

Jena Edwards
NIOZ Royal Netherlands
Institute for Sea Research

Allert Bijleveld
NIOZ Royal Netherlands
Institute for Sea Research

Erwin Winter
Wageningen Marine
Research

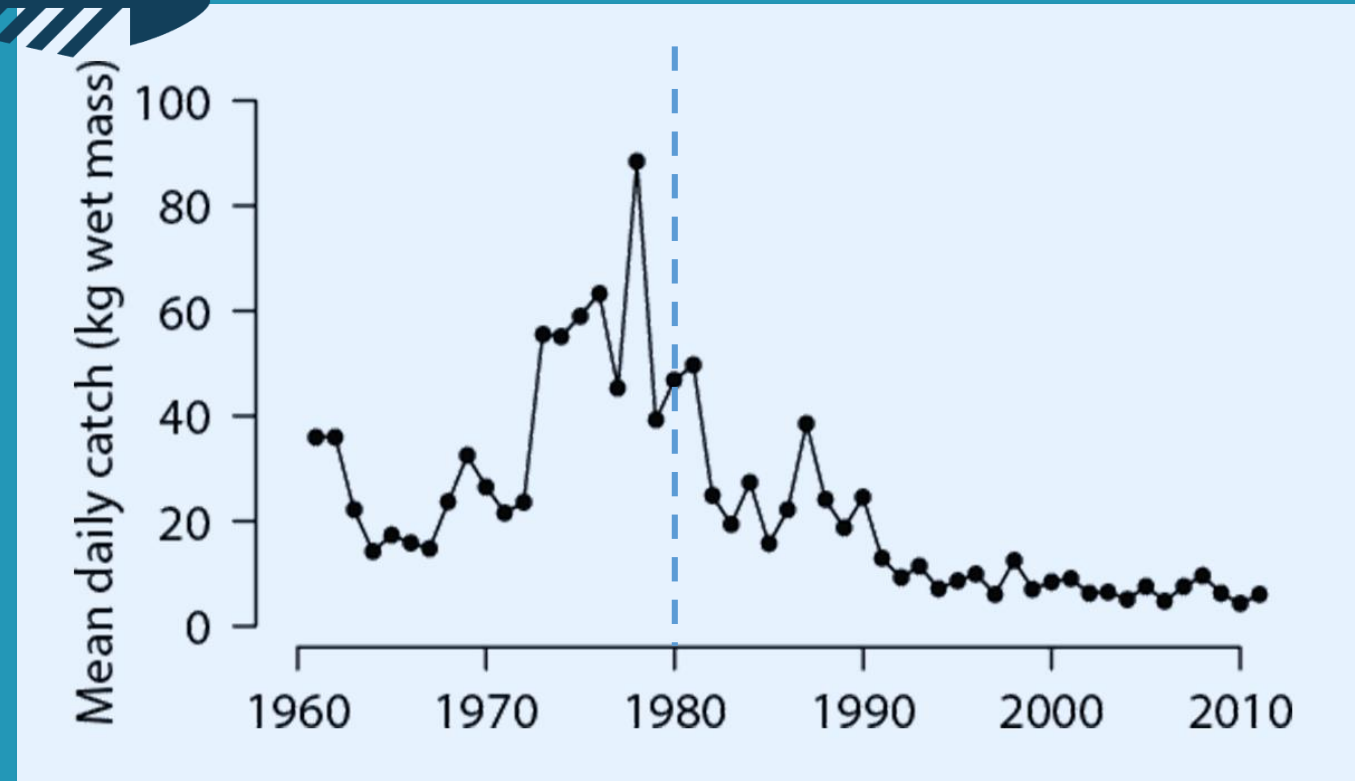
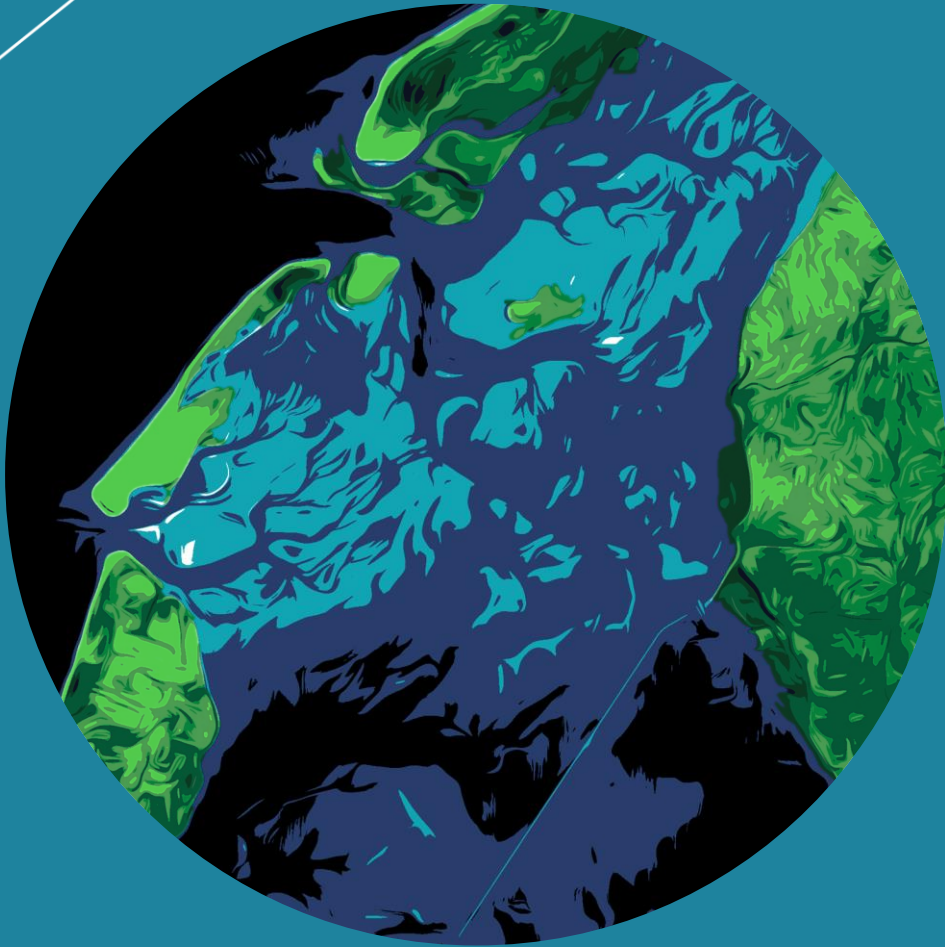
Tom Buijse
Wageningen University &
Research

