PROBLEMS, STUMBLING BLOCKS AND SOLUTIONS FOR U.S. AQUACULTURE

MAINE AQUACULTURE ASSOCIATION

KEEPING MAINE’S WORKING WATERFRONTS WORKING
GOOD JOBS - RESPONSIBLE STEWARDSHIP - HEALTHY FOOD
BY 2030 AVERAGE STANDARD OF LIVING IN CHINA AND INDIA = US
SMALL LIFEBOAT, LOTS OF OCCUPANTS

9.6 BILLION BY 2050

FOOD PRODUCTION MUST DOUBLE
BIG AND INCREASING NEED
LIMITED RESOURCES

ARABLE LAND – FRESH WATER - NUTRIENTS
“The world is in transition from an era of food abundance to one of scarcity, rising food prices and spreading hunger. Population growth, rising affluence, and the conversion of food into fuels are combining to raise consumption by record amounts. Extreme soil erosion, growing water shortages, and the earth’s rising temperature are making it more difficult to expand production. Unless we can reverse such trends, food prices will continue to rise and hunger will continue to spread, eventually bringing down our social system.” Lester Brown 2012

COST AND AVAILABILITY OF FOOD, ENERGY AND WATER WILL BE THE SOCIAL DRIVERS IN NEXT CENTURIES
25% of Earth's surface is land.

30% of that landmass is arable.

Only 7.5% of the world's surface area must feed the world.
UNLESS…….? 
75 % OF EARTHS SURFACE IS WATER

MOST SOLAR RADIATION HITS THE EARTH IN UNFARMED AREA 
GROWING FOOD IN WATER HAS KEY ADVANTAGES
Efficiencies of different animal protein sectors

Input requirements to produce 1 kg raw product

- 8 kg feed, 1857 gallons
- 2 kg feed, 469 gallons
- 3 kg feed, 756 gallons
- 1.1 kg feed, 32 gallons
- 0 kg feed, .001 gallons

Aquatic animals 10-20% more efficient than land animals at converting energy to meat and protein.

One acre of farmed mussels produces 1000 x more meat than one acre of grazing land for cattle.
EFFICIENCIES OF DIFFERENT PLANT PRODUCTION
FRESHWATER REQUIRED TO PRODUCE 1 KG RAW PRODUCT

- Wheat: 1500 Liters
- Corn: 1400 Liters
- Rice: 4700 Liters
- Seaweed: 0.01 Liters

Aquatic Plants:
- 10% more efficient than land plants at converting energy to raw product
- Little or No fertilizer required
- Little or No freshwater required
IT’S ABOUT SPACE AND RESOURCES

IN THE FUTURE WE WILL GROW MOST OF OUR FOOD IN WATER
THE FARMER OF THE FUTURE
AQUACULTURE
A SHORT HISTORY

- HUNTER / GATHERERS → HERDSMEN
  - 8000 YEARS AGO – LAND RESOURCES
  - 2000 YEARS AGO FOR AQUATIC RESOURCES
  - DRIVEN BY RESOURCE LIMITS AND INCREASED POPULATION

TRANSITION FROM WILD TO FARM

- FENCING IN WILD ANIMALS – TRAP AND HOLD
- SUPPLEMENTAL FEEDING
- CLOSING THE LIFE CYCLE
- IMPROVING PERFORMANCE
  - SELECTION
  - TECHNOLOGY
- IMPROVING ECONOMICS
World Edible Seafood Supply And Forecast 1991-2030

Growth in Aquaculture, Not Wild

Source: FAO
BRIC AND CHINA IN PARTICULAR AS A GAME CHANGER

• From 1985 to 2005 domestic demand for seafood in China has increased from 7kg to 25kg per capita
• 2010 China flips from net exporter to importer
• China projected to double its per capita spending on seafood products between 2008 and 2020

World Aquaculture Production

≈ 600 Species Cultured

- 62% Fresh Water
- 30% Salt Water
- 8% Brackish

Farm Gate ≈ $125 Billion

8.8% Annual Growth Rate 1980 – 2010

Supplies and Equipment $20.5 Billion 2009

11.6% Annual Growth

≈ 16.6 Million Employed Worldwide

Source: FAO 2012
GLOBAL STATUS /TRENDS 2012

• ~47% EDIBLE SEAFOOD IS FARMED

<table>
<thead>
<tr>
<th>Category</th>
<th>Current %</th>
<th>Growth Last 5 Years</th>
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<tbody>
<tr>
<td>PLANTS</td>
<td>46.2%</td>
<td>+15%??</td>
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<tr>
<td>MOLLUSKS</td>
<td>42.9%</td>
<td>+6.2%</td>
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<tr>
<td>FINFISH</td>
<td>9%</td>
<td>+11.5%</td>
</tr>
<tr>
<td>CRUSTACEANS</td>
<td>1.8%</td>
<td>+23%</td>
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</tbody>
</table>

