NATIONAL Aquaculture ASSOCIATION

Is Aquaculture Sustainable?

AQUACULTURE (fish farming)

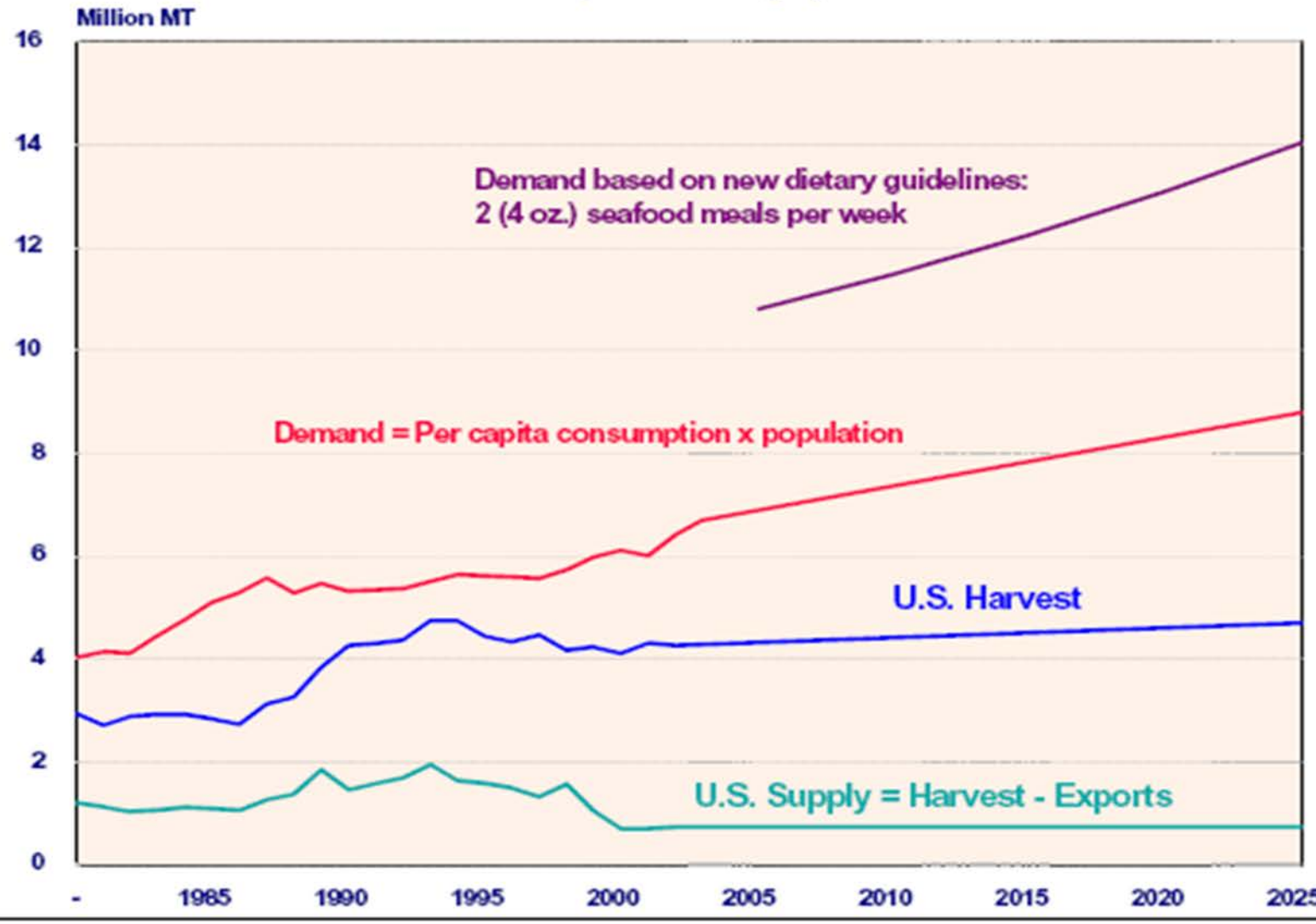
Production of aquatic animals and plants under controlled conditions for all or part of the life cycle.

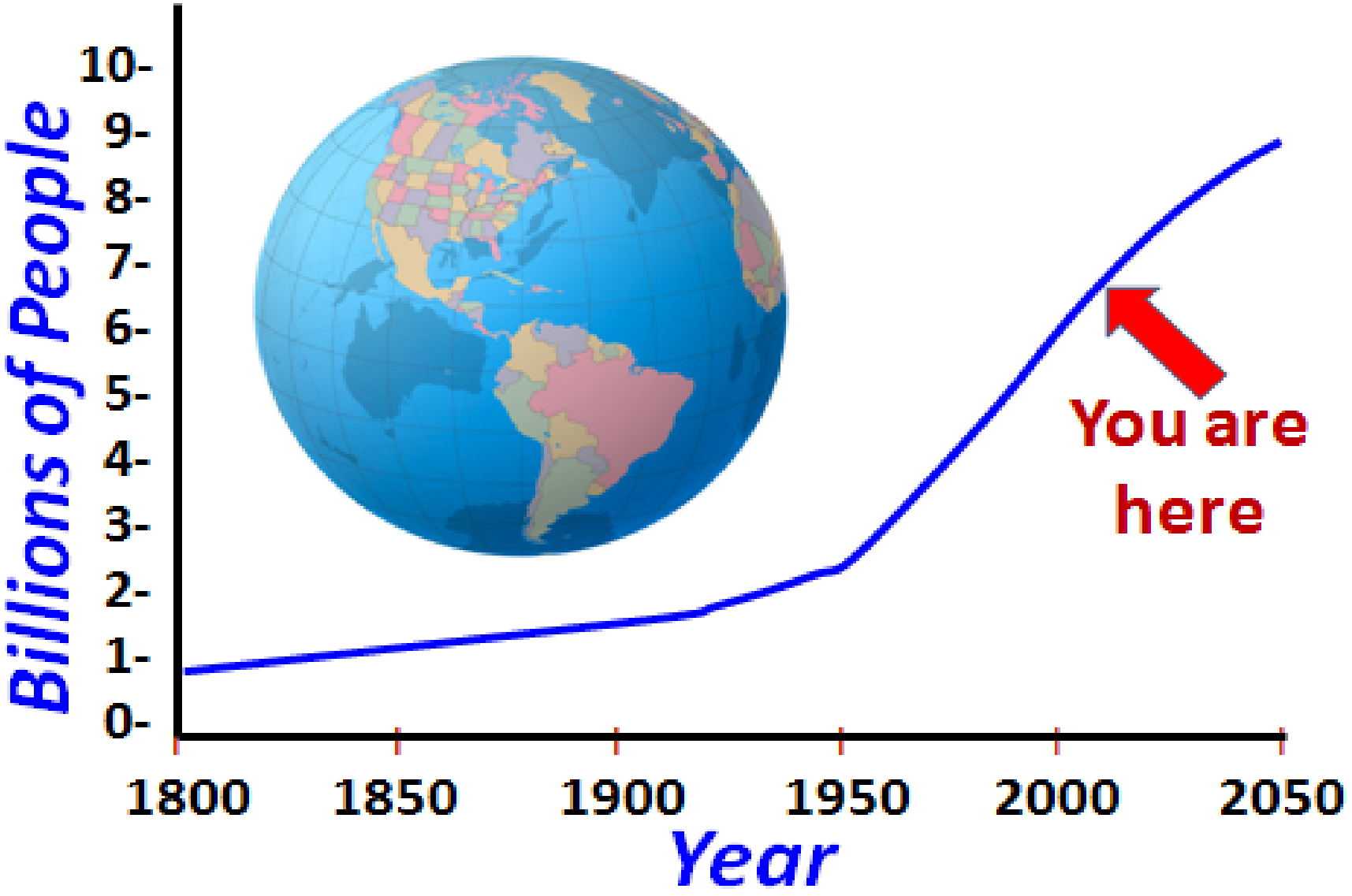
What is Produced?

