

# WKIrish 4

Workshop on stakeholder input to and parameterization of, ecosystem and food web models in the Irish Sea aimed at a holistic approach to the management of the main fish stocks

Dave Reid, Marine Institute, Galway

Francis O'Donnell for NWWAC

## Terms of reference

- a. Identify and document the main ecosystem concerns for stakeholders and determine if these can be addressed with the available models, and make any appropriate recommendations for future work.**
- b. Populate an Irish Sea food web structure based on stakeholder perceptions**
- c. Evaluate the out-turn food web structures against those developed by scientists.**
- d. Specify appropriate human activity sectors, pressures derived from these and ecosystem components appropriate for an ODEMM IEA for the Irish Sea.**

## **WKIrish History**

### **WKIrish1 - 14–15 September 2015, Dublin**

- **Scoped the ecosystem knowledge and analysis approach**

### **WKIrish2 - 26–29 September 2016, Belfast**

- **Reviewed data and parameters for full benchmark stock assessments of whiting, cod, haddock, plaice and herring**

### **WKIrish3 - 30 January–3 February 2017, Galway**

- **Develop methods to determine stock status and short-term outlook and to propose biological reference points for the Irish Sea stocks of cod, haddock, herring, plaice and whiting.**

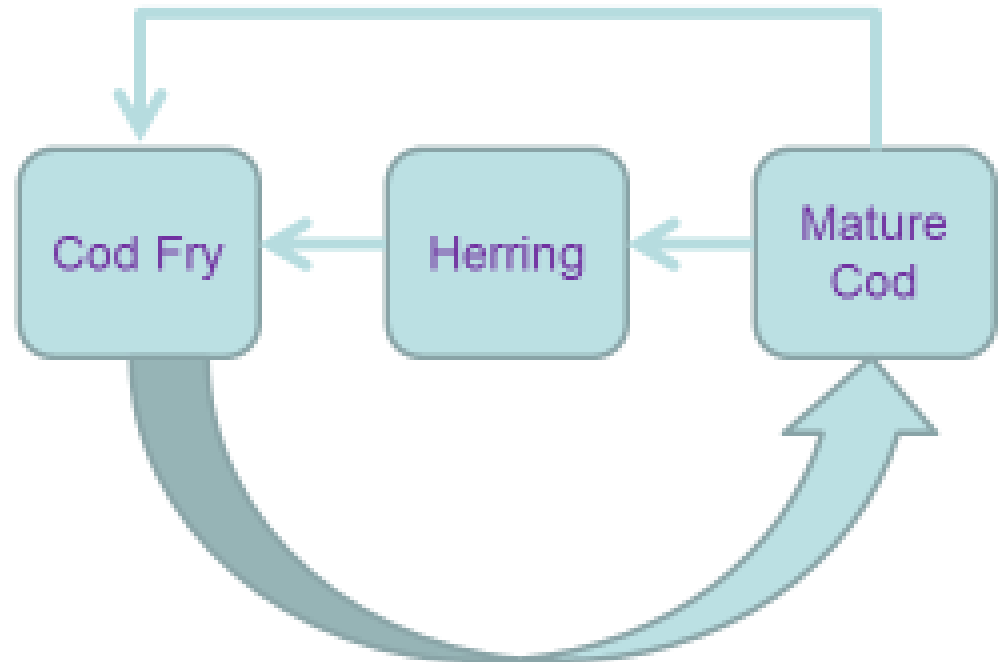
# Why do multi-species models

## WHY MULTISPECIES DIMENSION IS NEEDED

Stable fish community:

- large cod eats herring
- herring eats cod fry
- some small cod survive to become large and reproduce

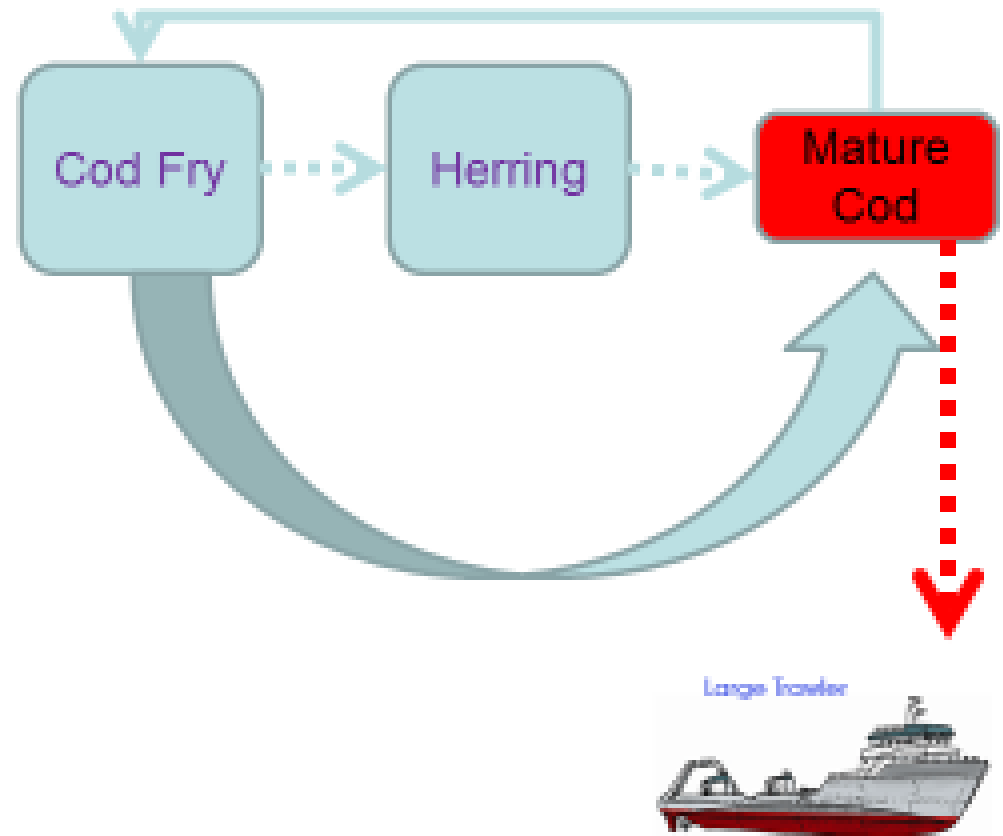
Herring and cod keep each other in check and neither can dominate.



