

# How ICES can help farmers in implementing the MSFD

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Science for sustainable seas



# MSFD

## A holistic framework

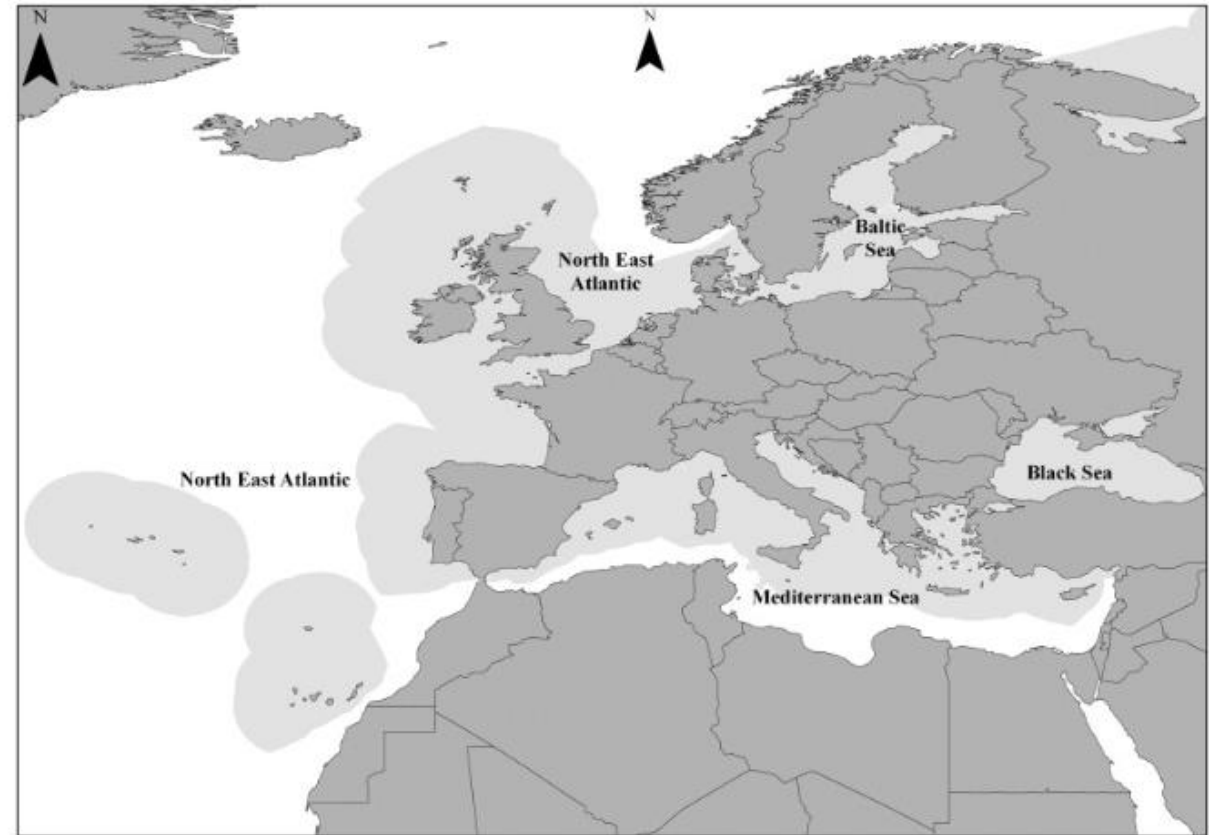
The Marine Strategy Framework Directive builds on existing EU legislation and covers specific elements of the marine environment not addressed in other policies. Some of the key legislation and policies directly relevant to the Directive are

- The [Water Framework Directive](#) - sets the goal of achieving Good Status for all EU surface and groundwaters by 2015, tying in with the goal of Good Environmental Status under the Marine Directive.
- The [Birds](#) and [Habitats](#) Directives - Europe's central laws on nature conservation, providing special protection for key sites including marine.
- The [Common Fisheries Policy](#) sets out a collaborative approach to managing the EU's shared seas and fisheries. It lays down rules to ensure Europe's fisheries are sustainable and do not damage the marine environment, thereby contributing to achieving good environmental status.
- The [Blue economy](#) and [maritime spatial planning](#) - setting out the policy framework for use of maritime space and resources
- [REACH Regulation](#) - aims to improve the protection of human health and the environment through the better and earlier identification of the environmental risk chemicals pose.
- [Action plan: Protecting and restoring marine ecosystems for sustainable and resilient fisheries](#), bridging the fisheries and environment worlds for a transition to sustainable ways of fishing.
- The [Urban Waste Water Treatment Directive](#) – regulates one of the main sources of water pollution that can find its way to coastal waters if left uncollected and untreated.

