

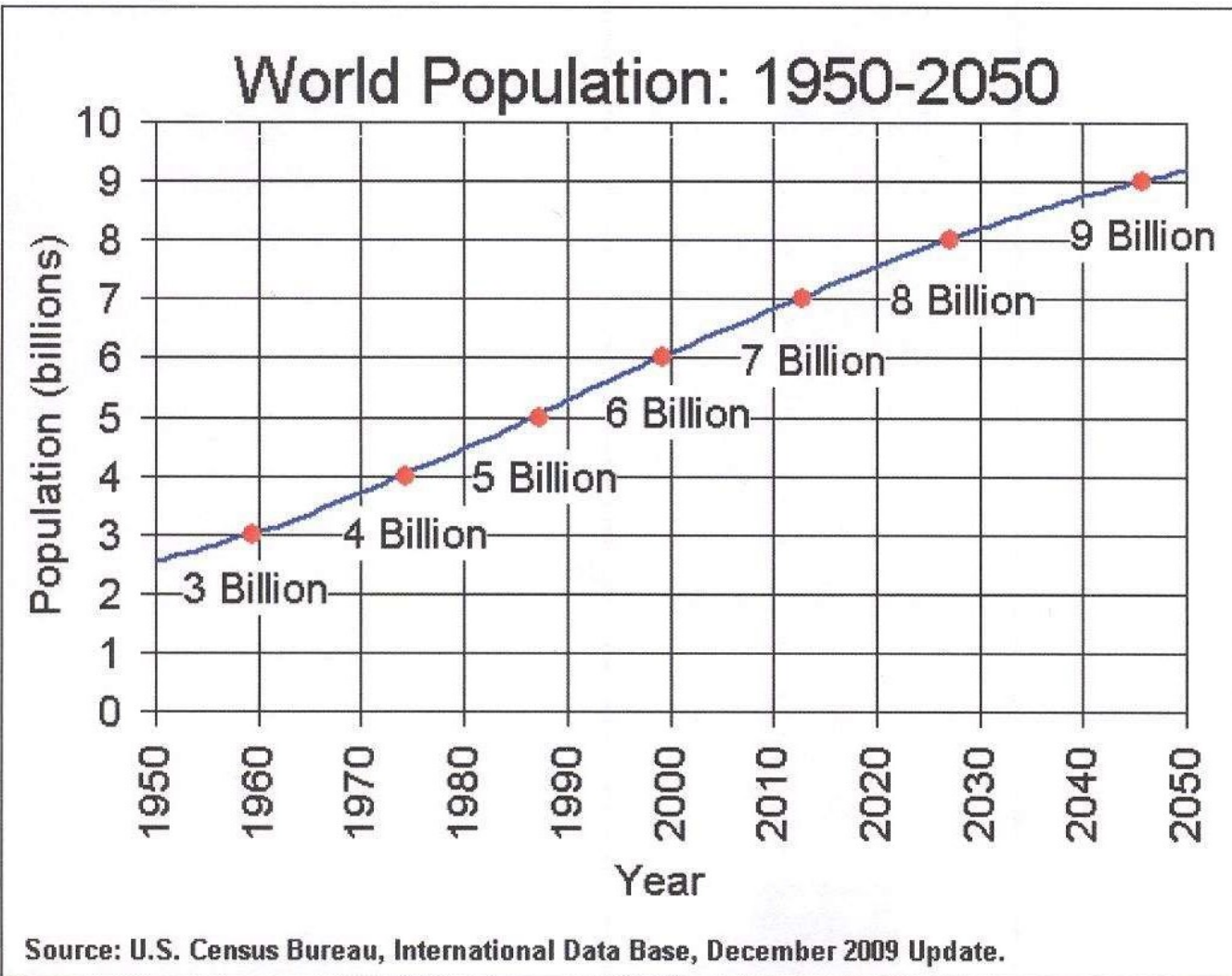
The Realities of Farmed Seafood

Lou D'Abramo

“Setting the Stage”

- The Global Population Continues to Grow
- The Average Global Temperature is Rising
- Freshwater and Land Resources for Food Production are Limited