**From Rob Scott: CEFAS**

# WHY MULTISPECIES DIMENSION IS NEEDED

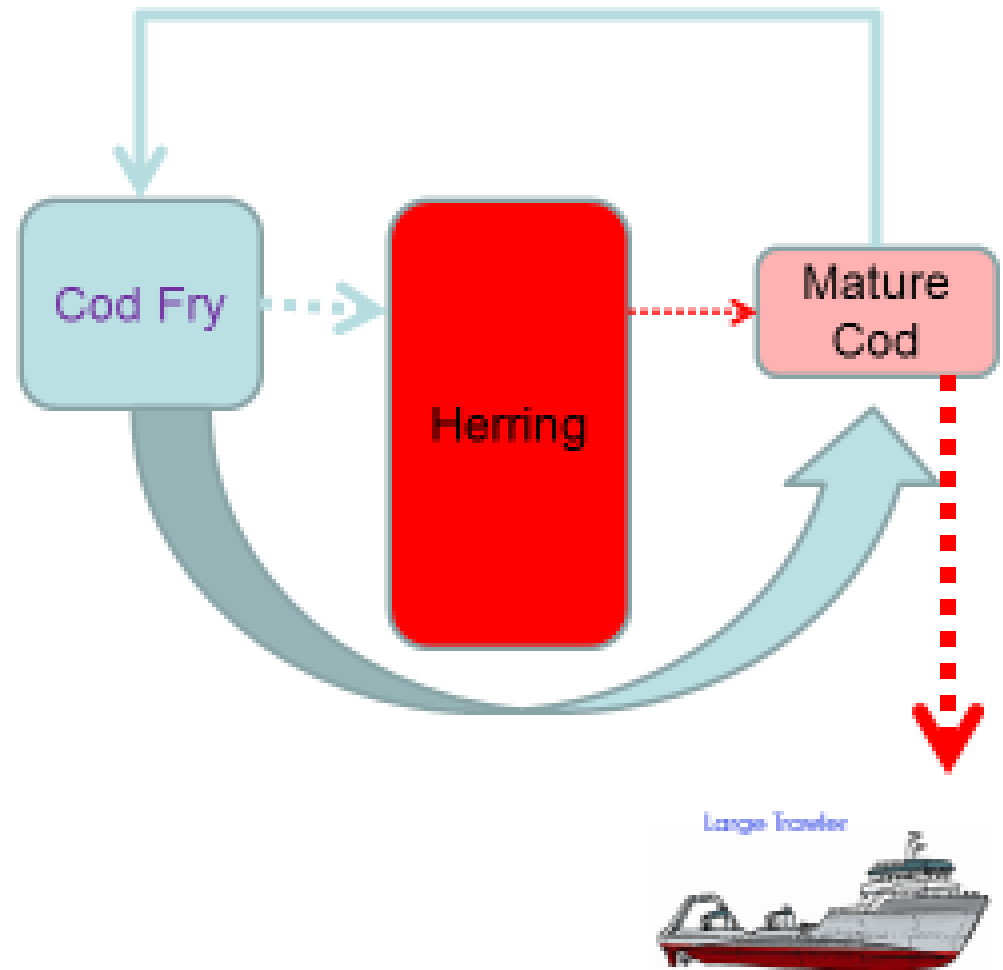
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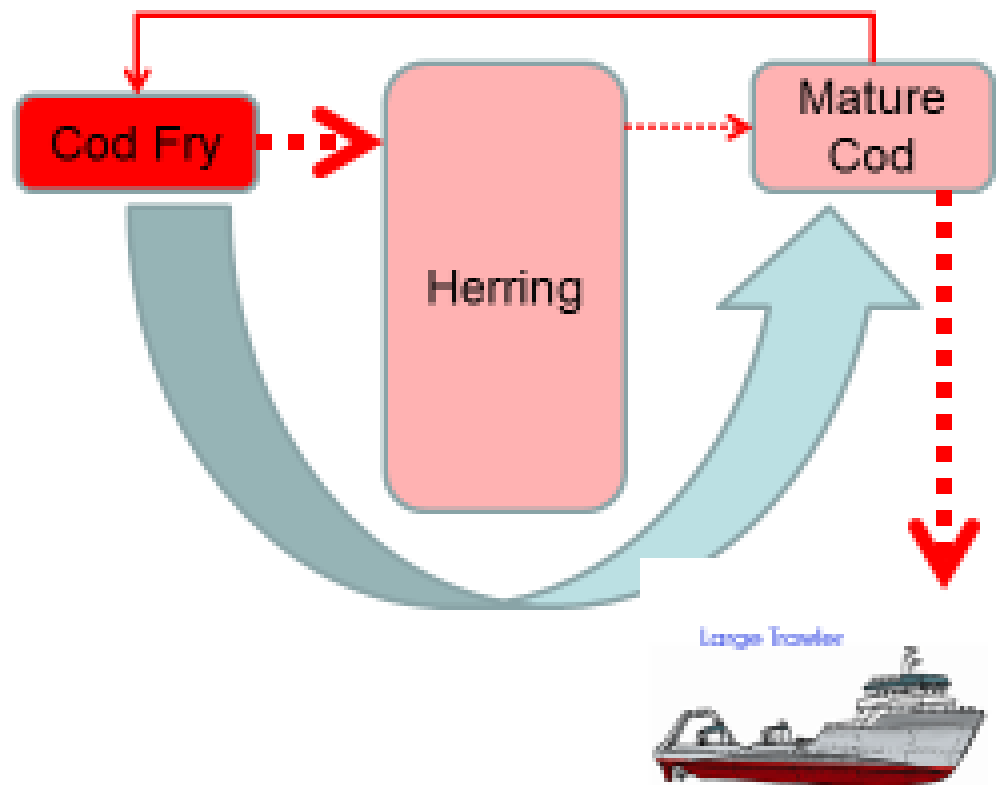


