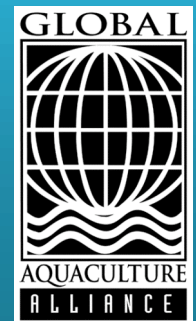


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# Aquaculture Performance Indicators

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Global Aquaculture Alliance

GAPI / LCA workshop San Diego



# Outline

1. Status of the BAP program
2. Projections
3. Quantitative indicators in BAP
4. BAP and GAPI
5. Measuring impact on wild fisheries

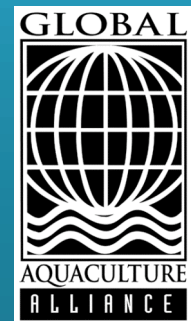
# Status of the BAP program

## – Standards for

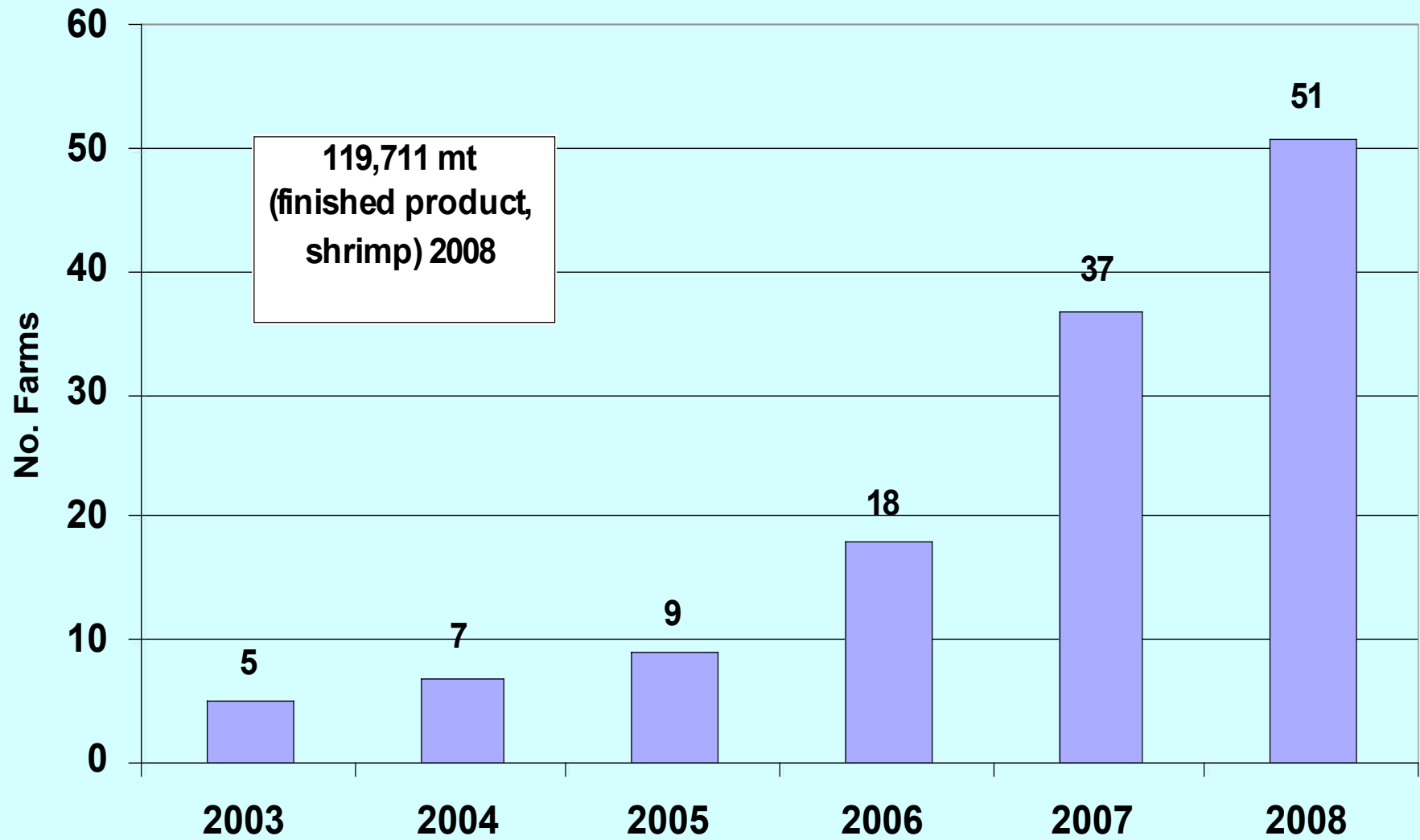
- Shrimp (farms, hatcheries)
- Channel catfish
- Tilapia
- Processing plants

