New insights from self-sampling

Martin Pastoors

Drivers of dynamics of small pelagic fish resources. Victoria, Canada, 8/3/2017

A Guide to Making Your Science Matter

ESCAPE from the IVORY TOWER

Foreword by Donald Kennedy

Nancy Baron

Characteristics of small-pelagics

- Schooling; concentrating in large schools
- High biomass; large stocks
- Offshore; in different parts of water columns
- Migratory; sometimes large distances

Traditional data collection on small pelagic fisheries

- 'Market' sampling
- Observer trips

Too low resolution for detailed biological understanding

Could we better utilize fishermen knowledge and their sampling activity to supplement data collection?

Merk	Aantal cartons	Voorraad in (m/t)	Tijd in tank	Stukstallen per p	Stuks per kg	Sorteerklasse	Kwaliteit	Sorteringskwaliteit	Voedsel	Textuur	Model	Buikvulling Hom/Kuit	Beschadigd andere vis
ARU010	5667	20	0 - 12uur	60/80	3 a 5	A	2	A	0	B	A	A	A/B
ARU011	2030	20	0 - 12uur	40/60	2 a 3	A	2	A	0 - 1	B	A/B	A/B	A/B
WHB012	1360	20	0 - 12uur	120/160	4 a 7	A/B	2/3	A/B	0	B	C	A	B/C
WHB013	1664	20	0 - 12uur	180/220	5 a 9	A/B	2/3	A/B	0	B	C	A	B/C
ARU014	2435	20	0 - 12uur	60/80	3 a 5	A	2	A	0	B	A	A	A/B
WHB015		30	0 - 12uur	300 +	13 a 16	A/B	2	A	0	B	C	A	B/C
WHB018		30	0 - 12uur	220/260	8 a 11	A/B	2	A/B	0	B	C	A	B/C
WHB019	5023	30	0 - 12uur	120/160	4 a 7	A/B	2	A/B	0	B	C	A	B/C
WHB021		30	0 - 12uur	180/220	6 a 10	A/B	2	A/B	0	B	C	A	B/C
WHB022	4992	30	0 - 12uur	260/300	10 a 13	A/B	2	A/B	0	B	C	A	B/C
ARU023	1543	20	0 - 12uur	40/60	2 a 3	A	2	A	0 - 1	B	A/B	A/B	A/B

Research & Knowledge strategy 2015 - 2018

Ambition

PFA *(Pelagic Freezer-trawler Association)* is committed to initiate, develop, contribute and sustain knowledge development that is needed for sustainable management and exploitation of fish stocks in all areas where PFA members are active.
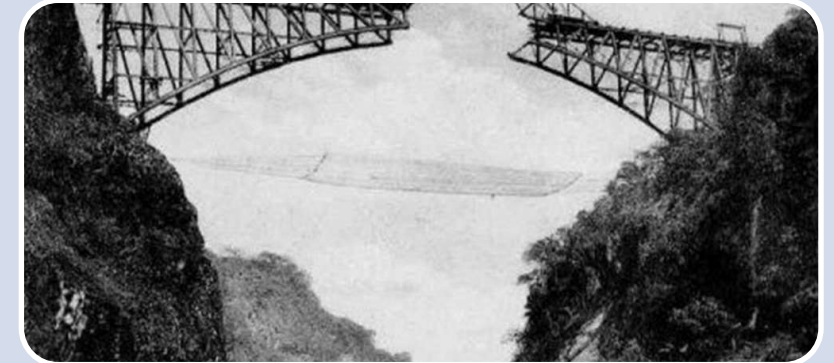
Catching with care for a better world.

Fishing 'research' fleet

Pelagic freezer-trawler self-sampling programme

| Collect additional information from ongoing fisheries | Utilize data that was collected by companies | Change role of industry in science and management |

Collect additional information from ongoing fisheries

Adding information to existing data collection protocol

Small changes – big effects

- Haul by haul information
  - Consistent noting down of location, time, environmental variables etc.
- Production information
  - Measurements of mean weight, mean length, fat content etc.
- Coupling production information to haul information
  - Allowing catch composition per haul
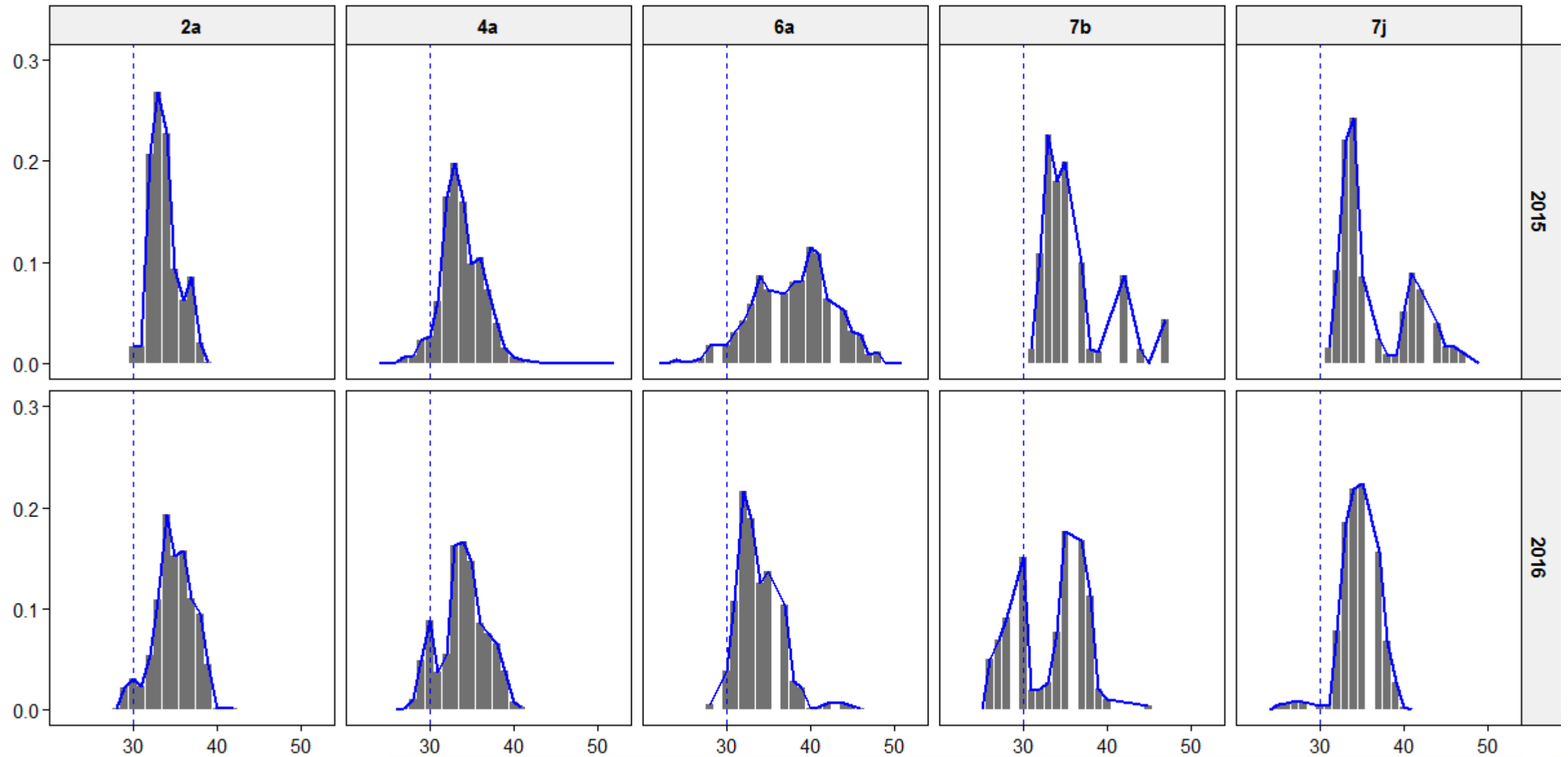- Additional length measurements
  - Numbers at length by species

