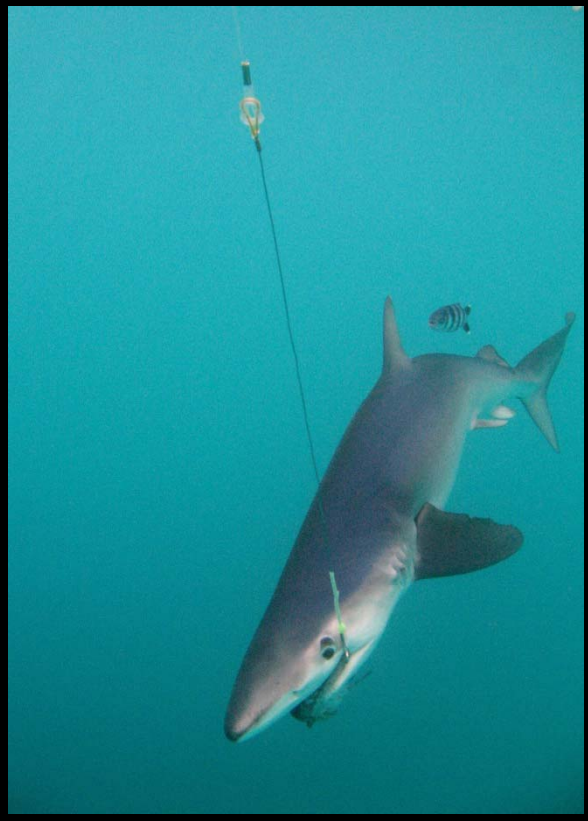
Using tracking data to evaluate spatial protection measures for juvenile bycatch in longline fisheries



Pedro Afonso,
F Vandeperre, N McGinty, G Tserpes, N Peristeraki,
C Koutsikopoulos, M Valastro, A di Natale

EBMF Tuna – Montpellier, Oct 2012

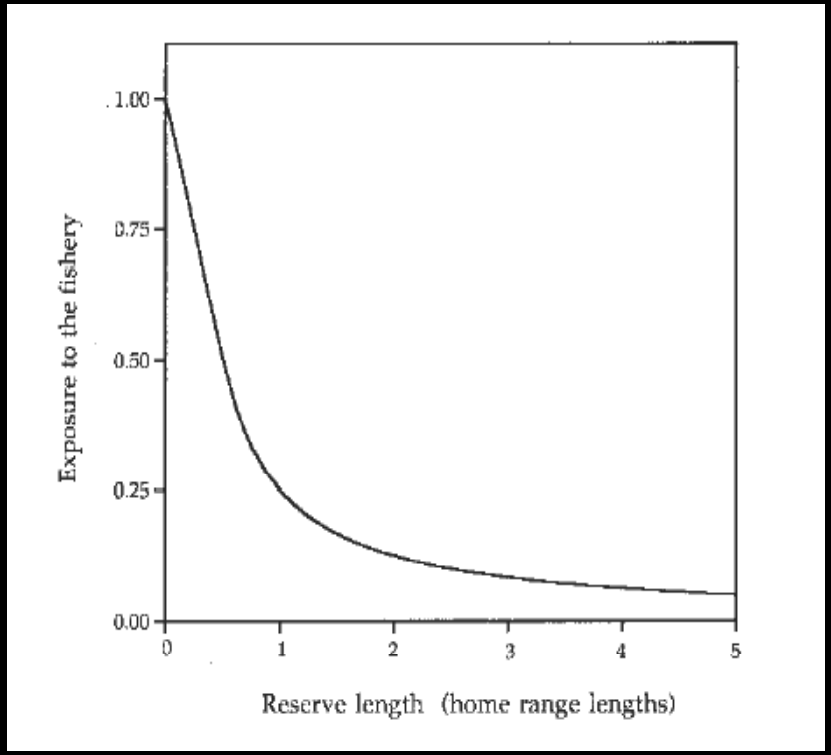
Can pelagic MPAs work to protect bycatch?

Essential habitat

- mating grounds, pupping grounds, feeding areas, nurseries, aggregations / migratory bottlenecks
  > increased vulnerabilty

'Home Range'

- size of activity area / MPA
- temporal stability of activity area



(Kramer and Chapman, 1999; Env Biol Fish)

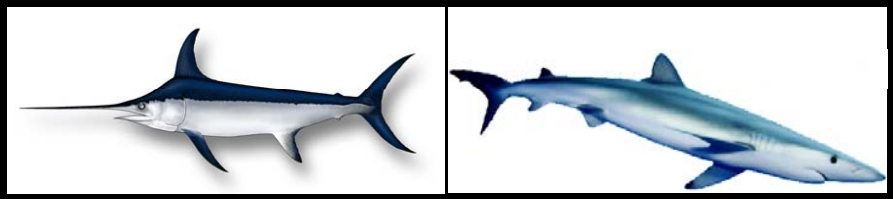
juvenile bycatch in the longline fishery

North Atlantic and Med

- Swordfish (SWO) target species
- juvenile SWO <25 kg to be discarded (ICCAT)
- juvenile SWO can reach > 60% of SWO catch
- blueshark (BSH) > 80 % total catch in the NA
- juvenile BSH can reach > 80% of BSH catch

Major concerns with growth overfishing

Juvenile bycatch behaviour and pelagic MPAs



Spatial (horizontal) behaviour:

juvenile BSH/SWO have discrete (seasonal) areas where they 'agregate'