## – Next

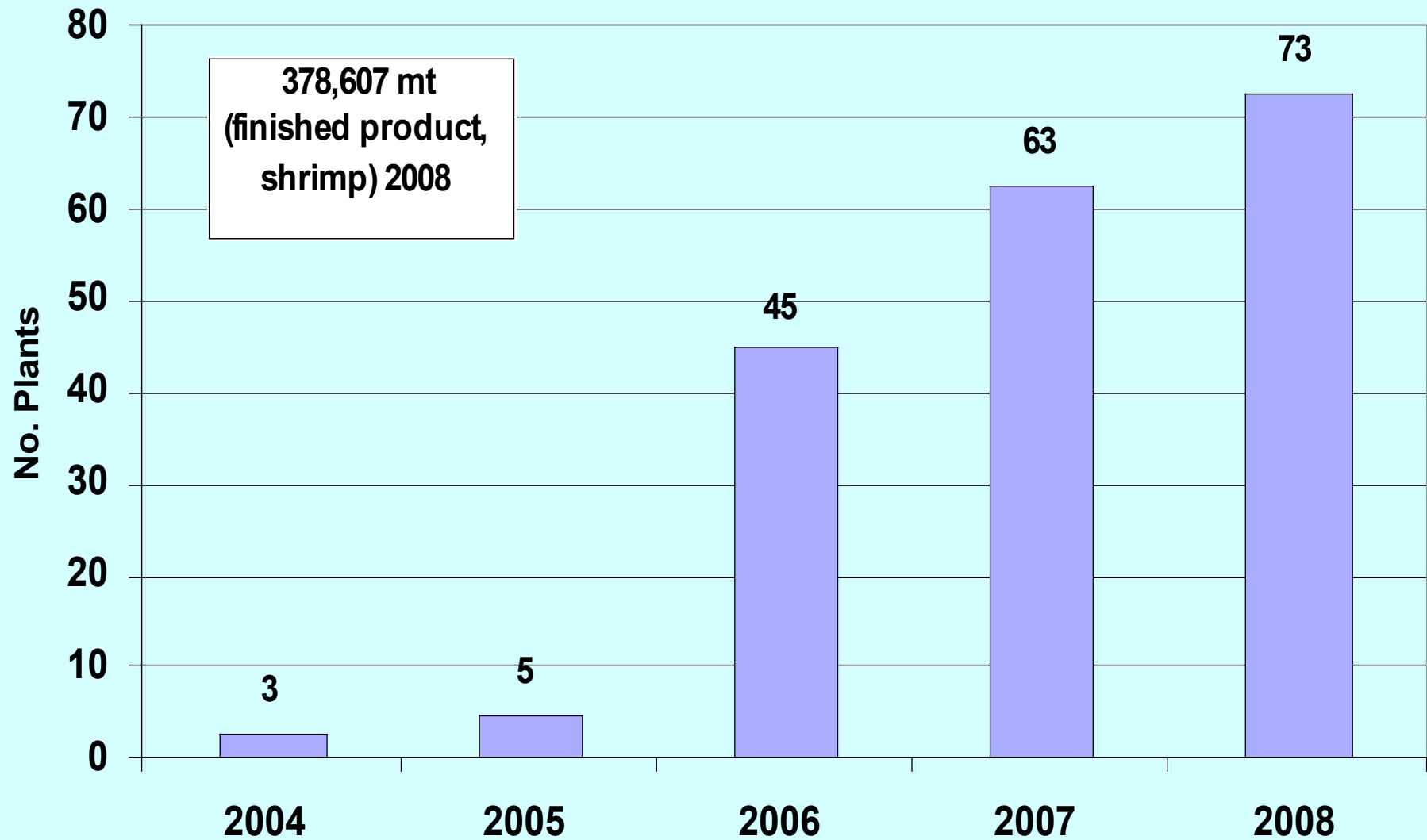
- *Pangasius*
- Feedmills
- Salmon



## BAP: Farm Participation (Worldwide)

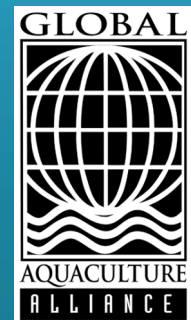


## BAP: Processing Plants Participation (Worldwide)

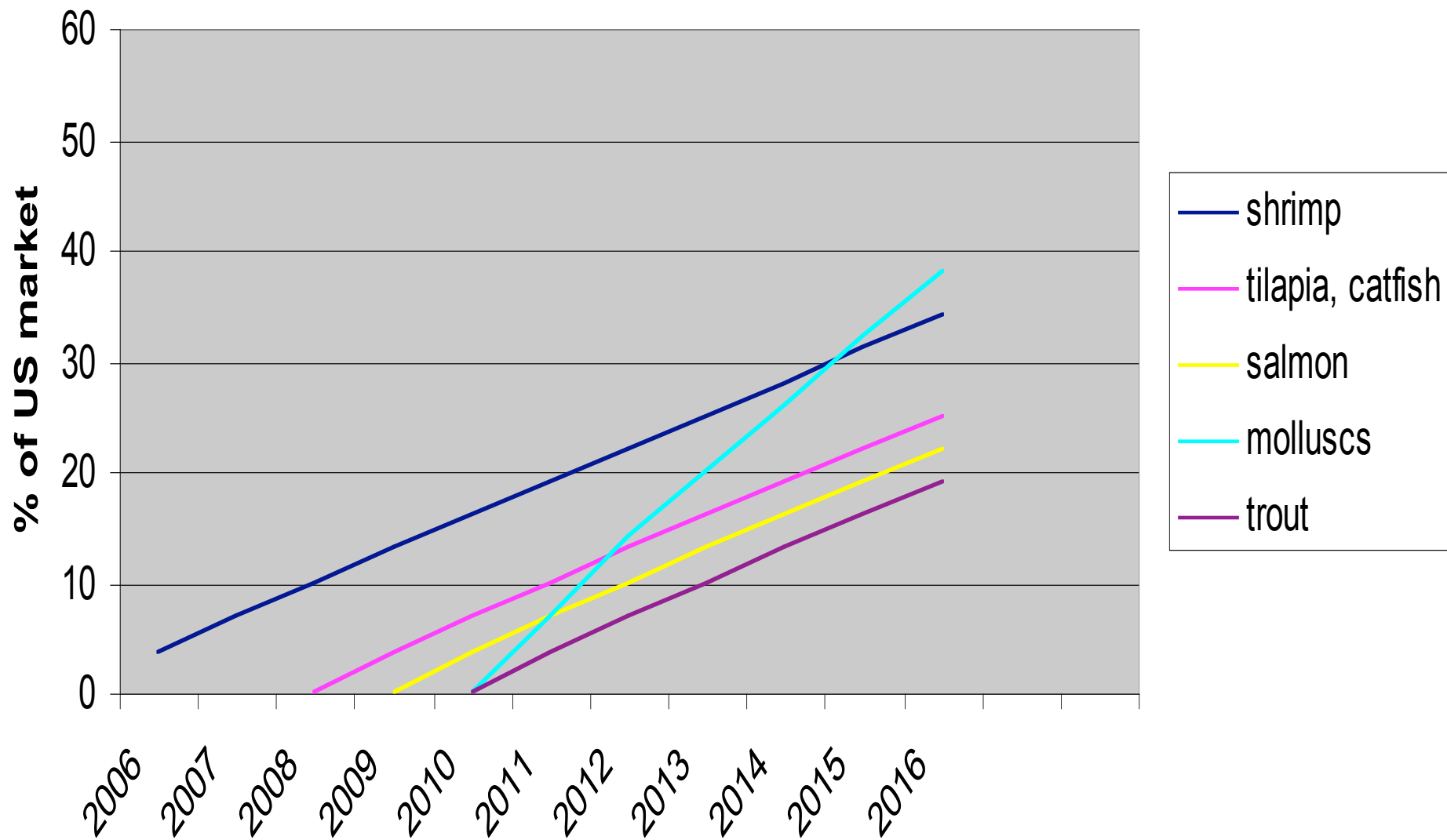


# Latest Supply Data

- BAP shrimp from plants 378,607 MT (2008)
- BAP Tilapia from plants 40,408 MT (2008)
- BAP Farm shrimp 119,711 MT (2008)
- BAP Farm Tilapia 6,000 MT (January 2009)
- BAP Farm Catfish 16,000 MT (January 2009)