SWIMWAY WADDEN SEA: MIGRATION AND COASTAL RESIDENCY OF EUROPEAN GREY MULLET

THE WESTERN DUTCH WADDEN SEA

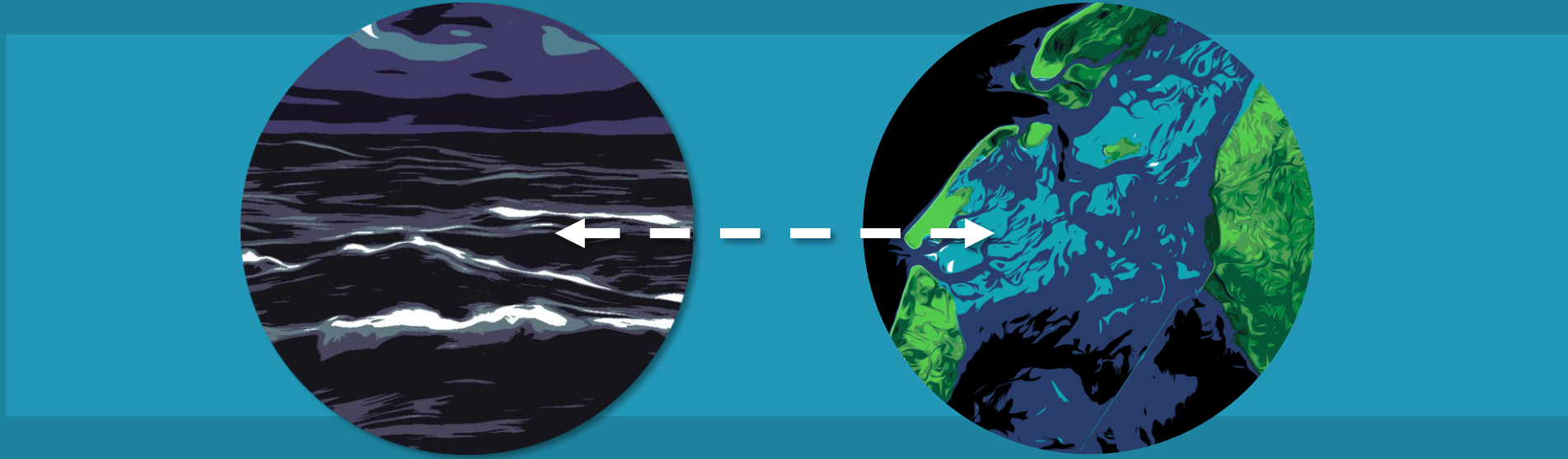


THE WESTERN DUTCH WADDEN SEA



NIOZ kom-fyke survey

RESEARCH TOPICS



Migration
timing



Arrival &
departure

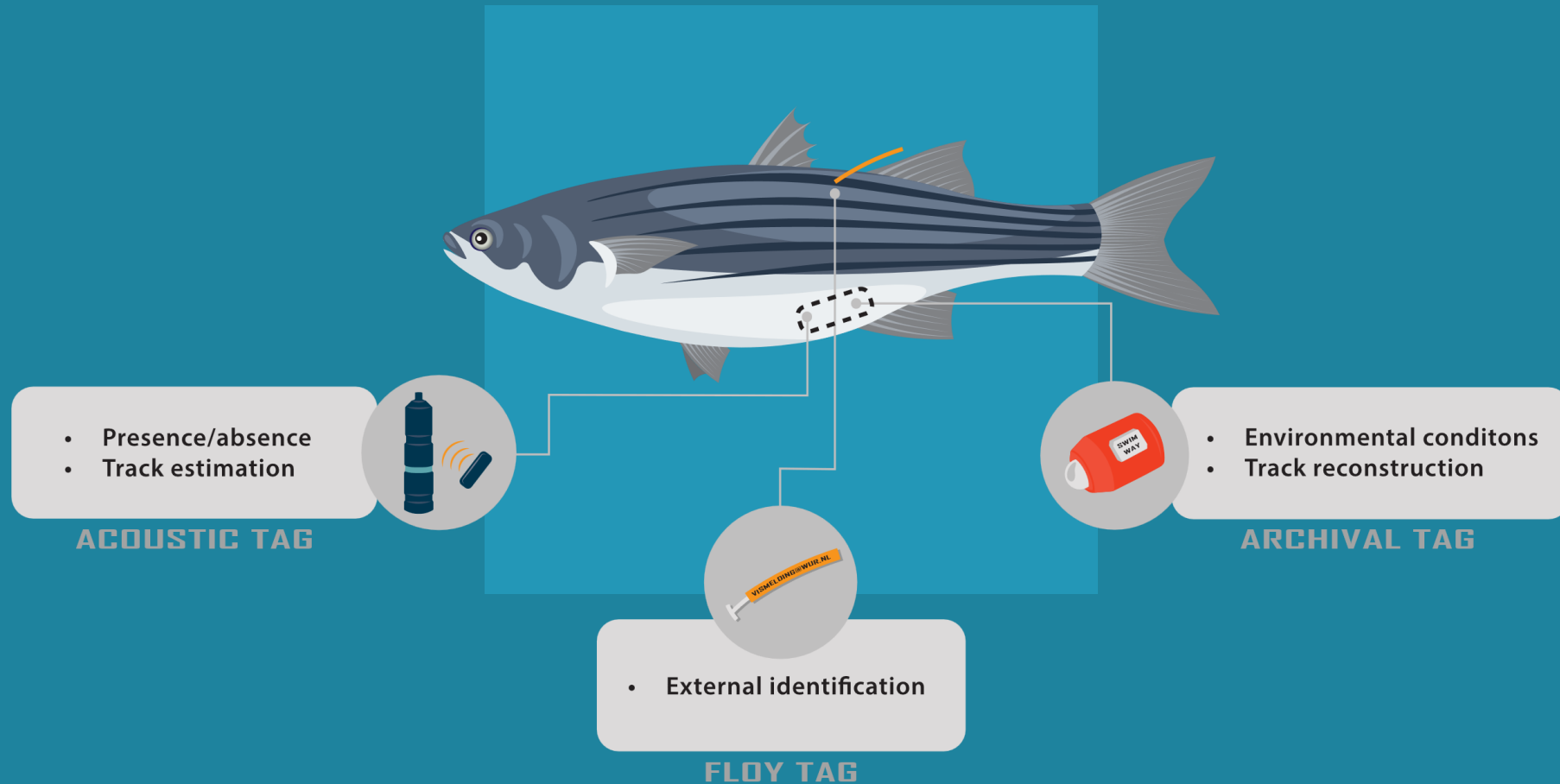


Migration
direction

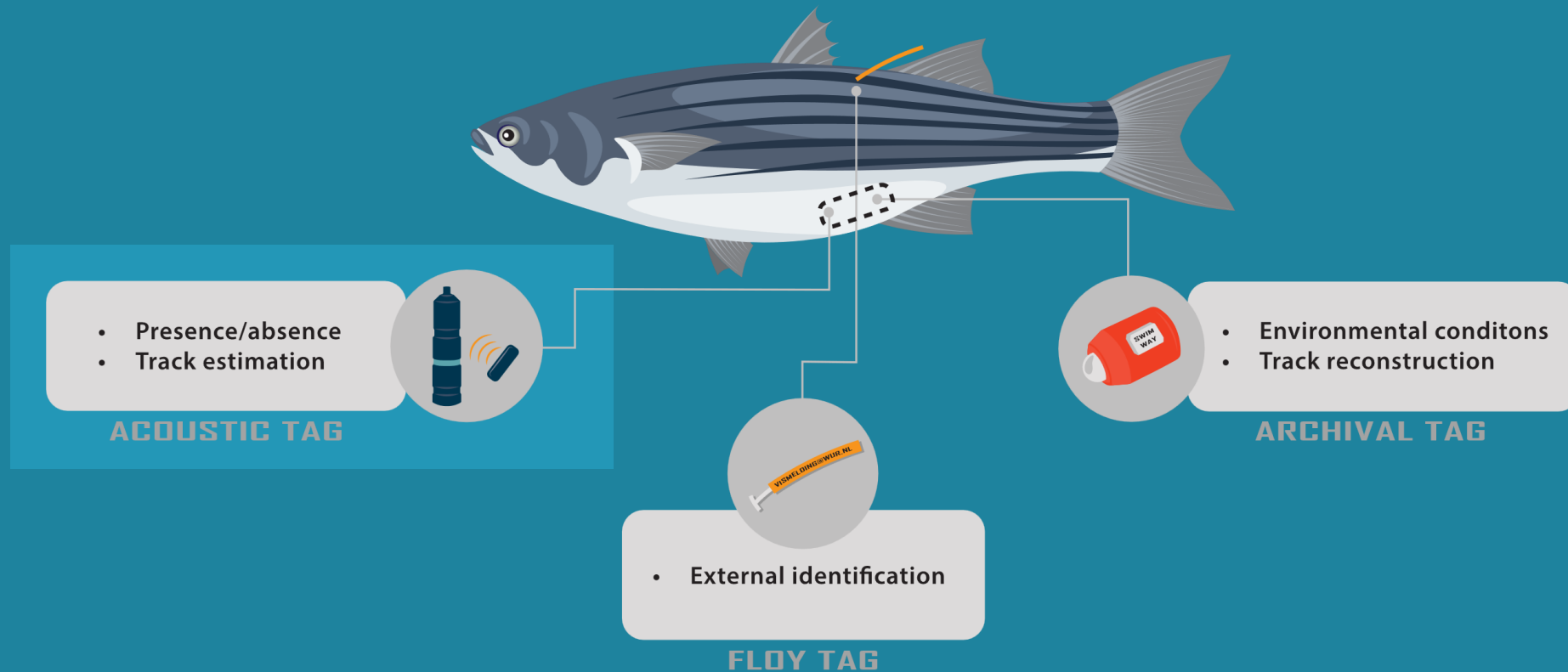


Residency &
recurrence

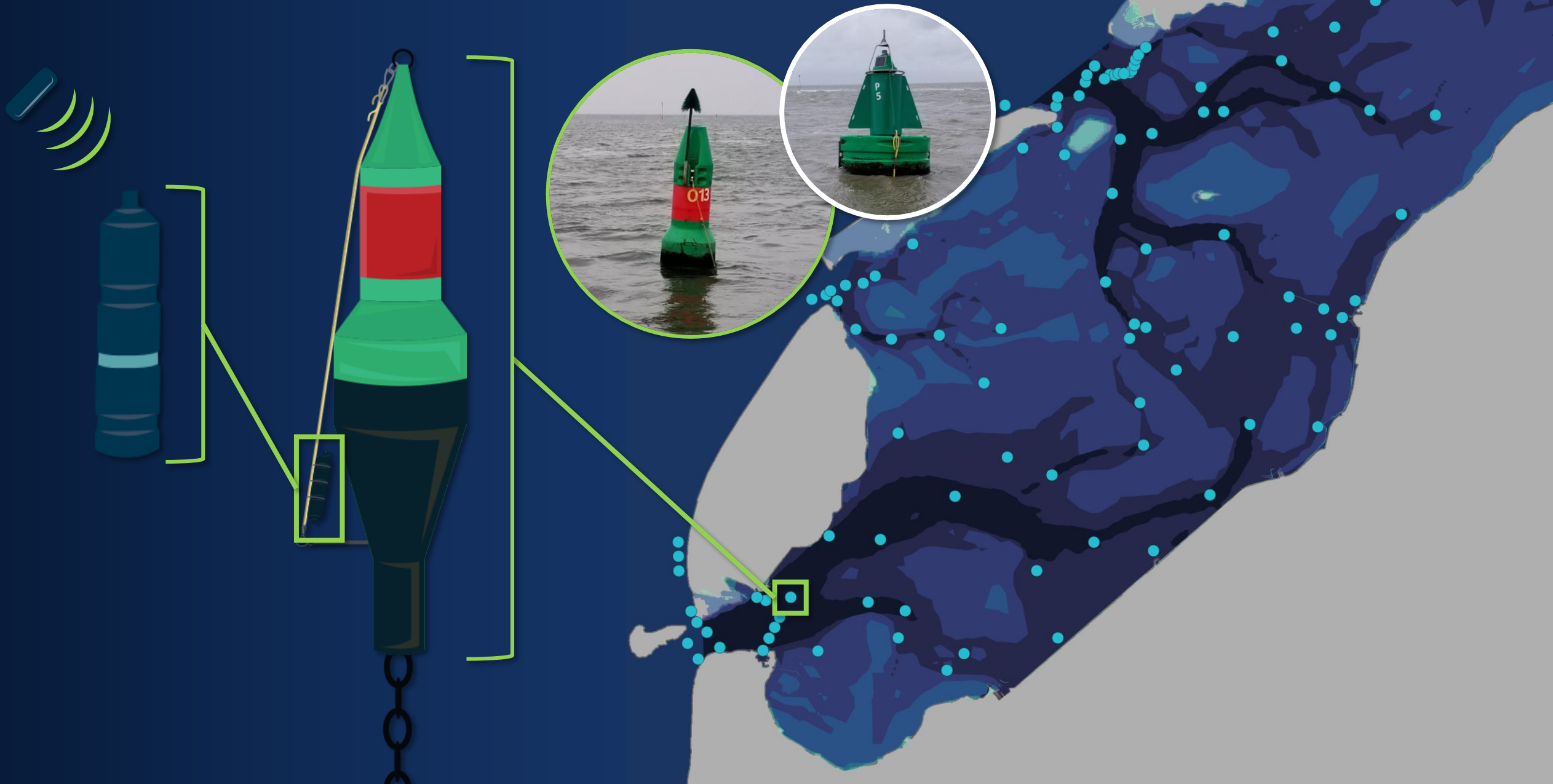
INDIVIDUAL TRACKING APPROACHES

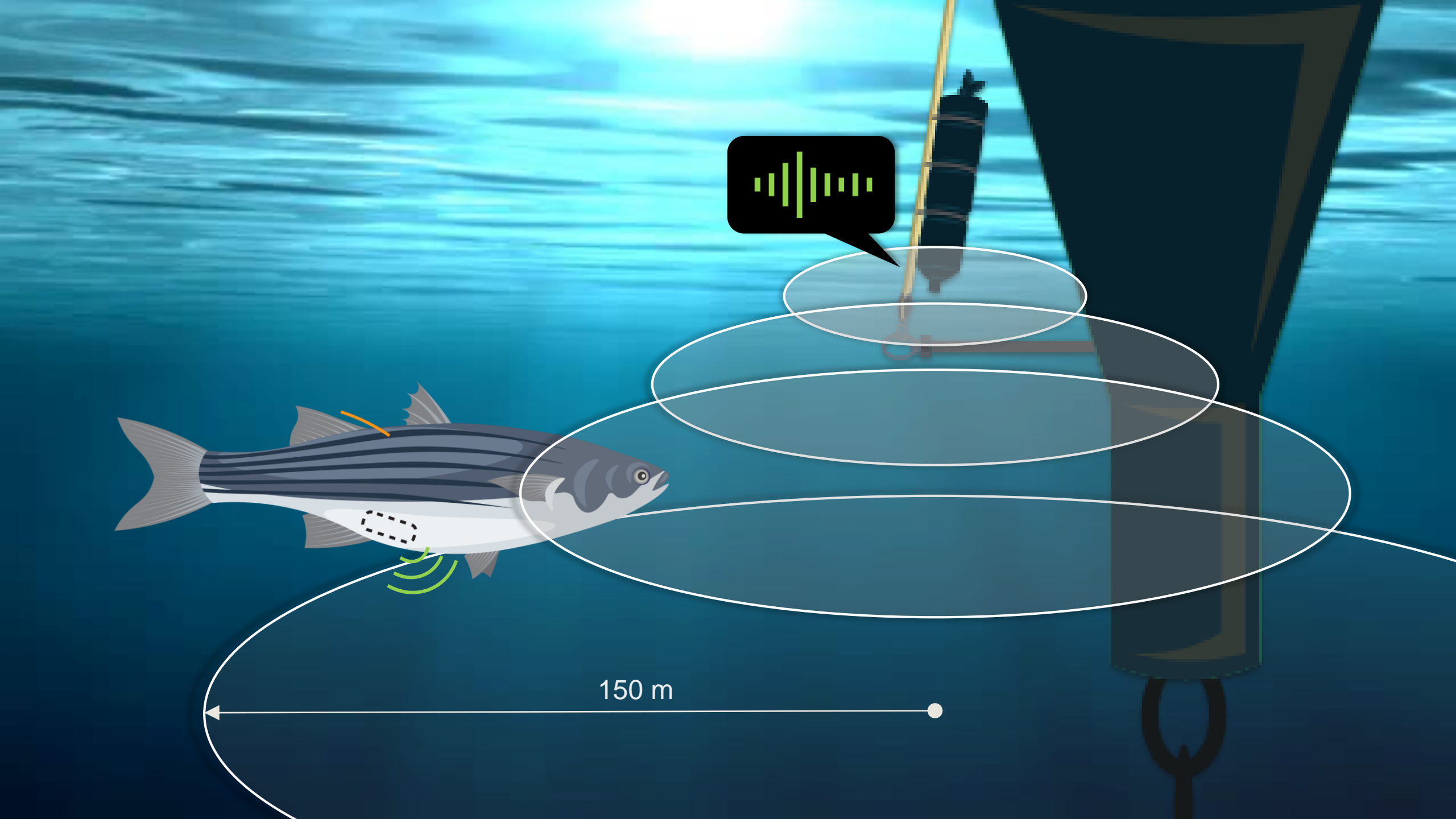


INDIVIDUAL TRACKING APPROACHES

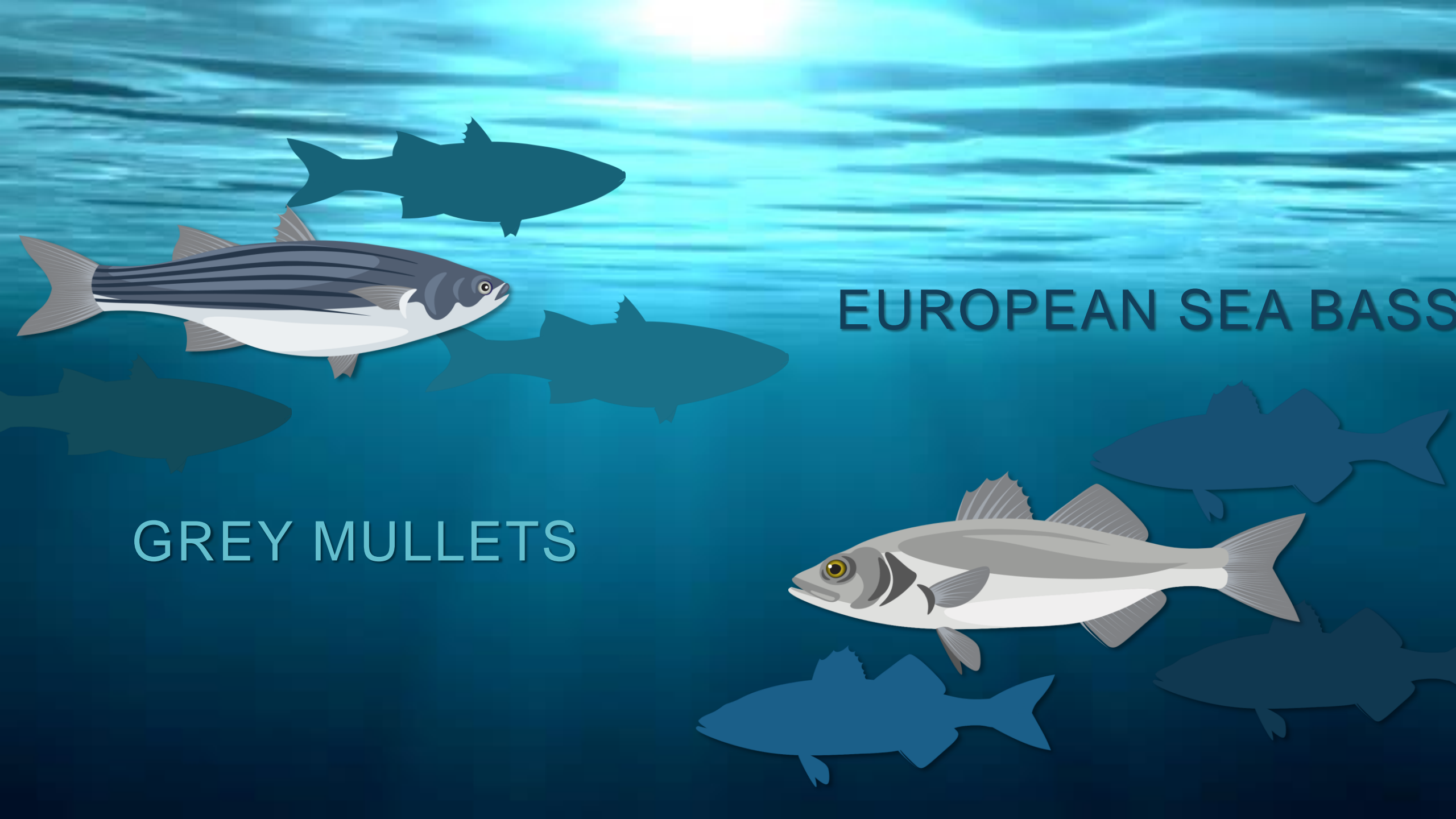


ACOUSTIC TELEMETRY ARRAY



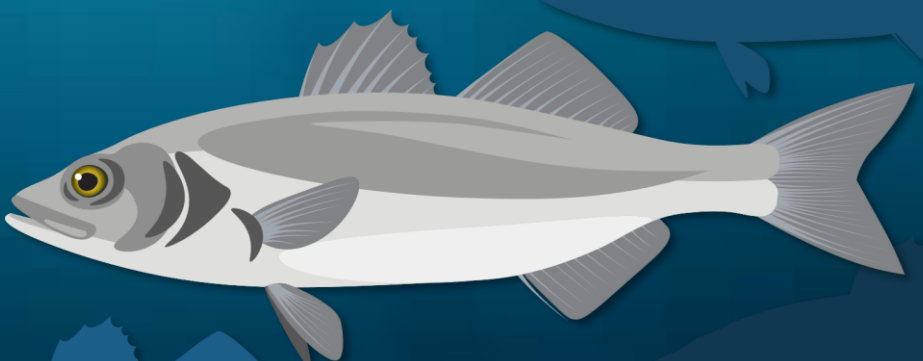
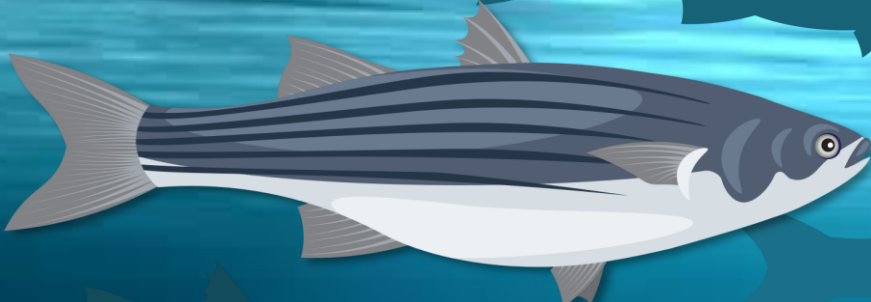


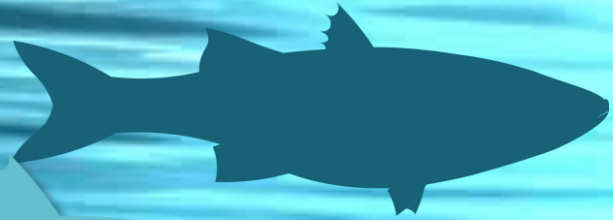
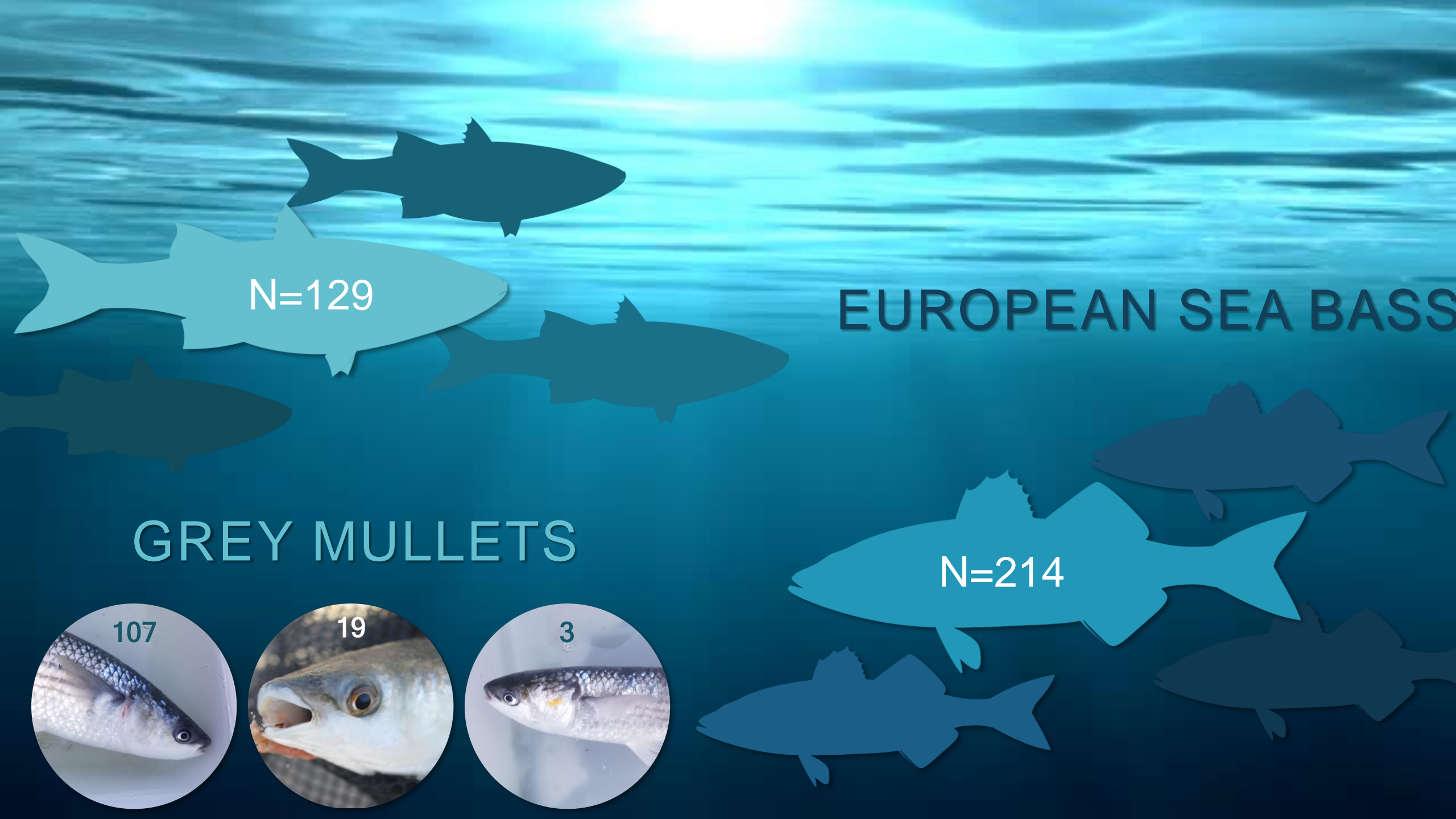
150 m



