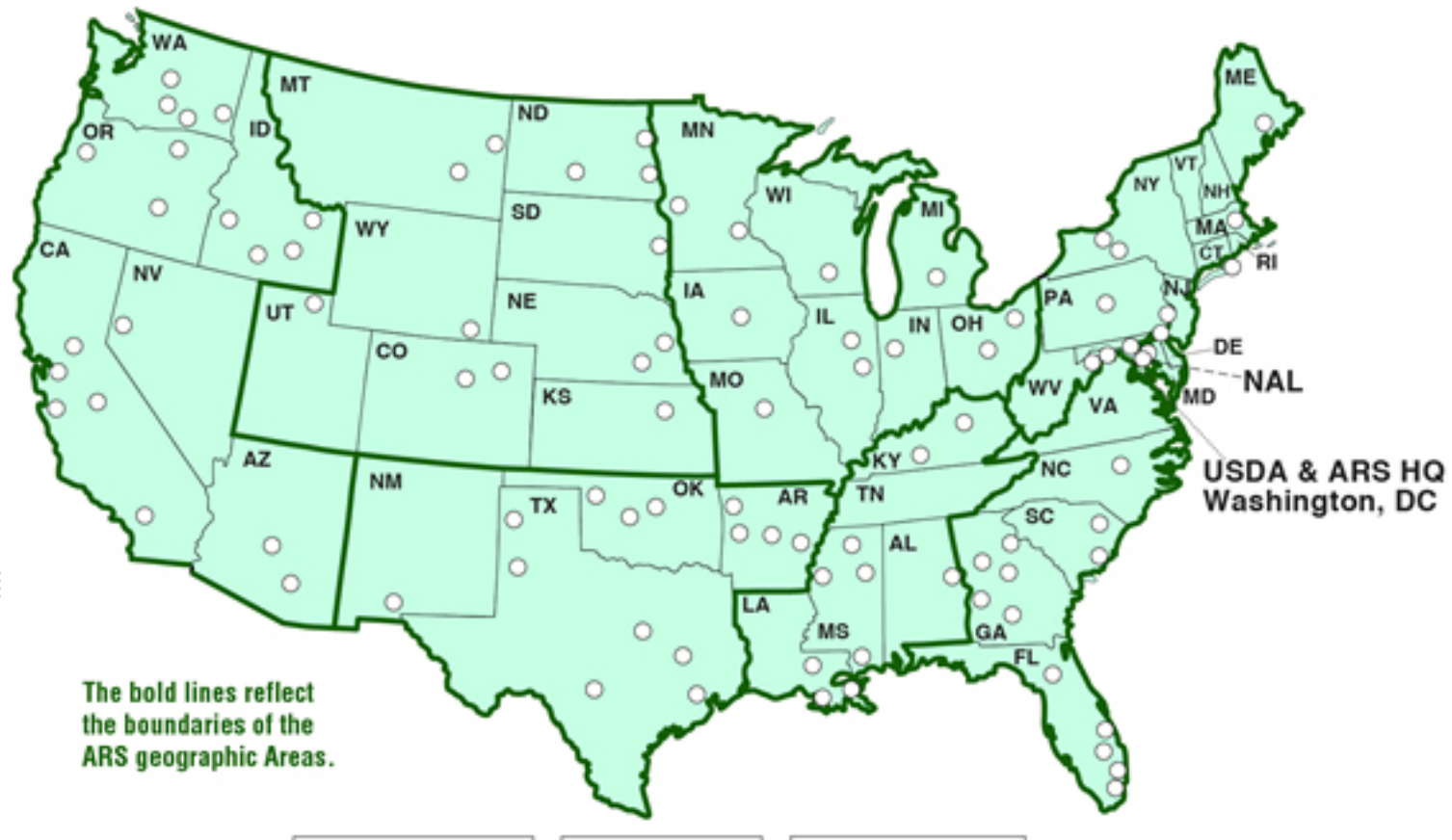




USDA-Aquaculture Research Opportunities

Jeff Silverstein, US Department of Agriculture, Agricultural Research Service, National Program Leader, Aquaculture