The [Waste Framework Directive](#) provides important mechanisms for the removal of litter and the improvement of water quality in line with the requirements of the MSFD

# MSFD

- 4 marine waters
- Maintaining biodiversity
- Clean, healthy and productive oceans
- Environmental considerations



*Breen et al. 2012. An environmental assessment.... Marine Policy*



# Ecosystem-based approach



- ICES sees Ecosystem-based Management (EBM) as the primary way of managing human activities affecting marine ecosystems
- Ecosystem-based Fisheries Management (EBFM) addresses the fishing sector
- Ecosystem-based approach to aquaculture?
- Sustainable Aquaculture; Guidelines (FAO COFI-Sub committee aquaculture)



# Sustainable aquaculture

is generally understood as

the practice of producing safe aquatic food and associated products in a manner that is environmentally and socially responsible, economically viable, and able to meet the needs of present and future generations

It involves using production systems and technologies that minimize negative impacts on the environment, livelihoods and communities and promotes the long-term health and productivity of aquatic ecosystems

MSFD; Promoting sustainable use of the seas and conserving marine ecosystems



# MSFD; Good environmental status

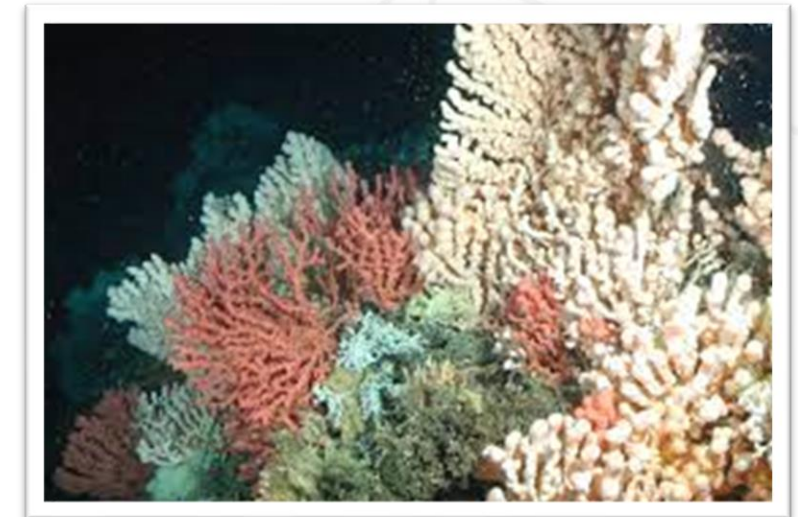
- Identify pressures and impacts
- Set of good environmental status; criteria & methodological standards
- Environmental targets
- Monitoring programmes (flexible, adaptive, science, technological development)



# Assessment; Good environmental status



- Physical and chemical features (depth, topography, T, S, O<sub>2</sub>, CO<sub>2</sub>)
- Habitat types (special habitat types; vulnerable ones)
- Biological features (inventory; all living, fish populations, invasive etc etc)
- Other features (chemicals, sediment contamination, hotspots, health issues...)



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# ICES aquaculture is already contributing with science



- MSFD; initial assessment; existing data where available
- Aquaculture overviews provide such status
- Based on ecoregions, similar to the Fisheries and Ecosystem products
- These ecoregions do differ slightly to MSFD Marine waters





# Objectives of Aquaculture Overviews

- Summarize regional and temporal information on aquaculture activities, practices, and production of the cultured taxa
- Describe the relevant policy and legal foundation as well as management frameworks
- Consider the environmental and socio-economic interactions of aquaculture activities and practices
- Provide insights on the interaction of environmental, economic, and social drivers
- Consider future projections and emerging threats and opportunities



