

Industry survey of Western herring ...and other things

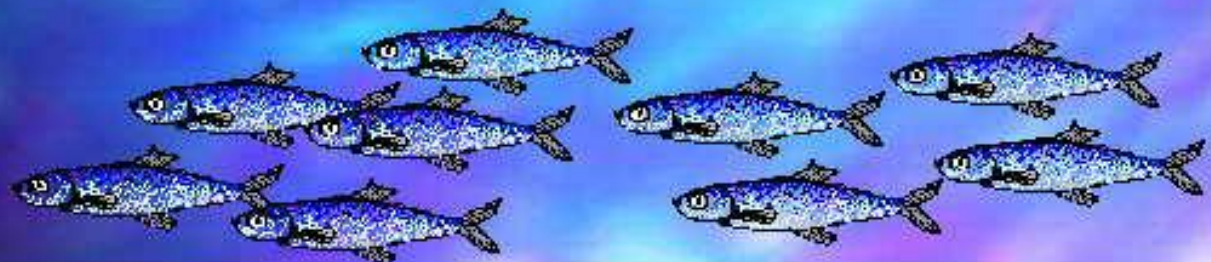
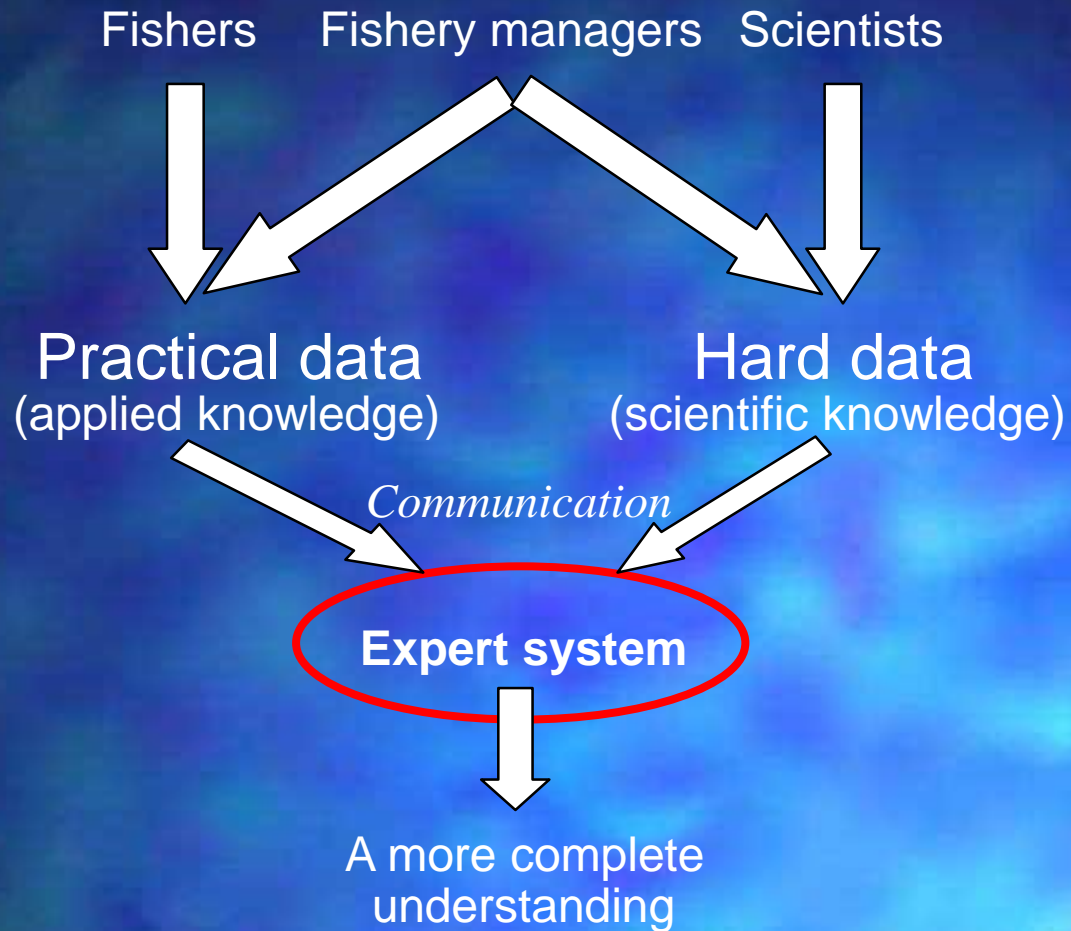
Steven Mackinson







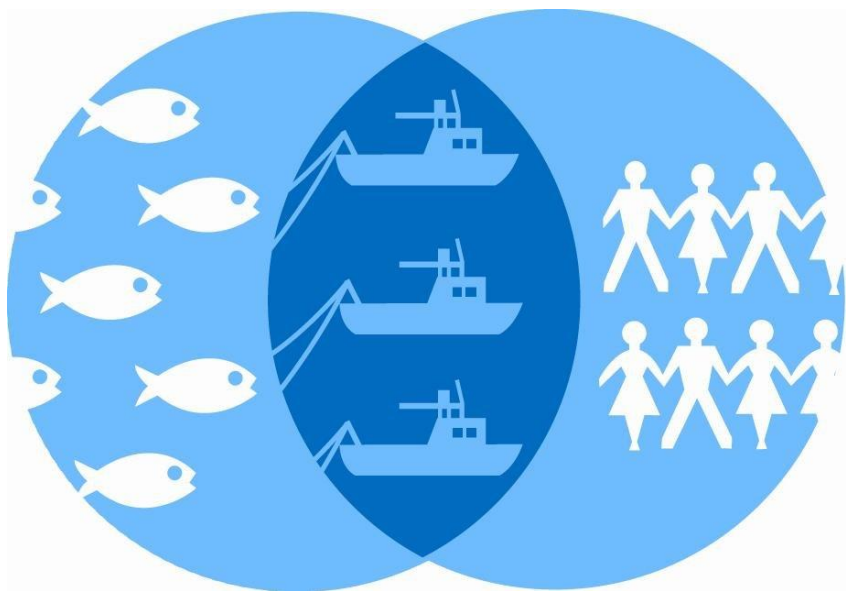
PhD - Combining fishers and scientific knowledge





Cefas

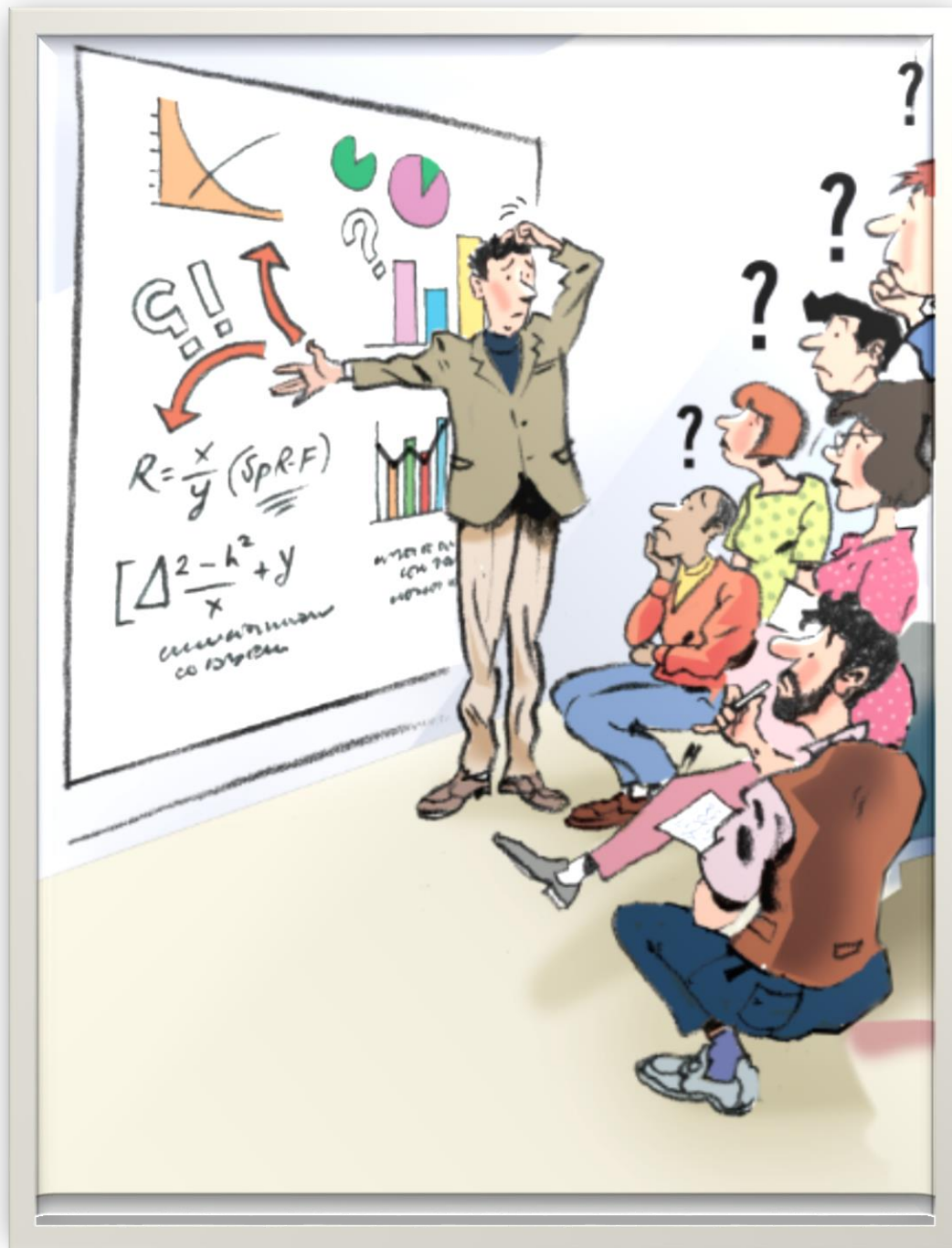
**Centre for Environment, Fisheries
& Aquaculture Science**



GAP

Connecting Science
Stakeholders and Policy











Values

TRUST

RESPECT

FEELING VALUED

Behaviours

Open

Honest

Transparent

A photograph of a fishing net with floats hanging from a boat over the ocean at sunset. The net is made of a fine mesh and has several dark floats attached to its edge. The background shows the sea and a cloudy sky with the sun low on the horizon. Several birds are flying in the distance.

