FRANCE vs ENGLAND: match of observer data. What does it tell us about fishing selectivity at the community scale?

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Outline

1. **France VS England:** match of observer data

2. **Objectives:** what can it tell us on fishing selectivity at the community level?

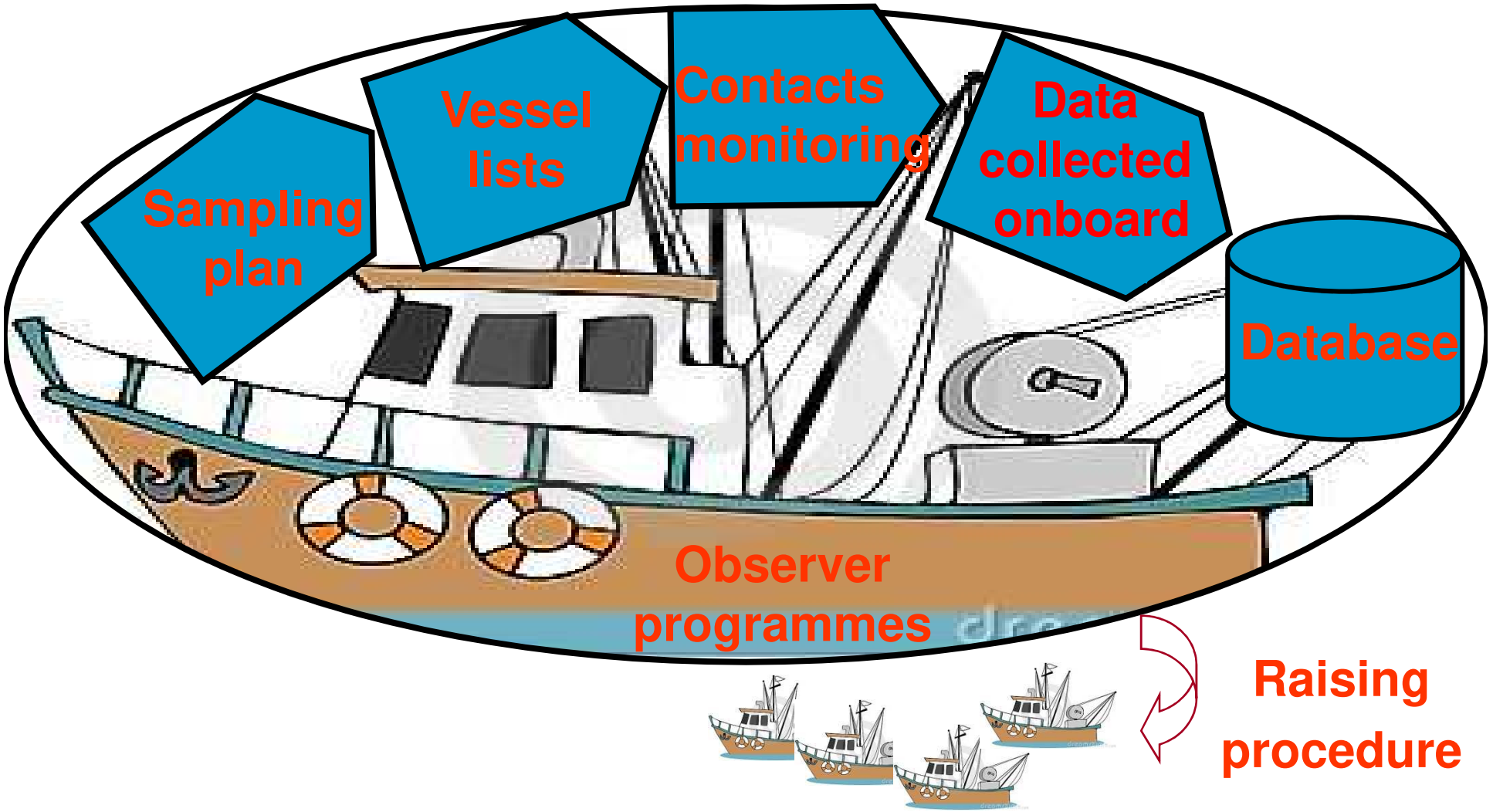
3. **Example** in the Bay of Biscay

1. France VS England: match of observer data

A. **Comparison** of the English and French observer programmes: Can we combine data? What are the assumptions?

B. **How to combine** the English and French observer data?

A. Comparison of observer programmes



Main differences: sampling plan

Sampling plan		
Technical stratification	Groups of gear type and vessel size	Groups of métiers level 5 DCF
Observer effort allocation (no of trips)	Given no of days converted to no of trips	Compromise precision - regulations - resources