**You asked HOW can science help farmers**

**use an example from Norway to elucidate this**

Slides; curtesy from of Pia Kupka Hansen



# Norway MOM; Monitoring-Ongrowing farms-Modelling



- A management system for keeping the environmental impact from aquaculture within carrying capacity
- The magnitude of aquaculture production that can be supported without leading to unacceptable changes in ecological process, species, populations or communities in the environment
- Was developed by scientists at IMR, but is now part of the licence
- Environmental Quality Standards (EQS)



# Monitoring program

- Environmental variables
- Threshold levels
- Samplings stations
- Sampling frequencies
- A system for assessing all the information
- Mitigating actions





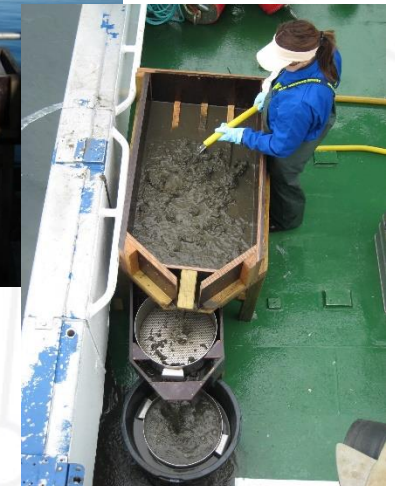
# Monitoring benthic impact under and around Norwegian fish farms

