Economic Considerations in Thinking About United States Marine Aquaculture

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My Background for Talking About Aquaculture

- I’ve spent many years studying markets for wild fisheries
- It is impossible to understand seafood markets without understanding what is happening in aquaculture
- I have tried to learn as much as I can about aquaculture
- I have visited aquaculture operations in Canada, Norway, Chile, Iceland and Japan

Why am I here?

- I was invited by MAFAC
- I am speaking for myself
- I am not representing
  - the State of Alaska
  - wild fisheries
  - aquaculture proponents

Conclusions

1. The global seafood industry is in a period of rapid and profound change.
2. The key causes of change are economic globalization and aquaculture.
3. Aquaculture is growing rapidly because it can meet market demands for predictable, consistent supply of high-quality seafood.
4. World aquaculture production will continue to expand whether or not the United States becomes a significant producer.
5. Marine aquaculture offers significant potential economic benefits for the nation and coastal regions.
6. Offshore marine aquaculture will not develop in the United States without an enabling regulatory framework.
7. Marine aquaculture has potential environmental impacts. So does all food production, including wild fisheries. The issue is whether and how marine aquaculture can be developed with acceptable environmental impacts.
8. Marine aquaculture will have market impacts on wild fisheries—regardless of the extent of U.S. production. Lower fish prices harm fishermen and benefit consumers. The issue is whether or how we should consider these market effects in encouraging or discouraging marine aquaculture.
9. The issue is not choosing between wild fisheries and aquaculture. It is how to achieve potential benefits from both wild fisheries and aquaculture.

Aquaculture is an emotional issue in Alaska.

Many Alaskans think the answer to any kind of aquaculture is “Just say no.”

I think we need to learn more and think more in developing aquaculture policy for the United States—and for Alaska.

We should think carefully about the opportunities offered by aquaculture and whether there are ways to achieve them while protecting the environment and other economic activities, including wild fisheries.

Alaska bumper sticker

Outline of Presentation

1. The Globalization Revolution
2. The Aquaculture Revolution
3. Why is the Aquaculture Revolution Happening?
4. Aquaculture in the United States
5. Considerations for an Informed Debate about United States Marine Aquaculture Policy

1. The Globalization Revolution

Seattle Harbor (photograph by Gunnar Knapp)

Far-reaching changes are occurring in the world economy, which are frequently referred to as “globalization.”

Starbucks at Shibuya Station, Tokyo, Japan, July 2004 (photograph by Gunnar Knapp)

“Globalization” includes . . .

- Increasingly reliance on markets
- Reduction in trade barriers
- Technological revolution in communications and transportation
- World economic integration in markets for resources, goods, services, labor and capital
- Movement of production to low-cost producers
- Consolidation and integration resulting in larger, more powerful firms operating in many countries
- Growing consumer incomes in developed and developing countries
- Increasing consumer expectations for quality, convenience, variety and lower prices

Globalization is transforming seafood production, processing, distribution, and retailing.

- Rapid expansion of seafood trade
- Shift in labor-intensive seafood processing to countries with low labor costs
- Increasing consolidation and market power in the retail and food service industry
- Restructuring of seafood distribution networks
- Increasing pressure on seafood suppliers to lower costs
- International standards for food handling and safety

In the United States, Europe and Japan, large retail and food-service buyers are dominating more and more of the seafood market. These buyers want:

- Consistent and reliable supply of large volumes
- Low, stable and competitive prices
- Consistent quality
- Traceability
- Products which consumers view as
  - Safe
  - Healthy
  - Convenient
  - Environmentally and socially responsible

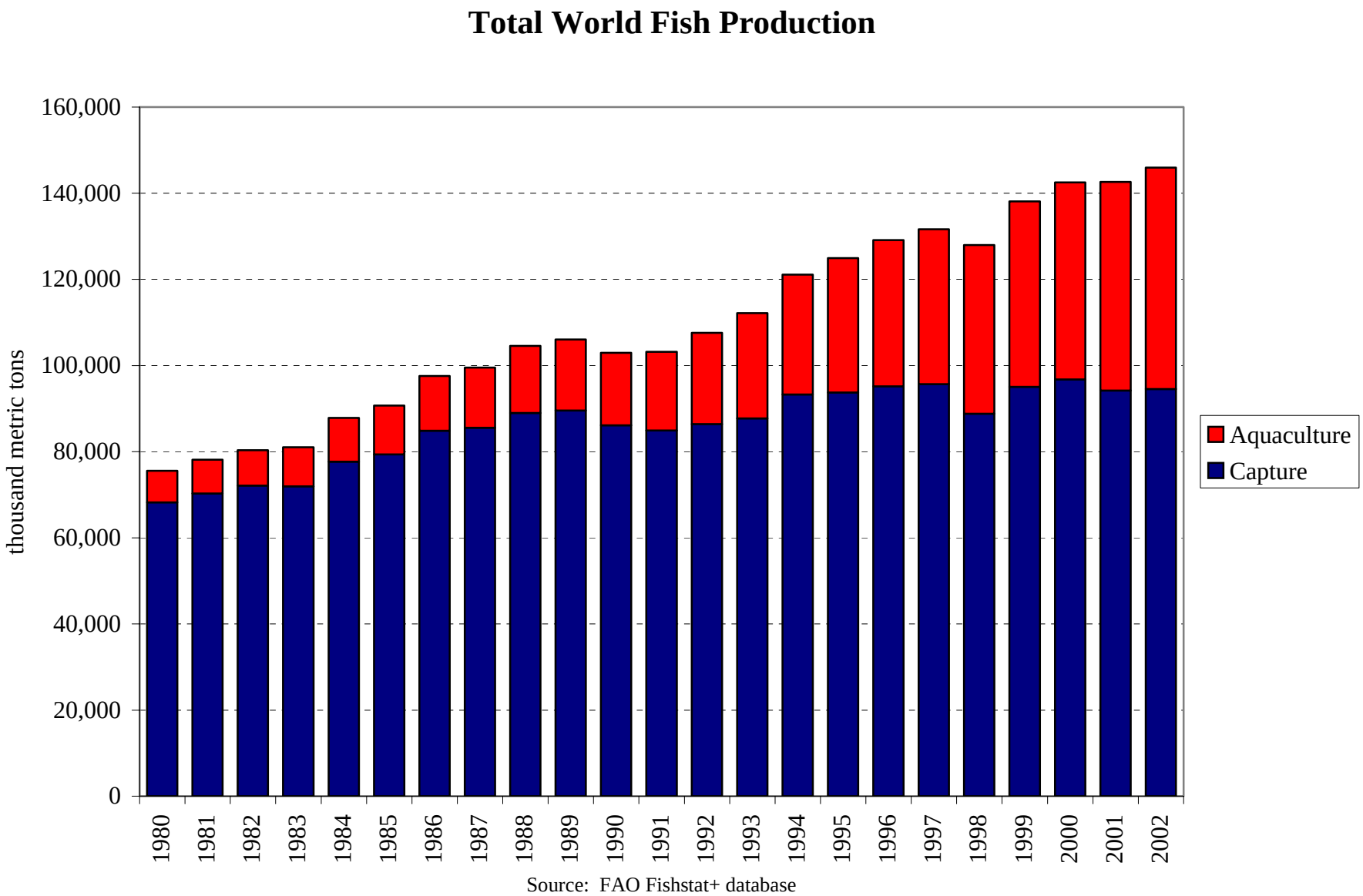
Globalization is creating significant market challenges for wild fisheries.

Traditional wild fisheries would still face significant challenges and change even if there were no aquaculture.

2. The Aquaculture Revolution

Salmon Farm, Chile (photograph by Gunnar Knapp)

An aquaculture revolution is happening in the world seafood industry. Aquaculture accounts for a large and growing share of world seafood production.



Caveats in using aggregate world fish production data. . .

- Chinese data are probably greatly exaggerated for both aquaculture and capture fisheries. Excluding Chinese data may give a more accurate picture of actual trends.

- Aquaculture produces a different mix of fish than capture fisheries. Most aquaculture production is freshwater & diadromous fish, molluscs, crustaceans, and aquatic plants (included in "other").