# Projected Availability of Certified Farmed Seafood



# BAP: existing performance metrics

- Some key performance requirements are not suitable for comparative purposes, e.g:
  - Mangrove displacement = 0
  - Use of banned antibiotics = 0
  - Salinization of land, water = 0
  - Use of wild post-larvae = 0

# BAP: existing performance metrics

- Farm level
  - Effluent concentration limits (pH, TSS, P, N, BOD, DO)
  - Water use and load indices
    - eg water use (m<sup>3</sup>/kg fish)
    - eg soluble phosphorus (kg/ton of fish)
  - Feeding rate limits
    - for cage farms in lakes
  - FCR
  - Fish in: Fish out Ratio (= FFER)
  - Fish welfare
    - Biomass maximum
    - Max periods for fasting, crowding, time out of water

# BAP: Existing eco-system level performance metrics

- Feeding rate limits for lakes, reservoirs
  - for combined input from all farms, depending on water surface area and hydraulic retention time

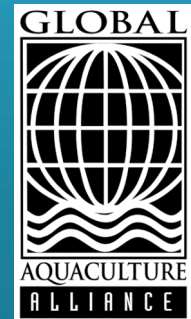
# GAPI vs FLAPI

- FLAPI
  - = farm-level aquaculture performance index
- Potential for conveying messages
  - to individual farmers: BAP, FLAPI
  - to consumers: BAP
  - to national and international policymakers:  
GAPI

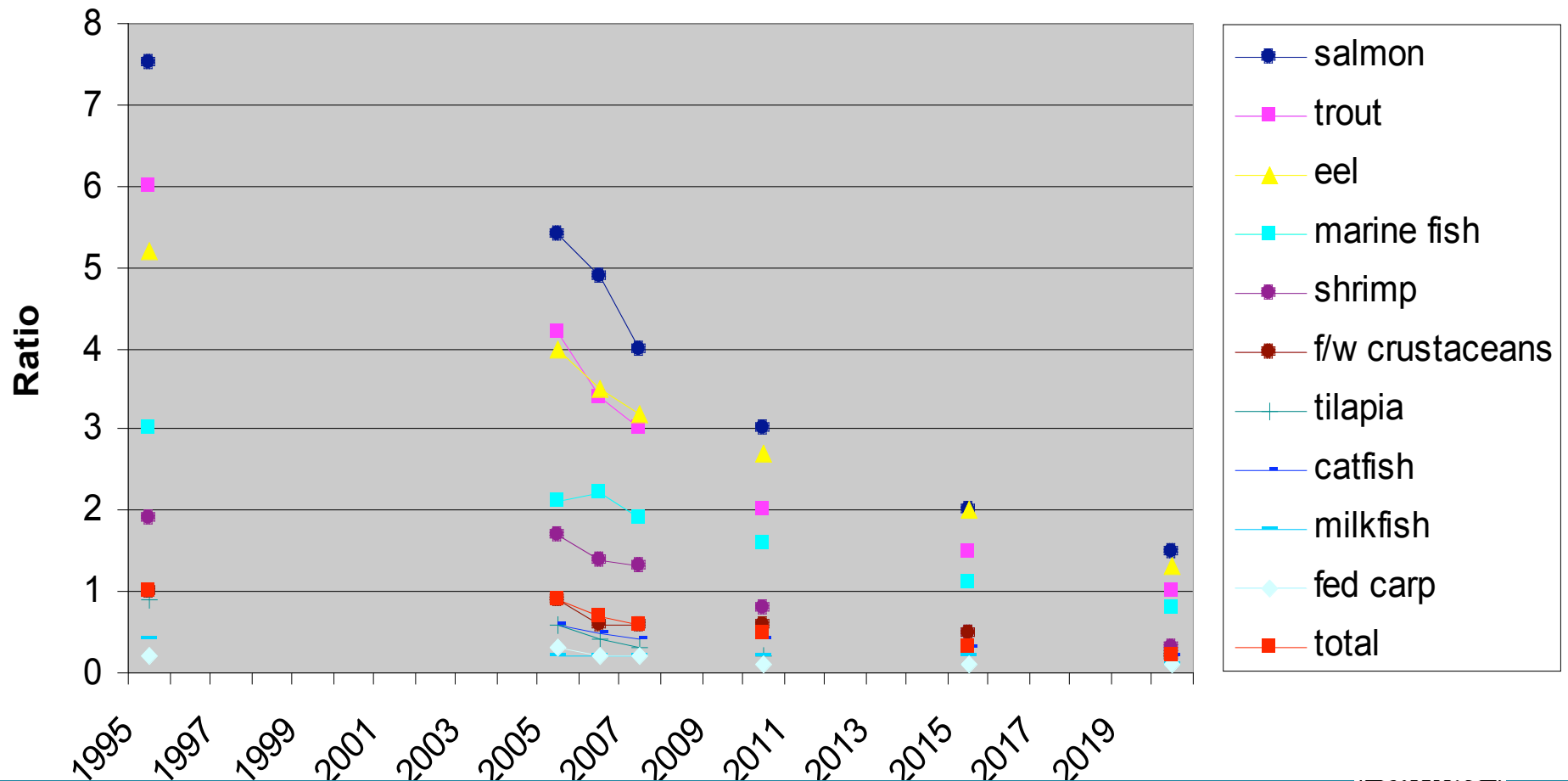
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# Potential compatibility between BAP and FLAPI approaches