Self-sampling rapidly expanding over time

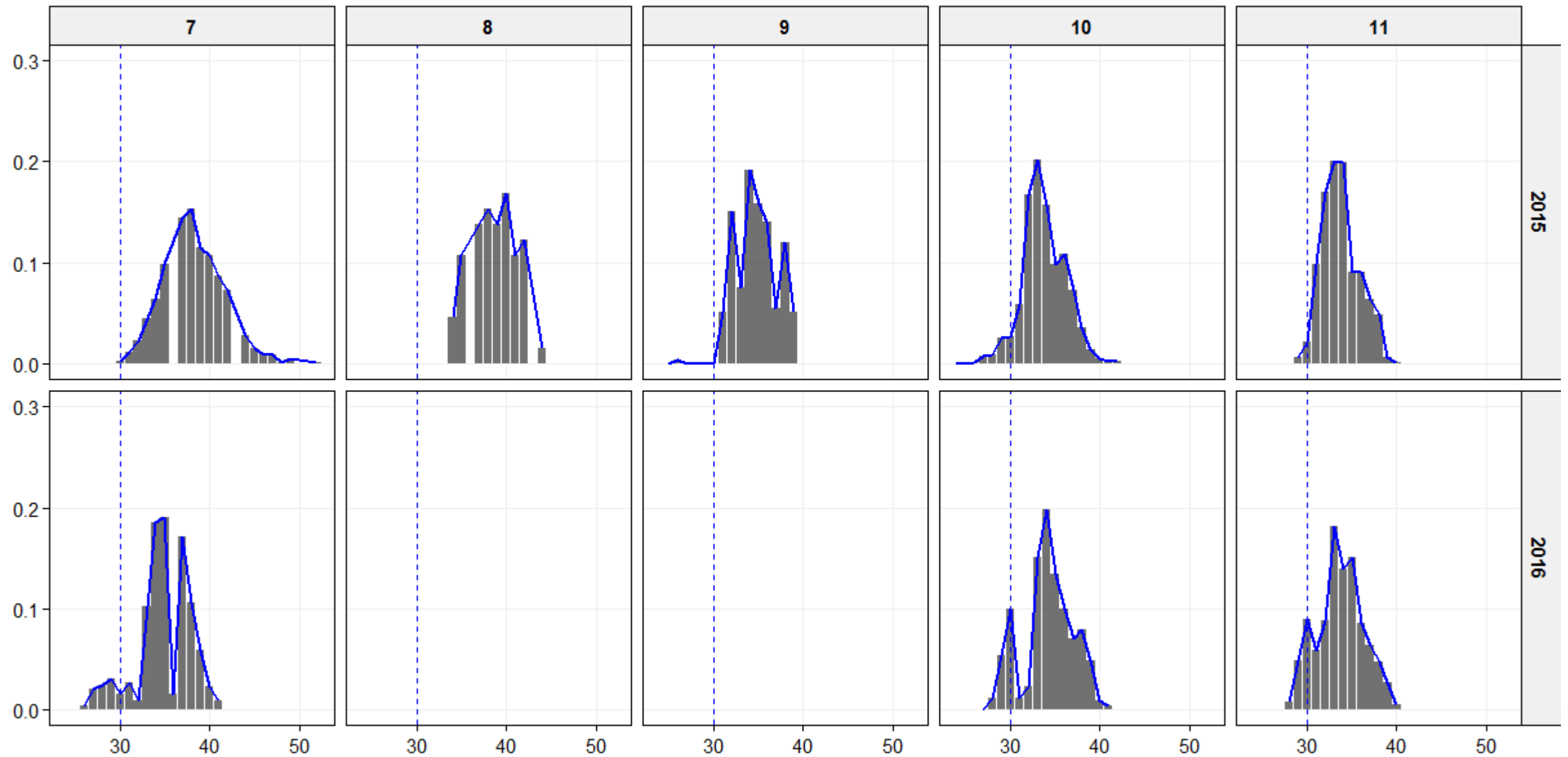| year	ntrips	ndays	catch	nlength
2014	4	136	11456	0
2015	34	747	126907	122417
2016	79	1412	233410	146024

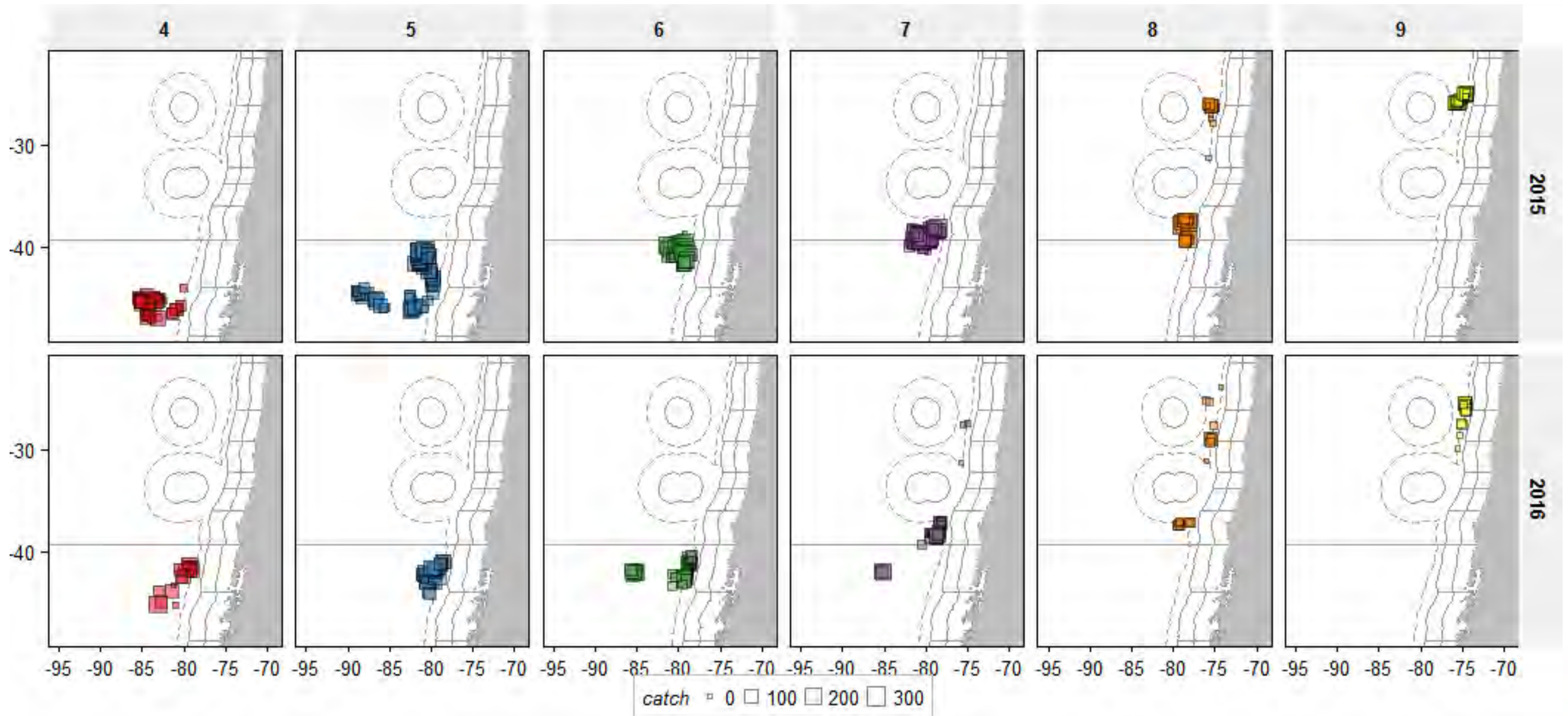# Length composition of mackerel, by area and year