- Food -both finfish & shellfish
- Plants-food, ornamentals, remediation
- Baitfish & sportsfish
- Wildlife restoration
- Companion animals
- Biological controls
- Medical research
- Amphibians & reptiles

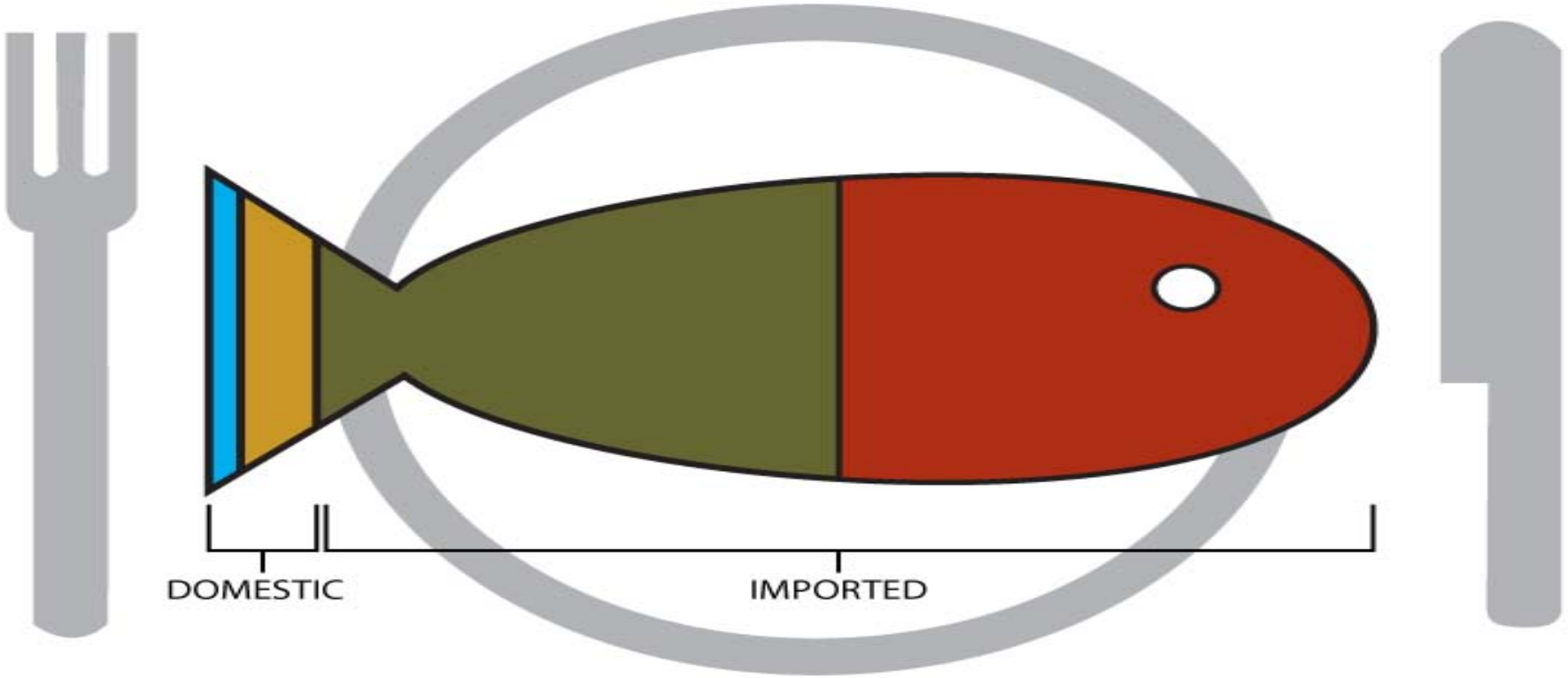
U.S. SEAFOOD SUPPLY AND DEMAND: PAST AND PROJECTED

(Round Weight)




Billions of People
10-
9-
8-
7-
6-
5-
4-
3-
2-
1-
0-
You are here
1800
1850
1900
1950
2000
2050
Year

Sources of all seafood consumed in U.S.



