Sustainable Shellfish aquaculture the Ecosystem approach

Shellfish Growing in Ireland

- Fish Farmers 1,716
- Processing 2,860
- Ancillary 1,140
- Shellfish €172 million -£4.53 from 4920 tonnes
- In total in N Ireland the aquaculture sector directly employs 73 full time and 40 part time employees.

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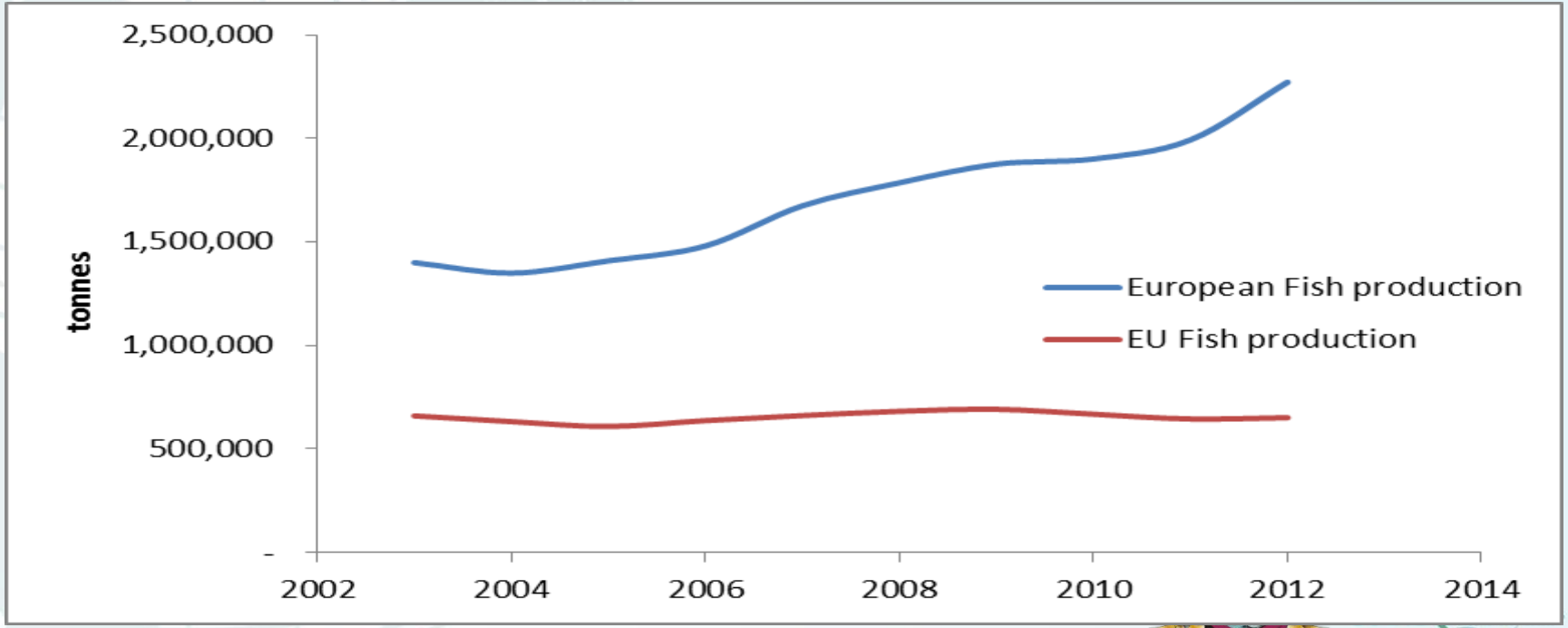
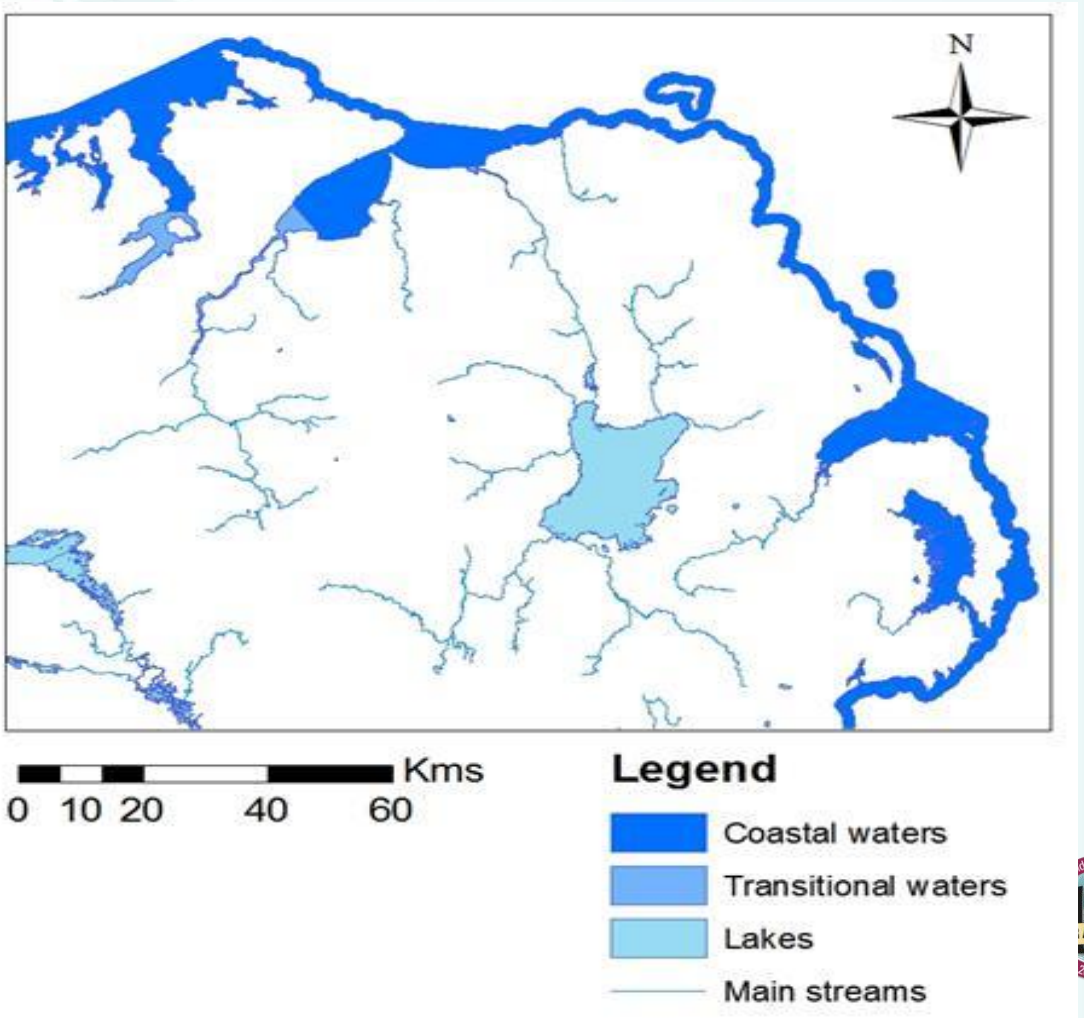
All Ireland Context