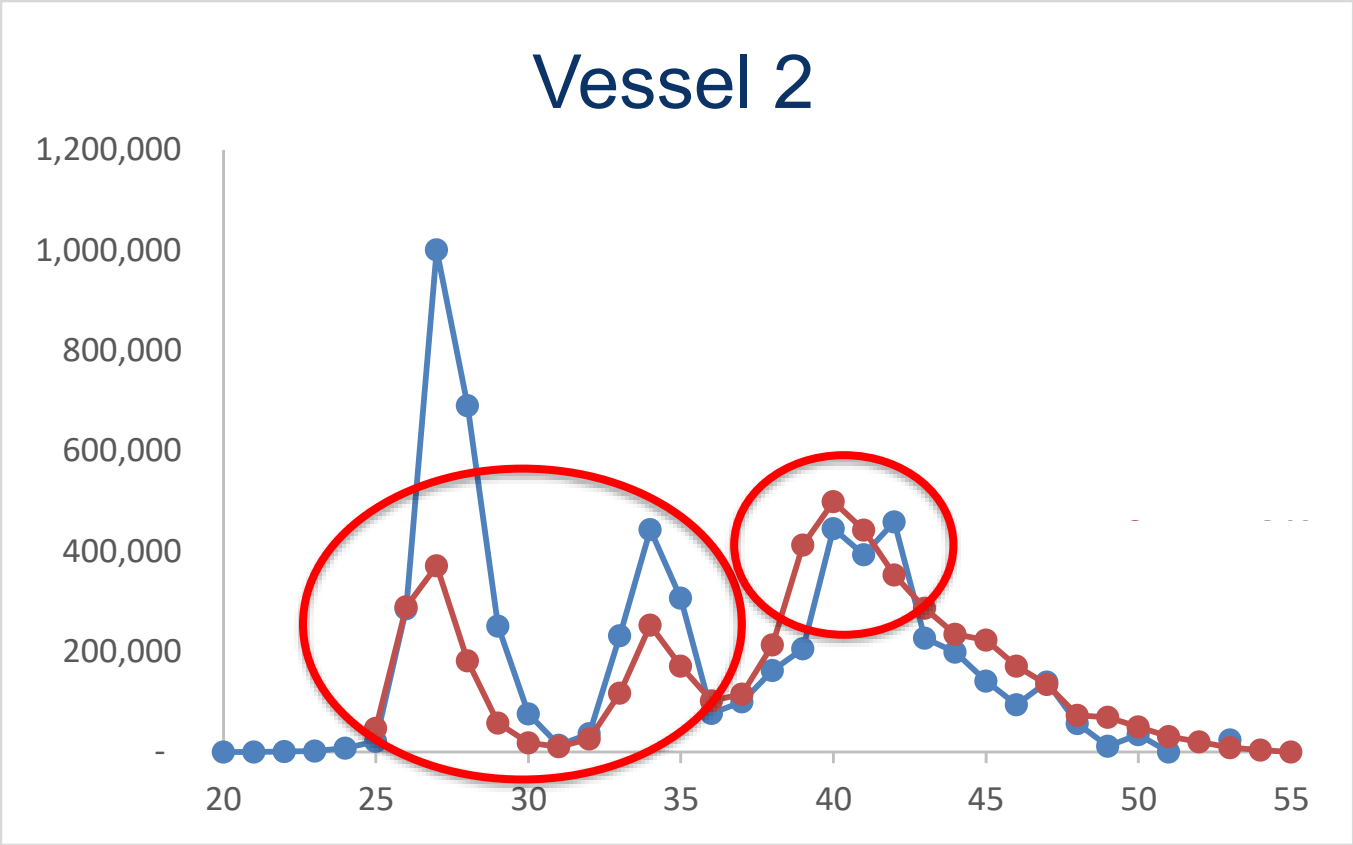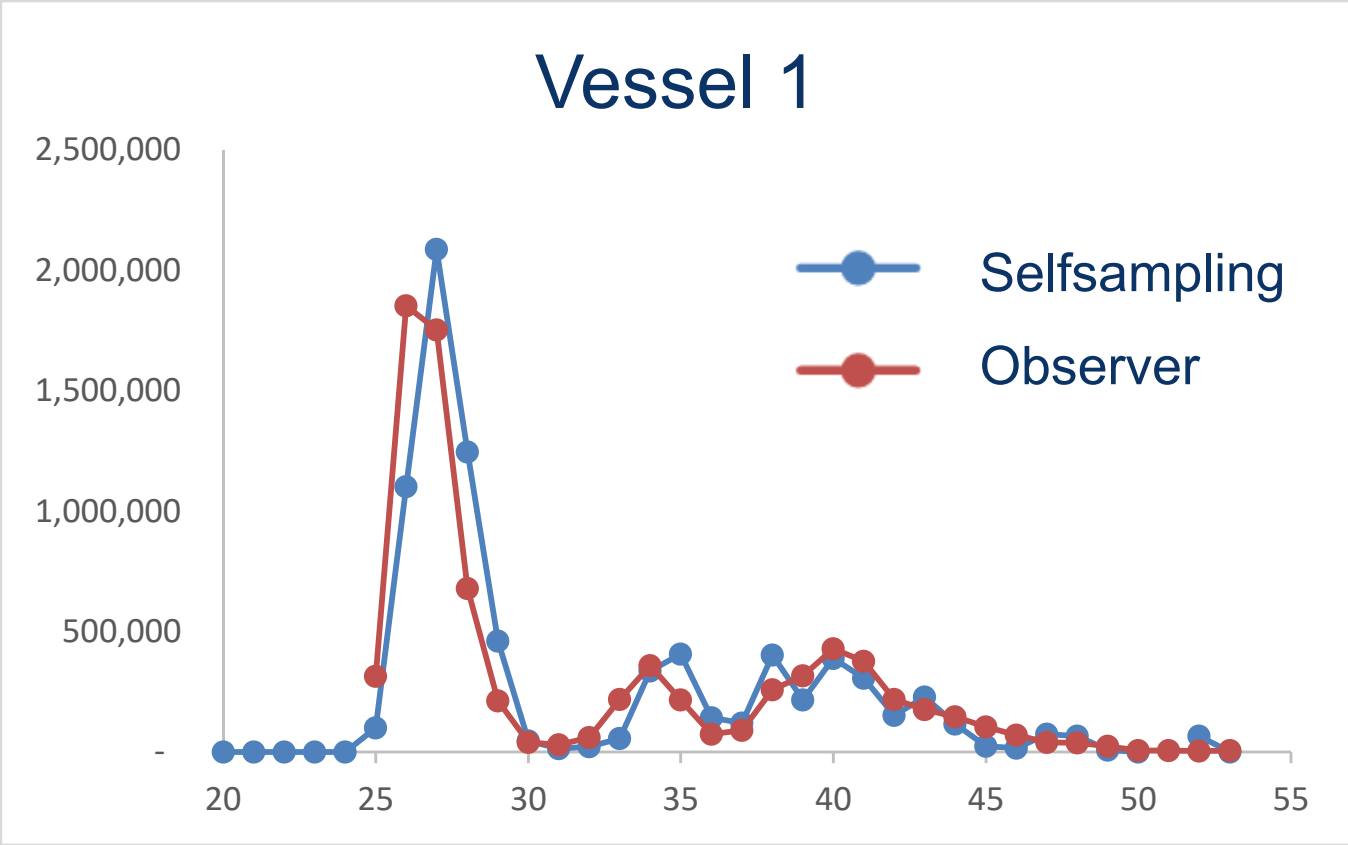# Length composition of mackerel in 4a, by month and year

Another example: South Pacific catches per haul / month

Higher consistency between self-sampling than observers

Conclusions on self-sampling programme

- Rapidly expanding
- Focus on core fishing area (NE Atlantic) but also on low-data situations (Pacific, Western Africa)
- Potential to apply for stock assessment
- Potential to apply in conjunction with scientific surveys.

