

Coastal Futures 2015
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Changes in the ecosystem of the Firth of Clyde



Glasgow's economic power was founded on its connection to the Atlantic Ocean through the Firth of Clyde

But, this has put pressures on the ecosystem:

- Nutrients and pollutants
- Shipping and seabed disturbance
- Dumping at sea
- Fishing
- Recreation

In addition, changes in temperature and land run-off

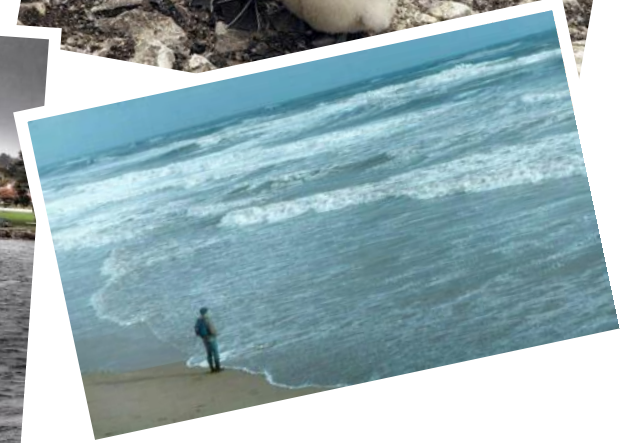


Surface Area	3,671 km ²
Volume	179 km ³
Average Depth	49 m
Maximum Depth	170 m

Passenger, merchant and military shipping and shipbuilding heritage of Glasgow and the Clyde



The Firth of Clyde provides many other services to Glasgow - which depend on a healthy ecosystem



Types of fisheries in the Clyde (static vs mobile)

Pelagic
(herring,
mackerel)



1830's

Drift net

1860's

Ring netting

1960's

Mid-water trawling

2014

Demersal
(cod,
haddock,
whiting,
plaice)



Line-fishing

Seine-netting

Demersal trawling

Shellfish
(Norway
lobster
(*Nephrops*),
scallop,
crab,
lobster)



Creel-fishing

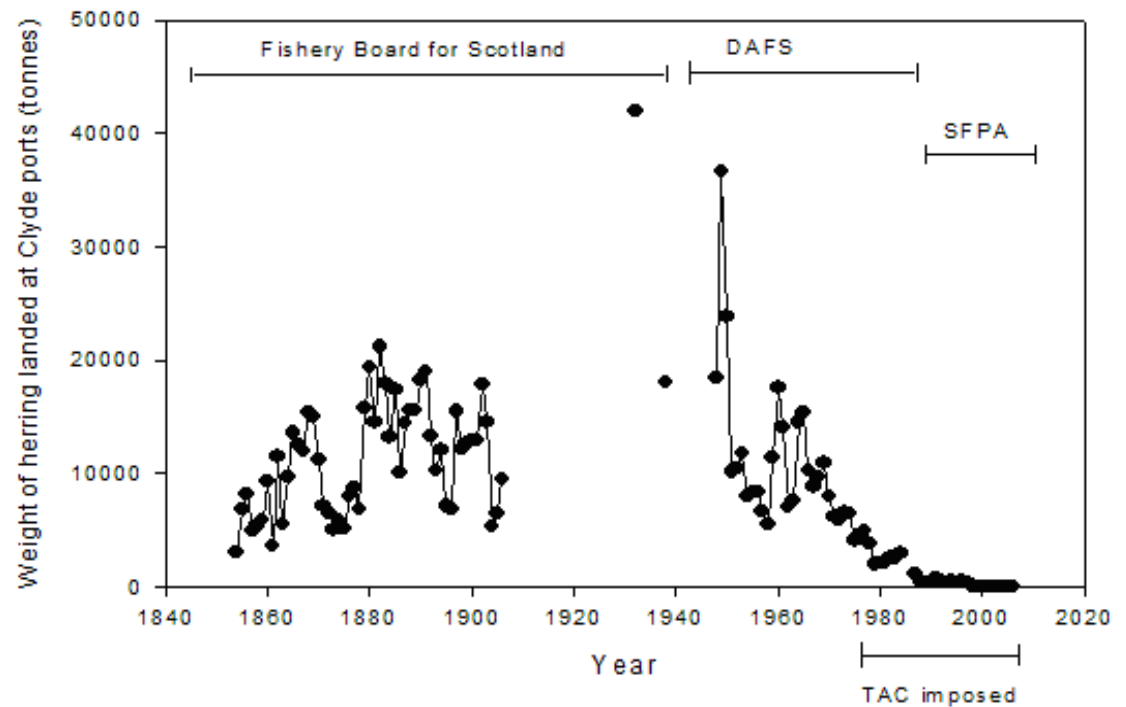
Dredging & trawling

Herring fishing in the Clyde dates back many centuries yielding up to 20,000 tonnes of fish per year (river, rail and road links to Glasgow)



