Multi-species fisheries stock identification genomic array technology

Ciaran Meghen

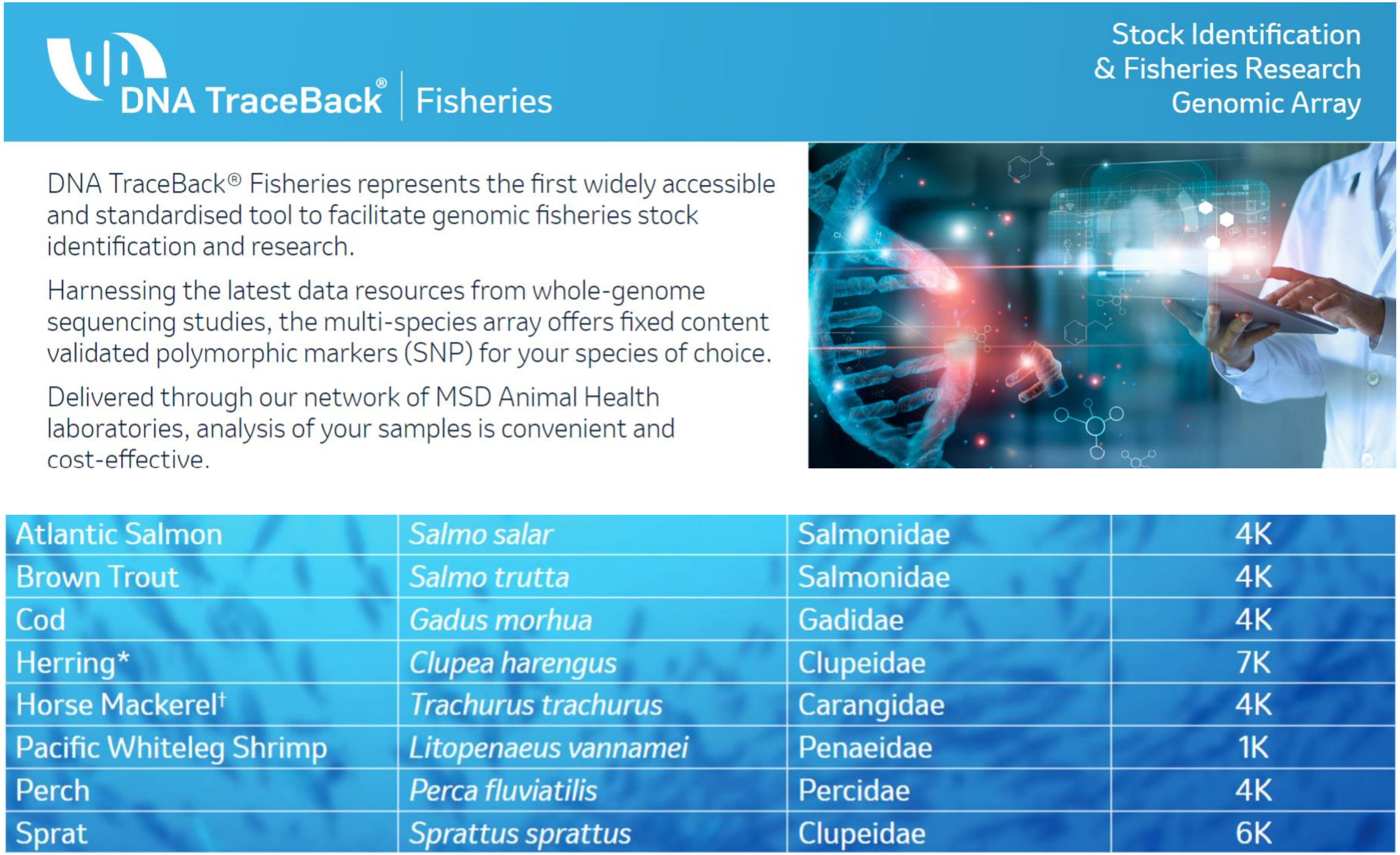
Science, Analytics & Compliance Lead, DataLabs
MSD Animal Health

November 2, 2022

MSD
Animal Health
The Science of Healthier Animals®

384 sample genomic array

Stock identification & fisheries research genomic array



DNA TraceBack® | Fisheries

Stock Identification
& Fisheries Research
Genomic Array

DNA TraceBack® Fisheries represents the first widely accessible and standardised tool to facilitate genomic fisheries stock identification and research.

Harnessing the latest data resources from whole-genome sequencing studies, the multi-species array offers fixed content validated polymorphic markers (SNP) for your species of choice.