EUROPEAN SEA BASS

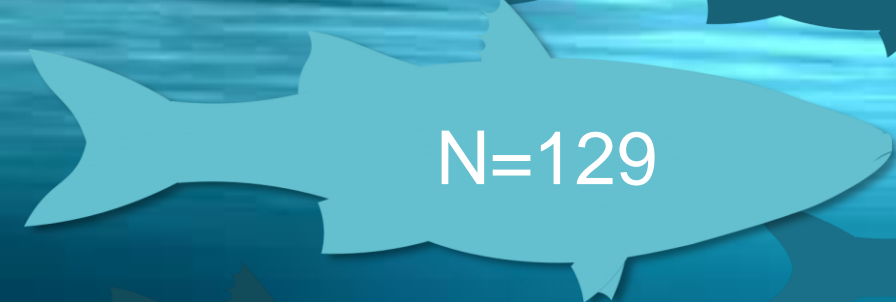
GREY MULLET





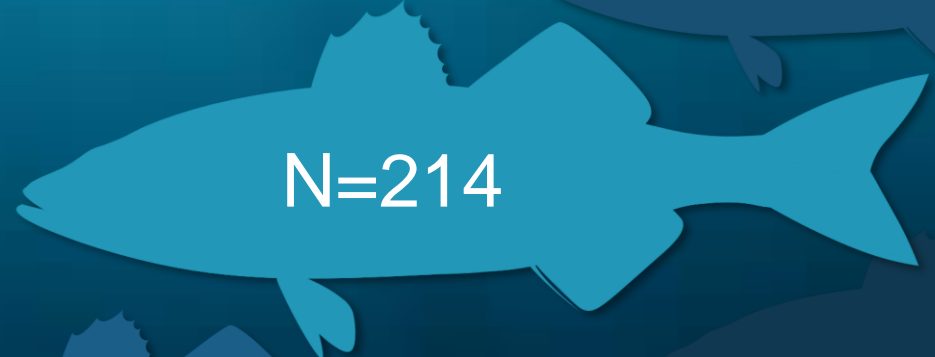
N=129

EUROPEAN SEA BASS

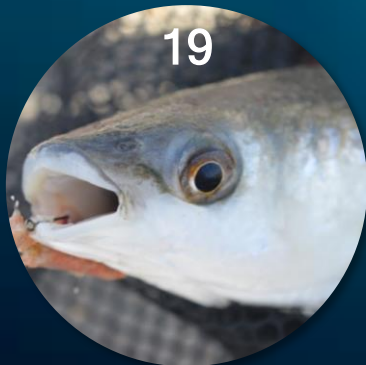


GREY MULLET

N=214



107

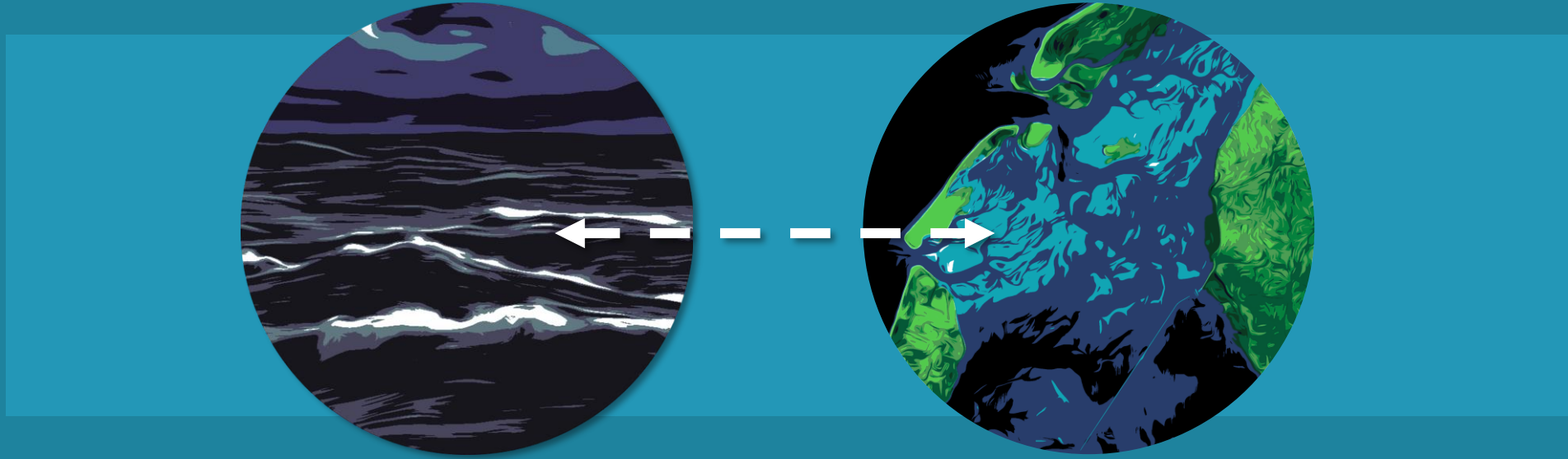


19



3

RESEARCH TOPICS



Migration timing



Arrival & departure

Migration direction



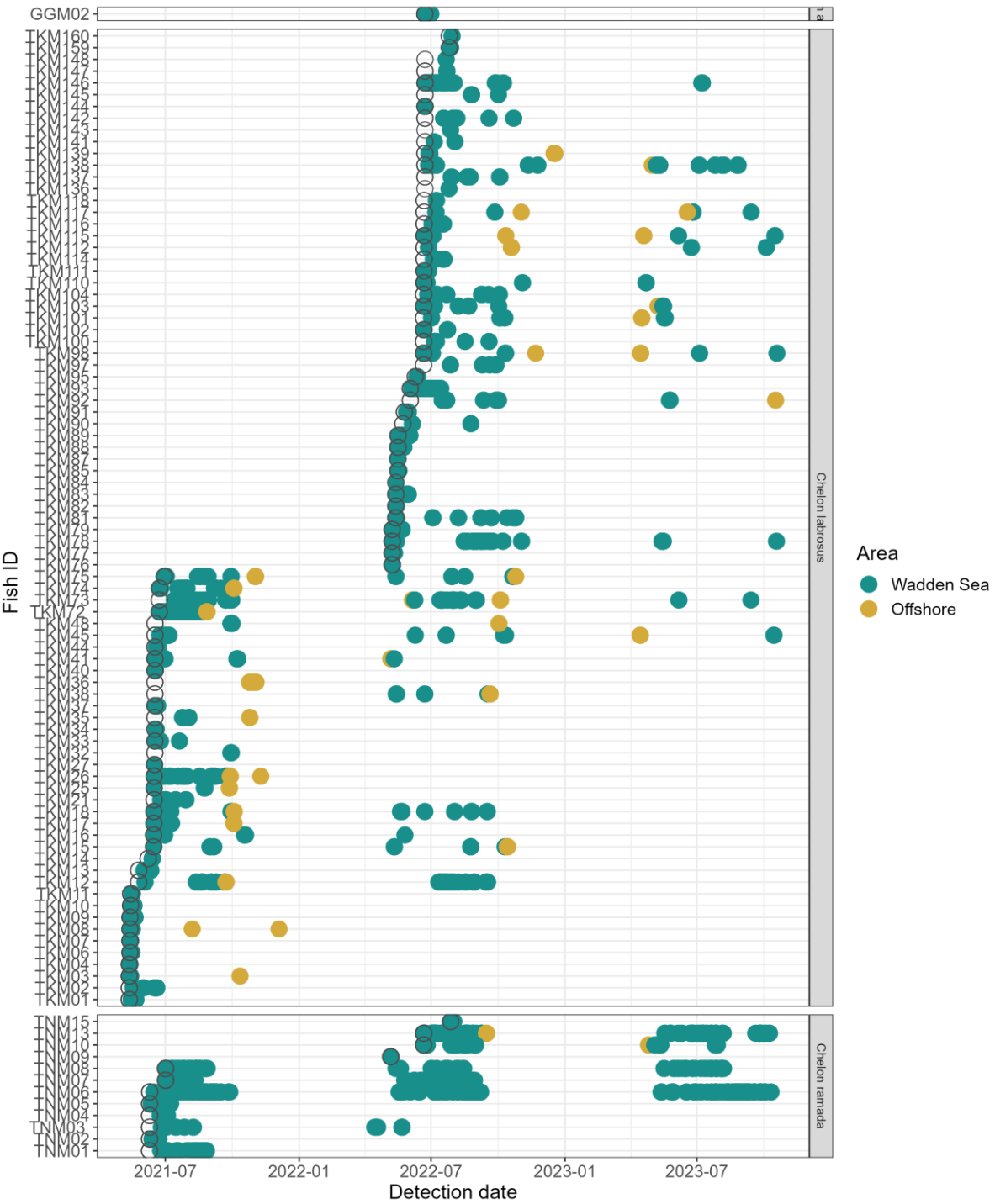
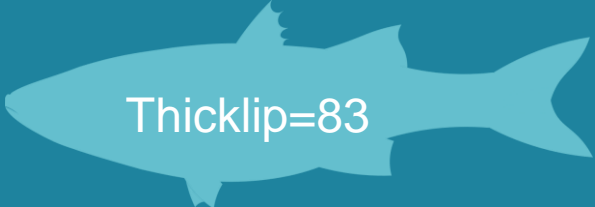
Residency & recurrence





Arrival & departure

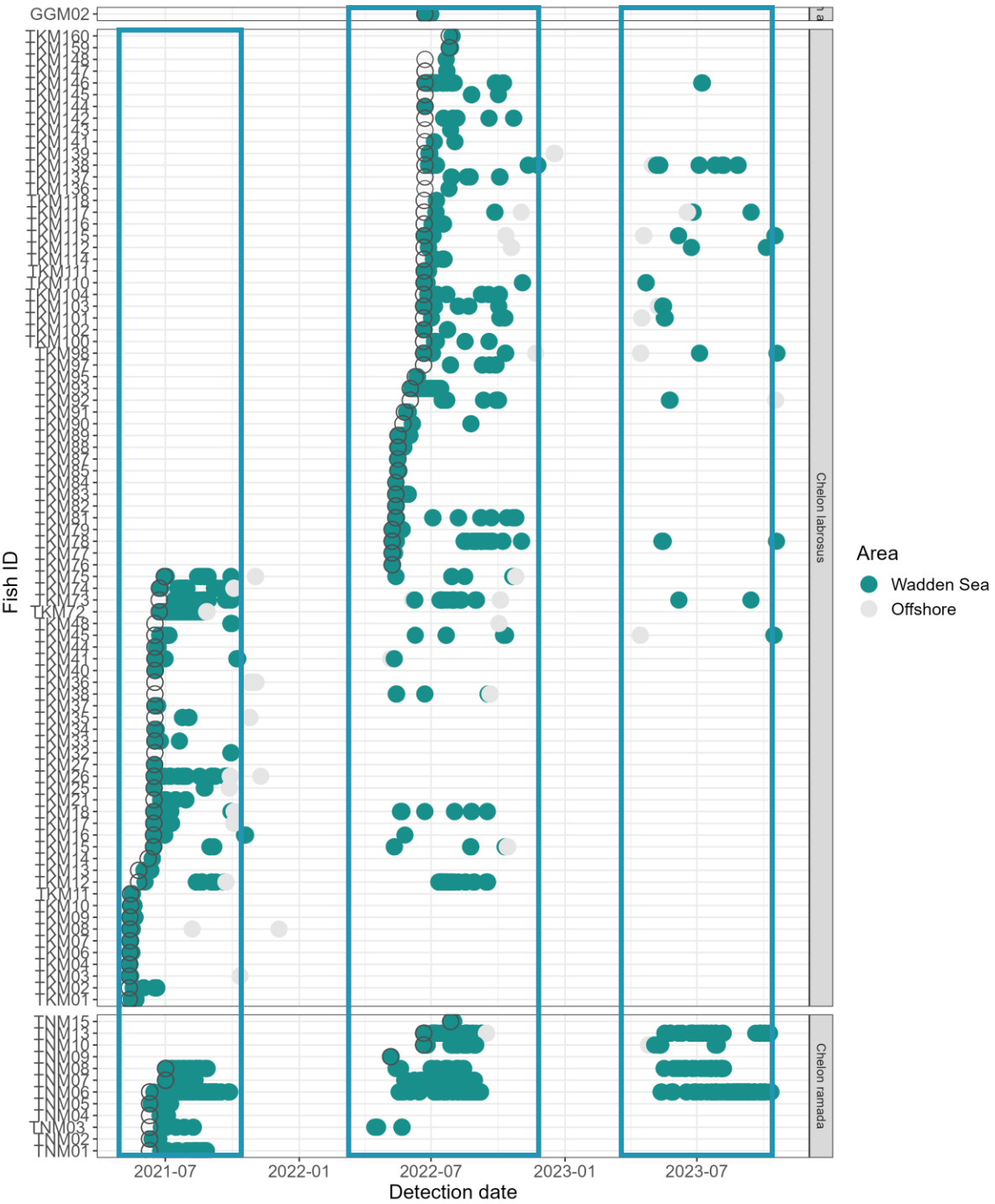
Total fish detected





Arrival & departure

Total fish detected

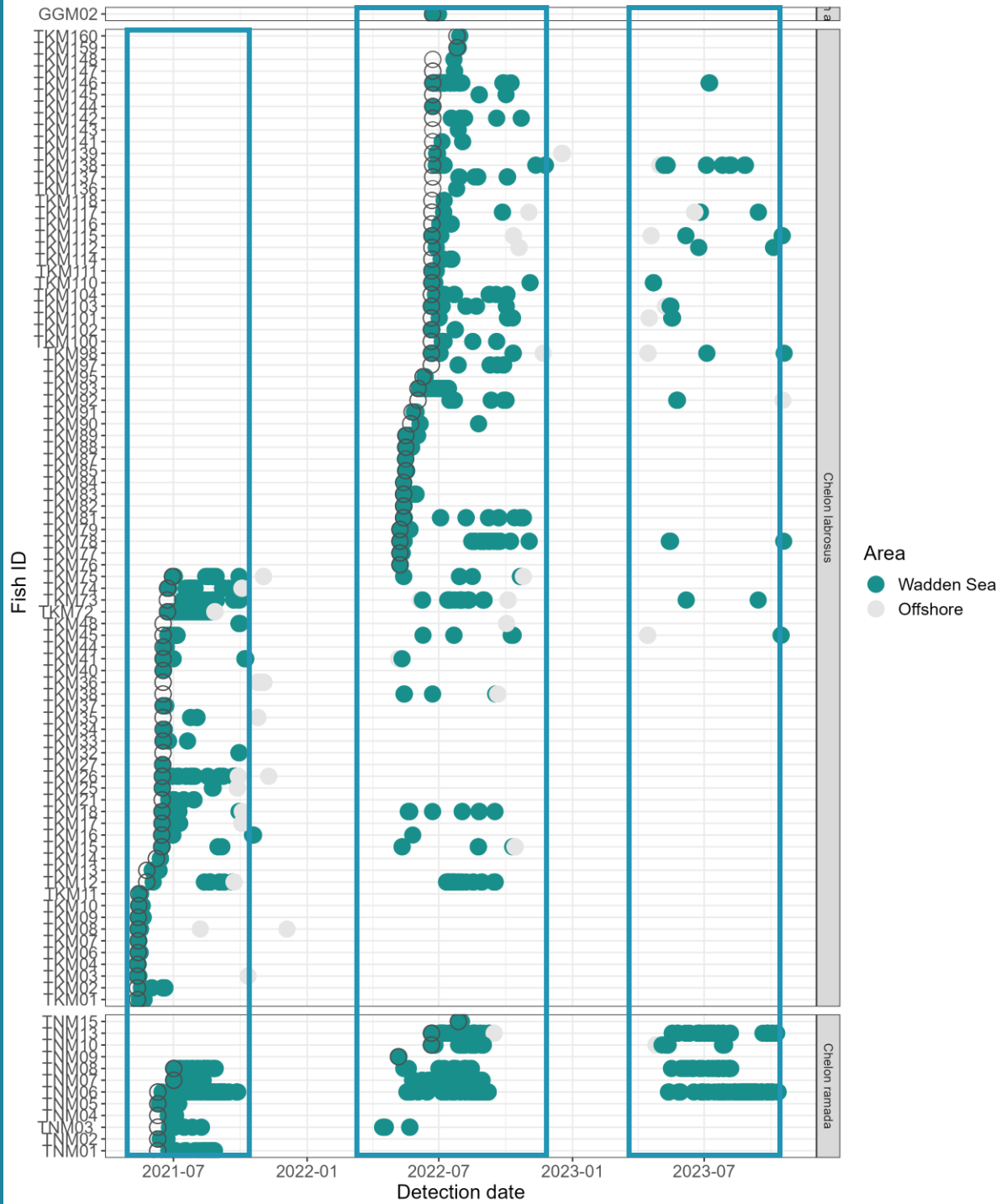
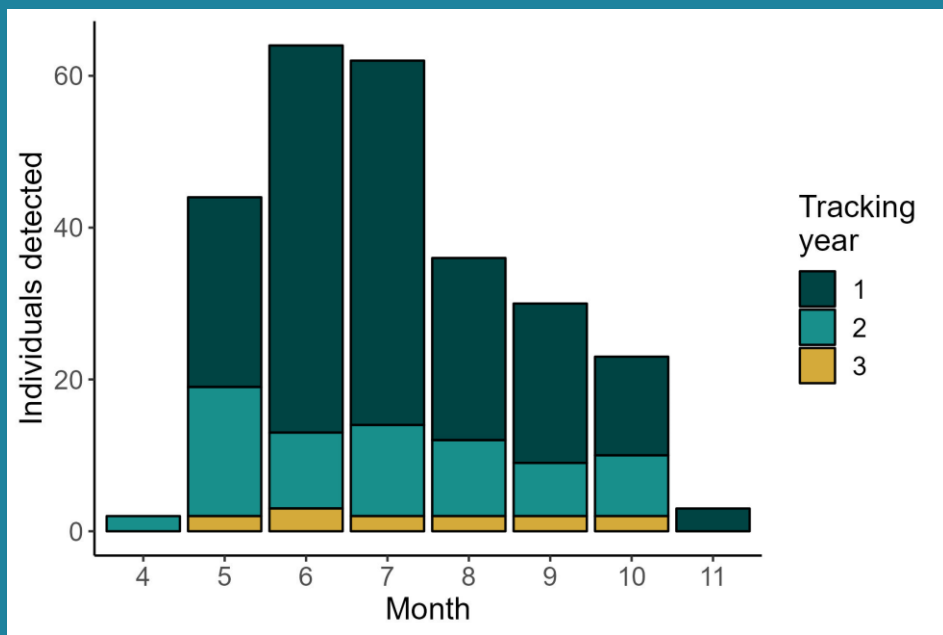