Making
collaboration
effective

Shared goals connected to impact
Understanding each others motivation & incentives

Making knowledge count

Learning by doing (participatory research)

Share outcomes and evolve

[Objectives](#)

[Stock Advice](#)

[Videos](#)



ENGAGING IN SCIENCE PROJECTS

Investing in fisheries science to enhance our
knowledge

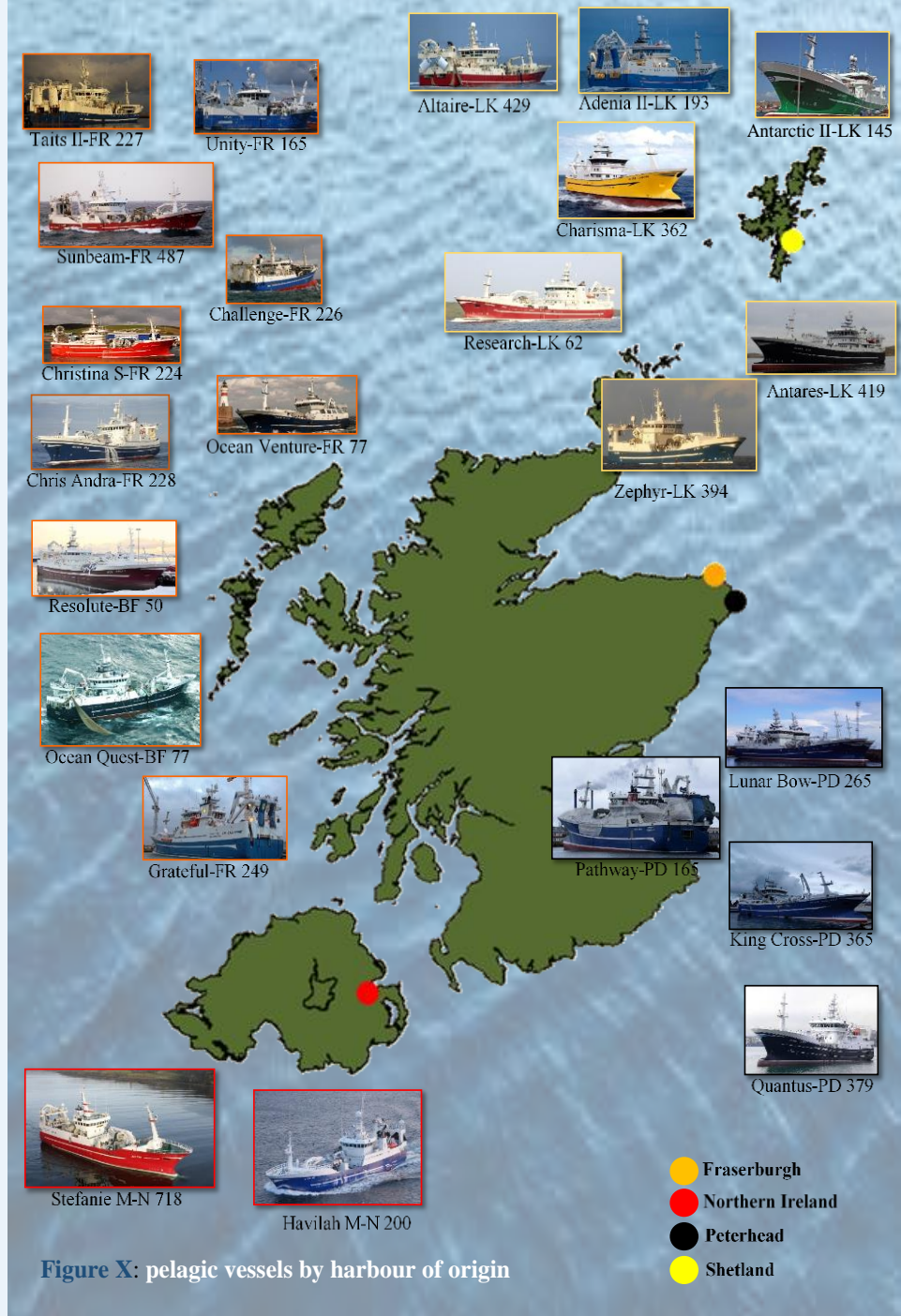


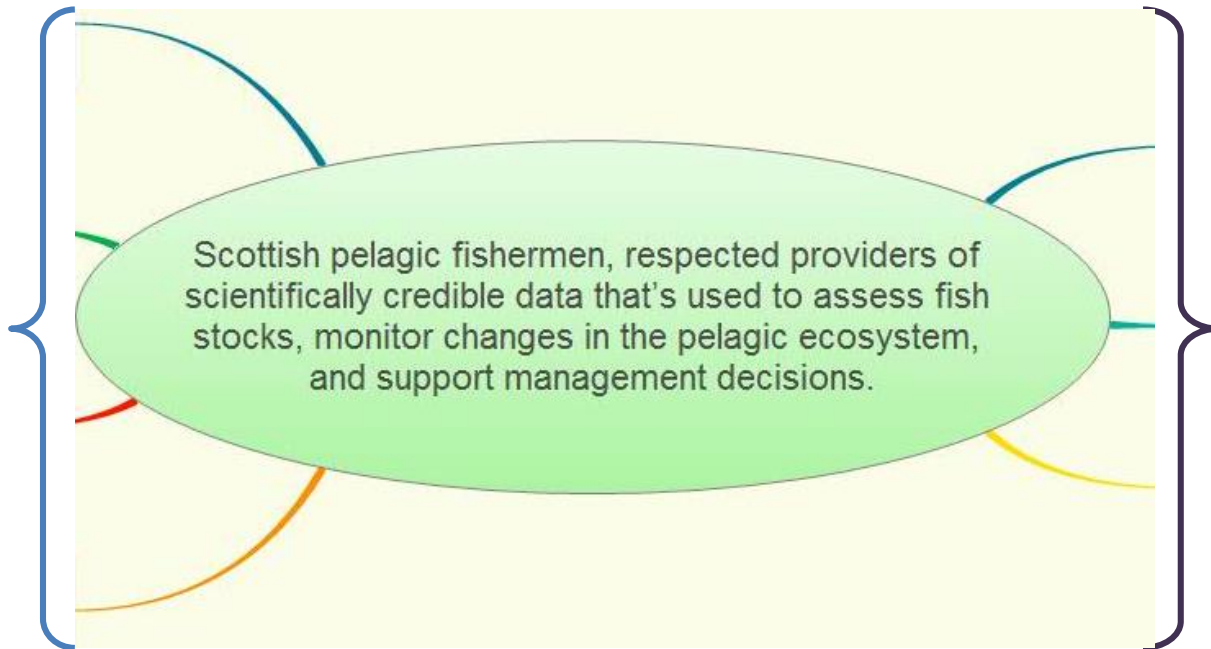
Figure X: pelagic vessels by harbour of origin

SPFA Science Plan

Science
Engagement
Strategy

Scottish pelagic fishermen, respected providers of scientifically credible data that's used to assess fish stocks, monitor changes in the pelagic ecosystem, and support management decisions.

Data
Collection
Strategy



Data Collection Strategy



Establish pelagic fishing vessels as research platforms, mapping changes in the abundance and distribution of pelagic fish



Work with fish factories to promote the collection of scientific biological data on pelagic fish

2016/17 INDUSTRY-SCIENCE SURVEY OF HERRING IN 6A, 7BC

Steven Mackinson¹, Martin Pastoors², Susan Lusseau³, Eric Armstrong³, Steven O'Connell³, Dick de Haan⁴, Dirk Burgraaf⁴, Benoit Berges⁴, Sascha Fassler, Alexander McClean⁵, Bruce Langlands⁵, Andrew Scott, Alex Wiseman¹, Michael O'Malley⁶, Maurice Clarke⁶

