Industry survey of Western herring
...and other things

Steven Mackinson
PhD - Combining fishers and scientific knowledge

Fishers  Fishery managers  Scientists

Practical data (applied knowledge)  Hard data (scientific knowledge)

Communication

Expert system

A more complete understanding
Diagram showing a whiteboard with various mathematical symbols and equations. A man in a suit is presenting, with a group of people in the audience looking confused.
Values

TRUST

RESPECT

FEELING VALUED
Behaviours

Open

Honest

Transparent
Making collaboration effective

Shared goals connected to impact
Understanding each other's motivation & incentives
Making knowledge count
Learning by doing (participatory research)
Share outcomes and evolve
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

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

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


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

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<th>Date</th>
<th>Area 1</th>
<th>Area 2</th>
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<td>Sun 20-Aug</td>
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- **F** = Fishing
- **C** = Calibration

**Different colour for each vessel**

**Total period of coverage**

(Caption: The table and diagram illustrate the timing and area coverage for different vessels from Sun 20-Aug to Sun 12-Sep, with specific dates and activities indicated.)
We did it!

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

Co-construction

Adaptive

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 Maersk 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 683963 added Uwe Richter
19/08/2016, 15:33 - +44 7450 683963 added Andrew Pillar

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

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

Henk Krijgsman
Good morning we will sail tomorrow 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

Susan Maersk 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?

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.

+44 7823 341687 – Stephen
Yes that’s ok

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 maybe a little sooner.

Allister
Zephyr LK394
24/08/2016, 22:40 - +44 7823 341687: Evening, Unity due in same area as Quantus 0600

Dear colleague,

We've spent the past days fishing in the deeper gap up there of the MacLeay Bank, in the deeper gap up there of the St. Kilda area because we couldn't find any of the two areas of the Bank.

With some herring south/SSW of Rona, 1 of Ronas in the deeper gap, up there of the Rona Bank, we've found a few tiny fish stuck in the meshes. NO catch these catches were makrell or whiting.

I'm not sure about the weather forecast, is it too early or too late?

Thanks in advance,

Adrie
See what happened
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)
“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.”
The advice rule leads to catch advice corresponding to a fishing mortality of:

- $F = F_{MSY}$ when the spawning–stock biomass is at or above $B_{trigger}$, and
- $F = F_{MSY} \times \frac{spawning–stock\ biomass}{MSY}$ when the stock is below $B_{trigger}$.

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

- **F_msy**
- **F ICES MSY rule**
- **Rebuilding plan F trajectory**

When **SSB > Blim** for 3 years +1 forecast years then **F = ICES MSY rule**, otherwise **= Rebuilding plan F**

- **B where monitoring TAC F>F**
- **ICES MSY rule (121,900 t)**
- **Blim**
- **Biomass**
- **MSY**
- **Btrigger**

Fishing mortality

0 100000 200000 300000 400000 500000 600000 700000
0 0.0200 0.0400 0.0600 0.0800 0.1000 0.1200 0.1400 0.1600 0.1800
Genetics – the key to splitting

6aN and North Sea

6aS and Celtic sea
Questions?

• For any questions, remarks or suggestions, please contact:
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  • Martin Pastoors (mpastoors@pelagicfish.eu)