



# Sea Grant

Washington

# Finfish Aquaculture and its relationship to forage fish

California Current Joint Venture  
Forage Fish Steering Committee  
July 22, 2008

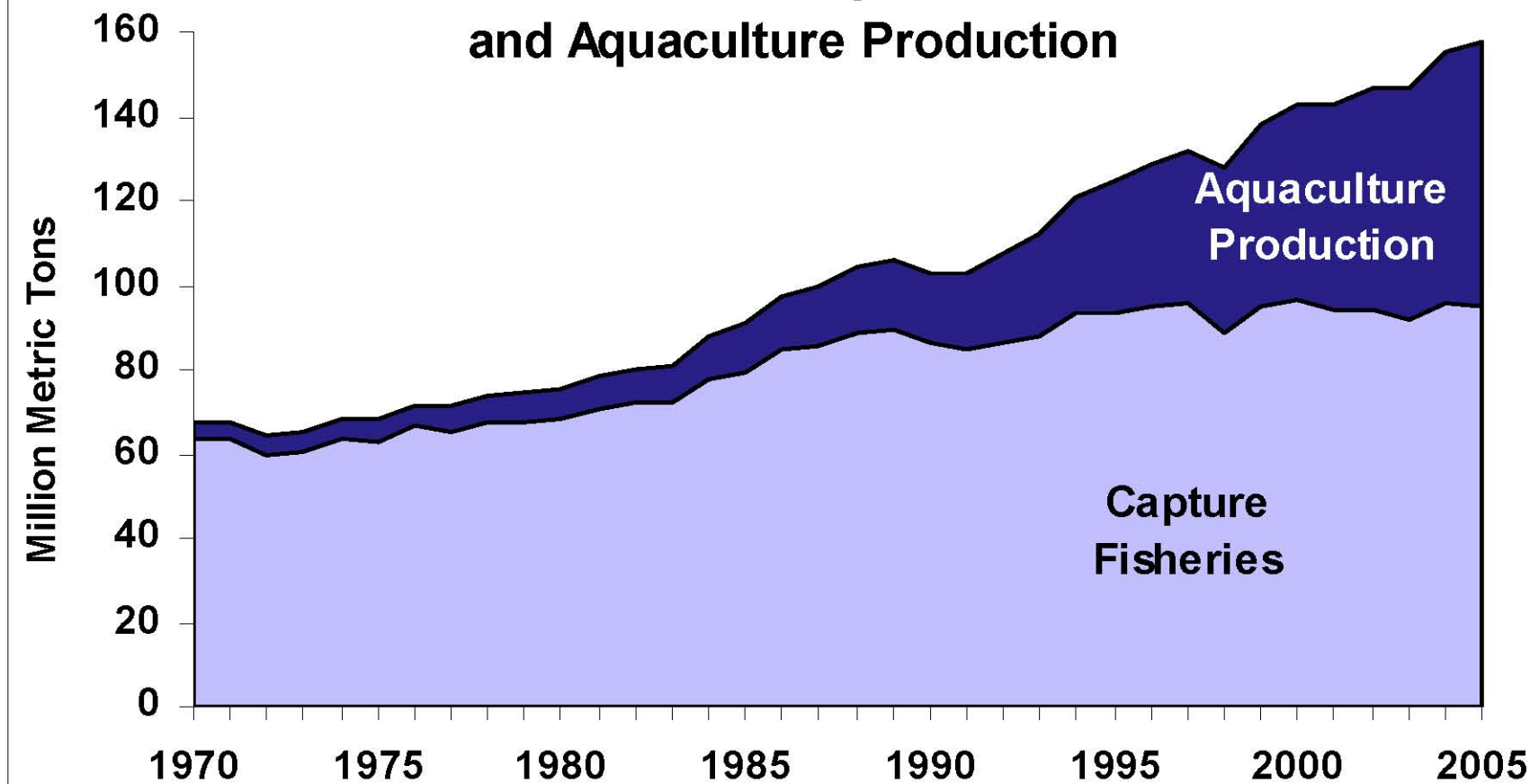
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# What we will cover:

- Overview of Aquaculture production
- Fish Meal and Fish Oil Issues
- Case of Farmed Salmon - pros and cons with emphasis on environmental factors
- Questions and Implications for West Coast Pelagics

## Trends for World Capture Fisheries and Aquaculture Production



Source U.N. Food & Agriculture Organization, 2007

# World Aquaculture

## Leading Species:

1. Carp - China
2. Oysters - France, Japan, US
3. Salmon/Trout - Norway, Chile, Scotland, Canada
4. Shrimp - China, Thailand, Mexico, Ecuador, Vietnam
5. Tilapia - Central America, China, US

# US Aquaculture Production

Catfish - Miss., Ala, Ark.

Oysters - Gulf Coast, Washington state

Salmon - Maine, Washington state

Trout - Idaho

Crawfish - Louisiana, Texas

Striped Bass - CA, AZ

Tilapia - CA, AZ

Sturgeon - CA

# Washington State

Oysters, clams, mussels, geoduck

Salmon

Trout (live eggs)

# Fish Meal and Oil Production

- Landings of industrial fish average 22 million tons per year
- 4 million tons of waste from food fisheries
- Leading producers:
  - Peru anchovy- 6.2 million tons in 2003
  - Europe blue whiting- 2.4 million tons
  - Japan anchovy - 2.1 million tons
  - US menhaden - .5 million tons
- US West Coast Coastal Pelagic 2006 production:
  - Sardine - 0.086 million tons
  - Anchovy - 0.013 million tons
  - Mackerel - 0.005 million tons

# Ingredients in fish feed

Fish Meal = 25%

Fish Oil = 30%

Rest: Wheat and soy binders, vitamins and minerals, carotenoid pigment.