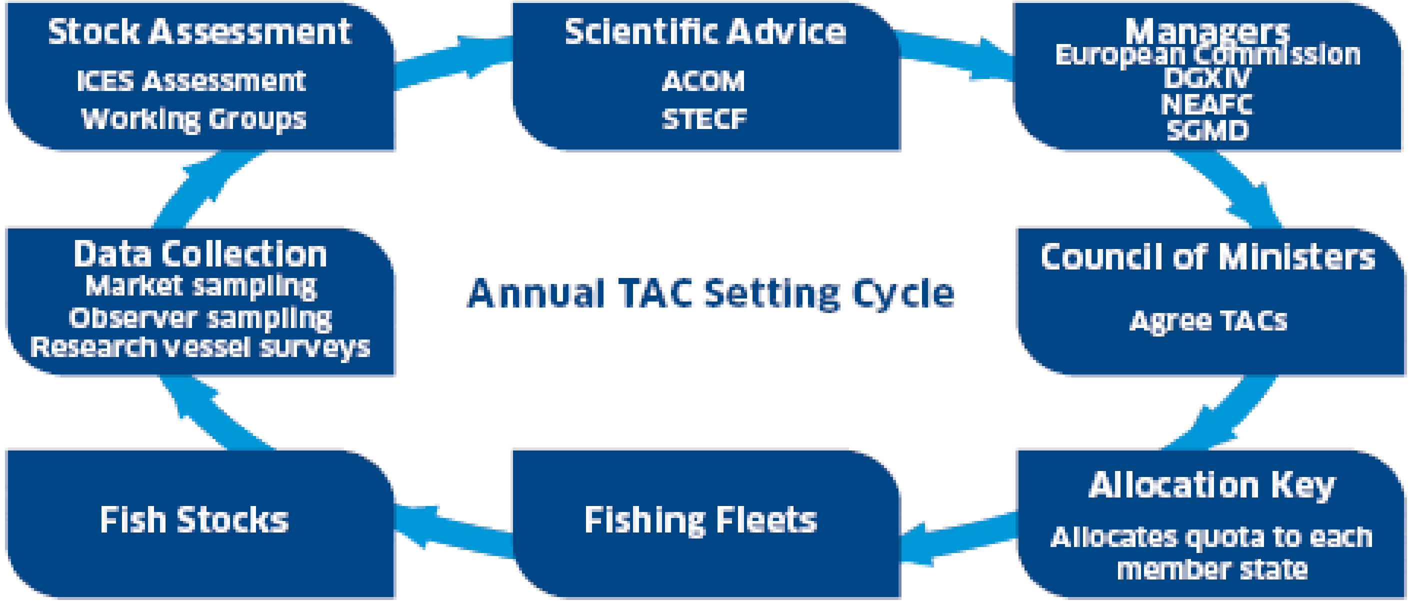
Delivered through our network of MSD Animal Health laboratories, analysis of your samples is convenient and cost-effective.

Atlantic Salmon	*Salmo salar*	Salmonidae	4K
Brown Trout	*Salmo trutta*	Salmonidae	4K
Cod	*Gadus morhua*	Gadidae	4K
Herring*	*Clupea harengus*	Clupeidae	7K
Horse Mackerel†	*Trachurus trachurus*	Carangidae	4K
Pacific Whiteleg Shrimp	*Litopenaeus vannamei*	Penaeidae	1K
Perch	*Perca fluviatilis*	Percidae	4K
Sprat	*Sprattus sprattus*	Clupeidae	6K

Stock identification, stock assessment & MSY/TAC framework

Article 50 of the EU Common Fisheries Policy (REGULATION (EU) No 1380/2013) states:

“The Commission shall report annually to the European Parliament and to the Council on the progress on achieving maximum sustainable yield and on the situation of fish stocks, as early as possible following the adoption of the yearly Council Regulation fixing the fishing opportunities available in Union waters and, in certain non-Union waters, to Union vessels.”



Stock Assessment
ICES Assessment
Working Groups

Scientific Advice
ACOM
STECF

Managers
European Commission
DGXIV
NEAFC
SGMD

Council of Ministers
Agree TACs

Allocation Key
Allocates quota to each member state

Fishing Fleets

Fish Stocks

Data Collection
Market sampling
Observer sampling
Research vessel surveys

Annual TAC Setting Cycle

Herring

Clupea harengus

Example framework

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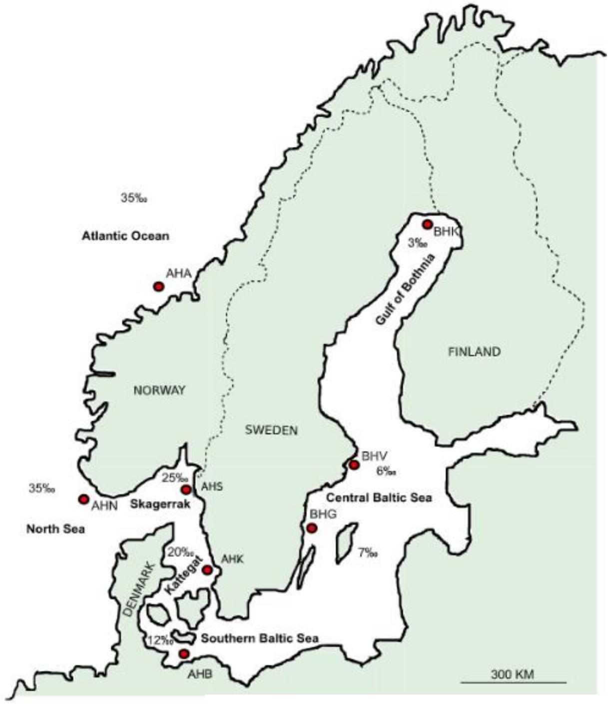
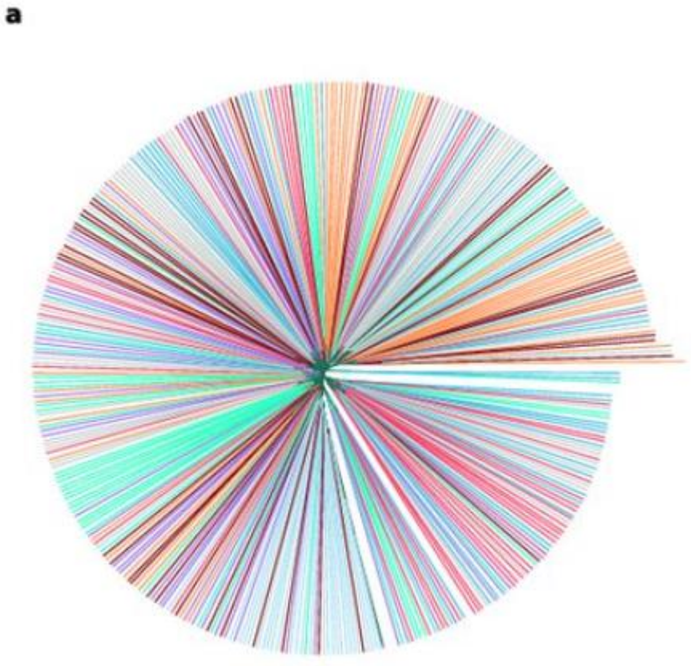