World Population: 1950-2050



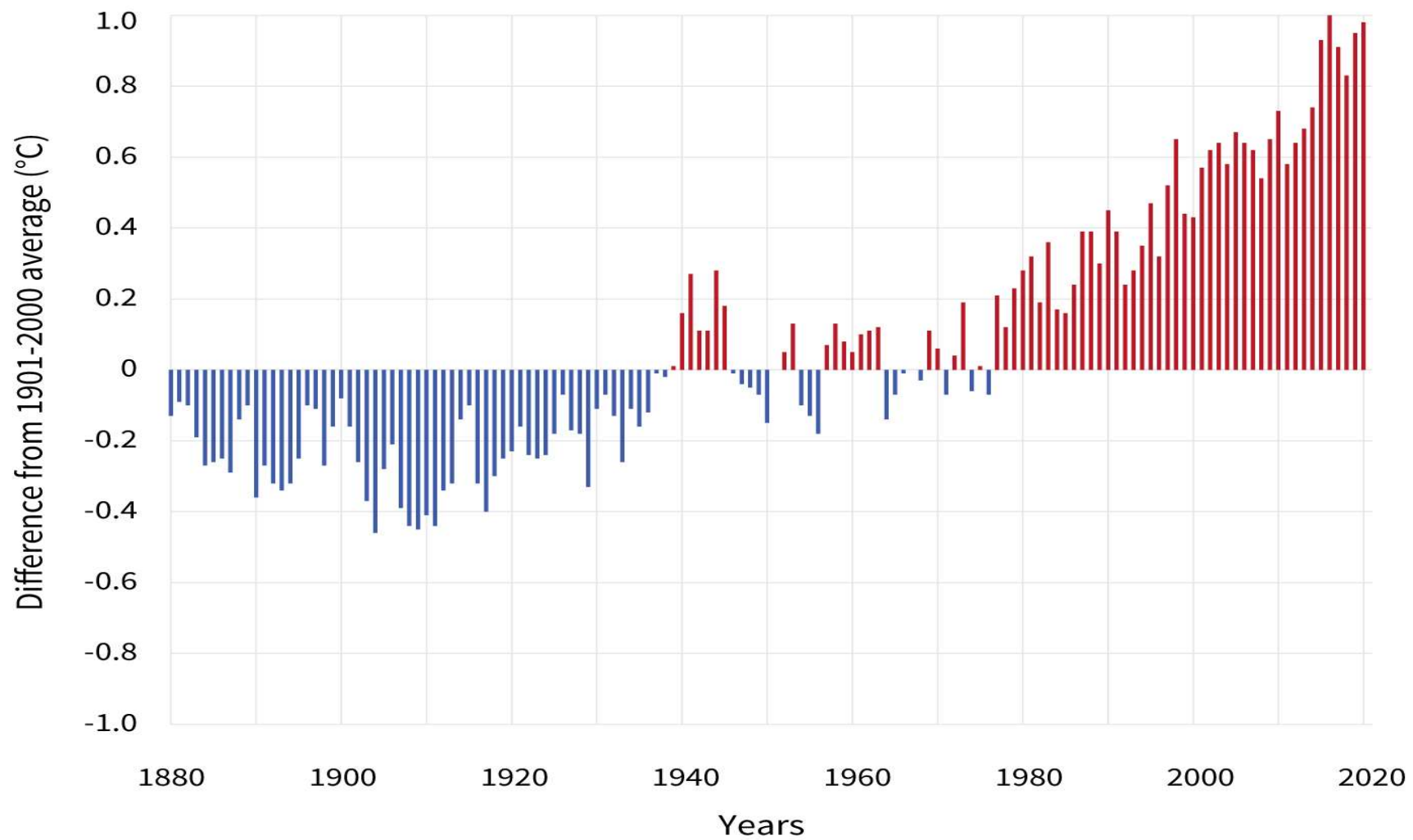
Current World Population

7.9 billion

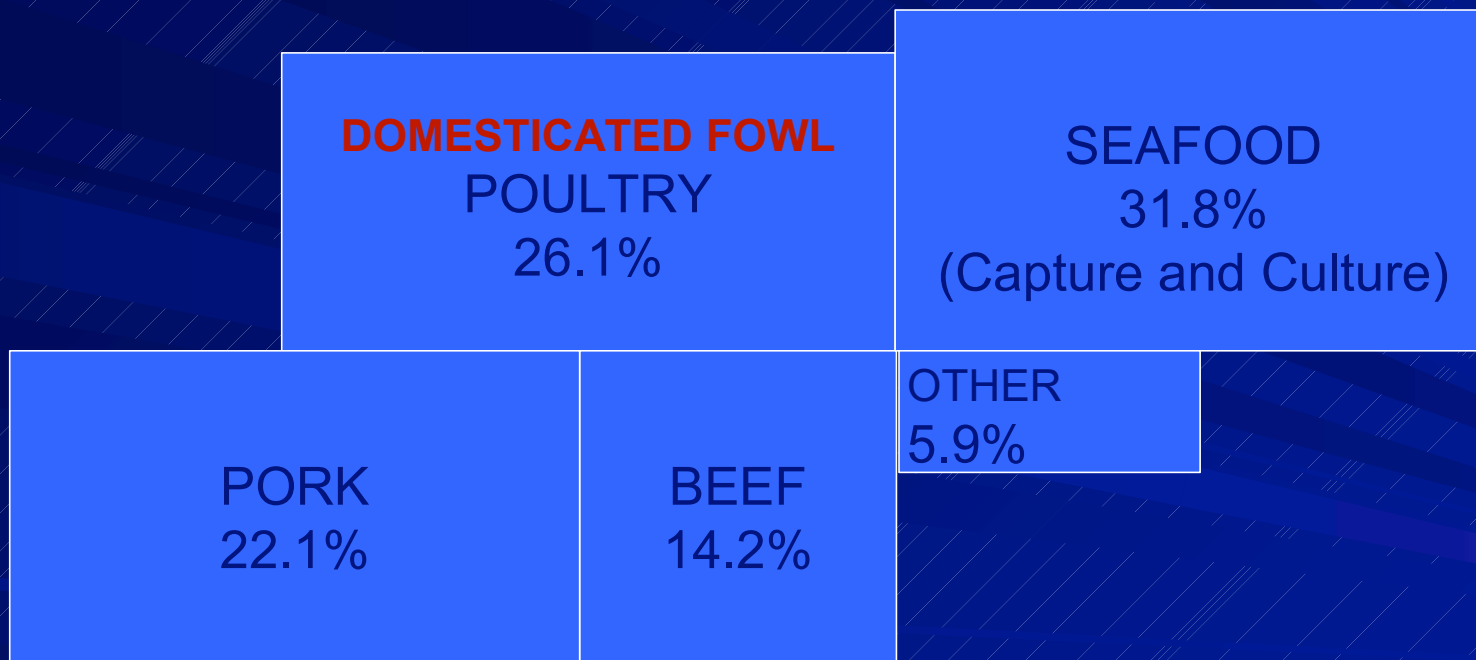
2050

9.74 billion

GLOBAL AVERAGE SURFACE TEMPERATURE



GLOBAL ANIMAL PROTEIN SOURCES 43% of total protein= (494 million mt)



2050 – additional 250-300 million mt needed- SOURCE?

FOR EACH KILOGRAM OF FARMED BEEF VS.
FARMED SALMON, 80-90% MORE CARBON DIOXIDE