- Norwegian standards NS9410-2016
- Two-part investigation; B or C

B-investigation

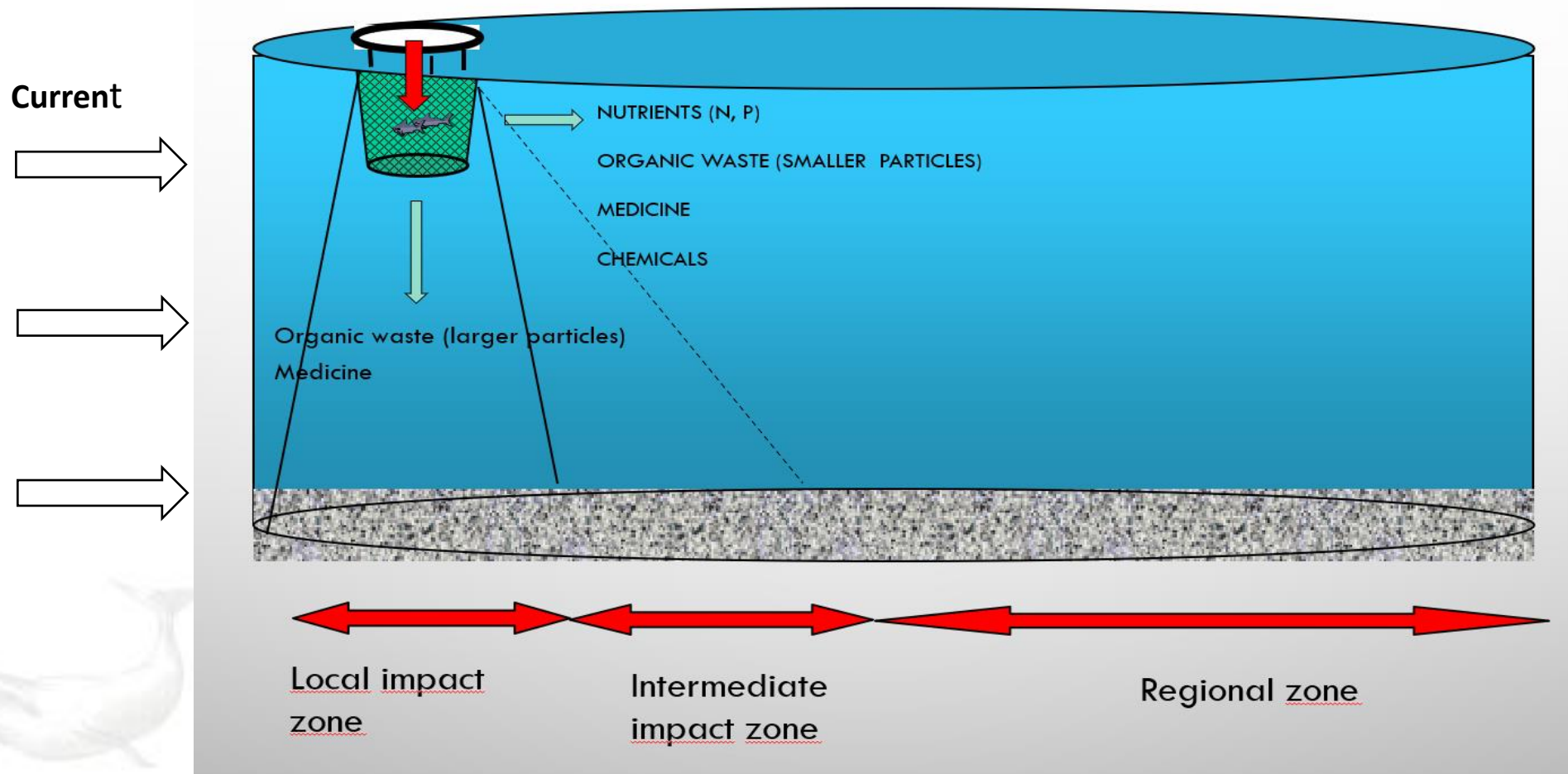


C-investigation



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# Impact zones



B-investigation

C-investigation

Coastal zone monitoring

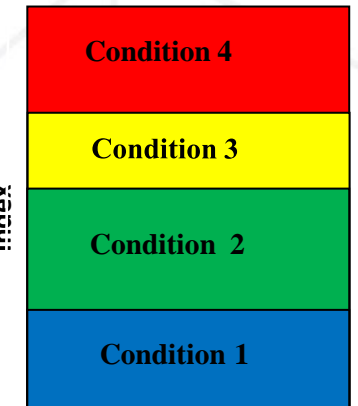
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# B-investigation

- Performed in the local impact zone
- Simple study of the sediment conditions beneath and close to the fish farm
- Suitable for sediments with middle to high organic sedimentation
- Cheap and easy to perform (by trained personnel)
- The frequency of performing the B-investigation is determined by the impact (the more impact the more often the location is monitored)
- Performed frequently to reveal undesirable developments

Parameter		Points	Sample number										Index		
Animals		Yes (0) No (1)													
pH		Measured value													
E <sub>n</sub> (mV)		Measured value + ref. potential													
pH <sub>E<sub>n</sub></sub>		Points, Appendix D													
		Condition (sample)													
Jugassing		Yes (4) No (0)													
Colour		Pale/grey (0) Brown/black (2)													
Smell		None (0) Medium (2) Strong (4)													
Consistency		Firm (0) Soft (2) Loose (4)													
Grab volume (v)		v < ¼ (0) ¼ ≤ v < ¾ (1) v ≥ ¾ (2)													
Thickness of deposits (t)		t < 2 cm (0) 2 ≤ t < 8 cm (1) t ≤ 8 cm (2)													
		Sum													
		Corr. sum (0.22)													
		Condition (sample)													
		Average value (Group II & III)													
		Condition (sample)													
		Condition (Group II & III)													
		AVERAGE VALUE FOR SITE													
		Signature:													



