Industries of the Future

EXPANDING FLORIDA'S AQUACULTURE: INSIGHTS & INNOVATIONS

April 10, 2024
2:00PM to 4:00PM EST

Milton Cochran, Sr.

- FIELD COORDINATOR AND ECONOMIC DEVELOPMENT INTEGRATOR
- ECONOMIC RECOVERY SUPPORT FUNCTION
- U.S ECONOMIC DEVELOPMENT ADMINISTRATION (EDA)
- **Serving the Atlanta Region**: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)

ABOUT INDUSTRIES OF THE FUTURE

- Launched by the Economic Recovery Support Function mission assigned by FEMA to serve Florida in the aftermaths of Hurricanes Ian and Nicole
- A result of close partnerships among federal, state, and local organizations with missions to see Florida become more economically resilient
- In the aftermath of Hurricane Idalia, we now seek to continue exploring industries of the future with a focus on the ever-important aquaculture industry

John Brogan

- FEDERAL COORDINATING OFFICER
- FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)
- **Serving Florida**: In the aftermath of Hurricanes Ian, Nicole, and Idalia

Naomi Friedman

- NATIONAL COORDINATOR
- ECONOMIC RECOVERY SUPPORT FUNCTION
- DISASTER RECOVERY & RESILIENCE
- U.S ECONOMIC DEVELOPMENT ADMINISTRATION (EDA)

ABOUT OUR SESSION

04/10/24

— SHERRY LARKIN, PROFESSOR & DIRECTOR —

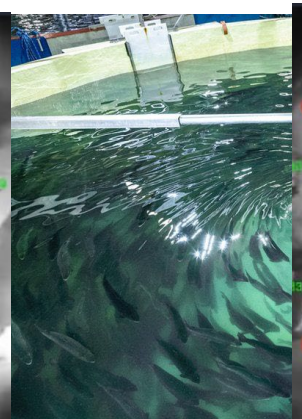
Sea Grant FLORIDA

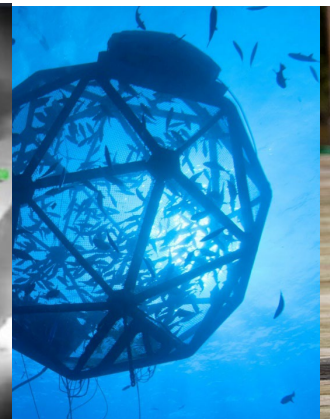
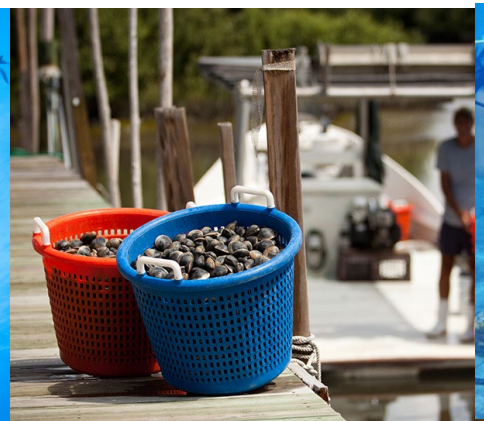
NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

UF UNIVERSITY of FLORIDA

Industries of the Future

Expanding Florida's Aquaculture: Insights and Innovations


Sea Grant FLORIDA

NATIONAL SEA GRANT

Overview of Sea Grant

01 | Network of 34 University-based programs

02 | Four National Focus Areas

03 | Aquaculture programs in Florida

04 | Supports research, Extension and education

05 | Program success (ROIs)

***Florida Sea Grant** supports integrated research, extension and education to enhance coastal and ocean resources, bolster coastal resilience and enhance economic opportunities for the people of Florida.*

Sea Grant FLORIDA

FLORIDA SEA GRANT

Introductions

Portia Sapp, Director
Division of Aquaculture
Florida Department of Agriculture and Consumer Services

Damian Claire, Chief
Atlantic Sapphire

Ed Chiles, Owner Chiles Hospitality

LaDon Swann, Director
Mississippi-Alabama Sea Grant
National Sea Grant Aquaculture Liaison

#

Florida's Aquaculture Industry: A Regulatory Perspective

Portia Sapp
Director
Division of Aquaculture
Florida Department of Agriculture and Consumer Services
Portia.Sapp@FDACS.gov

Industries of the Future
April 10, 2024

Overview

- **Florida's Aquaculture Industry**
- Species and Methods
- Challenges
- Moving Forward

Florida Aquaculture Policy Act

(Chapter 597)

1

Establishes the intent of Legislature to enhance the **growth of aquaculture while protecting Florida's environment.**

2

Authorizes the creation of the **Aquaculture Certificate of Registration.**

3

Establishes the **Aquaculture Best Management Practices Program** pursuant to Rule 5L-3 F.A.C.