- BAP could require each farm to calculate an overall performance index (=FLAPI)
- Then set minimum FLAPI
- Progressively raise minimum FLAPI over time



## Fish in: Fish out ratios for major, fed aquaculture species (data from Tacon and Metian, 2008)



# Wild fish used in feed for the fish and shell fish most commonly farmed in 1997\*

Species/group	Production with compound diets (kilotonnes)	fishmeal (%)	fish oil (%)	FCR	wild fish used	fish in: fish out ratio
marine finfish	377	50	15	2.2	1944	5.16
eel	117	50	10	2	546	4.69
shrimp	725	30	2	2	2040	2.81
salmon	737	45	25	1.5	2332	3.16
trout	473	35	20	1.5	1164	2.46
tilapia	331	15	1	2	466	1.41
milkfish	78	10	3	2	74	0.94
catfish	351	10	3	1.8	296	0.84
fed carps	2445	8	1	2	1834	0.75

\* Naylor *et al.* 2000, excluding filter feeding carps and molluscs

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# Wild fish used in feed for fish and shell fish in 2007 \*

Species/group	Production with compound diets (kilotonnes)	fishmeal (%)	fish oil (%)	FCR	wild fish used (m.)	wild fish used (o.)	fish in: fish out ratio (m.)	fish in: fish out ratio (o.)
shrimp	3544	18%	2%	1.58	4484	2240	1.27	0.63
marine fish	1690	30%	7%	1.37	3080	3240	1.82	1.92
salmon	1538	24%	16%	1.25	2053	6160	1.33	4.01
trout	683	24%	12%	1.25	911	2040	1.33	2.99
chinese carps	10736	5%	0%	0.80	1906	0	0.18	0.00
catfish	2080	8%	2%	1.08	800	760	0.38	0.37
eel	279	50%	5%	1.43	884	400	3.17	1.43
misc f/w carnivores	855	40%	5%	0.34	516	300	0.60	0.35
f/w crustaceans	1119	14%	2%	0.99	689	340	0.62	0.30
tilapia	2575	5%	0%	1.39	800	0	0.31	0.00
milkfish	608	3%	1%	0.82	67	100	0.11	0.16

\* Tacon and Metian (2008) GAPI / LCA workshop San Diego



# Efficient use of wild fish inputs

Fish in: fish out ratios for 2007\*

salmon: 4.0

shrimp: 1.26

Thus a simple sum:

4.00 kg of wild fish needed for 1kg salmon

1.26 kg of wild fish needed for 1kg shrimp

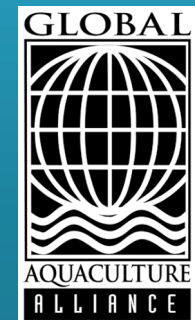
5.26 kg of wild fish needed for 1kg salmon and 1kg shrimp

