



INNOVATION PATHWAYS SEAFOOD PRODUCTION

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Planet earth and the challenge



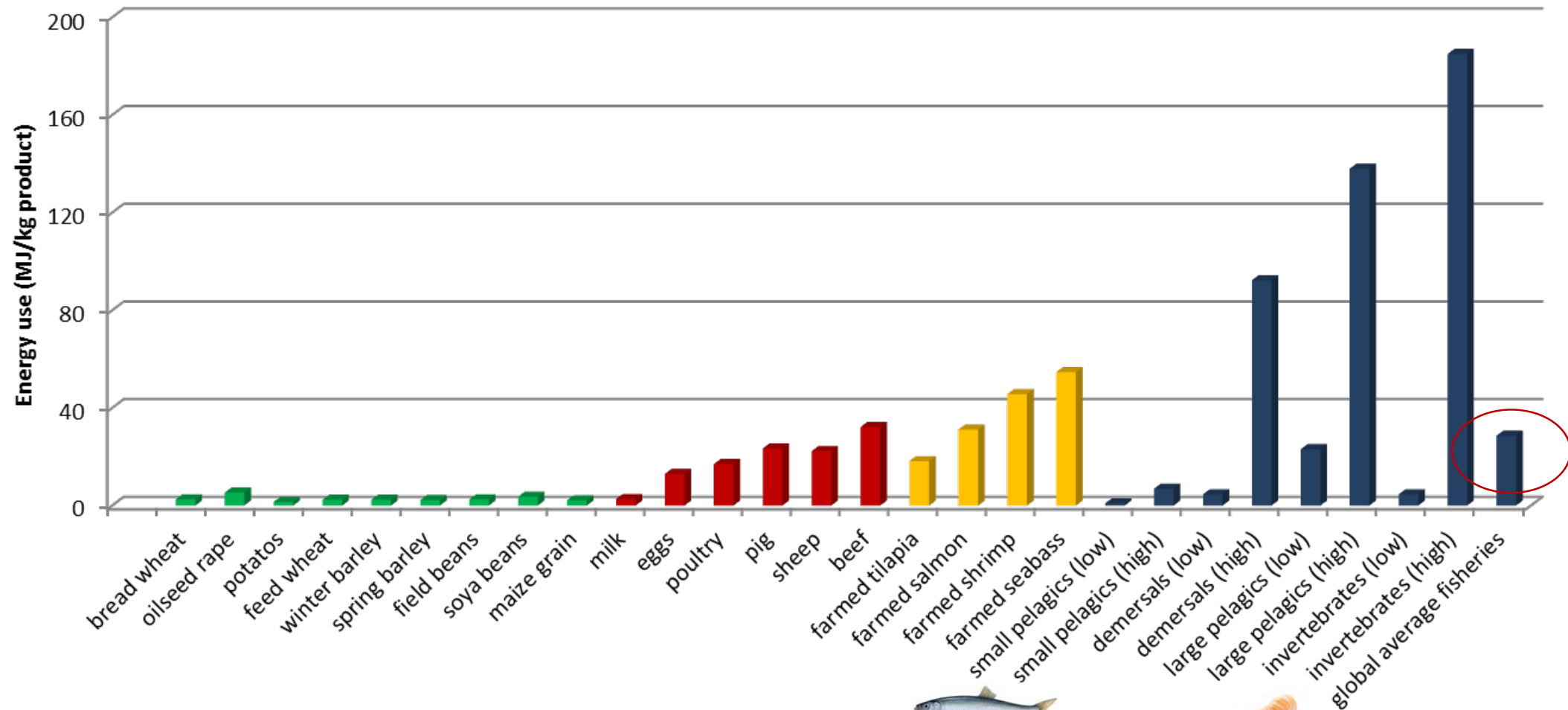
**We produce 5% of our food
on 70% of earth's surface**

In times of increasing competition for land...