+

The size of (seasonal) Home Range is amenable to fisheries management

=

(seasonal) closures can provide reduced mortality

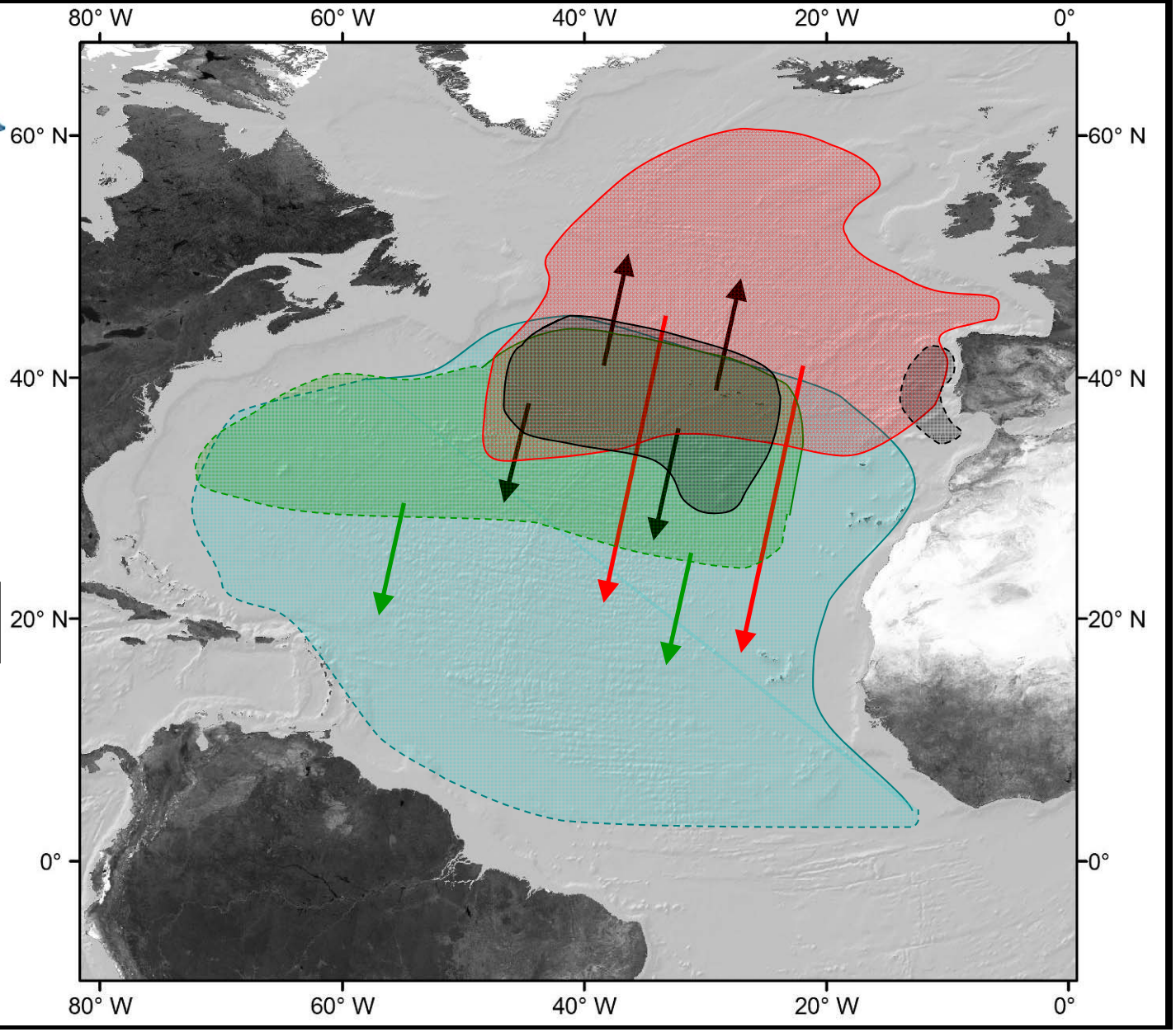
BSH essential habitat/migration model

Juvenile ♀

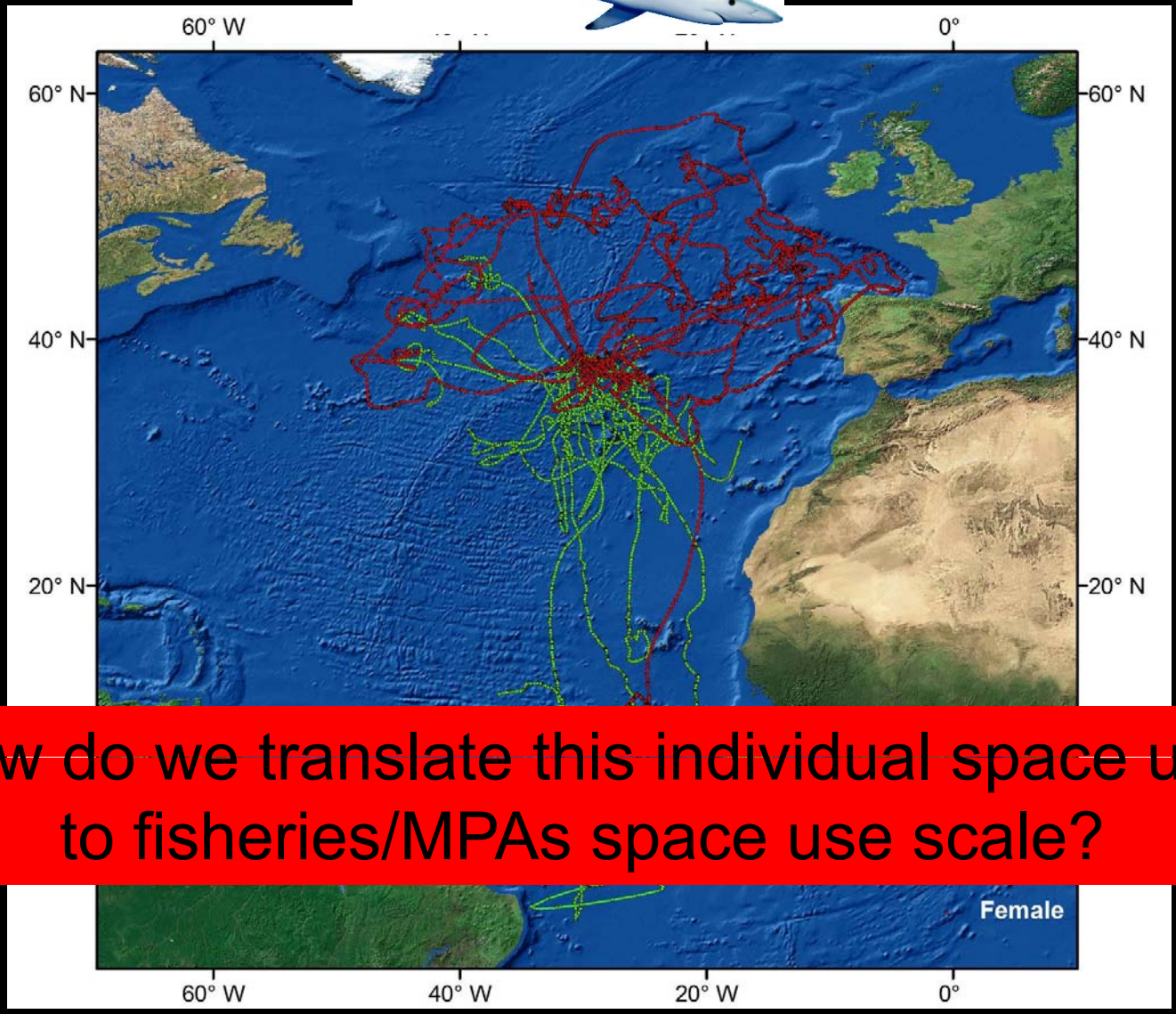
YOY ♂ ♀

Juvenile ♂

adult ♂ and ♀



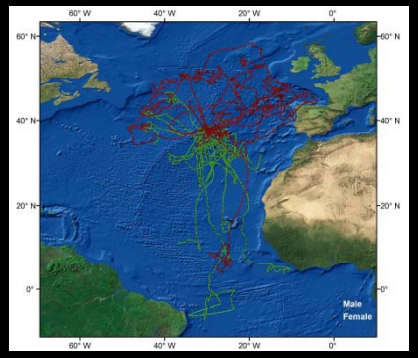
Individual tracking data



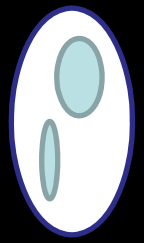
How do we translate this individual space use to fisheries/MPAs space use scale?

From individual to group homeranges

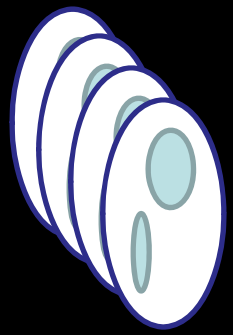
Position estimates
(IKNOS)



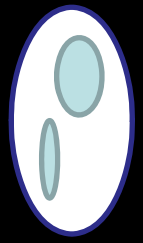
Home range estimator
(KUD)