Environmental condition of all monitoring variables from a fish farm site



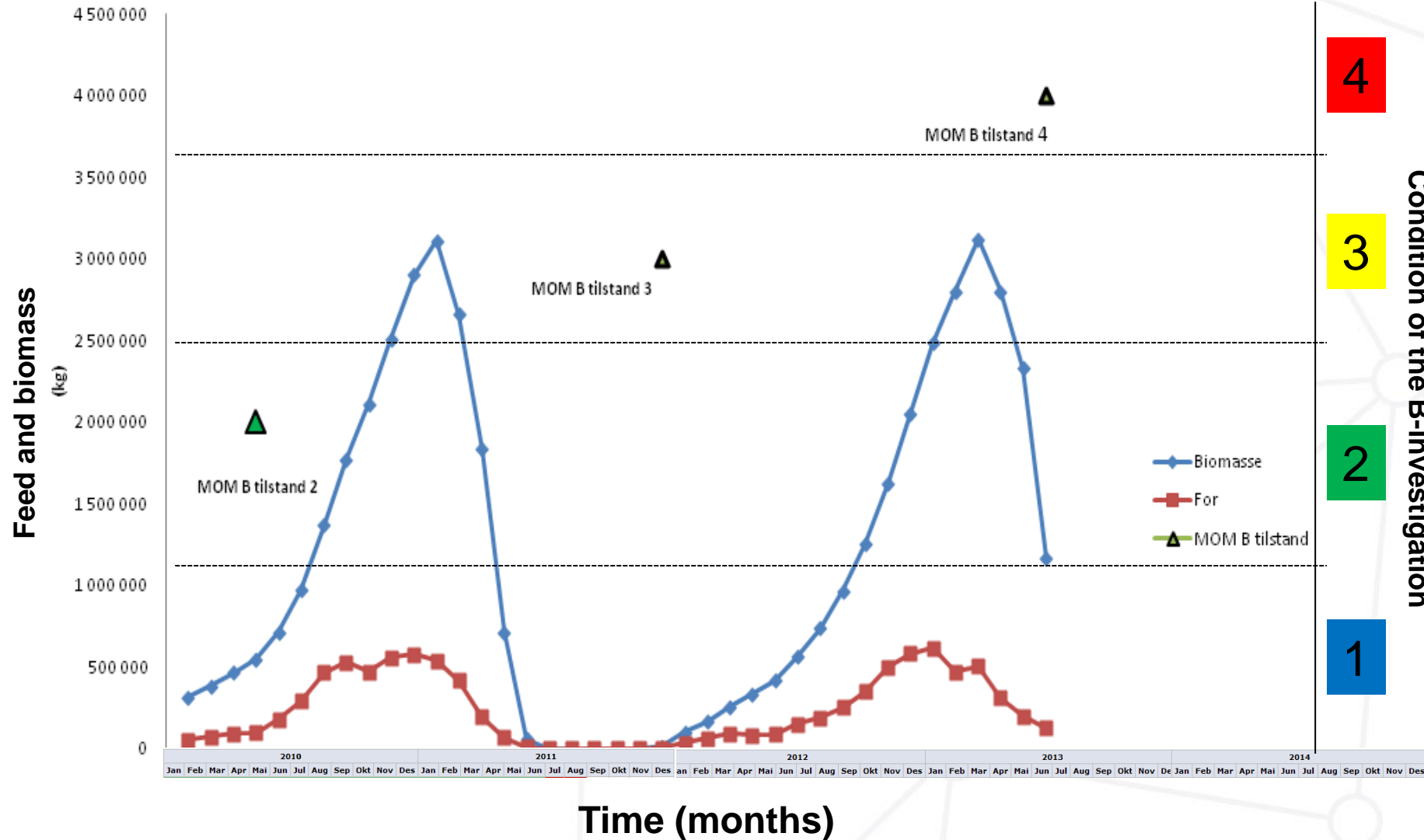
# C-Investigation

- Performed in the intermediate impact zone
- A comprehensive survey of the benthic macro fauna community structure in sediment
- Expensive and labour intensive (experts)
- The frequency of performing the C-investigation is determined by the impact (the more impact the more often the location is monitored)
- Provides an assessment of the long-term development

Tabell 5. Klassifiseringssystem for blautbotnfauna i vassstyp og vassregion relevant for lokalitet basert på ein kombinasjon av indeksar (Klassifisering av miljøtilstand i vann, rettleiar 02:2018).

		Grenseverdiar N3				
Indeks	type	Økologiske tilstandsklassar basert på observert verdi av indeks				
Kvalitetsklassar →		svært god	god	moderat	dårlig	svært dårlig
NQI1	samansett	0,9 - 0,72	0,72 - 0,63	0,63 - 0,49	0,49 - 0,31	0,31 - 0
H'	artsmangfald	5,9 - 3,9	3,9 - 3,1	3,1 - 2	2 - 0,9	0,9 - 0
ES <sub>100</sub>	artsmangfald	52 - 26	26 - 18	18 - 10	10 - 5	5 - 0
ISI <sub>2012</sub>	sensitivitet	13,1 - 8,5	8,5 - 7,6	7,6 - 6,3	6,3 - 4,5	4,5 - 0
NSI	sensitivitet	29 - 24	24 - 19	19 - 14	14 - 10	10 - 0
nEQR tilstandsklasse		1-0,8	0,8-0,6	0,6-0,4	0,4-0,2	0,2-0,0

