



INTERNATIONAL FISHMEAL AND FISH OIL ORGANISATION

The Use of Marine Resources for Aquaculture

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AQUAVISION
September 2006

Introduction

- What is IFFO?
- World Fishing
- Fishmeal & Oil Production
- Its use in Aquaculture
- Is it Sustainable?
- Is it a good use of a resource?
- Conclusions

What is IFFO?

The International Fishmeal and Fish Oil Organisation, the global trade association representing fishmeal and fish oil producers and related trades.

Represents two-thirds of world production plus 95% of exports of fishmeal and fish oil worldwide



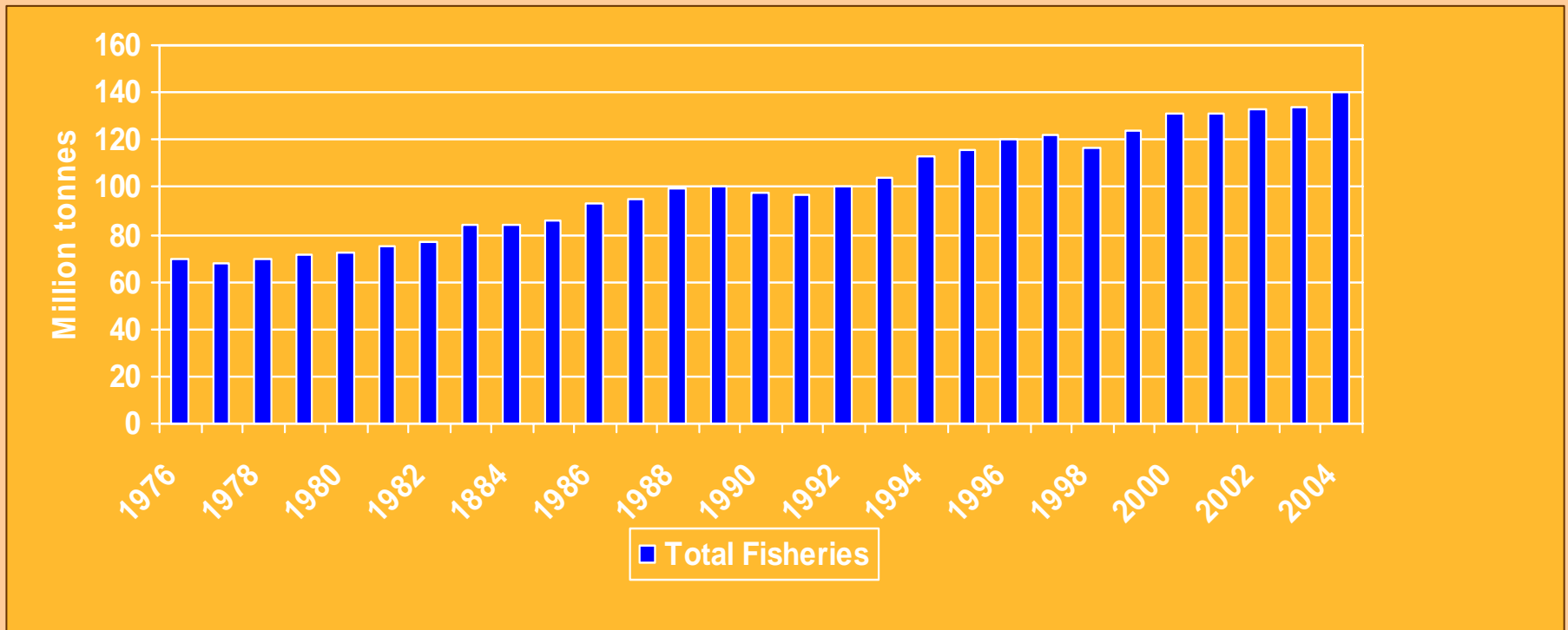
A short history

1950-1969 - Fish Oil extracted for production of margarines and soaps. Fishmeal more a by-product used for fertilizer & animal feed

1970-1989 - Fishmeal important feed ingredient in intensive animal production (poultry, cattle & pigs). Oil becomes more of a by-product often just used for fuel

1990-2009 - Fishmeal increasingly used in aquaculture diets and becoming a strategic ingredient for critical phases in the lifecycle of animal production due to its unique nutritional qualities. Fish Oil increasingly valued for its health and nutritional benefits to humans and animals