## No!

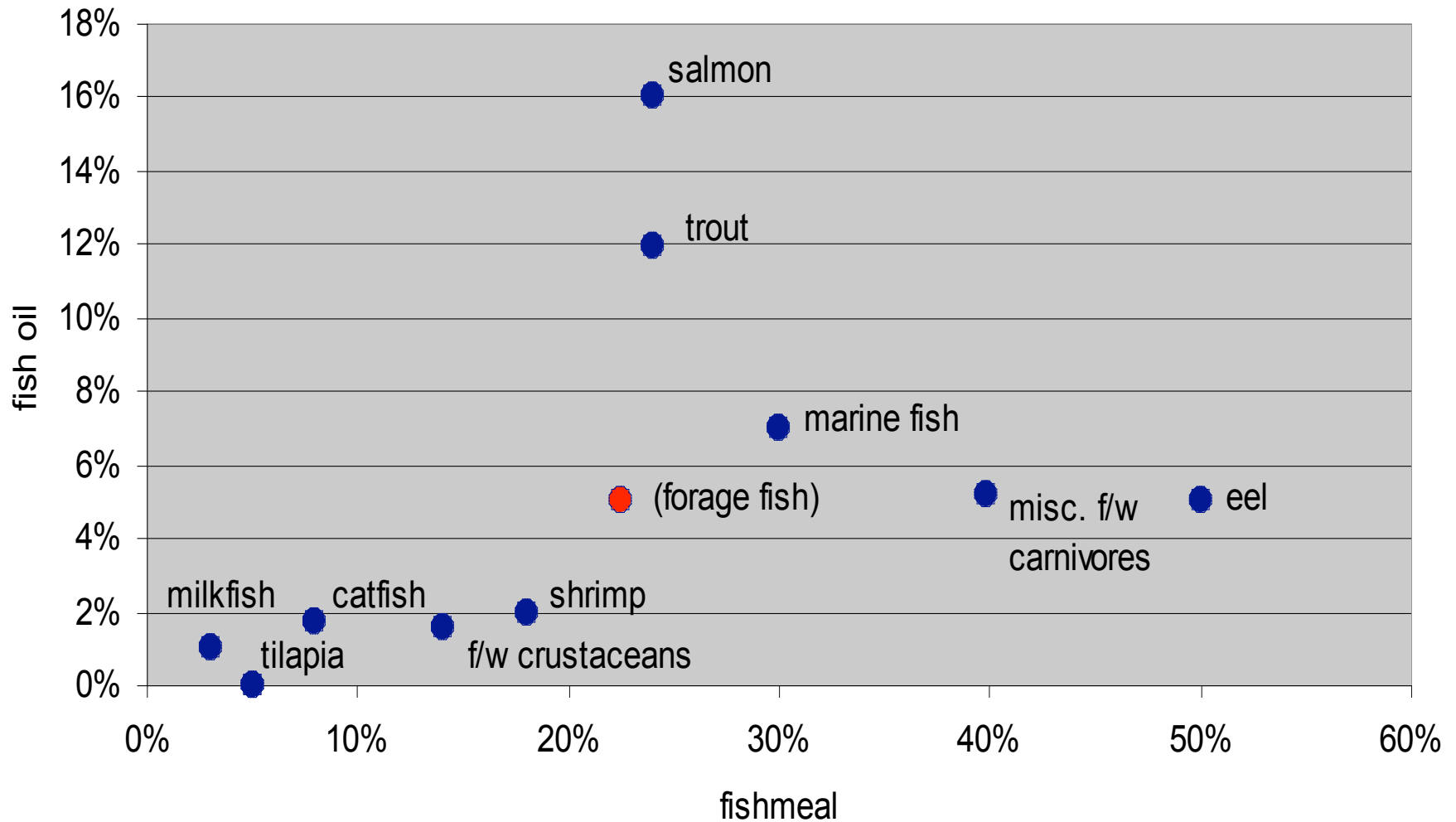
- Fish in: fish out ratios can be very misleading

\* (Tacon and Metian 2008)

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## Typical fishmeal and fish oil content of aquaculture diets (based on Tacon & Metian (2008))



# Actual yield from 5.26 kg of wild fish:

- Optimised ratio of salmon and shrimp, using all the oil and meal in 5.26kg of wild fish yields:

0.8 kg salmon, plus

3.3 kg shrimp

4.2 kg salmon and shrimp

- Traditional fish in: fish out calculation underestimates the overall efficiency of aquaculture

# Conclusions

- BAP for farm performance level
- Possibly adopt GAPI method = FLAPI
- FLAPI and GAPI for different audiences
- Quantitative indicators must be well designed
- Danger of 'hitting the target but missing the point'