EQUIVALENT IS PRODUCED

41% OF THE LAND IN THE U.S. IS USED TO FARM
ANIMALS

BEEF AND PORK REQUIRE 3.0 X and 1.5 X MORE
WATER TO PRODUCE THE SAME WEIGHT OF
CHICKEN

CARBON FOOTPRINTS (Kg of CO₂ equivalents per 100 g protein)

Beef 25

Lamb 20

Pork 4-8

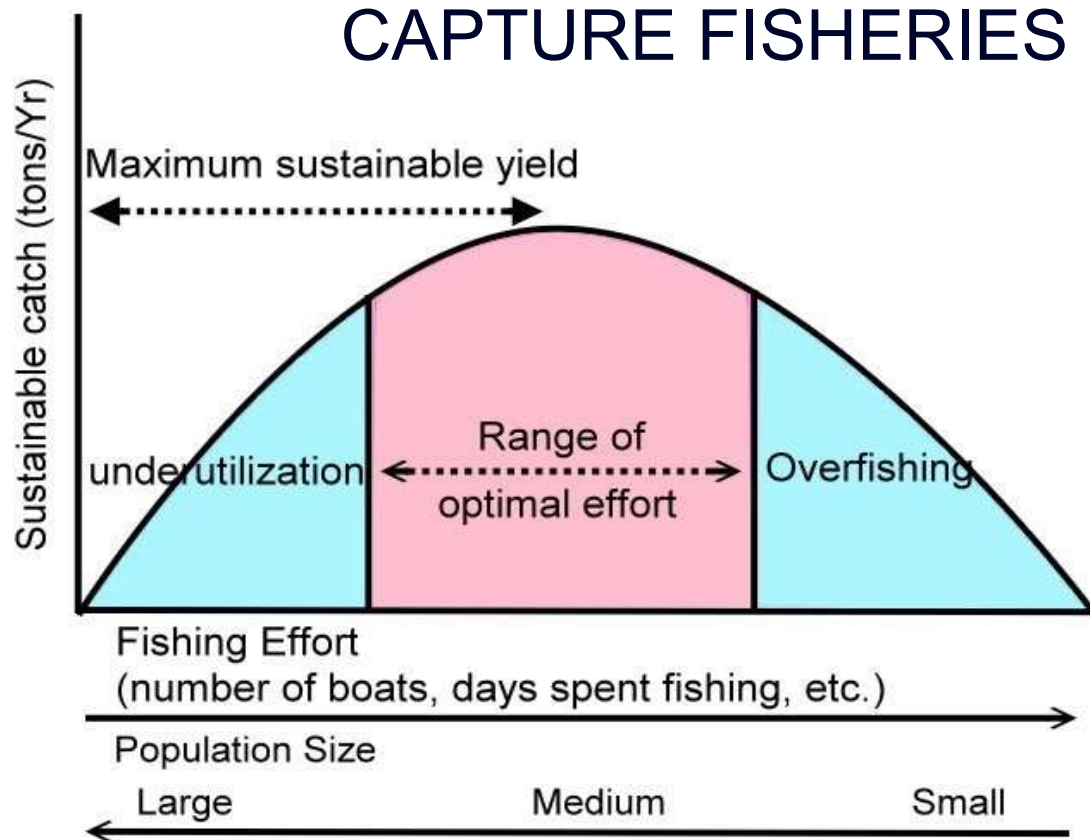
Chicken 3-4



Wild caught fish 1-3 (cod, saithe, haddock, herring, mackerel)