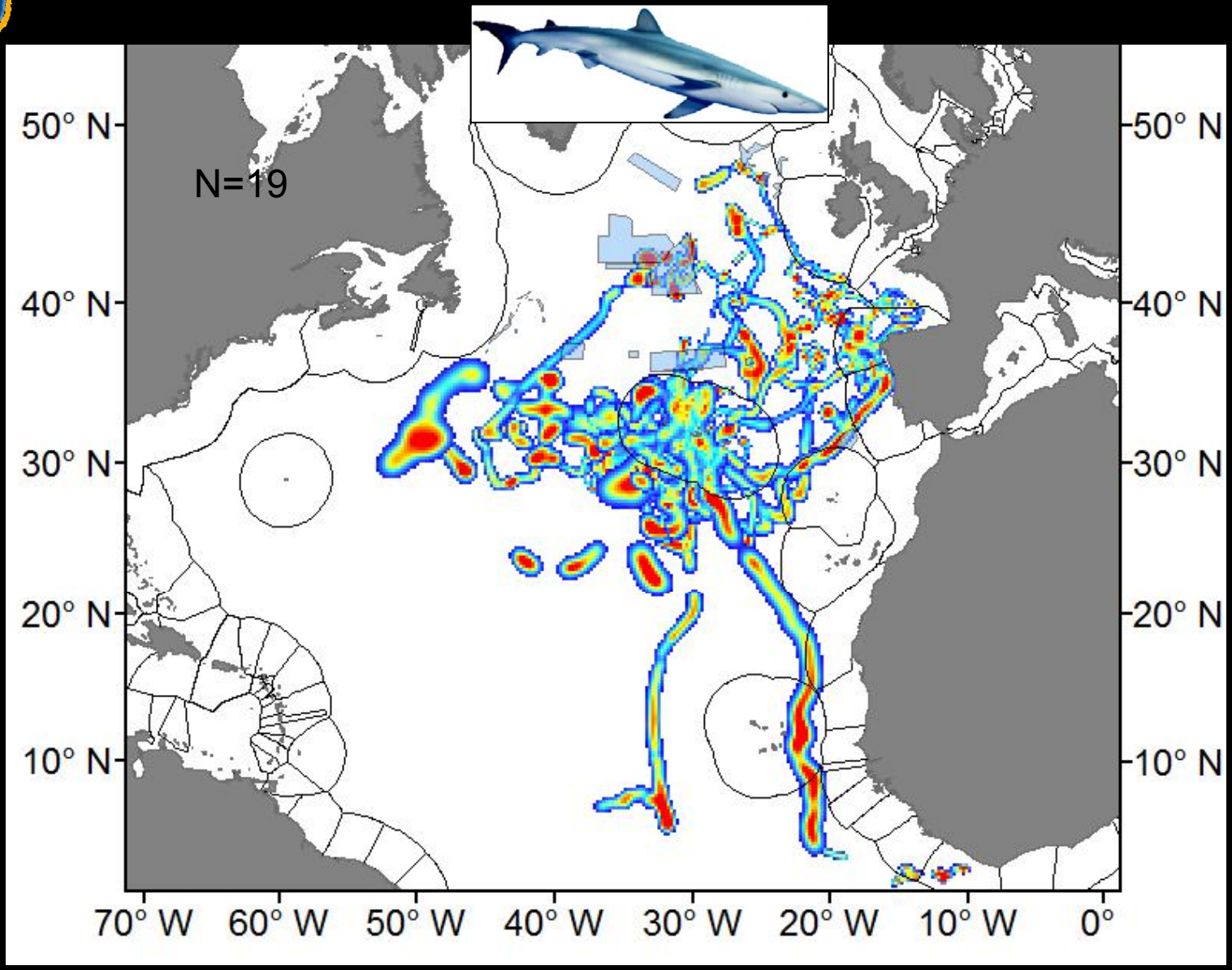
Weigted averaging



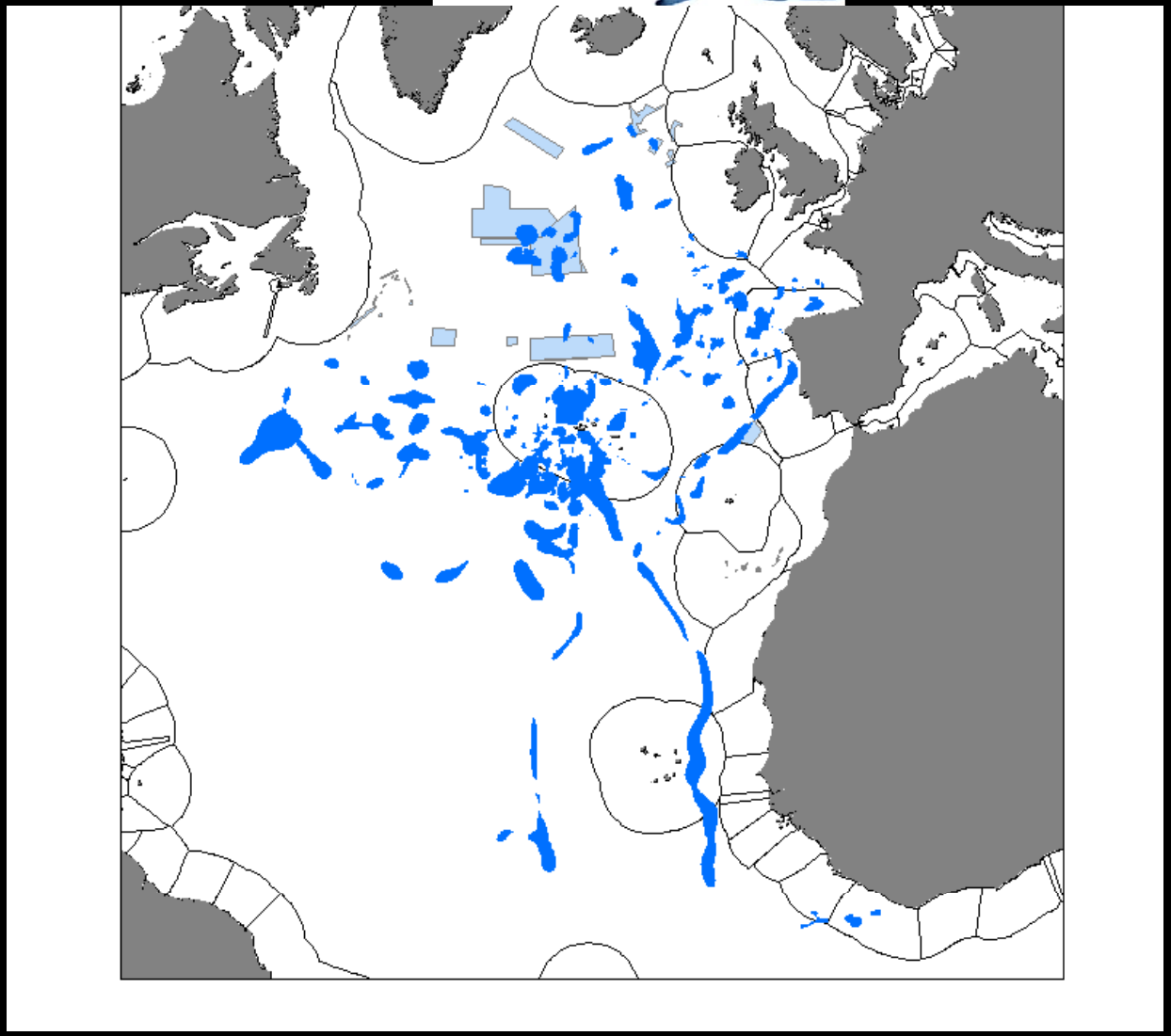
Group range



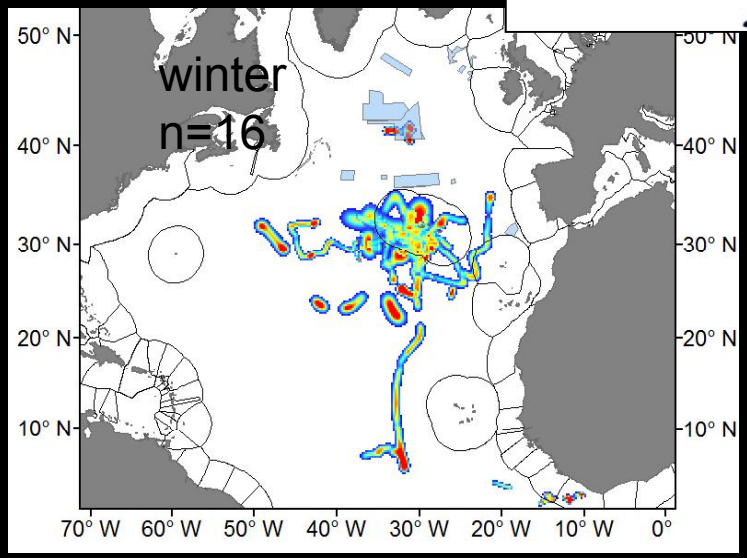
From individual to group homeranges