Aquaculture is Agriculture

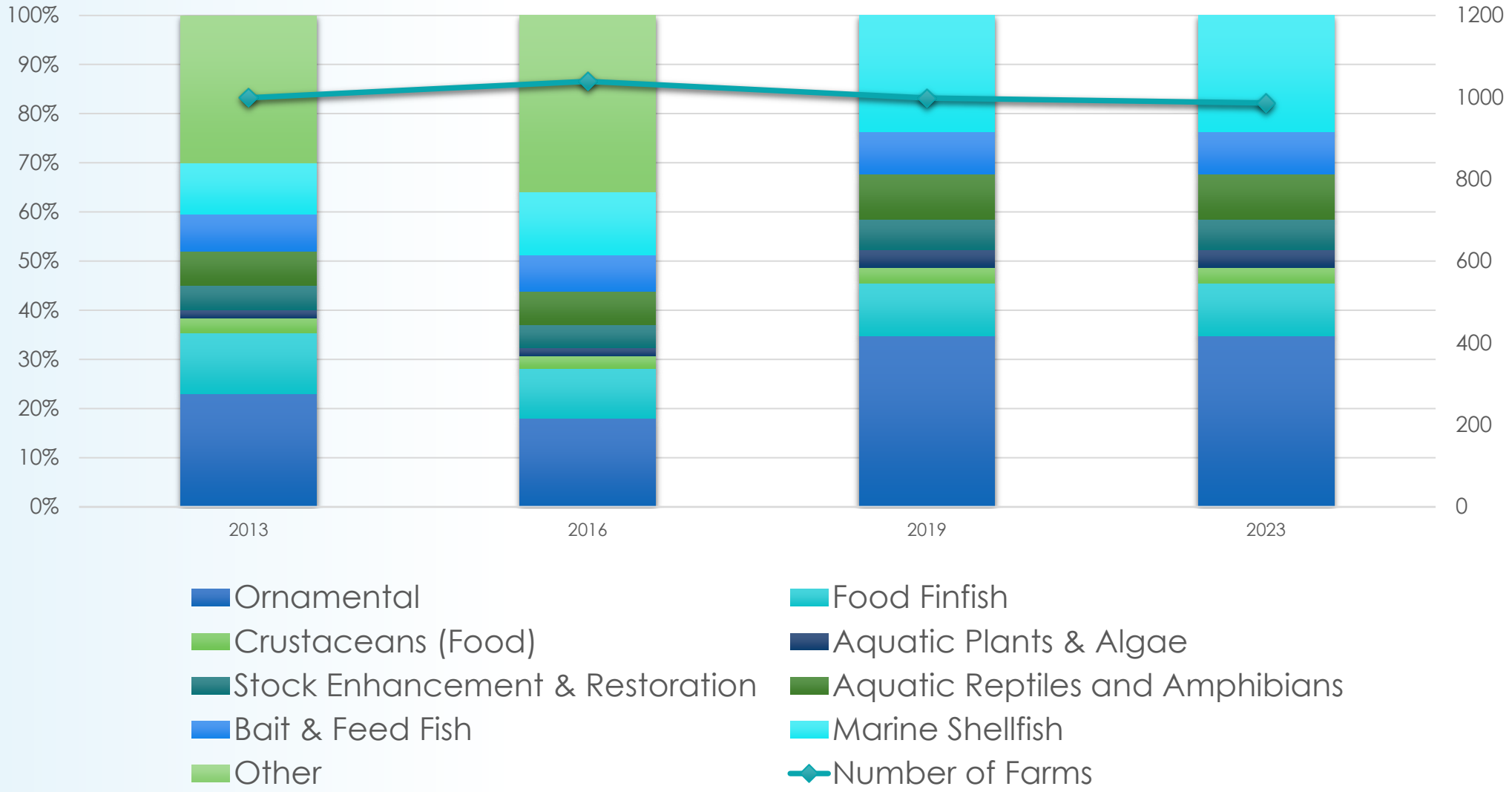
Florida's Aquaculture Industry



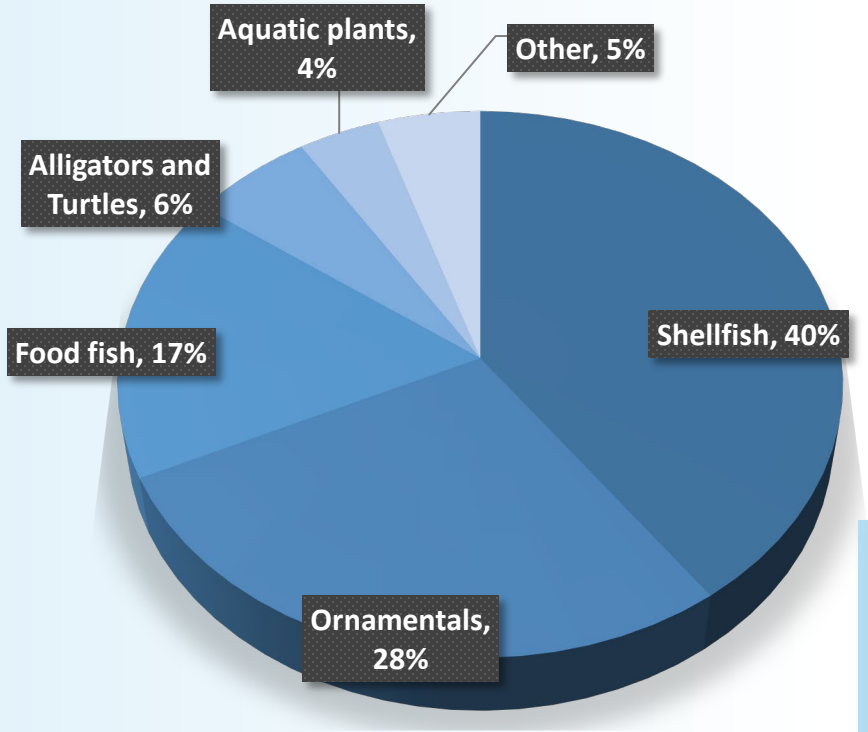


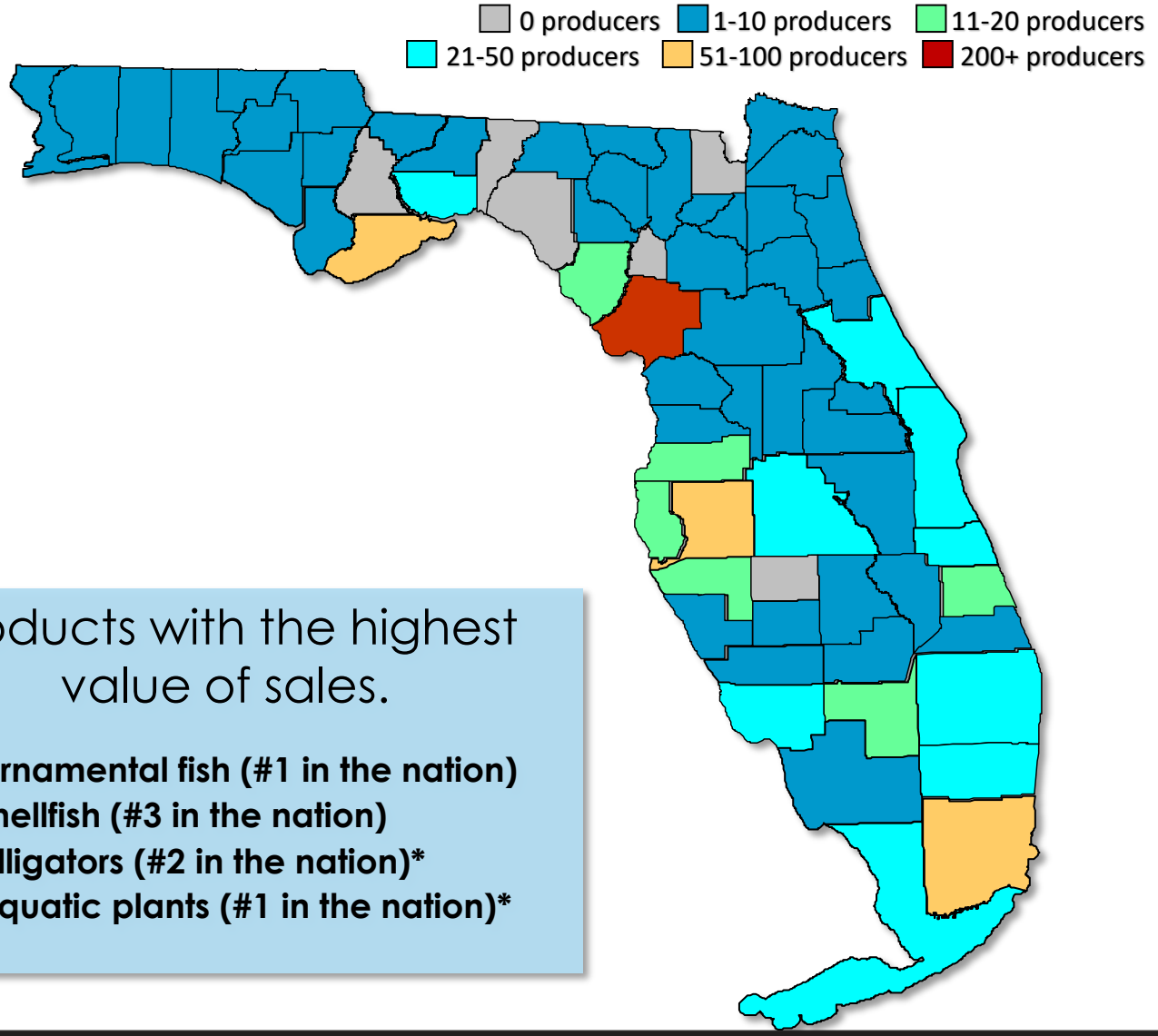

- ~1,000 Certified Aquaculture Producers
- ~1,500 species or varieties of fish, plants, mollusks, crustaceans and aquatic reptiles.
- Over 800 Aquaculture Submerged Land Leases covering close to 2,700 acres.
- Species raised for ornamental, food, bait markets as well as stocking, conservation, research and educational purposes
- **Why Florida?**
  - Warm climate ideal for tropical species
  - Proximity to ports and shipping corridors
  - Streamlined regulations