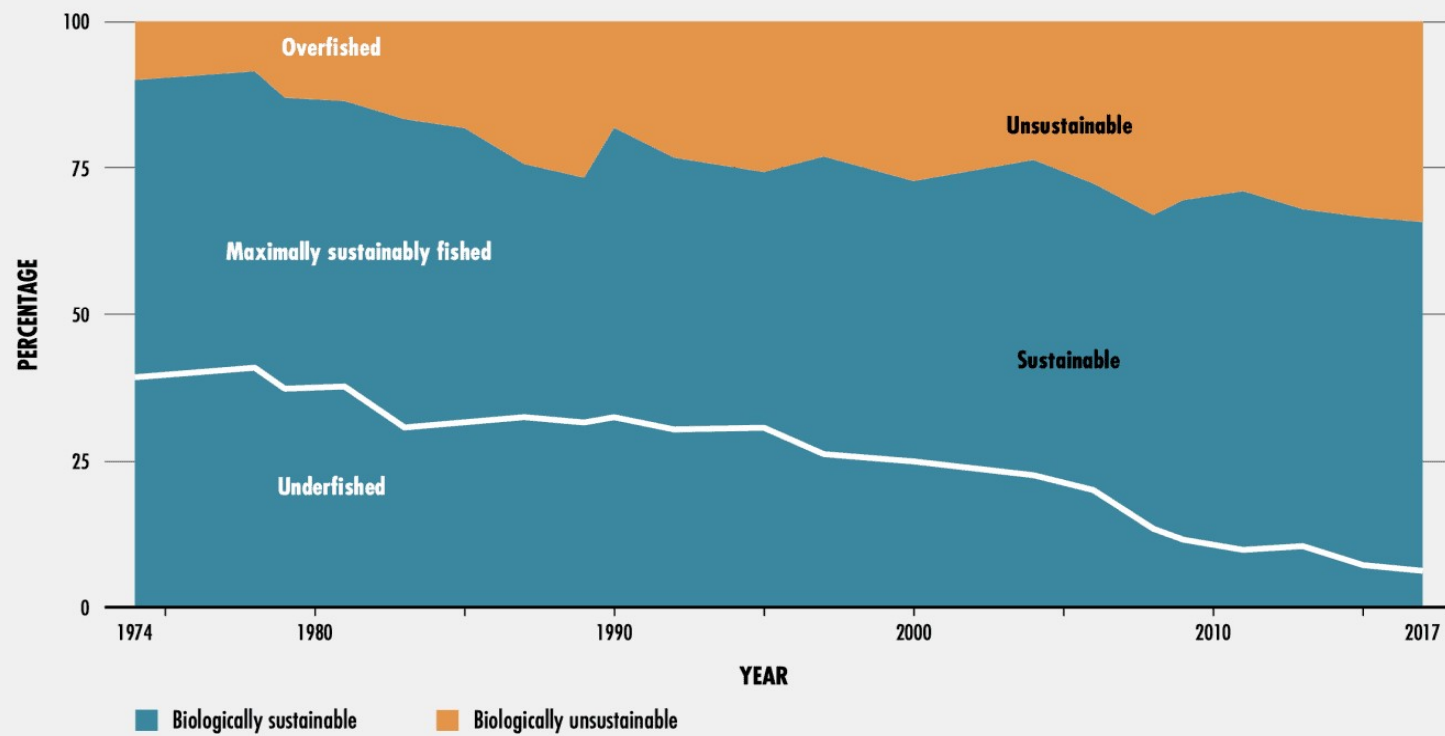
Farmed seafood 2-7, median = 4 (shrimp, tilapia, channel catfish, salmon, blue crab)

CAPTURE FISHERIES



MAXIMUM SUSTAINABLE YIELD = 90 MILLION METRIC TONS

FIGURE 19
GLOBAL TRENDS IN THE STATE OF THE WORLD'S MARINE FISH STOCKS, 1974–2017



SOURCE: FAO.

GLOBAL CAPTURE MARINE FISHERIES

Of the 600 marine fish stocks monitored by FAO:



3% are underexploited

20% are moderately exploited

52% are fully exploited

17% are overexploited

7% are depleted

1% are recovering from depletion

Most endangered species –TOP 10

Atlantic bluefin tuna

Chinese sturgeon

Winter skate

European eel

Red handfish

Nassau grouper

Orange roughy

Southern bluefin tuna

Beluga sturgeon

Atlantic halibut



TIME MAGAZINE, JULY, 2011

“CAN FARMING SAVE THE
LAST WILD FOOD?”