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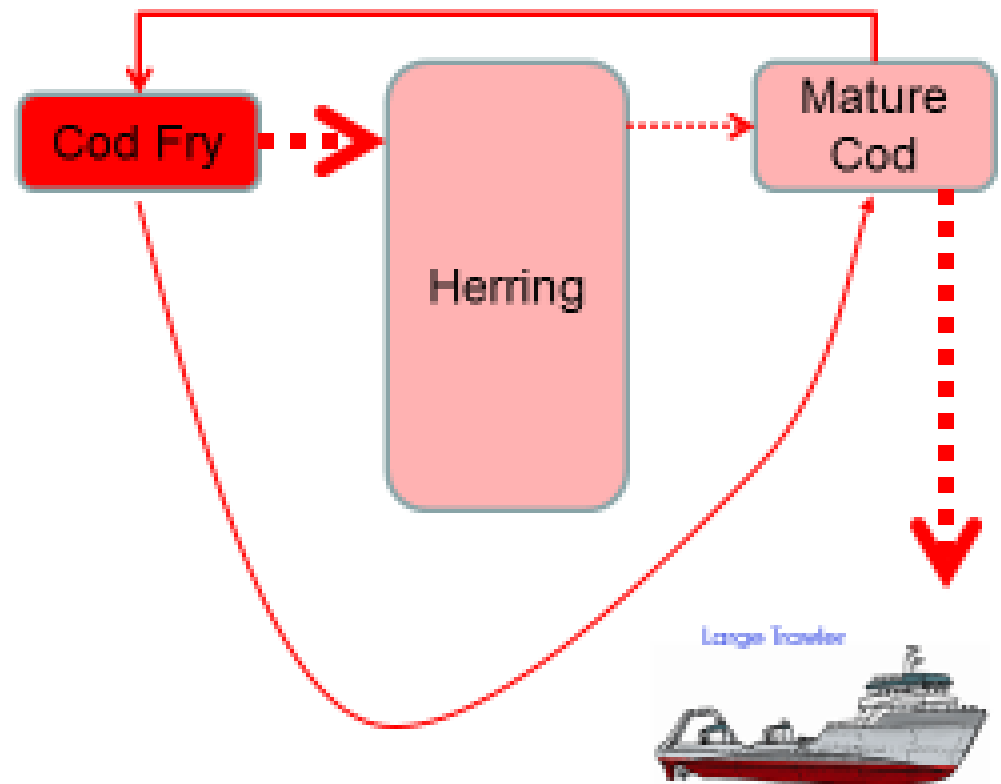




# WHY MULTISPECIES DIMENSION IS NEEDED

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Cod recruitment falls substantially as a result of reduction in cod fry.