Population-scale sequencing reveals genetic differentiation due to local adaptation in Atlantic herring

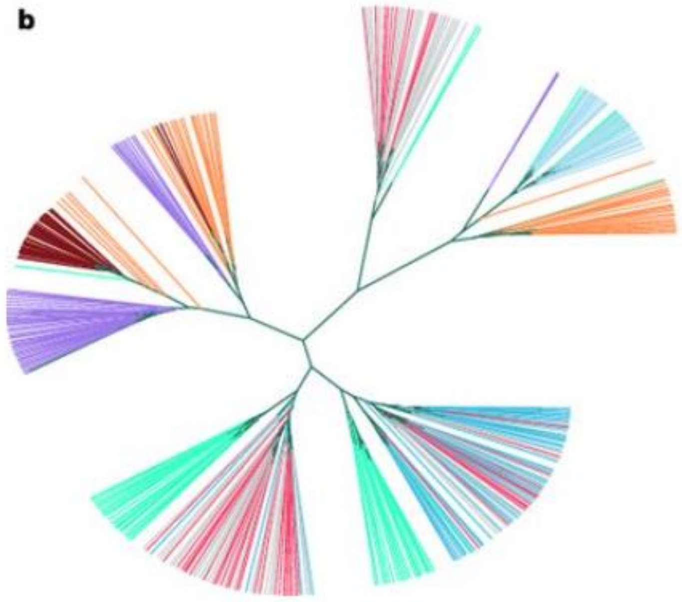
Sangeet Lamichhaney[a,1], Alvaro Martinez Barrio[a,1], Nima Rafati[a,1], Görel Sundström[a,1], Carl-Johan Rubin[a], Elizabeth R. Gilbert[a,2], Jonas Berglund[a], Anna Wetterbom[b], Linda Laikre[c], Matthew T. Webster[a], Manfred Grabherr[a], Nils Ryman[c], and Leif Andersson[a,d,3]

[a]Science for Life Laboratory, Department of Medical Biochemistry and Microbiology, Uppsala University, SE-75123 Uppsala, Sweden; [b]Science for Life Laboratory, Department of Cell and Molecular Biology, Karolinska Institutet, SE-17177 Stockholm, Sweden; [c]Department of Zoology, Stockholm University, SE-10691 Stockholm, Sweden; and [d]Department of Animal Breeding and Genetics, Swedish University of Agricultural Sciences, SE-75124 Uppsala, Sweden

Contributed by Leif Andersson, September 26, 2012 (sent for review July 28, 2012)



- 🟦 Baltic herring-Kalix (BHK)
- 🟥 Baltic herring-Vaxholm (BHV)
- ⬜ Baltic herring-Gamleby (BHG)
- 🟪 Southern Baltic Sea (AHB)
- 🟩 Kattegat (AHK)
- 🟧 Skagerrak (AHS)
- 🟦 North Sea (AHN)
- 🟫 Atlantic Ocean (AHA)



Ecological adaptation in Atlantic herring is associated with large shifts in allele frequencies at hundreds of loci