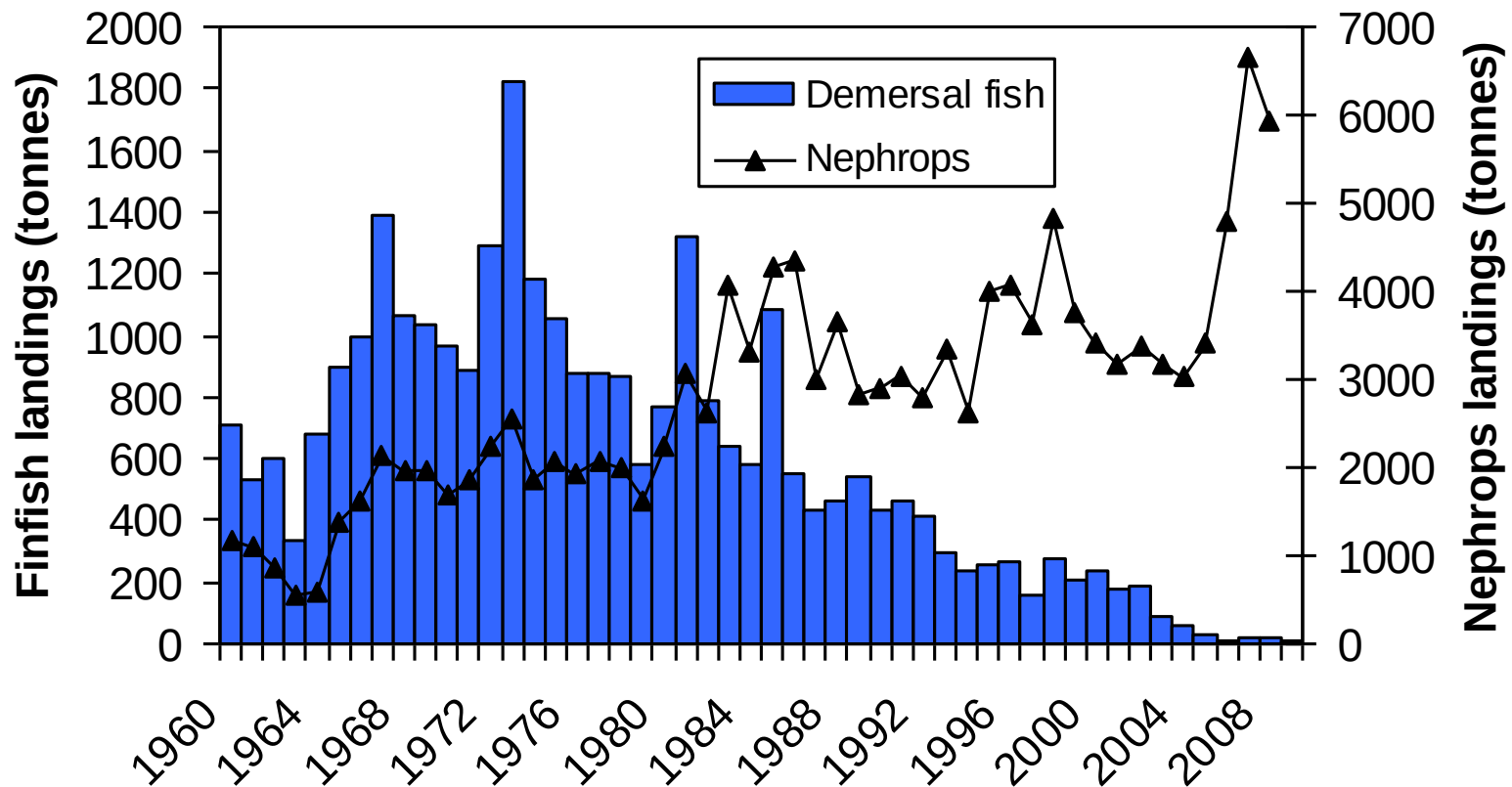
But the fishery collapsed in 1980's.