Reported World Fish Production, 2002 (million metric tons)

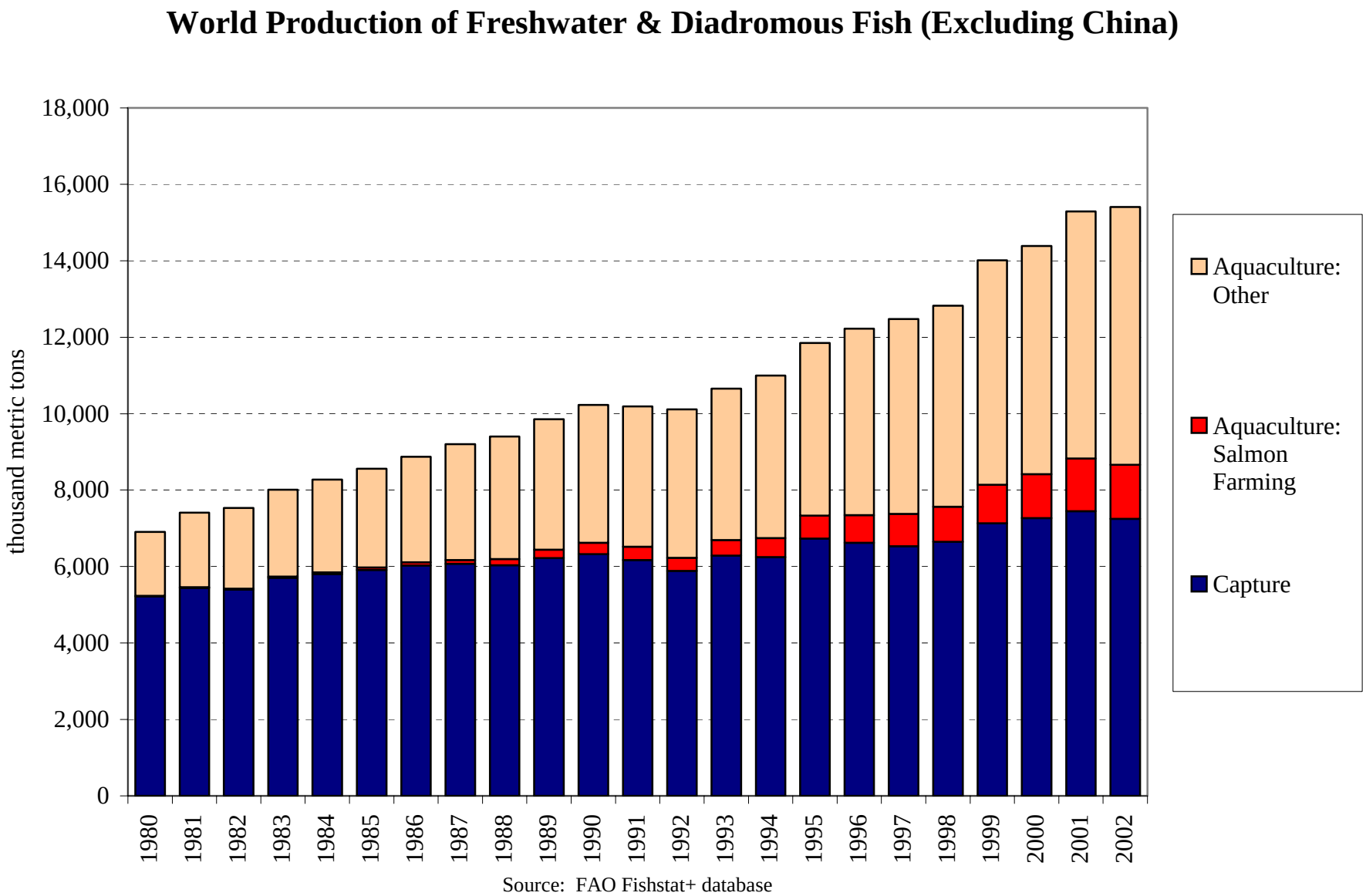
	China	Other Countries	Total
Capture	17	78	95
Aquaculture	37	15	51
Total	53	93	146

Source: FAO Fishstat+ database

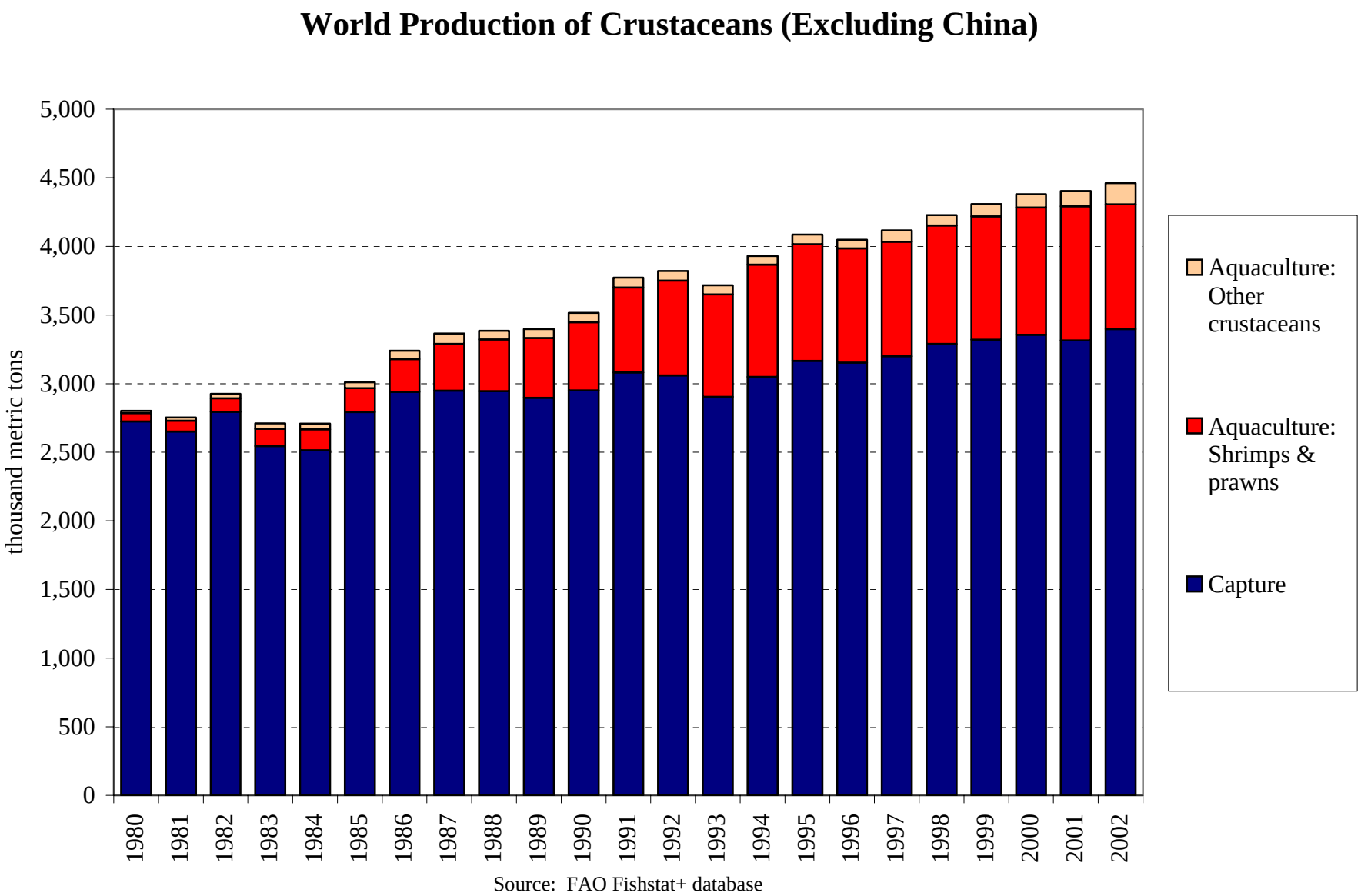
Reported World Fish Production, 2002, Excluding China (million metric tons)

	Capture	Aqua-culture	Aqua-culture %
Freshwater & diadromous fish	7.2	8.2	53%
Molluscs	2.3	2.1	48%
Crustaceans	3.4	1.1	24%
Demersal marine fish	16.7	0.4	3%
Pelagic marine fish	36.8	0.2	0%
Other	11.3	2.8	20%
Total	**77.7**	**14.8**	**16%**