¹ Scottish Pelagic Fishermen's Association, Scotland

² Pelagic Freezer Trawler Association, Netherlands

³ Marine Scotland, Scotland

⁴ Wageningen Marine Research, Netherlands

⁵ Scottish Fishermen's Federation, Scotland

⁶ Marine Institute, Ireland

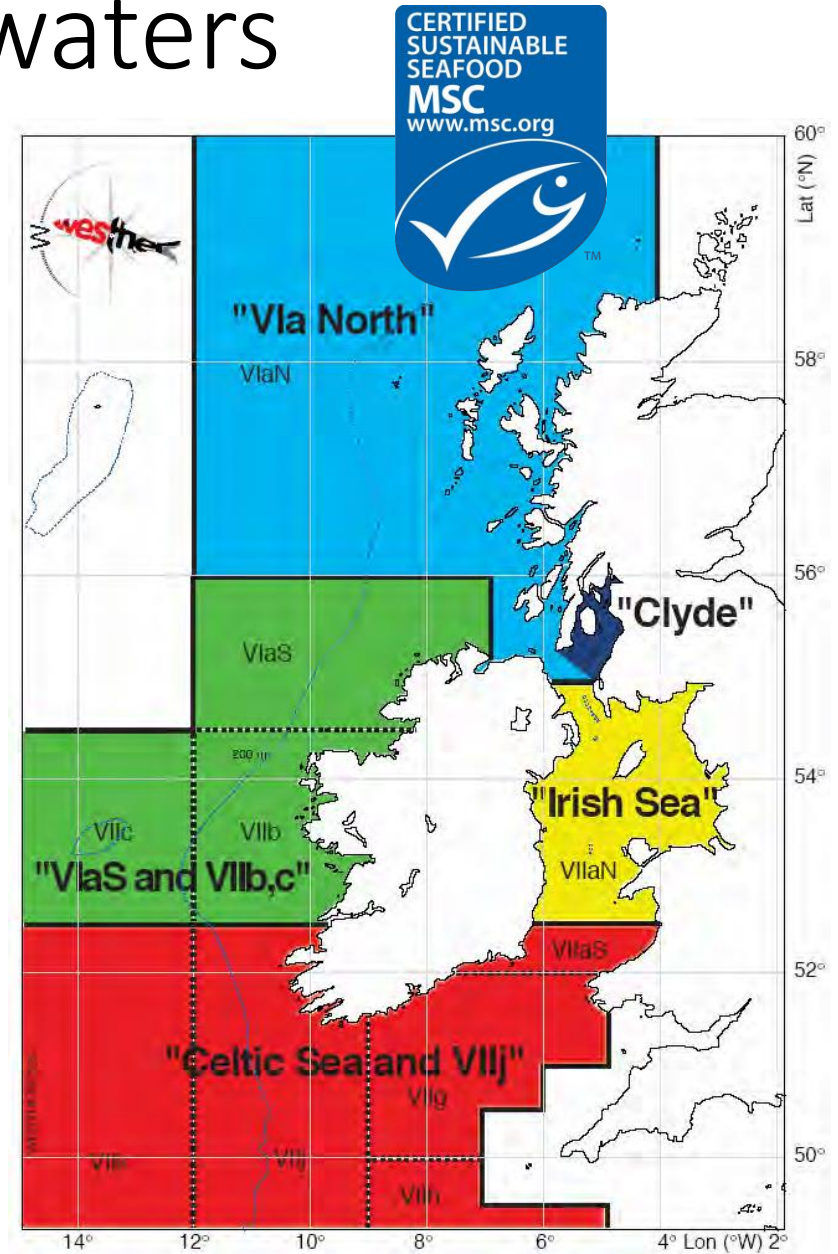


Rationale

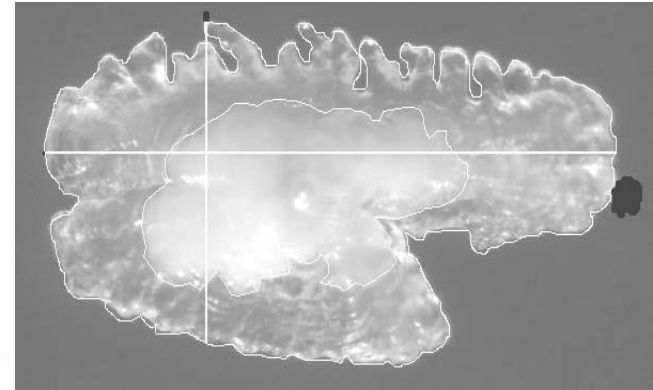
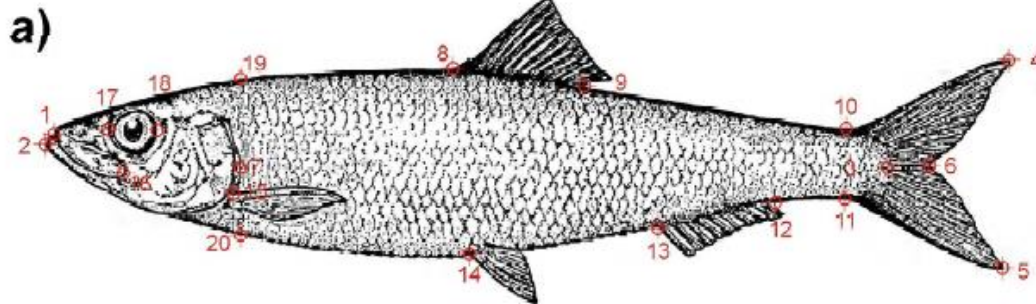
Herring in western waters



From 1981-2015, herring in Western waters were split into two stocks, 6aN and 6aS, 7b,c.

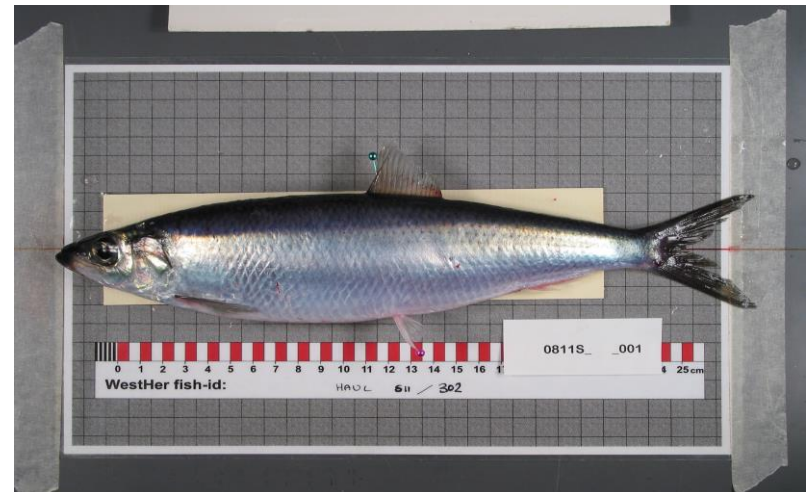


Morphometric analysis



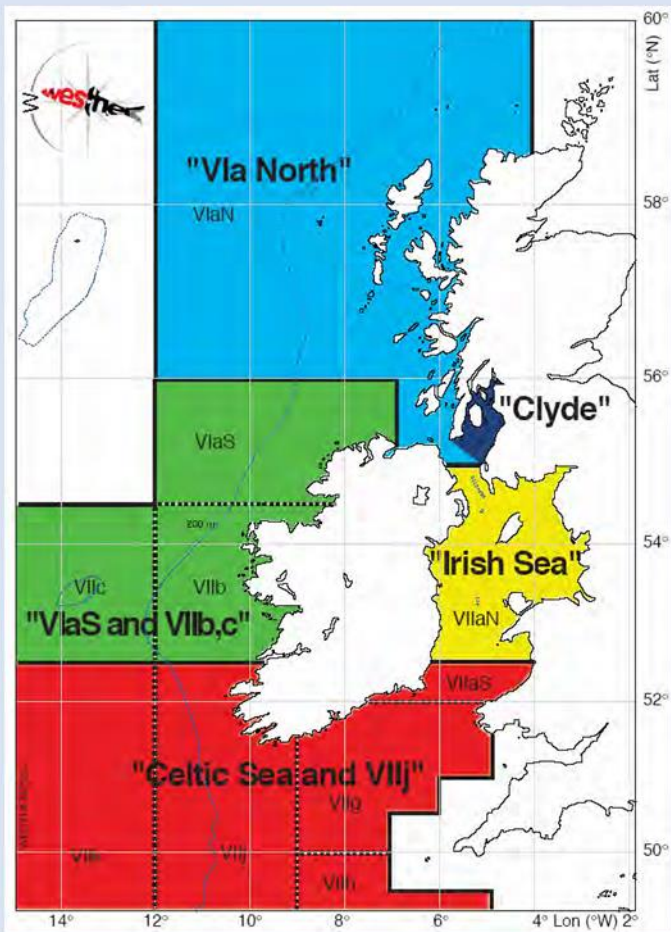
Points of measurement:

- | | |
|--|---|
| 1: anterior tip of maxilla | 11: bottom end of least peduncular height |
| 2: anterior tip of mandibula | 12: posterior insertion of analis |
| 3: end of the fleshy caudal peduncle | 13: anterior insertion of analis |
| 4: tip of the caudalis' dorsal lobe | 14: insertion of first pelvicular fin ray |
| 5: tip of the caudalis' ventral lobe | 15: insertion of first pectoral fin ray |
| 6: anterior end of caudalis' fork | 16: posterior tip of maxilla |
| 7: posterior opercular rim | 17: anterior orbital rim |
| 8: anterior insertion of dorsalis | 18: posterior orbital rim |
| 9: posterior insertion of dorsalis | 19: top of head (perpend. above P7) |
| 10: top end of least peduncular height | 20: base of head (perpend. below P7) |

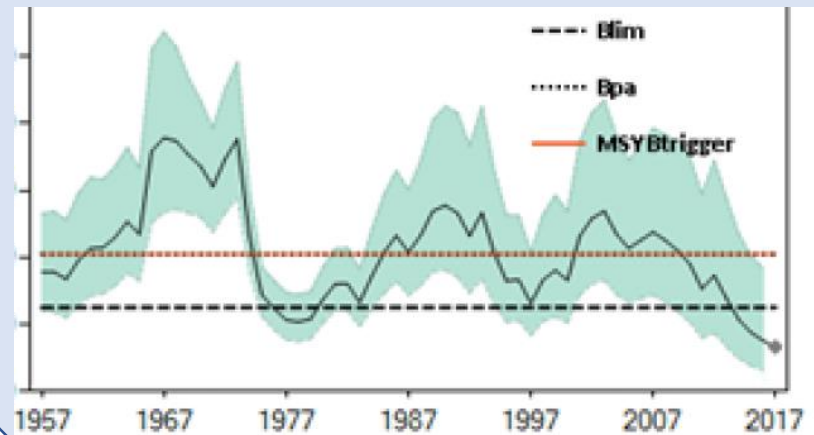


How the industry surveys came about

WKWIDE 2015: 6aN & 6aS, 7bc herring cannot be assessed separately



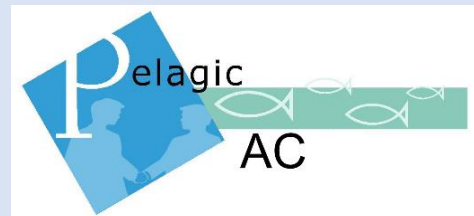
ICES 2015, 2016, 2017: combined stock below Blim. Advice: zero catch + rebuilding plan



2016: monitoring TAC + industry-science research programme



Development of rebuilding plan



Leading to.....