- ...We produce less than 5% of our food in the oceans (70% of the surface)!
- 9% of our protein
- 17% of our animal protein
- Locally (often in coastal regions in developing countries) much more dependant on seafood for protein intake



Seafood is generally good- and can further improve



from Pelletier et al. 2011

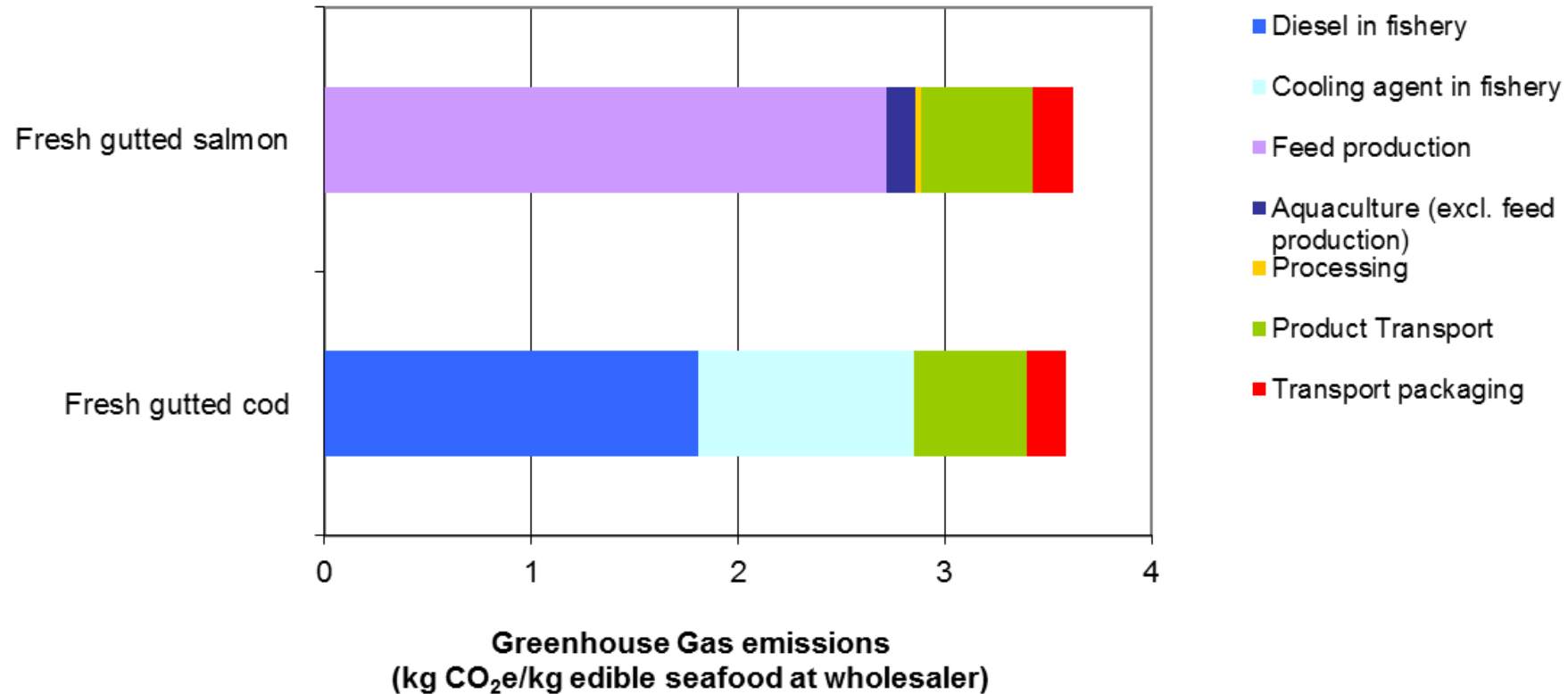


Seafood specials-capture fisheries

- Limited production => optimal harvesting strategy (biologically, economically, socially?)
- Capture in non-modified ecosystem (e.g. not only one species or desired size)
- Diverse harvesting technologies
- Resource ownership