From 1990 to 2018 (28 years) Globally

Rise in capture fisheries production
+14%

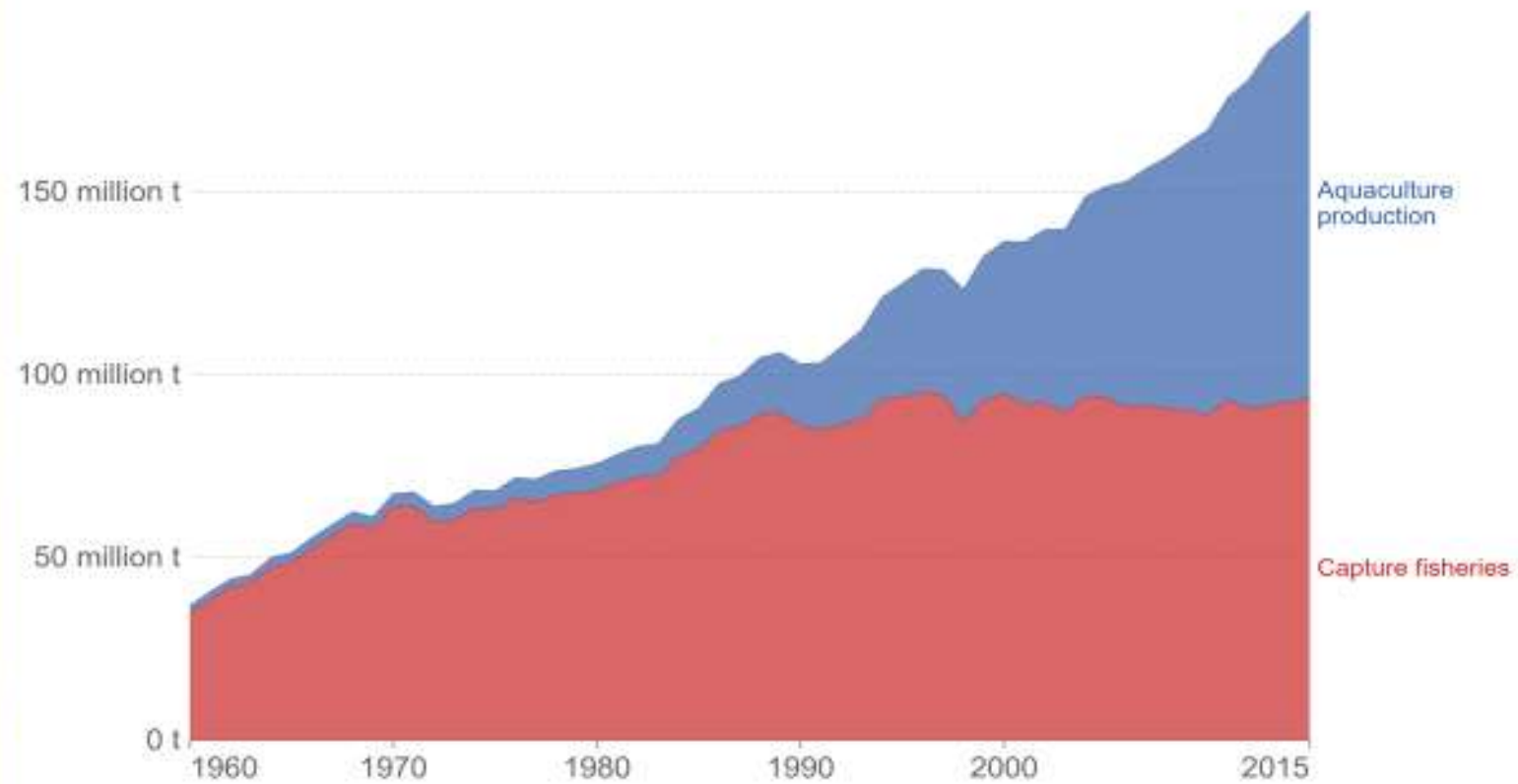
Rise in aquaculture production **+527%**

Rise in total food fish consumption
+122%

Seafood production: wild fish catch vs aquaculture, World

Our World
in Data

Aquaculture is the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Capture fishery production is the volume of wild fish catches landed for all commercial, industrial, recreational and subsistence purposes.



Source: UN Food and Agriculture Organization (FAO)

OurWorldInData.org/seafood-production • CC BY

Characteristics of Aquaculture

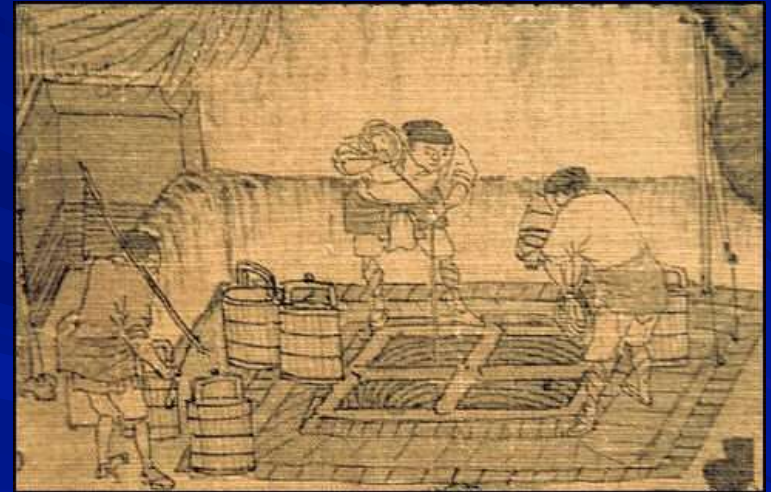
- World's fastest growing, animal protein-production systems
- 4 million tonnes (1980) to 82 million tonnes (2018);
- 1950 % increase, 2.05 million tonnes/year

What is Aquaculture?