Fan Han[1], Minal Jamsandekar[2], Mats E Pettersson[1], Leyi Su[1],

***For correspondence:**
leif.andersson@imbim.uu.se

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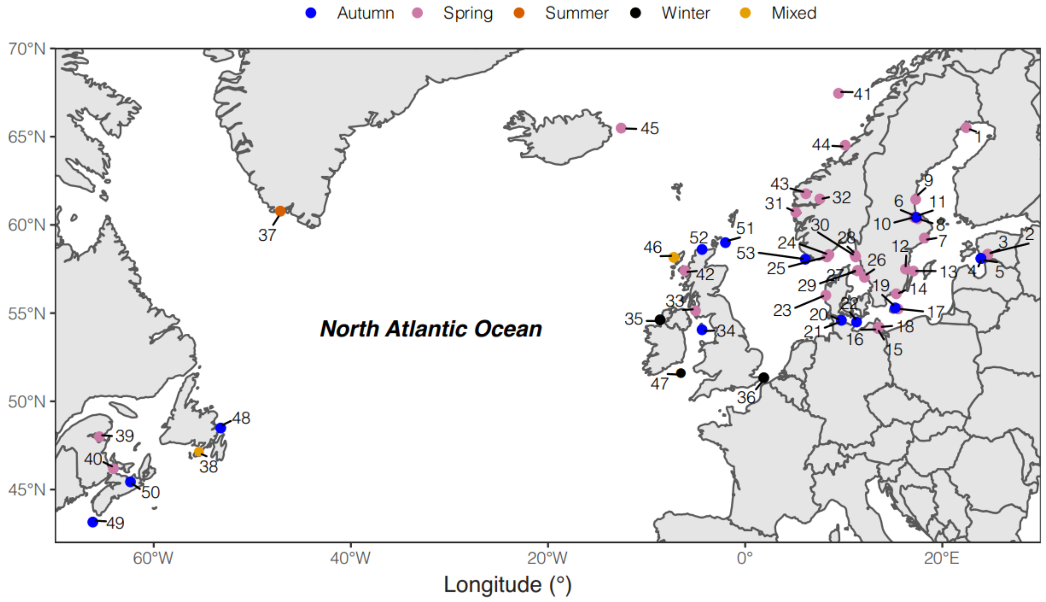
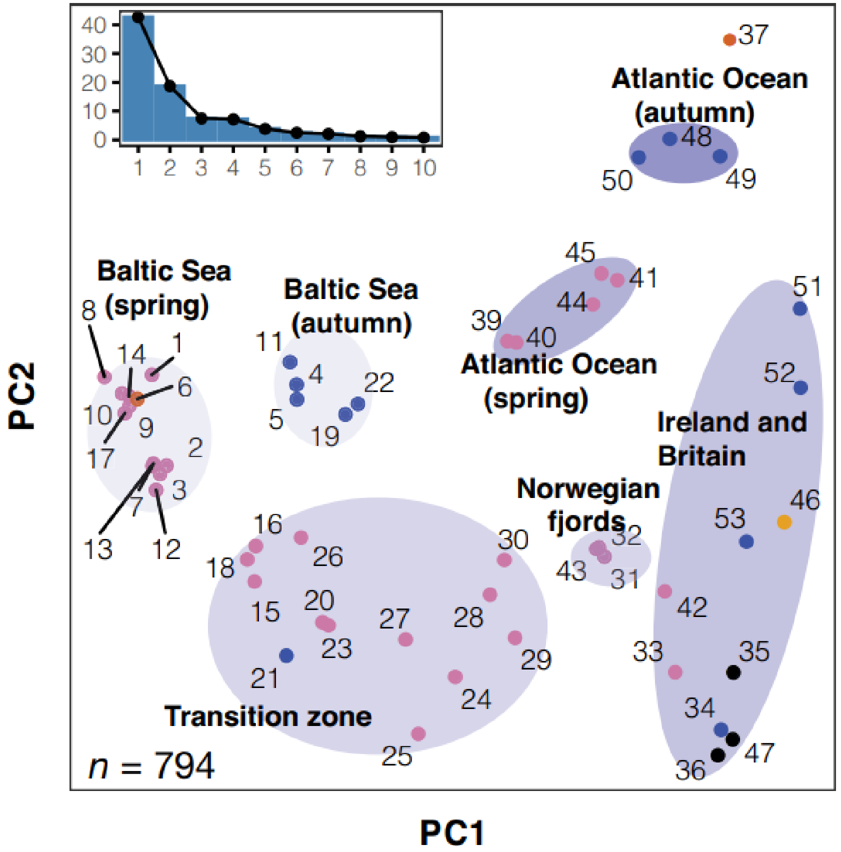
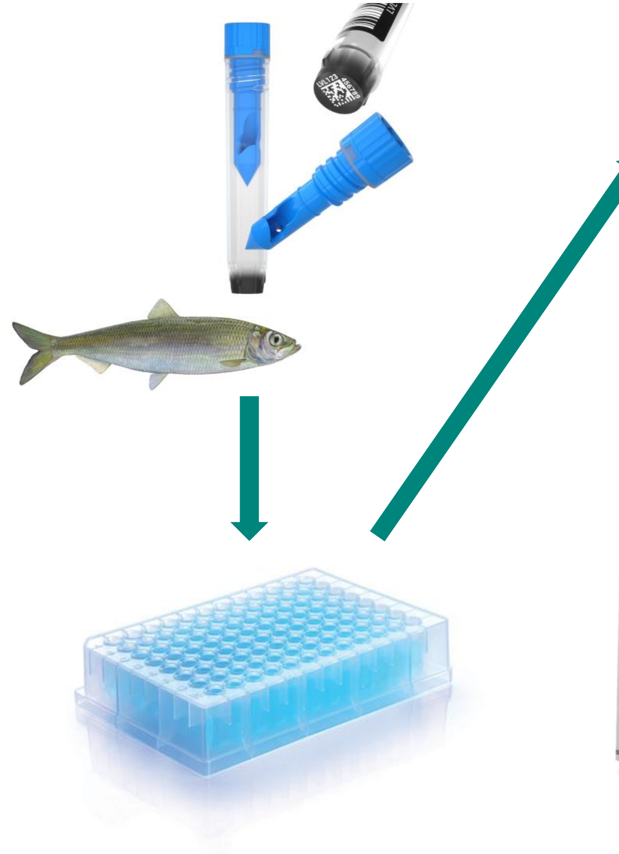
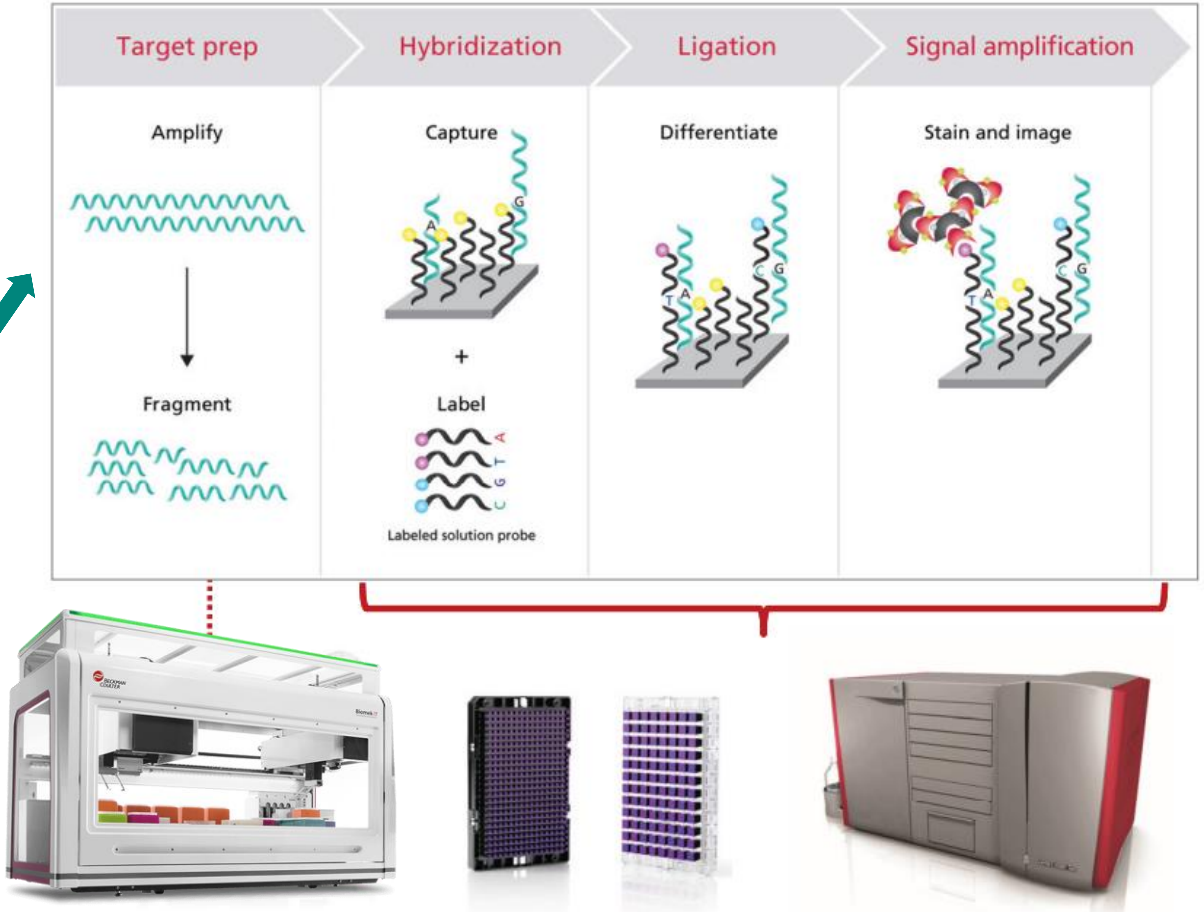