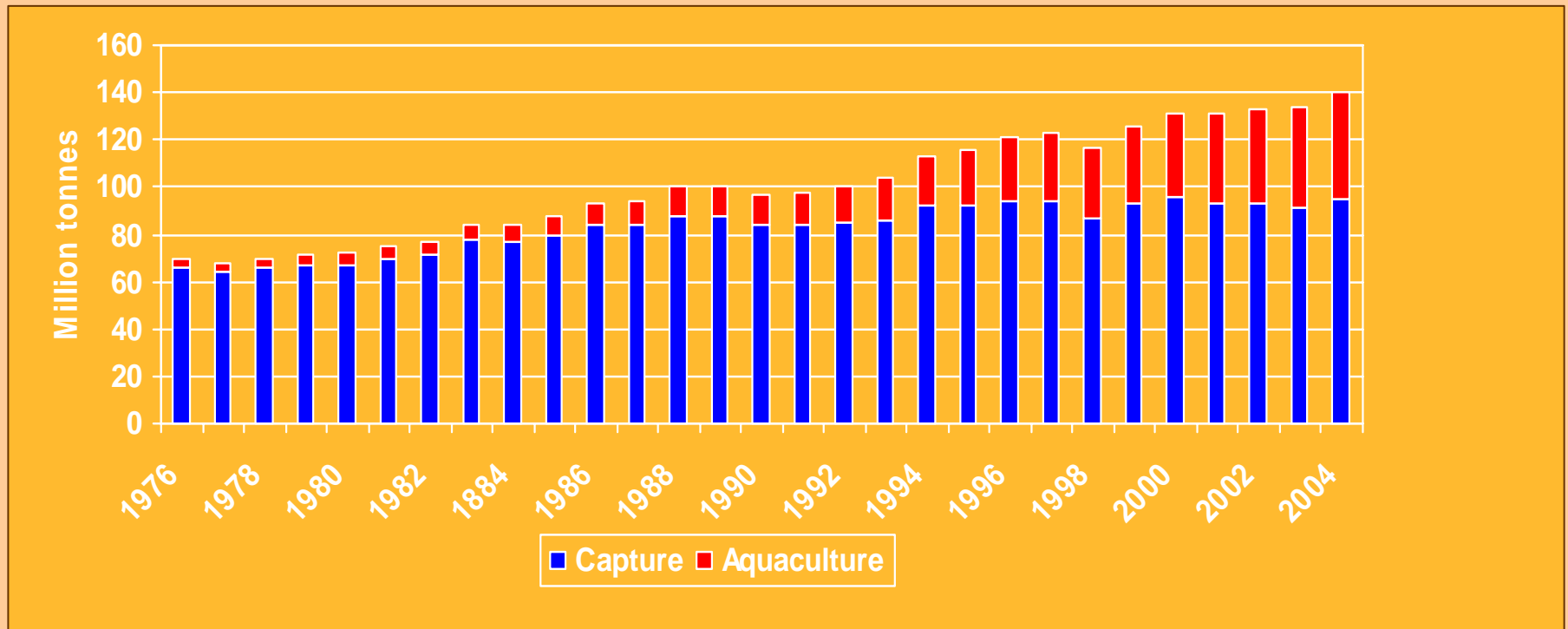
World fisheries – total output



FAO 2005



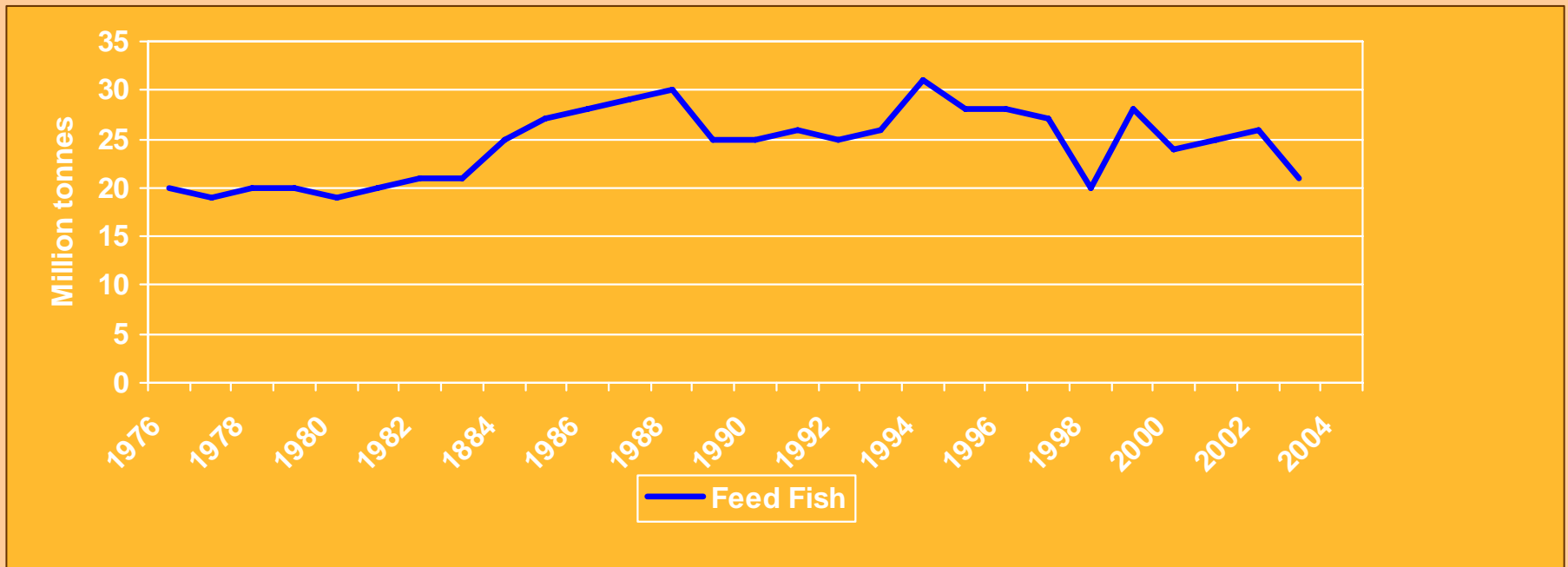
The growth of aquaculture



FAO 2005



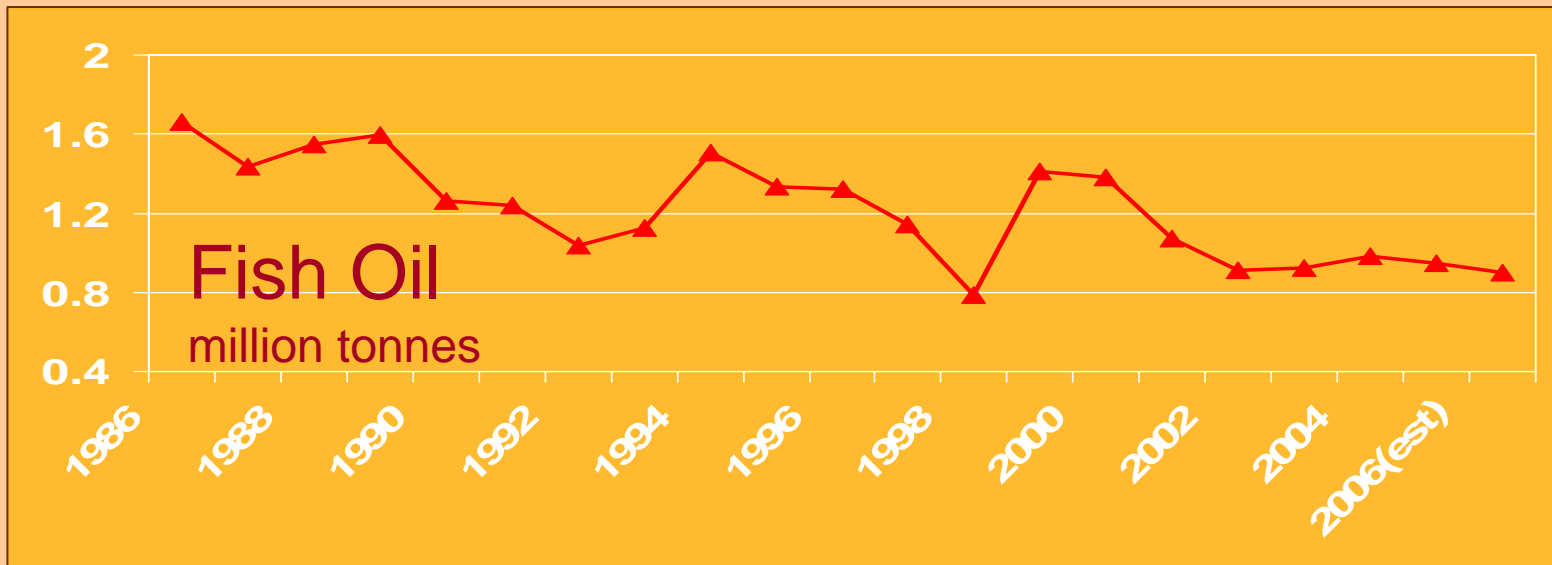
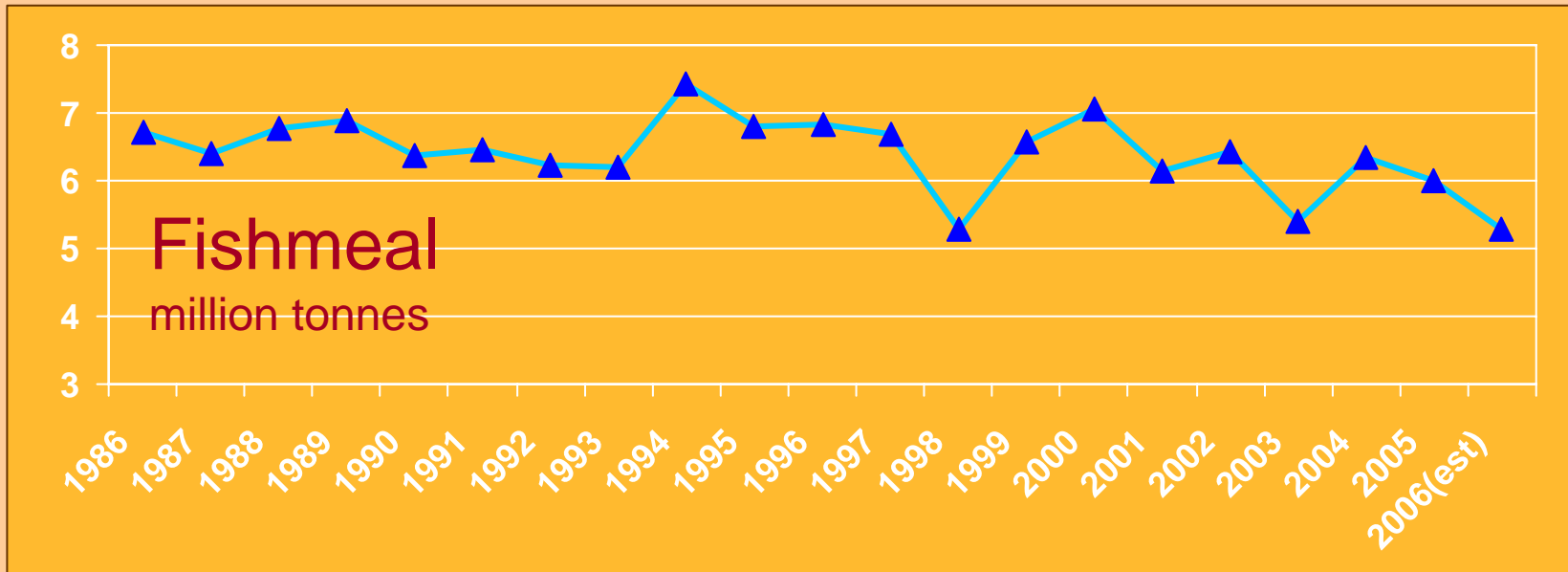
World feed fisheries landings