US Department of Agriculture, Agricultural Research Service

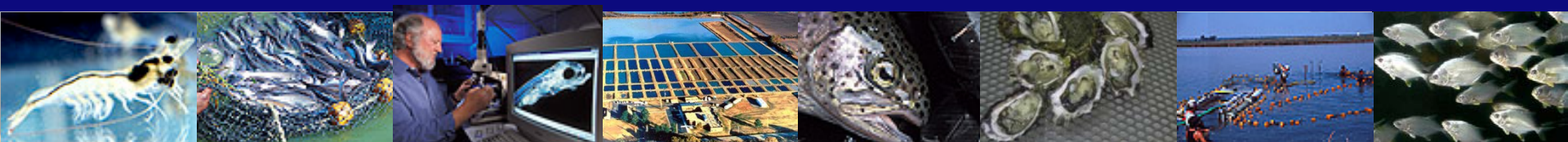
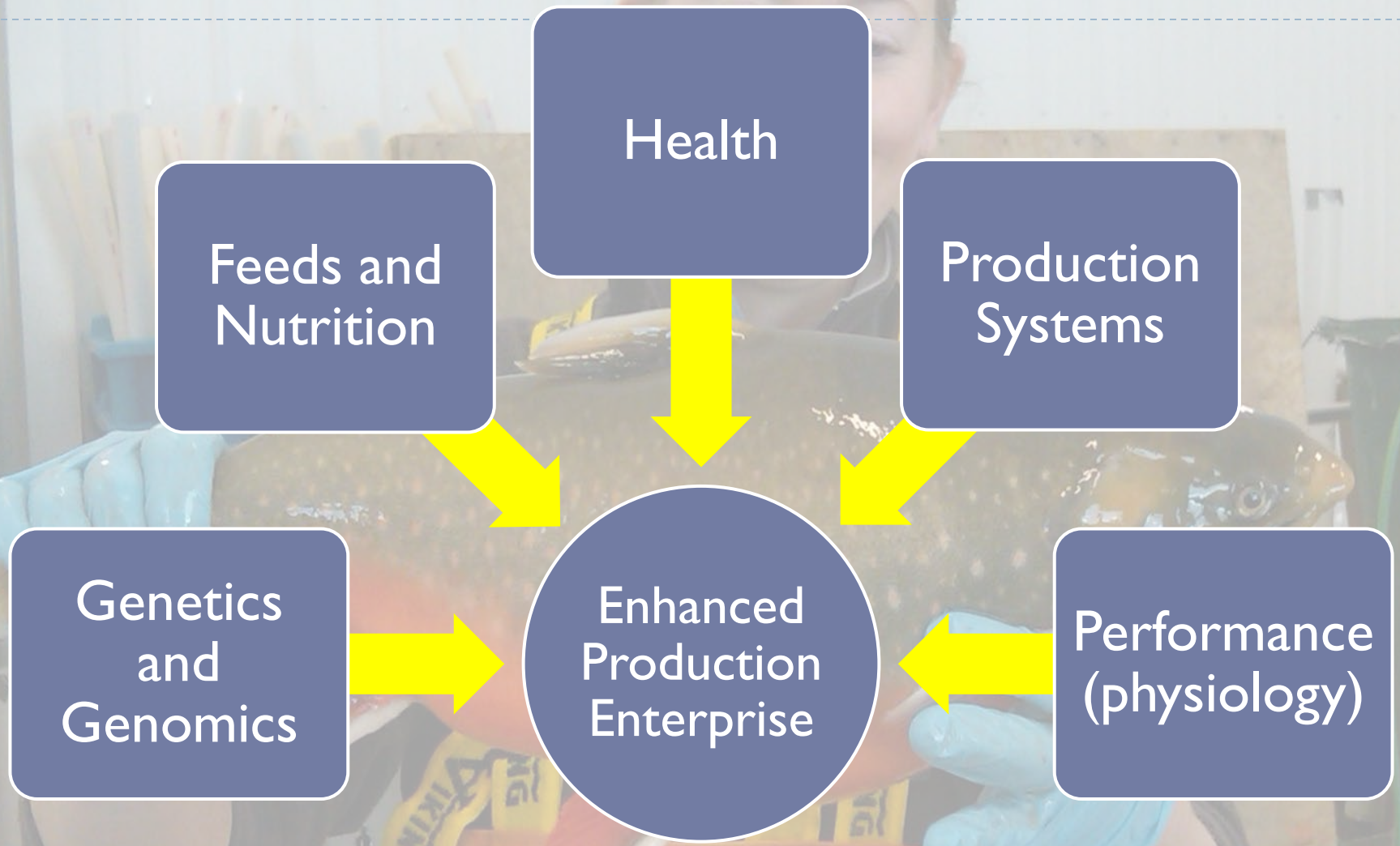