DNA TRACEBACK® Fisheries Array: sample to SNP genotype data

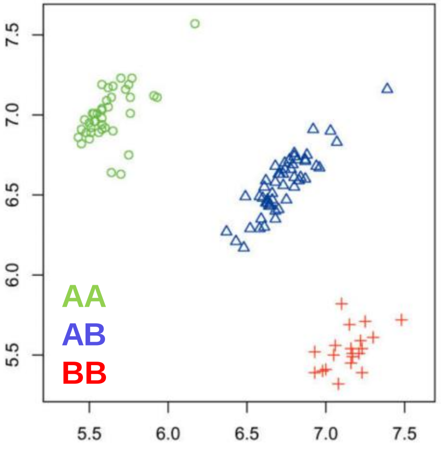




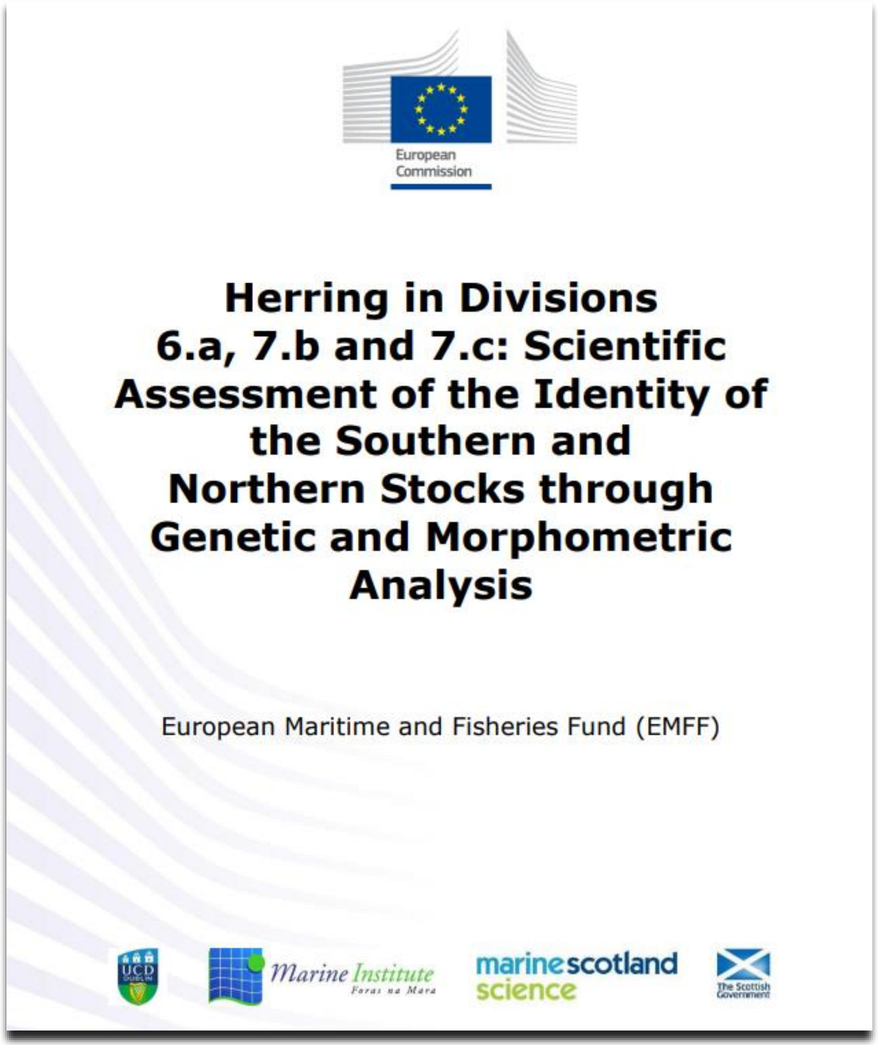
Automated liquid handling

Axiom® 96- and 384-arrays

GeneTitan® Multi-Channel Instrument



Herring Stock Identification: VIa



European Commission

Herring in Divisions 6.a, 7.b and 7.c: Scientific Assessment of the Identity of the Southern and Northern Stocks through Genetic and Morphometric Analysis