MERK	AANTAL	INSLAG	STUKST	ISI	10KG	ST/KG	OPMERK	St/CRT	WAARDERING
BON924 024112	191	191	010-020	1	5	1	-	8	uitstekend
BON926 024112	509	501	010-020	1	8	1	-	15	uitstekend
FRZ927 024112	1,160	1,160	050-060	1	23	2>3	-	60	uitstekend
FRZ928 024112	32	26	020-030	-	11	-	-		
JAX400 024112	468	468	060-070	1	29	3>4	-	58	uitstekend
JAX401 024112	185	175	065-075	1	31	3>4	-	65	uitstekend
JAX402 024112	21	21	095-105	2	46	3>6	-	91	goed
JAX403 024112	19	13	080-090	1	39	4>6	-	89	uitstekend
MAS324 024112	143	143	030-040	1	16	1>2	-	38	uitstekend

Utilize data that was collected by companies

Fishers collect data to generate 'sales reports'

The process of collating the data

- There are so many ways to enter a **date** ….

```
date    = gsub("--02"    , "-2012" ,date),
date    = gsub("3/4/5"    , "3" , date),
date    = gsub("3/4/6"    , "3" , date),
date    = gsub("3/4/7"    , "3" , date),
date    = gsub("5/7/8"    , "5" , date),
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date    = gsub("2/4/5"    , "2" , date),
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date    = gsub("3\\/4"    , "3", date ),
date    = gsub("3\\/5"    , "3", date ),
date    = gsub("3\\/6"    , "3", date ),
date    = gsub("3\\/7"    , "3", date ),
date    = gsub("3\\/8"    , "3", date ),
date    = gsub("4\\/5"    , "4", date ),
date    = gsub("5\\/8"    , "5", date ),
date    = gsub("15\\/17"  , "15", date ),
date    = gsub("15\\/19"  , "15", date ),
date    = gsub("16\\/19"  , "16", date ),
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date    = gsub("25-01/12" , "25-01-2012", date),
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date    = gsub("/","-",date),
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date    = gsub("-03$"     , "-03-2012" , date),
date    = gsub("-04$"     , "-04-2012" , date),
date    = gsub("-05$"     , "-05-2014" , date),
date    = gsub("-5$"      , "-05-2014" , date),
date    = gsub("-06$"     , "-06-2011" , date),
date    = gsub("-6$"      , "-06-2011" , date),
date    = gsub("-07$"     , "-07-2011" , date),
date    = gsub("-7$"      , "-07-2011" , date),
date    = gsub("-08$"     , "-08-2014" , date),
date    = gsub("-09$"     , "-09-2011" , date),
date    = gsub("-aout$"   , "-08-2011" , date),
date    = ifelse(grepl("^..-11$",date),
                 gsub("-11$","-11-2011",date),
                 date),
date    = gsub("-11$"     , "-2011"    , date),
date    = gsub("-111$"    , "-2011"    , date),
date    = gsub("-10$"     , "-10-2011" , date),
```

```
date    = gsub("18012-15" , "18-12-2015
date    = gsub(" 12$"     , "-2012"
date    = gsub(" 13$"     , "-2013"
date    = gsub(" 14$"     , "-2014"
date    = gsub("-12-4$"   , "-2014"
date    = gsub("-015$"    , "-2015"
date    = gsub("20-08-$"  , "20-08-2011"
date    = gsub("110-120"  , "09-10-2015"
date    = gsub("-120$"    , "-2012"
date    = ifelse(grepl("024119",vesseltr
                 gsub("-20$","-10-2011",
                 date),
date    = ifelse(grepl("024122",vesseltr
                 gsub("-20$","-02-2012",
                 date),
date    = gsub("13-1$"    , "13-01-2015"
date    = gsub("-1013$"   ,"-10-2013"
date    = gsub("-30$"     ,"-10-2011"
date    = gsub("22 1$"    ,"22-01-2013"
date    = gsub("28 2$"    ,"28-02-2013"
date    = gsub("trip 86$" ,"28-02-2014"
date    = gsub("hele gebied$" ,"18-04-2
date    = gsub("-0613$"   ,"-06-2013"
date    = gsub("-1015$"   ,"-10-2015"
date    = gsub("broken"   ,"07-04-2014"
date    = gsub(" "        , "-"
```

Some meta-data on the data available
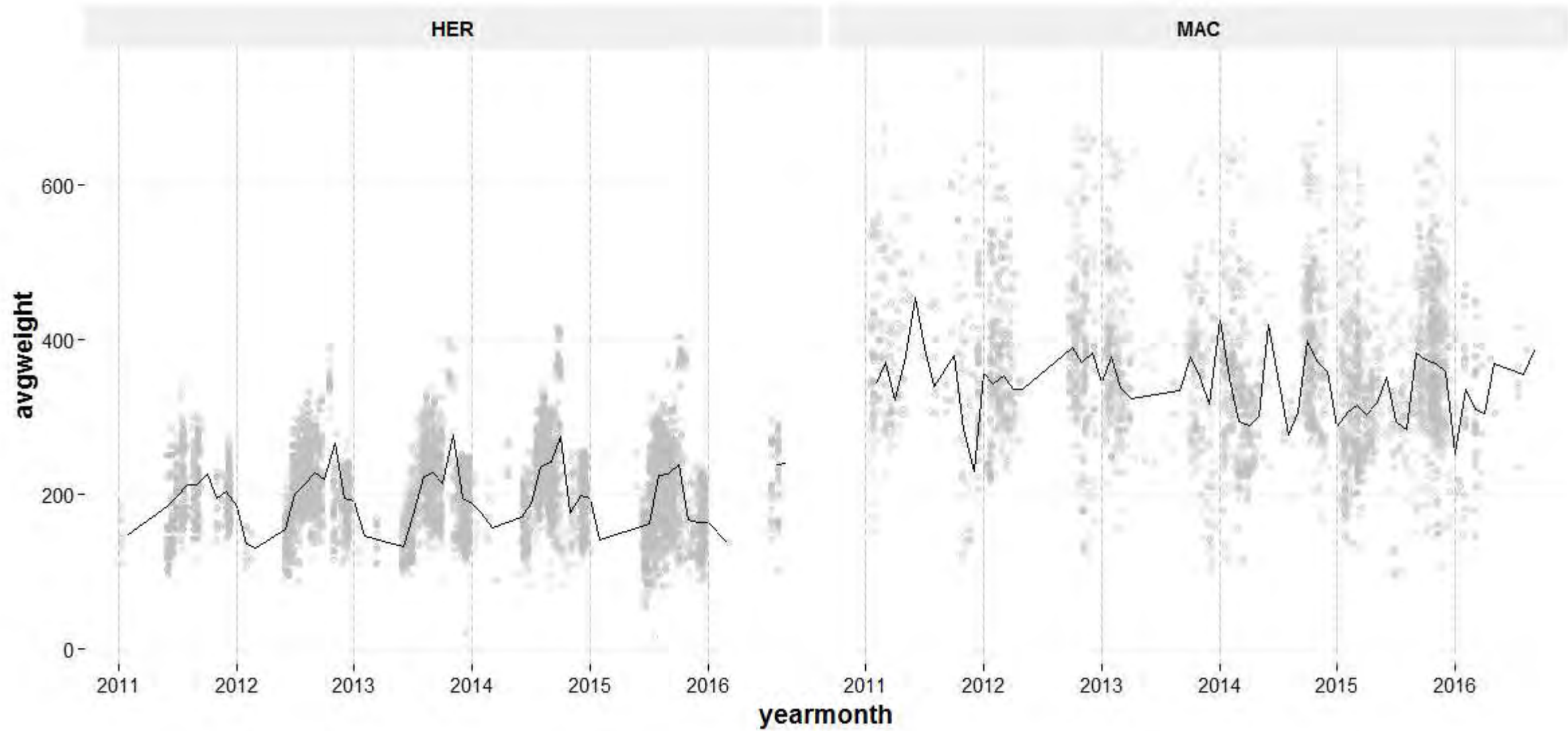
|	
20	vessels
62	species
473	trips (2011-2016)
3,372	'fishing days'
19,750	'production units'
1,165,180	tonnes catch

So what could we do with this information?