Arrival & departure

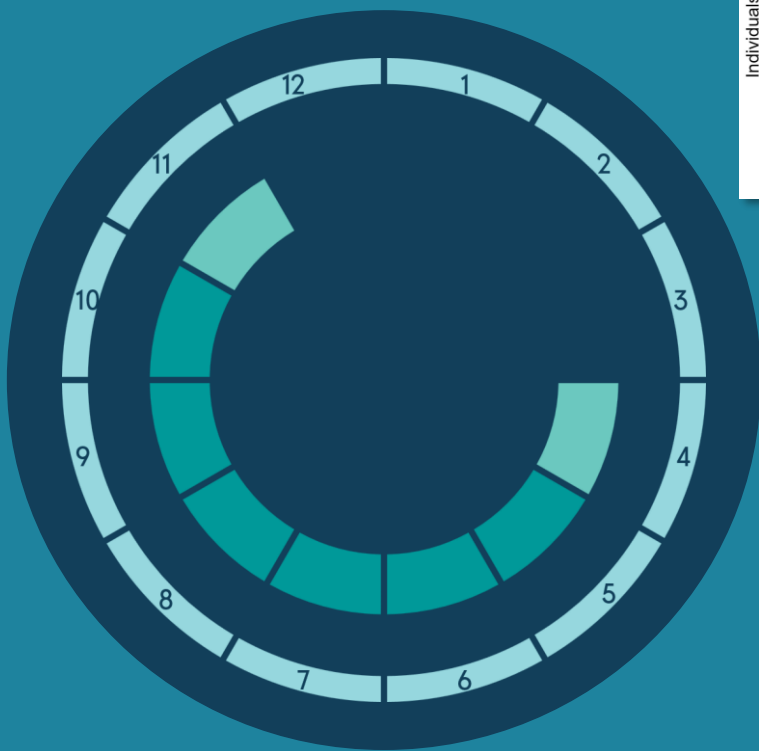
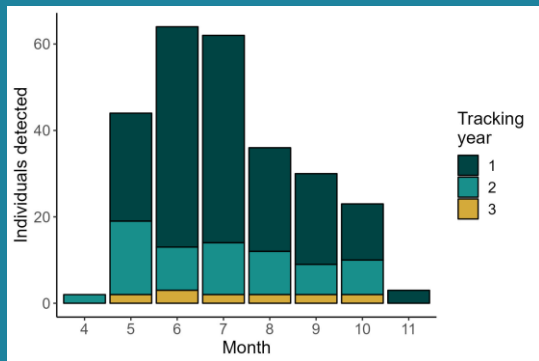


Seasonal presence

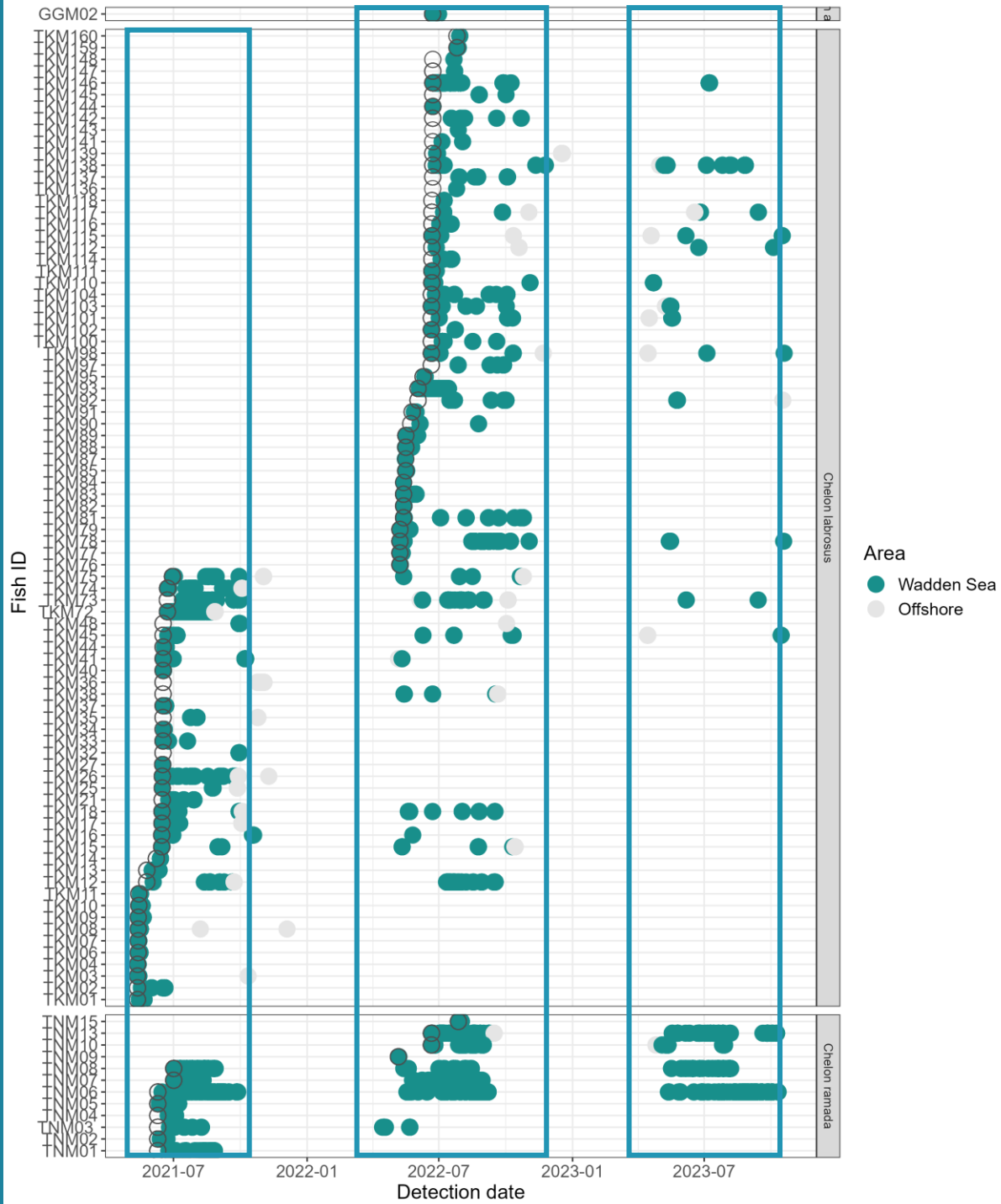




Arrival & departure



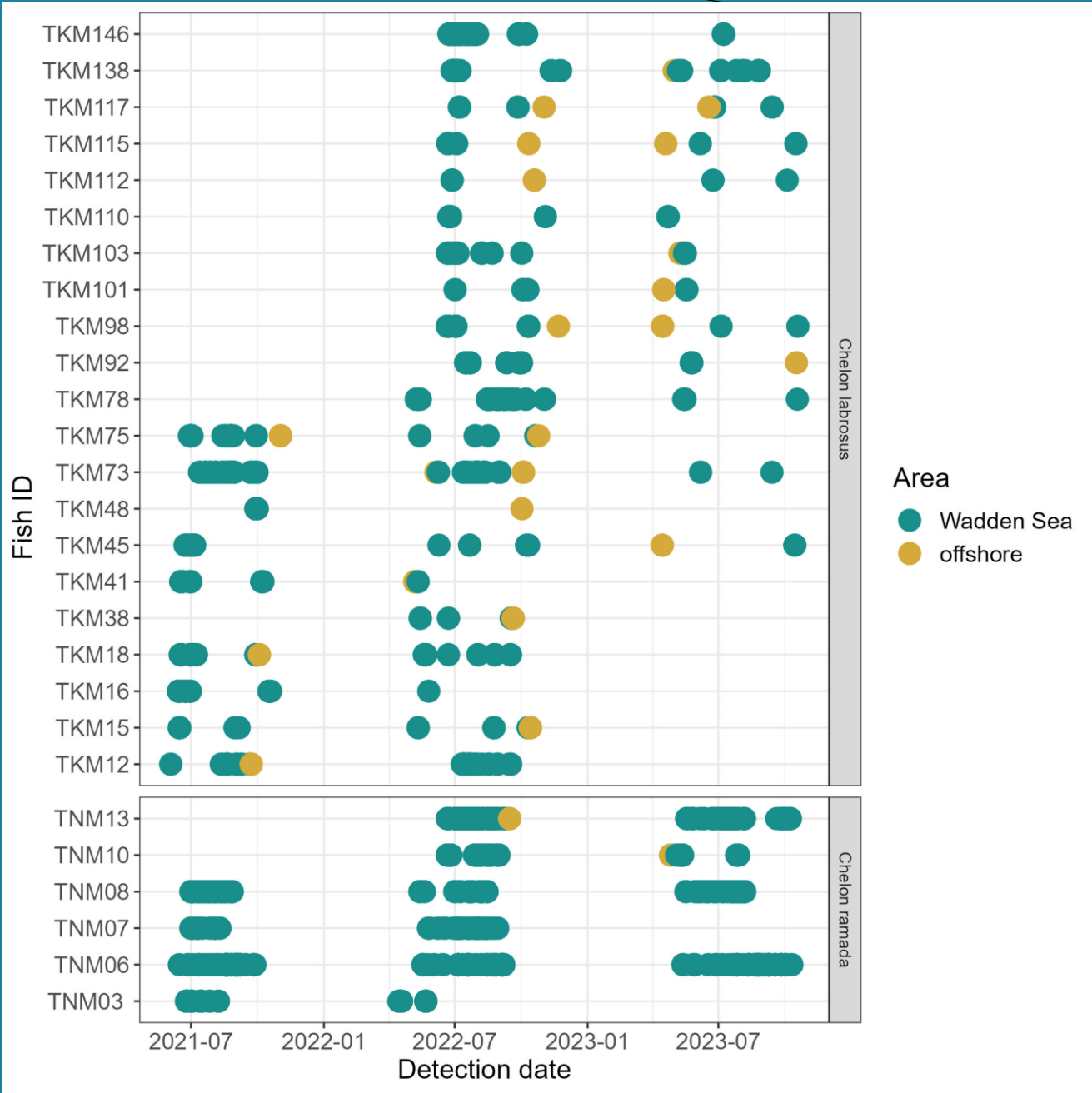
Wadden Sea





Arrival & departure

Fish detected in return years





— Mean
 - - - Median

Days at liberty:

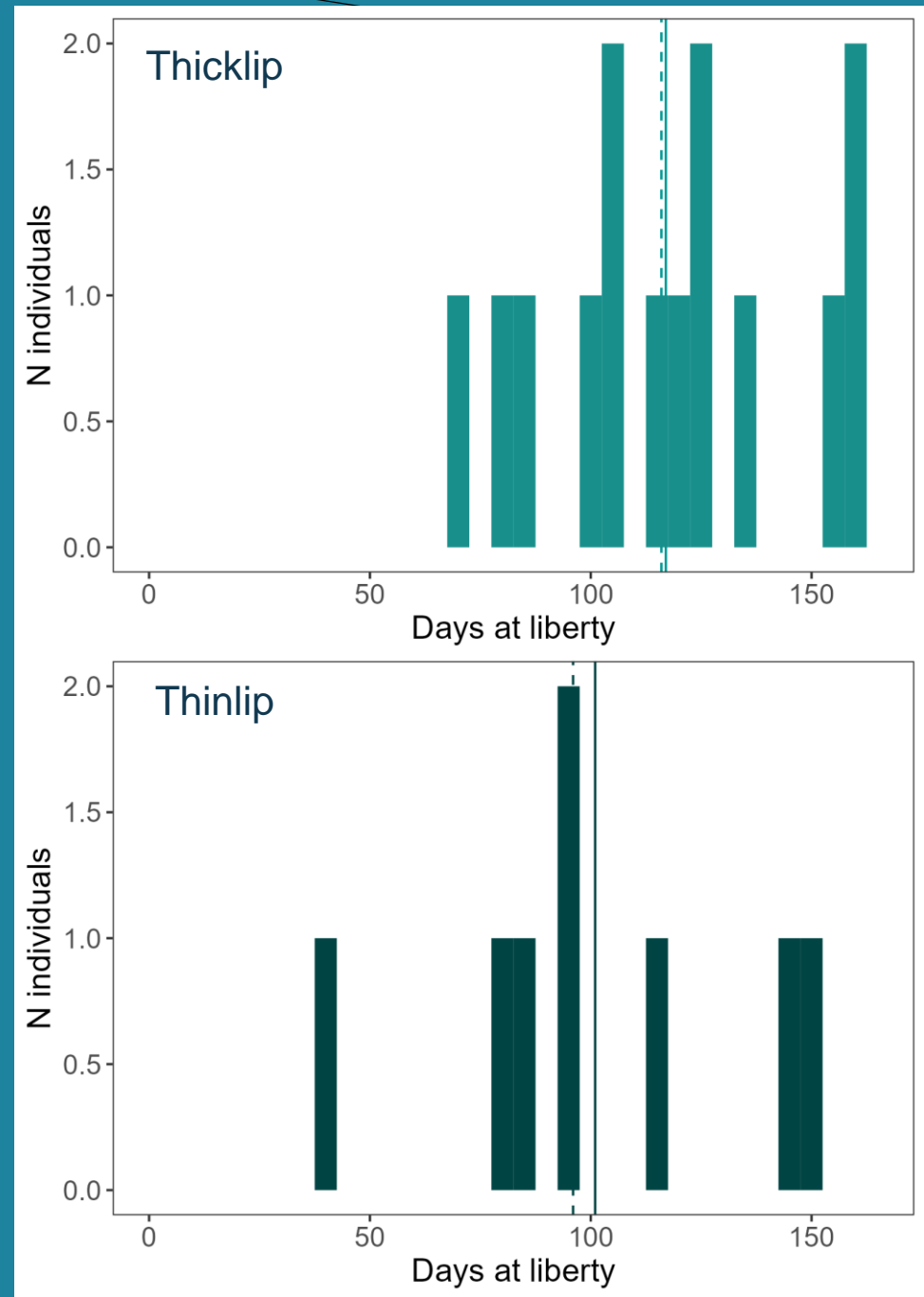
DAL = days between 1st & last detection (per year)