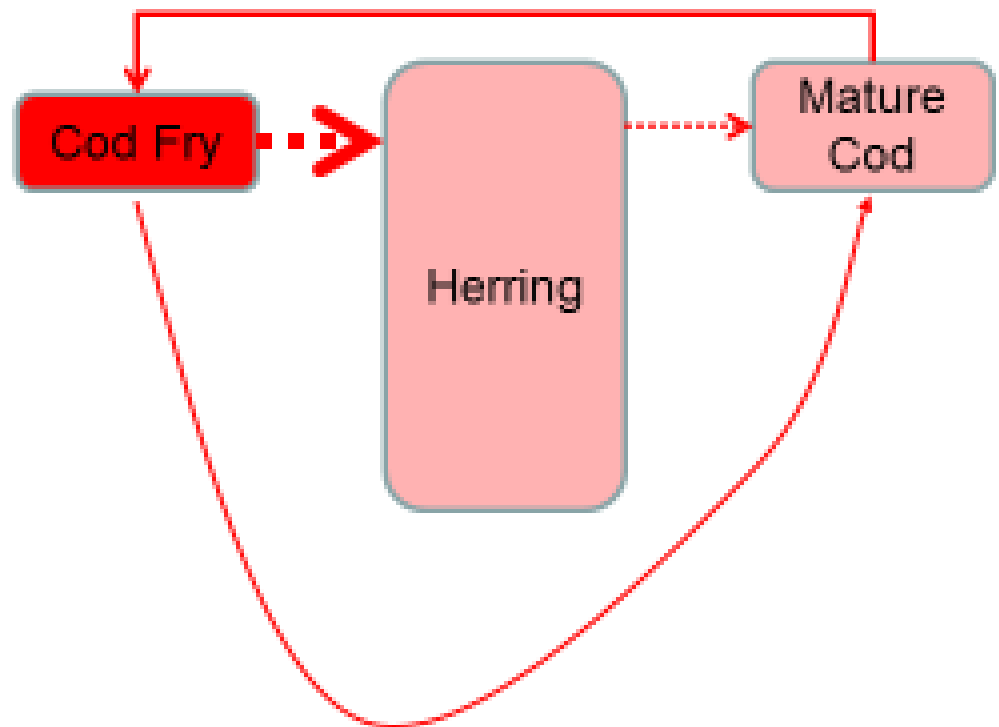


## WHY MULTISPECIES DIMENSION IS NEEDED

Even if fishing subsequently ceases, the cod stock may not recover.

As a result of multispecies interactions, the ecosystem has entered a new state (high herring/low cod).

Single species modelling would not be able to warn of such an outcome as the key feedbacks are missing.



Something akin to this may have happened to Newfoundland cod.

## Available Models

- a. Ecopath with Ecosim – EwE**
- b. Length-based Multispecies Analysis by Numerical Simulation – Ensemble modelling**



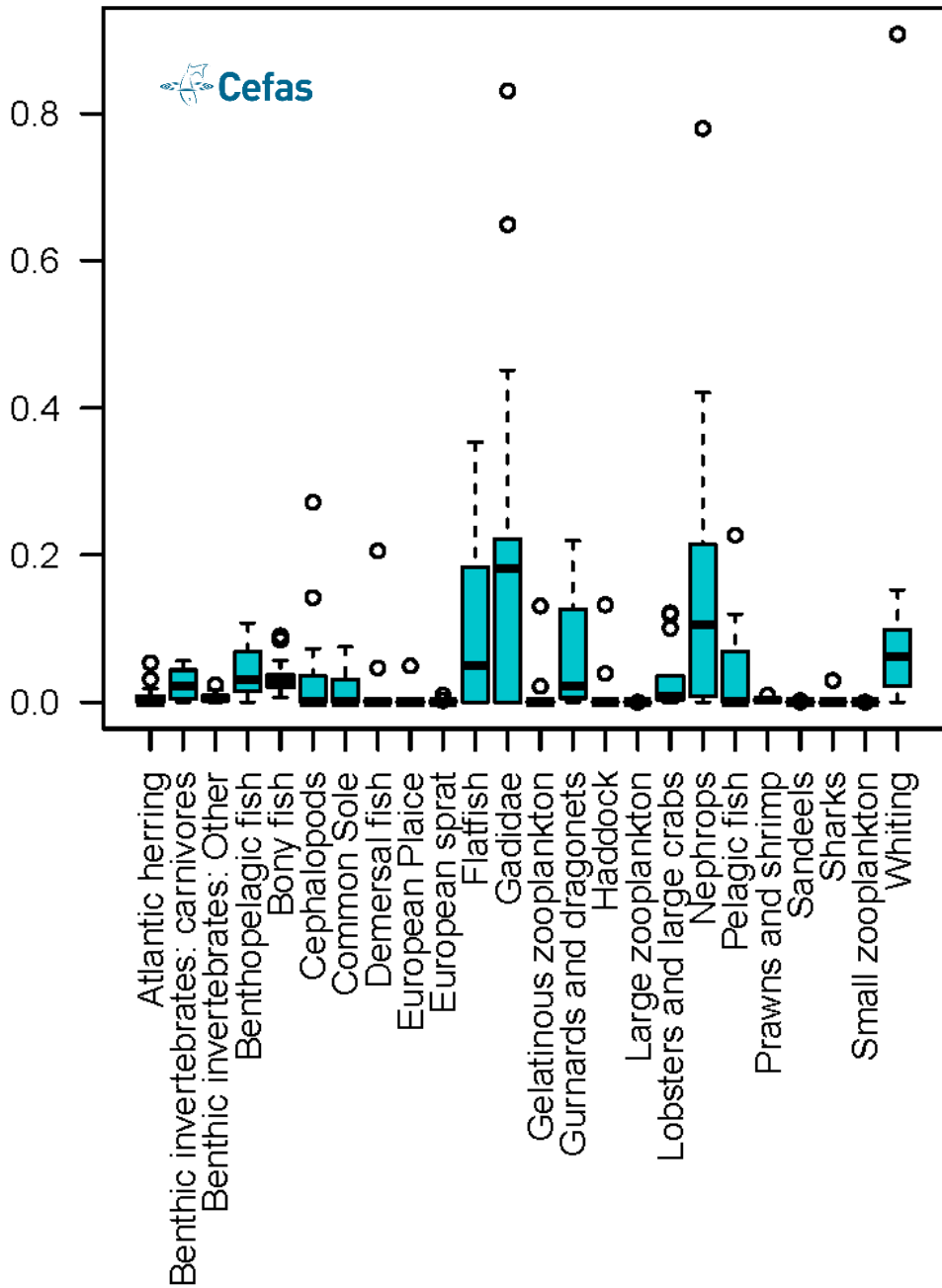
## *Ecopath: a mass balanced snapshot of the Irish Sea*