- Distribution of mean weight in the catch
  - By area, by season
- Changes in length-weight relationships
  - By area, by season
- Changes in fat content
  - By area, by season

- Stomach fill …. ?
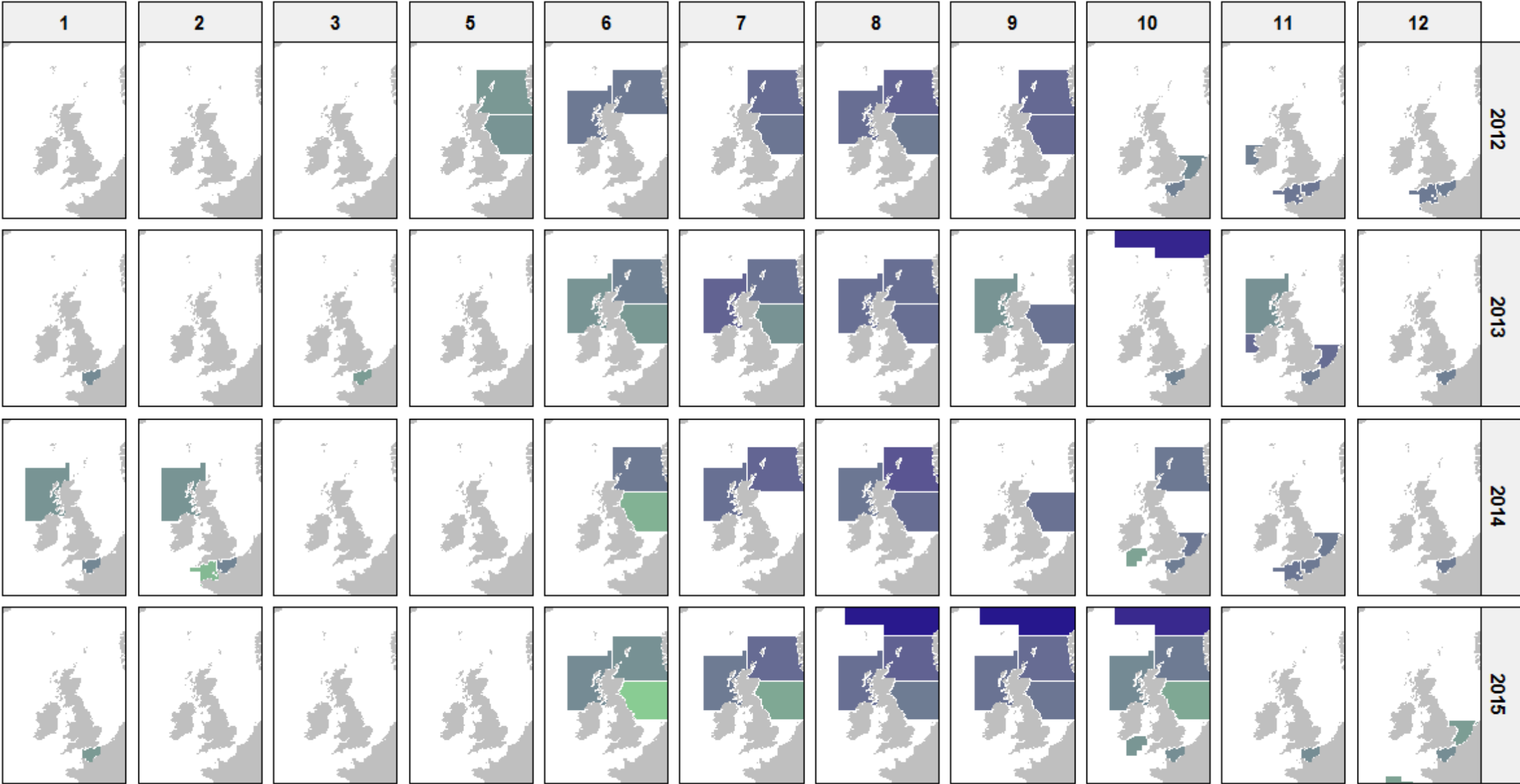- Body shape … ?

Average weight per fish

Average fat content per fish
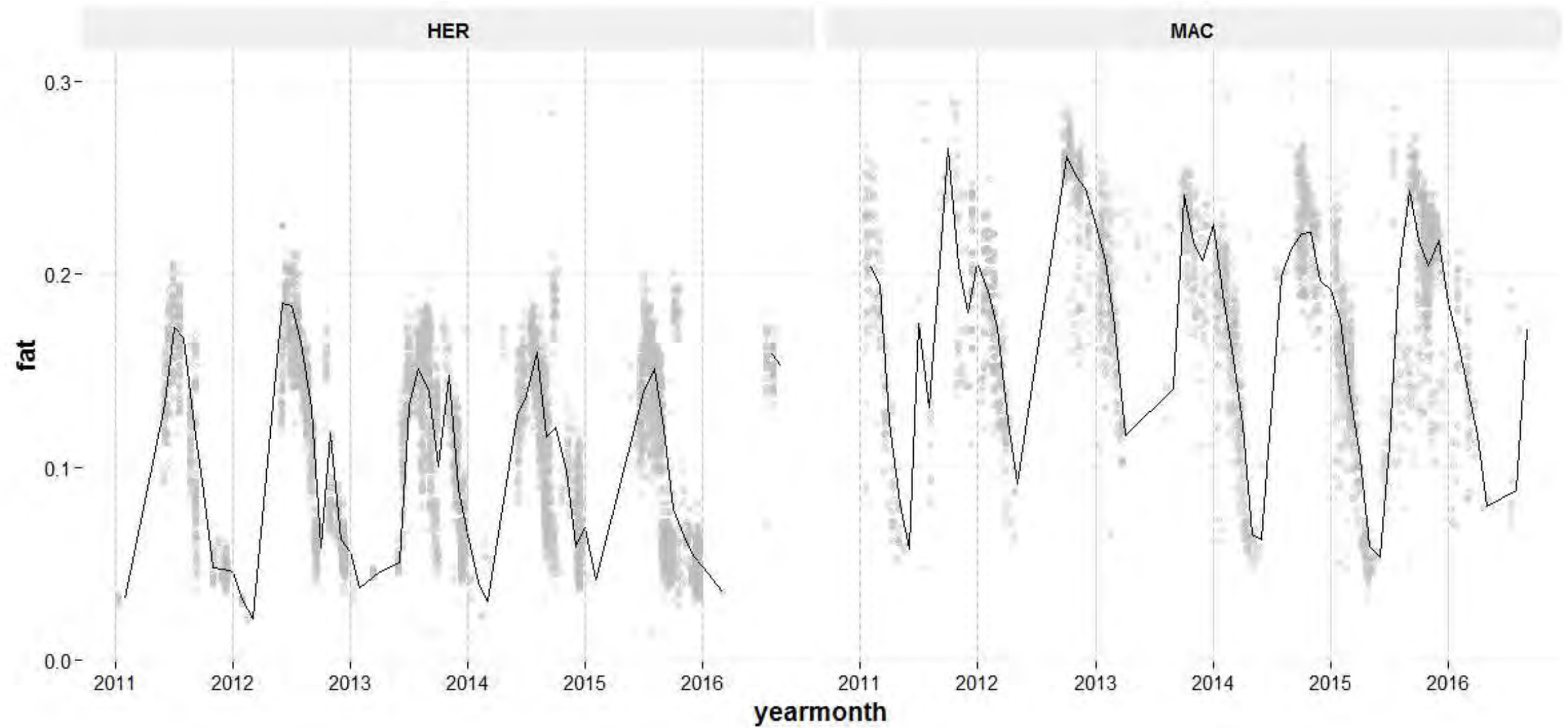
Herring: average weight by area, month and year
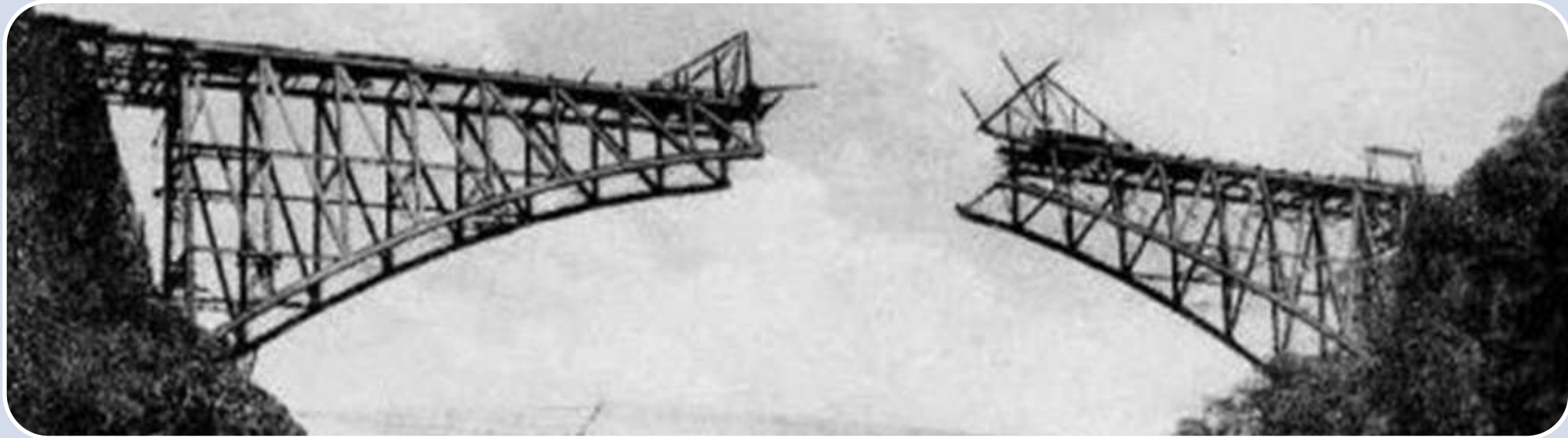