Median DAL: 117



Median DAL: 96





Arrival & departure

— Mean
- - - Median

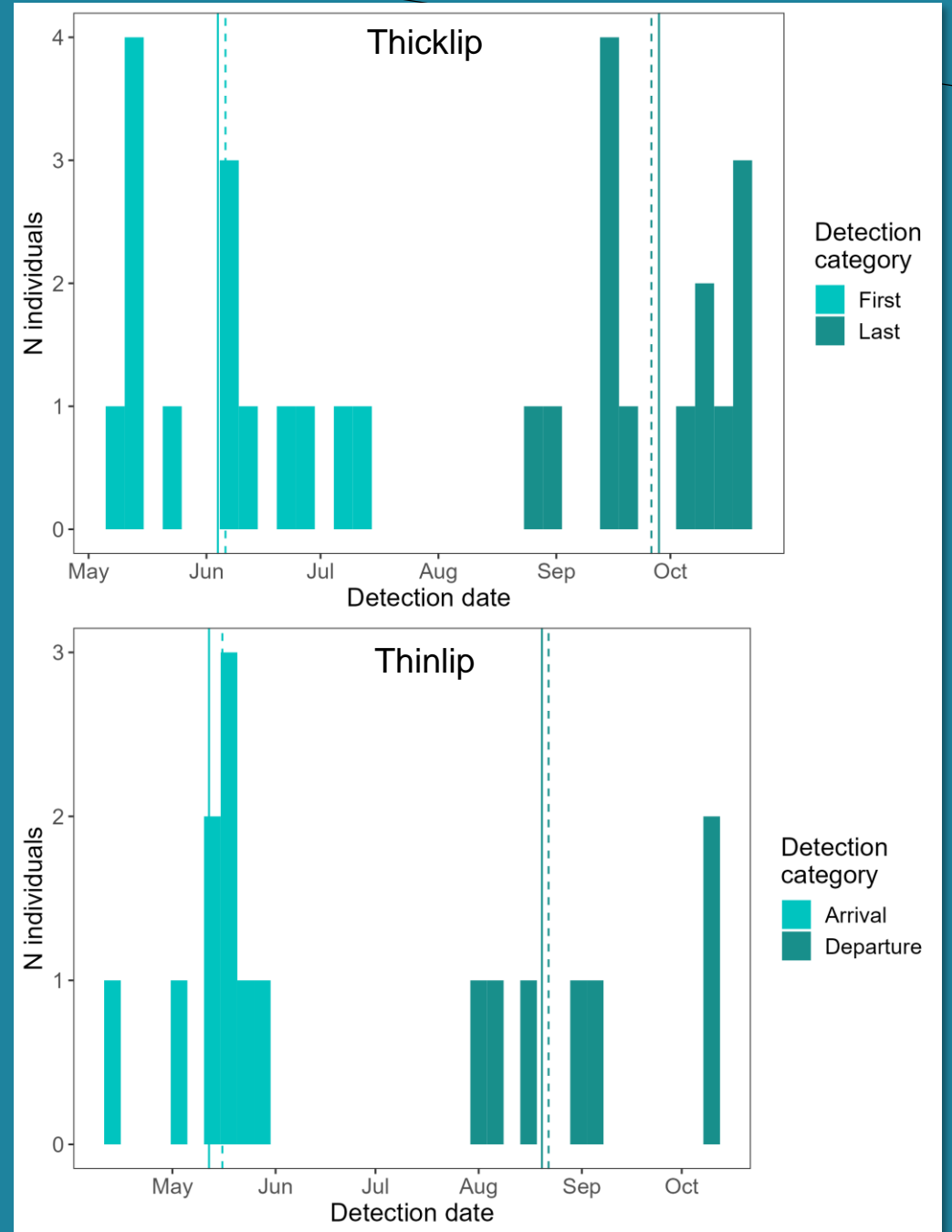
Arrival & departure in the Wadden Sea



Median arrival: June 6
Median departure: Sept 26



Median arrival: May 16
Median departure: Aug 22



RESEARCH TOPICS





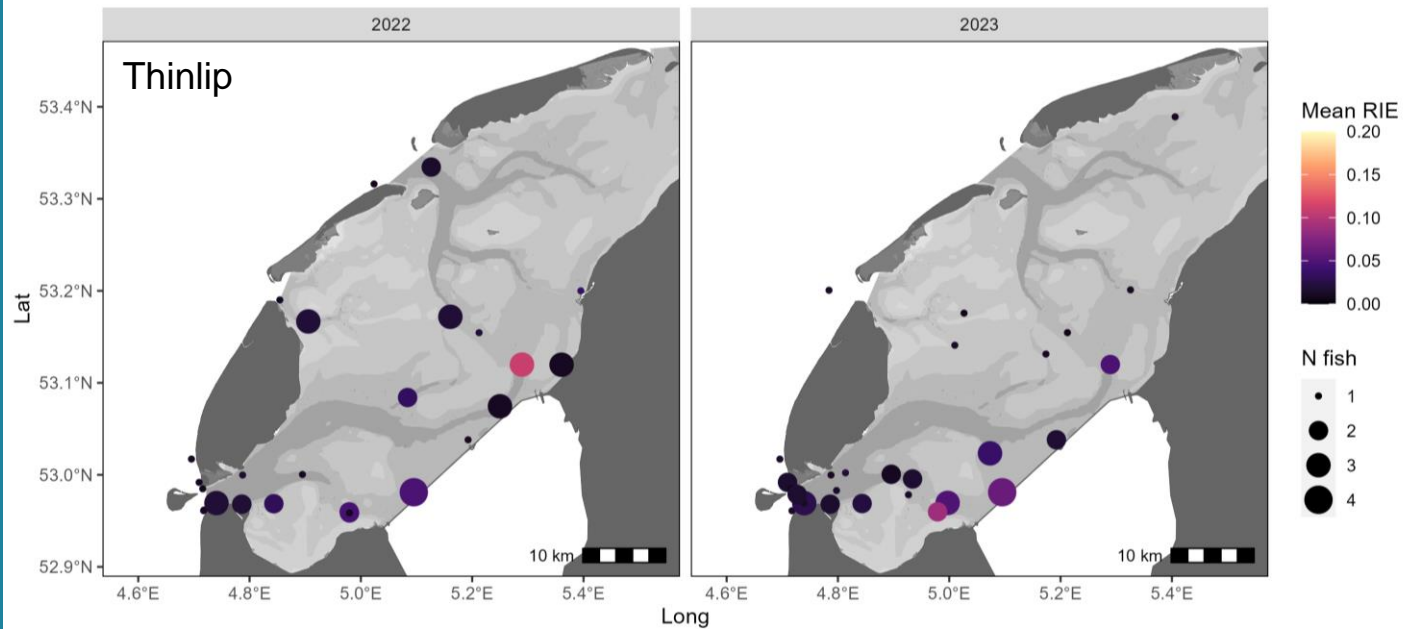
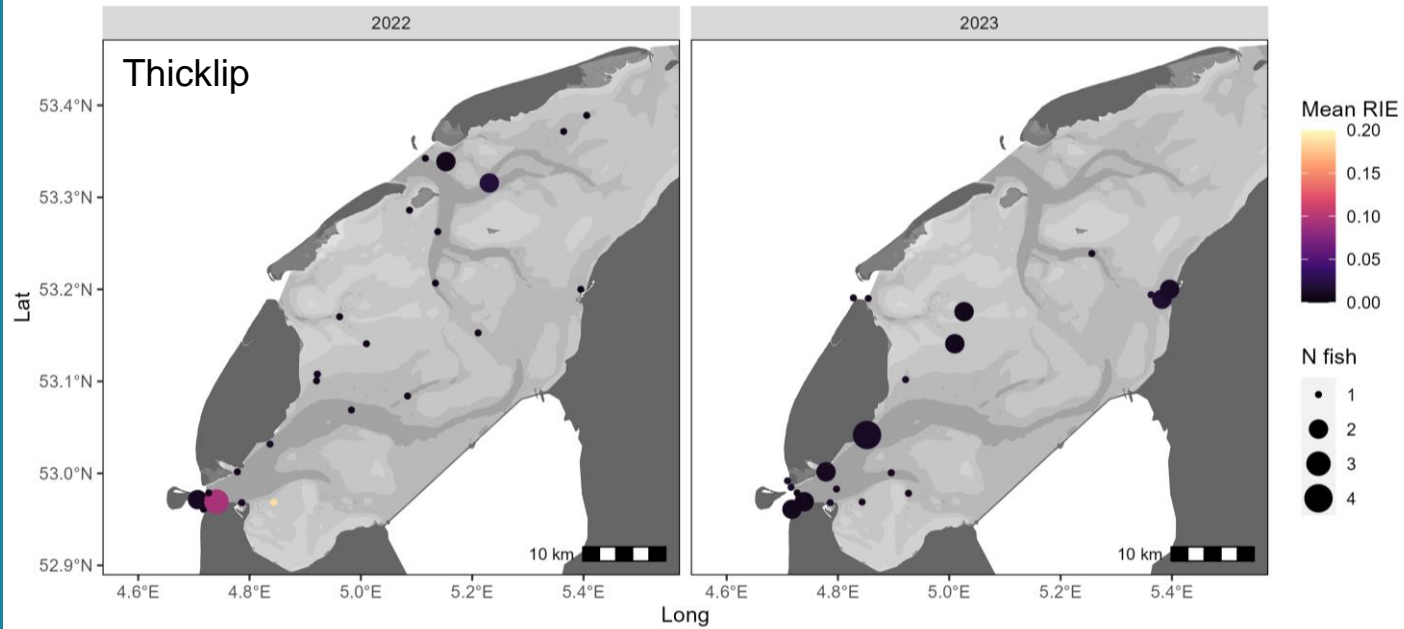
Residency & recurrence

Spatial residence:

(Legare et al. 2015; Hussey et al., 2017; Cochran et al. 2019)

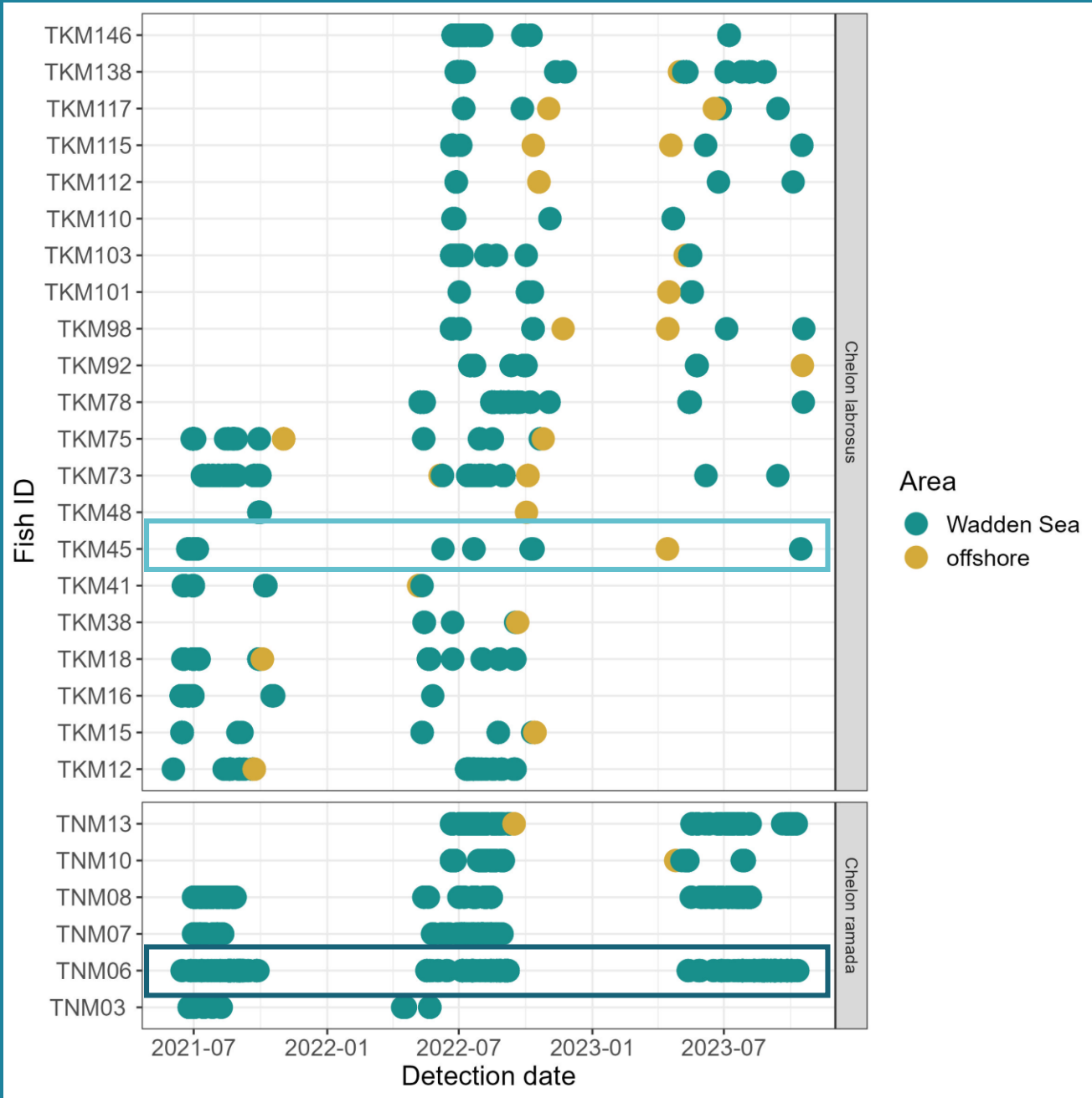
$$RI_E = \frac{\text{Days detected at station}}{\text{Days at liberty}}$$





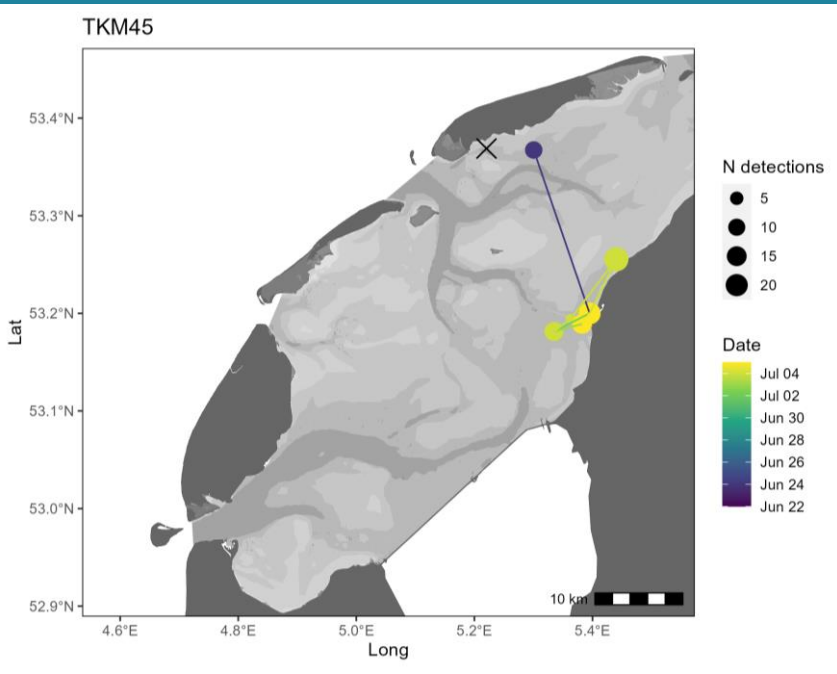
$$RI_E = \frac{\text{Days detected at station}}{\text{Days at liberty}}$$