- **Start year: 1973**
- **42 functional groups**
  - **Biomass**
  - **Landings**
  - **Discards**
  - **Production & consumption ratios**
  - **Diets**

# Cod (mature) Diet 1960–2016



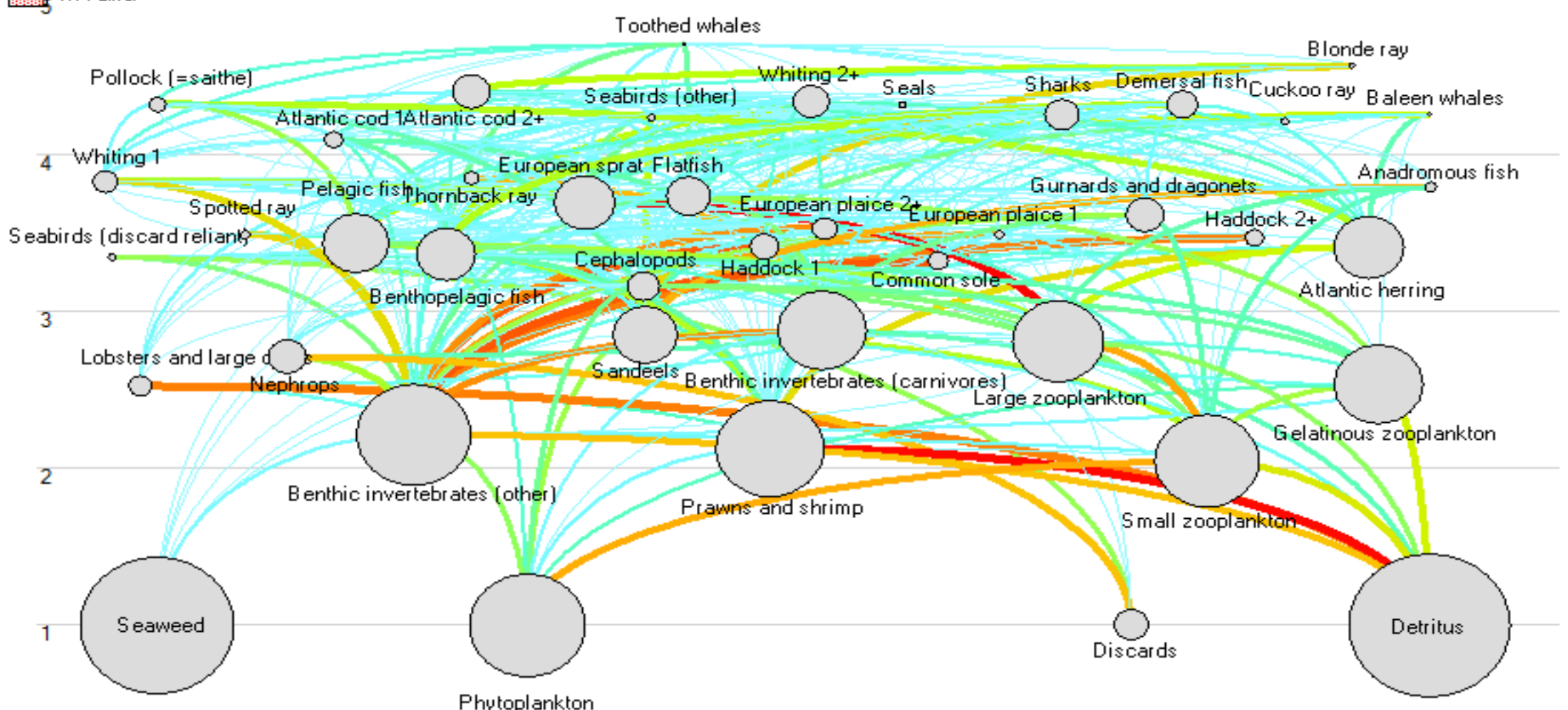
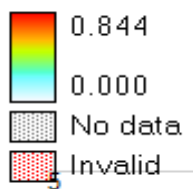
Diet Proportion