Vessel list		
Stratification	1 per quarter	1 per year
Vessel allocation	1 vessel per strata	1 vessel can be in several strata

Main differences: contacts with fishers

Contact monitoring		
Selection of vessel	Random	Opportunistic
Financial indemnification	Yes	No
Possible to use for enforcement	Yes	No
Feedback to fishers	No, only if asked after trip	After trip, quarterly + annually

Main differences: data

Data collected onboard		
Target species	Trip level	Haul level
Sampling coverage	Between 70 and 75% of fishing operations	Between 35 and 50% of fishing operations
Non-sampled fishing operations	No data	Landings: species, number, weight
Sampled fishing operations	Landings and discards: numbers, **volumes** and lengths	Landings and discards: numbers, **weights** and lengths
Biological samples	Otholiths + maturity on discards of listed commercial species	None

Main differences: data quality

Database		
Species	3 letters codes	Scientific names
Quality checks	No procedure	Several ongoing

Observers		
Type of contract	Mainly staff of institute	Mainly contractants
Staff turnover	Low	High
Training	6+ weeks	2 weeks
Quality control trips	Yes	No

B. How to combine both datasets?

→ Formating under **common format** (COST)

→ For English data, **numbers at length to be converted in weight** using length-weight relationships

→ For French data, **convert target species from haul to trip level** to compare with English data

→ Check for **uniformity in species identification** and grouping when necessary ; check for **uniformity of measurement types** and conversion when necessary

Under progress…

2. Objectives

In the English Channel**,**

i. What are the **total fishing pressures at the community scale**?

Total catch = landings + **DISCARDS**

All species (fish + commercial invertebrates)

By a **combination of fishing gears** deployed in an area

ii. How to characterize /measure the **fishing selectivity**?

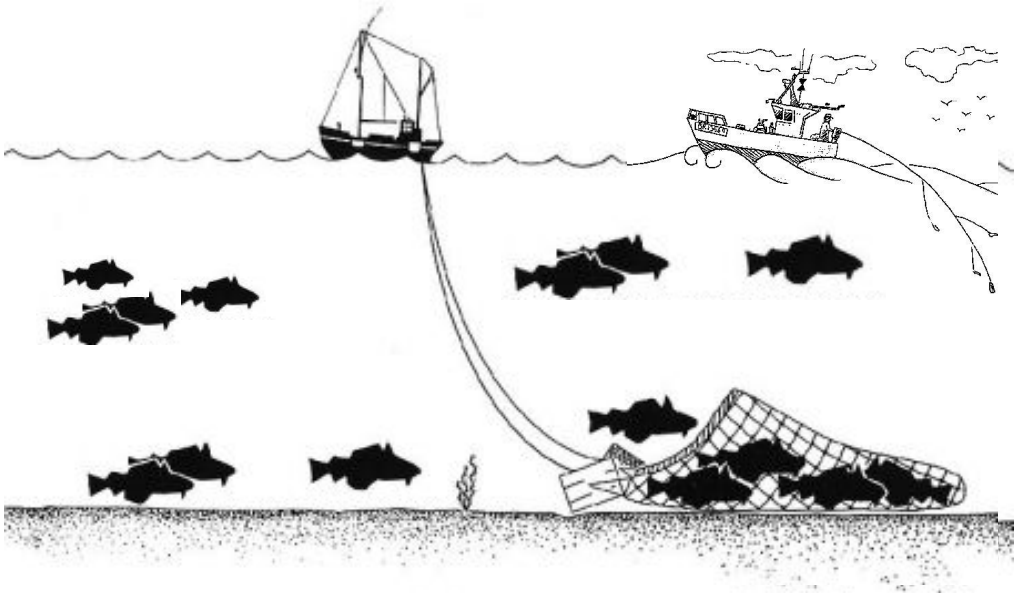
Selectivity: a matter of reference

Millar & Fryer, 1999 => 3 definitions of size selection each differing in the population being selected from:

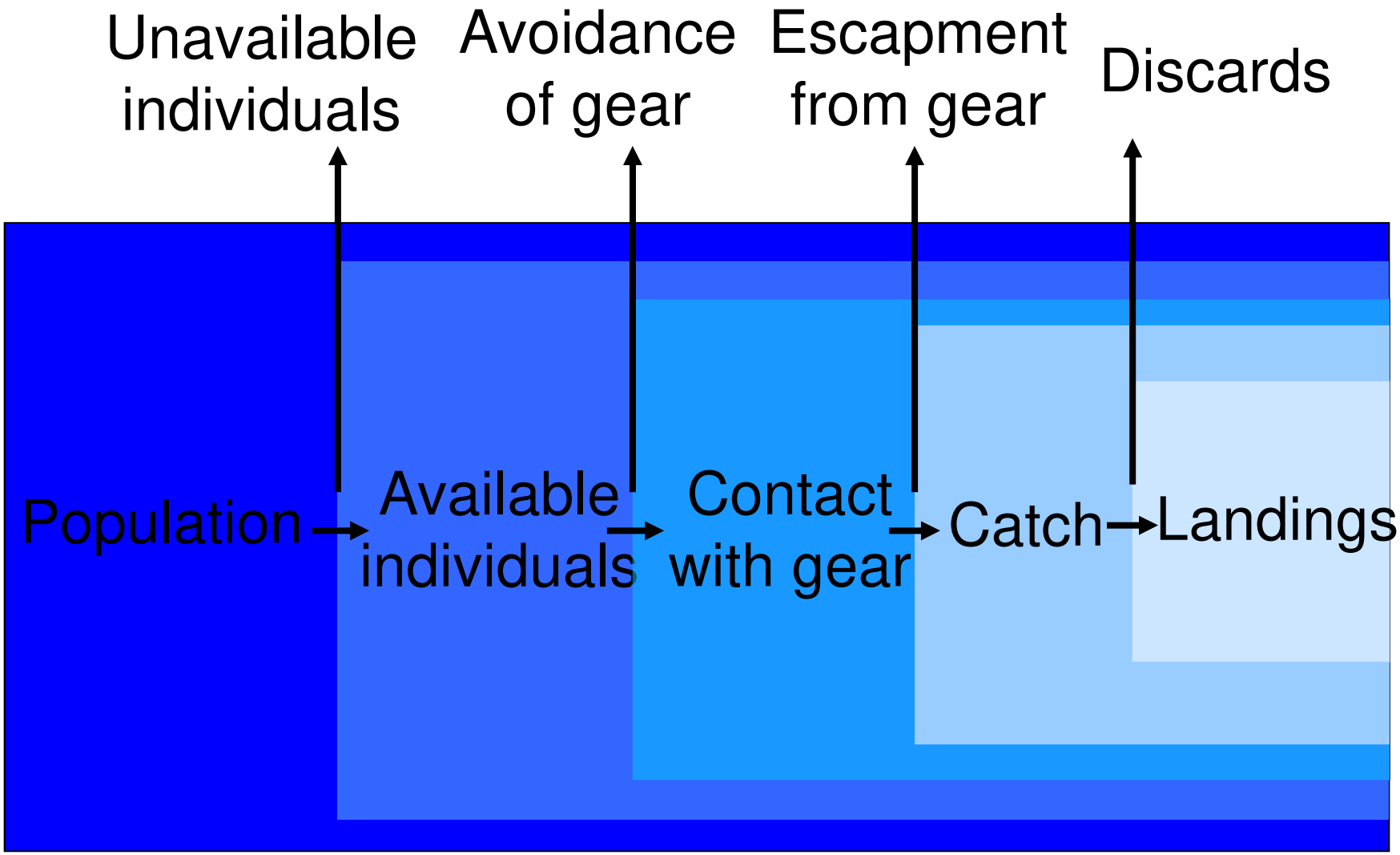
→ **The contact-selection curve** is the probability that a fish of length *l* is captured given that it contacted the gear.

→ **The available-selection curve** is the probability that a fish of length *l* is captured given that it was available to (but possibly avoided) the gear.