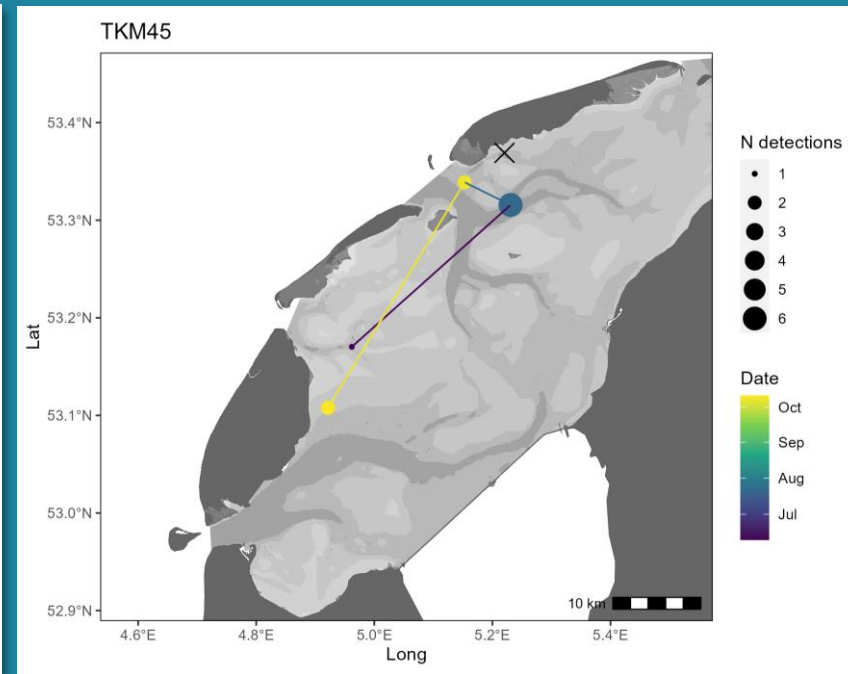




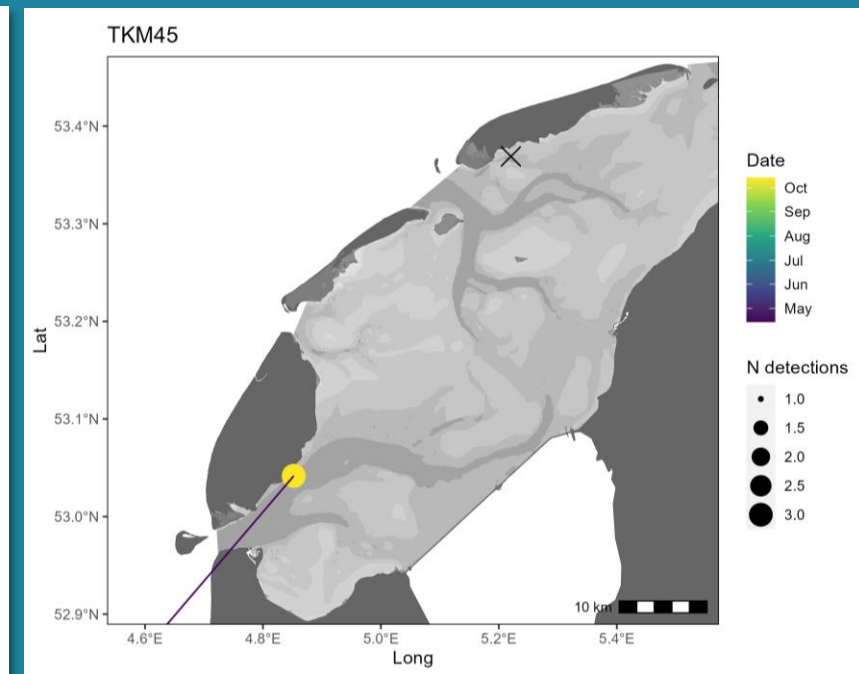
Thicklip mullet



2021



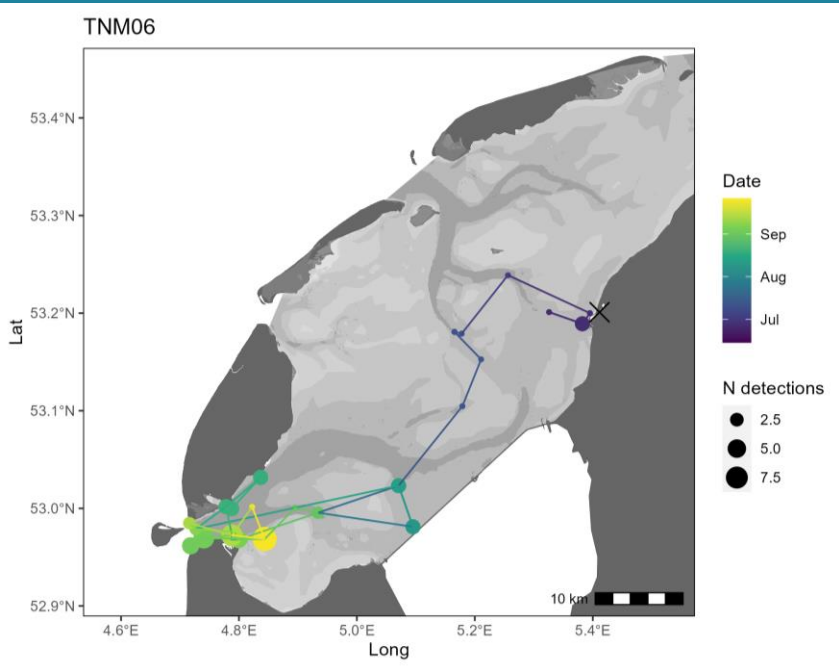
2022



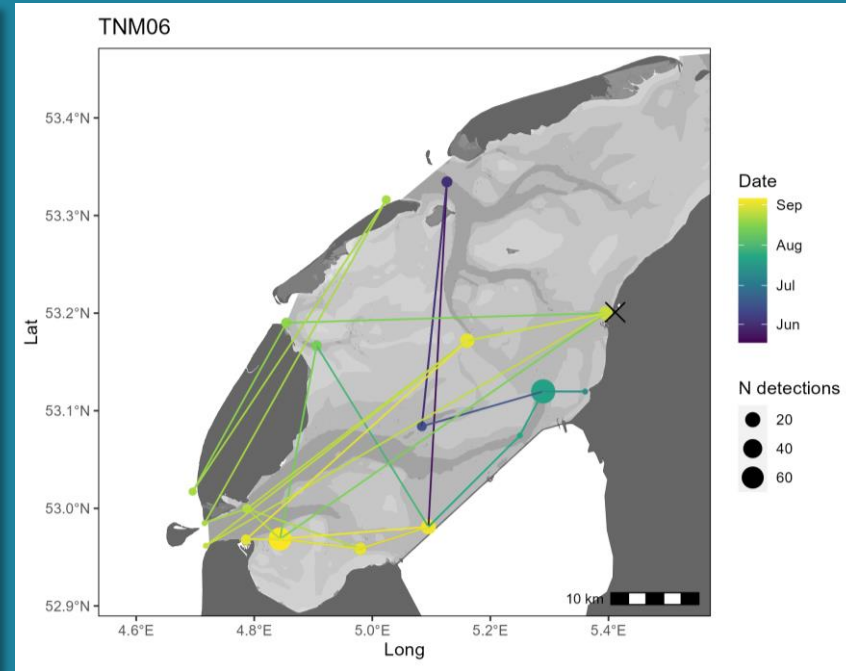
2023



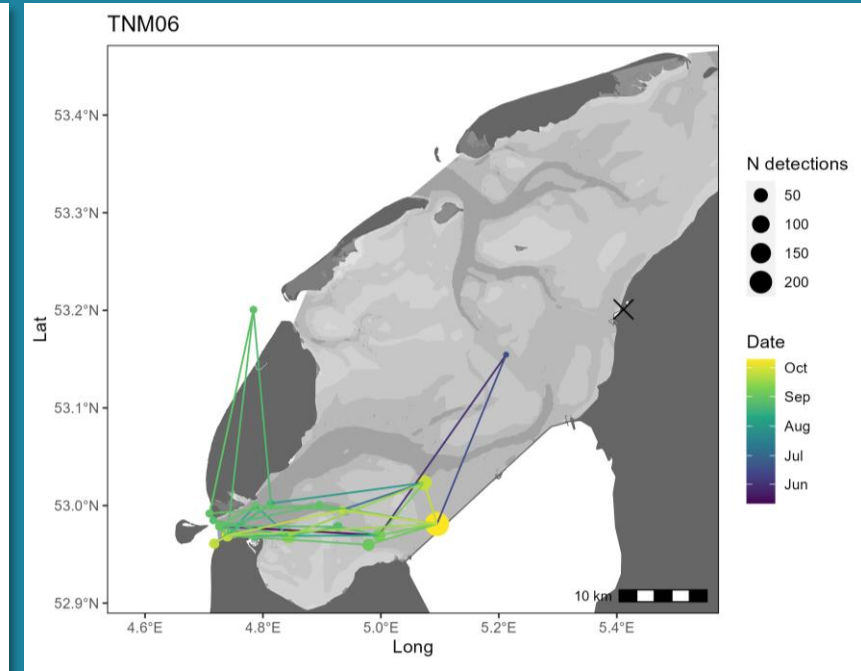
Thinlip mullet



2021



2022



2023

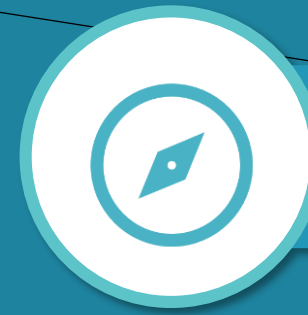
RESEARCH TOPICS



Migration
direction



Migration
timing

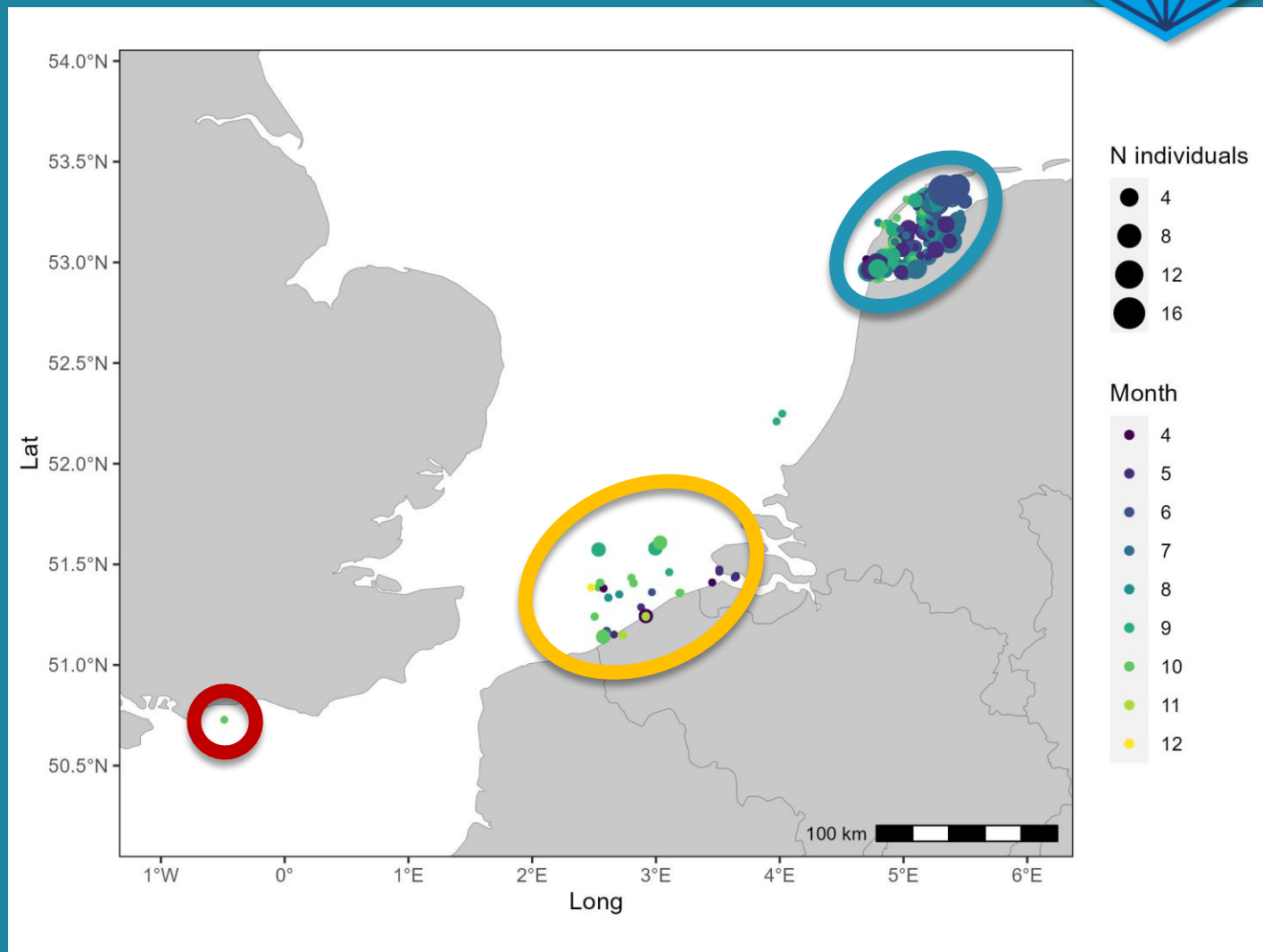


Migration direction

Where do fish go when they leave the Wadden Sea?

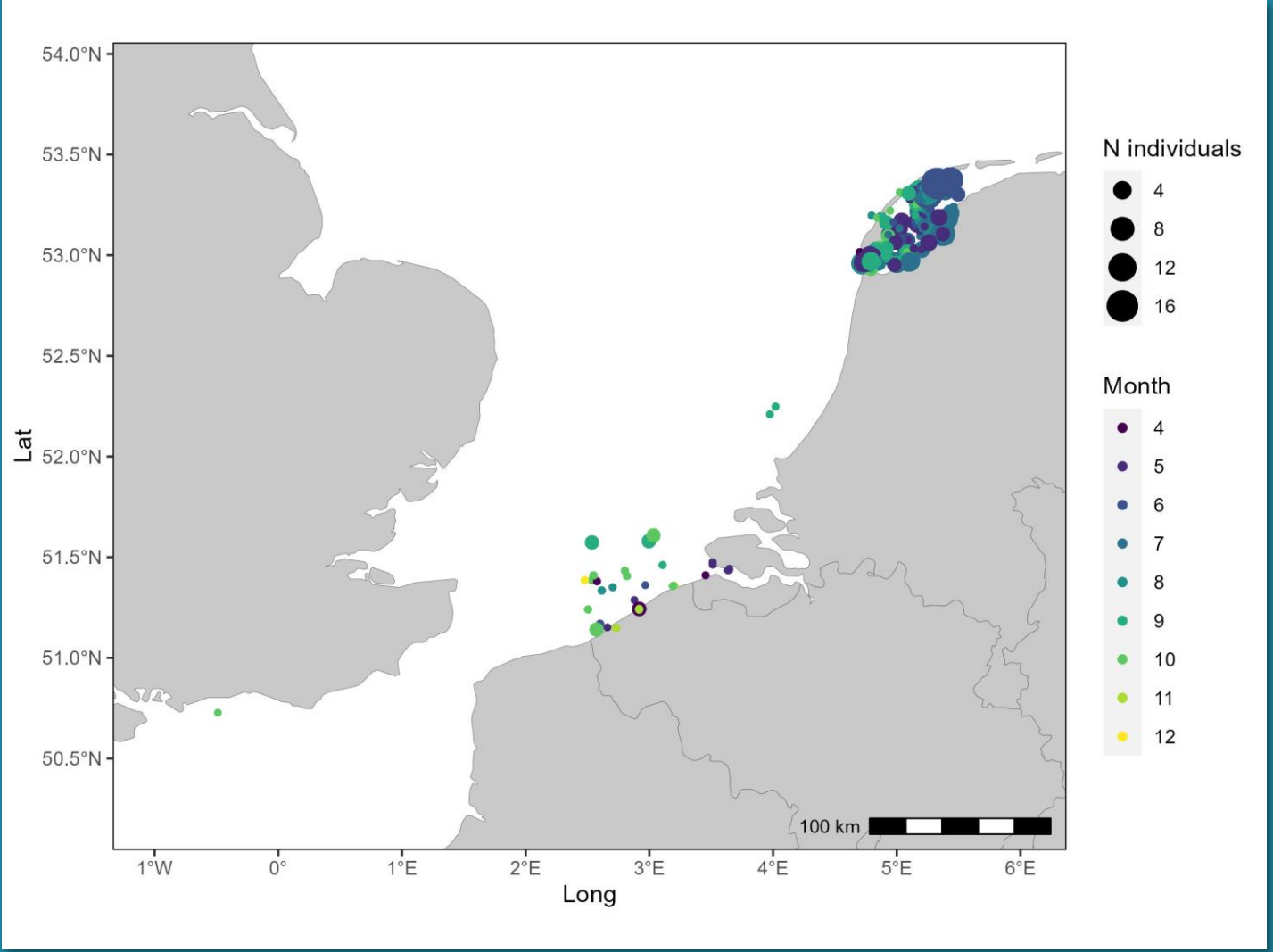


Where do fish go when they leave the Wadden Sea?

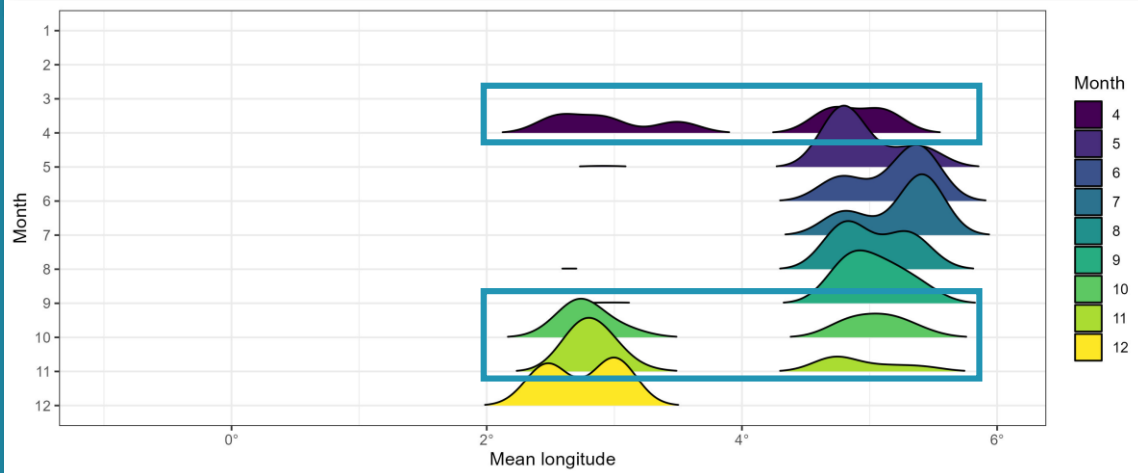
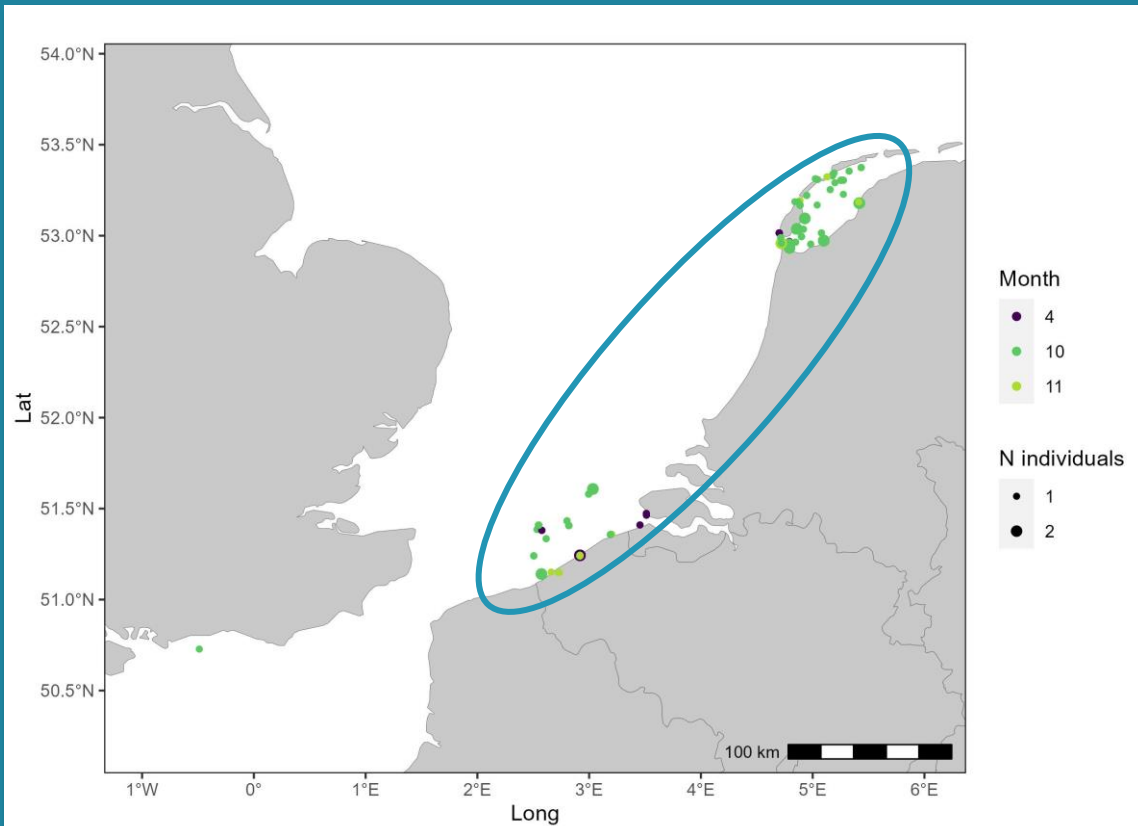