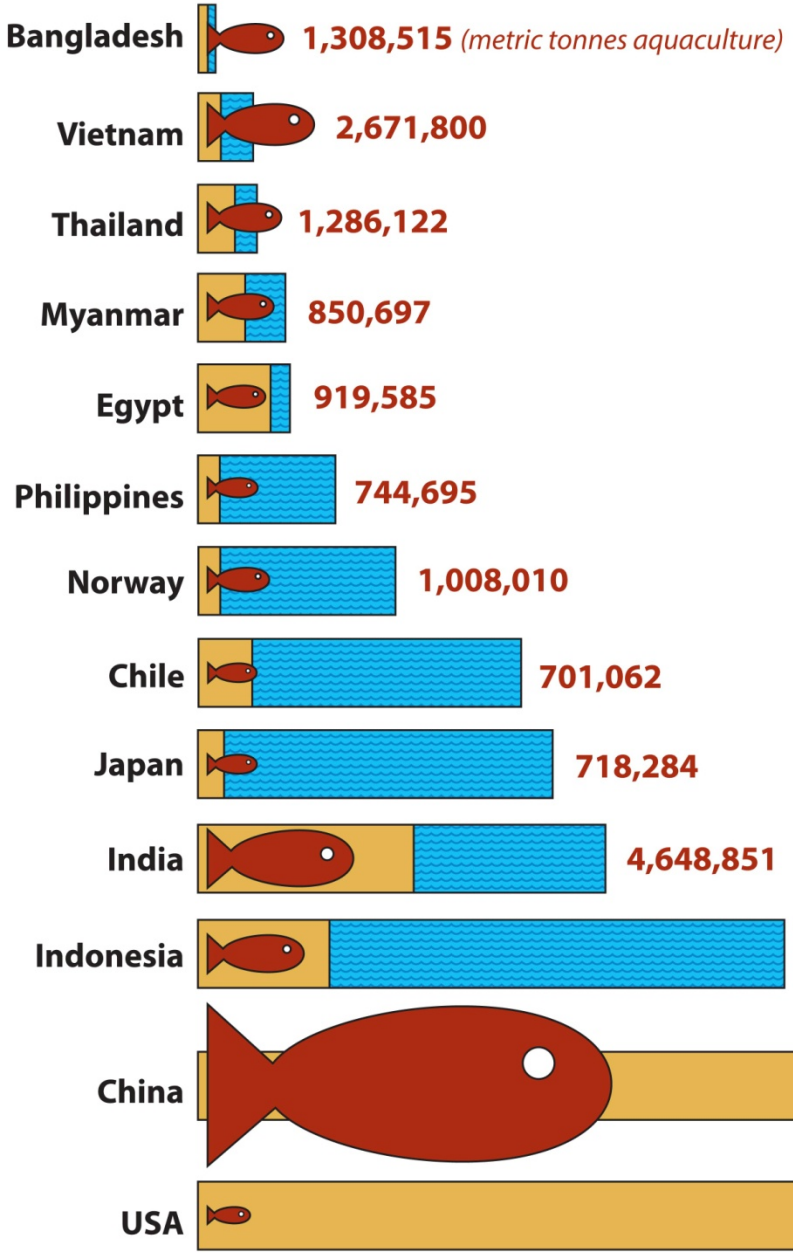
U.S. Farmed	U.S. Wild-caught	Imported Wild-caught	Imported Farmed
2.5%	6.5%	45%	46%

Data 2012, NOAA National Marine Fisheries Service.

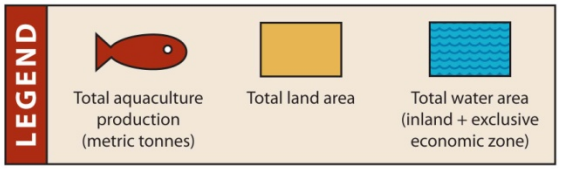
David J. Landkamer, Ed.D., Aquaculture Extension Specialist, Oregon Sea Grant Extension Program.
Infographic by Patricia Andersson, Oregon Sea Grant