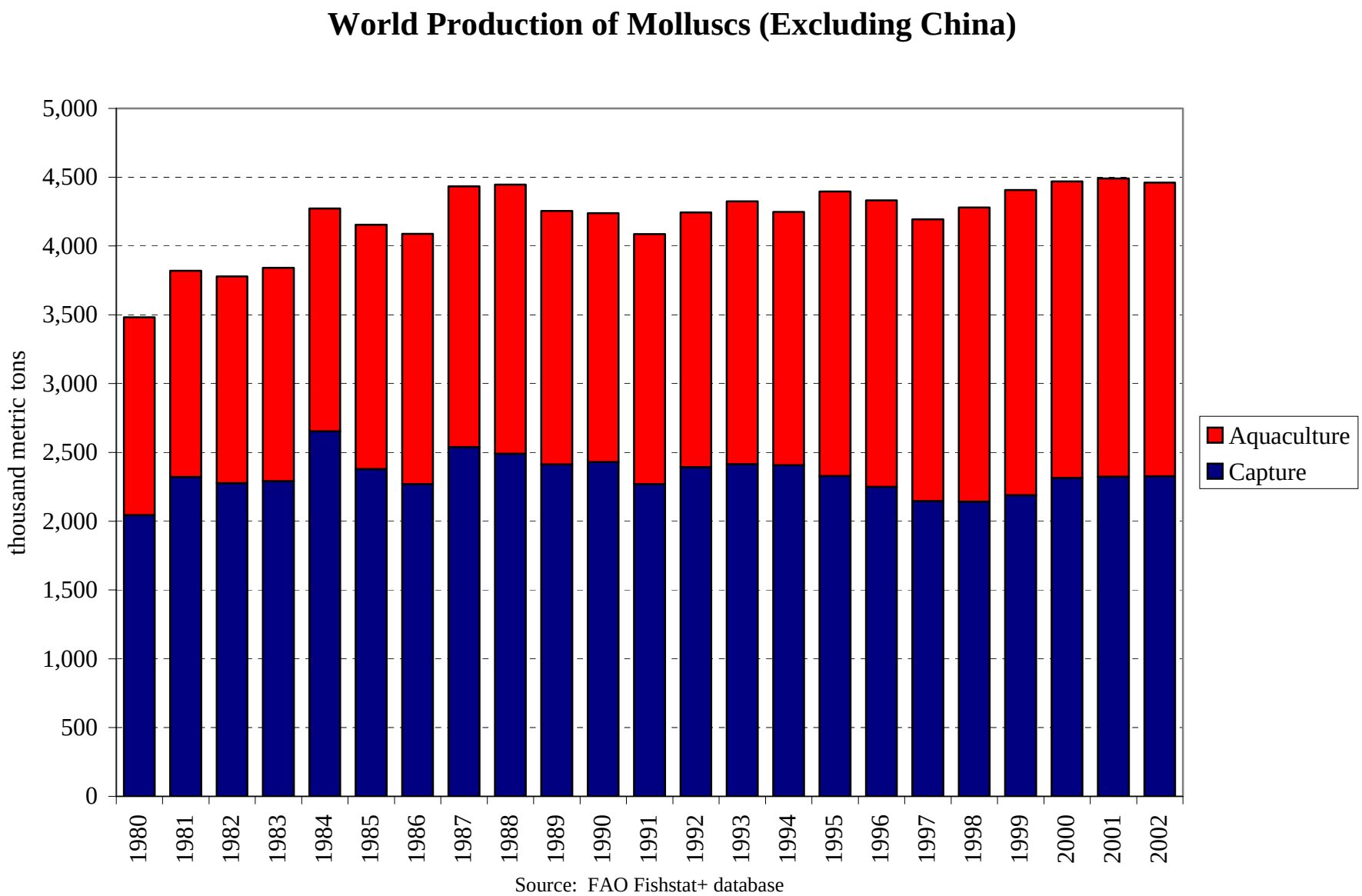
The largest and fastest-growing share of world aquaculture production is freshwater and diadromous fish—of which salmon farming is a relatively small share.



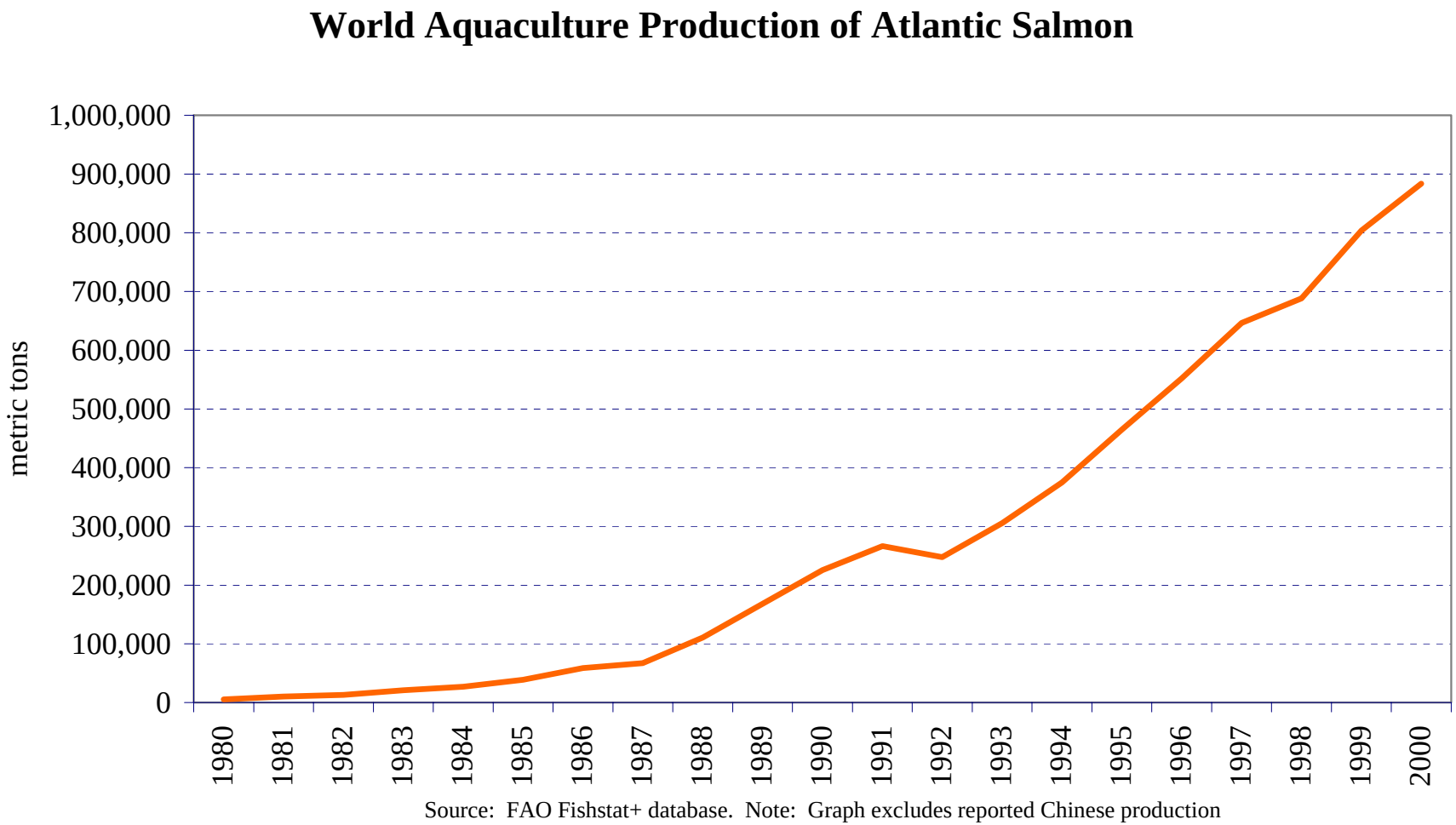
Aquaculture production of crustaceans—mainly shrimp—is also growing rapidly.



Aquaculture has long represented a large share of world production of molluscs (mostly mussels, oysters, scallops & clams).