Survey logistics

Quantus

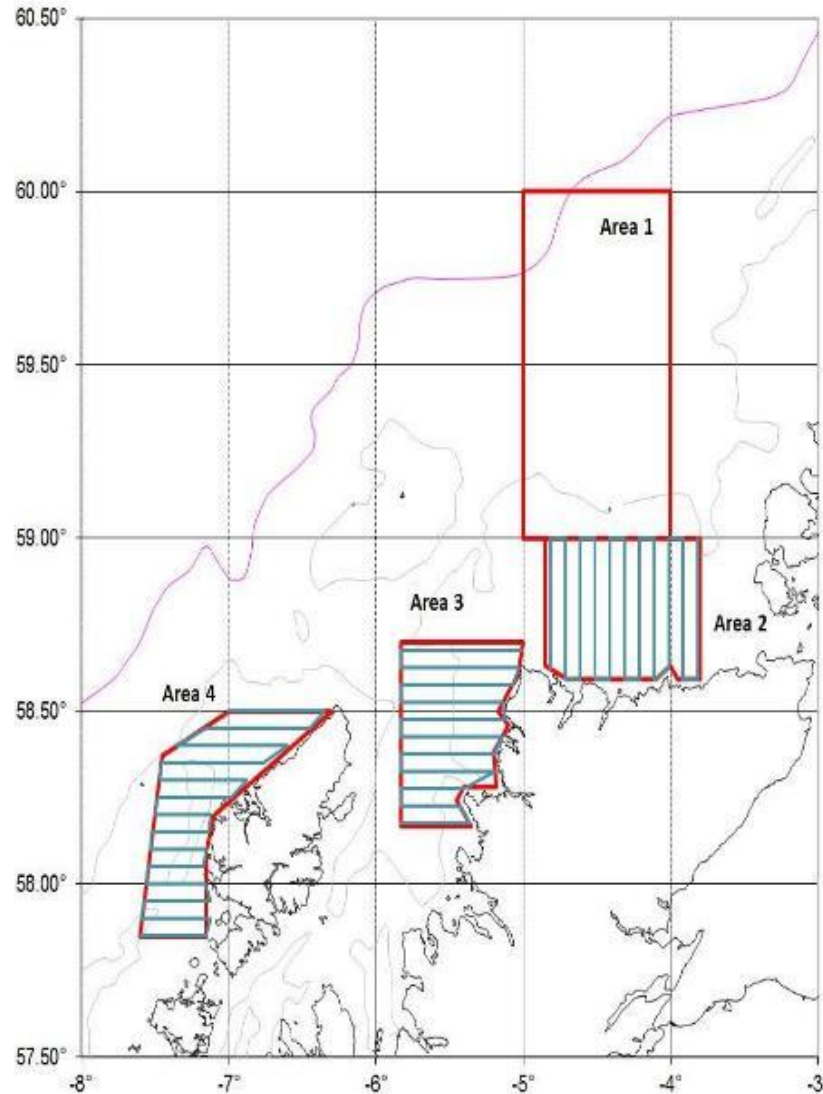


18/8 – 28/8
6/9 – 9/9

Wiron 5&6



5/9 – 16/9



Annie Hillina



24/7 – 8/8
11/9 – 16/9

Zephyr




Unity



24/8 – 29/8
29/8 – 5/9
7/9 – 9/9

Timing and area coverage	Sun 20-Aug	Mon 21-Aug	Tue 22-Aug	Wed 23-Aug	Thu 24-Aug	Fri 25-Aug	Sat 26-Aug	Sun 27-Aug	Mon 28-Aug	Tue 29-Aug	Wed 30-Aug	Thu 31-Aug	Fri 01-Sep	Sat 02-Sep	Sun 03-Sep	Mon 04-Sep	Tue 05-Sep	Wed 06-Sep	Thu 07-Sep	Fri 08-Sep	Sat 09-Sep	Sun 10-Sep	Mon 11-Sep	Tue 12-Sep
Area 1																								
Dirk Dirk (Catch sampling)																								
Antares (Biol / Gen / Morphometrics)																								
Area 2																								
Sunbeam (Acoustics)																								
Dirk Dirk (Biol / Gen / Morphometrics)																								
Wirons (Acoustics)																								
Antares (Biol / Gen / Morphometrics)																								
Area 3																								
Sunbeam (Acoustics)																								
Lunar Bow (Acoustics)																								
Dirk Dirk (Biol / Gen / Morphometrics)																								
Antares (Biol / Gen / Morphometrics)																								
Area 4																								
Sunbeam (Acoustics)																								
Dirk Dirk (Biol / Gen / Morphometrics)																								
Antares (Biol / Gen / Morphometrics)																								

Different colour for each vessel

 Total period of coverage

F= Fishing
C=Calibration

A photograph of a ship's deck, likely a fishing vessel, with a prominent yellow crane structure on the left. The sea is dark and choppy, and the sky is overcast and grey. Several birds are seen flying in the sky. In the distance, another ship is visible on the horizon. The text "We did it!" is overlaid in large white letters across the upper portion of the image.

We did it !

The first industry-led
scientific acoustic survey on
herring in Europe

Co-construction

Adaptive

Unique

Enabling
fishermen to be
scientific

Agility in
planning

24h
communication

24h communication using Whatsapp

15/08/2016, 12:49 - +44 7450 683963 created group "SPFA Science"

19/08/2016, 14:09 - +44 7450 683963 added you

19/08/2016, 14:09 - Messages you send to this group are now secured with end-to-end encryption. Tap for more info.

19/08/2016, 14:17 - +44 7450 683963 changed the subject from "SPFA Science" to "6a Herring Survey"

19/08/2016, 14:17 - +44 7450 683963 added Susan Mærsk Lusseau

19/08/2016, 14:39 - You changed this group's icon

19/08/2016, 14:40 - +44 7450 683963 changed this group's icon

19/08/2016, 15:33 - +44 7450

19/08/2016, 15:33 - +44 7450

19/08/2016, 15:33 - +44 7450

19/08/2016, 15:33 - +44 7450

19/08/2016, 15:34 - +44 7450

19/08/2016, 15:34 - +44 7450

19/08/2016, 15:34 - +44 7450

19/08/2016, 16:15 - Jan Meli

Thanks in advance

Jan skipper Wiron 6

19/08/2016, 17:14 - Henk Kri

19/08/2016, 20:16 - +44 7450

23/08/2016, 21:41 - +44 7450

23rd August. Start: 06:00. En

Week 2, day 1. Two early mo

whiting and half a dozen indi

for the day = 6. Well, as the s

23/08/2016, 21:42 - +44 7450

23/08/2016, 22:01 - Henk Kri

marks. We searched along de

tow with 3 tons herring of a t

130/140 mtr we shot on a sin

23/08/2016, 22:05 - Henk Kri

horse mackerel. With a few h

23/08/2016, 22:09 - Martin P

previous years?

23/08/2016, 22:11 - Henk Kri

23/08/2016, 22:14 - Henk Kri

a couple of days later on we l

23/08/2016, 22:18 - Henk Kri

most of the time and scattere

23/08/2016, 22:20 - Henk Kri

23/08/2016, 22:22 - Henk Kri

23/08/2016, 22:26 - Henk Kri

nobody is fishing there anym

24/08/2016, 11:52 - Susan M

Just finished setting up the st

measured and weighed onbo

each herring. The results will

outside of spawning time.

24/08/2016, 11:56 - Martin Pastoors: Good work Susan. Steven, Andrew and crew of the Unity: I hope you will have a successful trip. Please keep us posted on how things are developing.

24/08/2016, 12:07 - +44 7823 341687: Will do , should be in area 4 about 6am tomorrow

24/08/2016, 22:22 - +44 7733 203731: Good evening

On route for Peterhead ETA

10 am mybe a little sooner.

Allister

Zephyr LK394

24/08/2016, 22:40 - +44 7823 341687: Evening , Unity due in same area as Quantus 06:00

24/08/2016, 22:45 - Susan Mærsk Lusseau: Good luck to you Stephen and thank you for making it so easy for us to get organised with the sampling station on Unity



6a Herring Survey

Adrie, Alex, Andrew, Dick, Eric, Gerard, Henk, Ian, Jan, Raoul, Sascha, Susan, +44 7450 683963, +44 7473 021765, +44 7733 203731, ...

+44 7823 341687 -Stephen

Just hauled tow 3 stroke , should be 350t , left the big mark alone

11:15

We will freeze 50 more , back into peterhead to unload friday 6am , we also have sounder data for the trip last trip both area 2

11:17

Henk Krijgsman

Good morning we will sail tommorow from ijmuiden this afternoon I Will be at the office and know What the plan is for the next trip later on today I Will inform you about the when and where

11:19

Susan Mærsk Lusseau

Hi Henk, that sounds good. Is it possible to get the frozen samples from the first trip from you when you come to pick up Steven?

13:32

Stephen, that is grand, thanks! I will try to come up tomorrow and get fish, sounder data and haul positions from you if that's OK.