Pelagic trawling replaced drift and ring-netting in the 1950's.

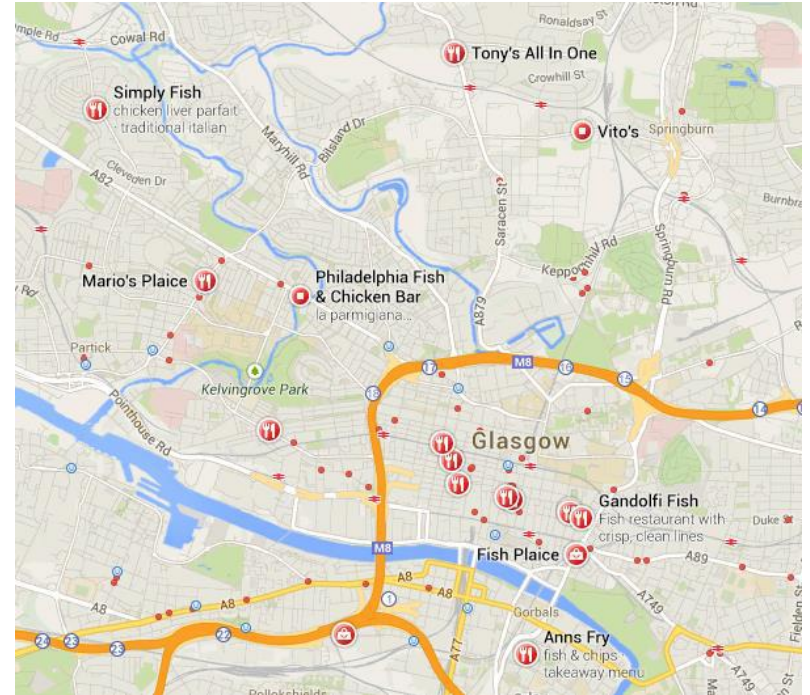


Similar story for demersal fisheries – but shellfisheries have expanded

Firth of Clyde 1960 - 2009

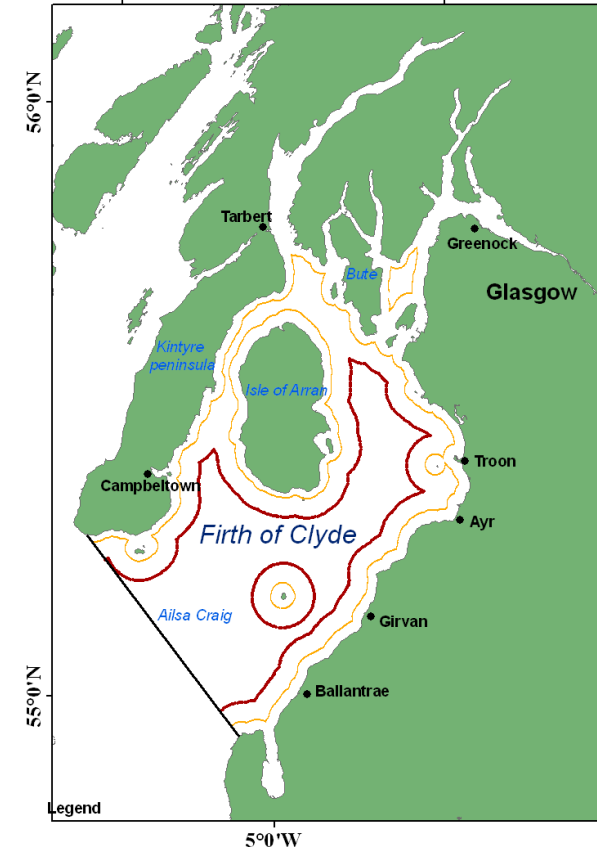


Speciality seafood restaurants in Glasgow are now almost entirely unable to source locally-caught finfish



Regulations intended to protect stocks...

1851-1867	Entire Firth	Ring-netting banned	To protect herring stocks
1889	Entire Firth	Closed to trawlers >8 tonnes	To protect inshore fishing grounds and herring
1962	Firth outside 3nm	Opened to trawlers	Fish landings rise to 1973, then start to decline Clyde established as a centre for major angling competitions in early 1960's
1984	Firth inside 3nm	Opened to trawlers	To maintain fish landings (failed) To exploit inshore Nephrops grounds 1988 – no prize fish caught in white Horse sea angling competition – Scottish Tourist Board investigation Clean-up of water quality in the Clyde estuary started
2001	Parts of the Clyde	Seasonal; closures	To protect spawning cod



Polarised views about why the fin-fish fisheries collapsed....