## Conversions

4 : 1 Fish to Meal/Oil

1.2 : 1 Feed to Fish (Salmon)

# Aquaculture Affecting Fish Meal and Oil

- Increasing demand for meal and oil
- Feed grade fish stocks not increasing
- Some, but not all feed grade fish stocks are managed sustainably
- Feed companies substituting vegetable proteins for fish in meal production
- Oil substitutes more problematic
- Vegetable substitutes more expensive
- Pressure from environmental concerns - catch, feed formulation
- Marketplace demanding more sustainability
- Consolidation of commercial markets and feed companies

# Future Factors:

- Offshore Aquaculture
- New species: tra, basa, barramundi, cobia
- China
- Climate Change

WHERE SCIENCE AND POLICY MEET

# ENVIRONMENT

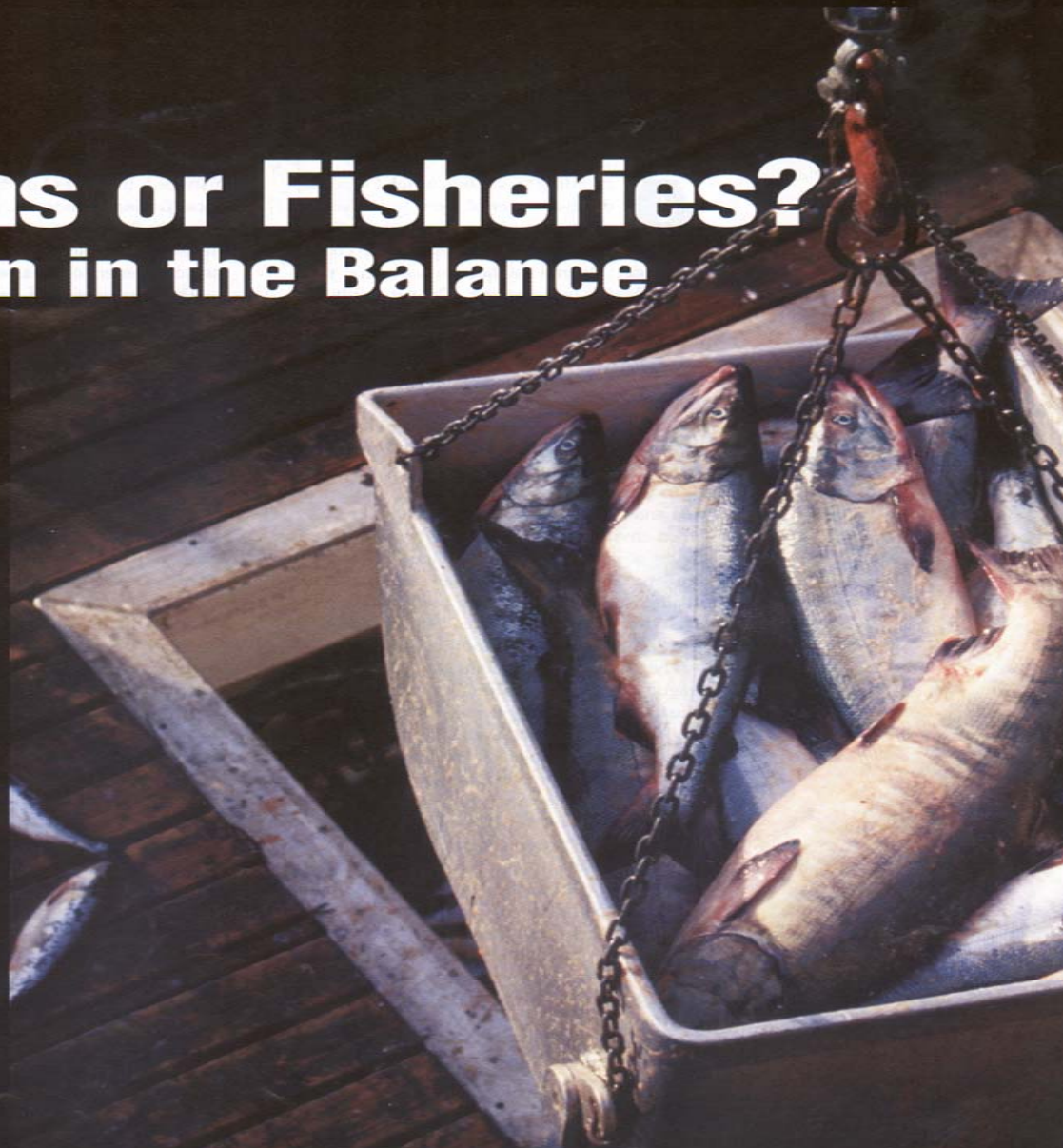
October 2003  
Volume 45 Number 8  
\$4.95 U.S.  
\$6.50 Canada

## Farms or Fisheries? Salmon in the Balance

ALSO . . .

Comparing  
environmental  
policy in  
Germany, the  
United States,  
and Japan

Nuclear power  
on the web



  
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# Farmed vs. Wild in the Marketplace

- Quality
- Availability and Consistent Supply
- Consistent price
- Taste
- Nutritional aspects
- Cooking attributes

# Farmed Fish and the Environment

- Disease
- Sediment impact
- Water quality
- Feed Issues
- Pathogens
- Escapes
- Sea lice
- Genetically modified fish
- Marine mammal interaction

## Open Net System

## Sargo Reservoir