Florida's Aquaculture Industry



Florida's Aquaculture Industry

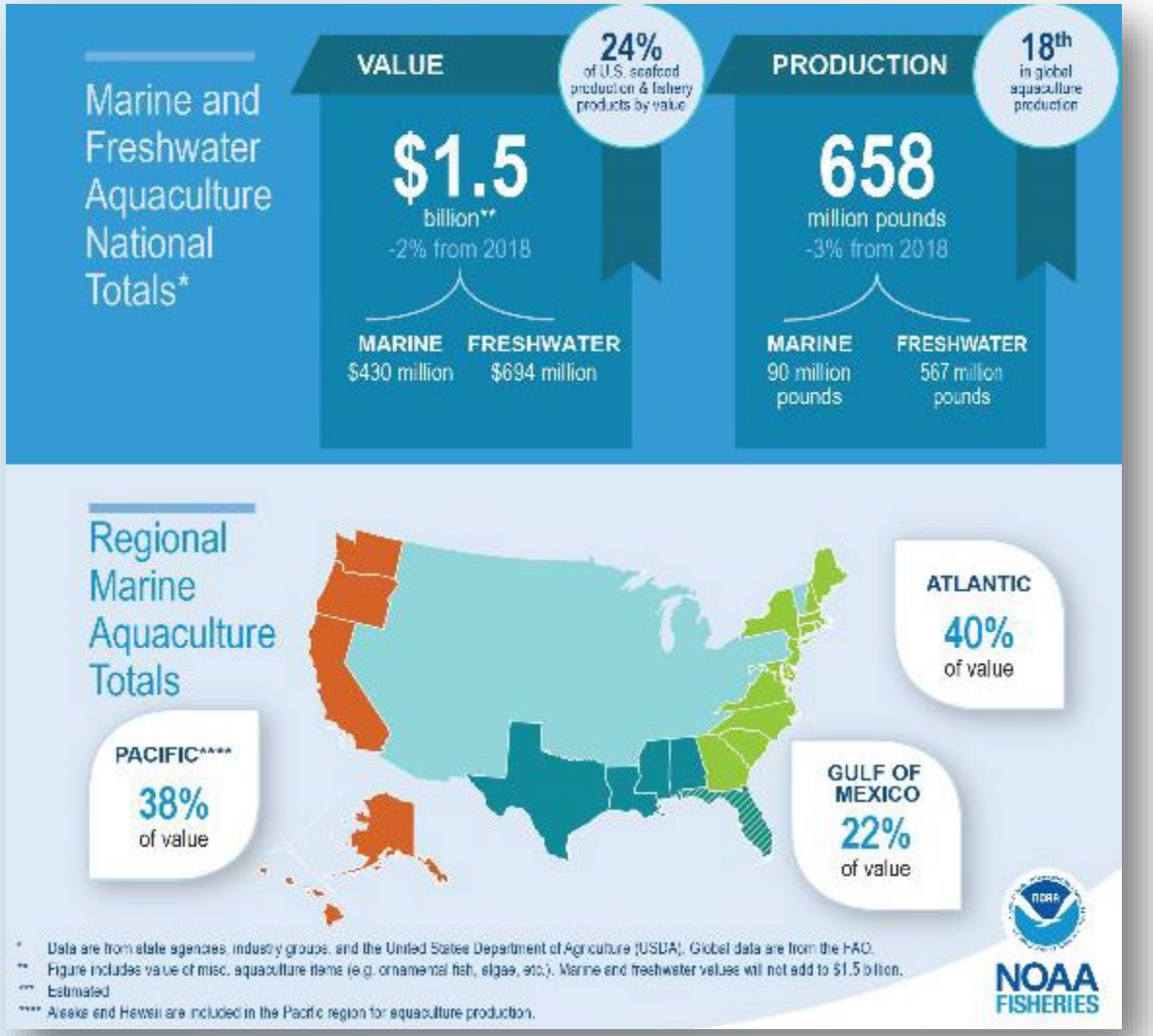




Products with the highest value of sales.

1) **Ornamental fish (#1 in the nation)**
2) **Shellfish (#3 in the nation)**
3) **Alligators (#2 in the nation)***
4) **Aquatic plants (#1 in the nation)***

Economic Impact

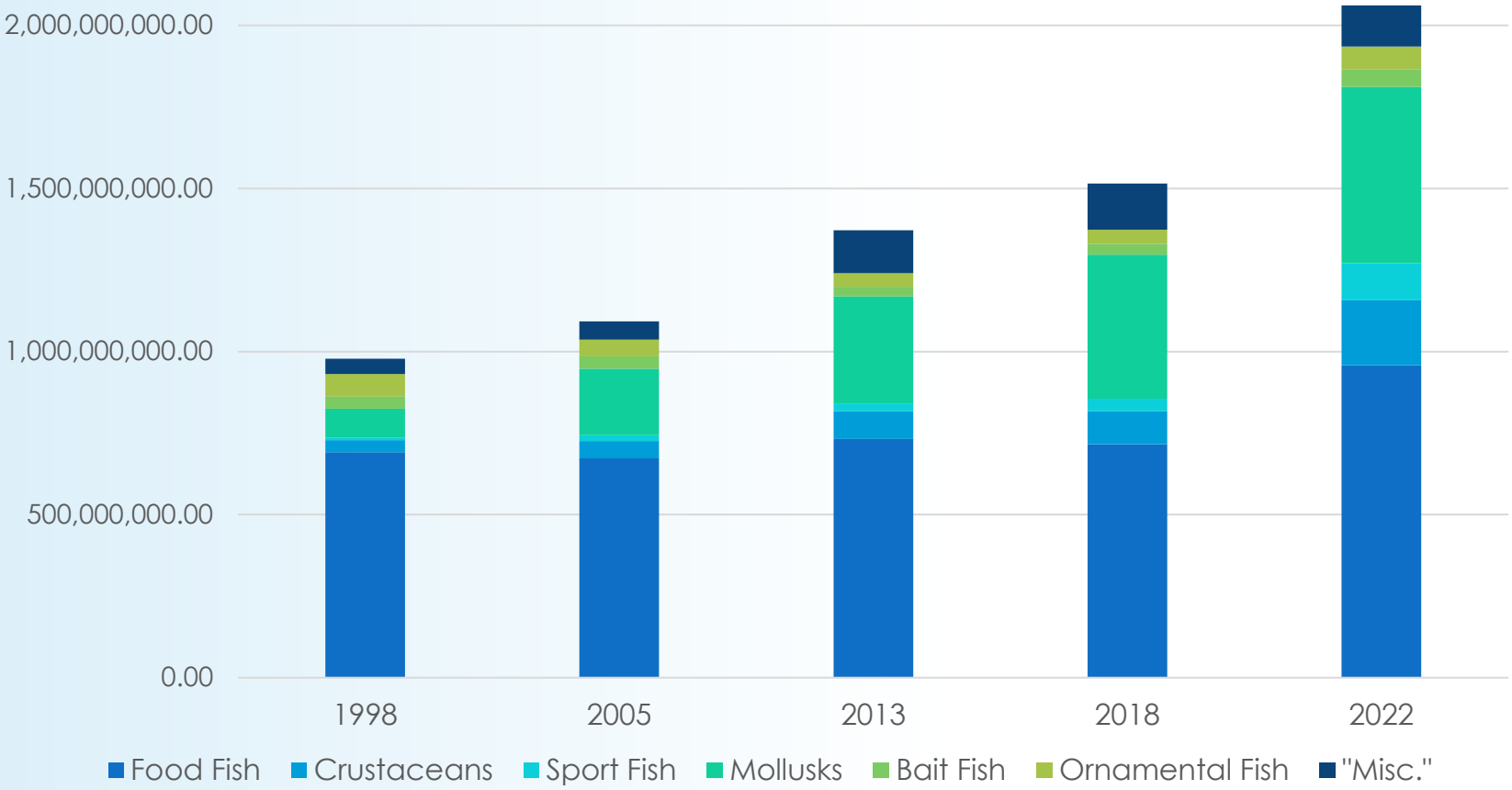


**USDA, National Agricultural Statistics Service (2022) Census of Agriculture*

- Total Annual Sales: $191 million farm-gate value*
- 4th in United States for total aquaculture sales
  - 1st in Ornamentals, $62.4 million*
  - 2nd in Crustaceans, $34 million*
  - 3rd in Shellfish, $53 million*
- $172 million in sales for 2021 and close to 1,100 employees!

Note: A study conducted by UF/IFAS Tropical Aquaculture Lab in 2022, suggests gross underreporting of the actual sales value to the USDA Census of Aquaculture.