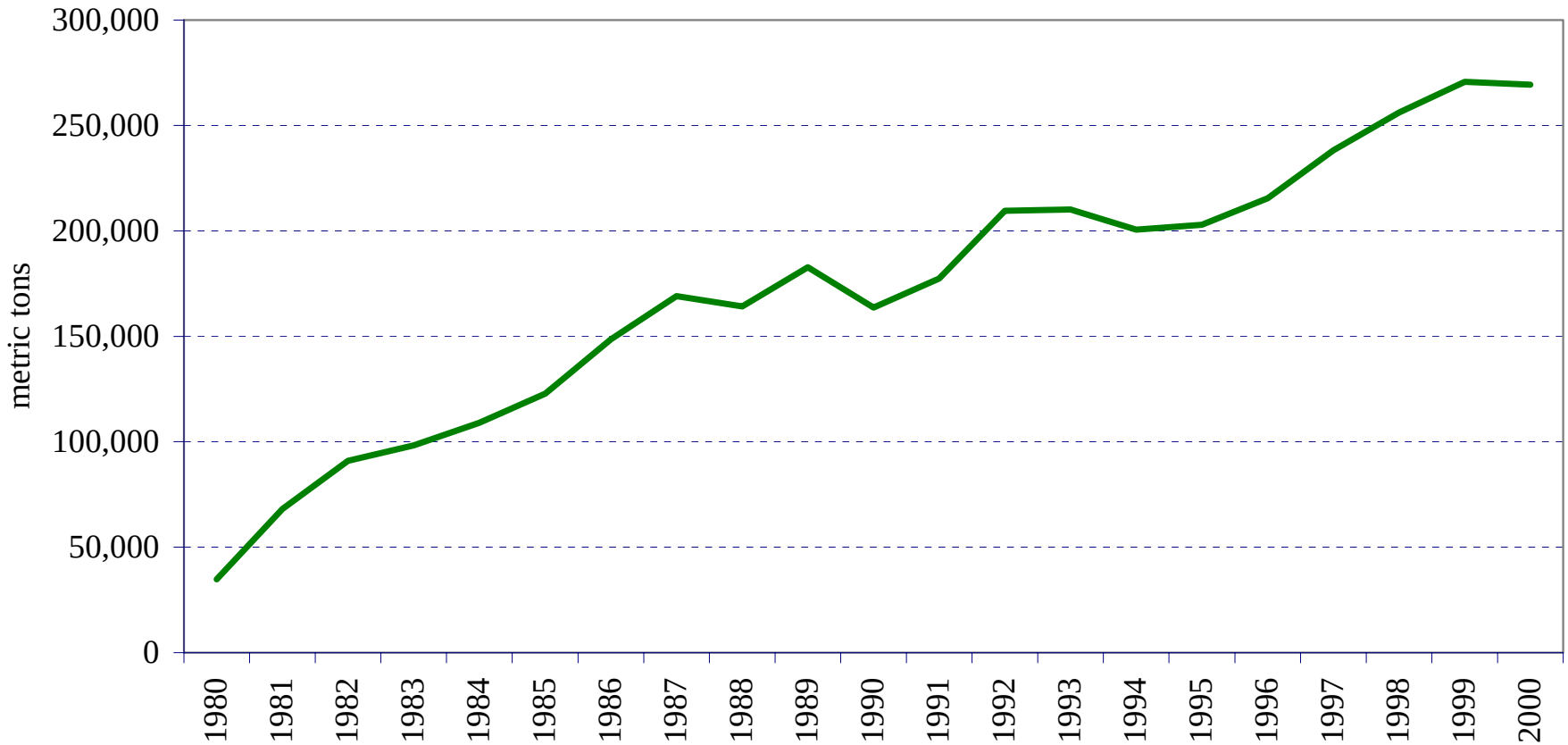
The aquaculture revolution is much more than farmed salmon. Farmed salmon is only one of many species for which aquaculture production has grown very rapidly.



Source: FAO Fishstat+ database. Note: Graph excludes reported Chinese production

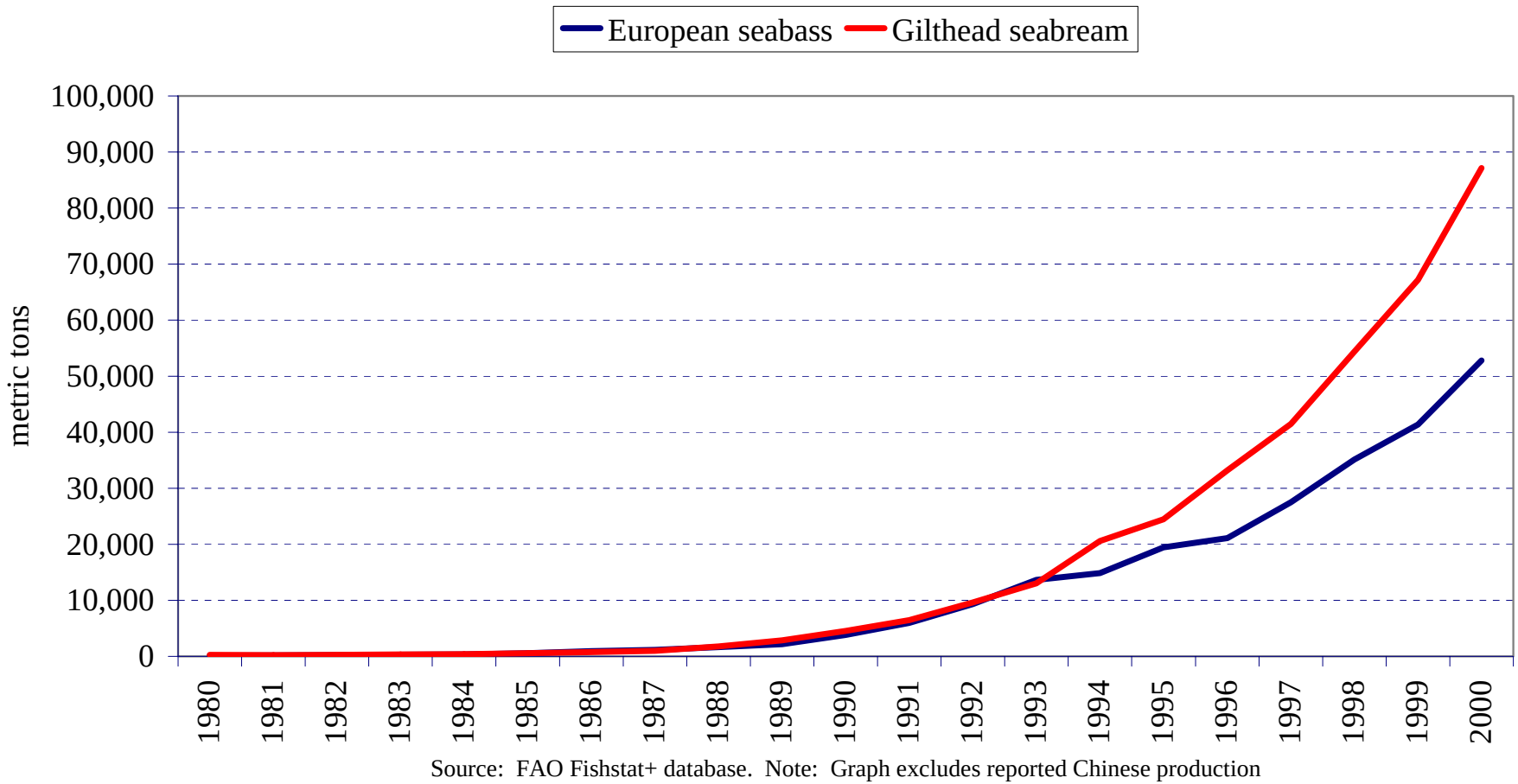
Some other species for which farmed production has grown very rapidly include catfish . . .

World Aquaculture Production of Channel Catfish



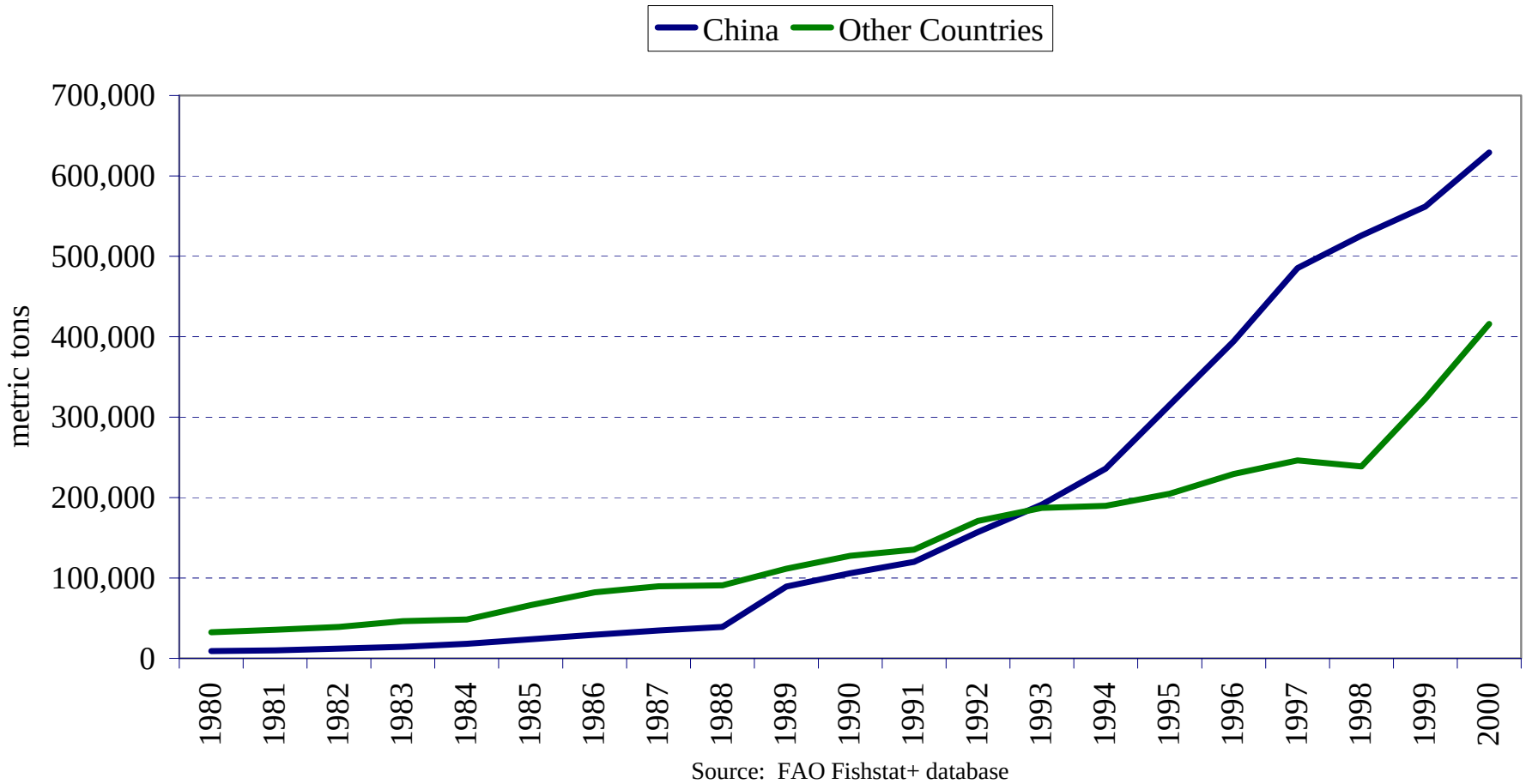
Source: FAO Fishstat+ database. Note: Graph excludes reported Chinese production