13:37

+44 7823 341687 -Stephen

Yes thats ok

13:38



No.1 blank, No.2 -two baskets of tiny to be small whiting again. Herring tally

rea iva because we couldn't find any with some herring south/SSW of rona. 1 of rona in the deeper gap up there of y tiny fish stuck in the meshes NO catch these catches were mackerel or

ly? Too late? How does it compare to

quit ok. 1 mark for 50T or so inie hillina. We had some nice tows for

mit of the butt of Lewis. Light marks

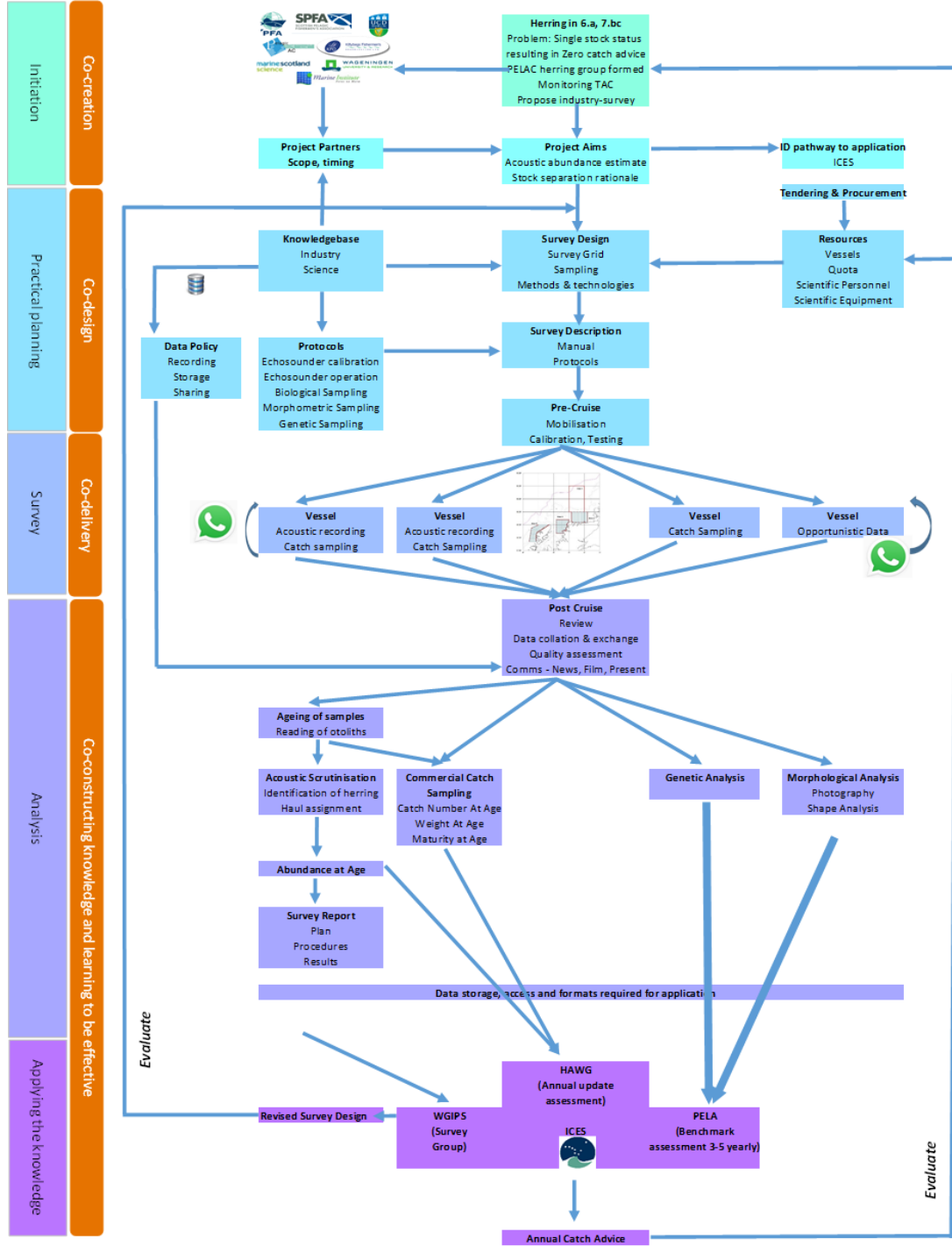
indications.

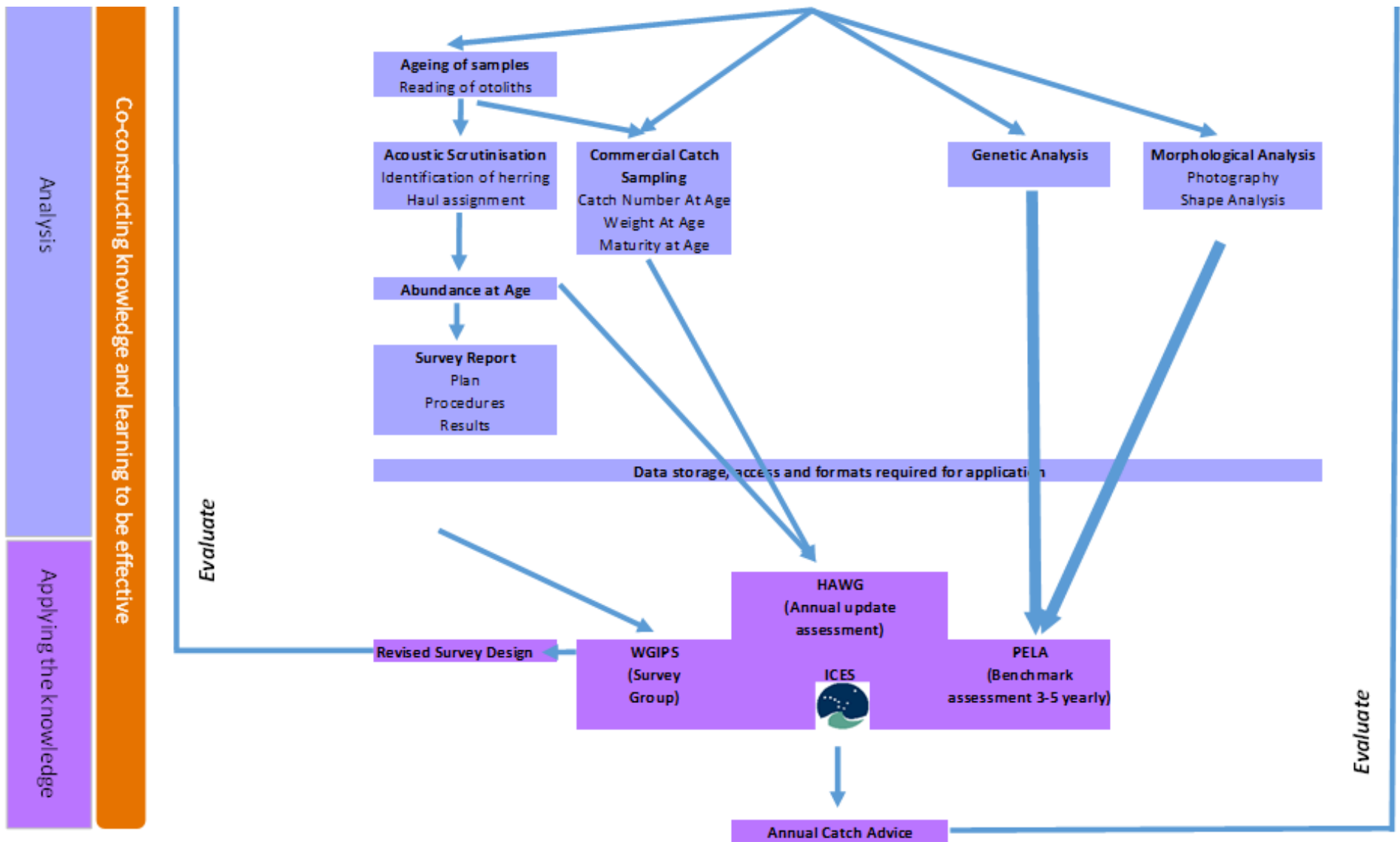
these years and as far as I know of

ds. Herring will be photographed, and determine the sex and maturity of rring in mixed catches and surveys