avgweight 0 200 400

# Mackerel: fat content by area, month and year

Conclusions on utilizing company data

- Potentially useful and detailed data
- Still work to do: checking, longer histories, more companies
- Linking observations to environmental changes

Change role of industry in science and management

Fishermen are the eyes and ears at sea

mpastoors@pelagicfish.eu

Marine Traffic, accessed 13/10/2015, 10:20
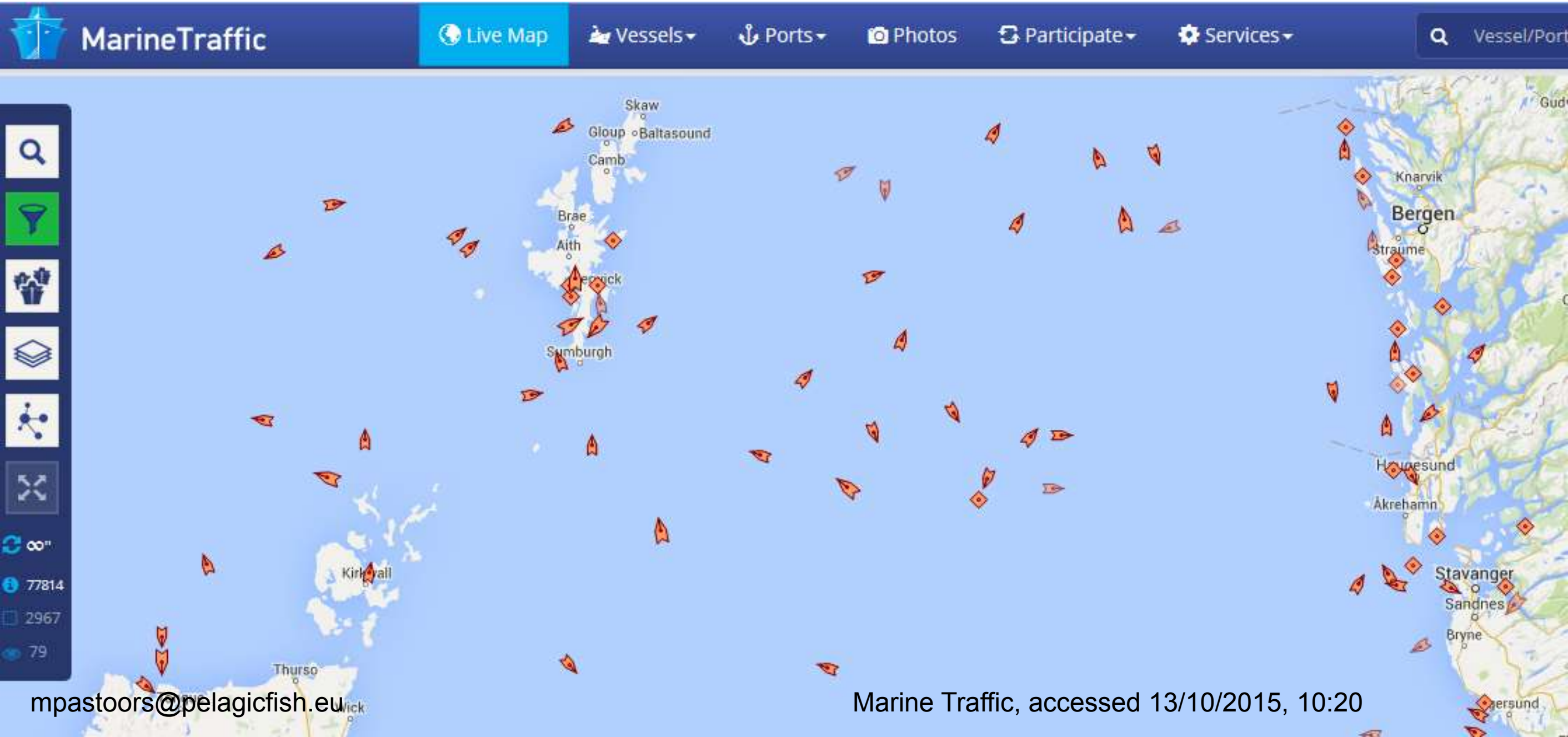
Many projects have demonstrated benefits of engagement…
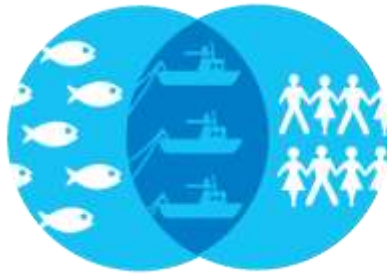
… but so far, the 'exchange' was mostly 'over the border'

Data, information, knowledge

Fishing industry

Research (Science)