Seabass and Seabream . . .

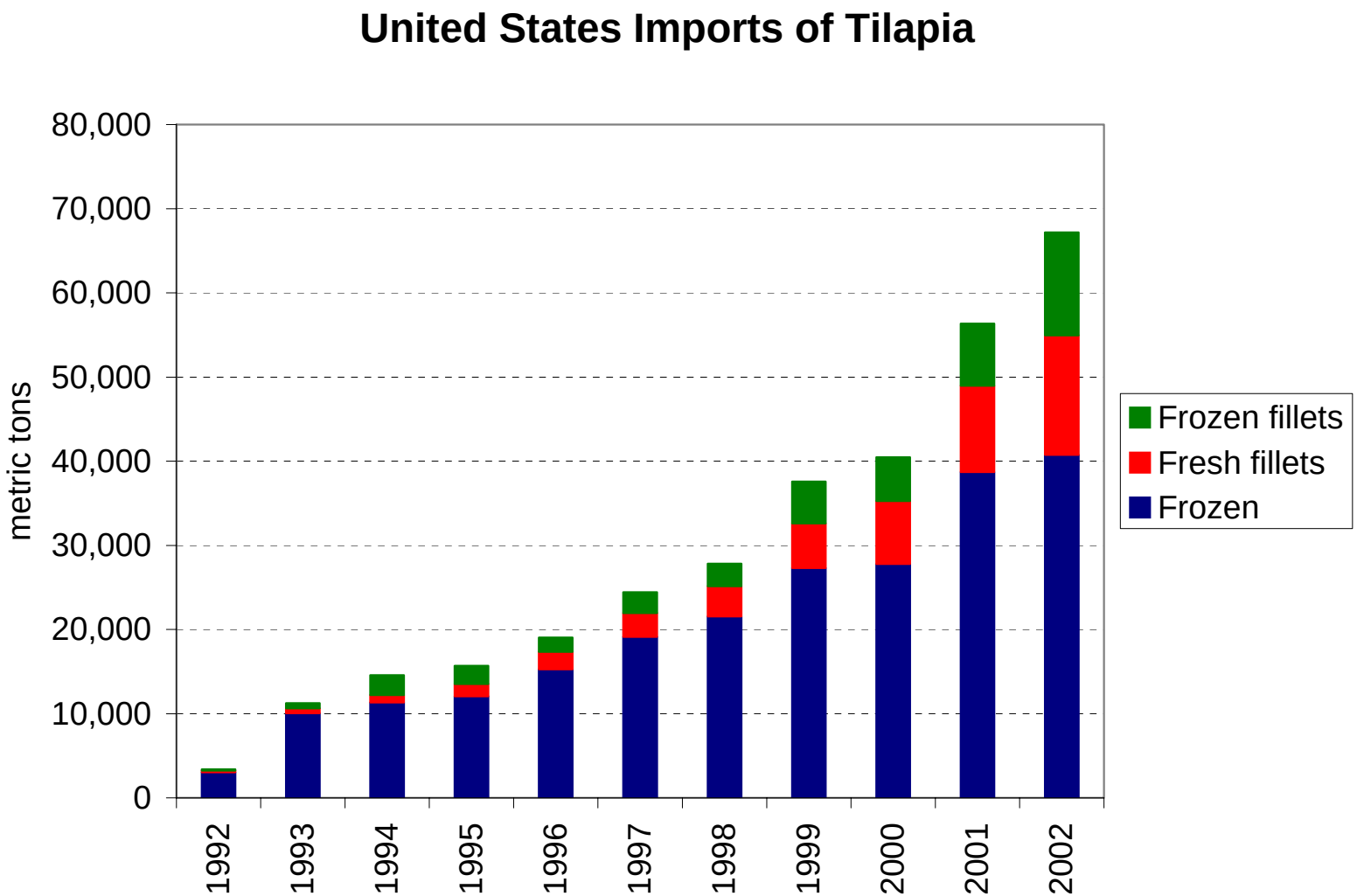


Source: FAO Fishstat+ database. Note: Graph excludes reported Chinese production

and Tilapia . . .

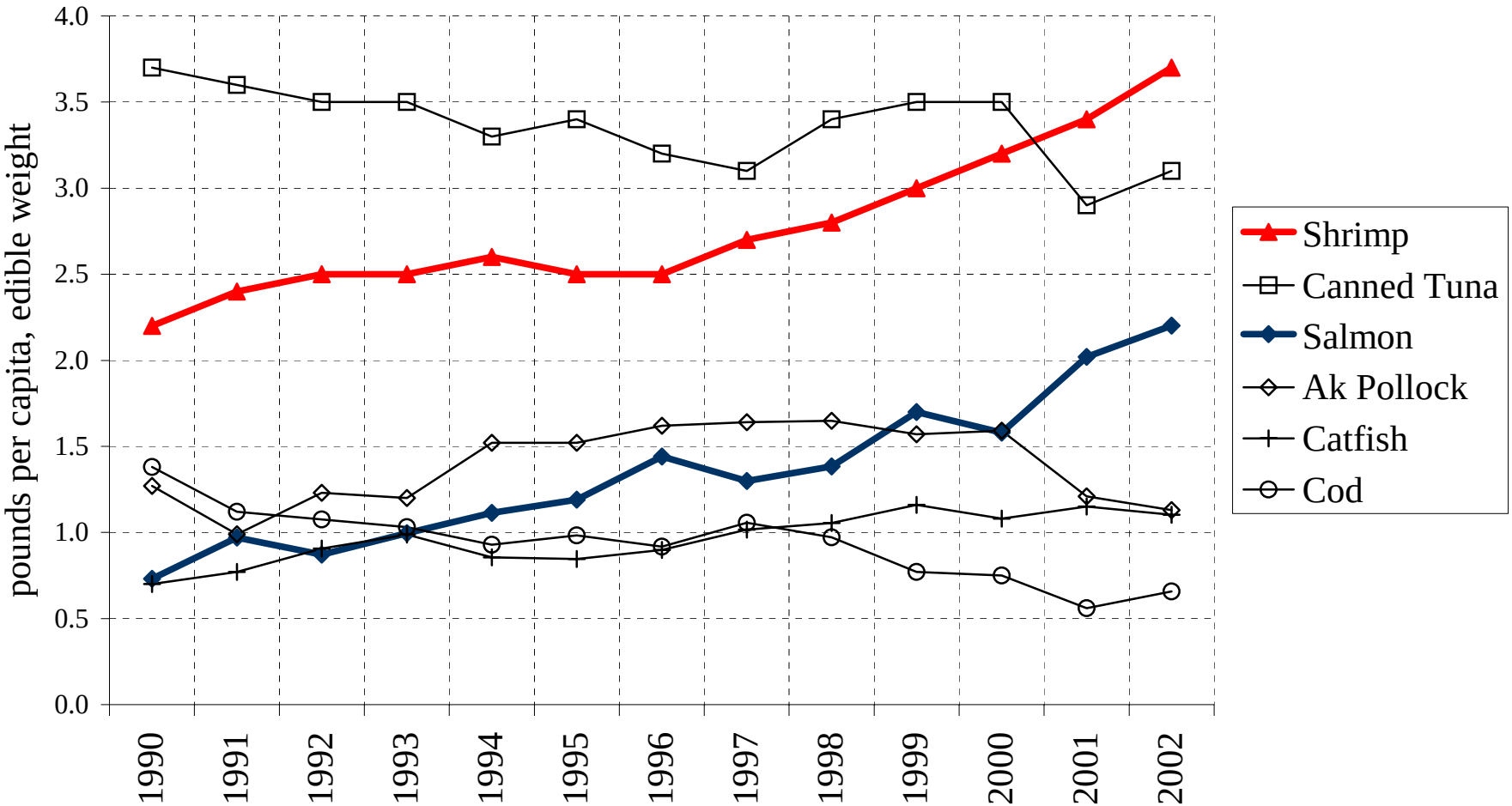

World Aquaculture Production of Nile Tilapia
China
Other Countries
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
metric tons
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Source: FAO Fishstat+ database

Farmed tilapia is one of the fastest growing U.S. seafood imports (along with farmed salmon).