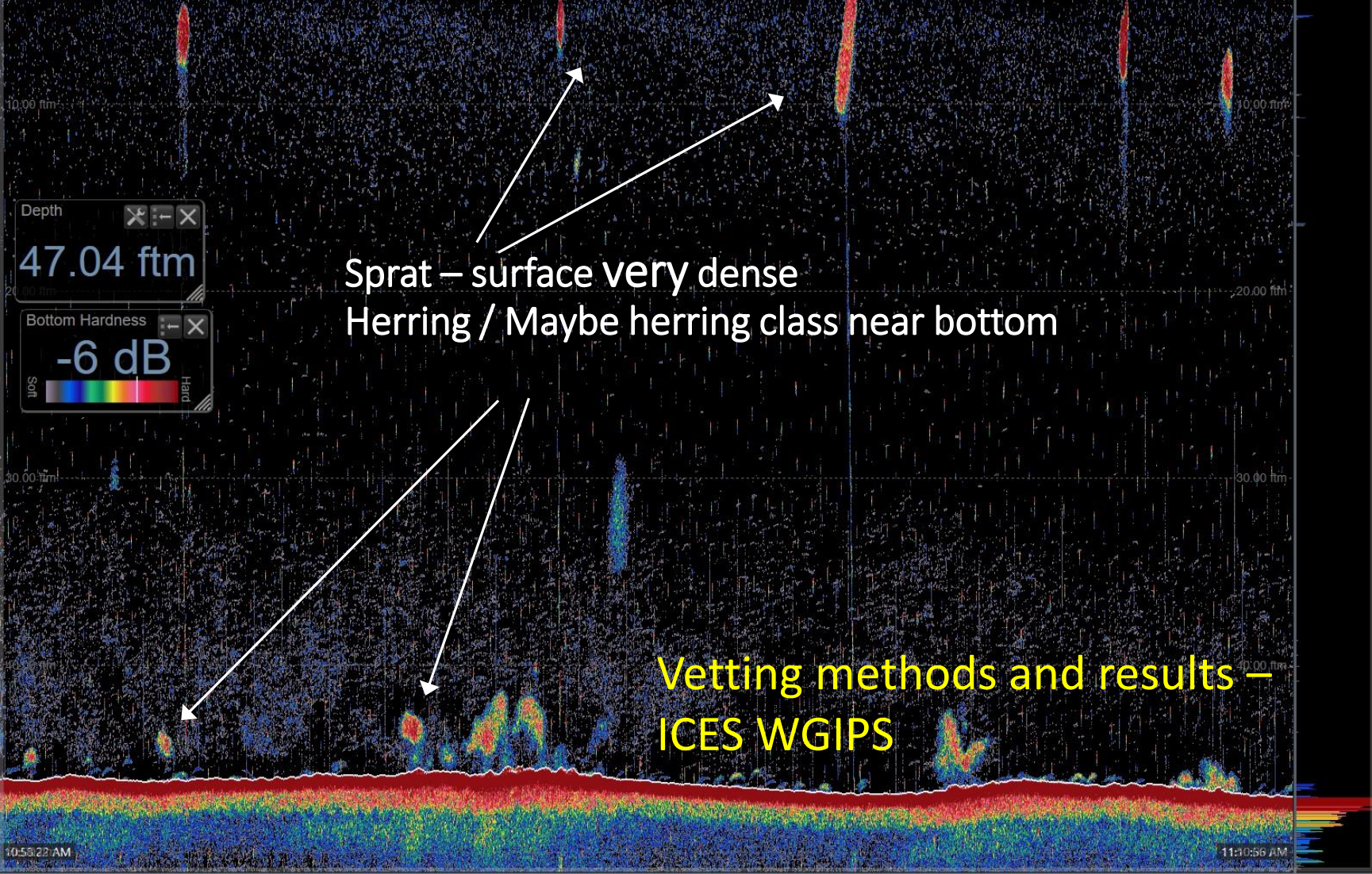
See what happened







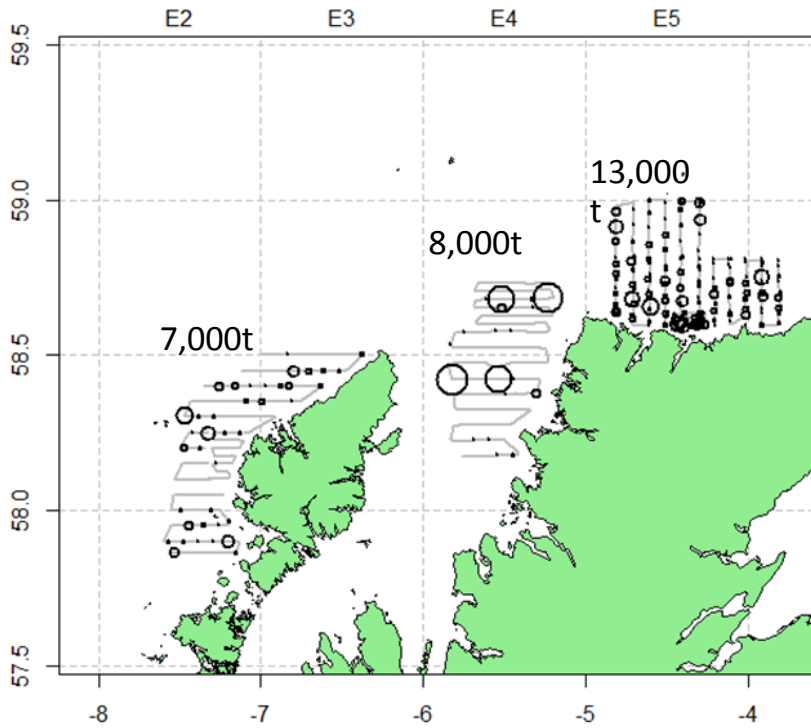
WBT
ES38B Serial No: 0
Sv (20 Log)



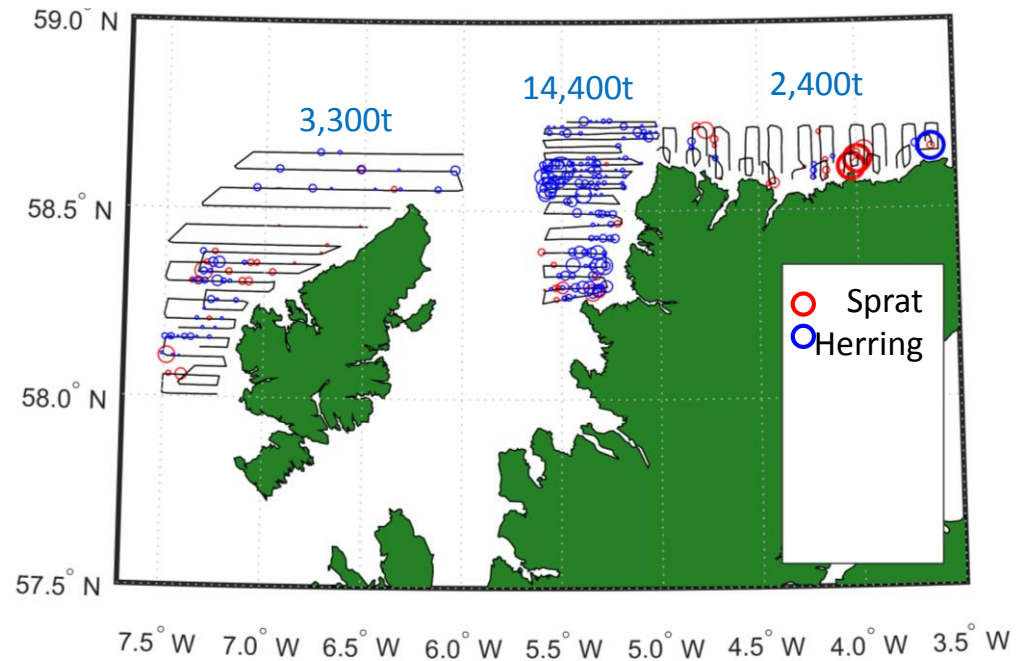
Sprat – surface very dense
Herring / Maybe herring class near bottom