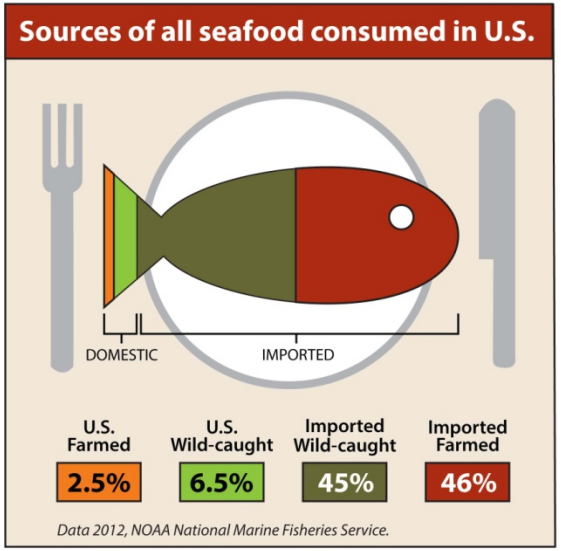
Top 13 Aquaculture Producers Worldwide

Total aquaculture production in relation to land and water resources

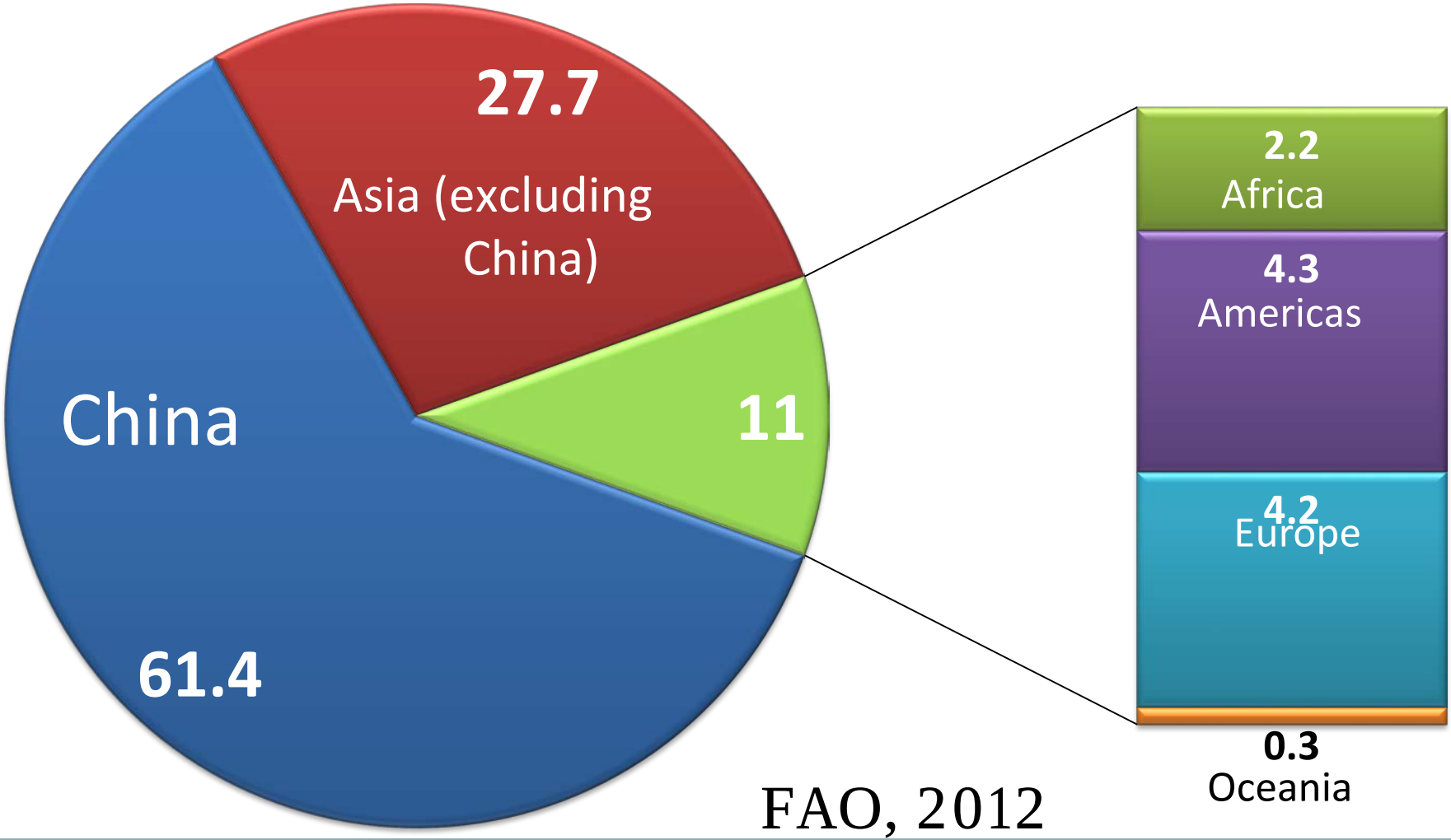


2010, UN Food and Agriculture Organization





Aquaculture Production by Region 2010 (%)



FAO, 2012

U.S. aquaculture is sustainable

Sustainability

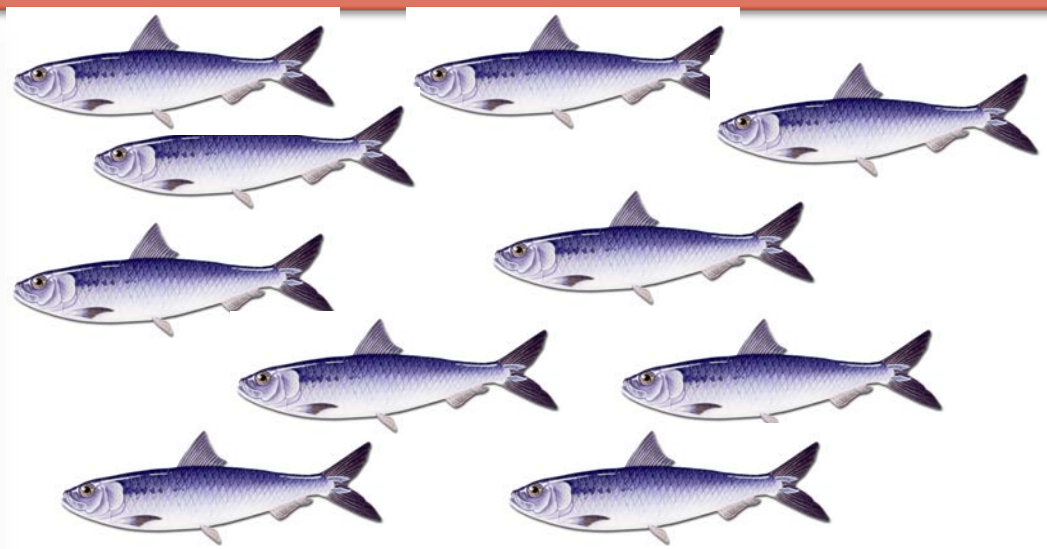
1. **Wise use of natural resources**
2. **Maintain environmental integrity**
3. **Security**
4. **Social**
5. **Economic**

U.S. Regulations

- Water quality
- Wetlands protection
- Wastewater treatment
- Water supply
- Non-native species
- Fish health programs
- Food safety
- Human Rights