U.S. Aquaculture Industry



- Food fish are the primary product cultured in the U.S.
  - 71% of industry in 1998 down to 46% in 2022, but still growing in value.
- Mollusk aquaculture has increased steadily from 9% in 1998 to 26% in 2022.

Overview

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What is Raised in Florida?

- Ornamentals

What is Raised in Aquaculture?

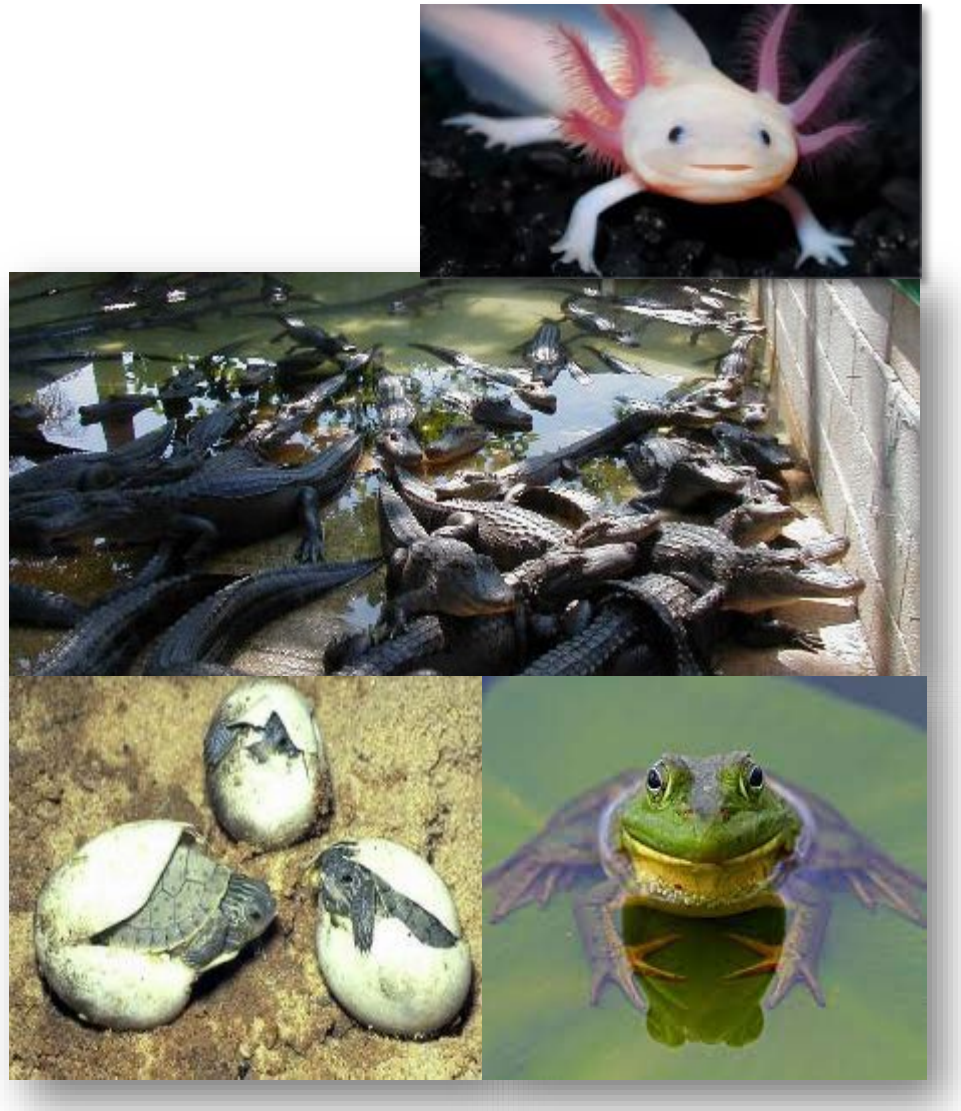
- Ornamentals
- Food Fish

What is Raised in Aquaculture?

- Ornamentals
- Food Fish
- Shellfish

What is Raised in Aquaculture?

- Ornamentals
- Food Fish
- Shellfish
- Aquatic Reptiles and Amphibians



What is Raised in Aquaculture?

- Ornamentals
- Food Fish
- Shellfish
- Aquatic Reptiles and Amphibians
- Aquatic Plants

What is Raised in Aquaculture?

- Ornamentals
- Food Fish
- Shellfish
- Aquatic Reptiles and Amphibians
- Aquatic Plants
- And Much More!

Seaweed uses - food, animal feeds, biofuels, bioplastics, pharmaceuticals, cosmetics

System Types

Tanks, Ponds and Raceways

System Types

Coastal Shellfish Aquaculture

System Types

System Types

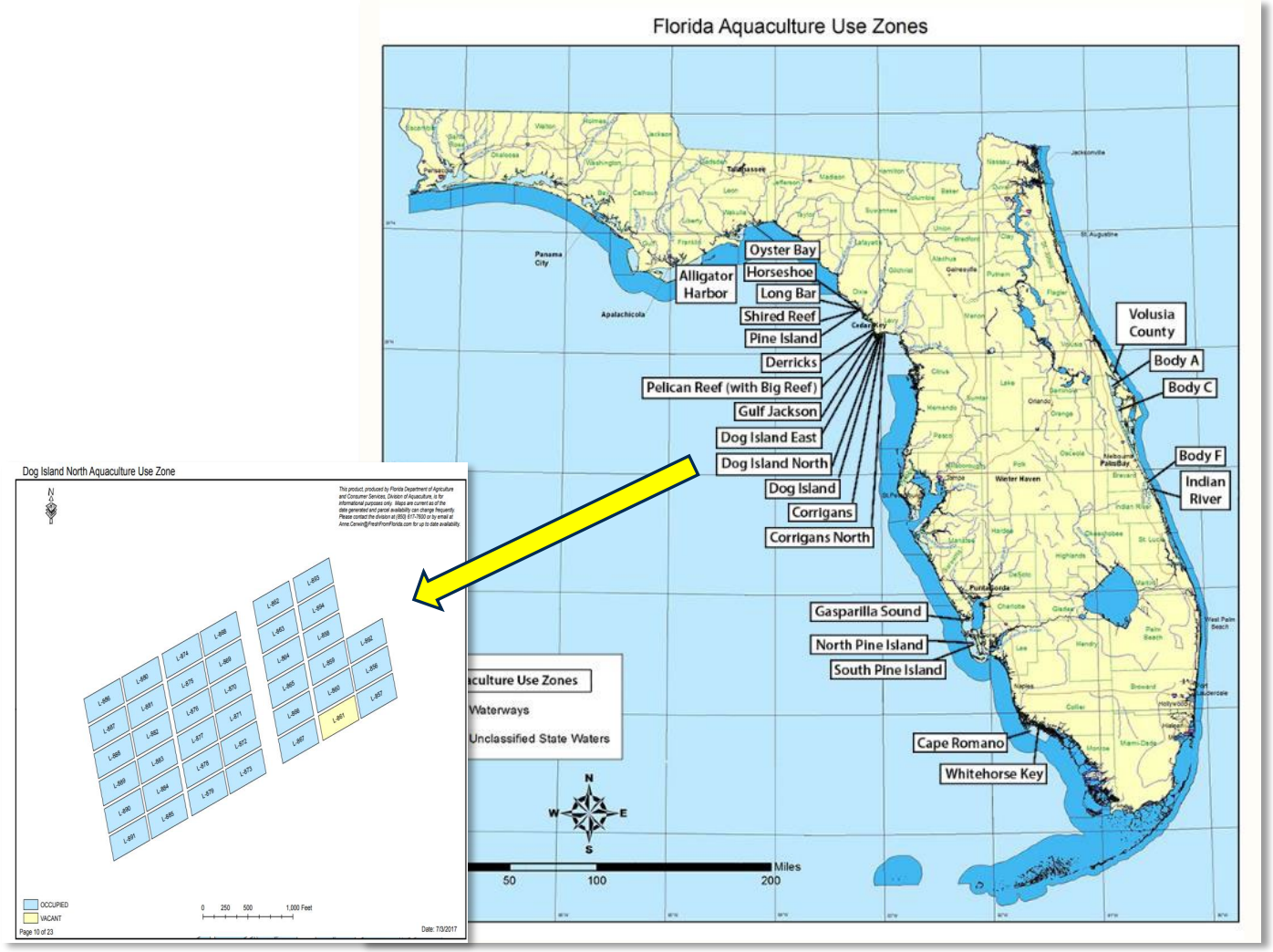
Offshore Cages

Overview

- Florida's Aquaculture Industr
- Species and Methods
- **Challenges**
  - **Leasing Process**
  - Siting
  - Species Protections
- Moving Forward