Vetting methods and results –
ICES WGIPS

Herring acoustic biomass 6aN

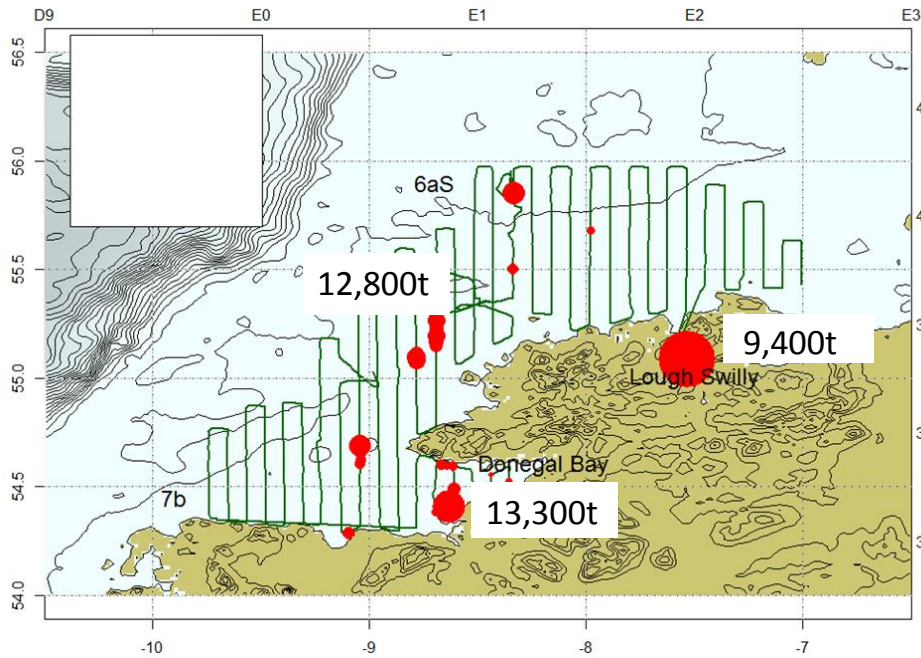


2016 total = 28,000t

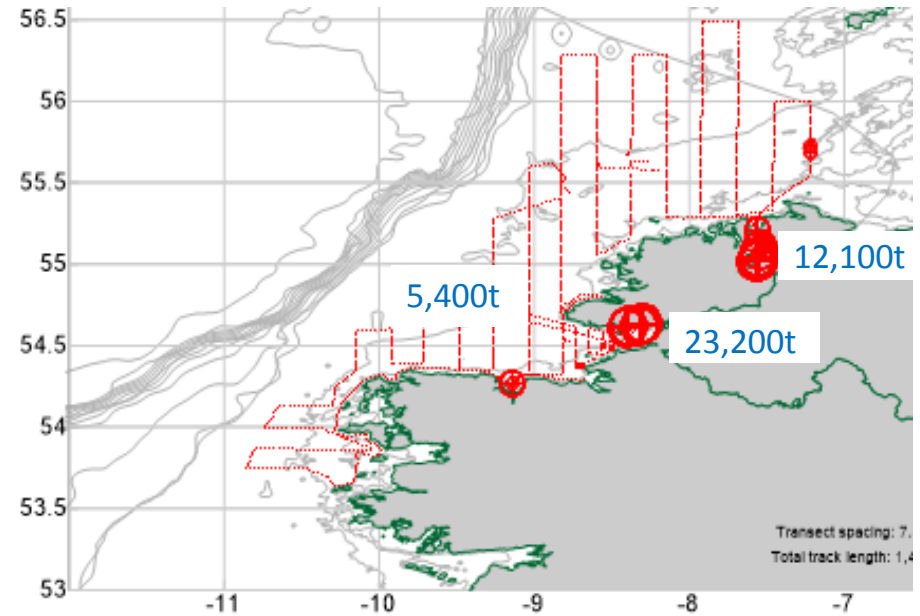


2017 total = 20,100t

Herring acoustic biomass 6aS, 7bc



2016 total = 35,500t



2017 total = 40,700t

Good

✓ Calibration



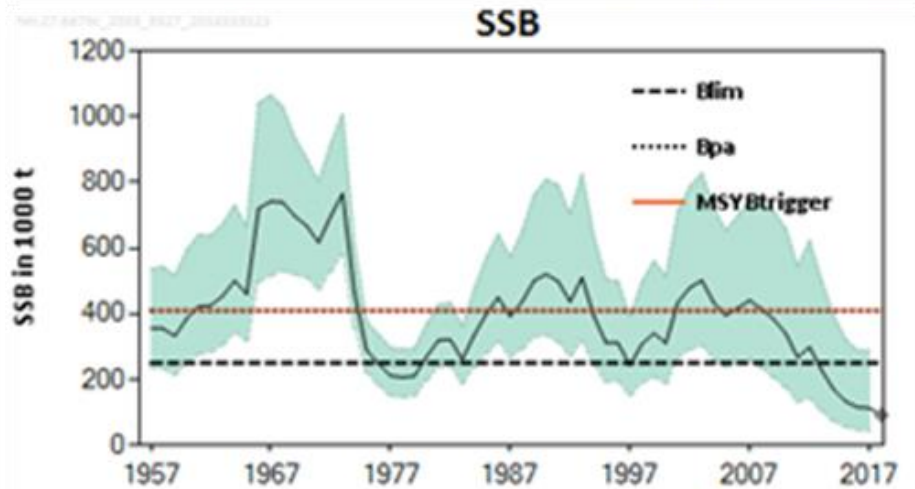
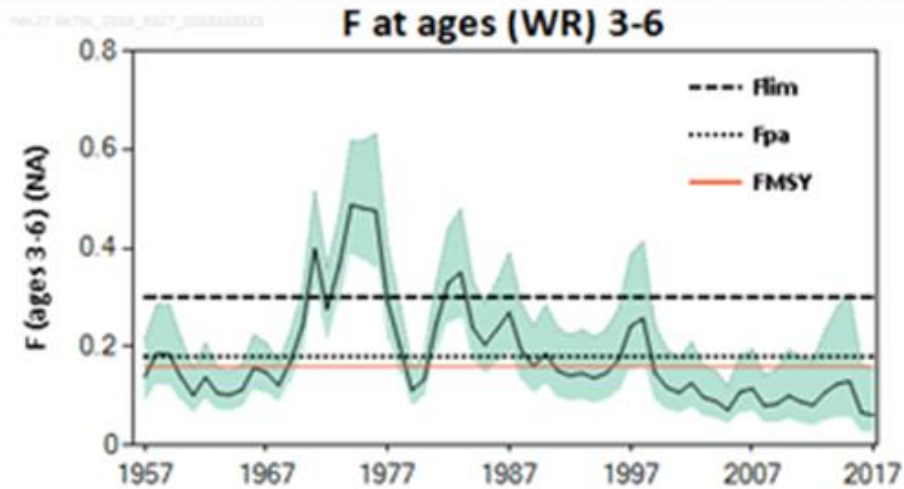
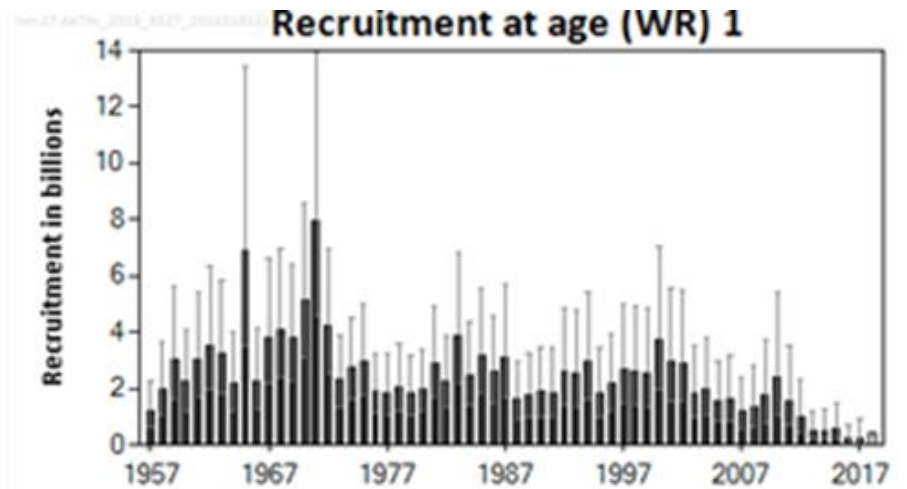
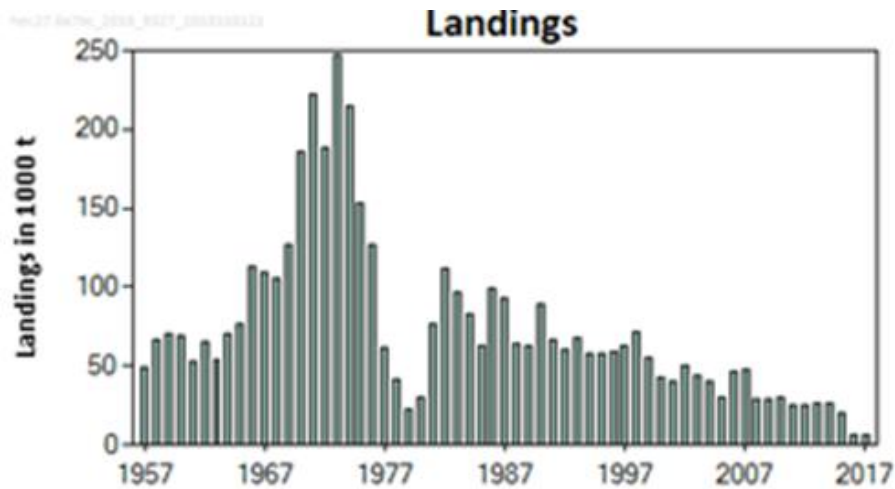
- ✓ Each acoustic survey completed 2x
- ✓ Samples of spawning fish collected for genetics
- ✓ Enough biological samples
- ✓ (nearly) Every commercial haul sampled
- ✓ Modified nets
- ✓ Flexibility to adapt to conditions

Could do better

- Sample size
- Clarity on objectives
- Vessels suited to task
- Notify creel fishermen
- Timing and continuity – intel from what is happening in the North Sea
- Quality of otolith samples
- Logistics too tight (some)
- Ensure sampling of acoustic marks



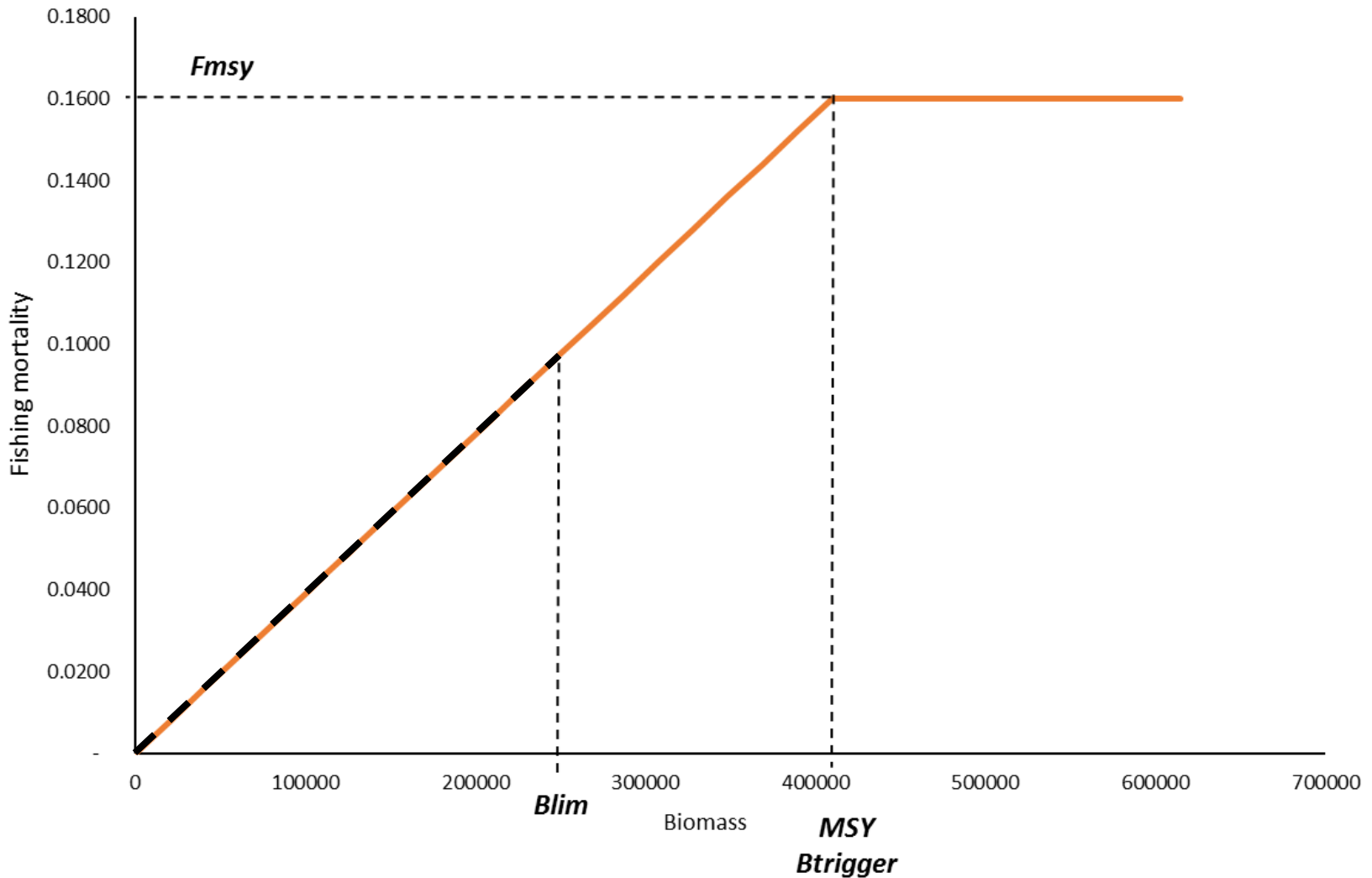
West of Scotland & Ireland Herring (6a,7bc)