FAO 2005



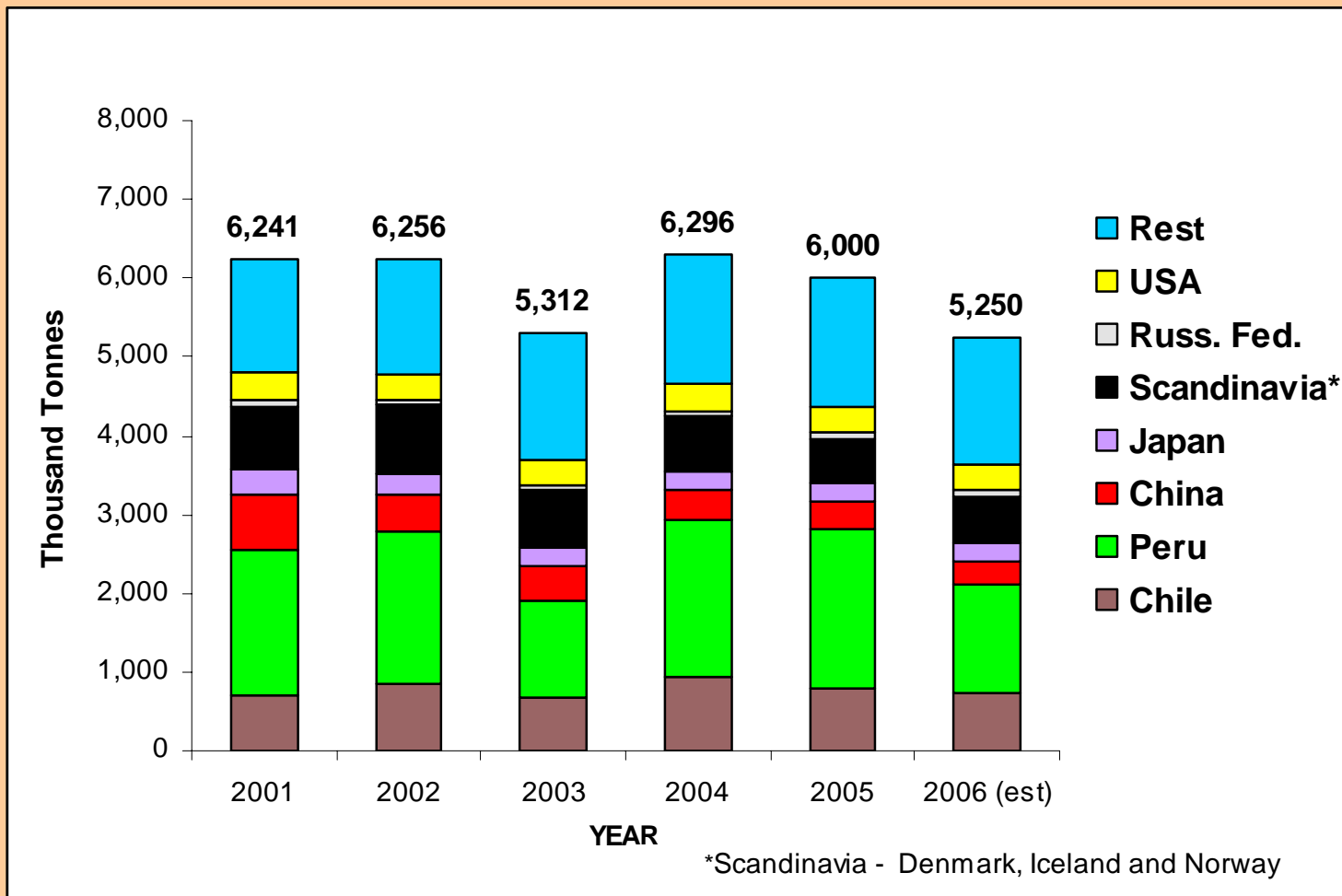
World production of fishmeal & fish oil



IFFO Data



Annual fish meal production



World fisheries summary

To sum up:

- ✓ The global fish catch has increased principally due to an increase in aquaculture
- ✓ Food Fishing has increased
- ✓ Feed Fishing has not increased
- ✓ Fishmeal Production has remained relatively constant except in El Niño years
- ✓ This year's reduction comes from a controlled quota reduction in Peru

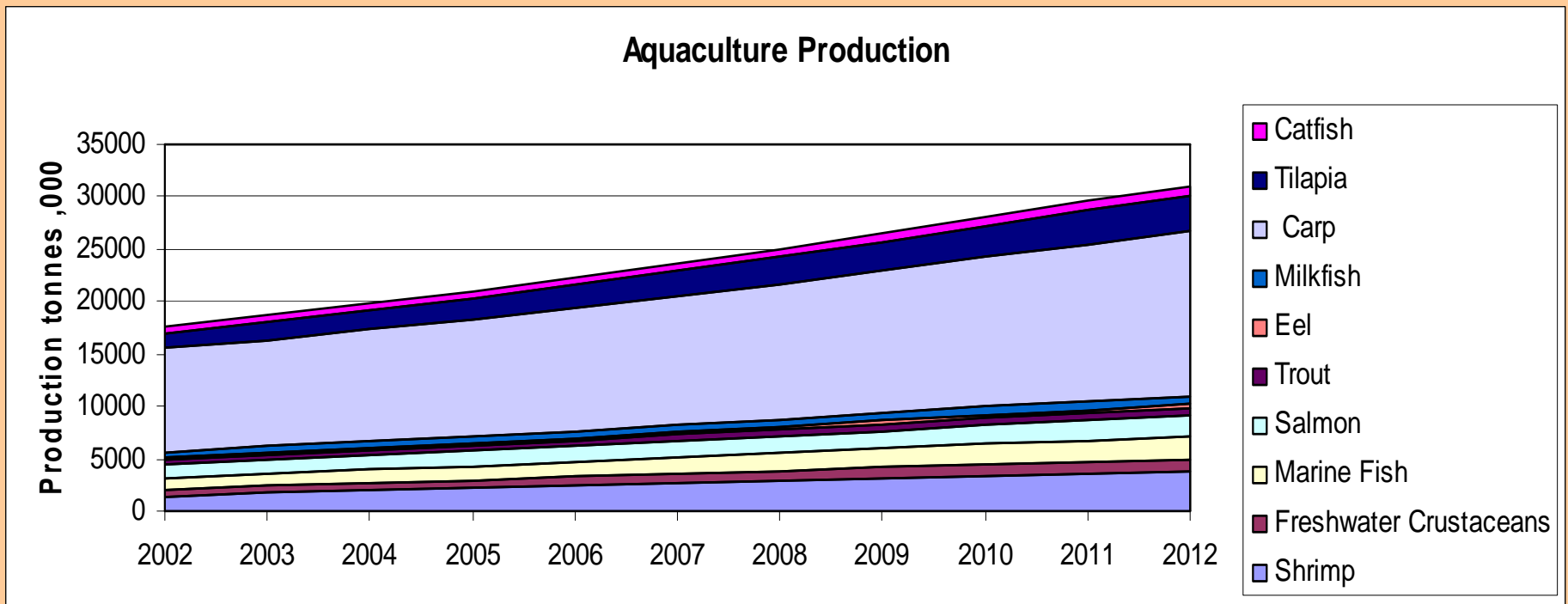
World fisheries summary

To sum up:

- ✓ Total Fisheries production increased principally due to an increase in aquaculture
- ✓ Food Fish production increased
- ✓ Feed Fish production increased
- ✓ Fishmeal production increased
- constant exports of fishmeal and fish oil
- ✓ This years reduction in fishmeal comes from a controlled quota reduction in Peru