- Husbandry (farming) of aquatic plants and animals
- Culture Fisheries 4,000 years ago

A production science; an industry (1950)

Production practices have become more intensive and efficient



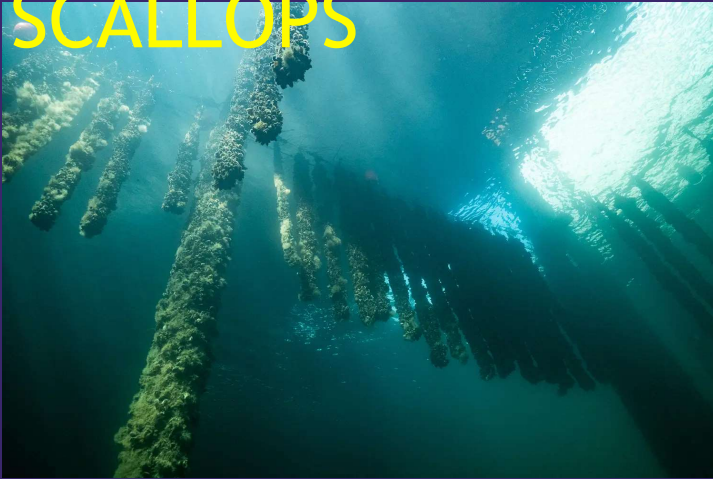
SUSPENDED AND BOTTOM CAGE CULTURE



CLAMS AND OYSTERS

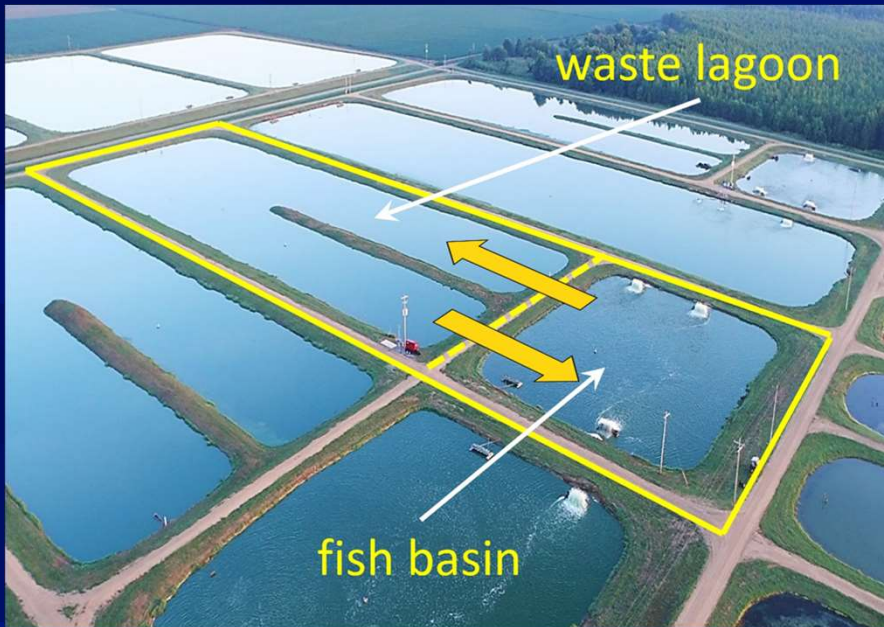


LONG LINE AND RAFT CULTURE = MUSSELS, SCALLOPS



PARTITIONED POND AQUACULTURE SYSTEM

CATFISH, SHRIMP



TANK CULTURE



TILAPIA, YELLOW PERCH,
SALMON

SEA CAGES

Salmon, European Sea Bass, Cobia
Pompano, Striped Bass, Barramundi,
Yellowfin Tuna



Feed conversion



2.2 lb (1 kg) of feed



GAIN

WEIGHT	PROTEIN
0.26 lb	0.11 lb
0.55 lb	0.35 lb
1.09 lb	0.55 lb
1.56 lb	0.66 lb



$$\text{Rate of feed conversion} = \frac{\text{Food consumed}}{\text{weight/protein gained}}$$