ICES advice for 6a,7bc herring 2016

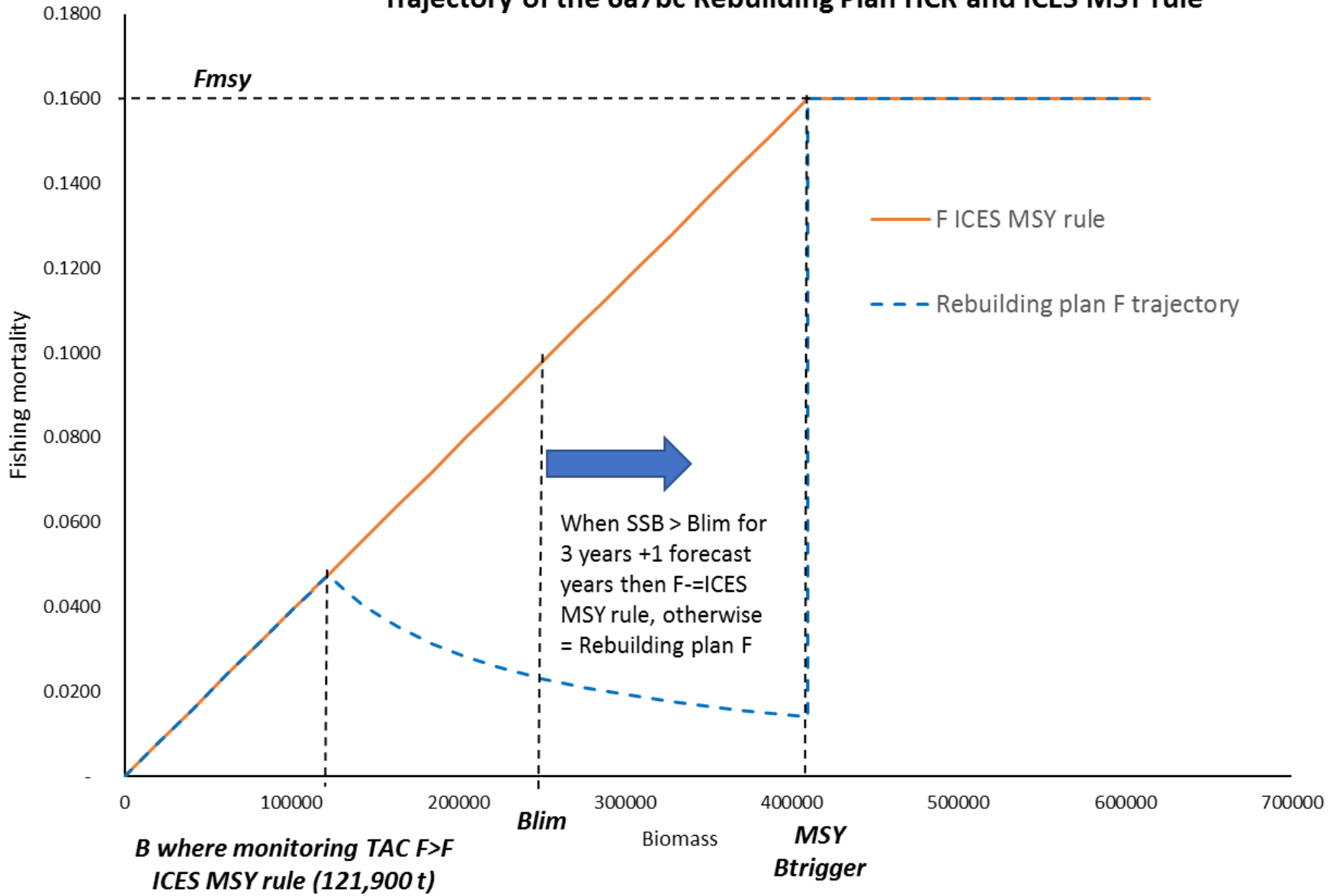
“Fishing should not proceed unless accompanied by a stock recovery plan. Such a plan should include rebuilding targets and time lines as well as protections for each stock. This would also imply including a research component to resolve the lack of information on stock mixing and recruitment.”

ICES MSY Advice Rule



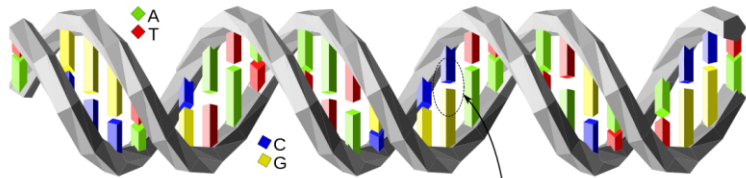
If the stock is below B_{lim} ICES advice is based on bringing the stock above B_{lim} in the short term. **This may result in advice of zero catch.**

Trajectory of the 6a7bc Rebuilding Plan HCR and ICES MSY rule



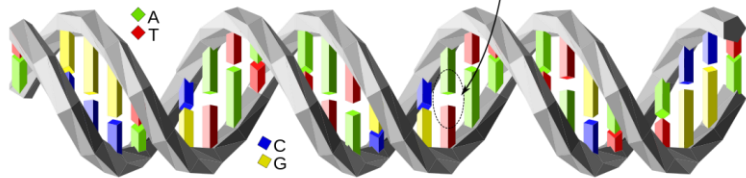


Genetics – the key to splitting

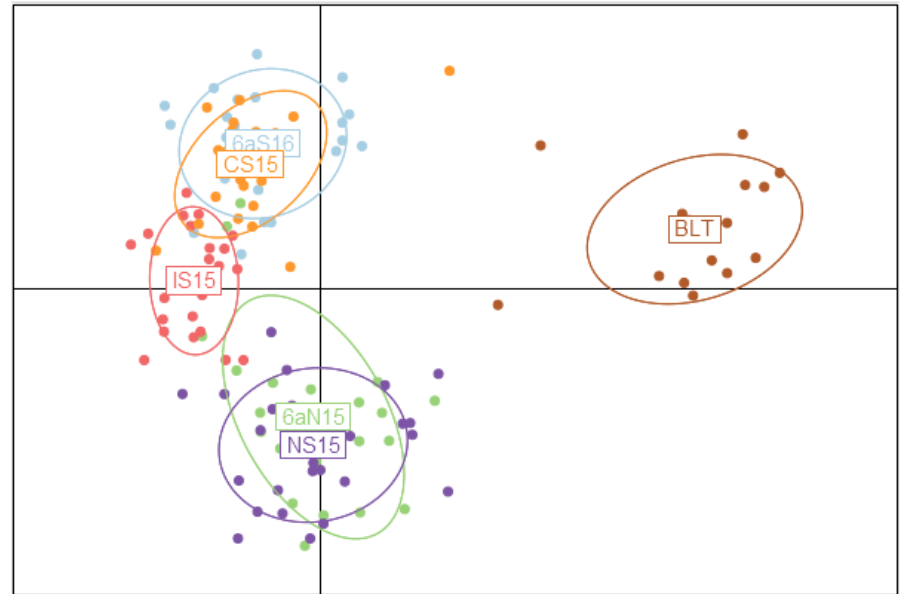


1

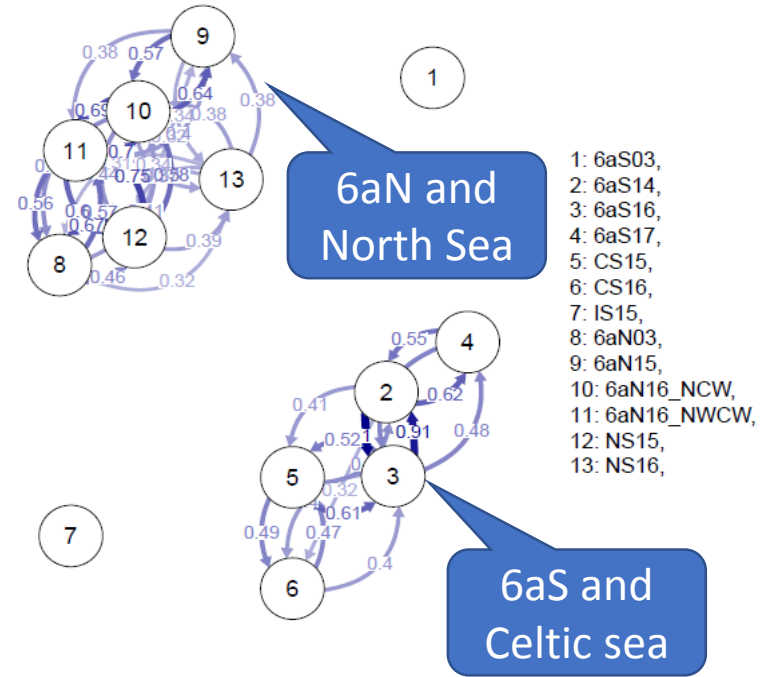
SNP



2



Relative migration network
(Filter threshold = 0.3; Gst)



Questions?

- For any questions, remarks or suggestions, please contact:
 - Steven Mackinson (steve.mackinson@scottishpelagic.co.uk)
 - Martin Pastoors (mpastoors@pelagicfish.eu)