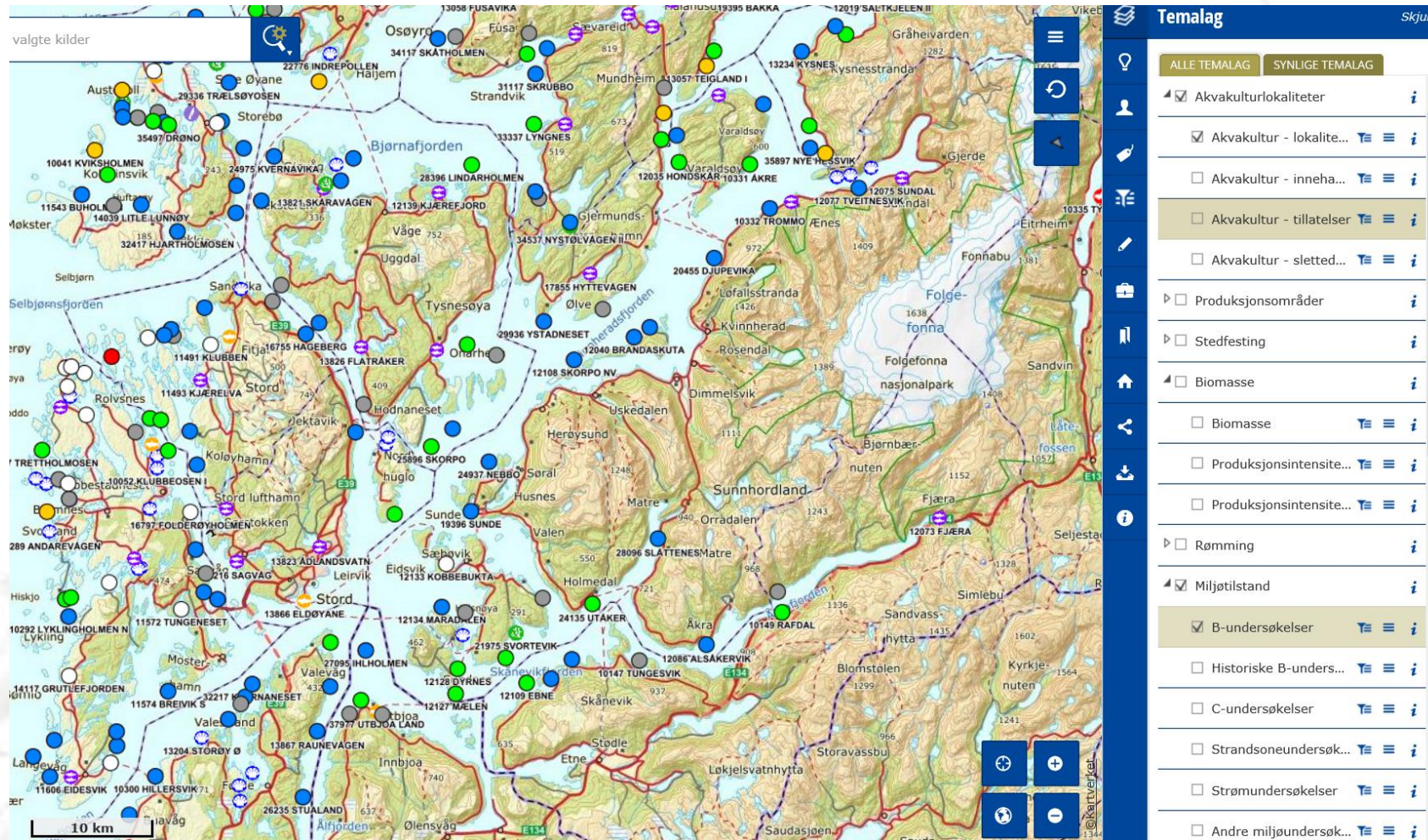
# Results from the B-investigation at a fish farm





# MSFD; transparency important

Using monitoring results at regional/national level: Latest results from the B-investigations

