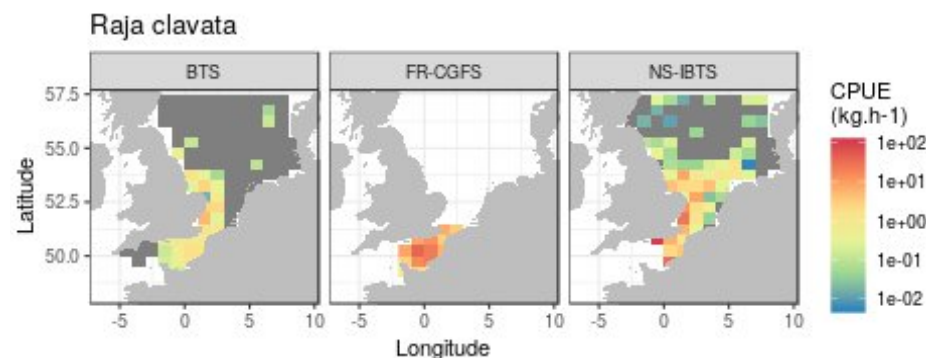# Atlas of the distribution of skates and rays

Atlas of rays and skates

"Atlas of the spatial distribution of the different species of skates and rays in the Channel and the Southern North Sea built on historical data per species and per fishery and information collected during the project, including reconstructed per-specie catches and landings, and new information from the fisheries campaigns."

Framework:

- "Developing a modern data workflow for regularly updated data" (Yenni et al 2019 PLOS ONE).
- One output (an atlas), different forms (document, html page, database)

In short: data + processing = atlas

Atlas of rays and skates

Data

Data were collected from three sources:

- **landing**: from logbooks and sales notes collected at the national level, the landings weights are reported in space and time,
- **fishery sampling**: fishery catches are sampled at the national level and they provide information in weights and size of the catches (landings and discards),
- **survey sampling**: fishery survey provide indices of the species distribution (density. . .), and biological information of the individuals (size, weights, sex, maturity).

Atlas of rays and skates

Data

- 2000-2017: landings*, commercial sampling**, DATRAS data (FR-CGFS, *BTS)

name	spp	Landings*	Commercial sampling**			Survey	
			FRA	GB_ENG	BTS	FR-CGFS	NS-IBTS
Rays and skates nei	Rajidae	19462.37564	575	0	0	0	1
Thornback ray	Raja clavata	10178.53867	4397	2411	713	705	489
Spotted ray	Raja montagui	5999.31999	1443	876	338	52	414
Cuckoo ray	Leucoraja naevus	3839.20146	1245	518	115	9	476
Blonde ray	Raja brachyura	2012.58064	1758	431	97	76	73
Rays, stingrays, mantas nei	Rajiformes	366.69752	9	0	0	0	3
Small-eyed ray	Raja microocellata	278.36561	239	130	24	28	3
Undulate ray	Raja undulata	255.31925	1976	212	48	150	8
Blue skate	Raja batis	200.27901	49	11	0	0	7
White skate	Raja alba	149.5257	1	0	NA	NA	NA
Common stingray	Dasyatis pastinaca	78.02172	93	0	0	50	0
Sandy ray	Raja circularis	46.12907	11	10	2	2	1
Shagreen ray	Raja fullonica	43.48156	58	0	0	1	0
Longnosed skate	Raja oxyrinchus	25.67172	7	0	NA	NA	NA
Starry ray	Raja radiata	2.53272	9	796	723	2	1984

* France
**France and UK

Atlas of rays and skates

Processing framework

Landing

Country A
Country B
...
Source X

Sampling

Country A
Country B
...
Source X

Survey

Survey A
SurveyB
...
Survey X

Atlas
(report)

Atlas
(html)

local files/web services

Processing:
QC, analyses, map

Filtering

Local
database

Database
(map and data)