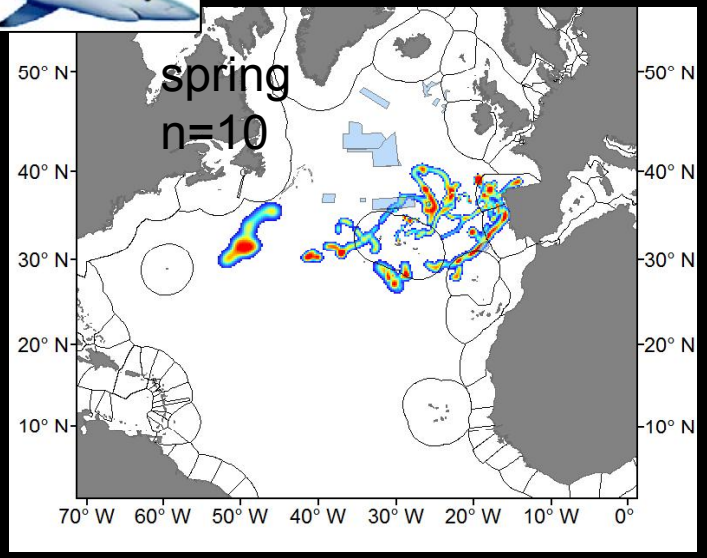


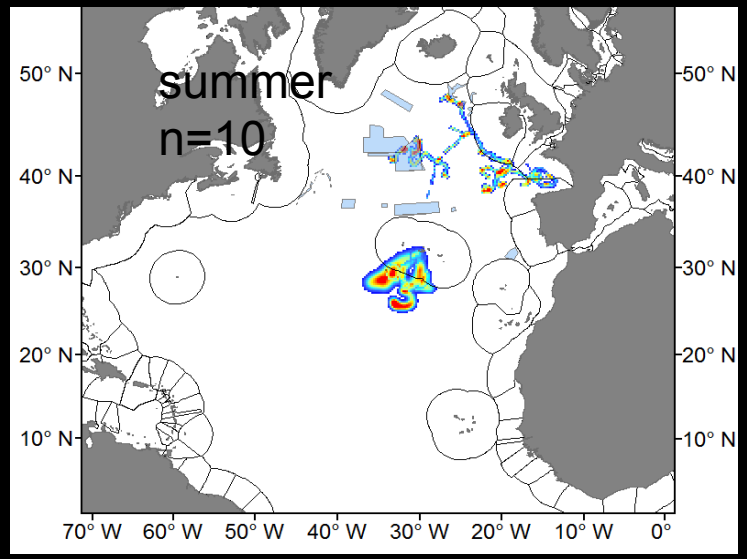
group homerange seasonal dynamics

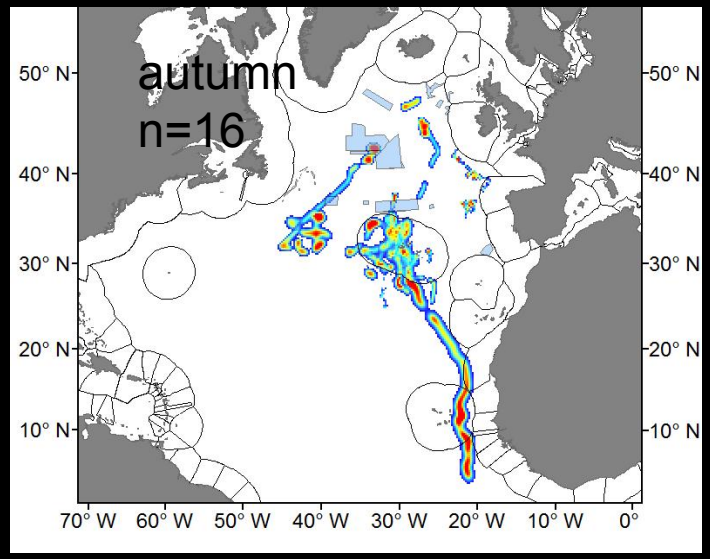