**“EH, EAT
MORE
FISH”**

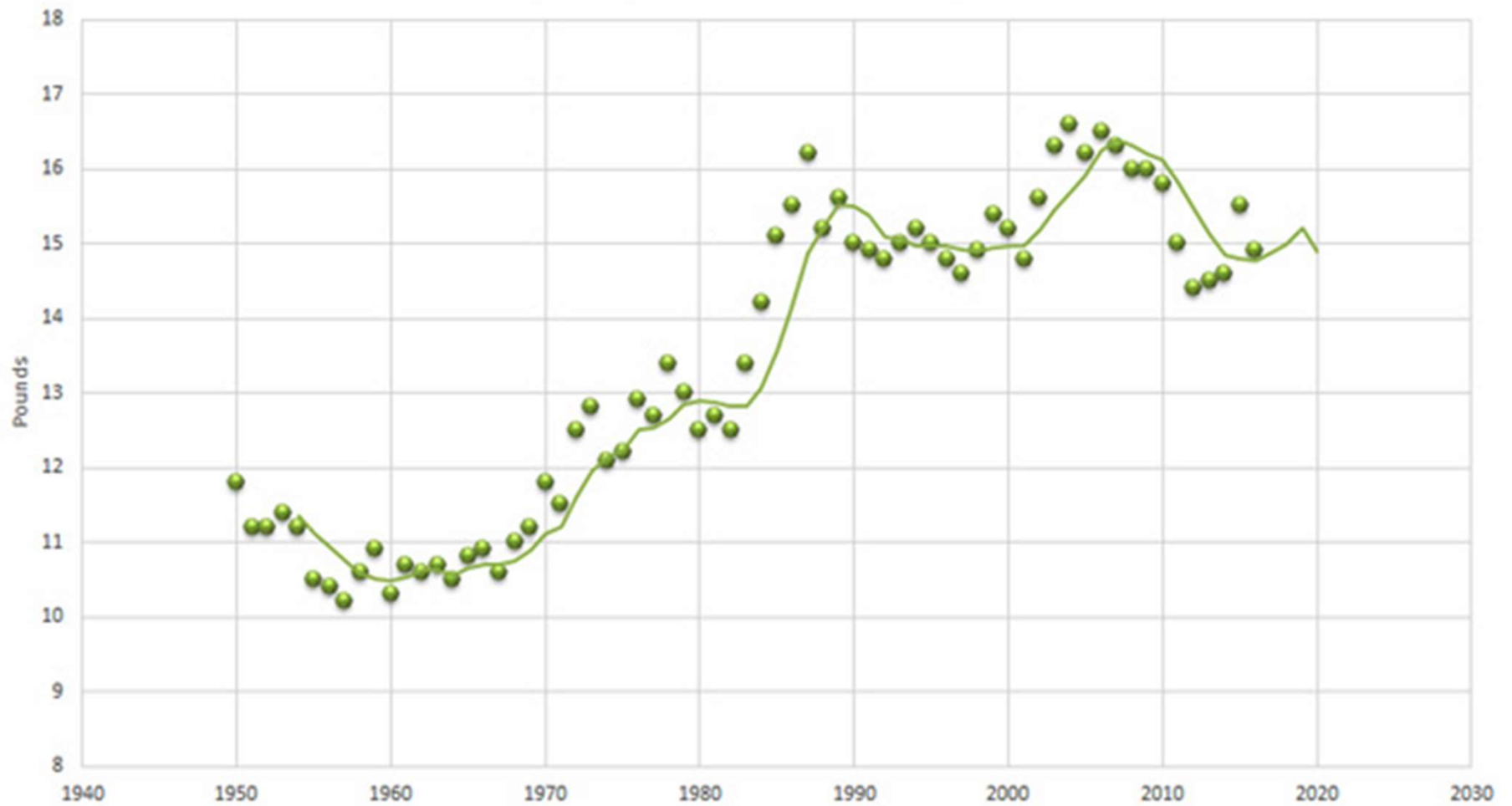
US SEAFOOD CONSUMPTION

GREATEST IMPORTER OF FISH AND FISHERY PRODUCTS

70-75% OF ALL SEAFOOD CONSUMED IN THE U.S. IS IMPORTED; ~50% IS FARMED

NEED TO REDUCE IMPORTS AND USE WASTE

U.S. per capita seafood consumption



Per capita seafood consumption (per product)

Top Seafood Products	
Species or Product	Amount Consumed in 2018
Shrimp **	4.6
Salmon	2.55
Canned Tuna	2.1
Tilapia	1.11 64.3 %
Alaska Pollock	0.77
Pangasius (Basa or Swai) **	0.63
Cod	0.62
Crab	0.52
Catfish	0.56
Clams	0.32
Per Capita Consumption	16.1 Pounds

Fresh/Frozen - 75%; Canned – 24%; Cured – 1%

IMPORTS – \$22.4 BILLION 6.0 BILLION LB

EXPORTS- \$5.6 BILLION

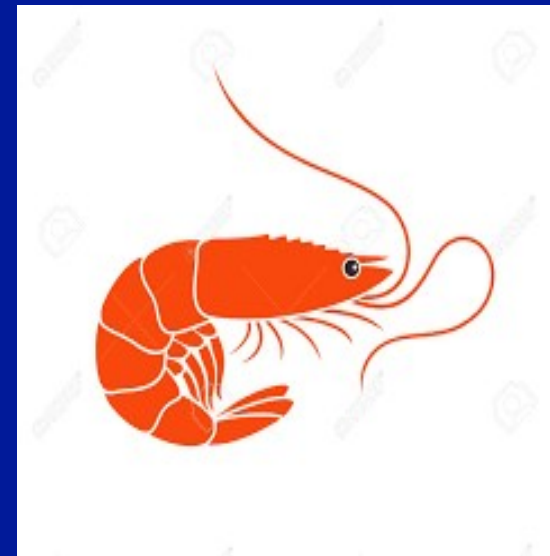
TRADE DEFICIT -\$16.8 BILLION

SHRIMP

IMPORTED 1.61 BILLION LB (88%)

DOMESTIC 0.23 BILLION LB (12%)