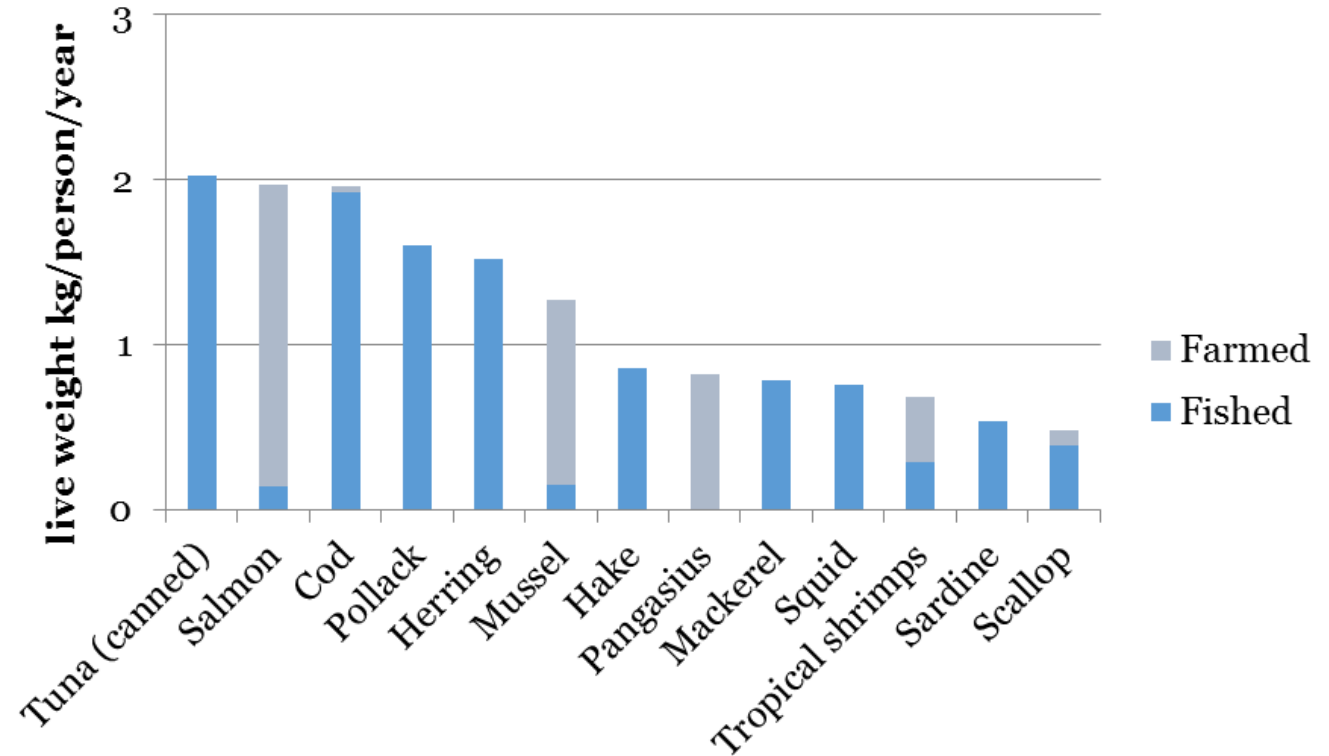
Fished or farmed? Both!



Winther et al. 2009,
Ziegler et al. 2013

EU seafood consumption

- Relatively high, 25 kg *liveweight* (in a global perspective)
- Dominated by few species
- In many countries recommendations are to increase consumption
- In some countries (Spain, Portugal) consumption is so high that health risks can be related to seafood consumption
- In a few countries (incl. Sweden), dietary advice also include sustainability



How meet increasing global seafood demand?