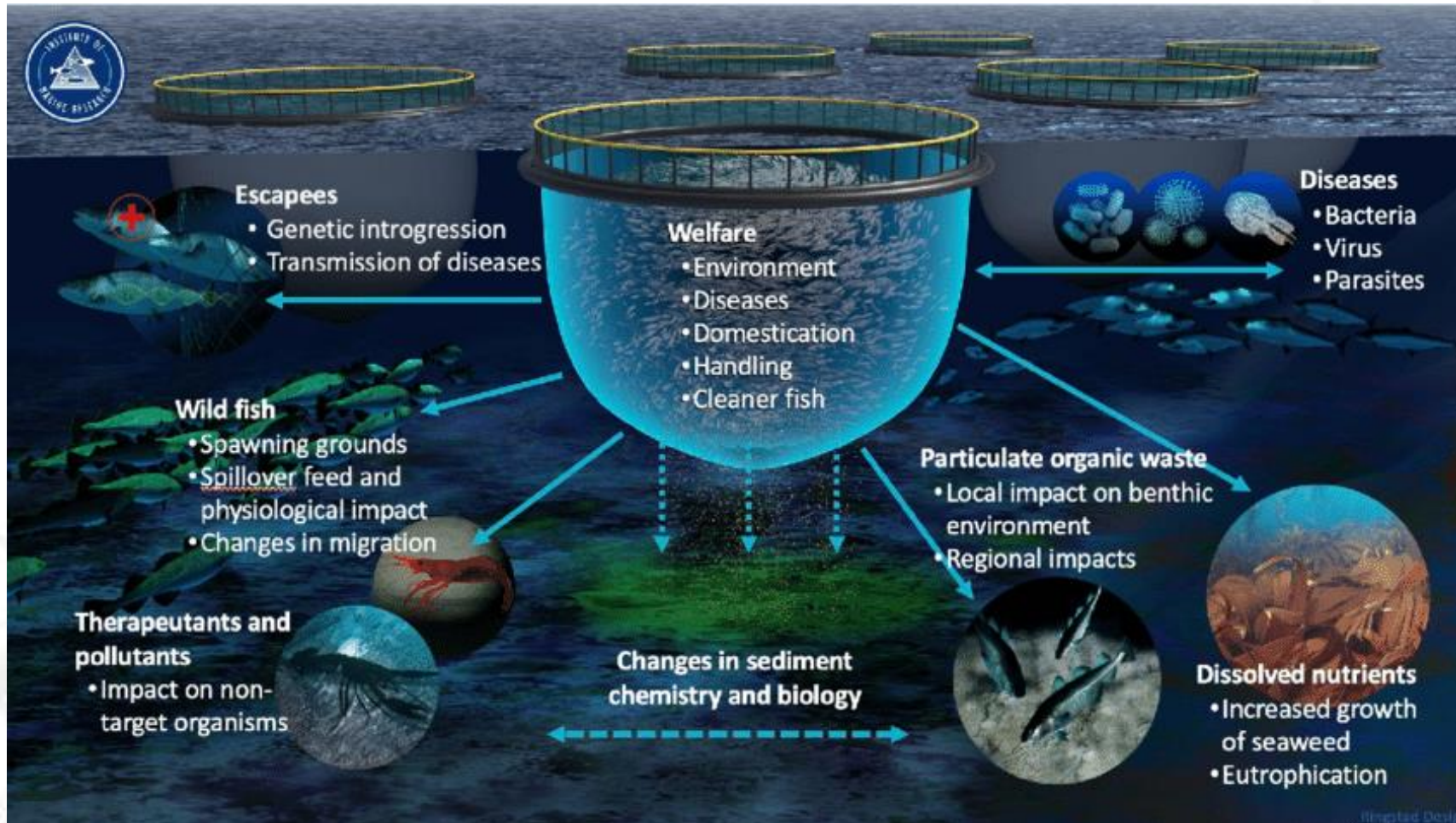


From the Fisheries directorates homepage – aqaculture sites: fish farms and mussel cultures (YGDRASIL)





# Another area where science contribute Risk assessment - finfish farming



# ICES can contribute with science



- **Pathology and Diseases of Marine Organisms (WGPDMO);** Richard Paley UK
- **Application of Genetics in Fish and Aquaculture (WGAGFA);** Naiara Rodriguez-Ezpeleta
- **Social and Economic Dimension in Aquaculture (WGSEDA);** Gesche Krause & Ramon Filgueira
- **Risk Assessment of Environmental Interaction of Aquaculture (WGREIA);** Ellen S. Grefsrud
- **Ecological Carrying Capacity (WGECCA);** Carrie Byron & Dror Angel
- **Open Ocean Aquaculture (WGOOA);** Bela H. Buck & Tyler Sclodnick
- **Sustainable feed**
- **Animal Welfare**
- **Food Safety and nutrition**