Sustainability – Effluents

Sustainability – Feed Ingredients

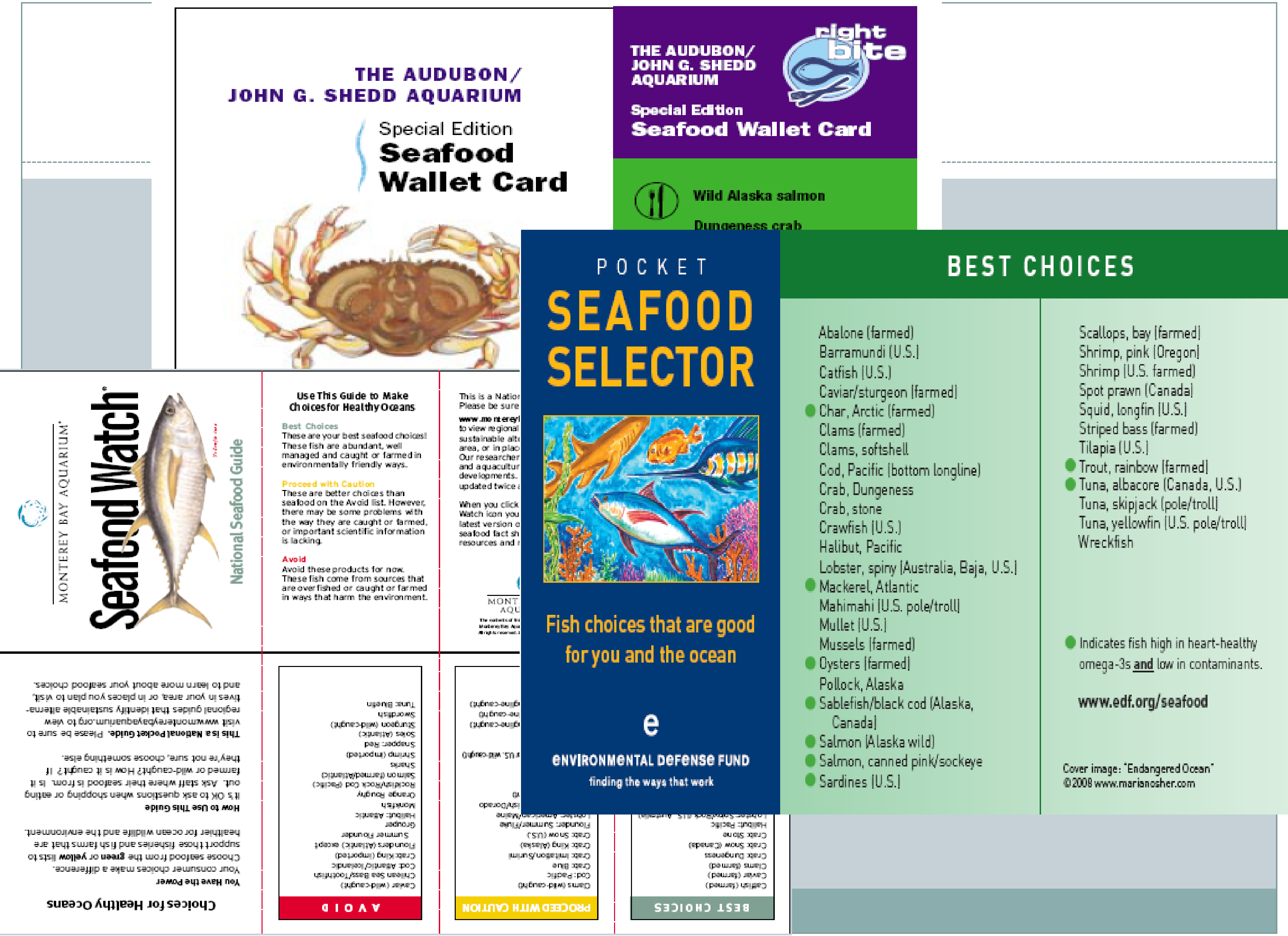


Environmental Impact & Feed Use
Grain fed per pound meat protein produced

61 pounds

38 pounds

13 pounds


THE AUDUBON/
JOHN G. SHEDD AQUARIUM
Special Edition
Seafood
Wallet Card
THE AUDUBON/
JOHN G. SHEDD
AQUARIUM
right bite
Special Edition
Seafood Wallet Card
Wild Alaska salmon
Dungeness crab
MONTEREY BAY AQUARIUM
Seafood Watch
National Seafood Guide
Use This Guide to Make
Choices for Healthy Oceans
Best Choices
These are your best seafood choices! These fish are abundant, well managed and caught or farmed in environmentally friendly ways.
Proceed with Caution
These are better choices than seafood on the Avoid list. However, there may be some problems with the way they are caught or farmed, or important scientific information is lacking.
Avoid
Avoid these products for now. These fish come from sources that are overfished or caught or farmed in ways that harm the environment.
POCKET
SEAFOOD
SELECTOR
Fish choices that are good
for you and the ocean
ENVIRONMENTAL DEFENSE FUND
finding the ways that work
BEST CHOICES
Abalone (farmed)
Barramundi (U.S.)
Catfish (U.S.)
Caviar/sturgeon (farmed)
Char, Arctic (farmed)
Clams (farmed)
Clams, softshell
Cod, Pacific (bottom longline)
Crab, Dungeness
Crab, stone
Crawfish (U.S.)
Halibut, Pacific
Lobster, spiny (Australia, Baja, U.S.)
Mackerel, Atlantic
Mahimahi (U.S. pole/troll)
Mullet (U.S.)
Mussels (farmed)
Oysters (farmed)
Pollock, Alaska
Sablefish/black cod (Alaska, Canada)
Salmon (Alaska wild)
Salmon, canned pink/sockeye
Sardines (U.S.)
Scallops, bay (farmed)
Shrimp, pink (Oregon)
Shrimp (U.S. farmed)
Spot prawn (Canada)
Squid, longfin (U.S.)
Striped bass (farmed)
Tilapia (U.S.)
Trout, rainbow (farmed)
Tuna, albacore (Canada, U.S.)
Tuna, skipjack (pole/troll)
Tuna, yellowfin (U.S. pole/troll)
Wreckfish
Indicates fish high in heart-healthy omega-3s and low in contaminants.
www.edf.org/seafood
Cover image: "Endangered Ocean"
©2008 www.marianosher.com
Choices for Healthy Oceans
AVOID
PROCEED WITH CAUTION
BEST CHOICES

BEST CHOICES

Arctic Char (farmed)
Barramundi (US farmed)
Catfish (US farmed)
Clams (farmed)
Cobia (US farmed)
Cod: Pacific (Alaska longline)+
Crab: Dungeness, Stone
Halibut: Pacific+
Lobster: Spiny (US)
Mussels (farmed)
Oysters (farmed)
Sablefish/Black Cod
(Alaska+ or British Columbia)
Salmon (Alaska wild)+
Scallops: Bay (farmed)
Shrimp, Pink (Oregon)+
Striped Bass (farmed or wild*)
Tilapia (US farmed)
Trout: Rainbow (farmed)
Tuna: Albacore (troll/pole, US+
or British Columbia)
Tuna: Skipjack (troll/pole)

GOOD ALTERNATIVES

Caviar, Sturgeon (US farmed)
Clams (wild)
Cod: Pacific (US trawled)
Crab: Blue*, King (US), Snow
Flounders, Soles (Pacific)
Herring: Atlantic
Lobster: American/Maine
Mahi Mahi/Dolphinfish (US)
Oysters (wild)
Pollock (Alaska wild)+
Salmon (Washington wild)*
Sablefish/Black Cod
(California, Oregon or Washington)
Scallops: Sea (wild)
Shrimp (US, Canada)
Squid
Swai, Basa (farmed)
Swordfish (US)*
Tilapia (Central America, farmed)
Tuna: Bigeye, Yellowfin (troll/pole)
Tuna: Canned Skipjack and Albacore*

AVOID

Caviar, Sturgeon* (imported wild)
Chilean Seabass/Toothfish*
Cobia (imported farmed)
Cod: Atlantic, imported Pacific
Flounders, Halibut, Soles (Atlantic)
Groupers*
Lobster: Spiny (Caribbean)
Mahi Mahi/Dolphinfish (imported)
Marlin: Blue*, Striped*
Monkfish
Orange Roughy*
Salmon (farmed, including Atlantic)*
Sharks*, Skates
Shrimp (imported)
Snapper: Red
Swordfish (imported)*
Tilapia (Asia farmed)
Tuna: Albacore, Bigeye, Yellowfin
(longline)*
Tuna: Bluefin*, Tongol, Canned
(except Albacore and Skipjack)
Yellowtail (imported farmed)

“We must plant the sea and herd its animals using the sea as farmers instead of hunters. That is what civilization is all about - farming replacing hunting.”

NATIONAL Aquaculture ASSOCIATION

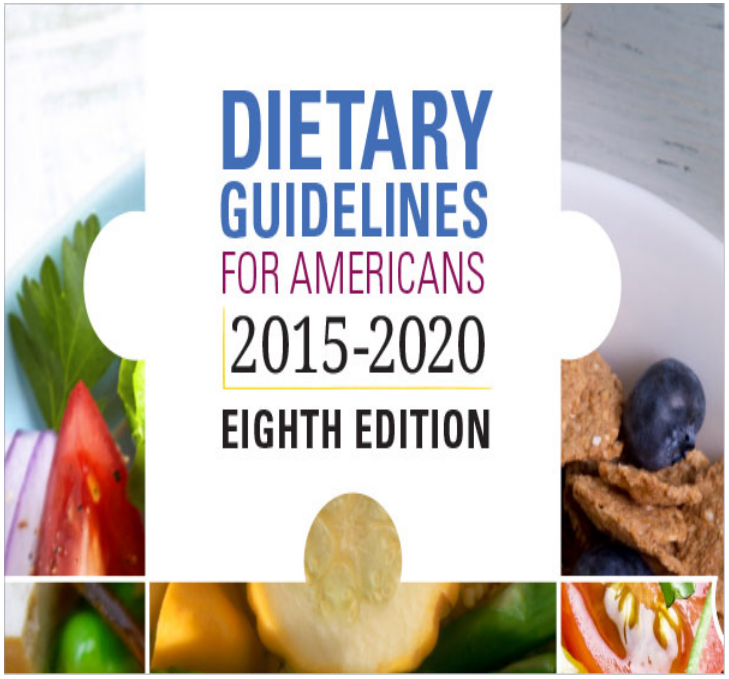
What About Nutrition and Product safety?