Watson, J.M. and Bryson, J.T. (2003). *“Clyde Inshore Fishery Study”*, Seafish (July 2003).

Question;	Creel fishers			Trawl fishers		
	Static Sector			Mobile Sector		
	Yes	No	No Opinion	Yes	No	No Opinion
Is the Clyde overfished?	67%	33%	/	15%	85%	/
Is static gear fishing in the Clyde a sustainable method?	85%	/	15%	51%	19%	30%
Is trawling in the Clyde a sustainable method?	8%	77%	15%	70%	4%	26%

2010 – dramatic
headlines – based
solely on the
landings data

OPEN ACCESS Freely available online



Ecological Meltdown in the Firth of Clyde, Scotland: Two Centuries of Change in a Coastal Marine Ecosystem

Ruth H. Thurstan, Callum M. Roberts*
Environment Department, University of York, York, United Kingdom

Report warns Clyde is 'fished out'
EveningTimes 12 July 2010

Clyde ecosystem 'in meltdown'
The Herald 12 July 2010

Clyde 'cleaned out' to become marine desert
THE SUNDAY TIMES SCOTLAND 11 July 2010

Changes in species diversity and size composition in the Firth of Clyde demersal fish community (1927–2009)

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Marine Population Modelling Group, Department of Mathematics and Statistics, University of Strathclyde, Livingstone Tower, Glasgow G1 1XH, UK

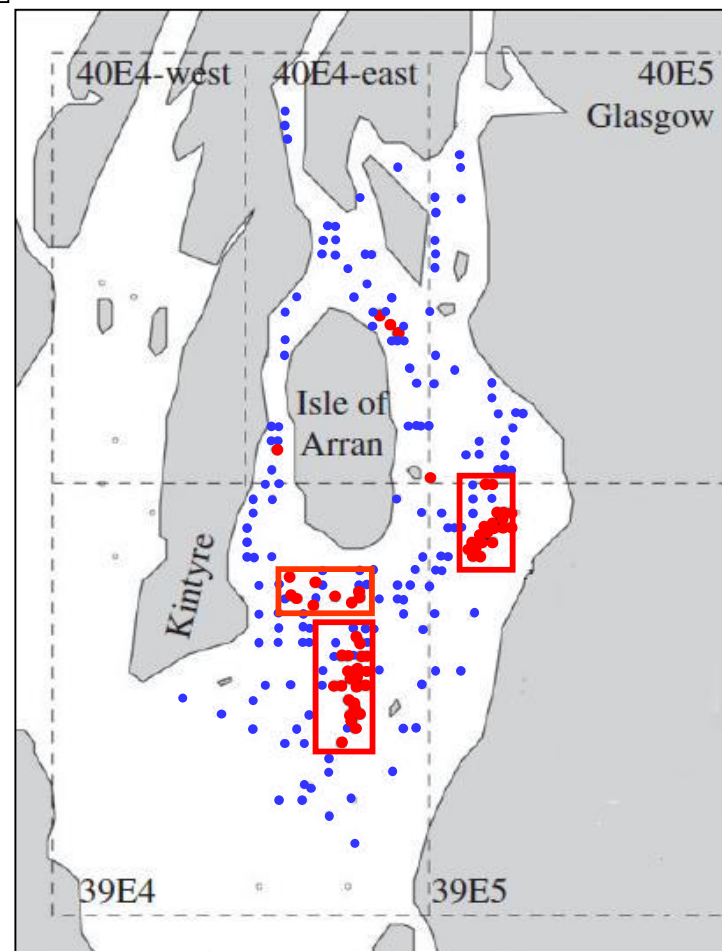
Research vessel survey data, 1927–2011

1985-onwards....