**"But surely
if aquaculture
keeps increasing
then so will
the production
of meal & oil!"**

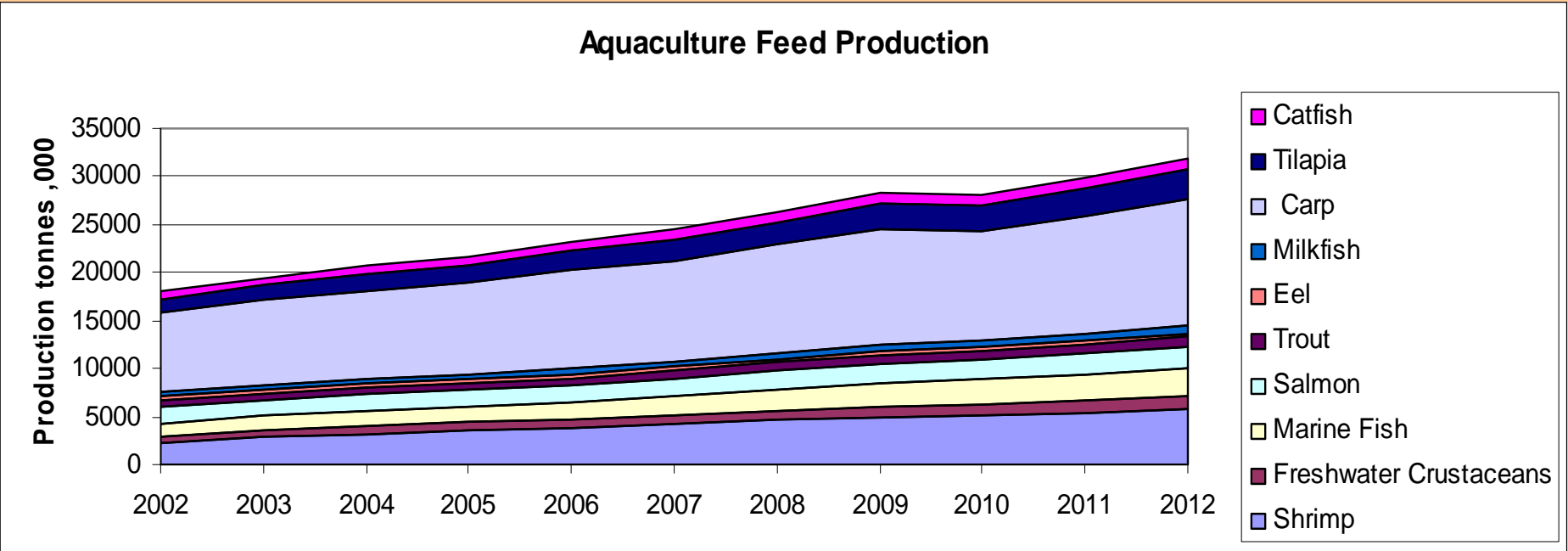
World aquaculture production of major fed species



FAO 2006



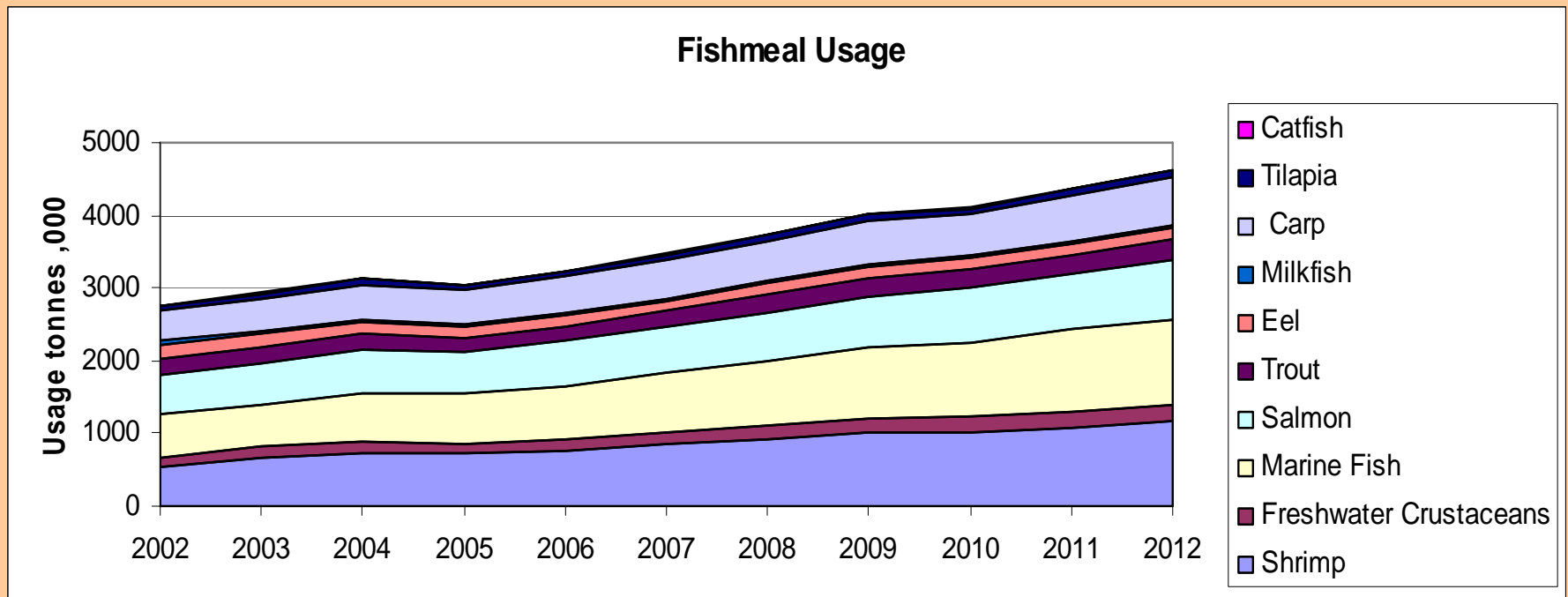
World aquaculture feed production



FAO 2006



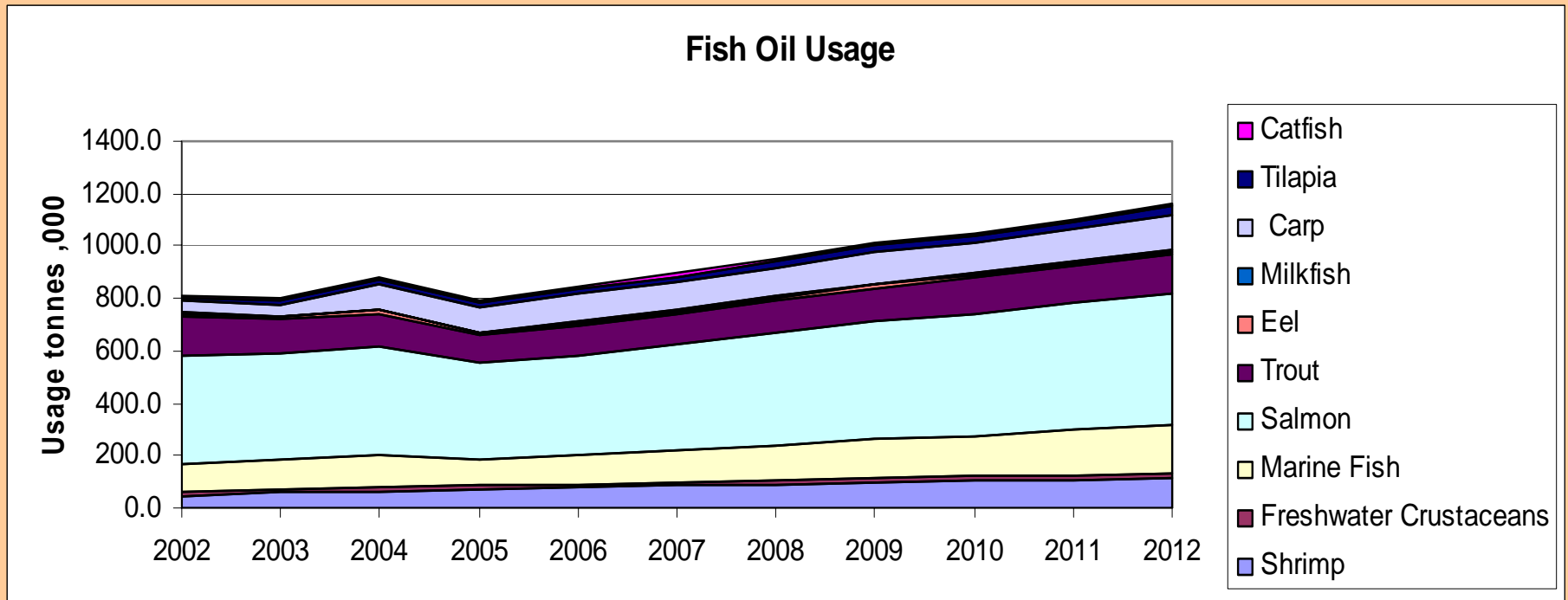
Projection of fishmeal use at 2005 inclusion levels