Ecopath: *Diet data*



# Ecopath: *Irish Sea food web*



**From Jacob Bentley: SAMS**



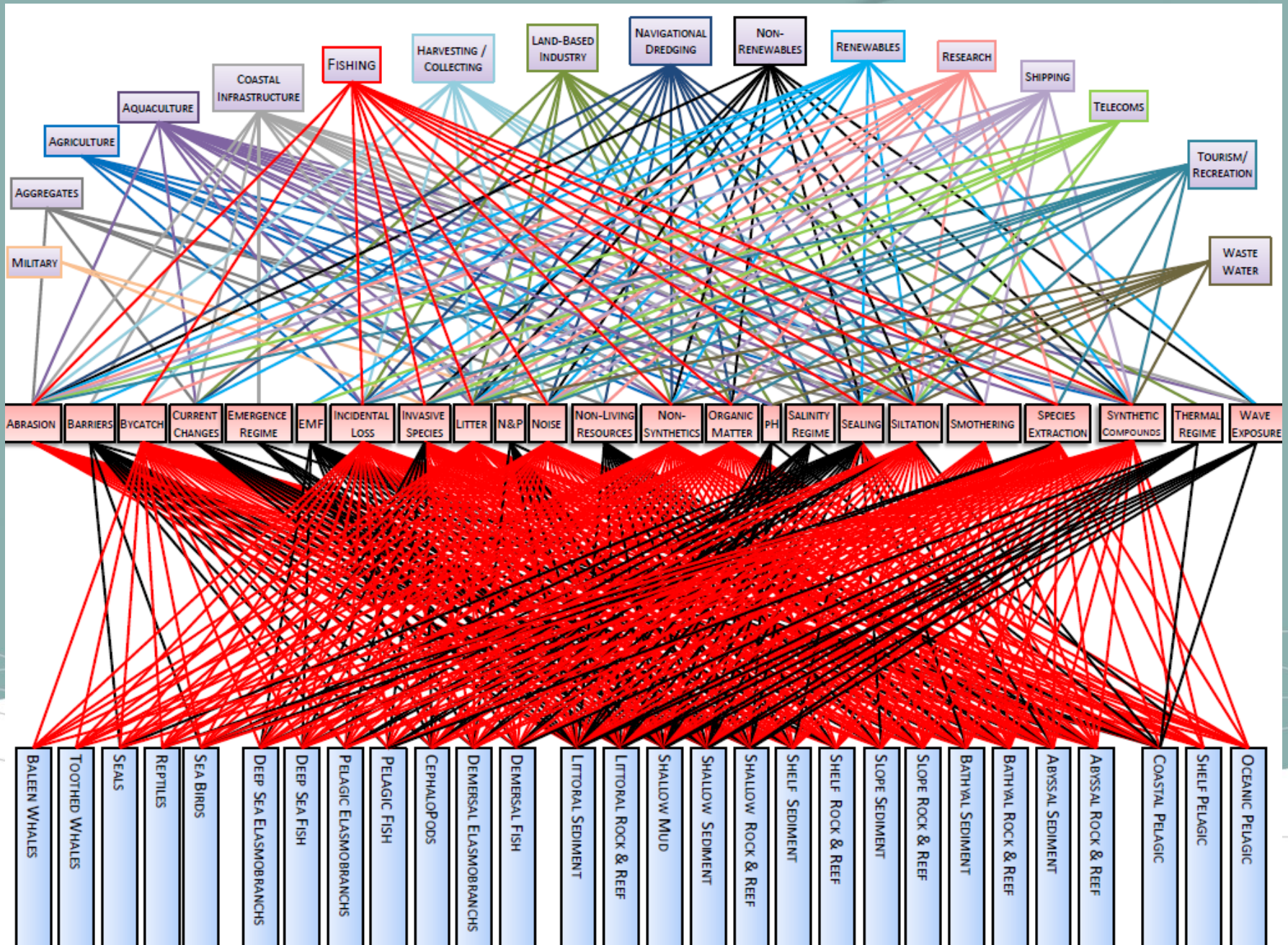
- **Why we need you?**
- **Who eats who??**
- **In 1973 ??? !!!!**
- **WE have some data e.g. CEFAS and have built a foodweb**
- **Build a foodweb from stakeholder knowledge**
- **Compare and contrast**

## ODEMM Integrated Ecosystem Assessment for the Irish Sea

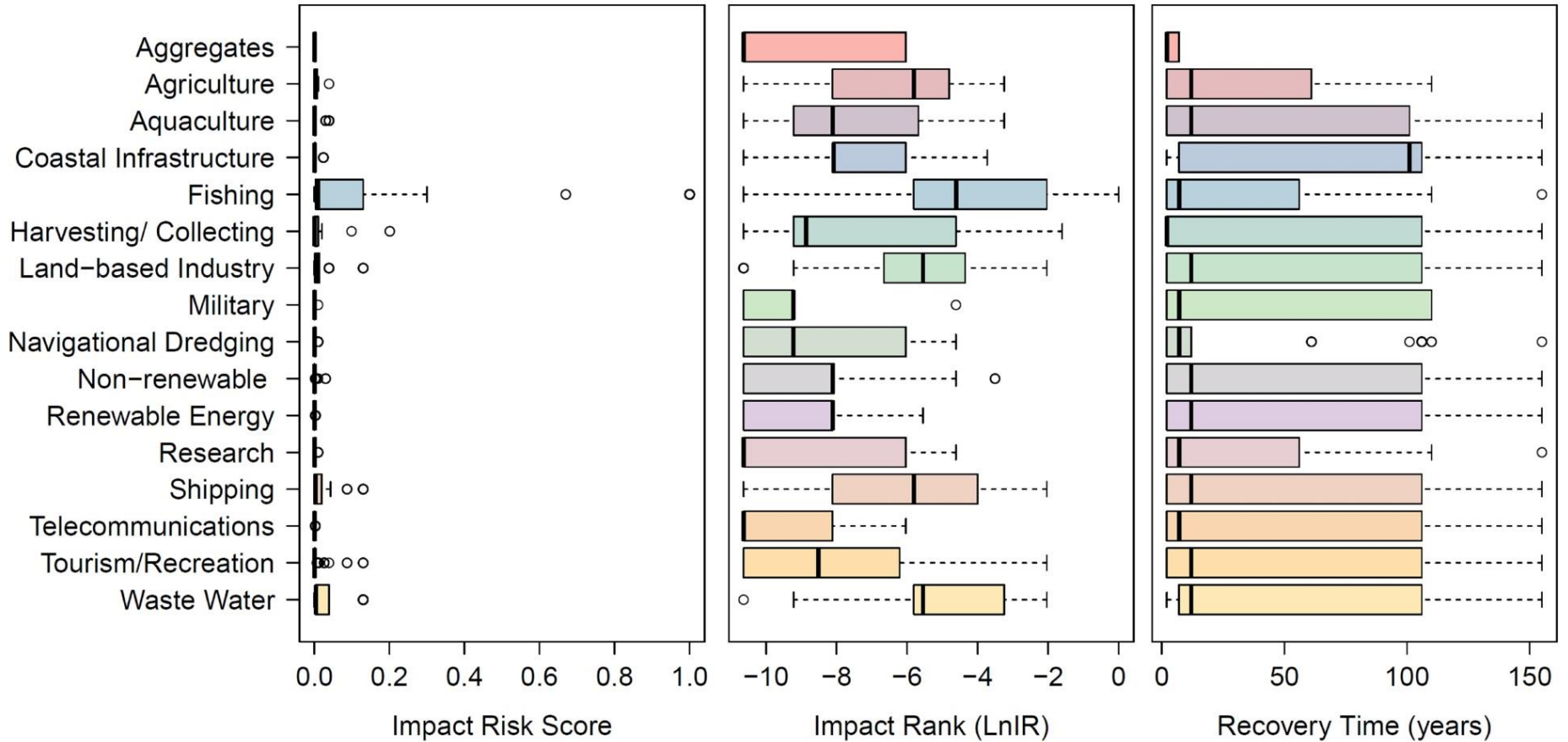
- **Quantifies the links between:**
  - **Human activities**
  - **Pressures caused by these**
  - **Ecosystem components that are impacted**
- **Allows us to identify key linkages**
- **IS fishing the worst??**