Shellfish Aquaculture Use Zones

- Aquaculture Use Zones (AUZs) are areas with multiple predetermined lease parcels grouped into a single area often containing dozens of parcels or leases



Resource Assessments

- Bare bottom substrate
  - No seagrasses, oyster reefs or hard-bottom
- Cannot hinder navigation or other recreational/commercial usage
- Bathymetric profile

Overview

- Florida's Aquaculture Industry
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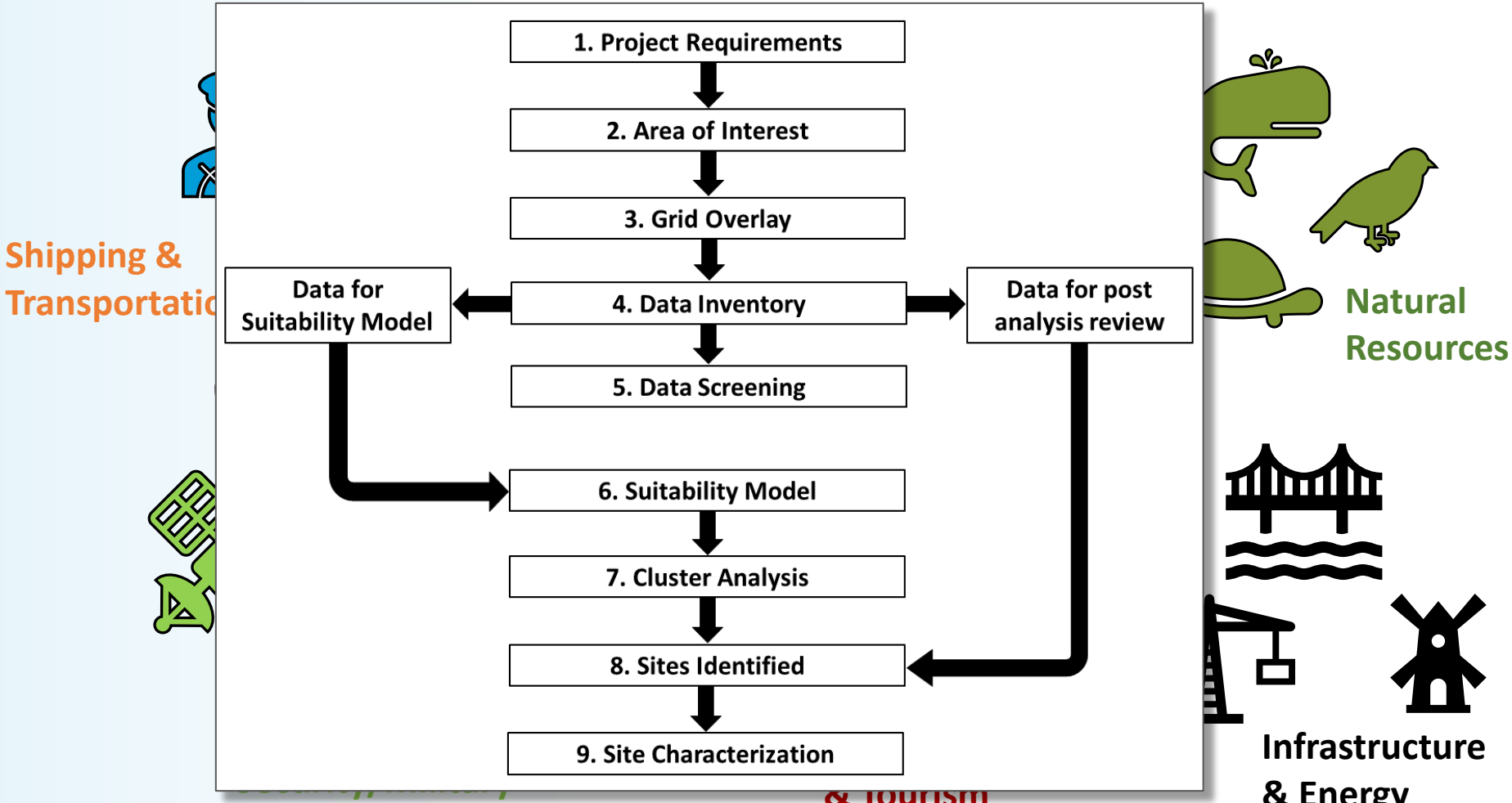
Marine spatial planning is understanding and planning for multiple uses of coastal & ocean space



Offshore Permitting Process

Image credit: NOAA

Landbased Siting

Access to saltwater
High land cost
Zoning restrictions

Overview

- Florida's Aquaculture Indus
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- **Challenges**
  - Lease Process
  - Siting
  - **Species Protections**
- Moving Forward

Case Study - Sturgeon

- Protected species
- Working groups between state agencies

Overview

- Florida's Aquaculture Industry
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- **Moving Forward**