Based on FAO 2006 with IFFO data



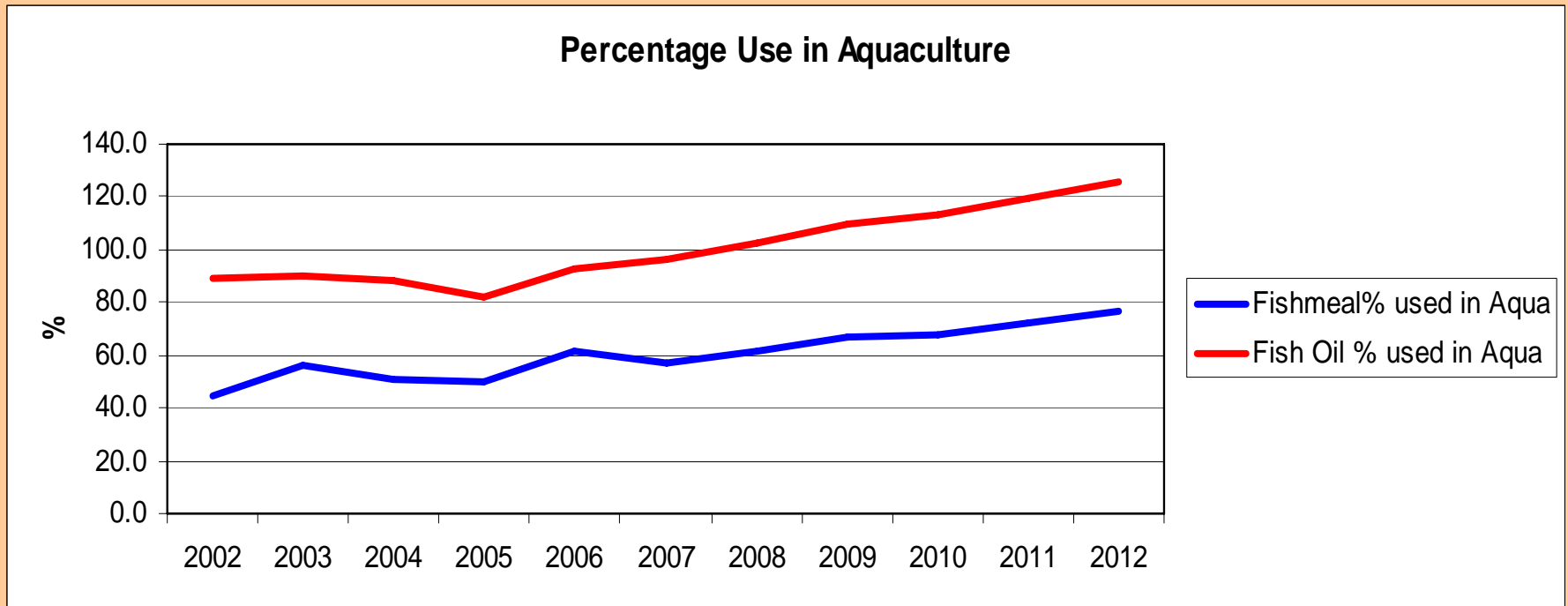
Projection of fish oil use at 2005 inclusion levels



Based on FAO 2006 with IFFO data



Percentage use with 2005 inclusion

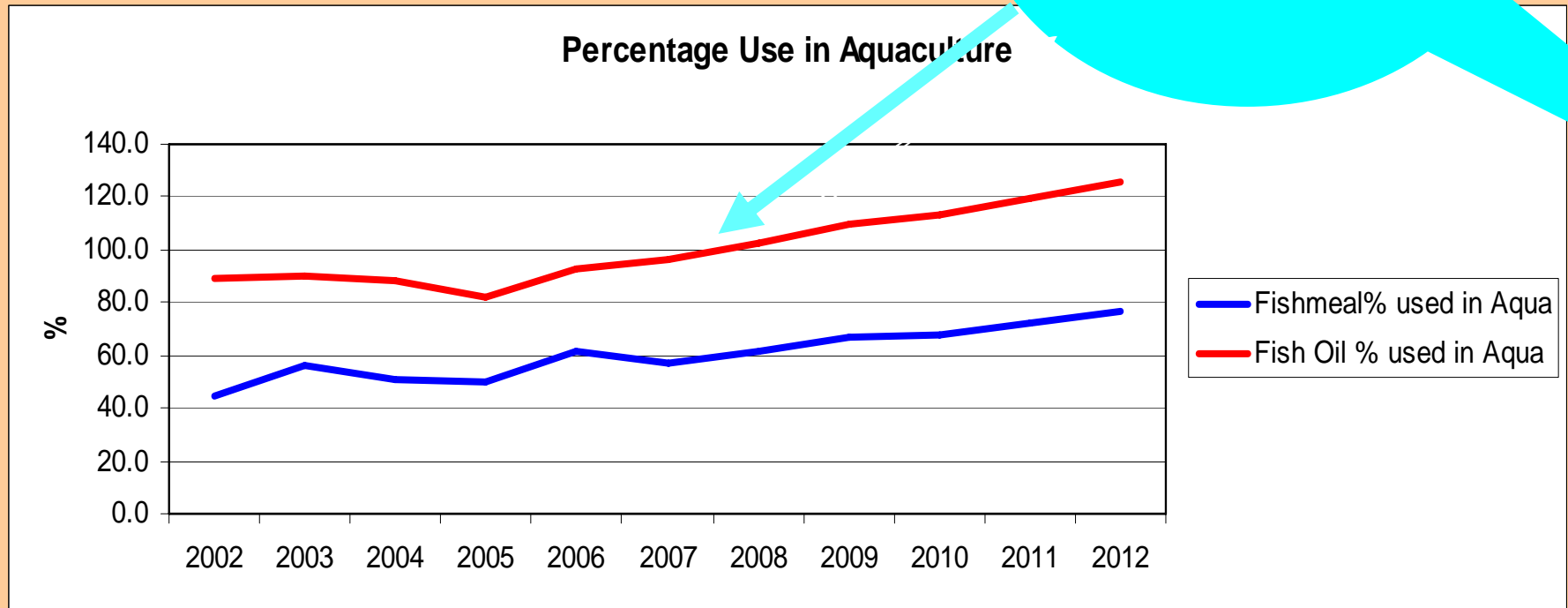


Based on FAO 2006 with IFFO data



Percentage use with 2005

"There – its not sustainable!"