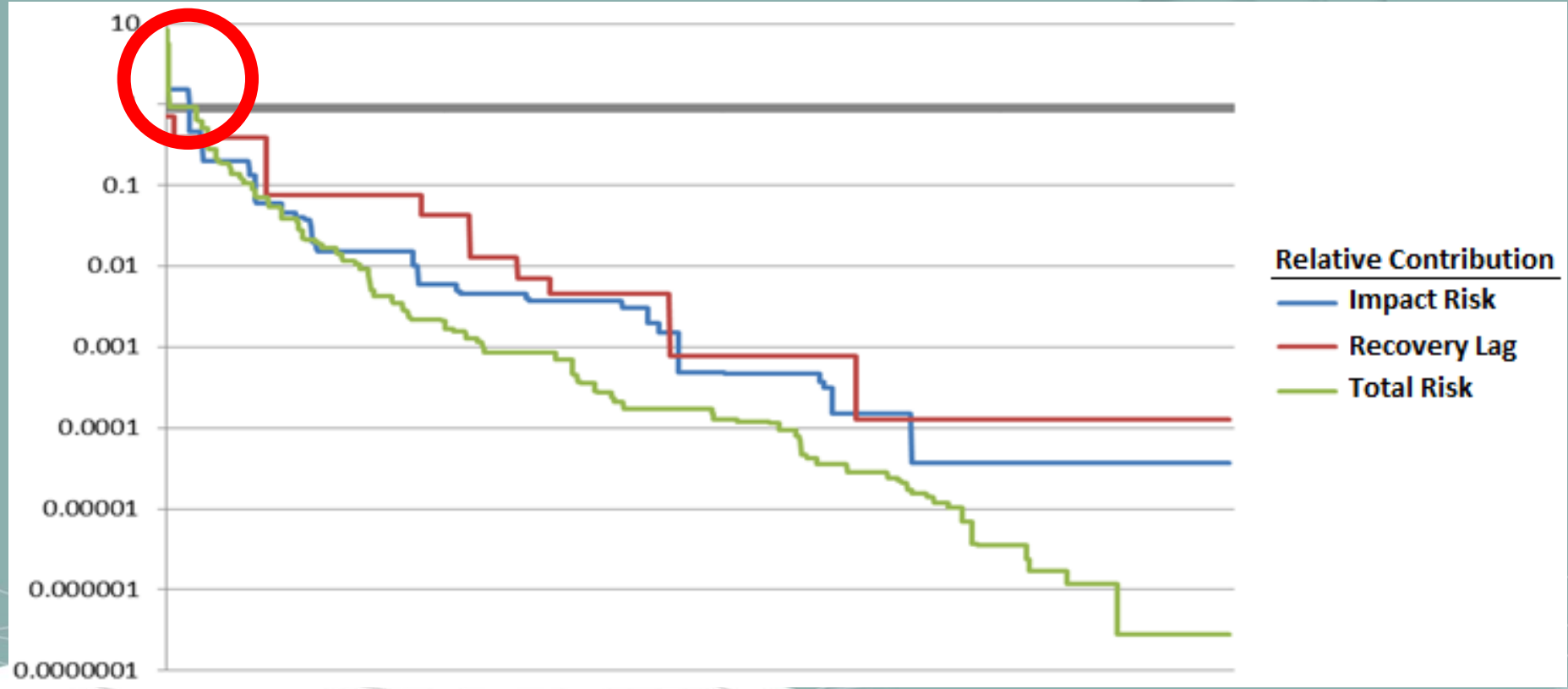
# ODEMM - Options for Delivering Ecosystem-Based Marine Management