group homerange seasonal dynamics

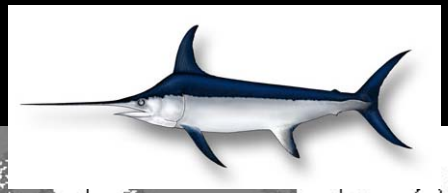


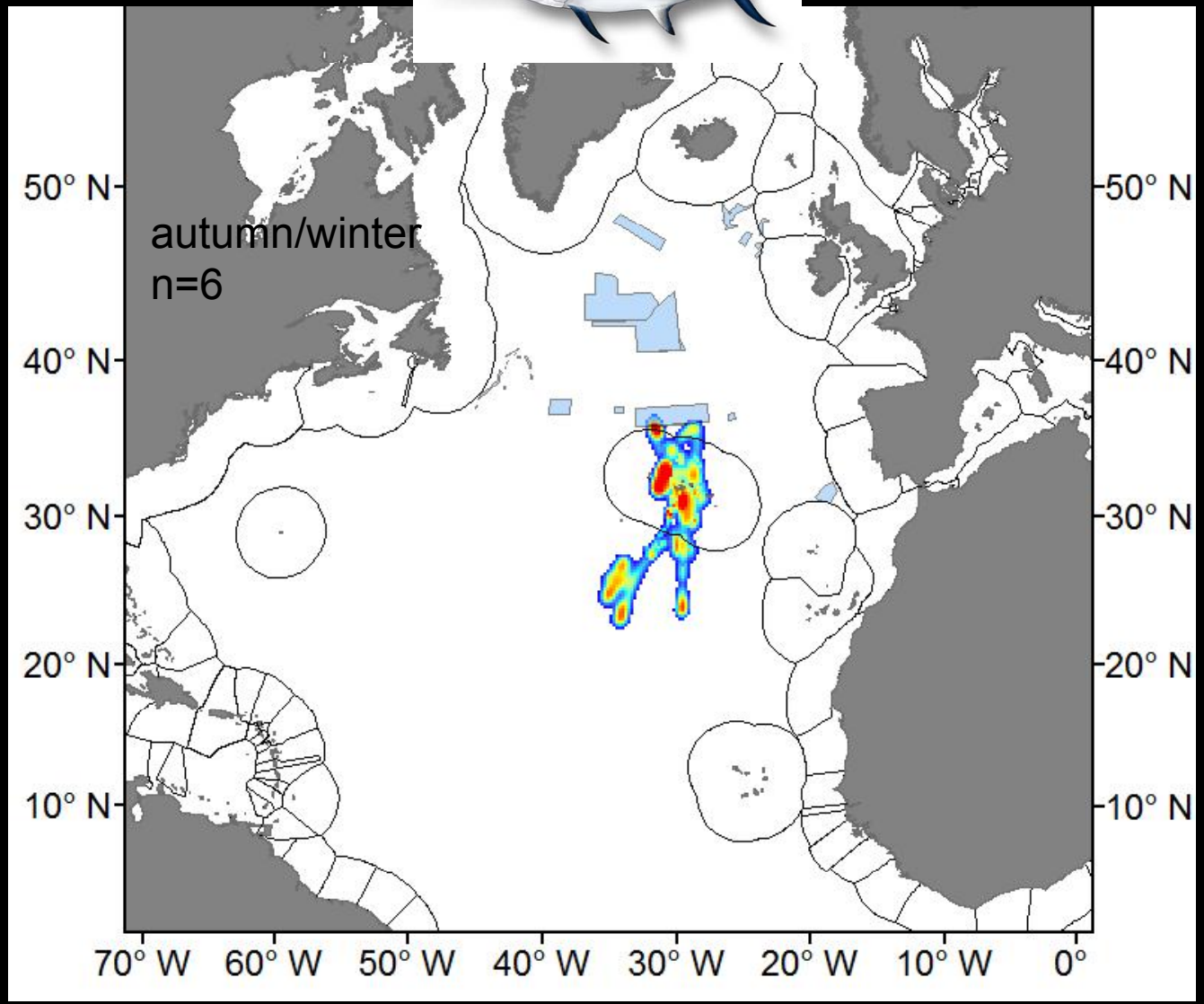






Group homerange seasonal dynamics