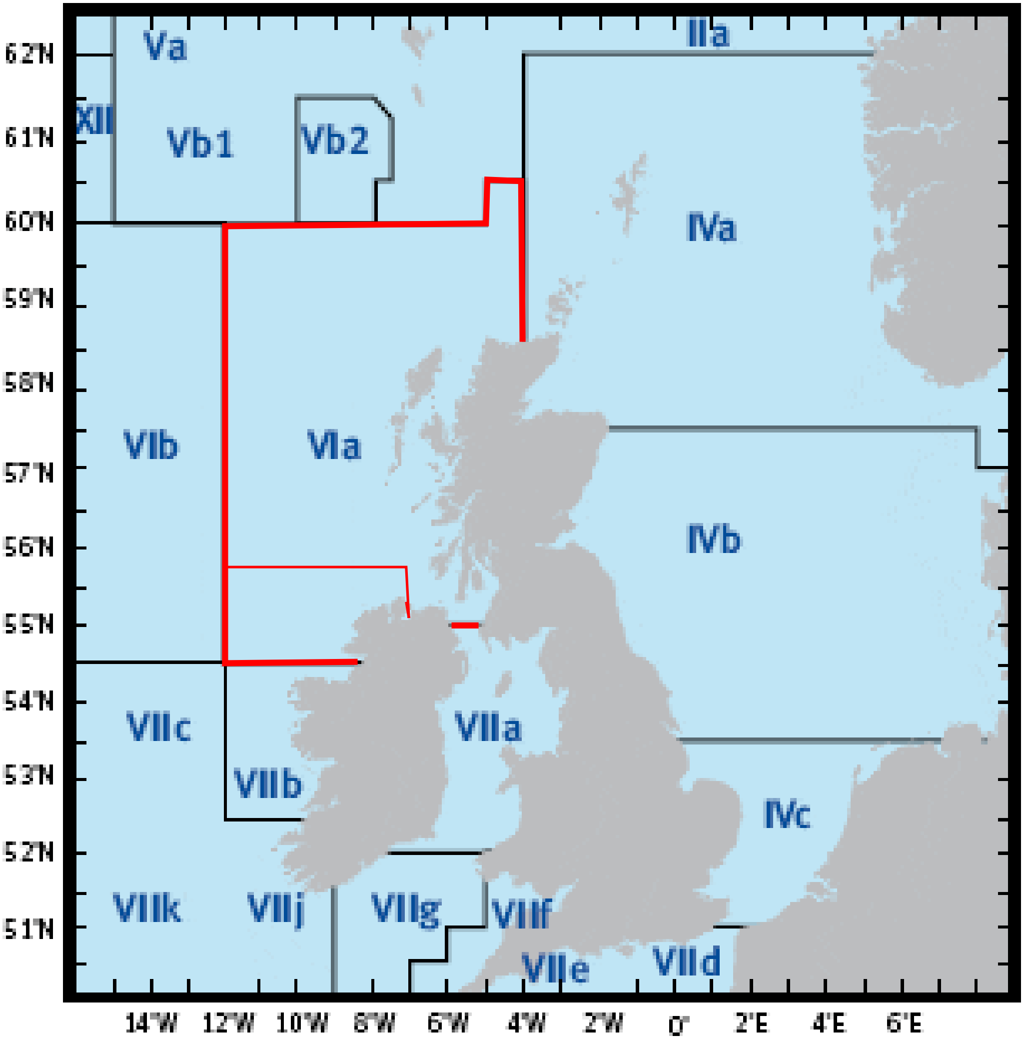
European Maritime and Fisheries Fund (EMFF)