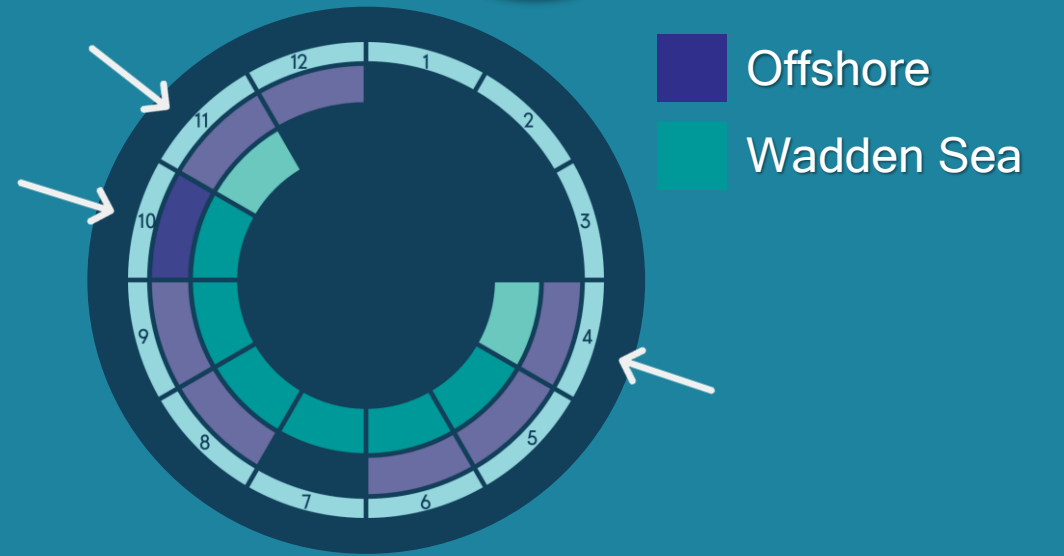
Migration timing



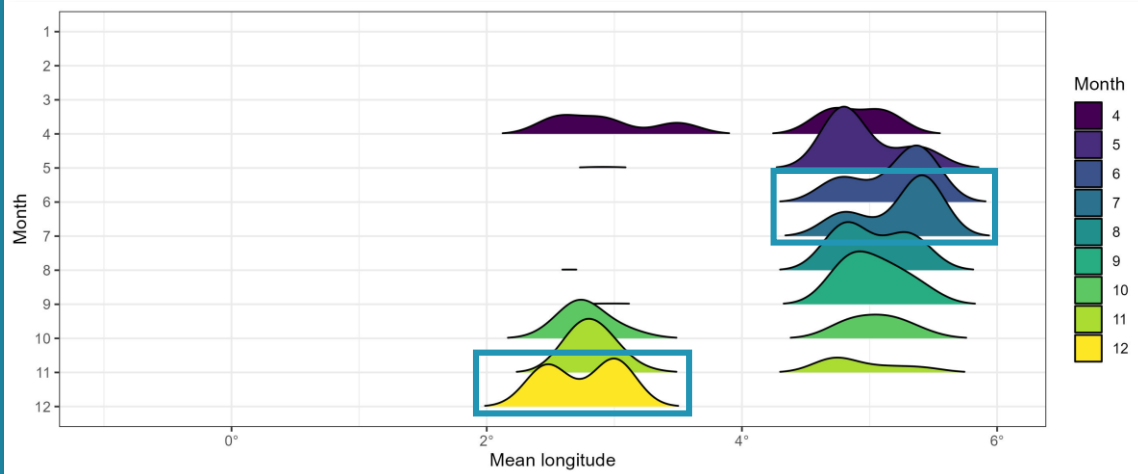
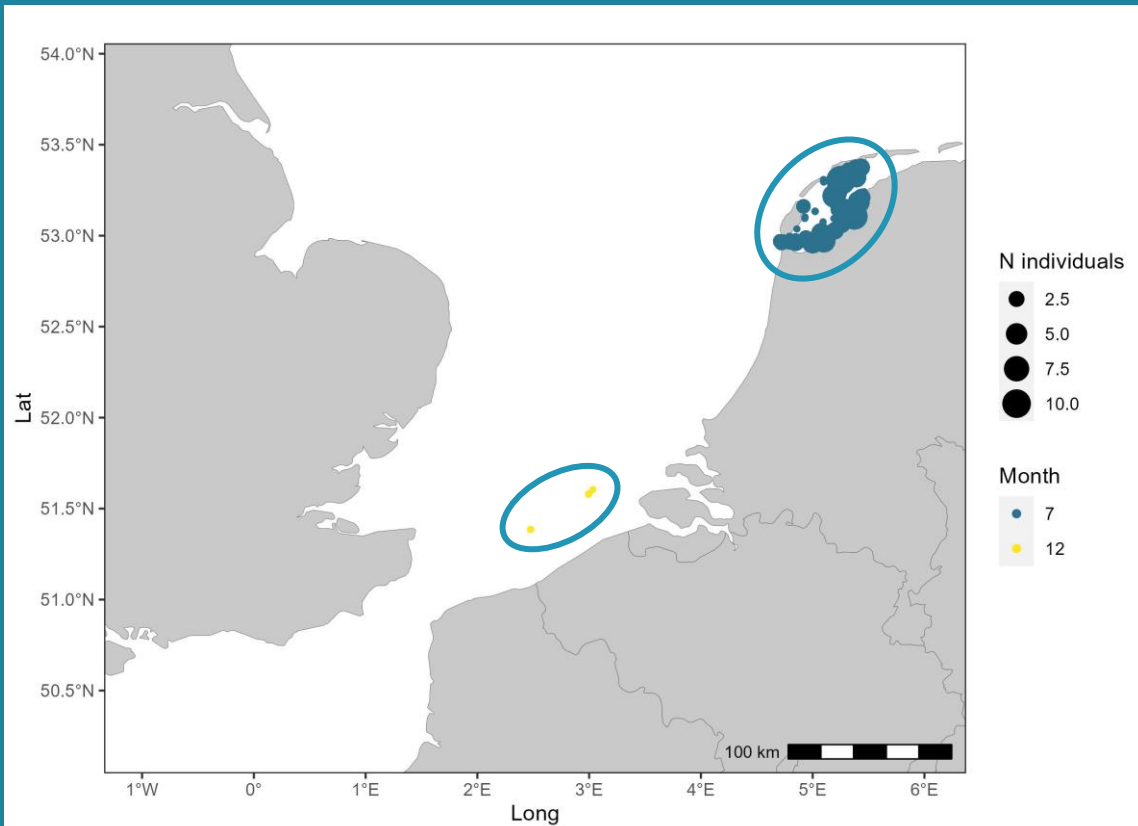
When do fish migrate to and from the Wadden Sea?



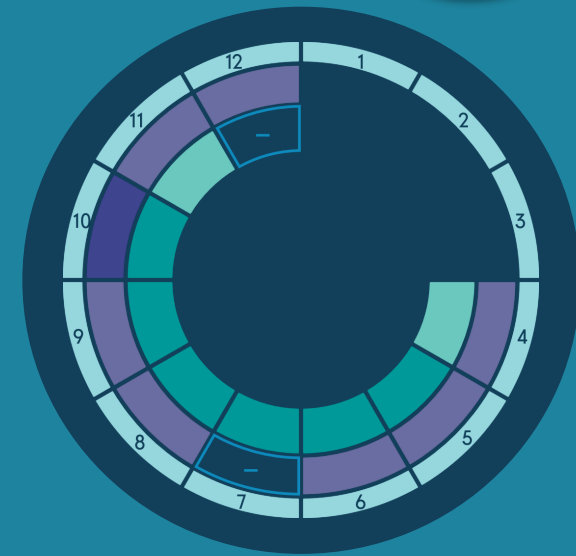
Migration timing



When do fish migrate to and from the Wadden Sea?
 → April, Oct, & Nov



Migration timing



Offshore
Wadden Sea

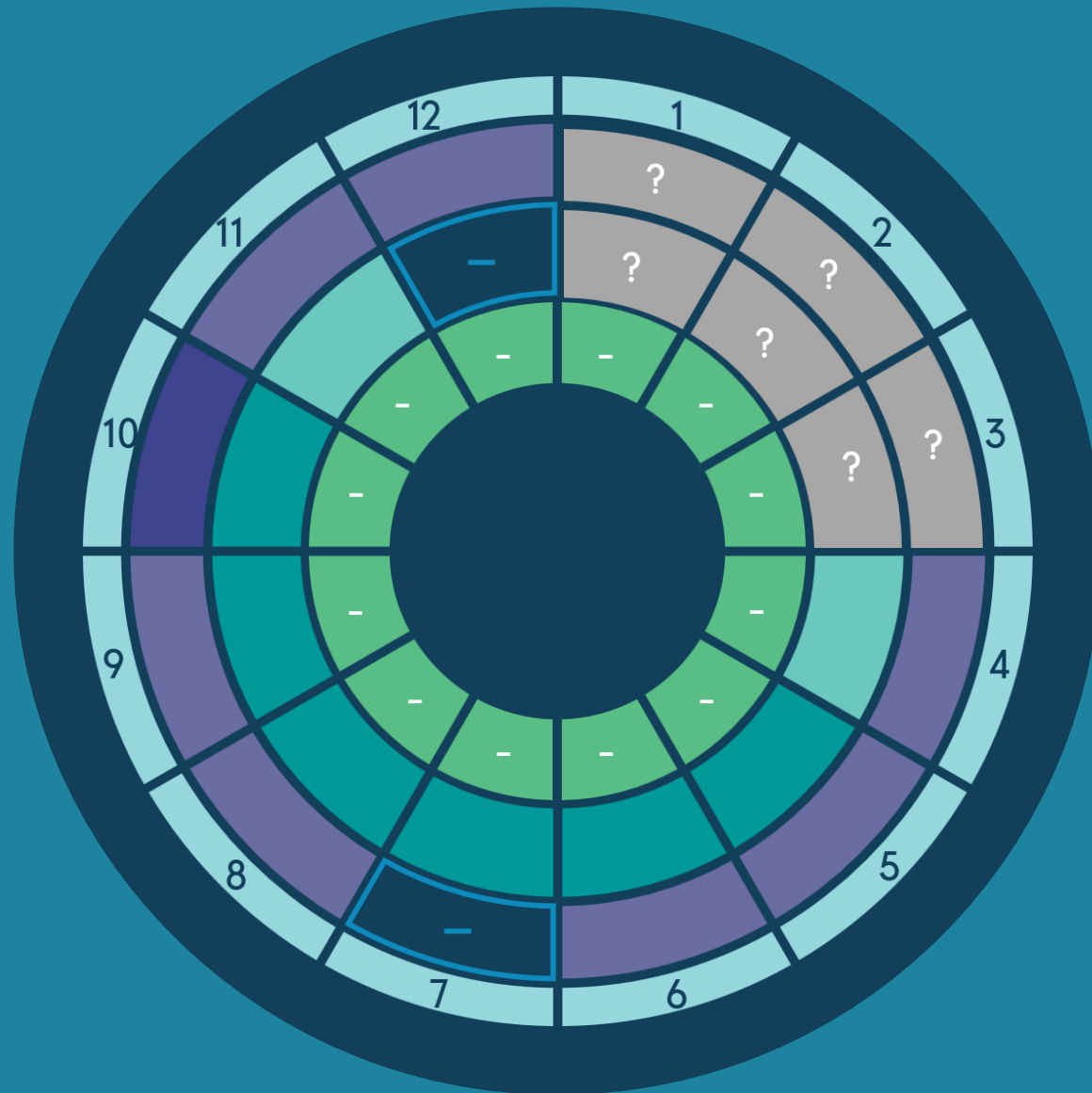
When do fish migrate to and from the Wadden Sea?

→ April, Oct, & Nov

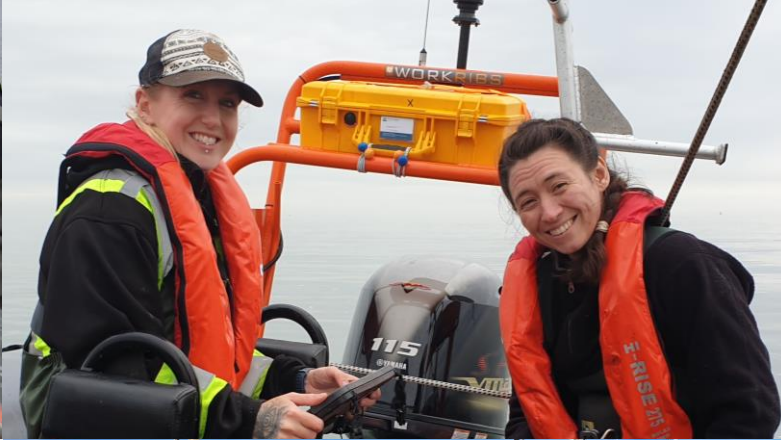
→ Segregation in July & Dec



Migration timing



- Offshore
- Wadden Sea
- Freshwater



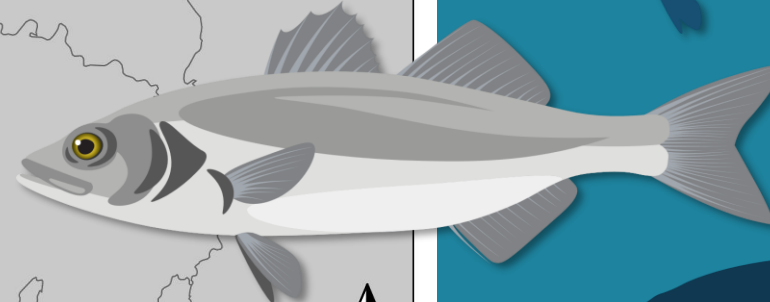
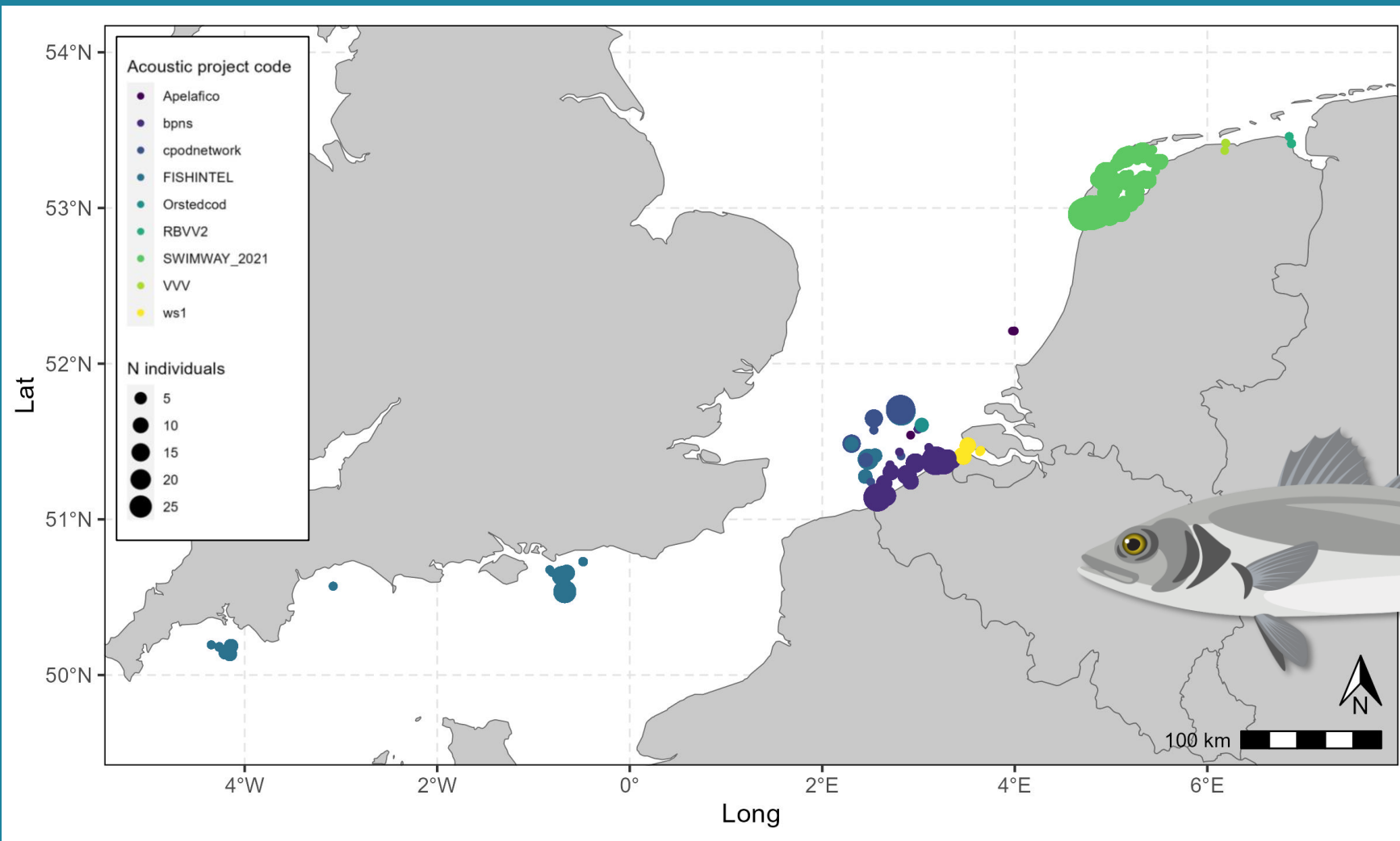


Thank you!



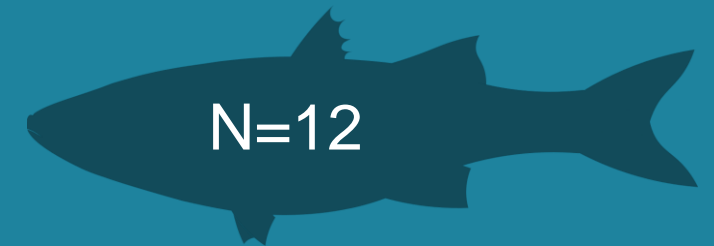
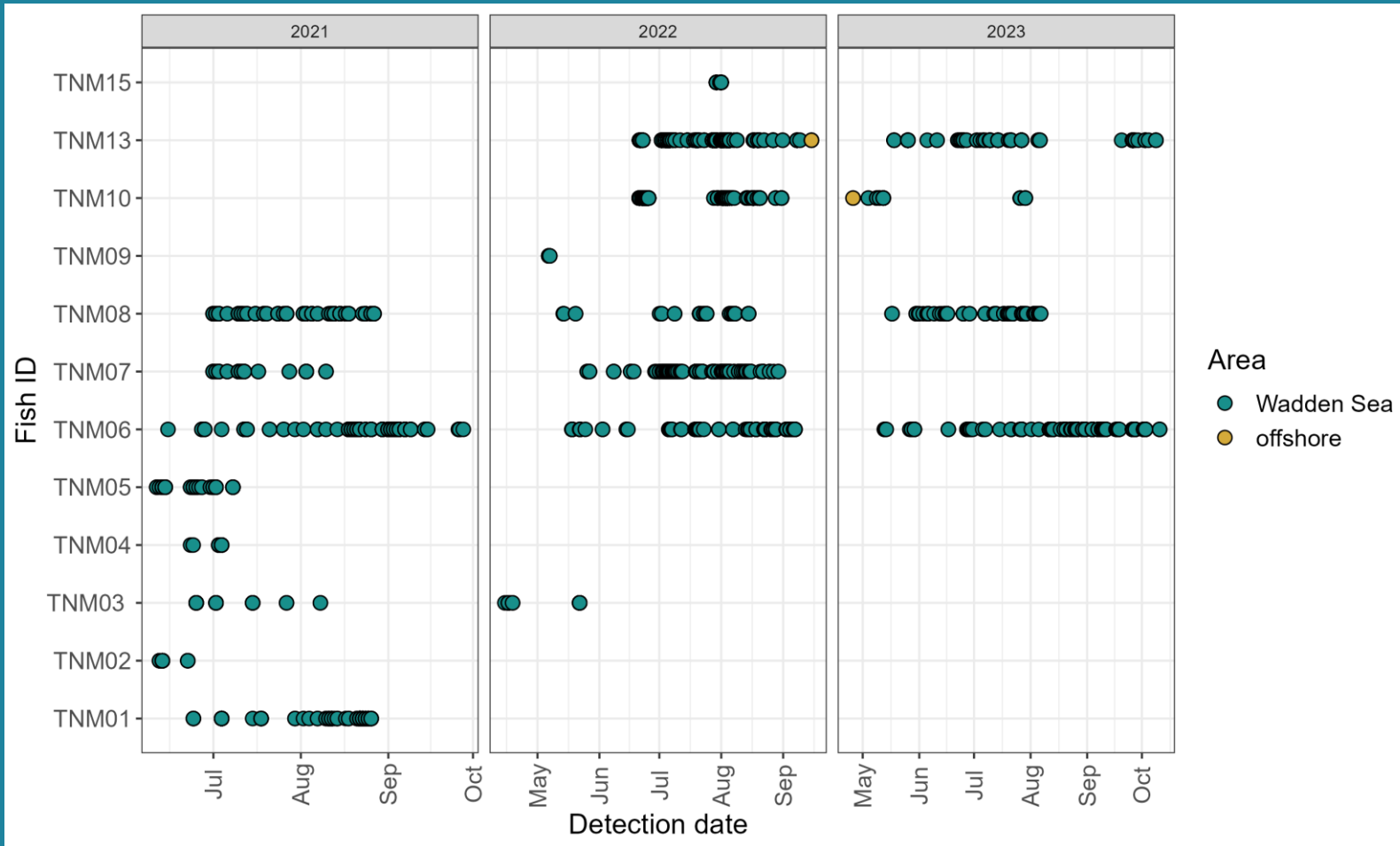
rijksuniversiteit
groningen