2015-2020 USDA Dietary Guidelines

About half of all Americans have one or more preventable, diet-related chronic diseases, including cardio-vascular disease, diabetes, overweight and obesity

Americans consume only 44% of the seafood that they should be consuming.

The review of the evidence demonstrated, in the species evaluated, that farm-raised seafood has as much or more EPA and DHA per serving as wild caught.



Seafood Consumption & Pregnancy

Benefits of Fish Consumption During Pregnancy and Breastfeeding

- Neurodevelopmental
  - Visual
  - Cognitive
  - Motor
- Improved nutritional content of breast milk

- Increased gestational length
- Management of perinatal depression
- Lower body fat in infancy and childhood
- Improved immune response

- Documented Benefits
- Emerging Benefits

FDA Advice on Mercury & Seafood

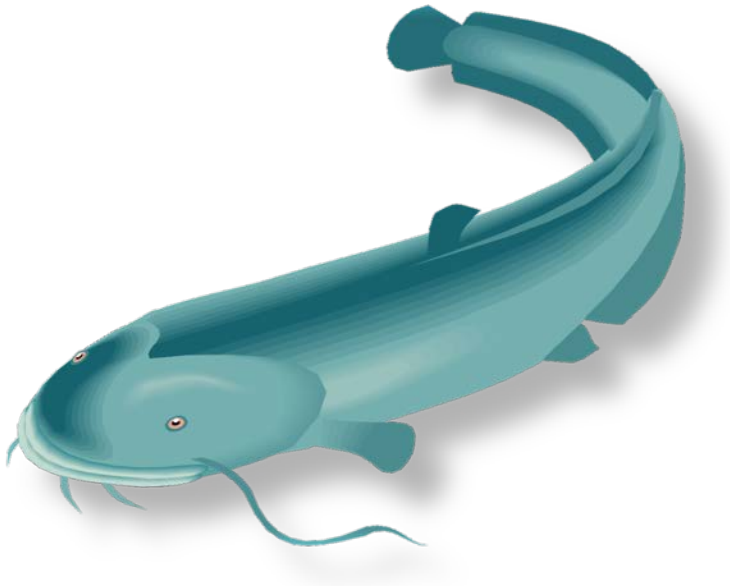
Pregnant women, nursing mothers, women who may become pregnant, and small children should avoid certain fish—

King mackerel,
Tilefish,
Swordfish,
Shark

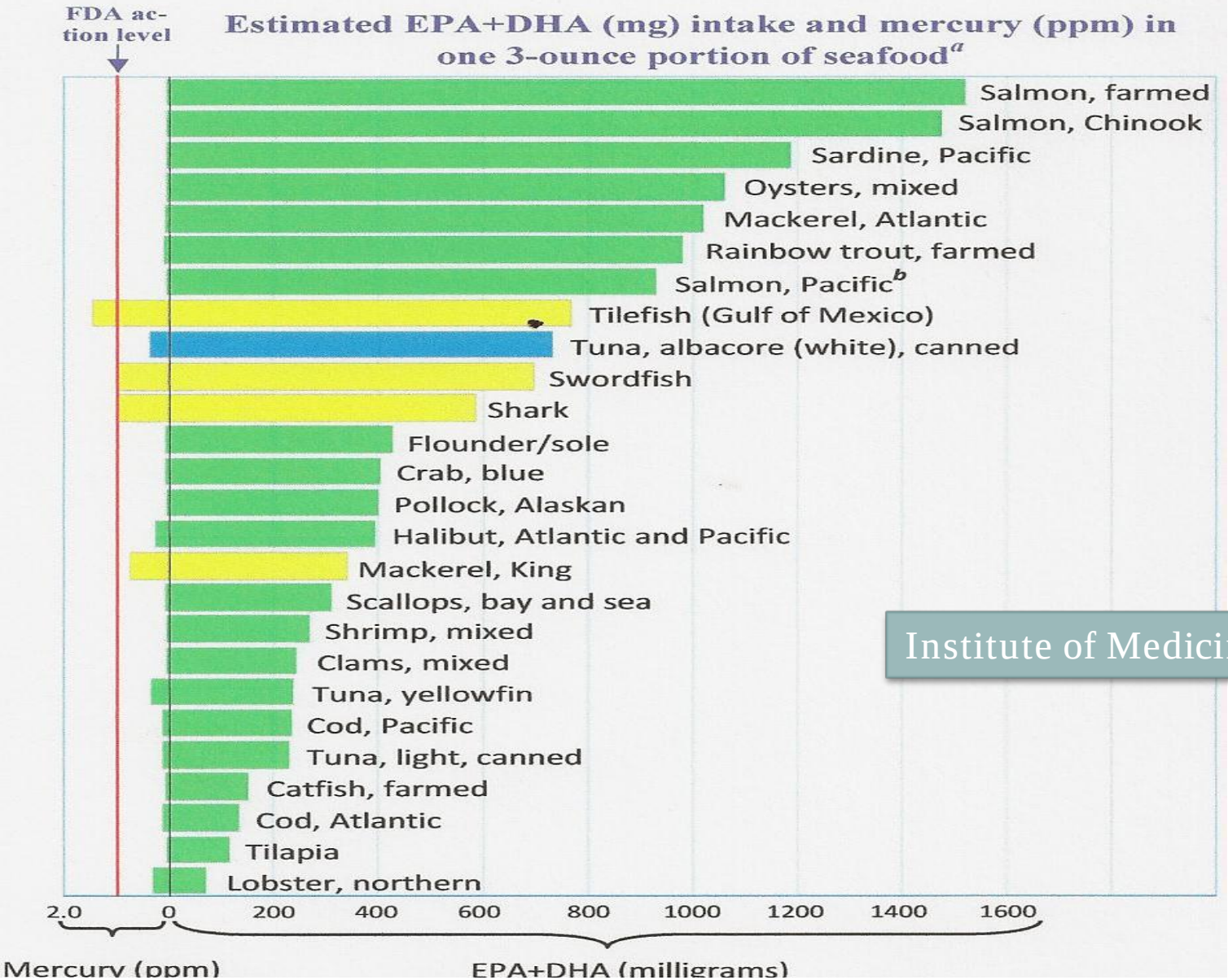
limit their consumption of **albacore tuna** to 6 ounces per week