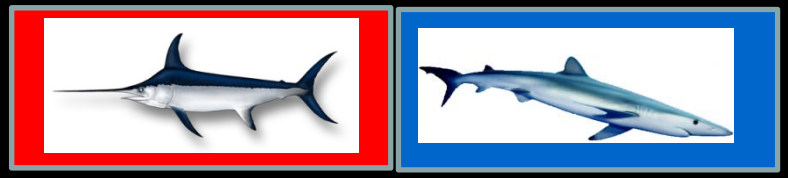


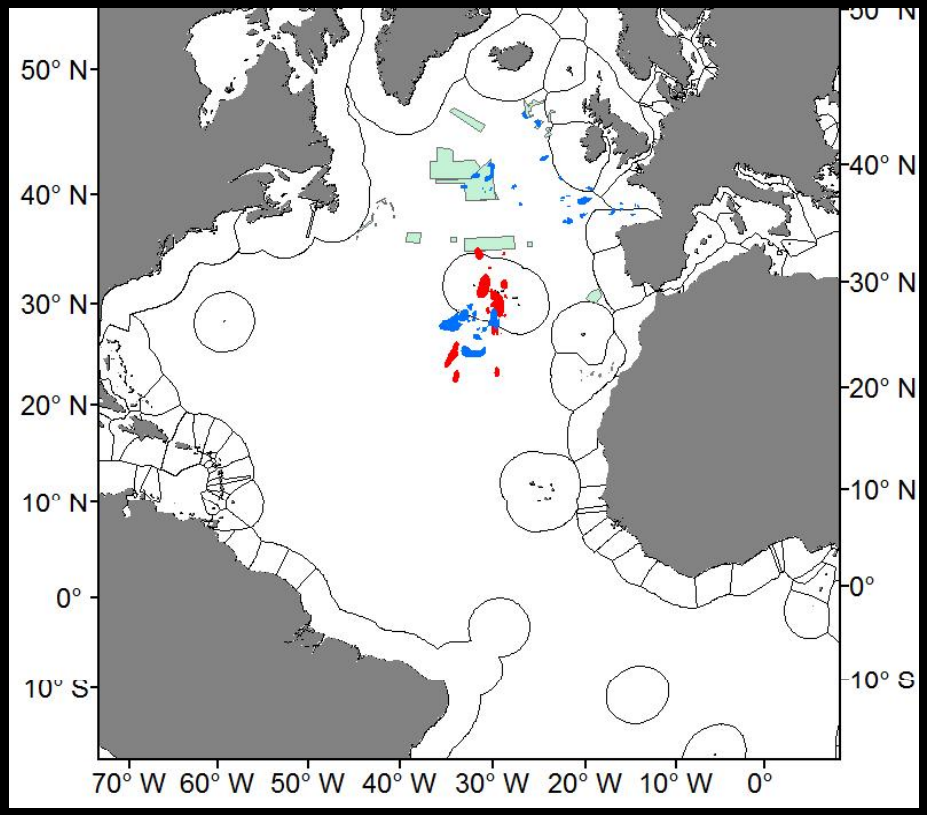
Mid-NAtlantic

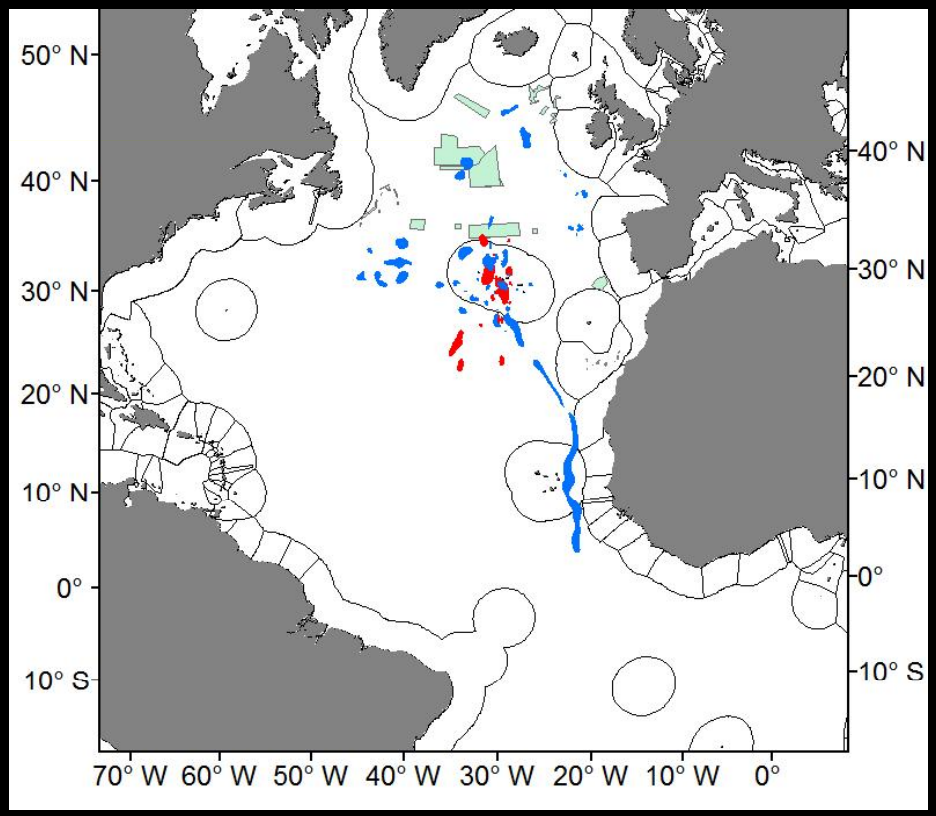
High latitudinal displacement

Possible seasonal grounds?