Farmed shrimp and farmed salmon are the fastest growing components of U.S. seafood consumption and rank first and third in total consumption.

Estimated United States Per Capita Fish Consumption: Top Six Species (edible weight)



Source: National Fisheries Institute Estimates.

There is very significant potential for growth in aquaculture production.

- The global aquaculture industry has very significant resources to invest in research, production and marketing
- Technological innovation is occurring rapidly.
- Once technological hurdles are overcome, farming of new species can expand at a very rapid rate.

There are no obvious limits to
growth in aquaculture production.

- Feed
  - Fish farmers can substitute vegetable-based feeds for fish-based feeds. This is already happening for salmon.
  - Many aquaculture species, such as catfish and tilapia, are grown almost entirely on vegetable-based feeds.
- Environmental Effects
  - Environmental effects can be reduced through regulation and changes in techniques and locations
- Market Acceptance
  - Rapid growth in consumption proves that buyers and consumers will accept farmed products

The past isn’t necessarily a guide to the future.

- Just because farming of a species isn’t profitable now doesn’t mean it won’t be in the future
- Just because production of a species isn’t significant now doesn’t mean it won’t be in the future.
- Just because consumers don’t eat a fish today doesn’t mean they won’t in the future.
- Tomorrow’s major aquaculture species may not be the same as those of today.

The past was not a guide to the future
for farmed salmon, catfish or tilapia.

3. Why is the Aquaculture Revolution Happening?

Farmed Chilean coho salmon, Daiei supermarket, Tokyo, Japan, July 2004
(photograph by Gunnar Knapp)

Aquaculture is growing rapidly because it can meet market demands for predictable, year-round and growing supply of high-quality seafood.

Fresh tilapia for sale at Swanson's Store, Bethel, Alaska, April 2002

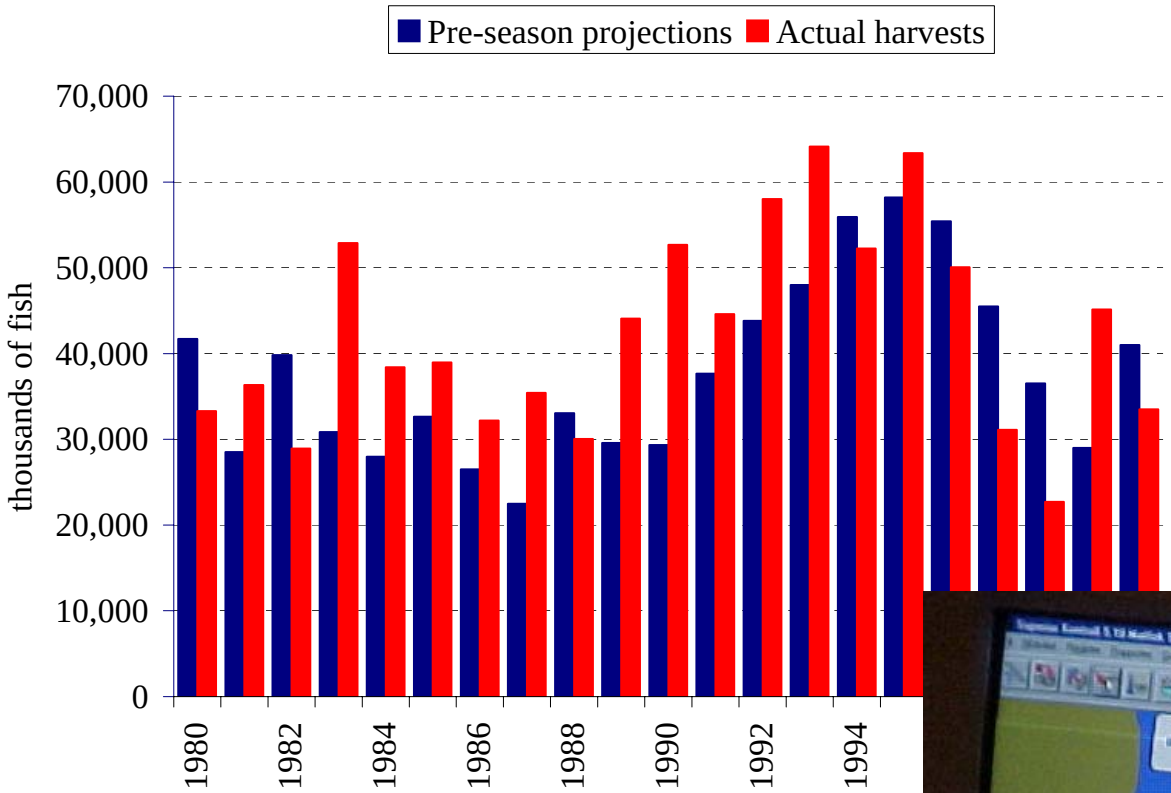
Photograph by Gunnar Knapp

Aquaculture has significant competitive advantages over wild fisheries in supplying world seafood markets in an increasingly globalized economy.

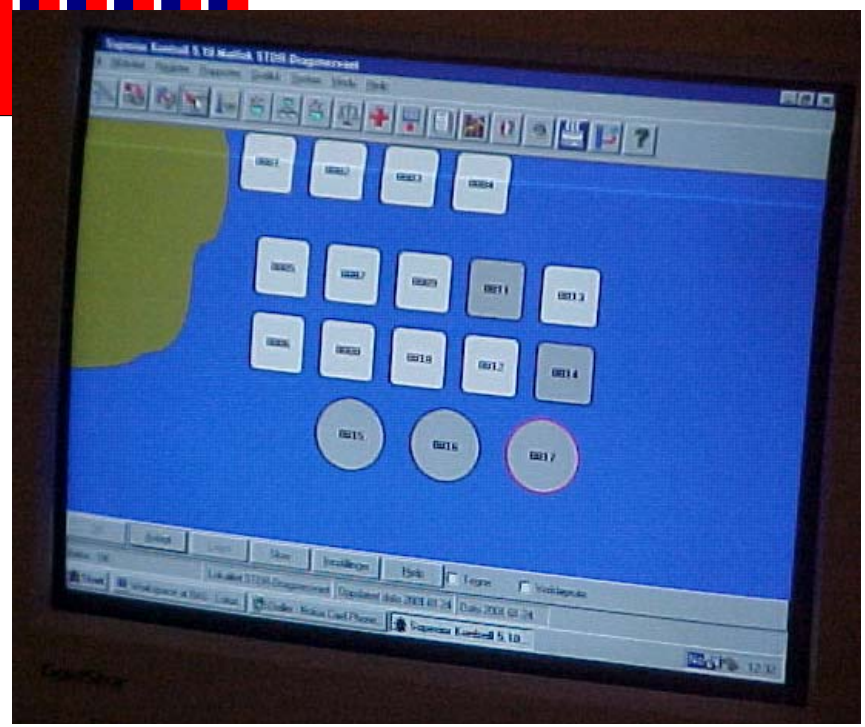
- Production is predictable.
- Production is year round.
- Production can increase.
- Production can be located close to infrastructure.

Consistent and predictable supply makes it easier for aquaculture producers to meet buyers' supply needs and to plan for marketing.

Farmed Salmon	Wild Salmon
Salmon farmers can accurately forecast production and guarantee supply commitments. Farmers can expand production to meet growing demand.	Wild salmon production is inconsistent from year to year, difficult to predict, and cannot expand.