Farmed Fish & Health

- Low mercury fish and shellfish include:
  - Shrimp
  - Channel Catfish
  - Tilapia
  - Trout
  - Salmon

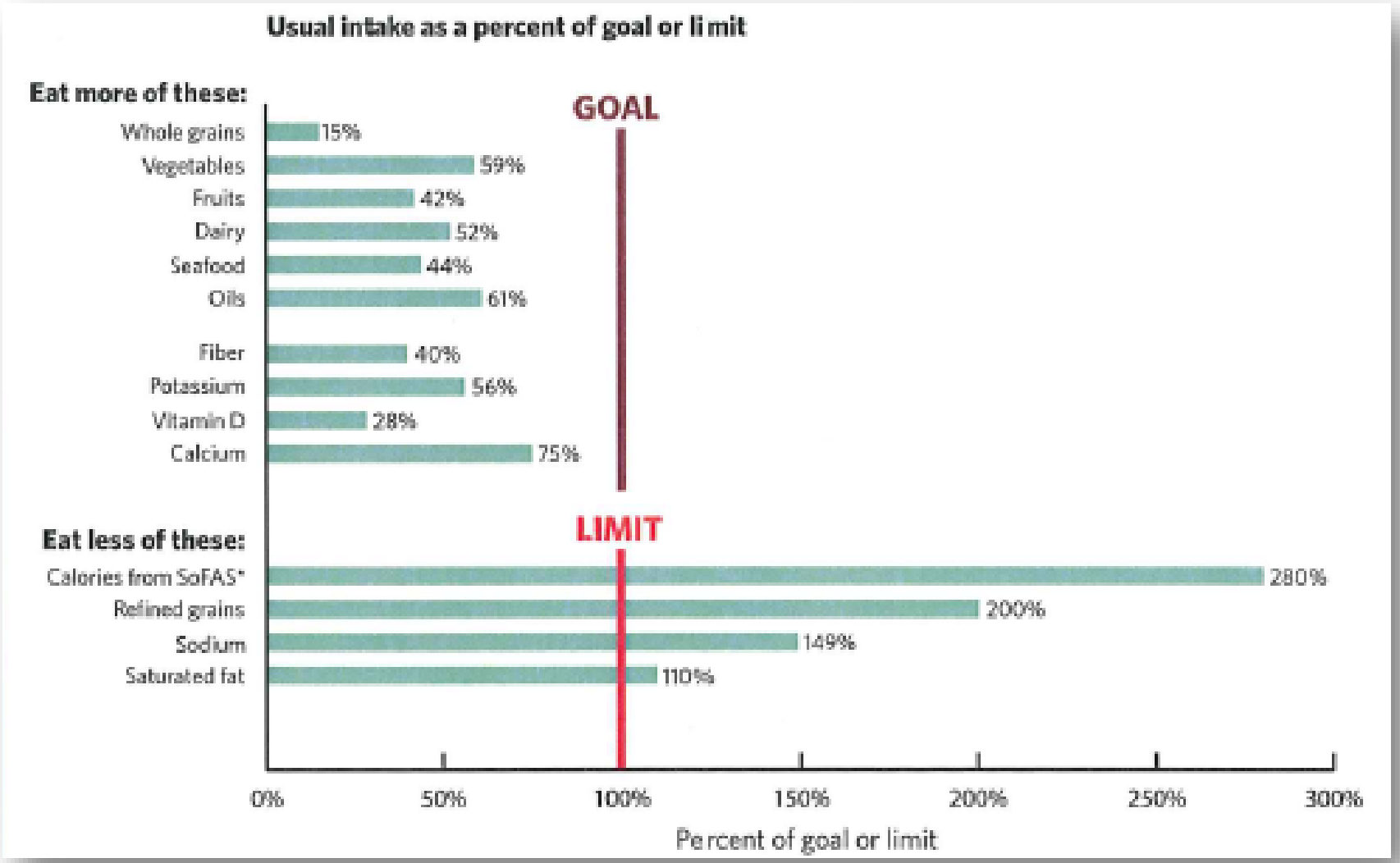


Source: FDA



Institute of Medicine

Typical American Diet Intake



U.S. Farm-Raised Seafood and Health

- Alzheimer's Association
- American Diabetes Association
- American Dietetic Association
- American Heart Association
- American Optometric Association
- Arthritis Foundation
- Food and Agricultural Organization
- National Healthy Mothers, Healthy Babies Coalition
- National Heart, Lung and Blood Institutes
- US Department of Agriculture
- US Food & Drug Administration

In addition to Omega-3s…

- High quality protein
- Low calorie
- Low in saturated fats
- Easily digestible
- Low in sodium
- High in vitamins A, D, thiamine, niacin, B_6, B_{12}
- High in valuable minerals (selenium, iron, magnesium, and zinc)

Antibiotics and Hormones

- **No growth or production hormones**
- **No growth promotion with antibiotics**
- **No pesticides**
- **Very few drugs**

Feeds

Regulated by:

- FDA
- State Departments of Agriculture
- American Association of Feed Control Officials