ARS Aquaculture Program

Locations and Worksites = 



Components of ARS Aquaculture

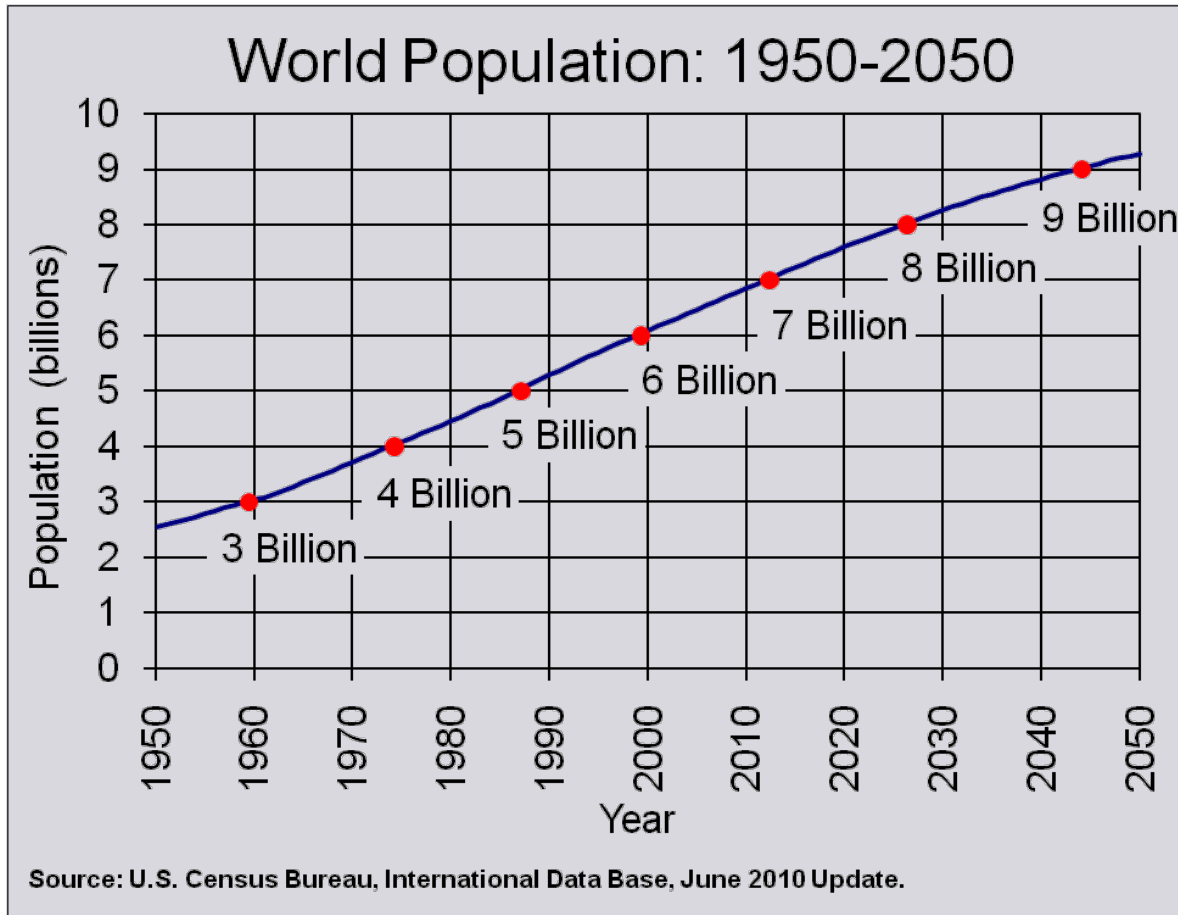


Opportunities for Aquaculture

- ▶ Demand for food
- ▶ Animal production opportunity
- ▶ Business opportunity
- ▶ Re-emphasis on agricultural research in US
- ▶ Diversity of systems in development
- ▶ Science excellence



A Growing Concern- Demand for food



- **By 2050 demand for food will increase by 50-100%**
- **Sustainable intensification**





Aquaculture is Efficient- Animal production opportunity

Animal Protein Production System	Feed Conversion Rate
Milk	3.0 (0.0)
Eggs	2.8 (0.2)
Broiler Chickens	2.0 (0.2)
Swine	2.5 (0.5)
Beef	5.9 (0.5)
Tilapia	1.5 (0.2)
Catfish	1.5 (0.2)
Marine Shrimp	1.5 (0.5)
Salmon	1.3 (0.2) (various data)