- Elements of Aquaculture (bottom mussels) already managed on an all Ireland Basis;
- Common issues; space, water quality environmental concerns;
- Need to develop an integrated solution
- Transboundary Locations

Growth in Europe but not in EU



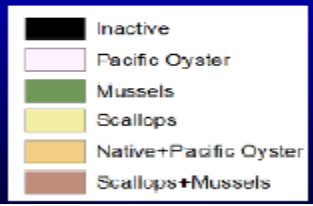


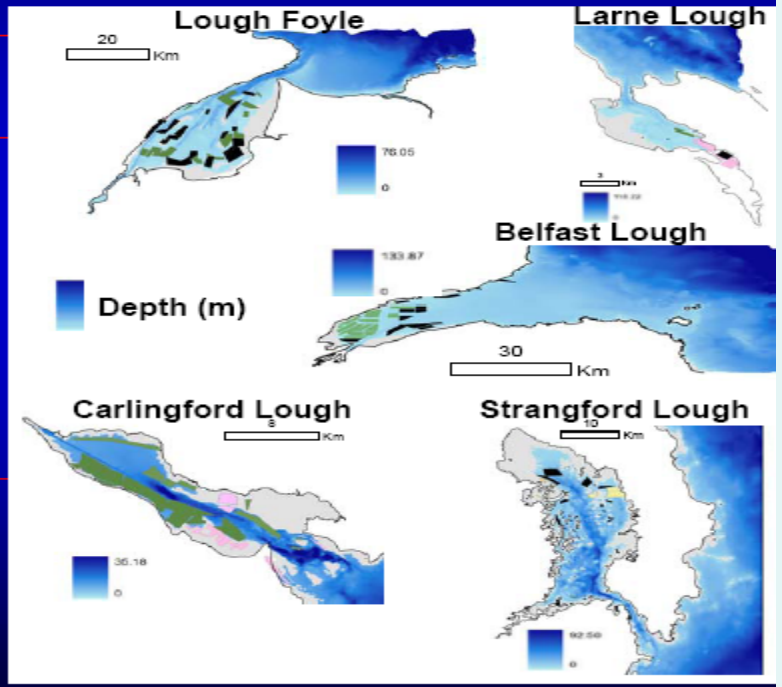
650 km Coastline

SMILE Loughs - Aquaculture areas (ha)