Atlas of rays and skates
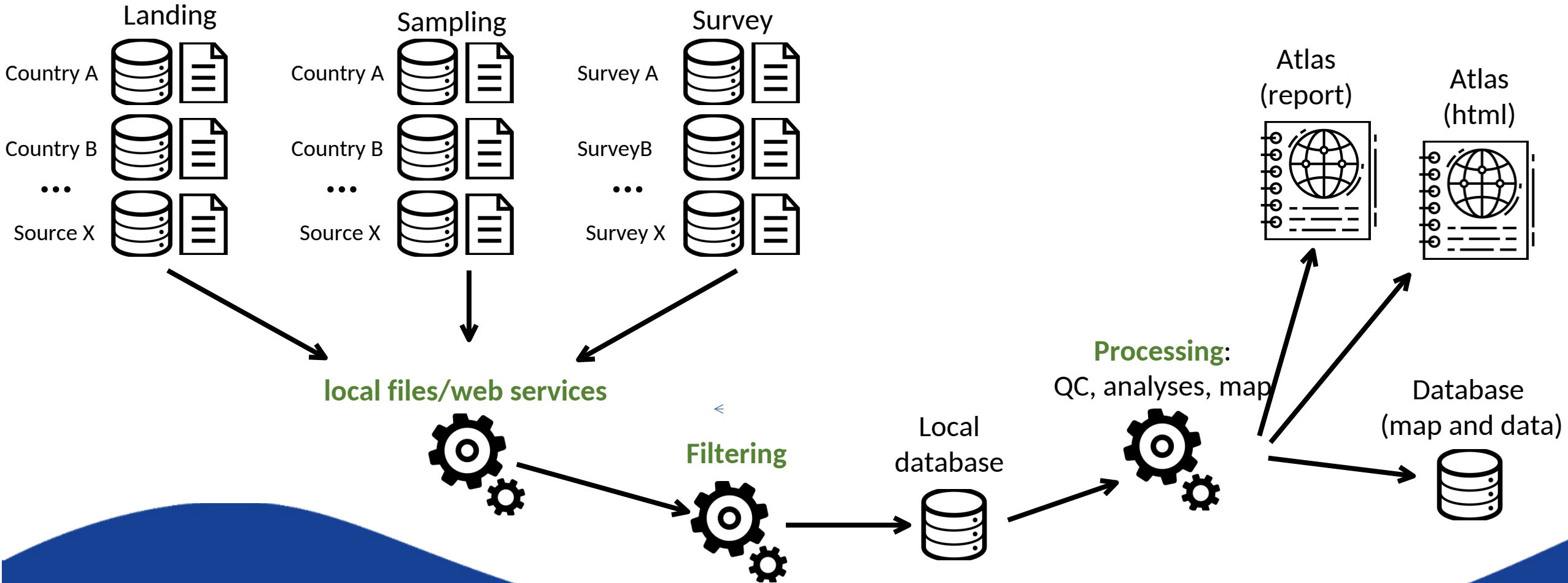
Processing

- **data access**: webservice (survey), local files (landing and sampling)
- **filtering**: space, time, species
- **processing**: quality check, computing (CPUE, interpolation), maps

- **outputs**:
  - report (the SUMARiS deliverable)
  - html (static or dynamic)
  - database

Code:
https://github.com/ldbk/SUMARiS

The present atlas

- A pdf document of 246 pages for 15 species
- raw data (almost no processing)
- averaged and annual maps of survey and fishery dependent
- thornback ray example:

Atlas of rays and skates
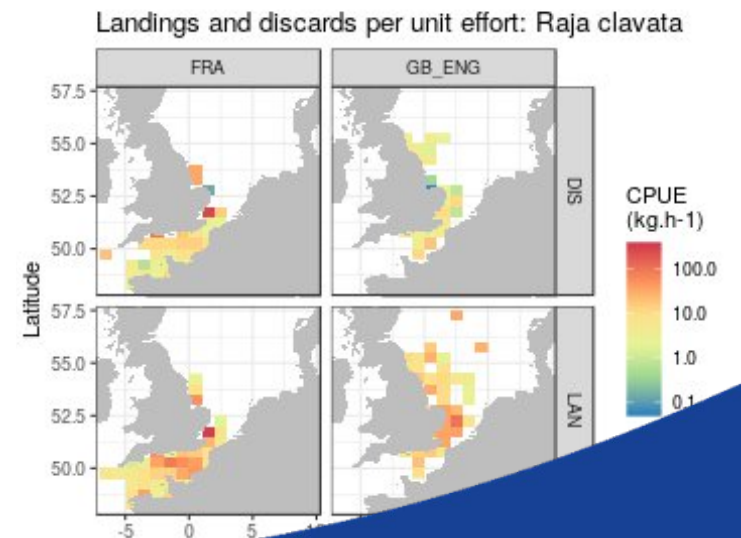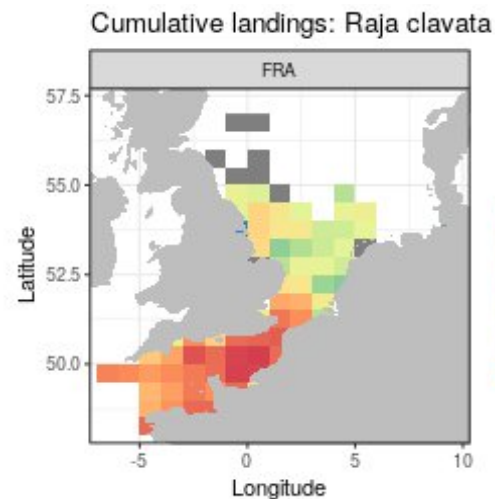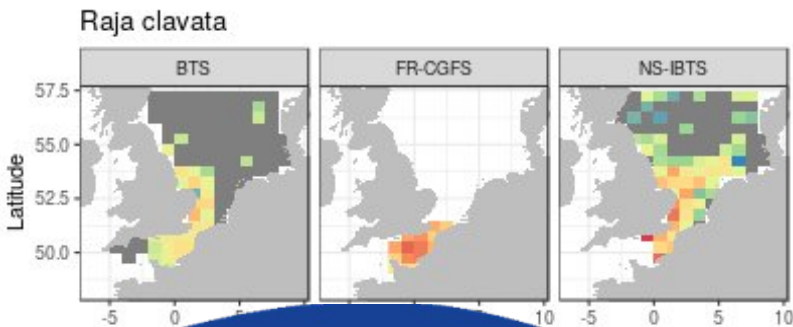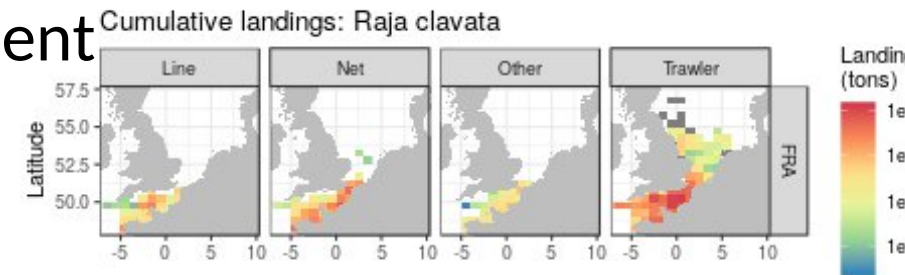
Possible improvements