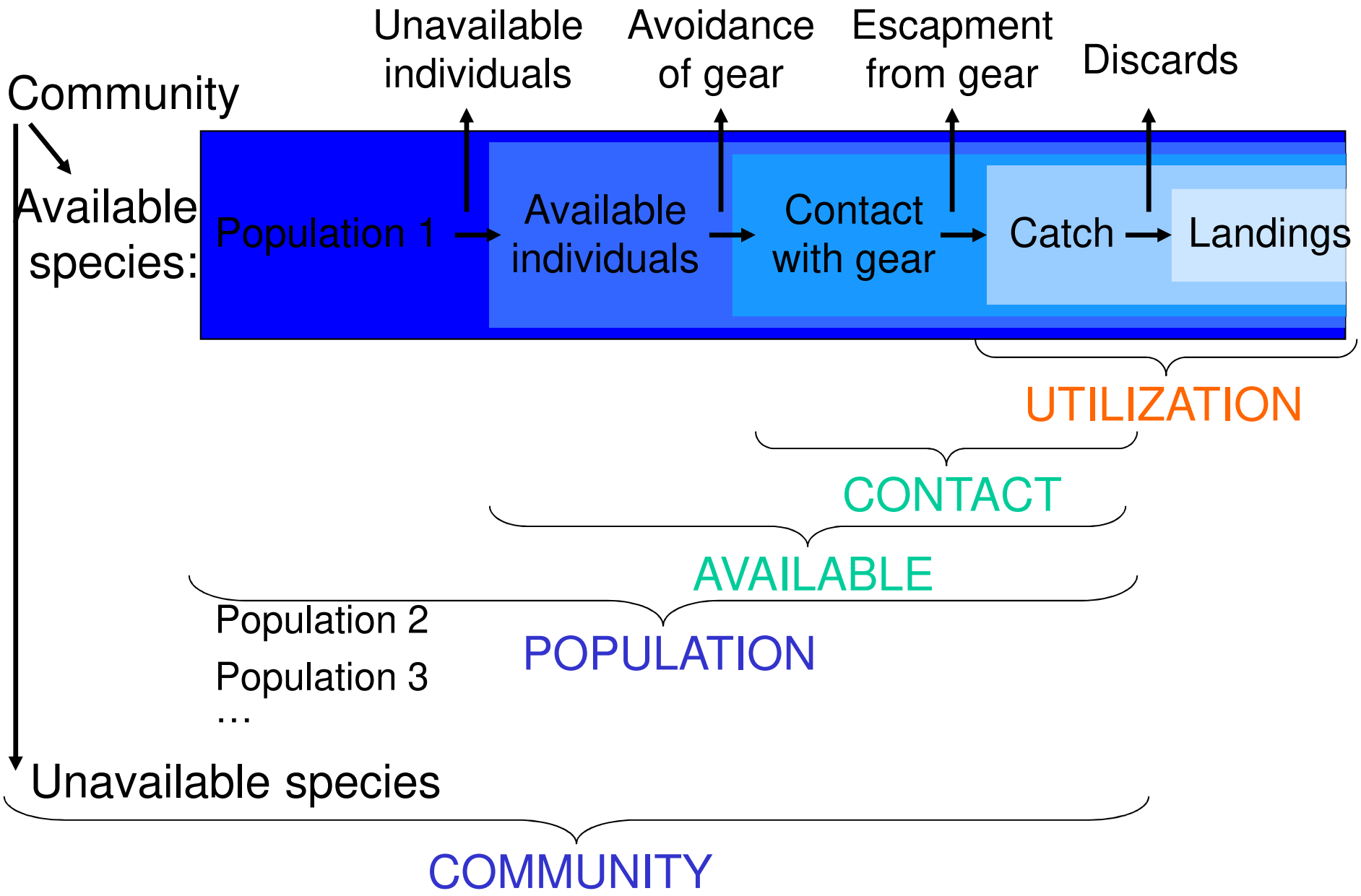
→ **The population-selection curve** is the probability that a fish of length *l* from the population is captured.



Size selection



Different extents



Three perspectives

→ Ecosystem = **probability of catching** individuals of length *l* of one species *s* (population) or all species (community) **by all gears** deployed in a given area

→ Technology = **probability of catching** individuals of length *l* of one species *s* **by a gear,** in the surrounding environment of the gear (available) or once it contacted the gear (contact)

→ Utilization = **decision** of keeping and landing or discarding the catch **once onboard**

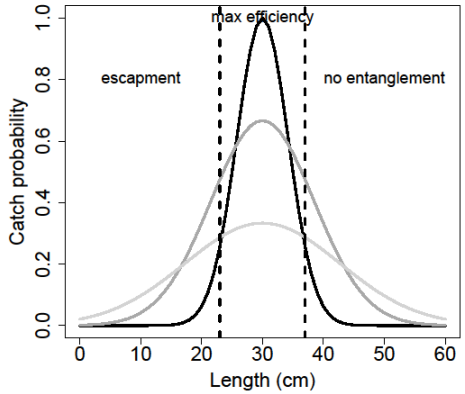
Scale	**Ecosystem perspective**	**Technology perspective**	**Utilization perspective**
Organi-sation	ecosystem	fishing operation	fishing sector
Spatial	region (10^3 – 10^6 km²)	swept/soak area (10^{-3} – 10^{-1} km²)	local to global
Temporal	decade	hour – day	week – month