Astaxanthin

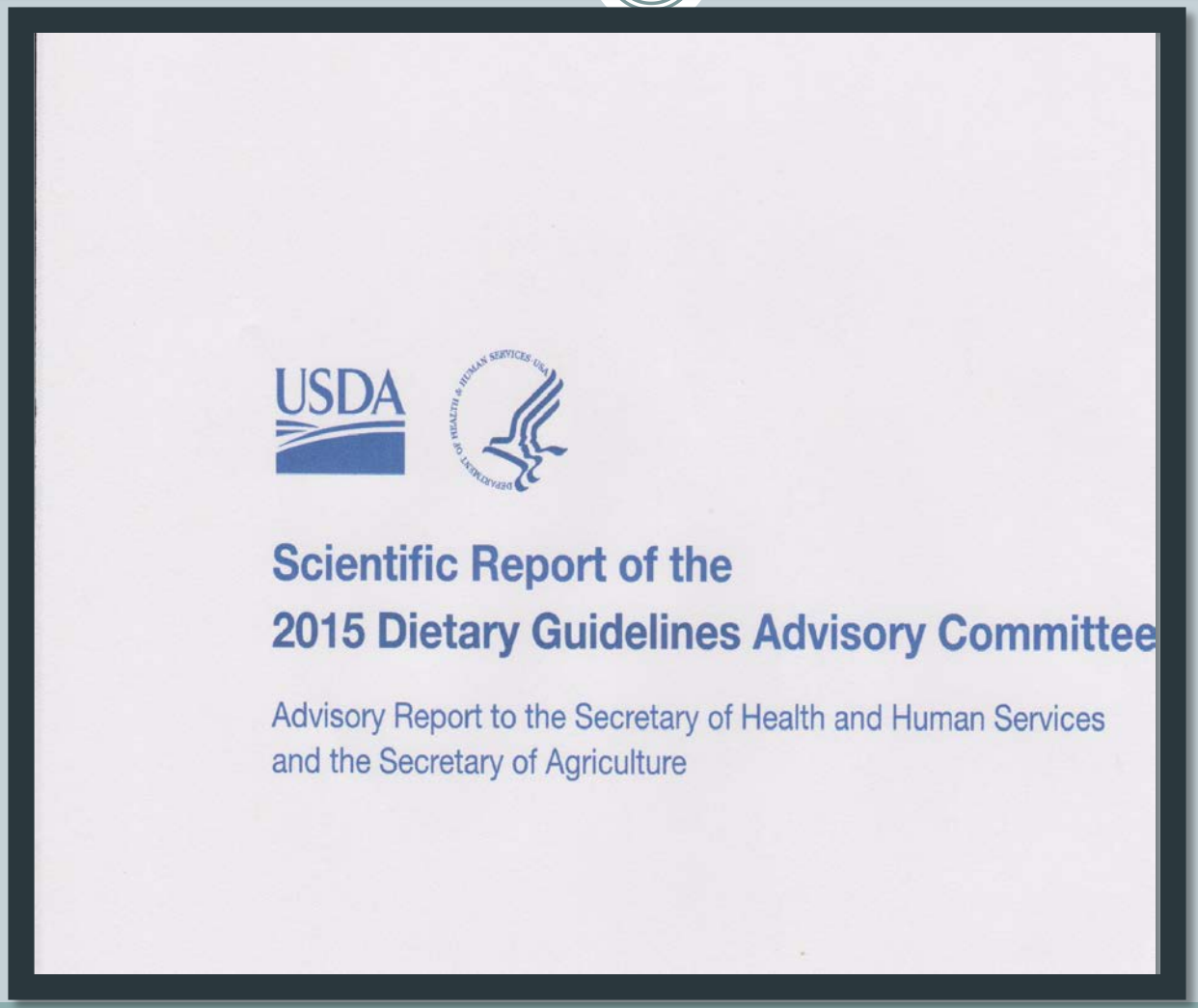
Wild

Farmed

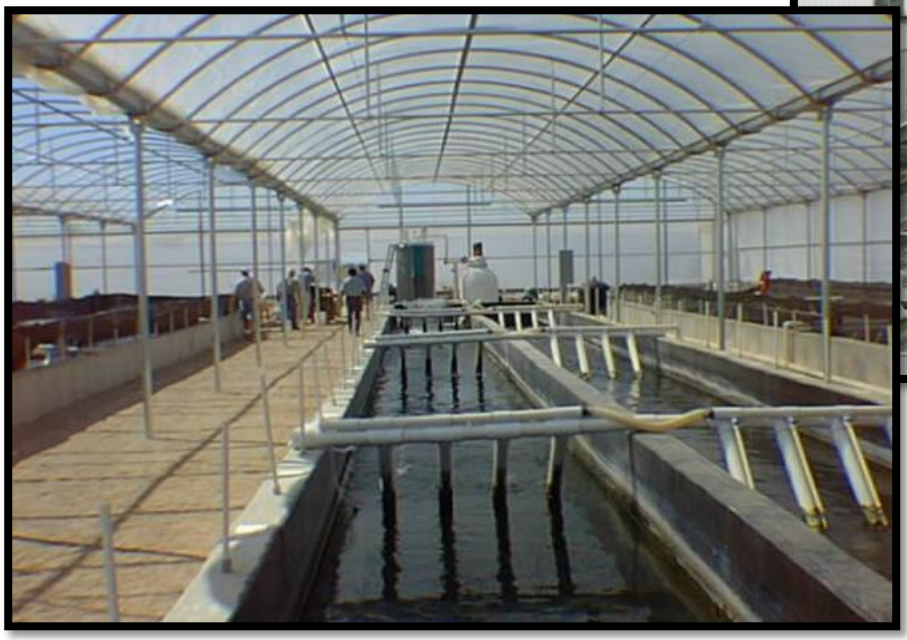
Safety-GMOs

- Sterile
- Produce growth hormone a

The Really Exciting News…



"Expanded supply of seafood nationally and internationally will depend upon the increase of farm-raised seafood worldwide"



Dietary Advice

- "Seafood varieties commonly consumed in the United States that are higher in EPA and DHA and lower in methyl mercury include salmon, anchovies, herring, shad, sardines, Pacific oysters, trout, and Atlantic and Pacific mackerel (*not* king mackerel, which is high in methyl mercury).

  "Individuals who regularly consume more than the recommended amounts of seafood that are in the Healthy U.S-Style Pattern should choose a mix of seafood that emphasizes choices relatively low in methyl mercury."



"Consistent with overall sustainability goals, farm-raised finfish (e.g., salmon and trout) is more sustainable than terrestrial animal production (e.g., beef and pork) in terms of GHG emissions and land/water use."

"The review of the evidence demonstrated, in the species evaluated, that farm-raised seafood has as much or more EPA and DHA per serving as wild caught.

It should be noted that low-trophic seafood, such as catfish and crawfish, regardless of whether wild caught or farm-raised seafood, have less EPA and DHA per serving than high-trophic seafood, such as salmon and trout."

Attributes of U.S. Farm-Raised Seafood

- Environmentally-sound production methods
- Product safety
- Consistency in price
- Consistency in supply
- Local production
- Product quality




Questions???

NATIONAL Aquaculture ASSOCIATION
One Industry, One Voice

www.thenaa.net

The Industry | Health and Nutrition | FAQs | Media | Members | About NAA | Kids Corner

NATIONAL Aquaculture ASSOCIATION

Health and Nutrition

Learn more about U.S. farm-raised seafood and your health, safe handling of seafood, and browse some great recipes for both finfish and shellfish on the health and nutrition pages.

Health and Nutrition

- U.S. Aquaculture and Health
- Food Safety
  - Purchasing
  - Handling
- Recipes
  - Finfish
  - Shellfish
- Site Home