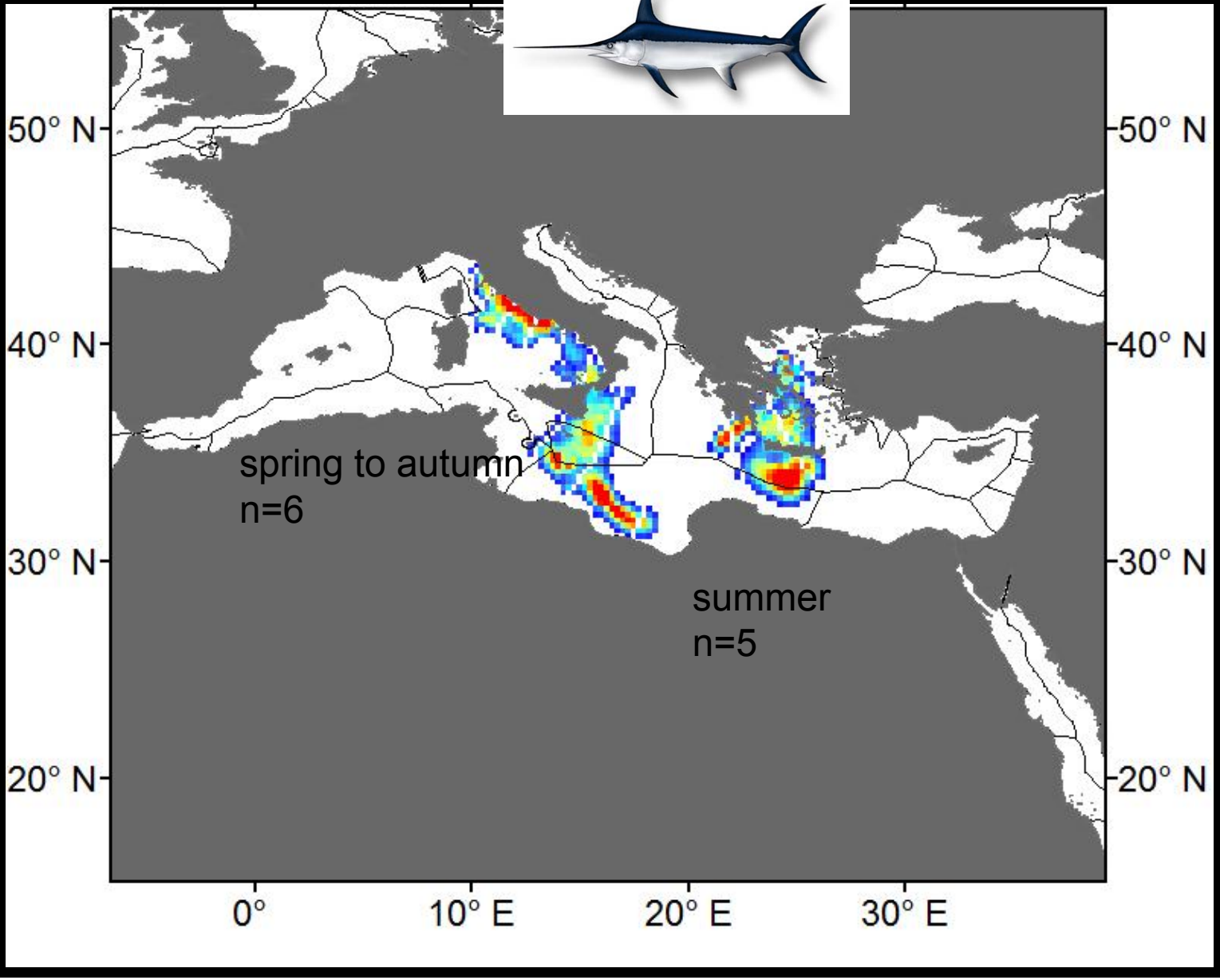
group homerange seasonal dynamics



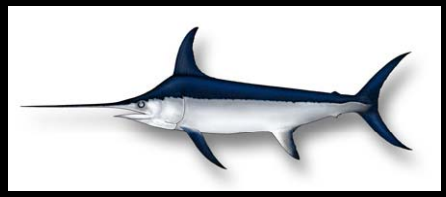




Group homerange seasonal dynamics



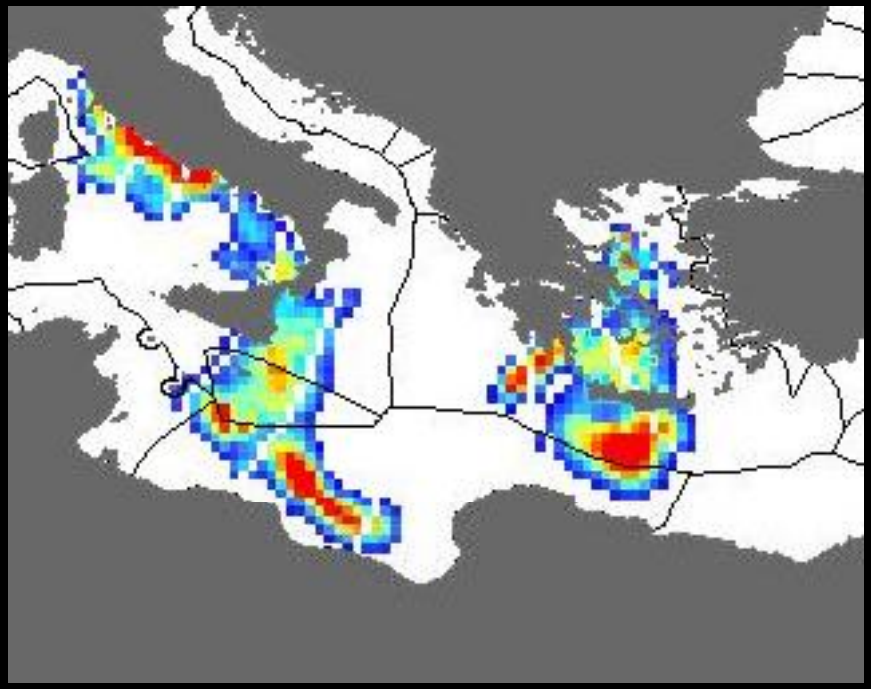
Group homerange seasonal dynamics



Central Med

High latitudinal displacement

Possible seasonal grounds?