- *Standardised survey net*
- *Standardised tow location*

Prior to 1985,,,,

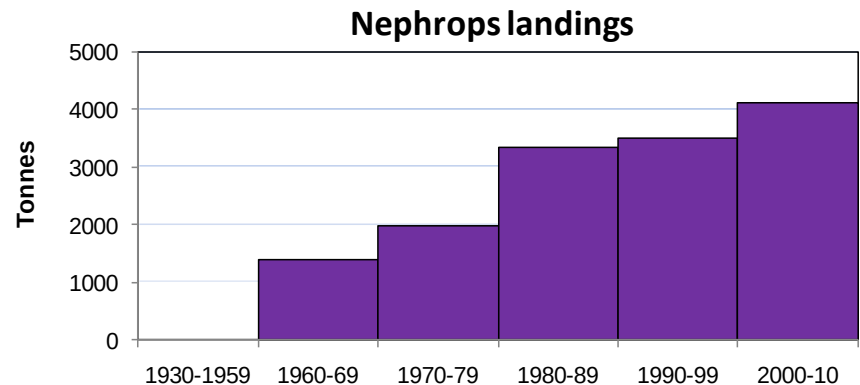
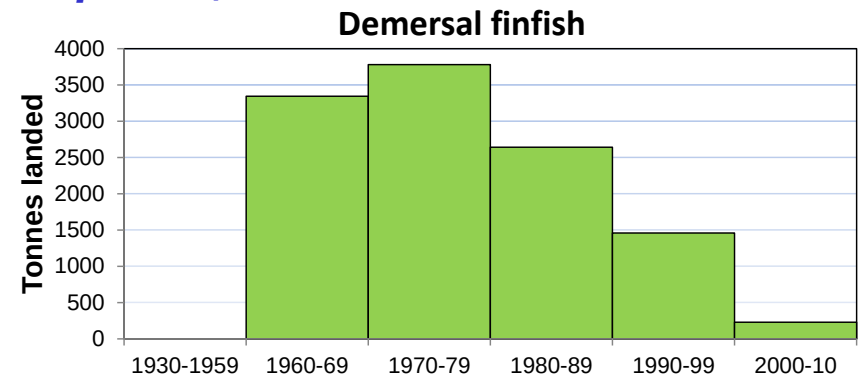
- *Used only data from tows with similar net*
- *Used only data from nearby locations*