Results, reports, presentations
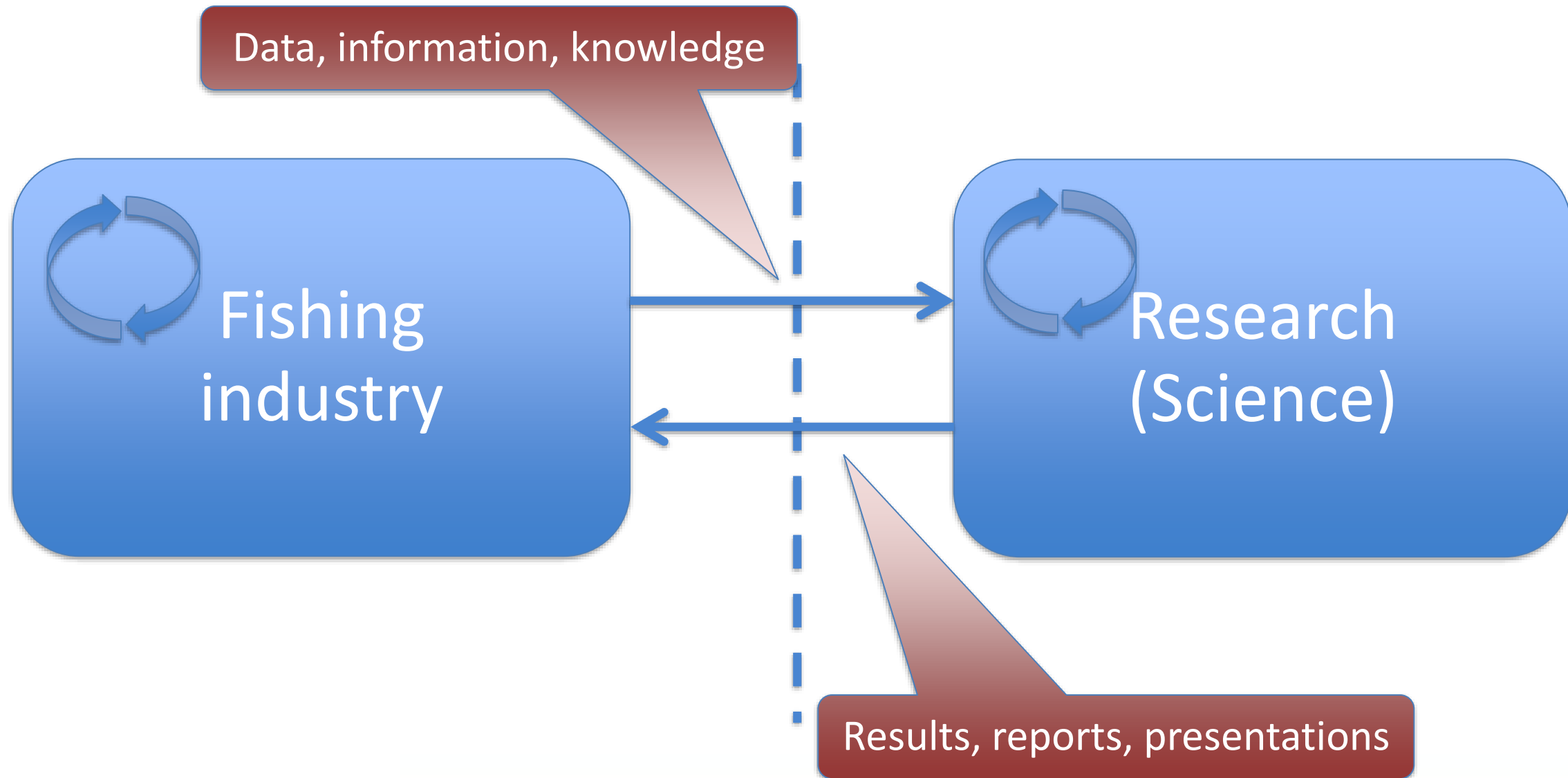
Fishing Industry Science: integrates science within industry
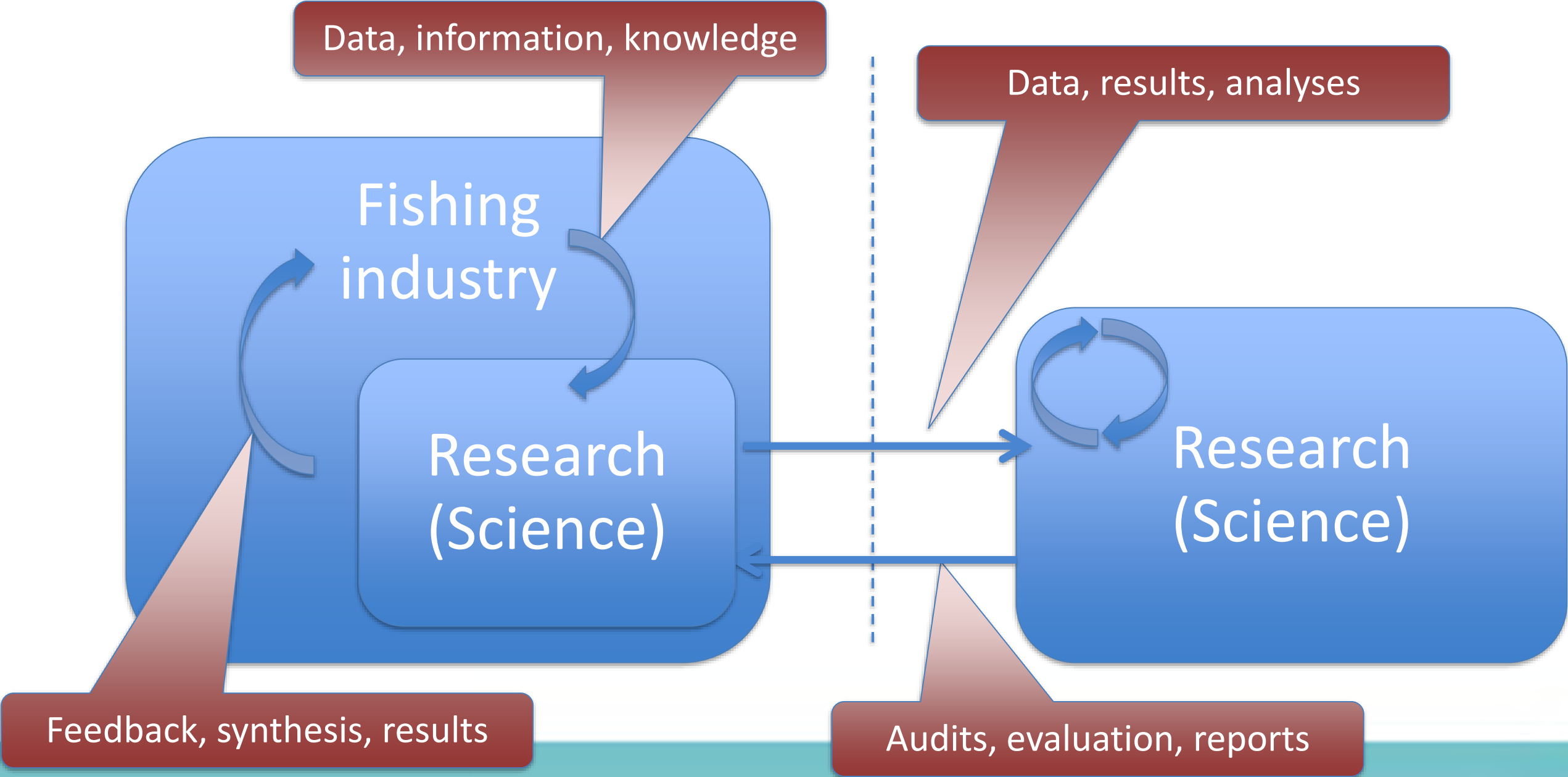
Feedback is essential

- Involving captains and crew
- Providing overviews
- Discussing results
- Using data for management
- Using data for fisheries

Data, information, knowledge

Fishing industry

Research (Science)

Feedback, synthesis, results

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Bridging between science and fishing practice