- Improved management (+5-20% global landings)
- Feed fish to food fish
- Increased use of "non-edible" processing by-products/leftovers => "circular fish"
- Reduced supply chain losses
- And last, but not least: Aquaculture



Production innovations

1. "Fishing at equilibrium", i.e. sustainable exploitation levels of wild stocks, following MSY
 2. Innovative fish feeds, new and more efficient feed ingredients (including increased use of food by-products, insects, algae, microbes), macro (protein and lipids) and micro (amino acids, omega-3 fatty acids)
 3. Expansion of non-fed aquaculture
 4. Reduced supply chain losses
 5. BAT fishing technology and allocation of fishing rights between fishing segments
- In SUSFANS: "Fishing at equilibrium" and innovative feeds for aquaculture

Consumption innovations- Improving consumption patterns

1. Reduce overconsumption
 2. Replace high-impact meat with low-impact meat, seafood and vegetables
 3. Replace high-impact with low impact seafood
 4. Replace high-impact with low impact vegetables
 5. Reduce waste/loss
-
- In SUSFANS: Replace consumption of red meat with seafood

So, lots of ideas, but what can the models do?

1. GLOBIOM- currently extended with seafood module (11 fish commodities, modelled per country)
2. MAGNET- Fishery, Aquaculture, Processed fish (3 commodities out of 37, future changes dynamic fish stocks)
3. CAPRI-currently extended with seafood module (13 production commodities)
4. SHARP diets, GHG, land use and nutrition of different diets