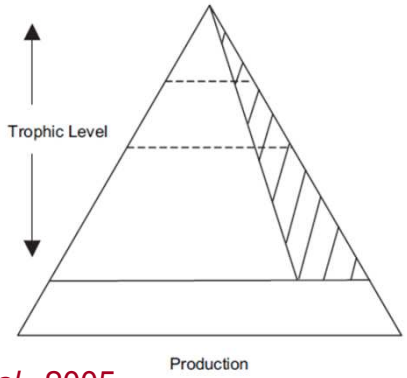
More or less selective? Depend on focus

Targeting efficiency:

+ match the catch with the target

− avoid bycatch





Bundy *et al.*, 2005

Extraction from community:

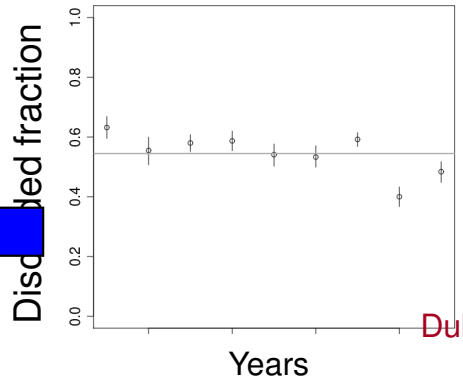
+ achieve a dominated catch

− avoid a diverse catch

Optimization of utilization:

+ match the landings with the catch

− avoid what is not suitable to land



Dubé *et al.*, 2012

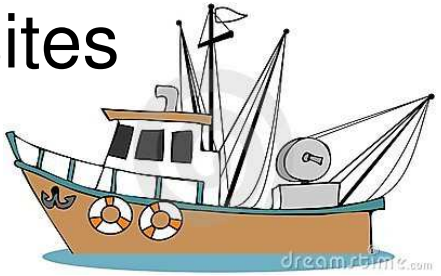
3. Example in the Bay of Biscay

Bay of Biscay

LOCAL scale

Comparison of selectivity:

- Between gears
- Between sites



Case study

Observer programme:
trammel nets
gillnets
pelagic trawls
bottom trawls
longlines

Southern
Bay of Biscay

Gironde river

Adour river

Capbreton canyon

45.5
45.0
44.5
44.0
43.5

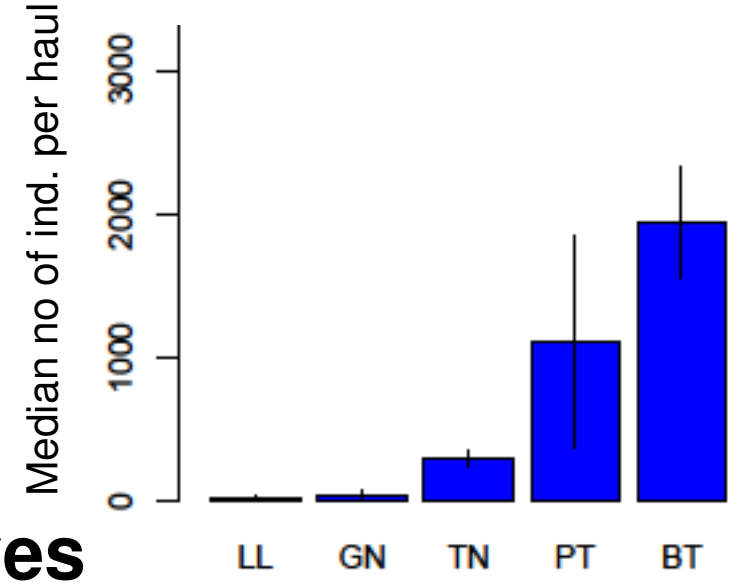
-2.5
-2.0
-1.5
-1.0
-0.5

Selectivity metrics

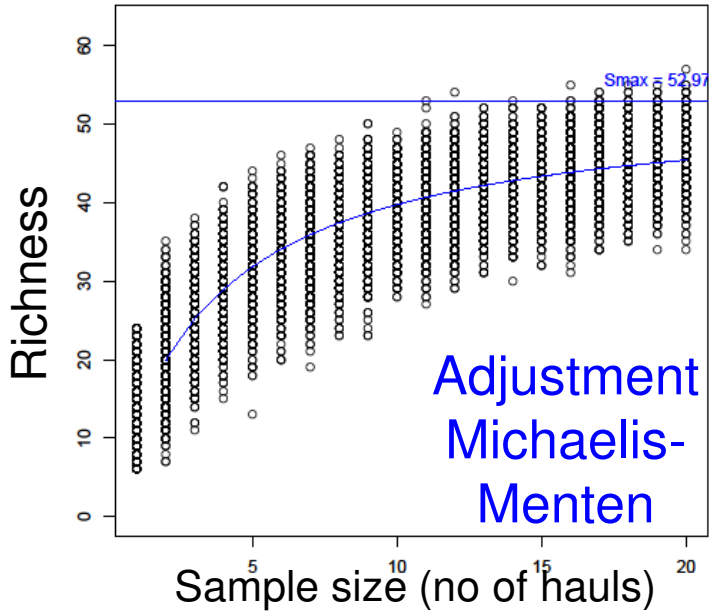
Focus	*Type*	*Metric*	*Description*
What is extracted from community	**Species**	**Richness (S)**	Number of species
		Evenness ($E_{1/D}$)	Abundance distribution across species (Simpson)
What is extracted from community	**Length**	**Mean length ($\bar{L}$)**	Typical length of individuals in the catch
		Length range width (ΔL)	Interpercentile range 5-95% of length structure
What is used from catch	**Utiliza-tion**	**Discard weight ratio (DWR)**	Proportion of the catch unused
		Discard number ratio (DNR)	Comp DWR - are discards smaller than landings?

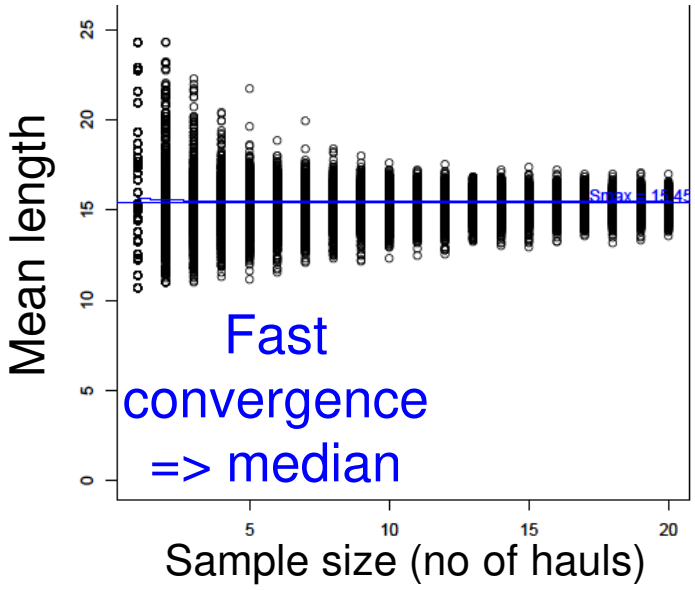
Standardisation across gears

Gear	South	North
Longlines (LL)	5	-
Gillnets (GN)	170	36
Trammel nets (TN)	110	168
Pelagic trawls (PT)	1	14
Bottom trawls (BT)	-	62