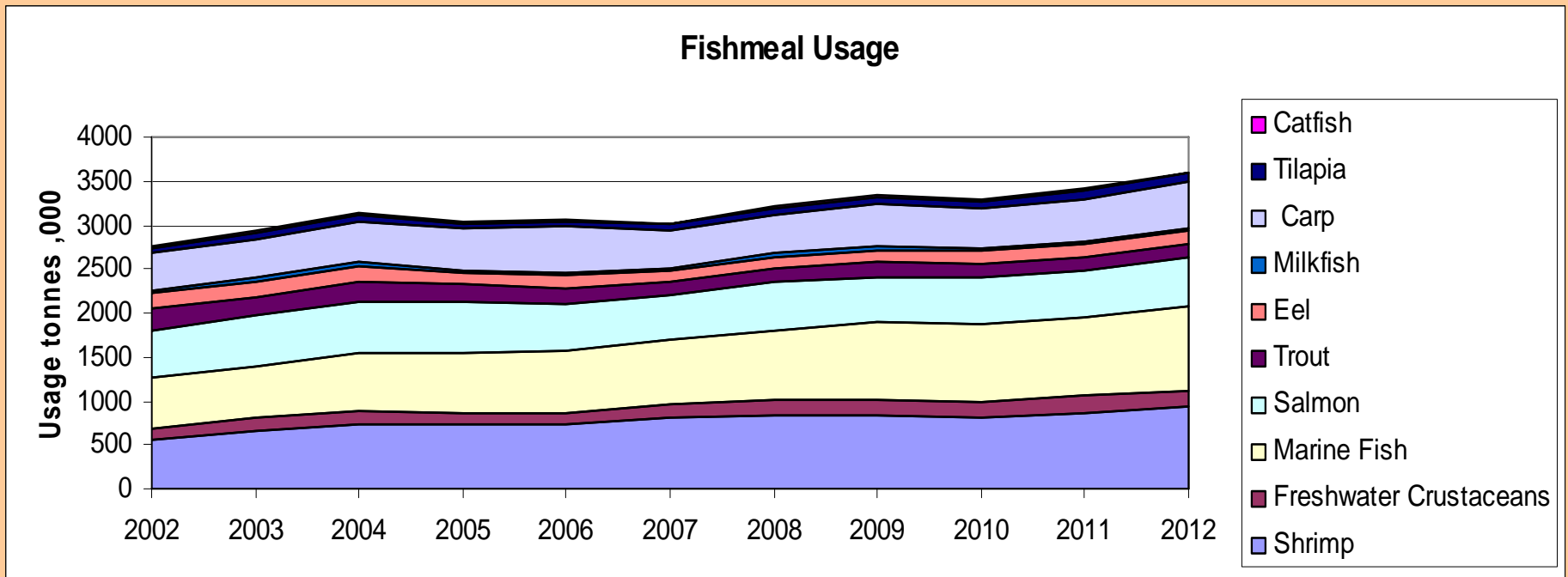
Based on FAO 2006 with IFFO data



Use in Aquaculture

- If Aquaculture keeps growing does fishmeal and fish oil production have to increase?
- As the supply tightens the price rises driving the search for replacements
- The protein requirement can be partially met by land animal proteins and plant proteins
- The oil requirement can be partially met by plant oils although care has to be taken to retain the omega 3 oils in the final product

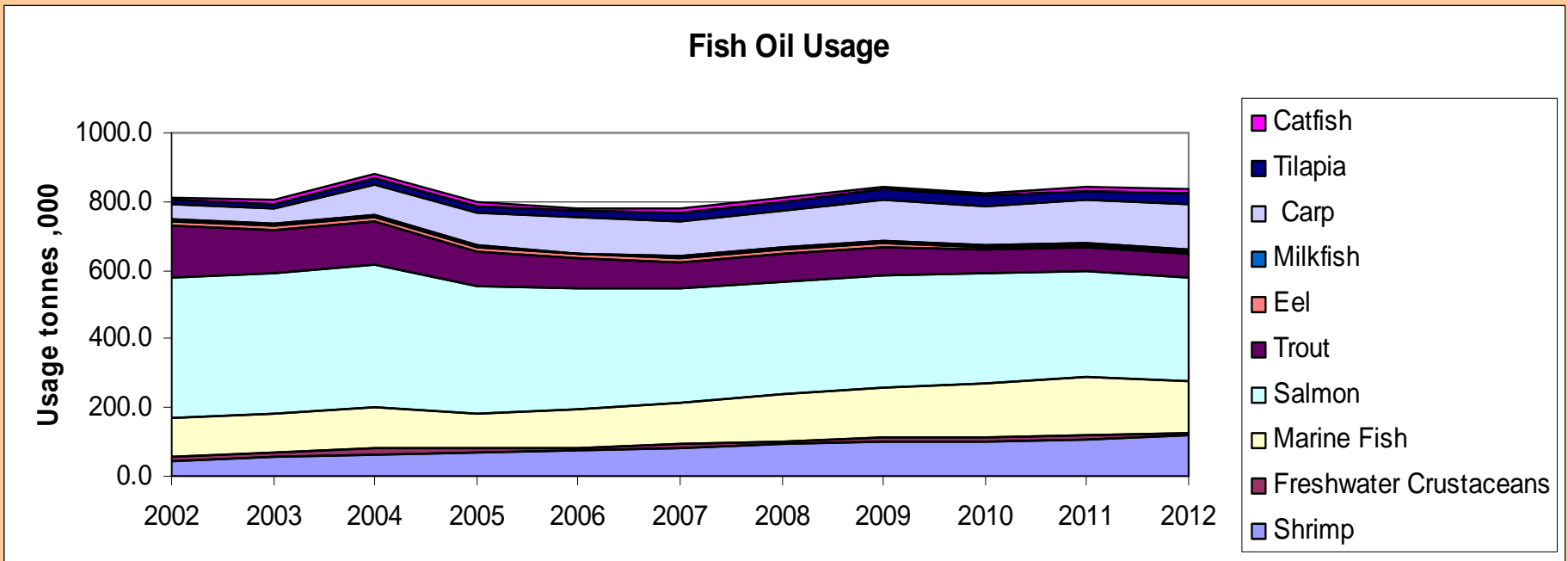
Fishmeal use in aquaculture with increased substitution



Based on FAO 2006 with IFFO data



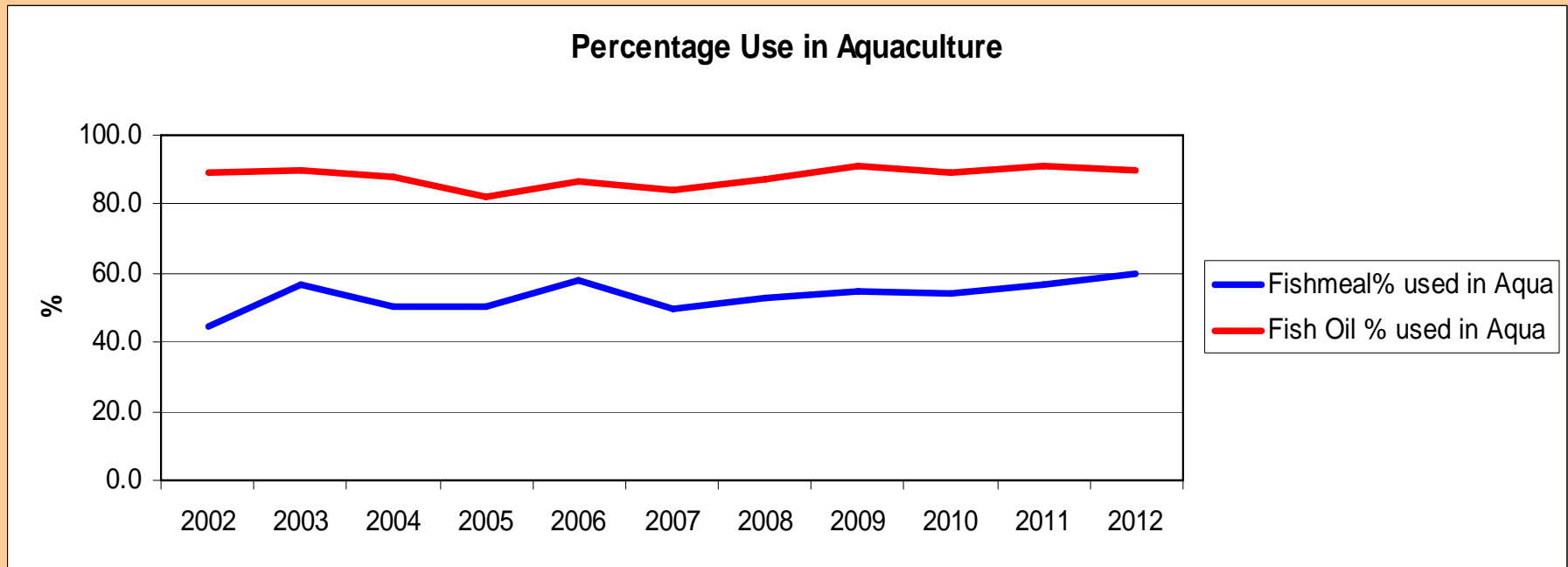
Fish oil use in aquaculture with increased substitution