Actual Alaska sockeye salmon harvests typically differ from pre-season projections by 30%.



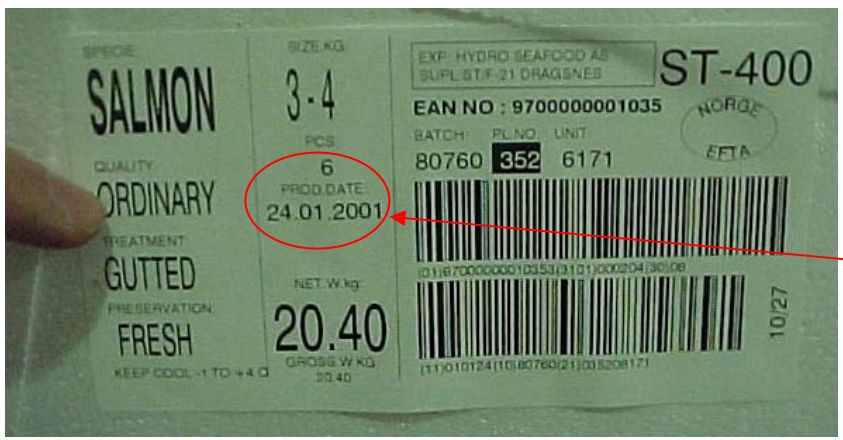
This computer at a Norwegian salmon farm can tell the producer exactly how many fish of what size are in each pen (and in the pens of all the farms owned by this company on three continents)

Year-round production reduces production costs of aquaculture relative to seasonal wild fisheries, and makes it possible for aquaculture to meet buyers' needs year-round.

Farmed Salmon	Wild Salmon
Farmed salmon production can occur year-round.	Most wild salmon can only be harvested during a short summer run.

The fact that many Alaska fishing boats and processing plants are idle for much of the year is a huge cost disadvantage.

Because it processes farmed salmon year round, this relatively small British Columbia facility processes as much salmon as the largest Alaska facilities.



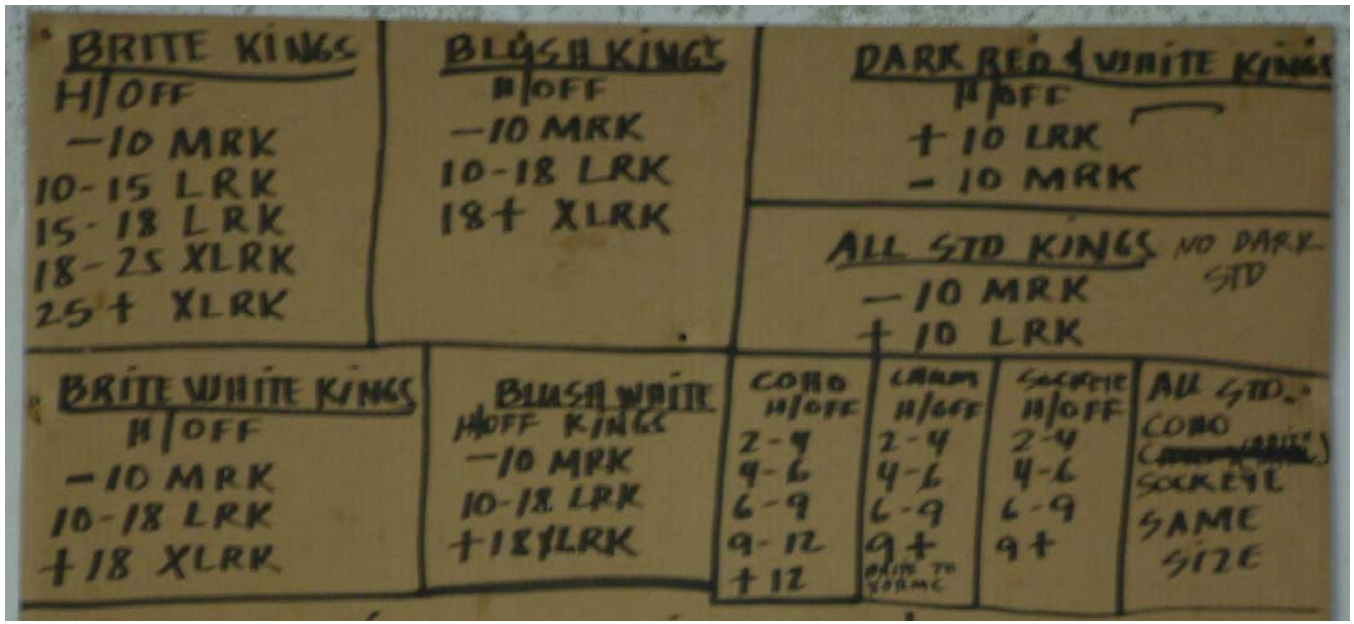
Norwegian salmon processed in winter

Because it can choose when to process fish, the BC farmed salmon processor doesn't process salmon until it already has a buyer. The fish are processed to that buyer's specifications.

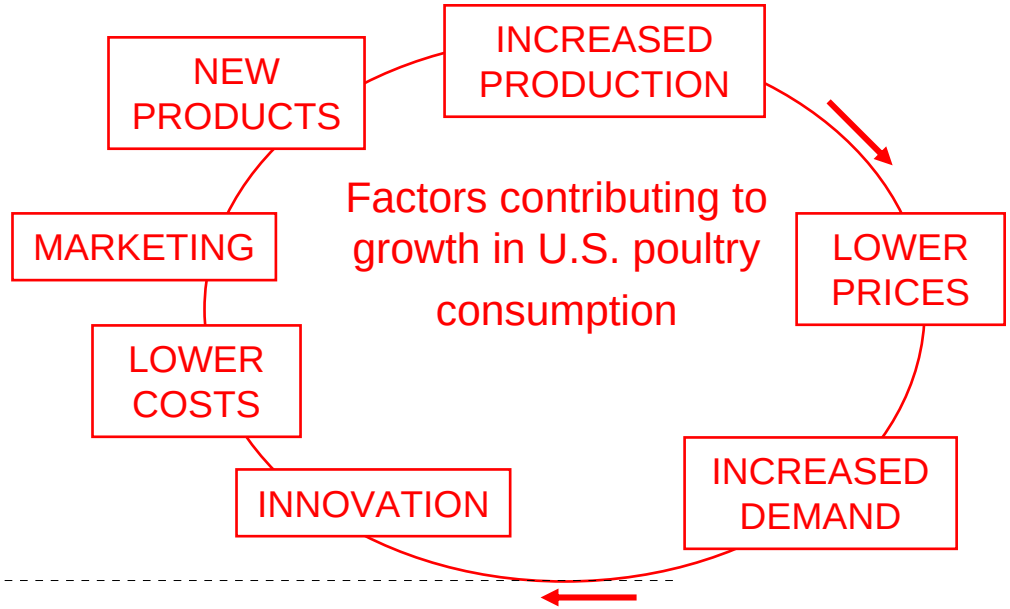
Ability to control production fish size (and other attributes) allows aquaculture producers to meet buyers' needs and lowers costs.