UCD Dublin

Marine Institute
Foras na Mara

marinescotland science

The Scottish Government



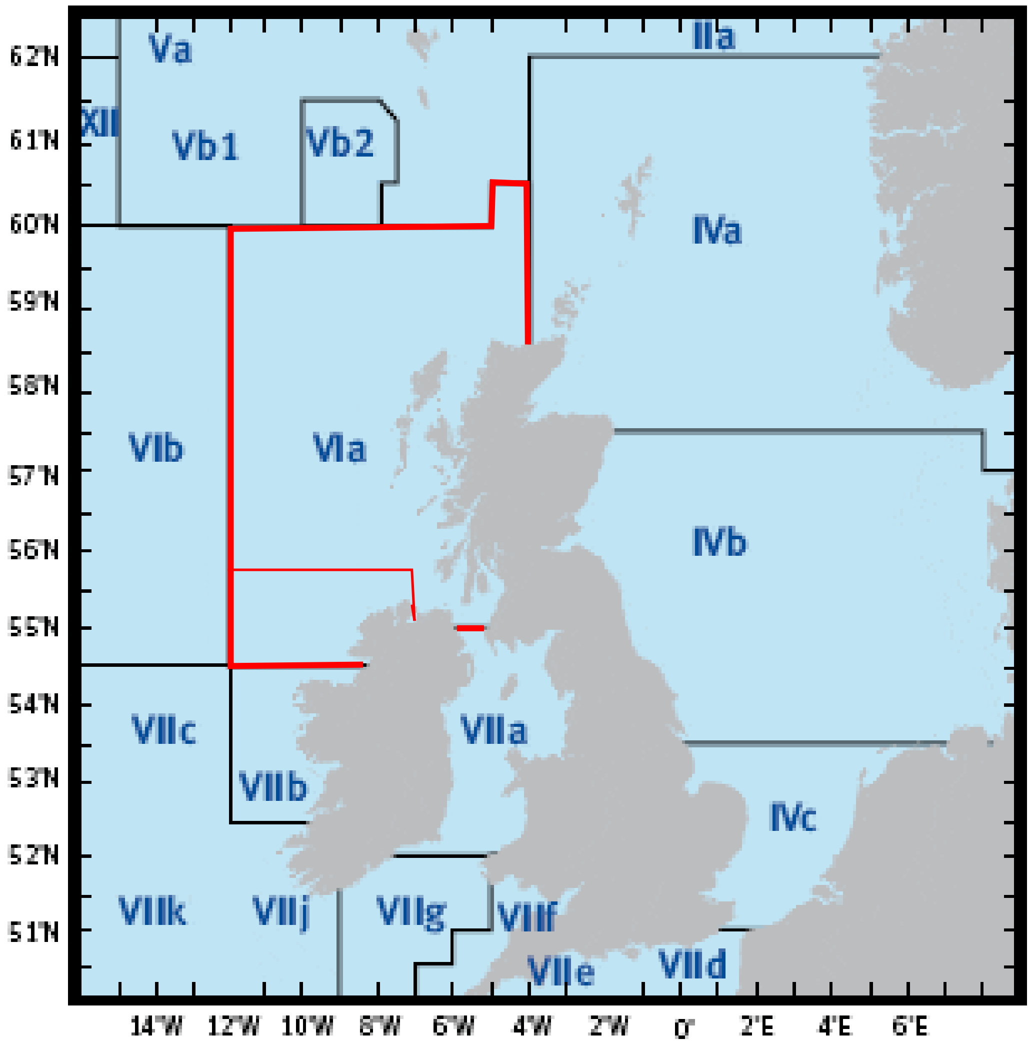
Herring Stock Identification: division VIa

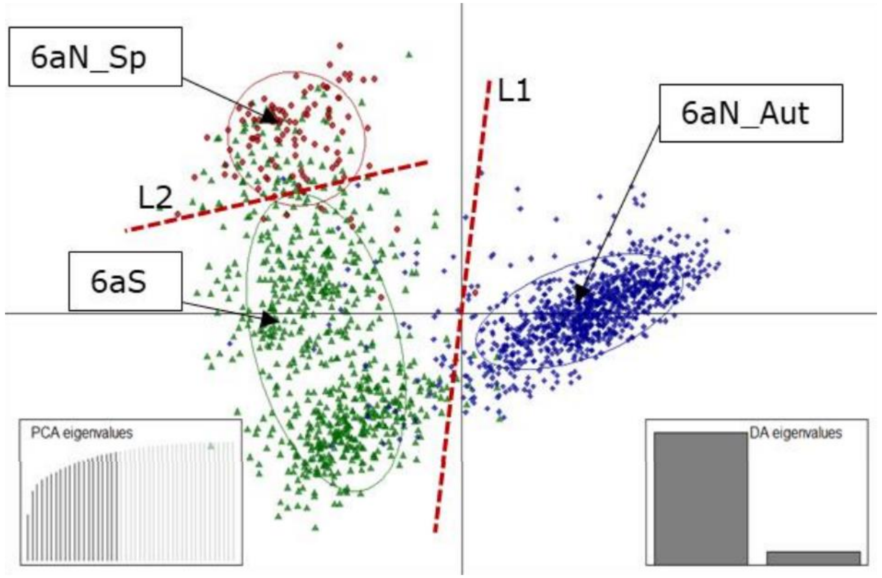
ICES Technical Service
Celtic Seas ecoregion
Published 30 June 2021

ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

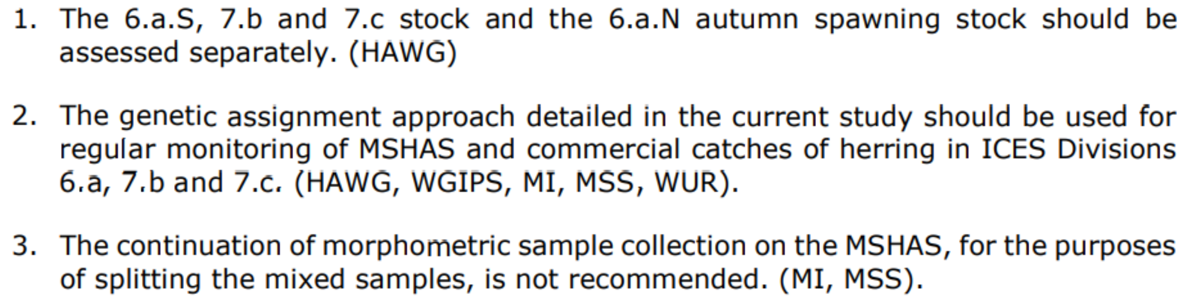
EU standing request on catch scenarios for zero TAC stocks 2021; herring (*Clupea harengus*) in divisions 6.a and 7.b–c (West of Scotland, West of Ireland)