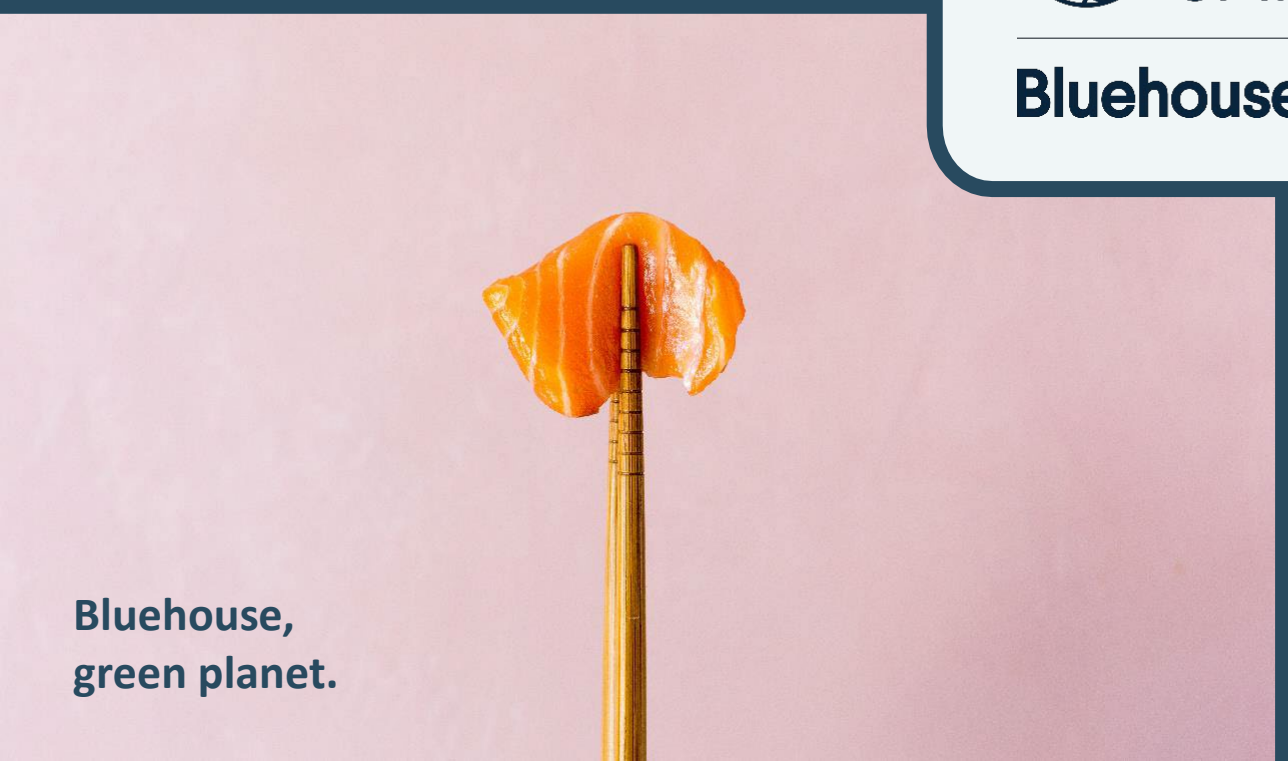
Moving Forward

- Growing and emerging industry expansion
- Permitting and technology expansions
- Building community trust and informed consumers
- More educator training and additional resources for colleges and universities
- Increased farmer-focused materials and trainings
- Researching potential markets for new and existing aquaculture products
- Rise of restoration aquaculture


Thank you! Any Questions?
Aquaculture_Web@FDACS.gov
Check out the FDACS Division of Aquaculture website!
Florida Department of Agriculture and Consumer Services

ATLANTIC SAPPHIRE®

Bluehouse Salmon®



Bluehouse,
green planet.

We Invented The Bluehouse
And It Allows Us To Raise Fish 100% On Land.

We’re sustainably raising salmon in the USA
that are good for you and better for our oceans.

ATLANTIC SAPPHIRE

Bluehouse Salmon

Bluehouse-Tech.

Bluehouse Salmon is not wild caught, but it's not traditionally farmed, either. The fish are raised in a revolutionary land-based Florida Bluehouse ™. A Bluehouse operates much like a greenhouse, only for fish, and eliminates the need to use ocean net pens in remote areas of the world.

Why South Florida Is Ideal For Bluehouse Salmon Farming

Water Intake

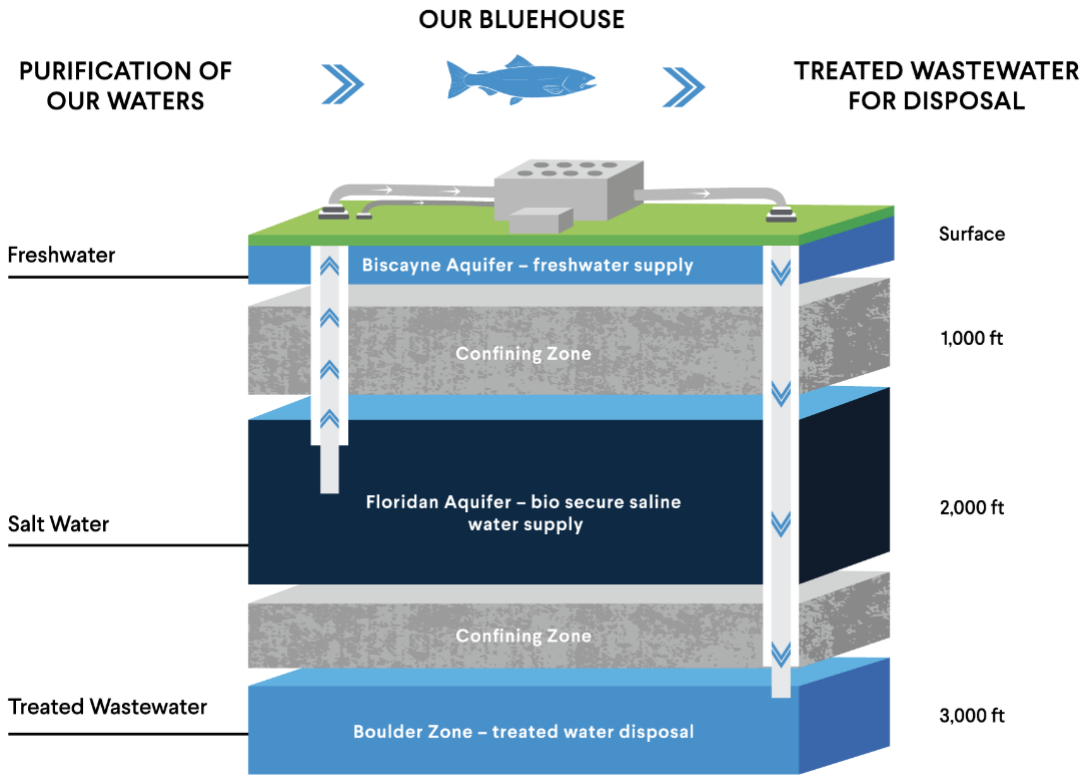
- The Florida Aquifer is a very large saltwater aquifer that starts in the Carolinas.
- Its water is filtered over thousands of years
- 95% of the water we use is salt water that has no commercial value for drinking water or irrigation
- 99% of the water is filtered and recycled

Provides water free of:

- Viruses
- Bacteria
- Modern man-made contamination such as microplastics or mercury

Water Discharge

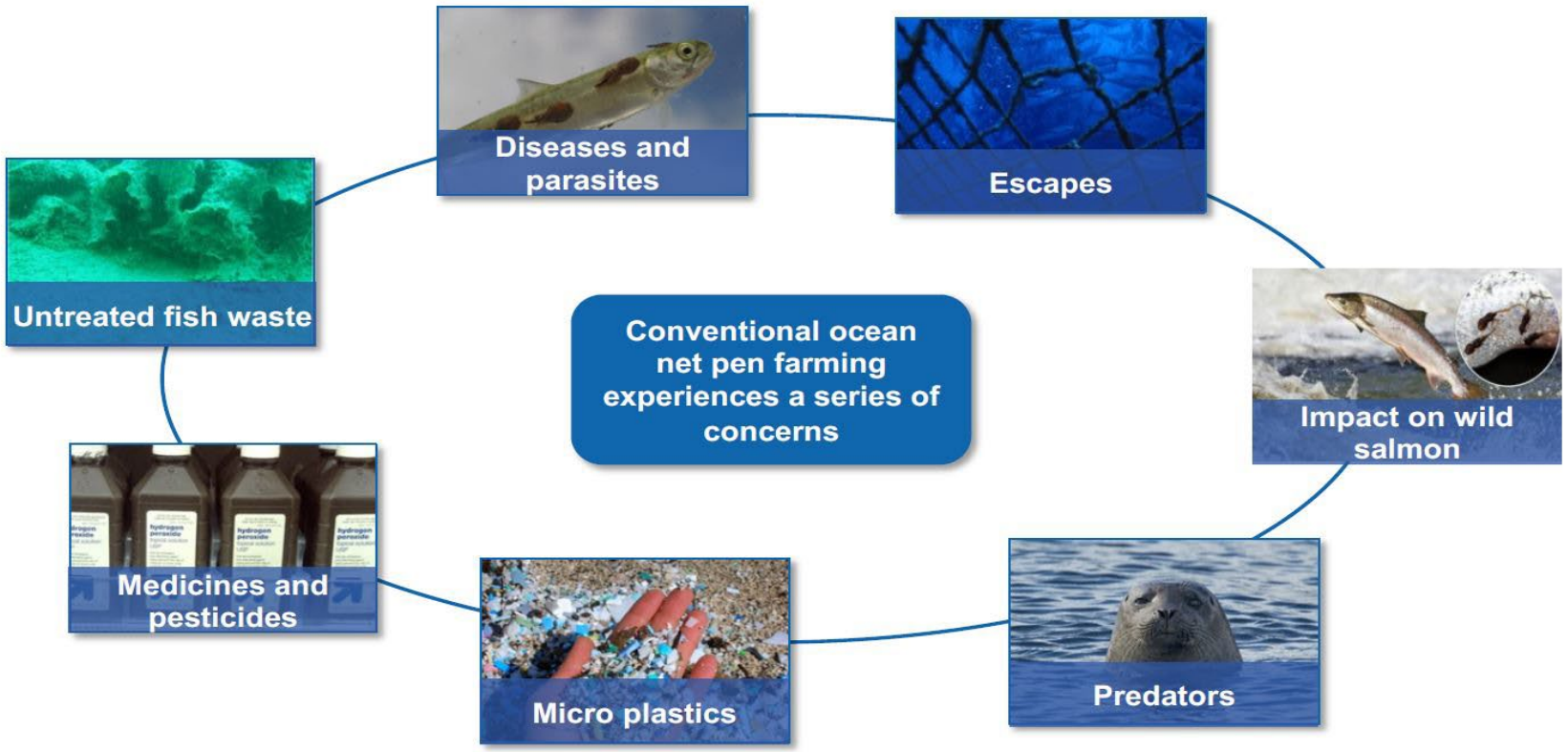
- The Boulder Zone is the most sustainable way to discharge treated wastewater
- Less than 1% of our water is filtered and discharged as non-toxic wastewater through an injection well and into the Boulder Zone, located nearly 3,000 feet underground.
- The Boulder Zone slowly filters the water over thousands of years and allows it to eventually return to the ocean as clean water, eliminating any impact from the wastewater on the ecosystem.