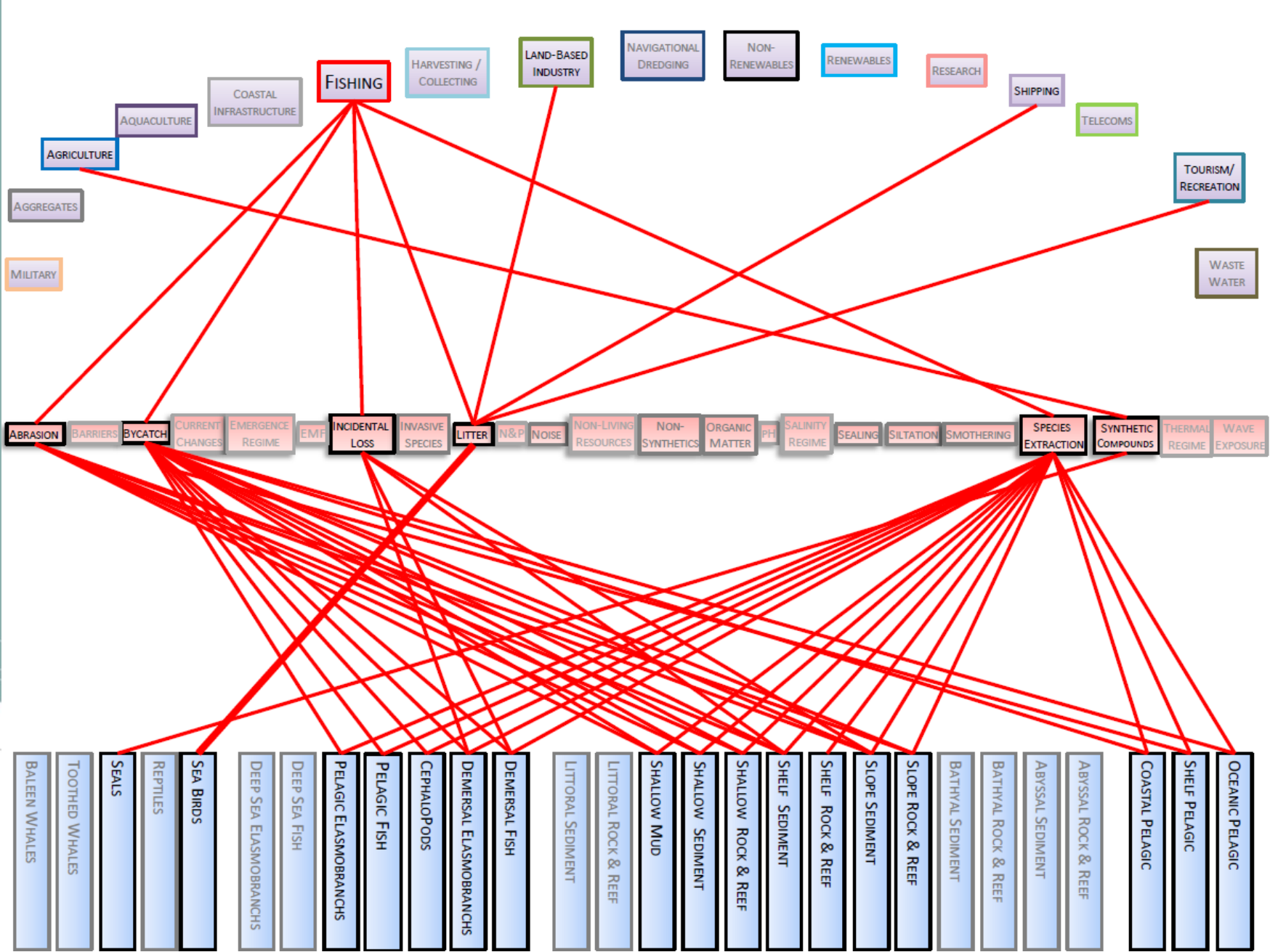
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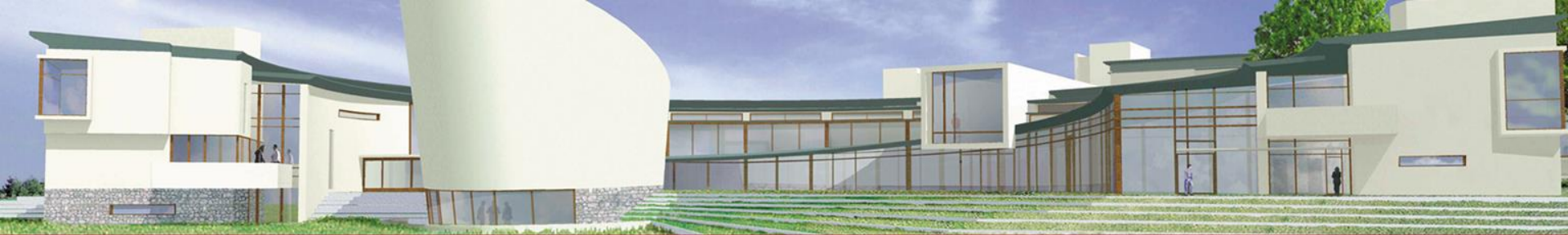


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## **RTI - an alternative fisheries management system**

- **The Carrot, not the Stick.....?**
- **Managing fishing-impact equivalents**
- **Not Quota, Not Effort**
- **Spatio-temporal explicit management**
- **Incorporates ecosystem objectives**
- **Each vessel allocated credits (based on TAC)**
- **Fishers choose – where, when, (how) to fish**
- **One simple rule – observe the tariff!**
- **RTI – Real Time Incentives**

**Please talk to Debbi**