Lough	Lough area	Mussel area	Oyster area	% of Lough
Foyle	18600	1602.9	0.07	8.6
Larne	800	10.4	59.9	8.8
Belfast	13000	952.6	---	7.3
Strangford	14900	5.9	23.5	0.2
Carlingford	4900	867.5	197.8	21.7
Only NI		167.9	83.2	5.1

Though Lough Foyle has a greater aquaculture area, in Carlingford Lough a higher percentage of the system is occupied by aquaculture.





The legalisative framework

- Fish culture licences - compulsory for all fish and shellfish farms
- Shellfish fishery licences - optional additional licences for shellfish farmers
- Marine fish fishery licences - optional additional licences for marine fish farms.
- Licenses are subject to public consultation

EU Framework

- The **Marine Strategy Framework Directive (MSFD)**national aquaculture strategies must ensure that aquaculture does not have negative impacts in terms of non-indigenous species, eutrophication, seafloor integrity, concentrations of contaminants
- **The Water Framework Directive (WFD)** Addresses pollution and biodiversity concerns in inland, coastal and transitional waters (e.g. estuaries and fjords). It requires Member States to attain 'good ecological status' and 'good chemical status' in these waters.
- **Birds** and **Habitats Directives**. In particular, they must comply with the conservation objectives of sites included in **Natura 2000**7, the EU network of protected areas, and be subject to an Appropriate Assessment prior to authorisation in line with Article 6 of the Habitats Directive8.
- **EU Regulation on the prevention and management of the introduction and spread of invasive alien species**. Also applies to aquaculture.
- **Directive on Maritime Spatial Planning (MSP)13 aims to promote sustainable development and use of marine resources, including for aquaculture**

Habitat Regulatory Assessment

- A European site within the meaning of regulation 9 of the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995
- shellfish aquaculture depends on good water quality as well abundant natural food supply

Typical Objections

- Historic monuments
- Disturbance to birds – *often on poor da*ta
- Danger to recreational boating(canoes)
- Achievement of Water Framework Directive objectives
- Consideration of Marine Conservation Zones
- Escape of non-native species i.e *Crassostrea gigas*
- Impacts on other commercial/non-commercial species – *biogenic reefs*

The NI approach
enhanced screening

- **Impacts of aquaculture activities on SPA designated features** i.e Breeding birds
- **Impacts of aquaculture activities on SAC designated features i.e.** Annual vegetation of drift lines
- **Non native species -** Introduced with stock or as cultured species i.e *Crassostrea gigas*
- **Benthic impacts -**sediment scouring/organic enrichment
- **Carrying capacity assessment -** ecosystem level effects

Typical Conditions

- Care should be taken to avoid areas of intertidal eelgrass when accessing sites.
- Flushing distances (in response to different types of human disturbance, walking, vehicles, boats etc) for the Tern species which breed on islands within Carlingford Lough should be determined and used to set a minimum threshold distance to avoid disturbance.
- An assessment on the potential interaction of oyster aquaculture and Light bellied Brent Geese populations within Carlingford Lough should be undertaken.
- In order to manage the spread of non native species only triploid Pacific oysters should be permitted to be cultured within the Lough.
- The boundaries of aquaculture licences should reflect the culture area utilised.
- A programme of benthic monitoring within each intertidal aquaculture area should be established.
- The SMILE model should be run on an annual basis to establish if shellfish production is within the ecological carrying capacity for the Lough.

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Two stage approach

- System (bay and catchment scale)
- Individual (production area scale)
- Modified DPSIR approach proportionate to scale of operation