Why Choose Bluehouse Raised?

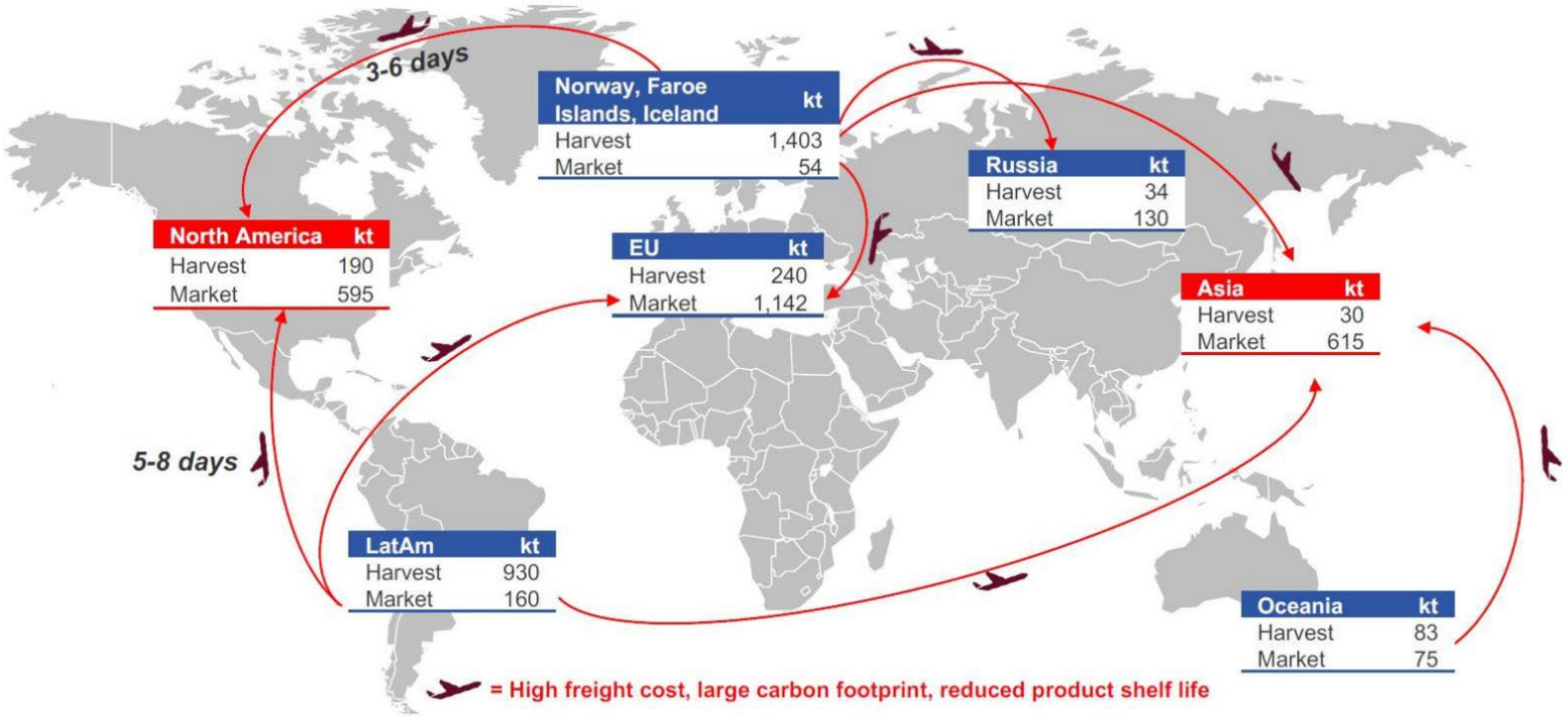
90% of assessed wild fish populations are unable to handle the pressure of additional fishing, and the conventional net pen ocean farming industry faces many challenges.

Atlantic Sapphire's Bluehouse-Tech eliminates conventional industry environmental and health risks.



Our Fish Don't Fly.

Trade Patterns for Ocean Farmed Salmon Are Characterized
By High Freight Costs And A Large Carbon Footprint



Conventional Salmon Farming

- Growth is capped
- Salmon is raised in remote areas of the world
- 80% of fresh seafood (96% of salmon) consumed in the USA is imported via airfreight
- Trade imbalance

Bluehouse Raised

- USA-raised means local job creation and support of the US Blue economy
- Supply chain control, 100% traceability
- Same day to 24–48-hour max transit time
- Lower carbon footprint, No air-freight
- An ethical solution to food security concerns in America

[1] Source: Kontali (Salmon world 2019, wfe, all salmonids).

Florida can become a sustainable aquaculture hub

Seafood that's safe for our oceans and better for our planet, raised locally

The path to an ethical solution to food security concerns in America

- Minimize marine ingredients from feed
- Utilization of novel ingredients in the feed (algae oil, insect meal, etc.)
- Local feed production
- Partnership with FPL for access to renewable/solar energy
- Recyclable packaging
- Utilization of fish byproducts such as heads, bones and viscera, to produce pet food, fertilizer and compost, fish oil and omega 3s supplements for human consumption
- Utilization of aquaculture sludge to create biogas / renewable energy
- Potential for carbon sequestration with injection well technology
- Third-party certifications: "Best Choice" Monterey Bay Aquarium Seafood Watch, Ocean Wise, Friend of the Sea, and ASC (in progress)

Bluehouse Salmon & Heart Health

Children setting healthy habits for life

- **Omega-3s** improve cognitive function
- 2-3 servings per week recommended by FDA
- Good source of **Vitamin B6** helps promote sleep and reduce anxiety

Athletes:

Salmon is a Superfood

The protein builds and repairs muscles

Omega-3 fatty acids:

- Work as an anti-inflammatory
- Increase your metabolic rate
- Regulate hunger hormones.

Tip: Kids have to be introduced to a new food as many as 15 times before they are comfortable with it.

Pregnancy and Nursing

FDA recommends eating 8 to 12 ounces of salmon per week

Omega-3 fatty acids are important during pregnancy

Fattier varieties, like salmon, are a source of the omega-3 fatty acid

DHA, which has been shown to boost baby brain power

Decrease your risk of depression during pregnancy as well as postpartum depression

Healthier For People

- No antibiotics ever
- Non-GMO salmon
- High Omega 3 content
- Heart Check Certified by the American Heart Association
- No microplastics or mercury in our water
- Safe for pregnant and nursing women - 31 times lower in mercury than the FDA's allowable concentration in fish

Salmon Has Many Health Benefits:

- High in protein, Omega 3s & DHAs, Vitamin B6
- Regulates hunger hormones
- Repairs muscles
- Increases metabolic rates
- Boosts your immune system
- Improves mental health
- Improves skincare
- Decreases risk for certain cancers

NON GMO SALMON

American Heart Association CERTIFIED Meets Criteria For Heart-Healthy Food

Bluehouse Salmon Menu of Attributes

USA raised or
Fresh from Florida

No antibiotics ever

Non-GMO salmon

Heart healthy or
Heart Check Certified

Ocean safe

Lower emissions or
lower carbon footprint

Raised in water free of:
Mercury or Microplastics

Sushi-grade

Omega-3s powered by algae

Aquaculture is Agriculture

How can you help?