Herring Stock Identification: division VIa



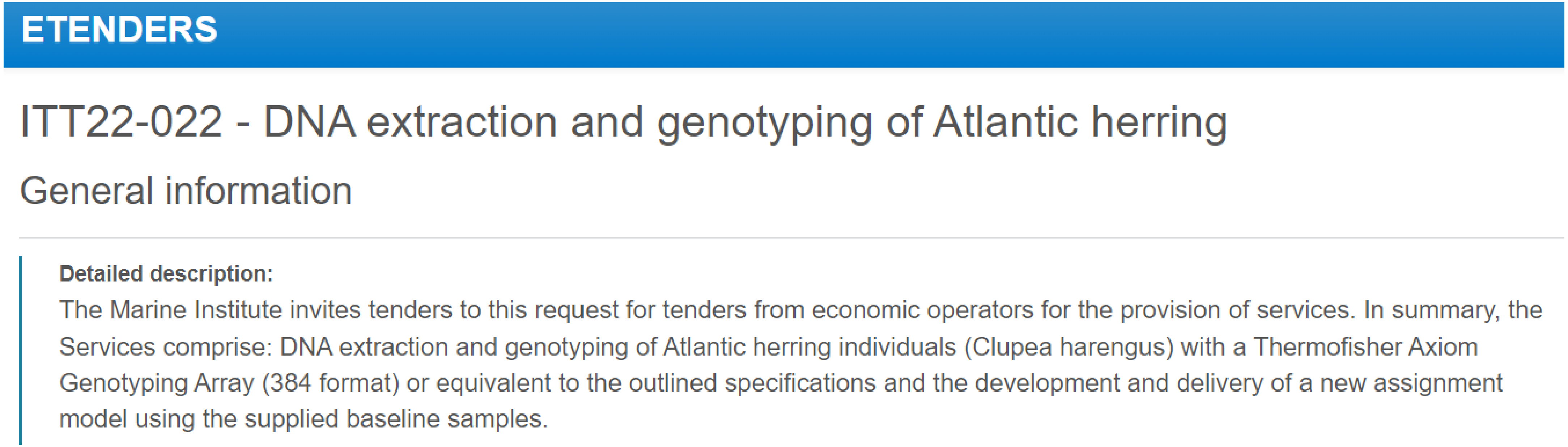


Recommendations:



1. The 6.a.S, 7.b and 7.c stock and the 6.a.N autumn spawning stock should be assessed separately. (HAWG)
2. The genetic assignment approach detailed in the current study should be used for regular monitoring of MSHAS and commercial catches of herring in ICES Divisions 6.a, 7.b and 7.c. (HAWG, WGIPS, MI, MSS, WUR).
3. The continuation of morphometric sample collection on the MSHAS, for the purposes of splitting the mixed samples, is not recommended. (MI, MSS).

DNA TraceBack® Fisheries: implementation

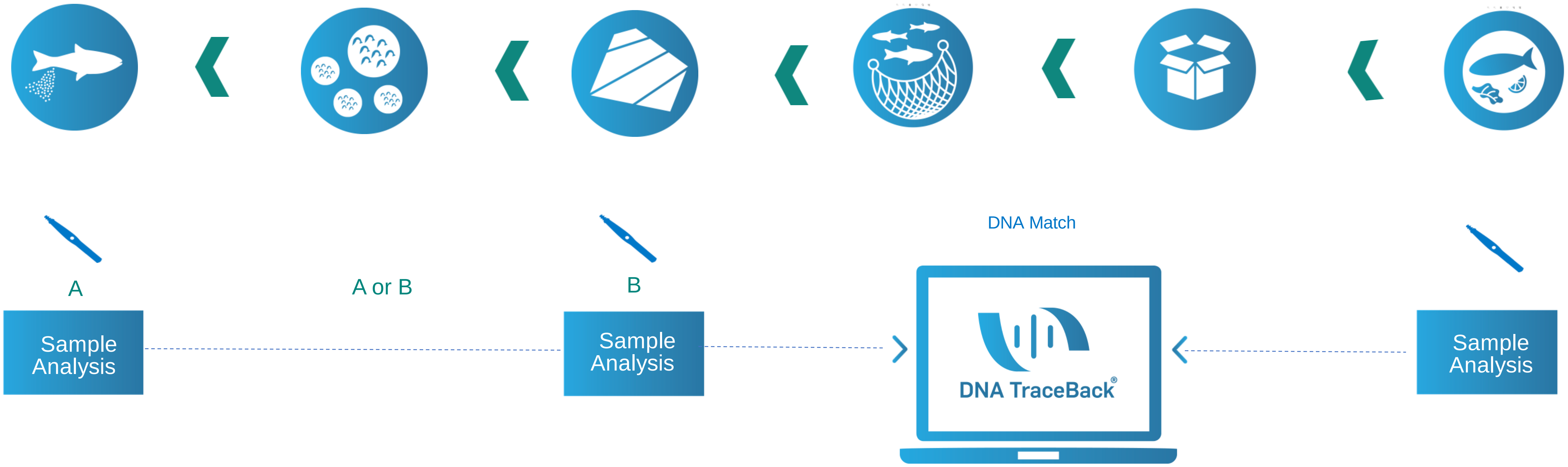


ITT22-022 - DNA extraction and genotyping of Atlantic herring

General information

Detailed description:
The Marine Institute invites tenders to this request for tenders from economic operators for the provision of services. In summary, the Services comprise: DNA extraction and genotyping of Atlantic herring individuals (Clupea harengus) with a Thermofisher Axiom Genotyping Array (384 format) or equivalent to the outlined specifications and the development and delivery of a new assignment model using the supplied baseline samples.

DNA TraceBack® aquaculture operating models



A

A or B

B

Sample Analysis

Sample Analysis

DNA Match

DNA TraceBack®

Sample Analysis

KPI DATA
- Origin Verification
- Product Authenticity
- Sustainability Metrics

Intelligent Data Analytics

Objective:
Verify origin (country, farm, pond) and associated claims e.g. welfare, antibiotics use etc..

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Thank you

MSD Animal Health
Tel: 00 353 1 6770221
E-mail: ciaran.meghen@msd.com
Address: Block 2, Blackrock Business Park, Co. Dublin, Ireland

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