+
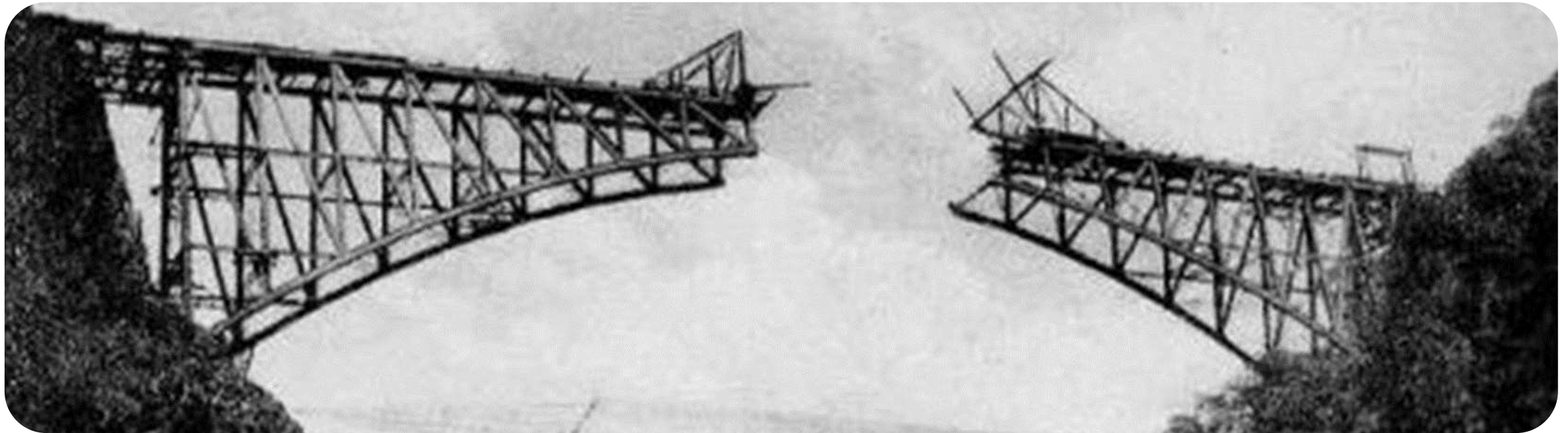
- **Engagement of skippers and crew in research**
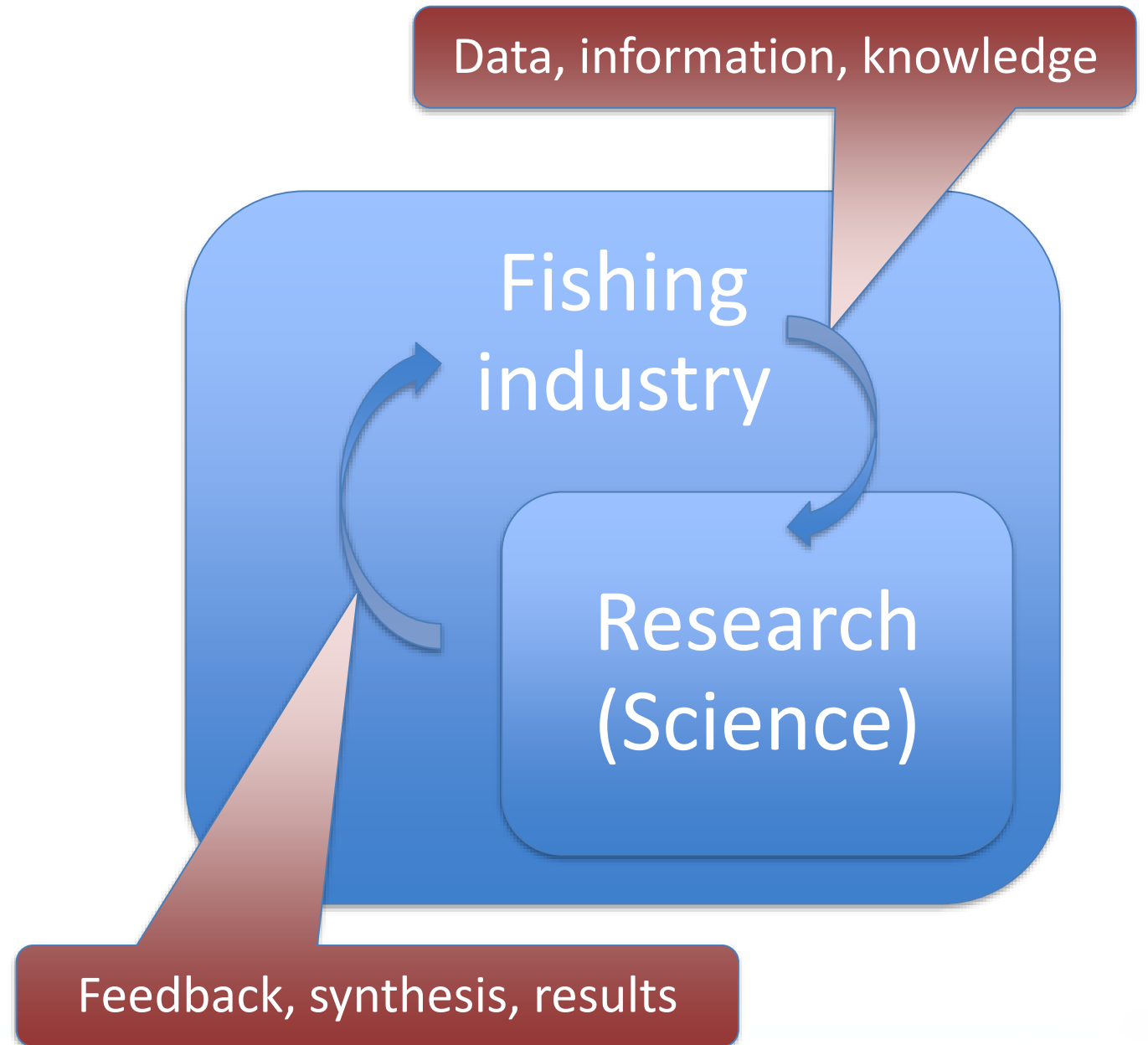- Broad coverage in space and time
- Potential application for biological changes

–

- Data formats not always standardized
- Non-random searching (but is that a problem?)
- Some data are competition sensitive

The **BIG** question:

Can we trust the data?

Yes !

- Data collection for commercial purposes
  - Clients are critical on data collection; the discipline of the market
- Check observations between vessels and areas
  - High consistency
- Check observations with observer data
  - High consistency

Pelagic freezer-trawler self-sampling programme

MERK	AANTAL	INSLAG	STUKST	ISI	10KG	ST/KG	OPMERK	St/CRT	WAARDERIN
BON924 024112	191	191	010-020	1	5	1	-	8	uitstekend
BON926 024112	509	501	010-020	1	8	1	-	15	uitstekend
FRZ927 024112	1,160	1,160	050-060	1	23	2>3	-	60	uitstekend
FRZ928 024112	32	26	020-030	-	11	-	-		
JAX400 024112	468	468	060-070	1	29	3>4	-	58	uitstekend
JAX401 024112	185	175	065-075	1	31	3>4	-	65	uitstekend
JAX402 024112	21	21	095-105	2	46	3>6	-	91	goed
JAX403 024112	19	13	080-090	1	39	4>6	-	89	uitstekend
MAS324 024112	143	143	030-040	1	16	1>2	-	38	uitstekend
MAS325 024112	521	521	060-070	1	30	2>3	-	63	uitstekend
MAS326 024112	601	601	080-100	2	42	3>6	-	84	goed
MAS327 024112	142	135	110-120	2	50	3>6	-	115	goed
MUL925 024112	1,276	1,268	015-025	2	9	1	-	19	goed
PIL616 024112	3,214	3,214	185-195	1	83	7>10	-	196	uitstekend
PIL617 024112	3,310	3,310	140-150	1	62	6>10	-	162	uitstekend
618 024112	3,155	3,155	200-220	2	94	8>12	-	204	goed
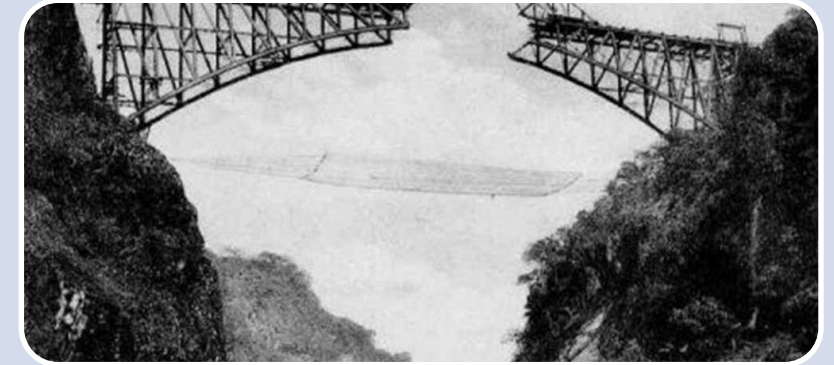
Collect additional information from ongoing fisheries

Utilize data that was collected by companies

Change role of industry in science and management

Efficient

Engagement

Spatial

Temporal

Innovative

Working with industry to improve   science and management

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