Based on FAO 2006 with IFFO data



Fishmeal & oil used in aquaculture with increased substitution



Based on FAO 2006 with IFFO data





"But is the current level of production sustainable?!"

What does Sustainable mean?

World Commission on Environment and Development in 1987 defined it as:

'Development that meets the needs of the present without compromising the needs of the future'

Sustainable Production

Despite biological fluctuations production has remained relatively constant

Unlike most fishing for human consumption, feed fish are mostly small pelagic fish with a short life-cycle, therefore recovery is rapid – as seen in Peru after an El Niño

Most major feed fisheries are controlled by TAC's, area catch limits, seasonal bans, min. mesh sizes, vessel registration and satellite tracking

Sustainable Production - Peru

Given Peru's importance with 1/3 of world fishmeal we should look more closely at their control measures

Because of the economic importance of this industry their fisheries have been monitored and controlled for many years

Sustainable Production - Peru

Given Peru's importance with 1/3 of world fishmeal we should look closely at their control measures

"But what about illegal fishing"


Because of the economic importance of this industry their fisheries have been monitored and controlled for many years

SGS Monitoring in Peru



Sustainability status

- Feed Fisheries have a better record than food fisheries for sustainability
- According to FAO the fisheries in Chile and Peru are being fully fished to over-fished (concern over excess capacity), but still being fished sustainably.
- In Europe the previously unregulated blue whiting fishery is now subject to quotas
- EU has made a commitment to move to Maximum Sustainable Yield for its fisheries

A photograph of a fish farm in the ocean. In the foreground, a person wearing a dark jacket and a hat is seen from the side, looking out at the water. The fish farm consists of several large, rectangular cages suspended in the water. A large, white, misty plume of water is being discharged from one of the cages, creating a large cloud of white water. The sky is clear and blue. A large, semi-transparent blue circle is overlaid on the right side of the image, containing the text "Feeding fish to fish still sounds wrong and inefficient" in white font.

**"Feeding
fish to fish still
sounds wrong and
inefficient"**

Optimal use of the resource

- Feed Fisheries are a renewable resource which have an annual sustainable yield of 20-25 million tonnes.
- We have 3 options as to what to do with this:
 1. Leave it for the next trophic level
 2. Harvest it directly for human food
 3. Harvest it for feeding to animals

Optimal use of the Resource - 1

Leaving it for the next trophic level would result in about 90% loss of protein and energy (Åsgård & Austreng)

It would certainly result in a net reduction in human food without a major alteration and improvement in the environment

Optimal use of the Resource - 2

- Any fish usually harvested for feed that can be sold for human food, will be, because the price is higher
- Increasingly Chilean Jack Mackerel are going for human consumption
- The FAO Code of Conduct for Responsible Fisheries encourages wherever possible fish to go for food not feed.

BUT.....

Which would you rather eat in quantity?:



Most feed fish are small, bony and almost inedible

Optimal use of the Resource - 3

If converted to animal feed the best efficiency is achieved in Aquaculture:

Retained (%) energy & protein from feed to food

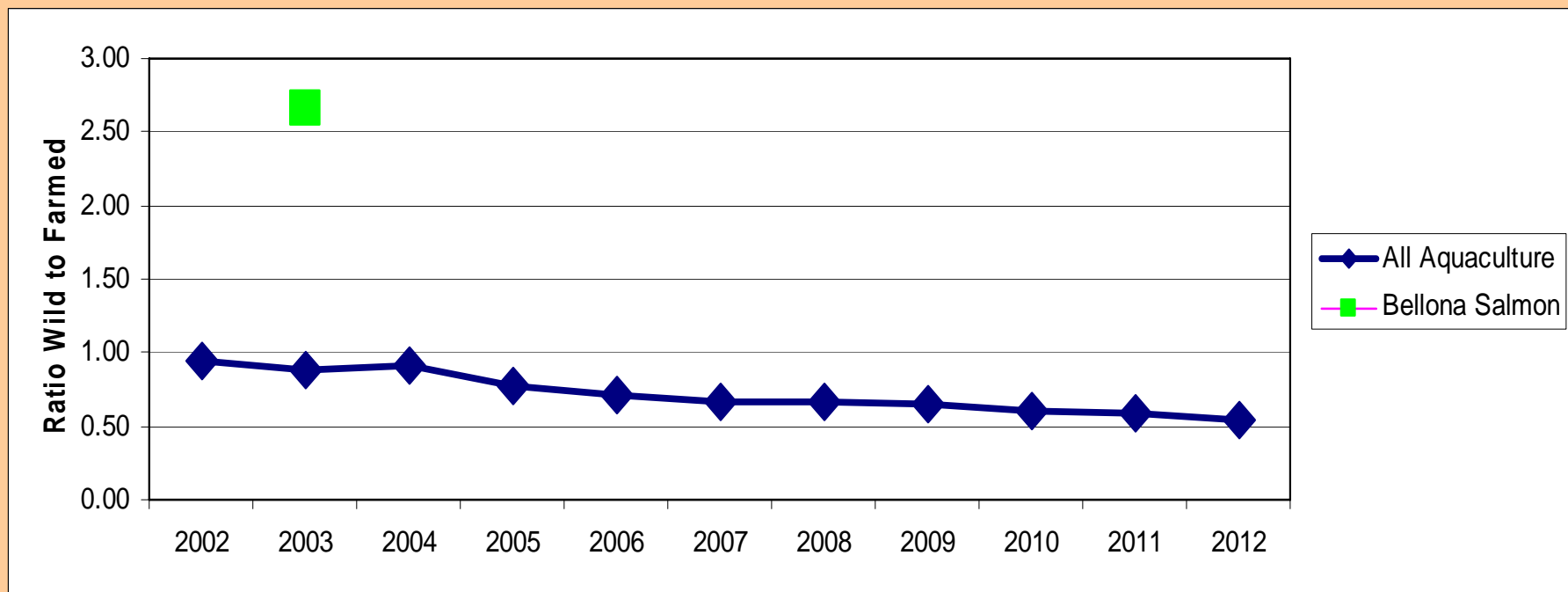
| | Salmon | Chicken | Pigs |
|---------|--------|---------|------|
| Energy | 27 | 12 | 16 |
| Protein | 30 | 18 | 13 |

Åsgård & Austreng 1995

Optimal use of the Resource - 3

- The conversion factor from wild fish into farmed fish has produced a lot of discussion
- Bellona (2003) calculated a figure of 2.66kg of feed fish to produce 1kg of salmon in Norway
- With improving FCRs and increasing substitution this will go below 2
- Because of a lower requirement for fish oil other species are even lower than salmon