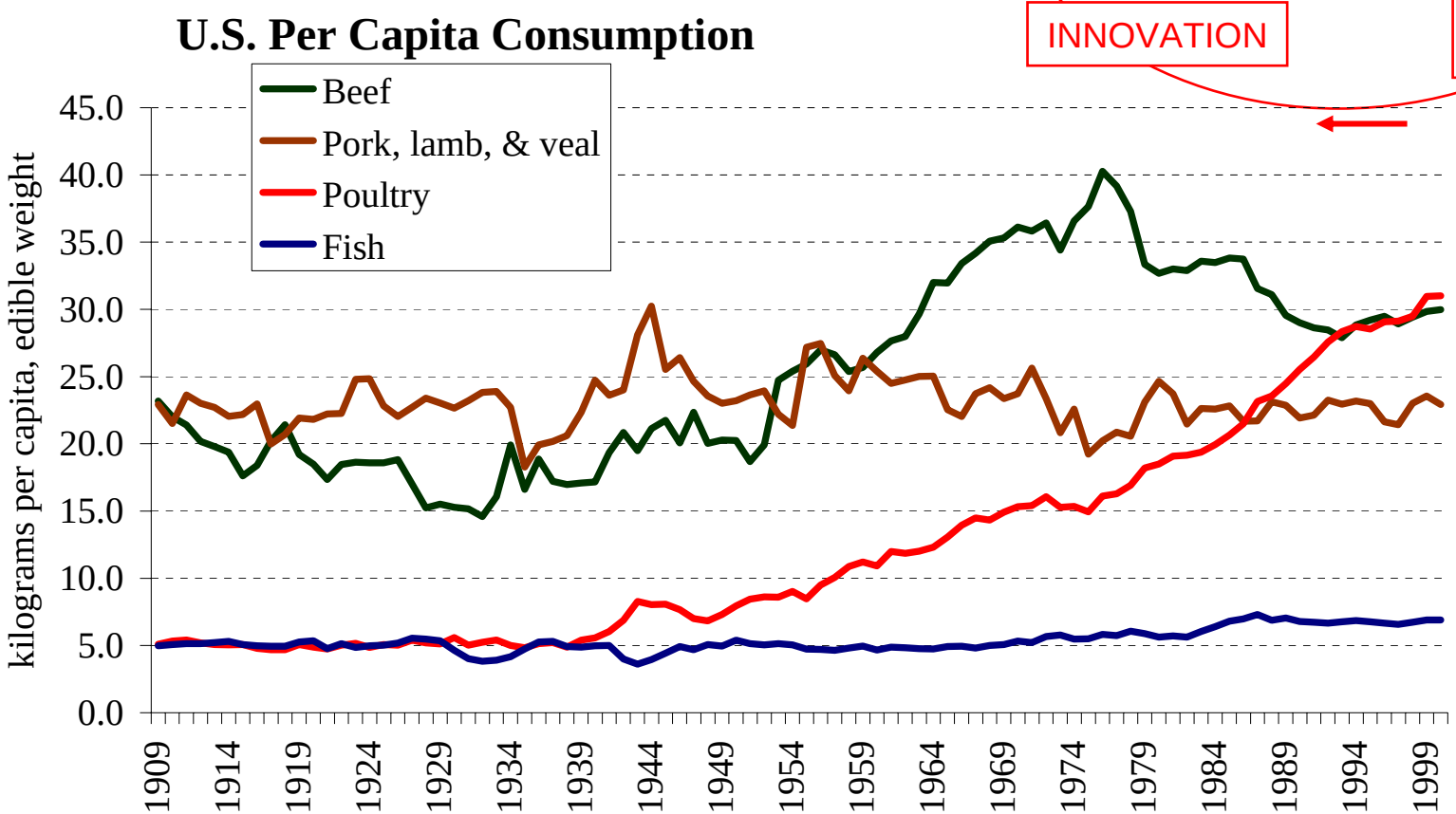
Farmed Salmon	Wild Salmon
Farmed salmon is consistent in size and quality.	There is wide variation in the size and quality of individual wild salmon

Grades at a southeast Alaska processing plant



Unlike wild fisheries, aquaculture has potential for continuing demand-driven growth. The historical experience of poultry may be a better indicator of the potential for aquaculture than that of wild-caught fish.





Source: USDA Economic Research Service.

4. Aquaculture in the United States

The United States has played a relatively small role in the aquaculture revolution.

United States Share of World Aquaculture Production (Excl. China)

Marine, salmon & trout	0.9%
Marine, other finfish	0.0%
Freshwater finfish	4.8%
Molluscs	5.7%
Crustaceans	3.0%
Other	0.0%
Total	3.4%

Catfish, oysters and clams account for most of U.S. aquaculture production.

The United States has very little marine finfish aquaculture production.

United States Aquaculture Production, 2002

(thousand metric tons)

Marine, salmon & trout	13
Marine, other finfish	0
Freshwater finfish	331
Molluscs	122
Crustaceans	32
Other	0
Total	497

Source: FAO Fishstat+ database.

Numerous other countries have far larger aquaculture production than the United States.

Overview of World Aquaculture Production, 2002 (thousands of metric tons)

Type of aquaculture	United States	Major salmon farming countries				Other countries			Total
		Norway	Chile	United Kingdom	Canada	Japan	Other (except China)	China	
Marine, salmon & trout	13	549	479	147	128	8	90	0	1,413
Marine, other finfish	0	3	0	0	0	260	221	560	1,045
Freshwater finfish	331	0	4	13	11	53	6,489	16,370	23,271
Molluscs	122	3	63	19	34	496	1,397	9,652	11,784
Crustaceans	32	0	0	0	0	2	1,029	1,068	2,131
Other	0	0	72	0	0	568	2,177	8,926	11,742
Total	497	554	617	179	172	1,387	11,403	36,576	51,386

"Freshwater finfish" is 96% freshwater and 4% brackishwater. "Other" is 99.7% aquatic plants.

Source: FAO Fishstat+ database.

It seems likely that the United States could significantly expand marine aquaculture production—if we chose to do so.

COMPETITIVE ADVANTAGES

- diverse and favorable water conditions.
- high level of technology.
- well-developed infrastructure.
- skilled labor
- lowest transportation costs to U.S. markets
- very competitive in animal farming industries (chicken, beef, etc.)

COMPETITIVE DISADVANTAGES

- high labor costs
- less developed infrastructure and higher costs in some regions (Alaska)
- Unfavorable regulatory structure

U.S. marine aquaculture policy is unfavorable to most marine aquaculture development.

- Alaska finfish-farming ban
- Ambivalent-to-hostile regulatory structure for most other coastal marine aquaculture
  - Lack of clear regulatory structure
  - Opposition by local groups & NGOs
  - Political risk
- Lack of an enabling regulatory structure for offshore (EEZ) marine aquaculture
  - Without an enabling regulatory structure offshore marine aquaculture will not develop

The aquaculture revolution will continue regardless of whether the United States chooses to participate in it.

The limiting factor in global aquaculture production is not United States production but global market demand.

5. Considerations for an Informed Debate about United States Marine Aquaculture Policy

Alaska bumper sticker
(photograph by Gunnar Knapp)

A starting point for an informed discussion of aquaculture policy is clearly defining what kinds of aquaculture we are talking about.

- Freshwater aquaculture
- Marine aquaculture
  - Stock enhancement
  - Ranching
  - Fully contained marine aquaculture
    - Marine shellfish aquaculture
    - Marine finfish aquaculture
      - Coastal finfish aquaculture
      - Offshore (EEZ) finfish aquaculture

My comments apply to all marine aquaculture

Primary federal responsibility and topic of MAFAC discussion

There are significant potential economic benefits to the United States and coastal regions from marine aquaculture

- Income
- Jobs
- Reduction in trade deficit
- Economic diversification for coastal communities
- Economic stability for coastal communities
- Synergies with wild fisheries
  - More efficient utilization of processing facilities
  - More efficient utilization of other infrastructure (ports, roads)
  - Markets for wild fisheries by-products as fish feed
- Economic development from backward linkages (aquaculture research, equipment, supplies) and forward linkages (fish processing and distribution)

Clearly, marine aquaculture can generate very significant production value.

Estimated Primary Value of Farmed Salmon Production, 2002

(millions of dollars)

Norway	1141
Chile	1450
United Kingdom	442
Canada	321
United States	28

Marine aquaculture can provide year-round employment in coastal areas.
Salmon farming and processing on a remote island in western Norway —in January

(Photos by Gunnar Knapp)

Part of an informed debate about marine aquaculture should be research to better understand the nature and scale of these potential benefits and to whom they would flow.

Only when we have thought carefully about potential benefits can we have an informed discussion about how the benefits compare with potential costs of marine aquaculture.

Marine aquaculture has potential environmental impacts.

- All food production has environmental impacts, including agriculture and wild fisheries.
- If we adopt standards of “zero environmental impact” or “zero risk”
  - marine aquaculture will be impossible
  - we will be imposing a higher standard than we do for other kinds of food production
  - we will be imposing a higher standard than we do for other uses of the marine environmental
    - Wild fisheries
    - Salmon ranching
- For an informed debate, the issues should be:
  - What are the potential impacts and risks?
  - How can they be reduced?
  - How do impacts and risks compare with potential benefits?

Marine aquaculture has impacts on markets for wild fisheries.

- Increased aquaculture production lowers prices for wild fisheries.
- Lower prices cause significant economic difficulties for fishermen and fishing communities.
- Lower prices benefit consumers.
- The market impacts of aquaculture will occur regardless of the extent of United States aquaculture production
  - Alaska's salmon farming ban did not stop the market impacts of farmed salmon on wild Alaska salmon
- United States trade policy offers little protection against market impacts of aquaculture on wild fisheries
  - U.S. wild fisheries are heavily dependent on export markets
  - The most significant effects of farmed salmon on markets for Alaska wild salmon occurred in Japan.
- The issue is whether or how we should consider market effects in encouraging or discouraging marine aquaculture.

For an informed debate about marine aquaculture, we should not think about the issue as choosing between wild fisheries and aquaculture.

- We should think about two related and important issues:
  - How can we responsibly achieve potential benefits from wild fisheries?
  - How can we responsibly achieve potential benefits from marine aquaculture