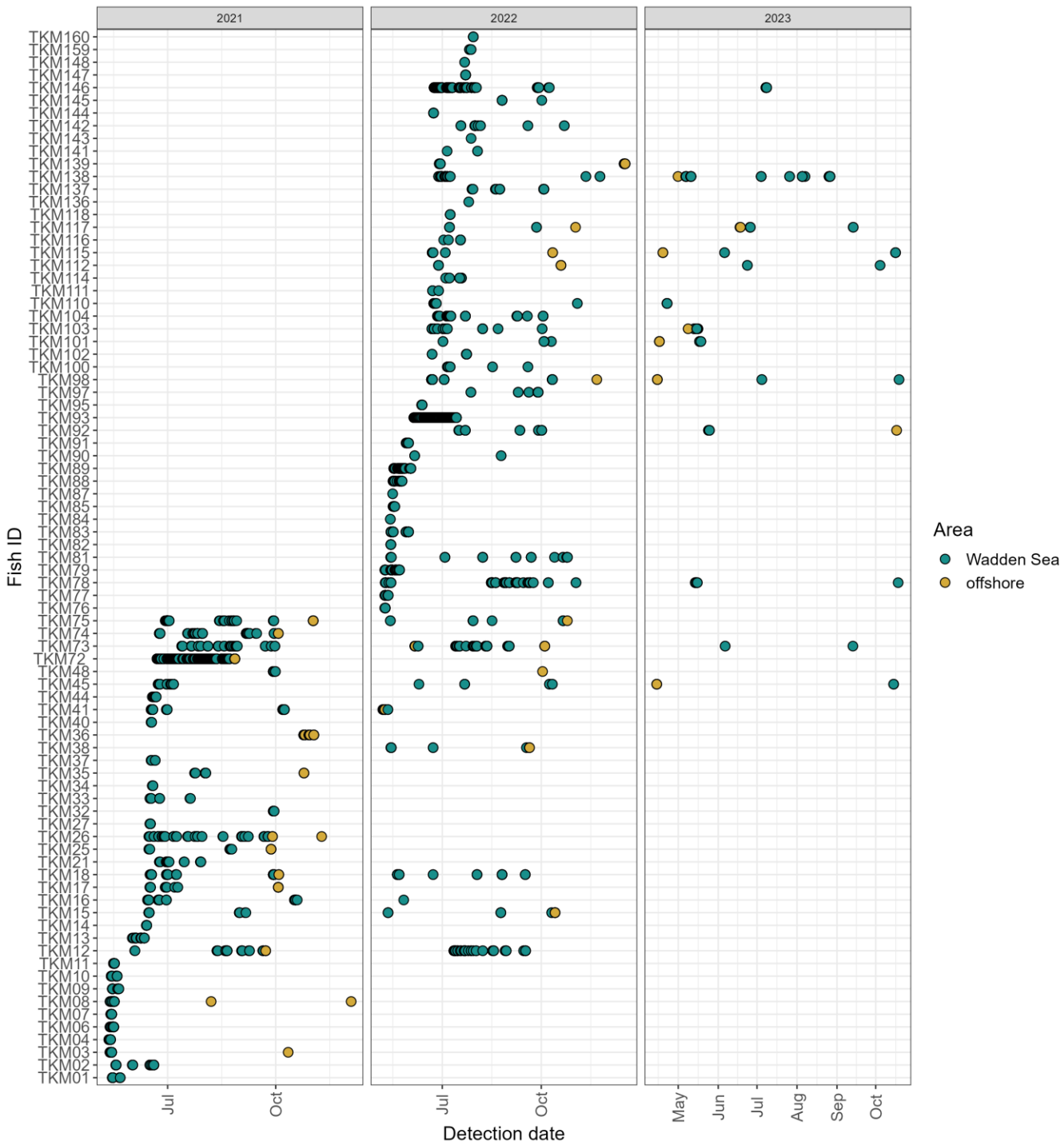




Residency & recurrence



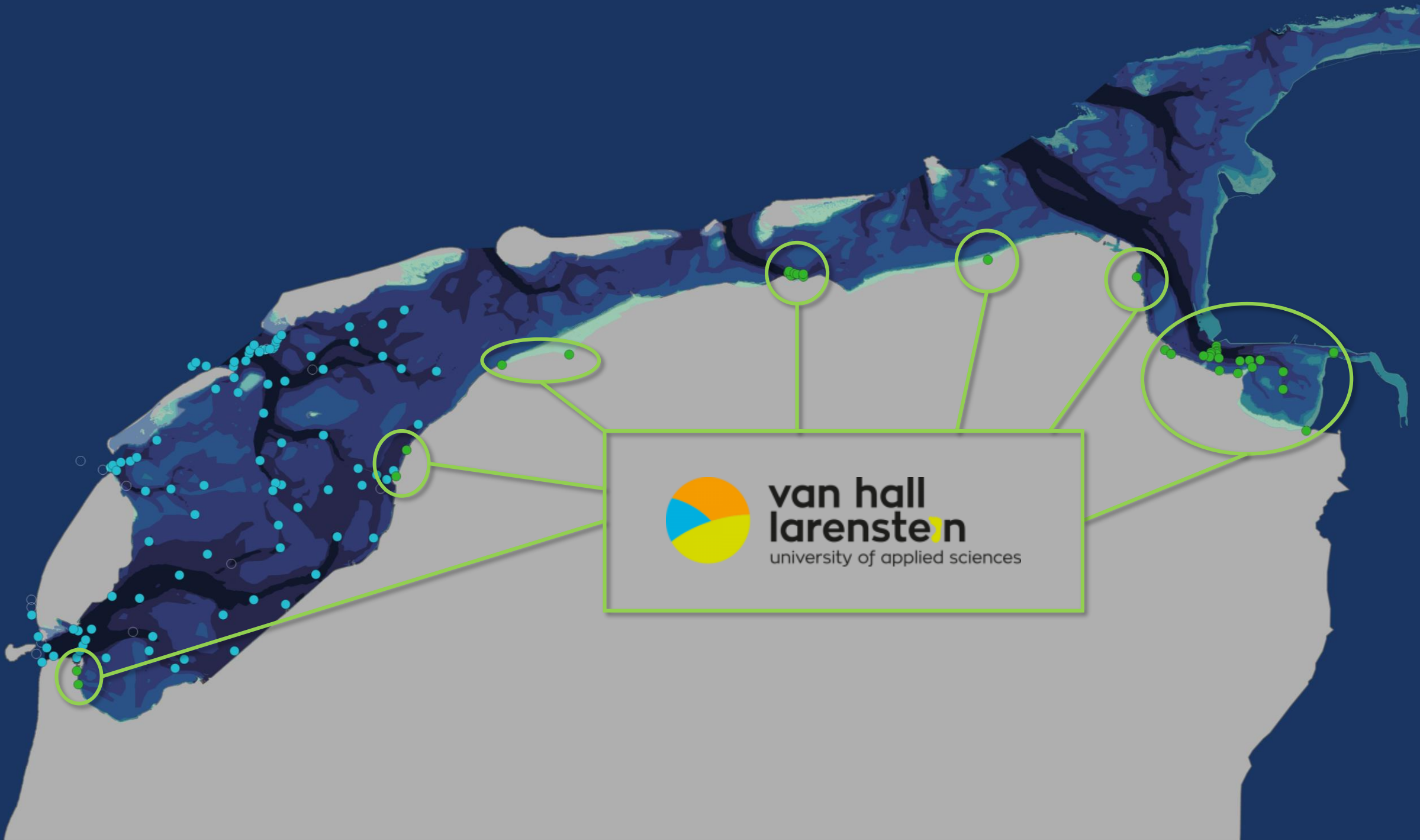
Detections in the Wadden Sea



Residency & recurrence

Detections in the Wadden Sea





van hall
larenstein

university of applied sciences



Arrival & departure

Total fish detected



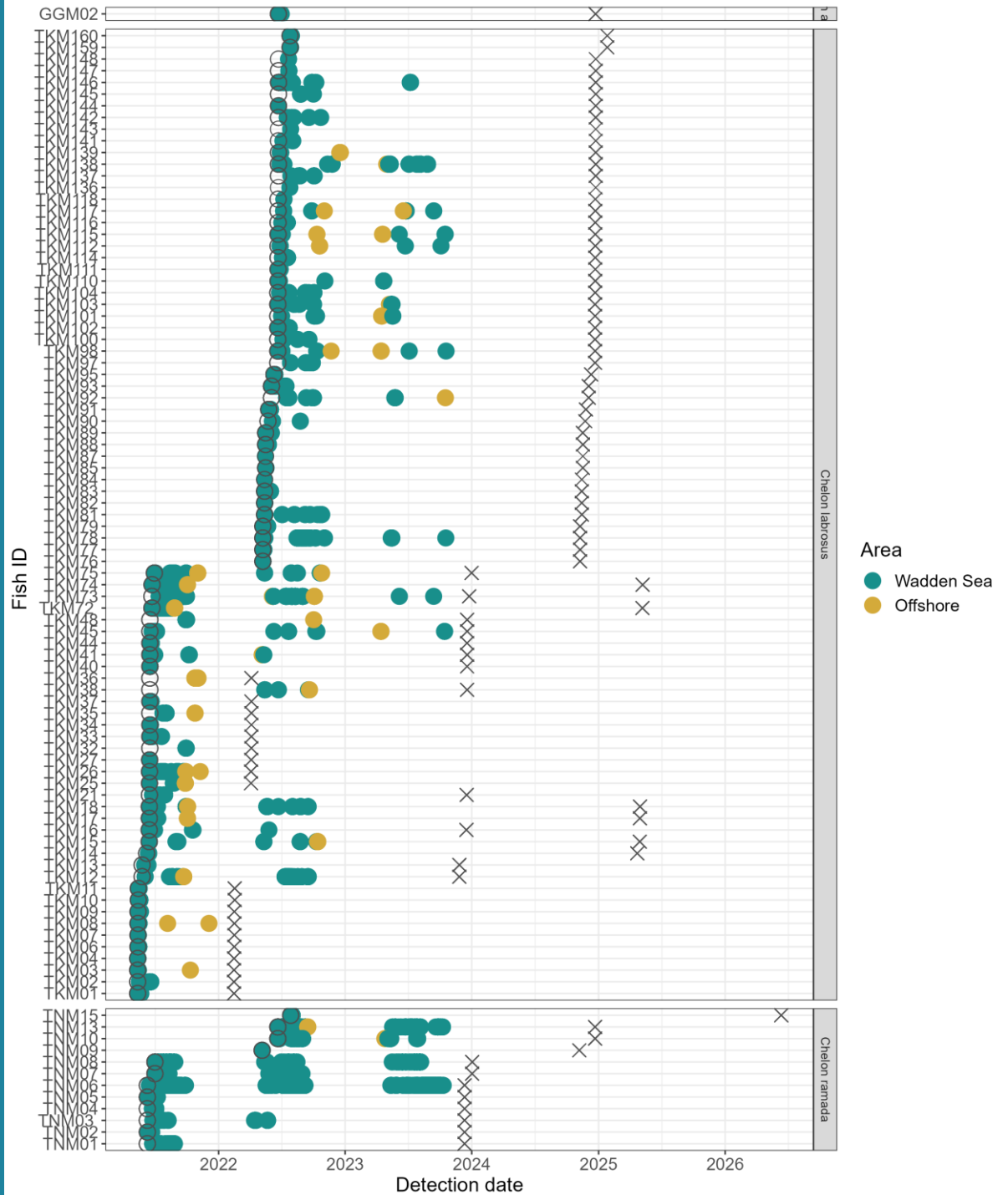
Golden=1

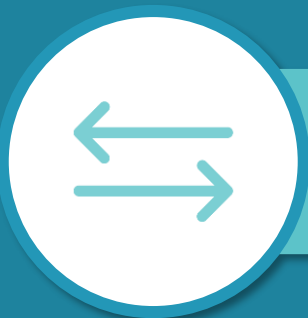


Thicklip=83



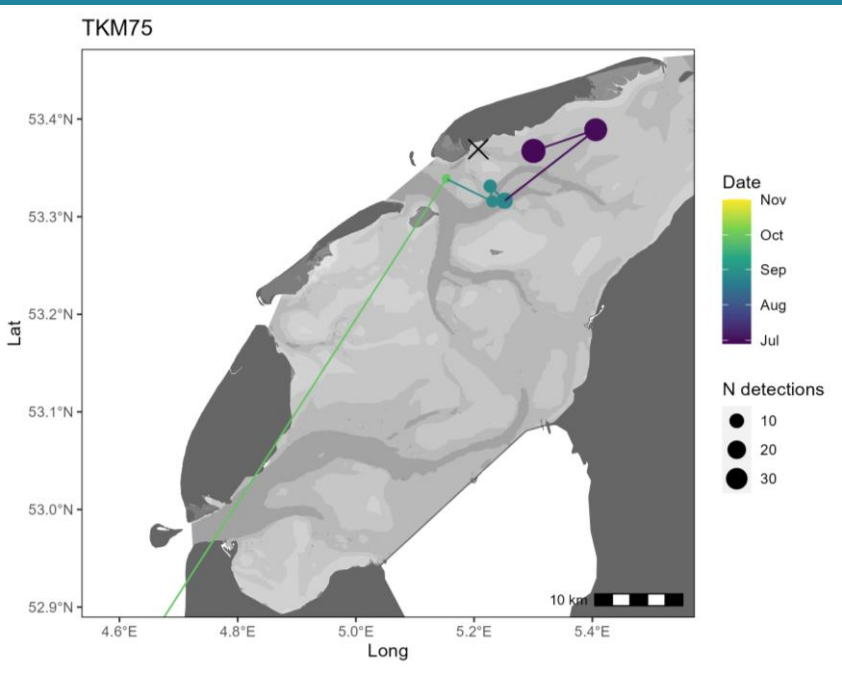
Thinlip=12



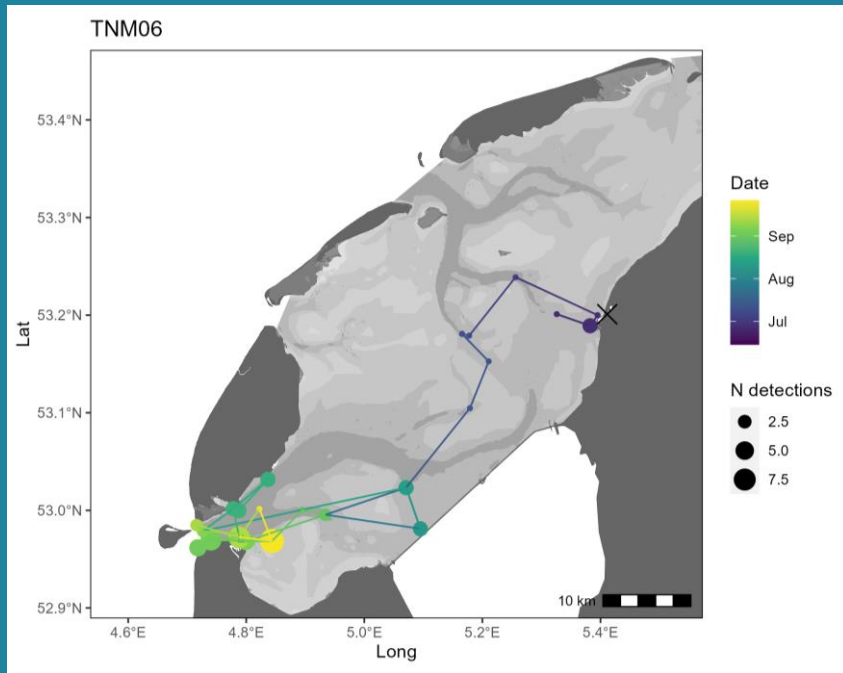


Local movements

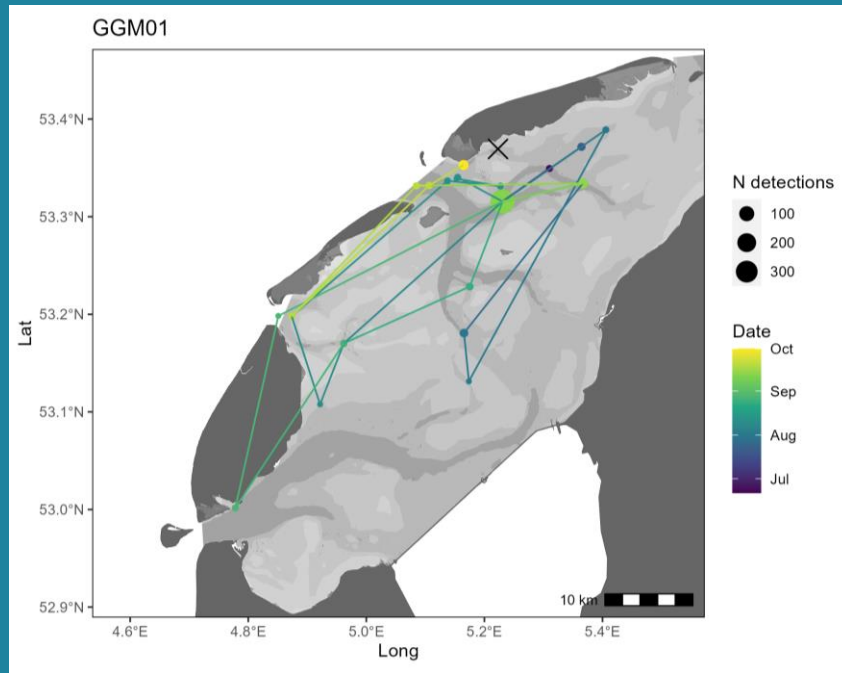
Variation across species



Thicklip



Thinlip



Golden