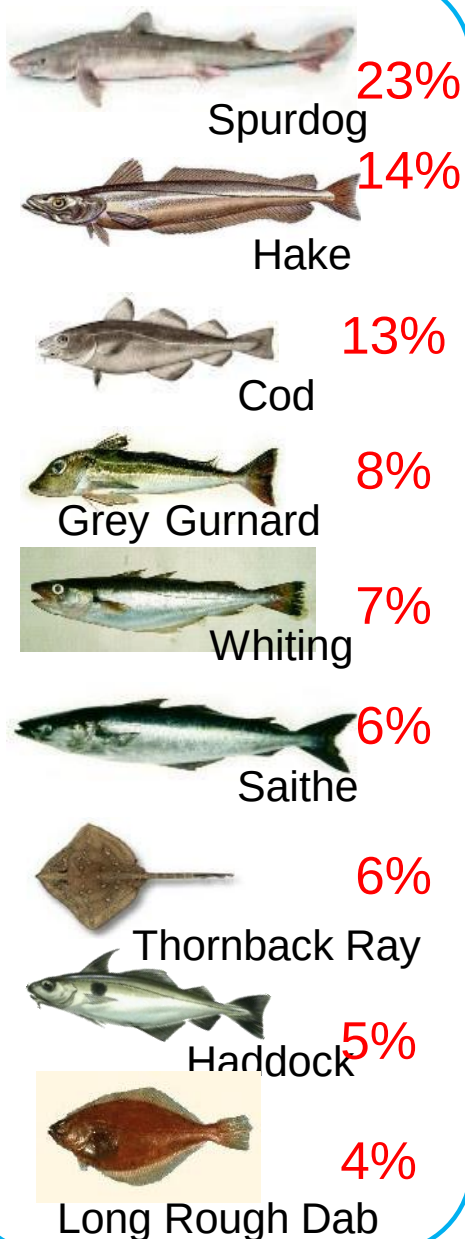
Fishery and survey data

Fishery landings

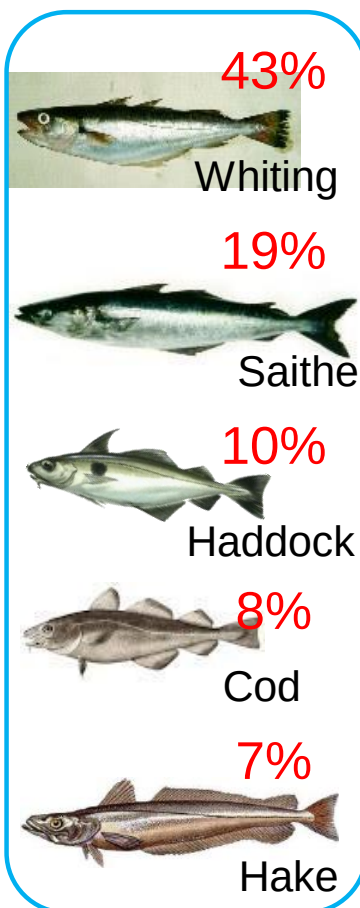
*Cod, haddock, whiting, hake, saithe,
plaice, flounder*



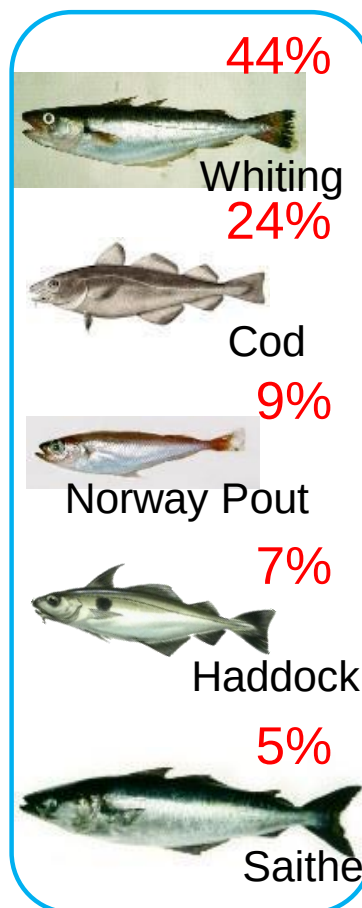
Species comprising 85% of biomass...



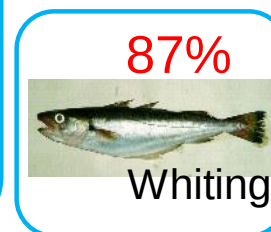
1920 - 1959



1960 - 1979



1980 - 1994



1995 - 2004

What evidence has emerged from the research?

- Economic output from fisheries remains high, but involves few boats and employees.
- Targeted fin-fisheries have more-or-less ceased. Fisheries dominated by *Nephrops* and scallops – mostly exported.
- The Clyde demersal fish community has undergone a transformation :
 - *Total fish biomass as high as in 1920's, but now comprising almost entirely fish <40cm. Few marketable sized-fish remaining.*
 - *Reduction in abundance of large-bodied fish species*
 - *Changes in fish growth rates and reduction in size at maturity*
 - *No loss of fish species richness, but much reduced species evenness*

Key scientific issue that need to be addressed

Are there any interventions that would promote a change in the state of the Clyde to one in which large fish are once more abundant?

- *Benefits of a 3-mile limit trawling ban?*
- *Are by-catch rates of demersal fish in the Nephrops trawl fishery inhibiting recovery?*
- *Benefits of Marine Protected Areas?*

Is it realistic to expect to recover the past state of the ecosystem?

- *Nutrient loads have changed*
- *Temperature is rising*
- *Fish growth and maturation changes may be genetic (evolutionary) rather than adaptive*



Key 'political' issue that need to be addressed

What is the societal aspiration for the ecological state of the Clyde?

Implications for Glasgow and associated local authorities:

- *Port facilities and infrastructure*
- *Employment and training*
- *Food supply and transport*
- *Tourism planning*



Recent developments...

2011	CIFG draft management plan published	Plan focuses on sectoral conflict resolution, but ignores sustainability issues and evidence of ecological damage
2011	Scottish Inshore Fishery Trust (SIFT) established	Campaigning to eliminate dredging and trawling in specific inshore waters to conserve and restore ecological quality
2012	MSS Clyde Ecosystem Review (McIntyre, Fernandes and Turrell)	Addresses the varying opinions on ecological state of the Clyde and presents a 'spatial planning tool' which estimates the impact on fishing opportunities of alternative spatial closures scenarios.
2013	SG Conference on Inshore Fisheries, Inverness	Workshops on 4 themes: 1. Managing Locally 2. Marine Planning 3. Management and Governance Measures, 4. Market Development: Opportunities for Growth
2014	Clyde Summit, Glasgow, April '14	Conference of all stakeholders sponsored by the SG





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