Source: FAO 2012
NATIONAL STATUS AND TRENDS

- >90% OF SEAFOOD IMPORTED
- <2% OF IMPORTS INSPECTED (CONTAMINANTS, RESIDUES)
- ~59% OF ALL SEAFOOD CONSUMED IN US IS FARMED
- SIGNIFICANT CONTRIBUTION TO U.S. TRADE DEFICIT >$10.6 BILLION (DOC 2011)
- 2010 SEAFOOD I'D AS NATIONAL SECURITY RISK
- US AQUACULTURE >$1.5 BILLION (FARM GATE)
- ~4200 FARMS (MOST FRESHWATER)

US AQUACULTURE PRODUCTION

- ≈ 81 SPECIES CULTURED
  - # SPECIES 47% FRESHWATER 42% SALTWATER
  - SPECIES BREAKDOWN 65% FINFISH 35% SHELLFISH

- PRODUCTION VOLUME ≈ 500,000 METRIC TONS (2008)
  - TONNAGE 80% FRESH WATER 20% SALT WATER

- COMBINED VALUE $1.1 BILLION

- 1.8% ANNUAL GROWTH RATE 1980 – 2008

- 4300 FARMS ≈5600 DIRECT EMPLOYMENT (2005)

SOURCE: USDA 2011, FAO 2012
SHARE OF CONSUMPTION SUPPLIED BY DOMESTIC PRODUCTION

% Domestically Sourced

Source: USDA2010, USDOC2012
US AQUACULTURE CHALLENGES

- LACK OF VISION AND LEADERSHIP
- LACK OF INDUSTRY COORDINATION
- LACK OF POLITICAL WILL AND LEADERSHIP
- DIFFICULT SOCIAL LICENSE (PUBLIC WATERS)
- LACK OF ECONOMIC DEVELOPMENT INCENTIVES
- LACK OF CROP INSURANCE AND RISK MANAGEMENT
- FEDERAL AGENCY CONFLICTS
- LACK OF THERAPEUTANTS
US AQUACULTURE
SECONDARY CHALLENGES

• SPECIES CHOICES
• TECHNOLOGY CHOICES
• ENVIRONMENTAL IMPACTS
• ERODING WORKING WATERFRONT INFRASTRUCTURE
• RESEARCH AND EXTENSION NONCOMMERCIAL FOCUS
• ENGO ENGAGEMENT IN NATIONAL OCEAN POLICY
CHALLENGES = OPPORTUNITIES = CHOICES
UNDERLYING FUNDAMENTALS STRONG

• WORLD NEEDS FOOD

• U.S. NEEDS JOBS, 3RD LARGEST SEAFOOD MARKET

• INCREASING CONCERNS ABOUT FOOD COST, FOOD SAFETY AND NATIONAL SECURITY

• U.S. EEZ LARGER THAN US LAND MASS

• FOOD CONVERSION, ENERGY AND WATER USE MORE EFFICIENT THAN OTHER FOOD PRODUCTION METHODS

• INCREASED ENERGY COSTS WILL INCREASE COST OF FOOD TRANSPORT AND IMPORTS

• WE NEED A NATIONAL “BLUE SPACE” PROGRAM

• MAINE IS ALREADY AHEAD OF THE CURVE
US AQUACULTURE SOLUTIONS

• RESOLVE FEDERAL AGENCY CONFLICT
• DEFINE SPECIALTY CROPS TO INCLUDE AQUACULTURE
• CREATE NATIONAL AQUACULTURE DEVELOPMENT PROGRAM
  – NATIONAL TRAINING PROGRAM
  – REGIONAL DEMONSTRATION FARMS
  – REGIONAL BREEDING STATIONS AND HATCHERIES
  – STARTUP CAPITAL AND FINANCING
  – RISK MANAGEMENT TOOLS
  – TAX / INVESTMENT INCENTIVES
  – REDUCED REGULATORY BARRIERS TO ENTRY
  – CONSUMER EDUCATION AND MARKETING
• CREATE NATIONAL WORKING WATERFRONT PROGRAM
• REFOCUS RESEARCH AND EXTENSION RESOURCES
US AQUACULTURE
STRENGTHS

• HIGH WATER QUALITY
• SPACE
• WORKING WATERFRONT INFRASTRUCTURE
• PROXIMITY TO MARKET
• FOOD SAFETY BRAND
• RESEARCH AND EXTENSION RESOURCES
• DIVERSE GROWING CONDITIONS
WHO KNOWS?
MAINE AQUACULTURE
KEEPING WORKING WATERFRONTS WORKING
Thanks

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