Eco-efficiency wild to farmed

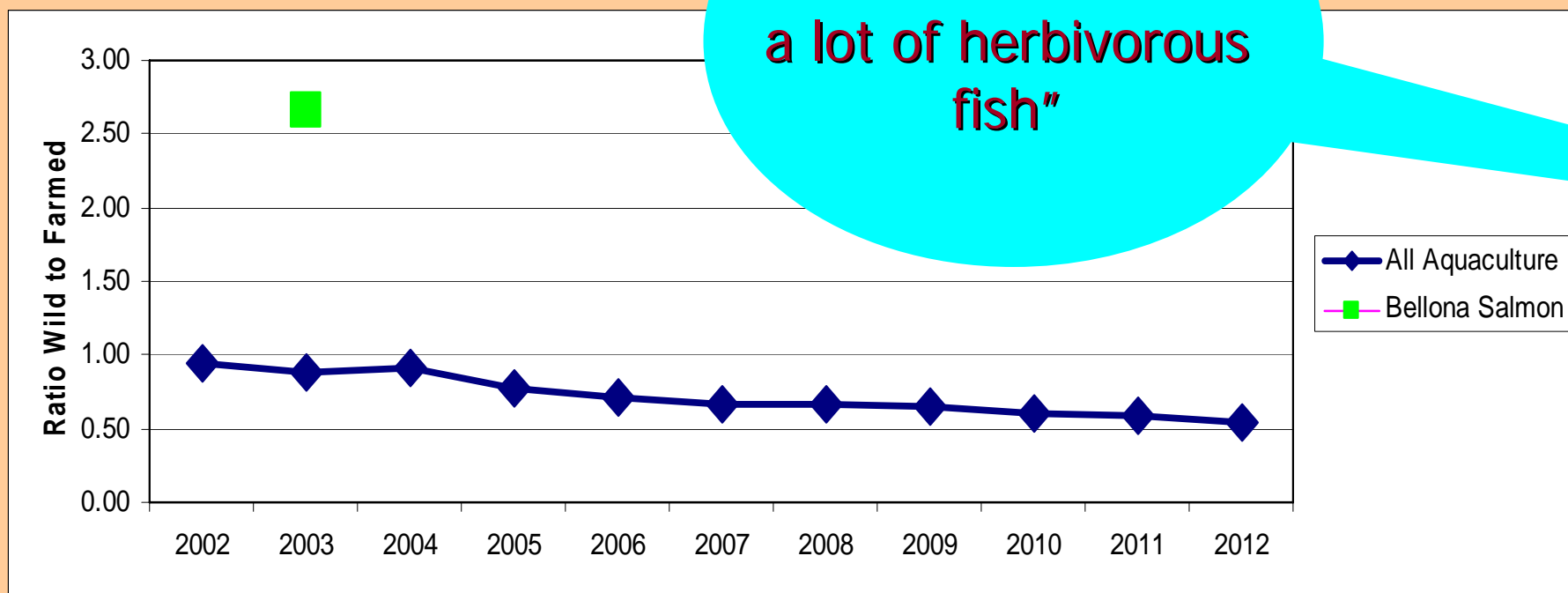


Based on FAO 2006 with IFFO data



Eco-efficiency wild to farmed

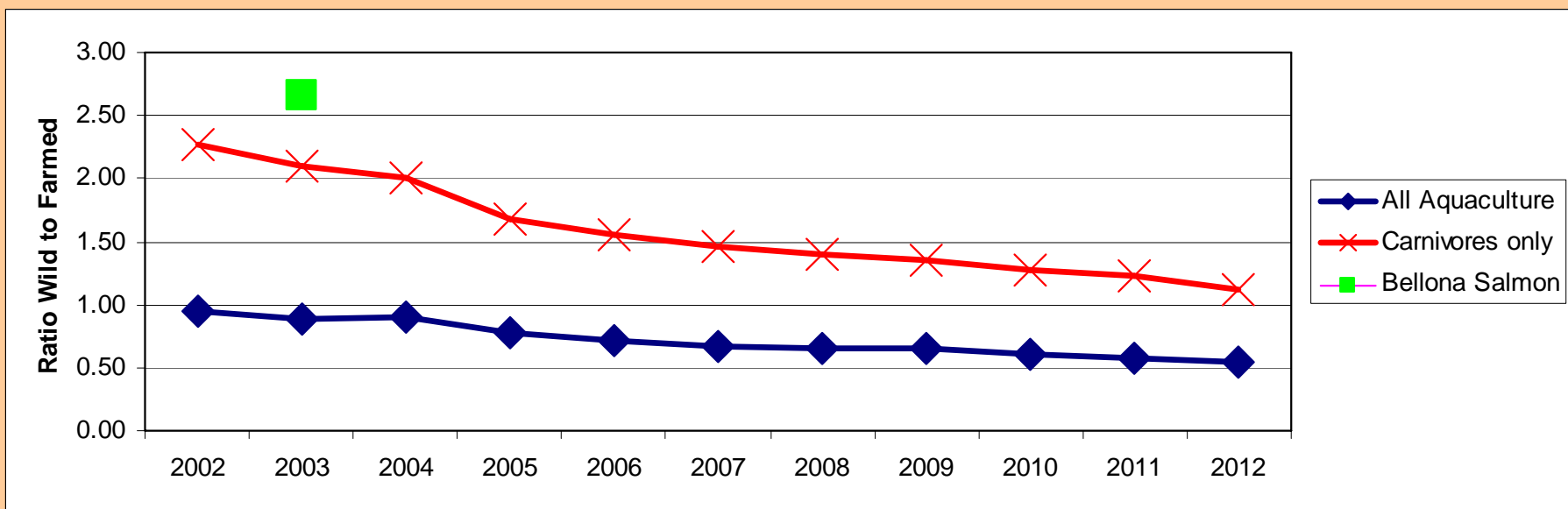
"But that includes a lot of herbivorous fish"



Based on FAO 2006 with IFFO data



Eco-efficiency wild to farmed



Based on FAO 2006 with IFFO data



Optimal use of the Resource - 3

- In addition a significant amount of fishmeal is coming from fish processing by-products e.g. trimmings
- There are increasing amounts of meal and oil being produced from aquaculture processing
- The estimated 1.5 million tonnes of salmon harvested next year would yield around 30,000 tonnes of fishmeal and 20,000 tonnes of fish oil
- This further improves the eco-efficiency calculation

New Resources – not many

Discarded By-catch

- Many economic reasons for dumping of “accidentally” caught fish
- Recent estimates put the figure at 7.3 million tonnes worldwide (FAO 2005)
- In NE Atlantic alone it was estimated at 1.4 million tonnes (FAO 2005)
- Efforts are being made to reduce the figure and it has come down
- Catch should be minimised and remainder made into fishmeal & fish oil

New Resources 2

- Trash Fish
 - Estimated 5-6 million tonnes of low value wet fish used in Asian aquaculture (Allan 2004)
 - More efficient use if turned into meal & oil
- Antarctic Krill
 - Biomass of 400-500 million tonnes
 - Sustainable annual catch of 4-5 million tonnes
 - This would yield 500,000-750,000 of meal
 - Currently only about 100,000 tonnes harvested
 - Aker Seafood Corp about to start increasing krill meal production

Conclusions

- ✓ Fishmeal and Fish oil are natural and highly nutritious ingredients produced from renewable resources which are currently being well managed
- ✓ Production has remained relatively stable except during El Niño years and is unlikely to increase
- ✓ The use of fishmeal and fish oil in aquaculture has grown but will not limit aquaculture's future development due to substitution
- ✓ The combination of fishmeal/oil & aquaculture is an increasingly eco-efficient method of upgrading low value inedible fish to high value health-promoting sea food products
- ✓ The unique nutritional qualities of fishmeal and oil are becoming increasingly recognised, as well as fish oil's health promoting characteristics
- ✓ IFFO and its members are committed to the sustainable development of the fishmeal and oil industry

Parting Message

Fishmeal and fish oil, once commodities, are becoming high value strategic dietary ingredients, used at critical points in the life cycle of many aquaculture species.

This ensures that the fixed volumes of these renewable resources will be sufficient to meet the growing global demand for healthy sea food and reduce the pressure on over-exploited stocks of fish for human consumption.