MAGNET

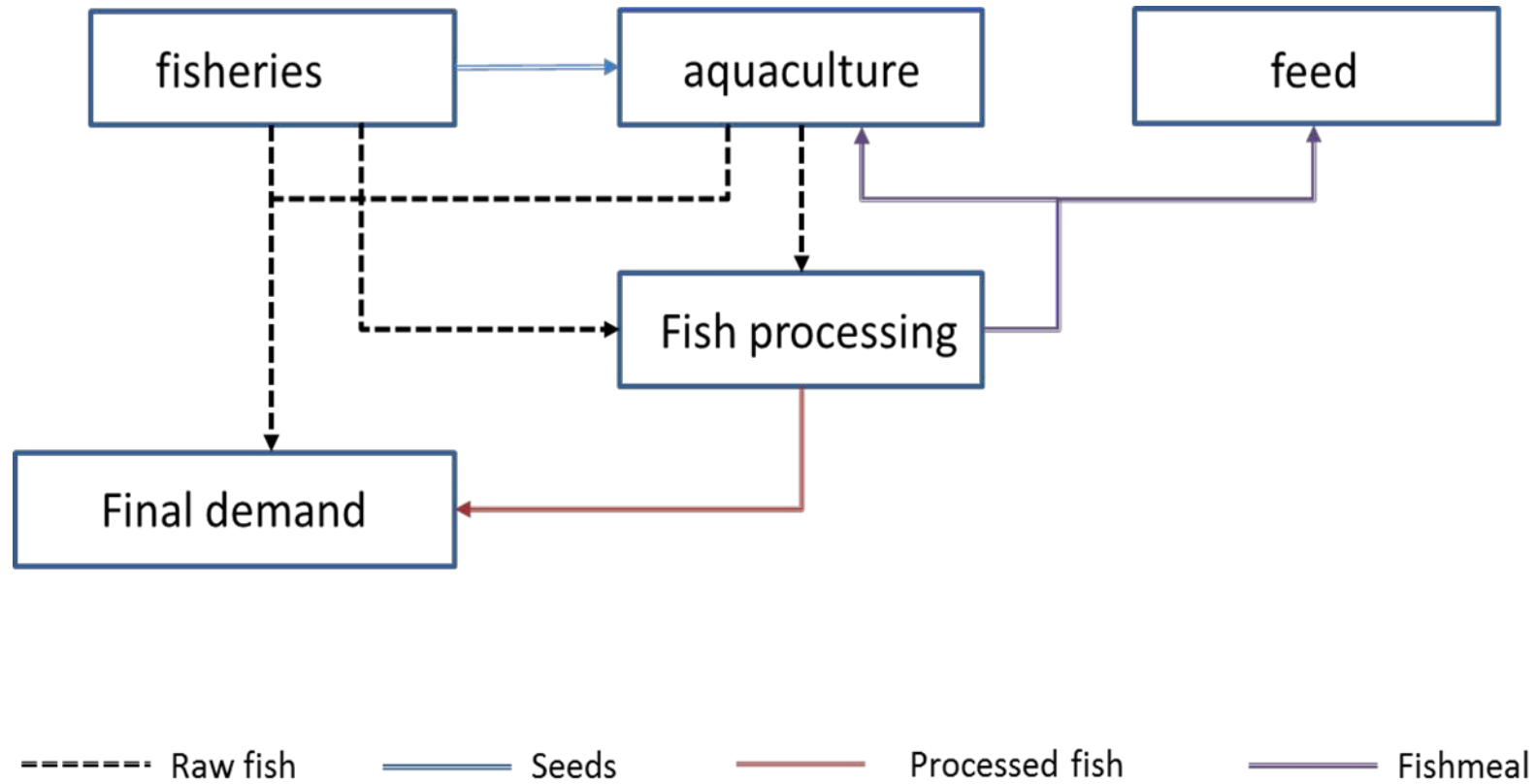


TABLE 2.2: Fish Products Included in the IMPACT Model

CONSUMPTION CATEGORY	PRODUCTION CATEGORY	
SPECIES GROUP	SPECIES GROUP	ABBREVIATION
Shrimp	Shrimp	Shrimp
Crustaceans	Crustaceans	Crustaceans
Mollusks	Mollusks	Mollusks
Salmon	Salmon	Salmon
Tuna	Tuna	Tuna
Freshwater and diadromous	Tilapia	Tilapia
	Pangasius and other catfish	Pangasius/catfish
	Carp	Carp
	Other carp	OCarp
	Eel and sturgeon	EelStg
	Other freshwater and diadromous	OFresh
Demersals	Major demersals	MDemersal
	Mullet	Mullet
Pelagics	Cobia and swordfish	CobSwf
	Other pelagics	OPelagic
Other marine	Other marine	OMarine
Fishmeal	Fishmeal	Fishmeal
Fish oil	Fish oil	Fish oil