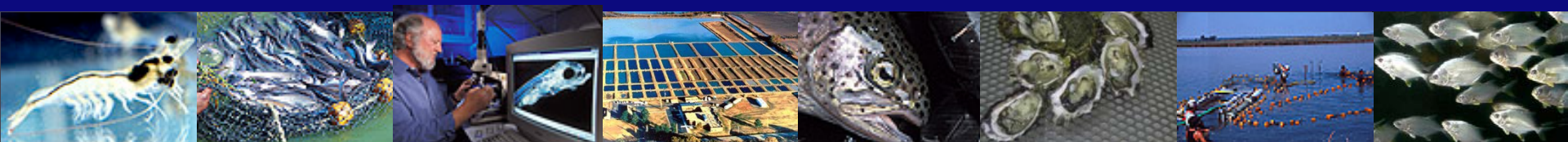
Costa-Pierce 2002, 2011



Sustainable Animal Production

3 P's

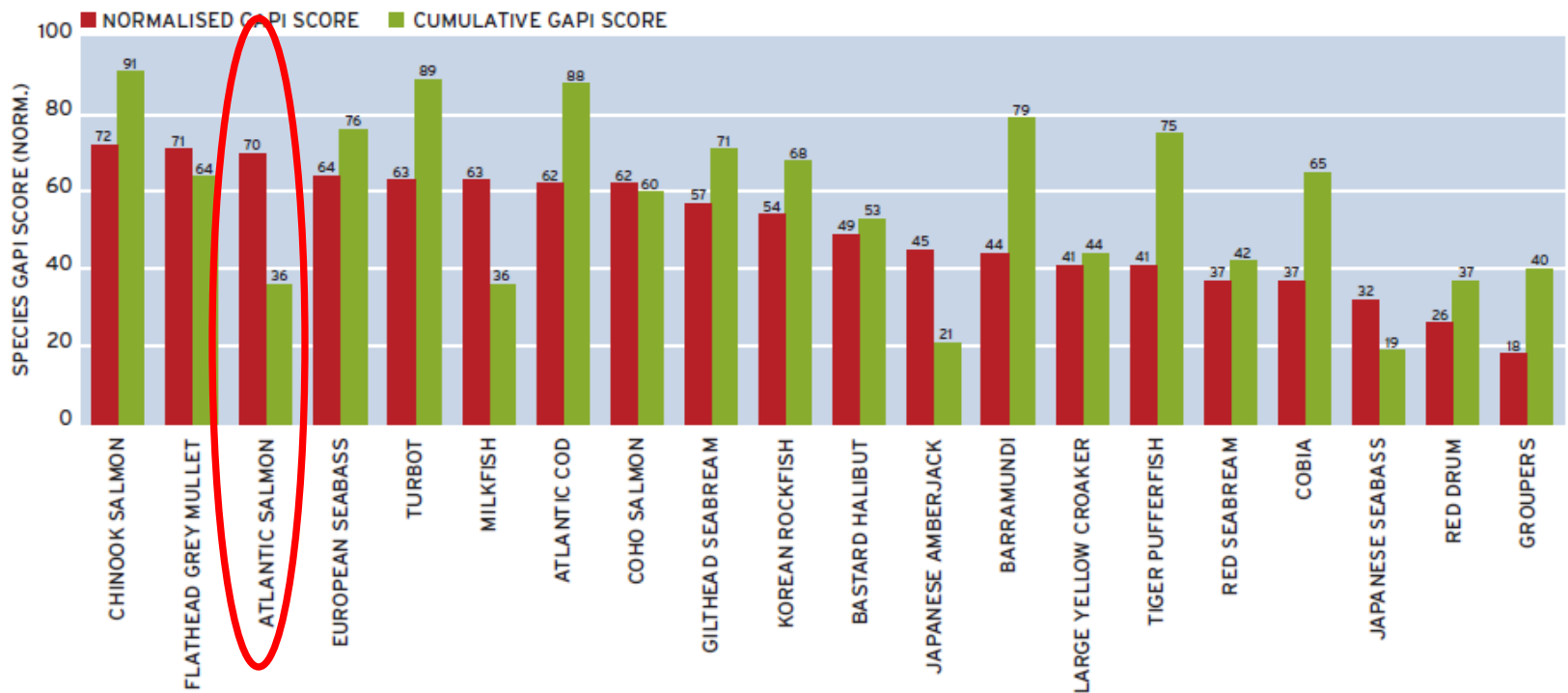
- ▶ Production
- ▶ Protection
- ▶ Profitability



Pew: Global Aquaculture Performance Index 2010

Net-pen farmed salmon score very high

Figure 3: Species GAPI Scores



Seafood- business opportunity



- Healthy food for people
- Industry development
- Jobs



Context for Research- reemphasis on agricultural research

- ▶ Public calls for more research
- ▶ Connection to big ideas-sustainability, climate change, open data, big data



EDITORIAL

Maintaining Science Eminence



Aquaculture Research Opportunities

► Deep studies on elements of the system



- Funding over \$130million in aquaculture related research
- Fund biology and engineering
- Recently funded mussel farming operation to monitor larval distribution on ocean currents

SBIR/STTR

SMALL BUSINESS INNOVATION RESEARCH
SMALL BUSINESS TECHNOLOGY TRANSFER



Aquaculture Research Opportunities

- ▶ genetics
- ▶ feeds
- ▶ benchmarking
- ▶ managing maturity
- ▶ depuration
- ▶ microbial environment



Integration of findings



Aquaculture Research Opportunities

- ▶ Integration of findings will be the technological tipping point where research impacts industry
 - ▶ Benchmarking to measure progress-assessment of alternative systems
 - ▶ No silver bullet-multiple lines of inquiry
 - ▶ Health, flavor, water quality, engineering innovation, value added co-products,
 - ▶ Open communication



Thank you!