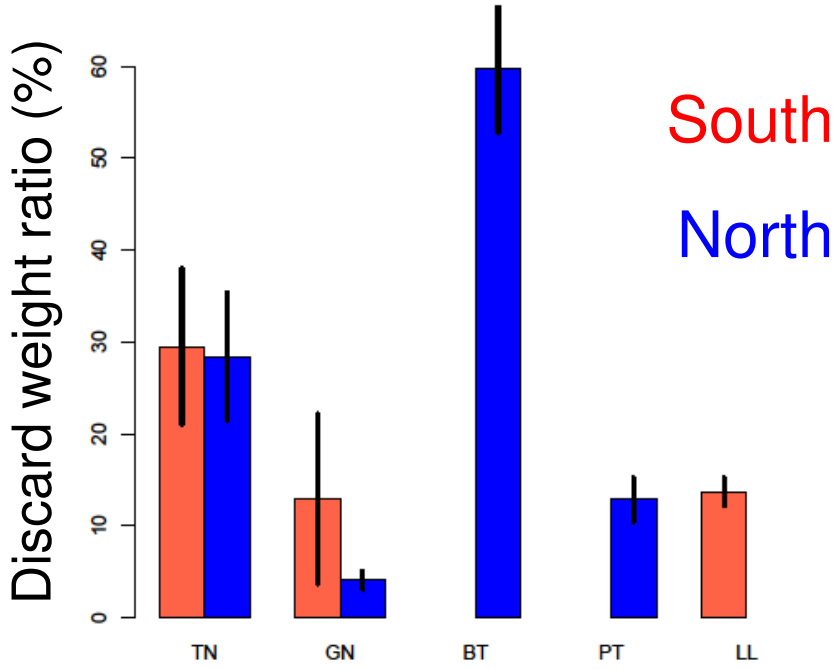


=> Rarefaction curves



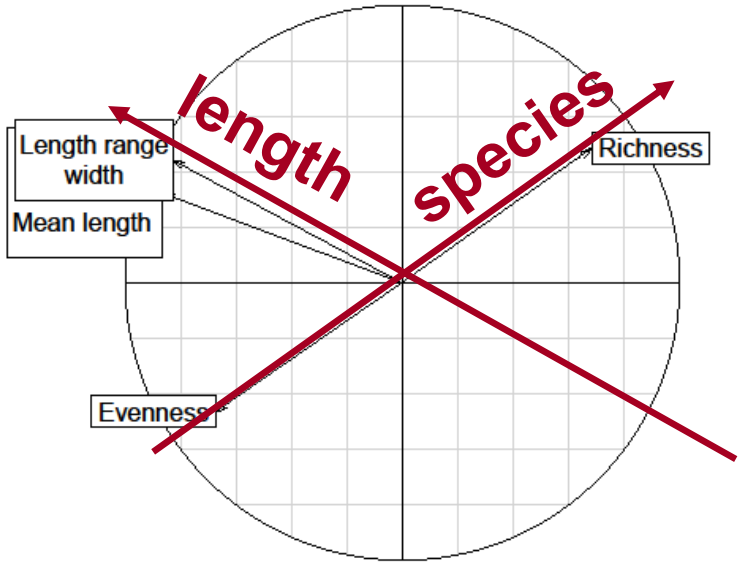


Gear / site effects

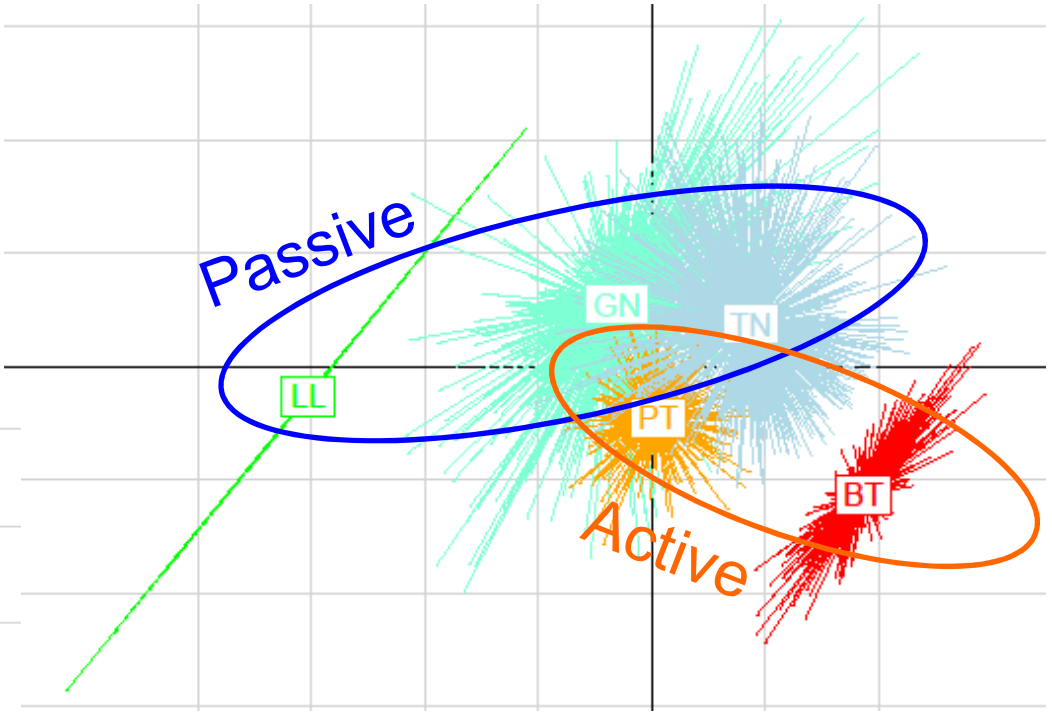


Metric	% variance gear	% variance site
Richness	69	8
Evenness	52	2
Mean length	92	2
Length range width	76	15
Discard weight ratio	83	7
Discard number ratio	90	0.2