TOTAL 1.84

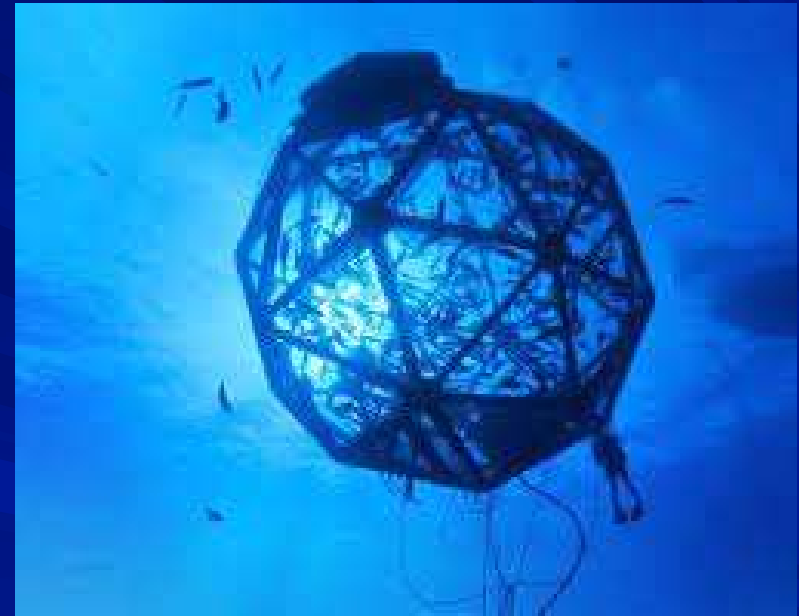


US WILL NEED ADDITIONAL **2 MILLION** TONS /YR OF
SEAFOOD BY 2050; **10 MILLION TONS**, IF SEAFOOD
CONSUMPTION DOUBLED

BUT

Aquaculture production in the U. S. is no longer
notably increasing (since 2011, @ early 1990s
levels; 4.5 million metric tonnes)

SOLUTION?



Use of 0.10 % of estuarine and marine waters in the US for aquaculture = 90 million mt of seafood



FARM-RAISED

VS.

WILD-CAUGHT FISH

Is farmed
seafood
safe?



IMPORT ALERT SYSTEM

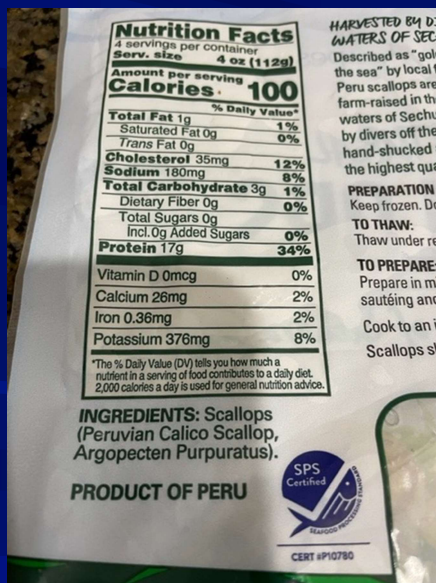
Responsible for ensuring that the nation's seafood supply, both domestic and imported, is safe, sanitary, wholesome, and honestly labeled

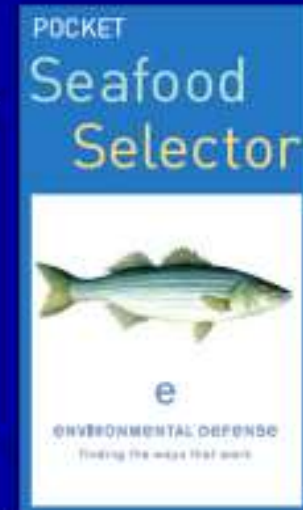
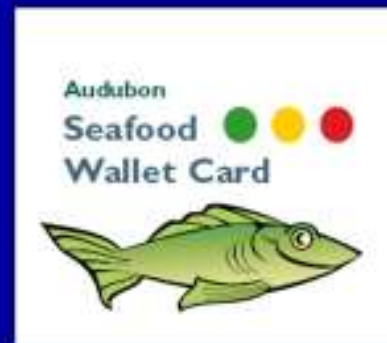
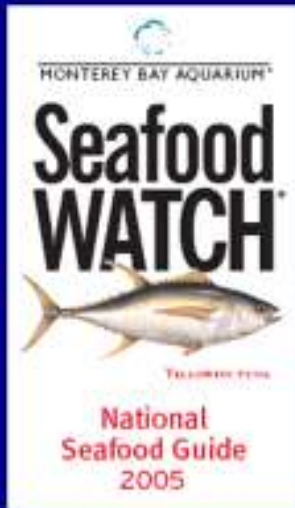


Agricultural Marketing Service
U.S. DEPARTMENT OF AGRICULTURE

Country of Origin Labeling (COOL) is a labeling law that requires retailers, such as full-line grocery stores, supermarkets and club warehouse stores, to notify their customers with information regarding the source of certain foods.

Regulations for fish and shellfish covered commodities (7 CFR Part 60) became effective in 2005.





CERTIFICATION PROGRAMS

Aquaculture Stewardship Council
(ASC)



Best Aquaculture Practices (BAP/GAA)



Friend of the Sea *



Global G.A.P. *



*aquaculture certification programs recognized by EU national and tons of production



MY RECOMMENDATIONS

Shrimp

Thailand, Ecuador, Mexico, Argentina, Indonesia

Salmon

Norway, Chile, United Kingdom, Canada

Clams, Mussels, Oysters, Scallops

US, Canada, Peru, New Zealand, Spain

Tilapia

Indonesia, Honduras, Mexico



**QUESTIONS/COMMENT
S**