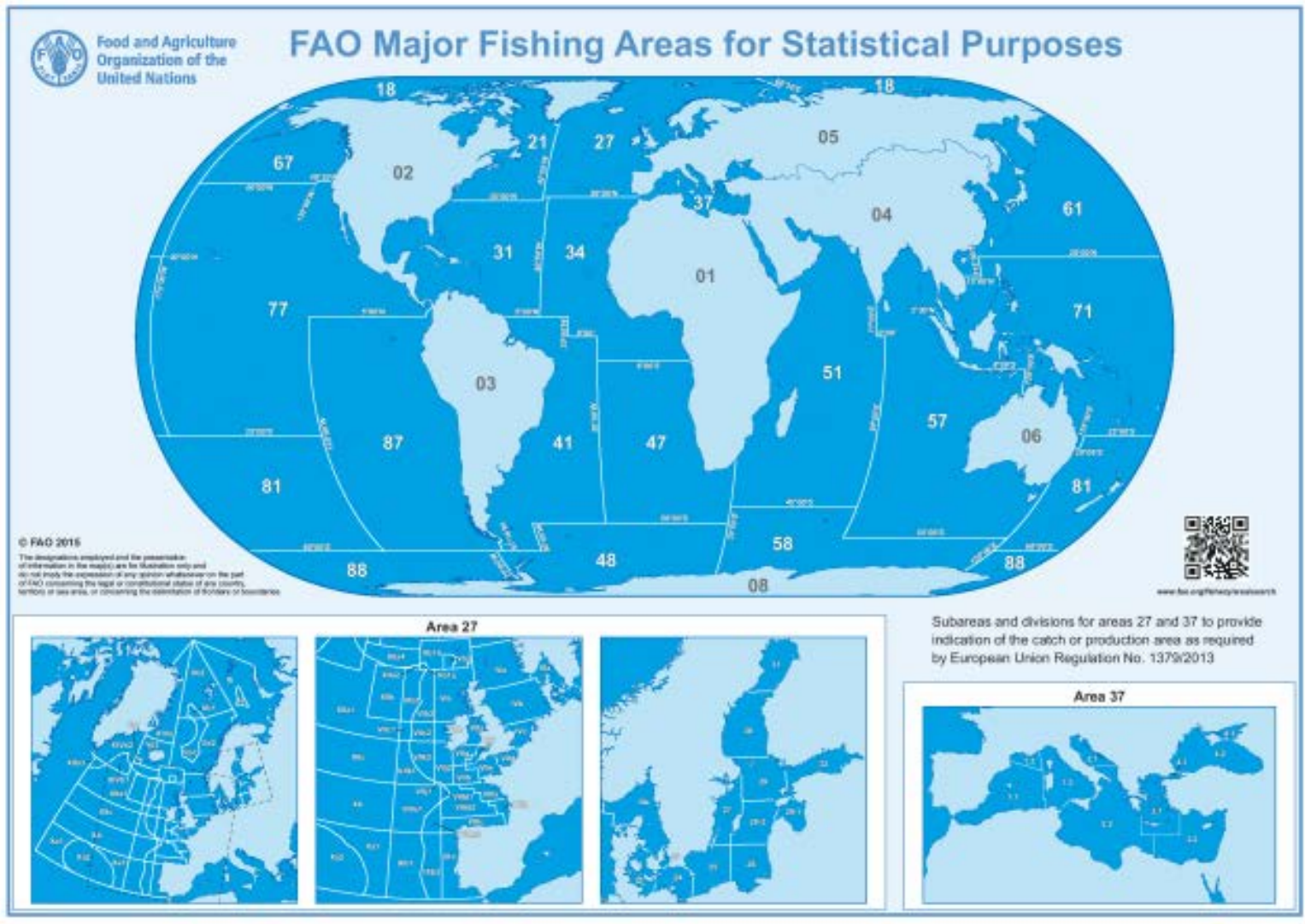
Species classification in CAPRI

Consumption Category	Production Category	
Species group	Species group	Abbreviation
Shrimp	Shrimp	SHMP
Crustaceans	Crustaceans	CRUS
Mollusks	Mollusks	MOLS
Salmon	Salmon	SALM
Tuna	Tuna	TUNA
Freshwater and diadromous	Tilapia	TILP
	All Carp	CARP
	Other freshwater and diadromous	OFFS
Demersals	Demersals	DFIS
Pelagics	Pelagics	PFIS
Other marine	Other marine	OAQU
Fishmeal	Fishmeal	FSML
Fish oil	Fish oil	FSOL

Source: World bank (2013)

GLOBIOM

GLOBIOM Fish Commodity Definitions	
	Tilapia
	Catfish
	Salmon
	Other Freshwater and Diadromous
	Demersal
	Tuna
	Other Pelagic
	Other Marine
	Shrimp
	Other Crustaceans
	Molluscs



For the group discussion...

- What are, from your perspective, the most interesting sustainable innovations in seafood production?
- How can the health and environmental benefits of seafood be measured and used to promote seafood consumption?
- Which future scenarios for seafood consumption would you like to see modelled in the SUSFANS project?
- Can you think of ways in which your organization could contribute?



Global seafood trade

- Seafood - the globally most traded food commodity globally (45% entering international trade)