- update the atlas with new data
- monthly map: ~4000 pages for a report -> interactive dashboard
- landings: using FDI data to complete the landings data base (but low taxonomic precision)
- surveys: add nursery survey data (NOURSOMME, NOURSEINE from IFREMER, others ?)
- add processing: CPUE, combine data from different sources (presented during the ICES conference in 2018)
- output: the local database can be used by the project (post-doc ?)

Thank you
for your kind attention

Icons from popcomarts (processing), Shmidt Servey (database), Saifurrijal (file), ProSymbols US (atlas)
Noun Project (https://thenounproject.com)
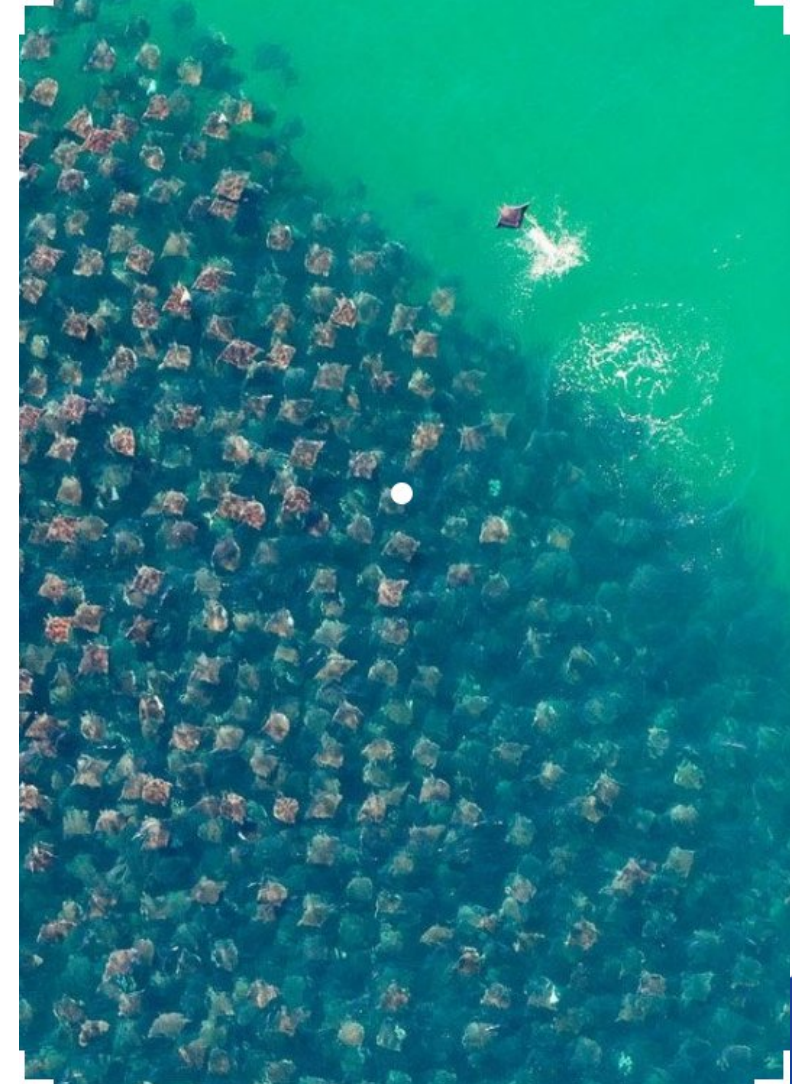
Natural atlas: aerial view of Munk's devil rays
https://imgur.com/r/pics/S12f84o