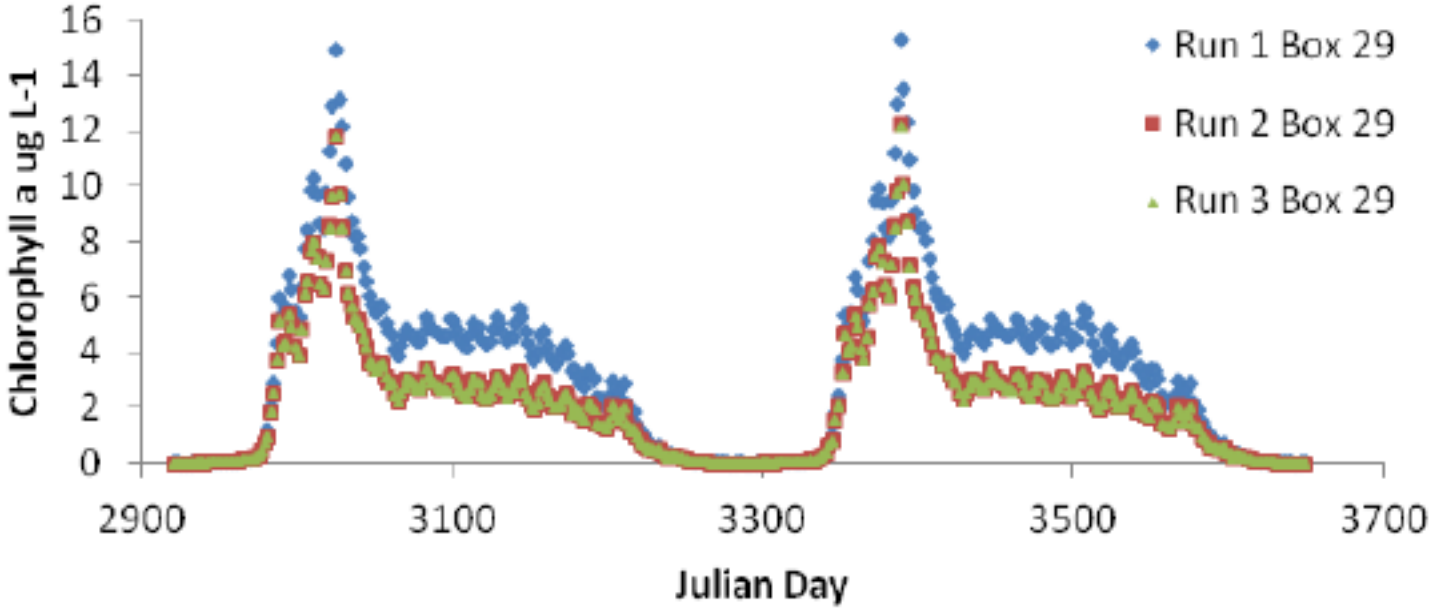
System Scale Assessment
Regulator Based

- Cumulative Assessments are undertaken at system (lough or basin) scale.
- Deal mainly with ecosystem effects.
- Undertaken by or on behalf of the regulator utilising ecosystem models.
- Develop a GIS risk based approach.

Ecosystem

- Simulate the impact on the ecosystem of increasing the abundance of filter-feeding organisms in a water body
- no aquaculture within the bay (only wild species
- present) this run is used as a baseline.
- aquaculture species reduce the overall ecosystem phytoplankton biomass and hence food availability for other organisms. Ensure this is within safe limits.

Runs 1,2 and 3 simulated Chlorophyll a profiles, Box 29



Individual Farm Scale

- Farm scale monitoring will be specific to individual operations and tailored to the specific Habitat Regulatory Assessment.
- Proportionate in scale to the pressure and associated with a specific management response.

	Activity (pressure)	Action-Operat0r	Audit-REGULATOR	Management action-AFBI
1	Installation or major changes to site geometry	Notify Regulator a minimum of 4 weeks in advance	Pay site visit advice on mitigation – modify HRA	If significant deviation from original license consider whether a full revision of HRA and consultation is required
2	Installation or major changes to site geometry	Avoid principle Bird aggregation and breeding seasons	Advise if timing appropriate	Provide guidance
3	Site maintenance	Text notification to REGULATORRegulator 24h in advance	Log text notifications. Pay site visit on 10% of occasions	Provide guidance if too much activity (over what period of activity?)
4	Site maintenance	Assess if bird aggregations on site. Consider changing visit date. Take time stamped (geotagged) photograph. Send Email image to REGULATOR	Archive images	Advise if timing inappropriate
5	Site operation	Once a month collect sediment sample from centre of site and upstream/downstream station in vessel provided by AFBI freeze.	Collect samples Request analysis of samples Audit 10% of sample occasions	AFBI to provide GPS points for sampling. Arrange analysis and if carbon levels increasing in conjunction with fauna. Advise of possible modification of site geometry
6	Site operation	Collect sediment cores annually at sediment sites used for monthly sampling.	Request AFBI analysis for benthic fauna	Carry out analysis for benthic fauna
7	Site operation	Ensure structures and site access are within Habitats Regulations Assessment specification	Site visits	Provide guidance

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Conclusion

- Well managed aquaculture can co-exist within conservation sites
- Shellfish aquaculture has a role to play in ecosystem management
- The whole catchment should form part of the management process
- Integrating aquaculture agricultural management

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