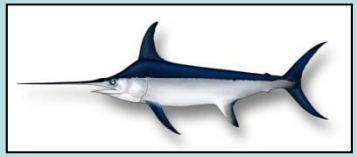


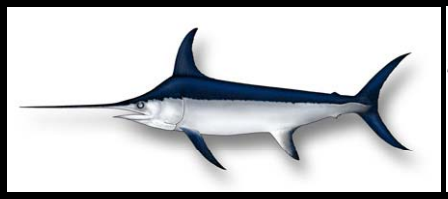
Eastern Med

Some latitudinal displacement

Possible seasonal grounds?

Group homerange statistics

Juvenile telemetry specs		
	N Atlantic	N Atlantic
Period tracked	68 (12-150)	267 (32-617)
daily individual distance	39 km	30 km
50% KUD (core area)	$142*10^3$	$428*10^3$
95% KUD (activity area)	$699*10^3$	$1.936*10^3$
number EEZs crossed	1	12/7EU (4 to 5)
% High Seas	41%	64%
% High Seas MPAs	2%	3.5%
number High Seas MPAs	1	9 (1 to 4)



Spatial (horizontal) behaviour and MPAs: remarks

Do juvenile SWO/BSH have distinct seasonal areas where they agregate / are essential habitat for growth?
Yes but on a broad scale – (BSH ocean basin)

Is the size of (seasonal) Home Range amenable to fisheries management?
Yes (seasonally) but only for fisheries operating at a regional scale (NAtlantic / Mediterranean)

Do we need to look at permanent or seasonal LL closures?
Permanent MPAs will provide less benefit than a network of seasonal MPAs

How big must MPAs be to effectively reduce bycatch?
Large (regional scale)

Do current HS MPAs effectively reduce bycatch?
No

Usefulness of tracking data: remarks

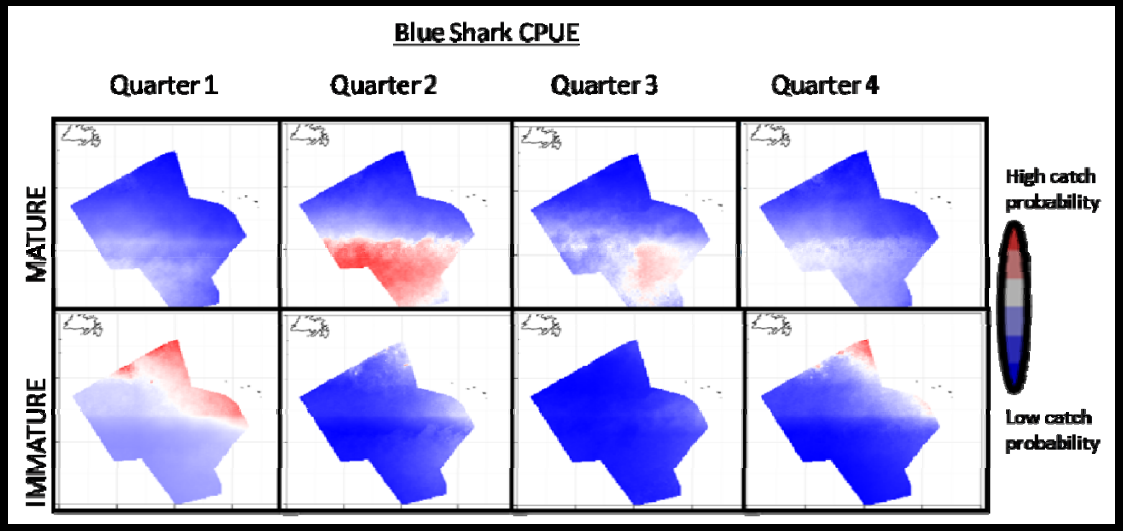
Should we use tracking data?
Yes – vital to obtain the individual habitat use scale; complementary to assess essential habitat; groundtruth fisheries abundance

Is Home Range detectable?
Yes, but large temporal datasets are essential - at least at the seasonal scale

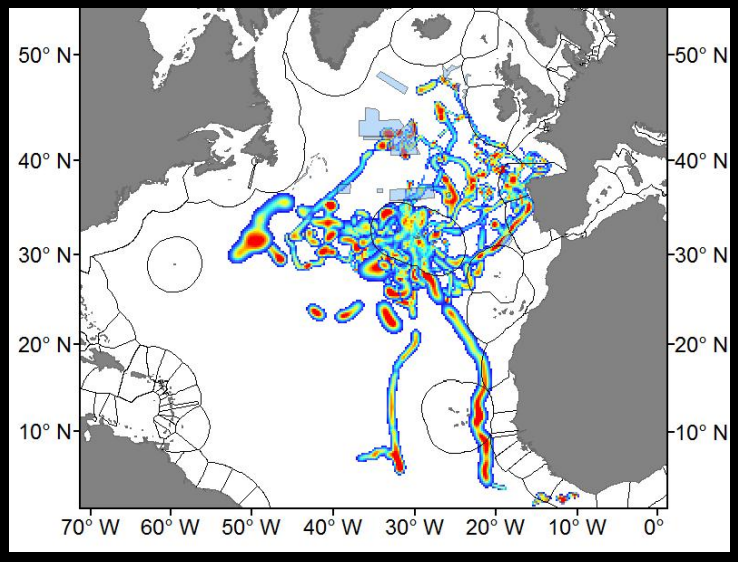
Is current technology adequate to depict HR?
Significant recent improvements but still limited by low quantity of (good) data

Should we move from individual to 'group' HR?
Yes, but the number of individuals must be significant
- ***Cumulative curves from large studies***
- ***Refine methods to incorporate variability***

Next step: scaling up towards decision making



+



=

dynamic population range predictons