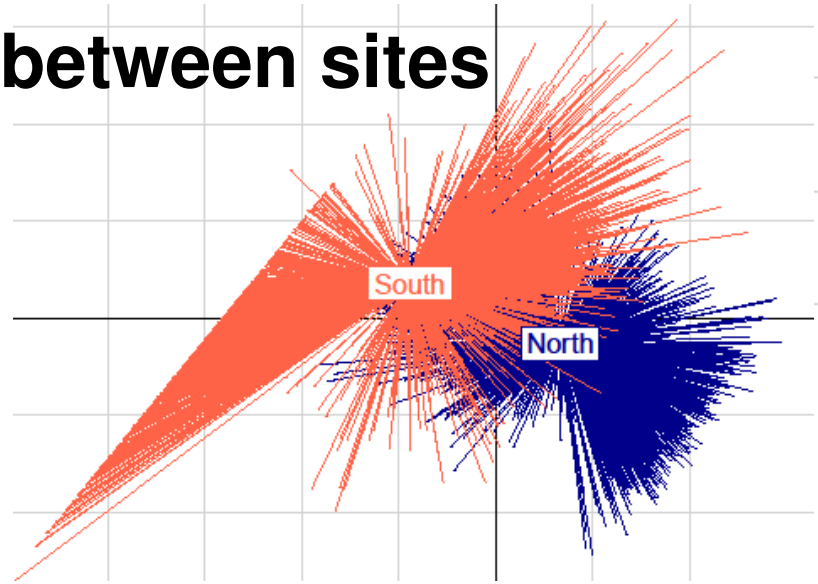
Comparison of selectivity



between gears



between sites



Conclusions

→ **Selectivity metrics**

A few samples are enough to estimate length and utilization metrics

Length and utilization metrics more sensitive to gear than species metrics

→ **Gear comparison**

Significant differences in selectivity between gears

Passive *vs* active not the gear characteristic that influences selectivity the most

→ **Site comparison**

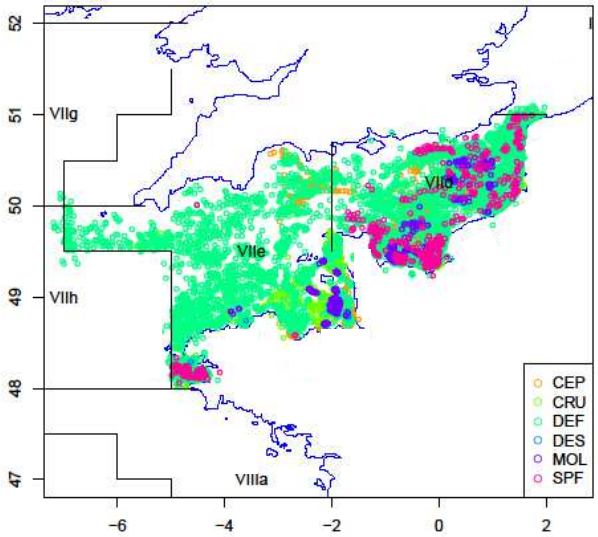
Differences in selectivity between sites, especially in length

→ **Depend on focus…**

Perspectives

→ Apply to **regional scale** in the English Channel

→ More precise stratification
- **Quarter**
- Gear + **target species**



→ **Add metrics** to better characterize extraction from ecosystem, in trophic chain for example

→ **Raising** to the fleet level to get the whole pressures

Acknowledgements

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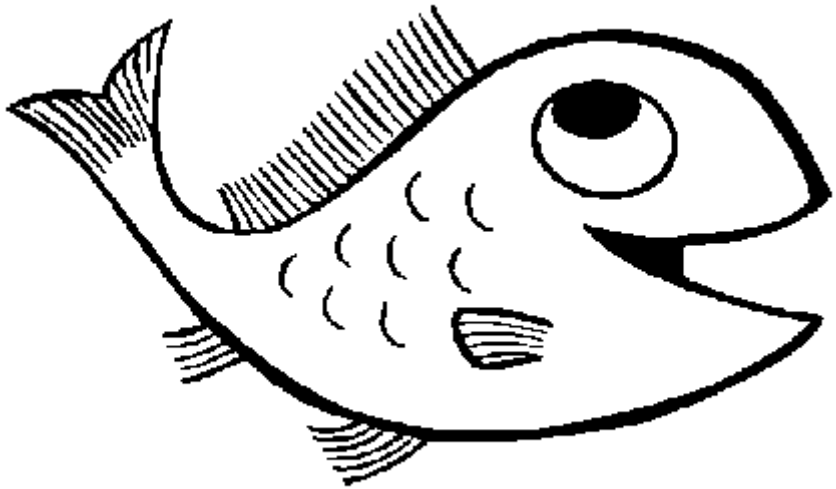
RÉPUBLIQUE FRANÇAISE

Ifremer

Région PAYS DE LA LOIRE

Ministère de l'Écologie, de l'Énergie, du Développement durable et de la Mer

All observers and fishers who participate in both observer programmes



Any questions ?

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