- Bring aquaculture to the forefront of the Farm bill
- Prioritize seafood in the Nutrition Title of the bill
- Increase purchases of farmed seafood in all government buying programs (armed forces, commissaries, USDA buying programs, school lunch, and many more) - Section 32
- Increase funding for aquaculture grants for research and development
- Increase funding to promote Florida aquaculture in stores with promotions(FDACS already does some of this work)
- Continue to support for Florida companies to attend trade shows (FDACS already does a great job there)
- Research and Applications of AI and big data (work already started with Sea Grant)
- Internship programs (work already started with Sea Grant)
- Education to provide information to consumers and policy makers on how new production technologies such as RAS are safer and needed for the Blue Economy
- Create a USDA Organic standard for U.S. farmed seafood
- Aquaculture needs to get the same government support and benefits of wild fisheries and other forms of agriculture

Thank You

Bluehousesalmon.com
Atlanticsapphire.com

Follow along
@bluehousesalmon

Ed Chiles

Owner Chiles Hospitality

CHILES
HOSPITALITY

ALL CLAMS ON DECK

RESTORING ESTUARIES AND
GROWING COASTAL ECONOMIES

Our business is three waterfront restaurants on the edge of the largest gulf in the world.

It is the only place in the United States that has three national estuaries on its borders

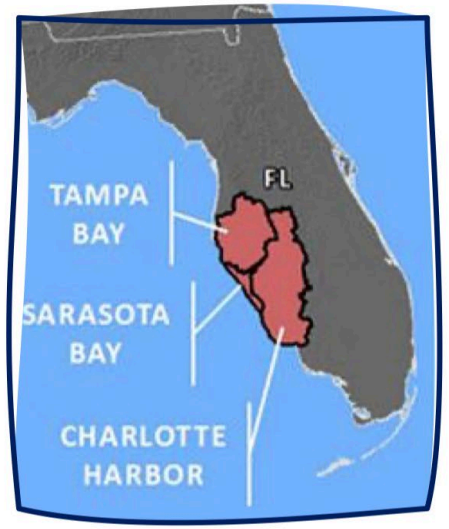
Florida’s economy is built on the beauty of its beaches.

Sandbar

Beach House

Mar Vista

Unique Geography &



3 Natural Estuaries:

- **Tampa Bay**
- **Sarasota Bay**
- **Charlotte Harbor**

Unique geography

- Florida's central Gulf coast celebrates three nationally recognized estuaries of significance.75% of all recreational and commercial fisheries depend on healthy estuaries
  - Over 60% of Florida's commercial seafood is harvested from the Gulf of Mexico

1%

of the world's aquaculture is produced in the US.

92%

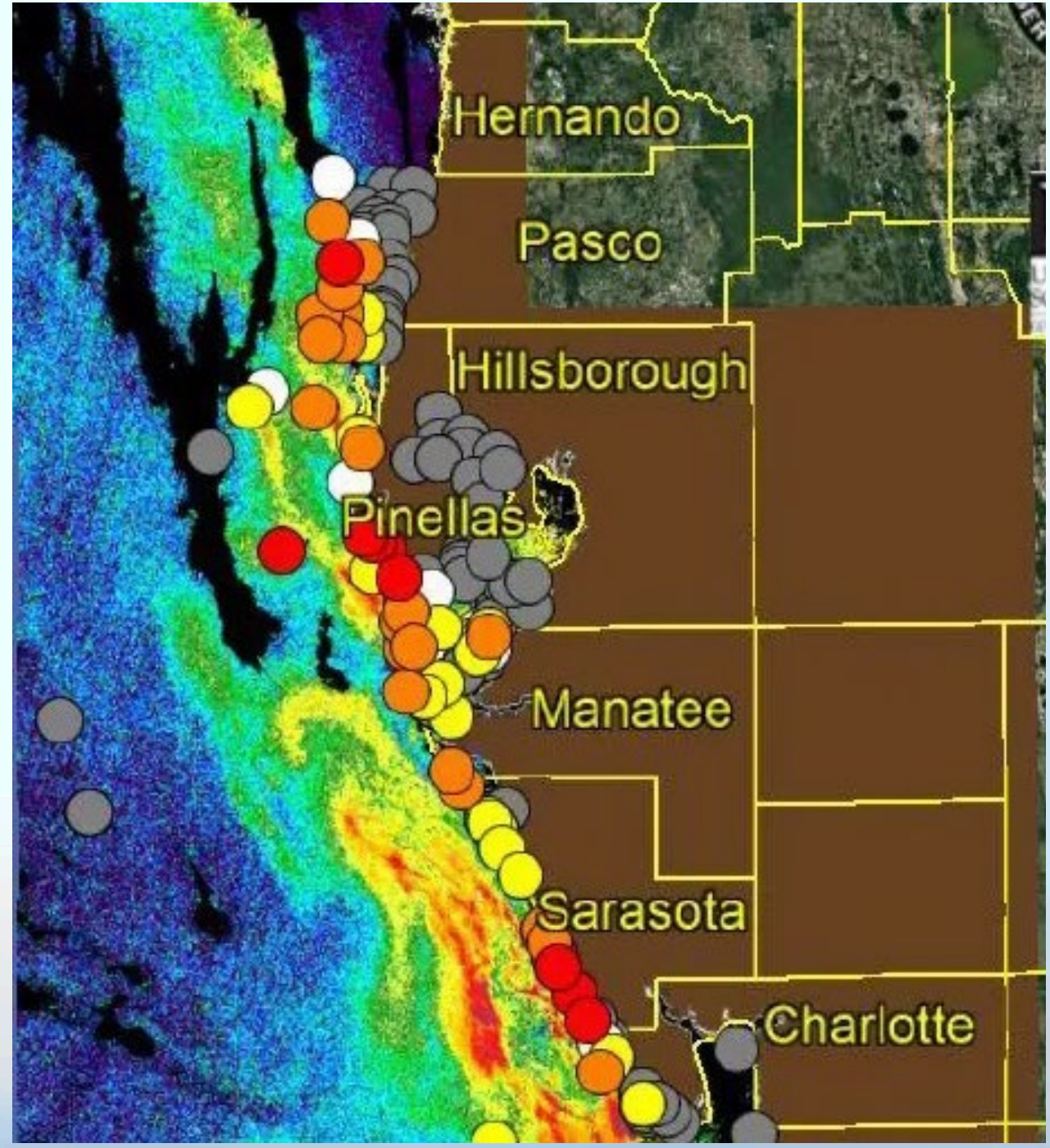
of all seafood consumed in the U.S. is imported and 50% of that is aquaculture.

Bivalves for Restoration

Coastal Water Quality Issues Are What Keeps Me Up At Night

1995 & 1996 Red Tide

- Lasted 11 months & 21 days and almost put me out of business.
- START was created.
- GSI was created to promote best practices and start the use of mitigation strategies to promote coastal resiliency.
- Biological mitigation strategies



Benefits of
Clams & Seagrass

- Clams eat red tide.
- Filter feeders clean water, promoting photosynthesis which in turn promotes the growth of seagrass.
- Florida has 1 million acres of shellfish approved water. Only 0.25 percent are currently leased.
- 80% of the leases in Charlotte Harbor have been abandoned.
- Clams feces and pseudo feces act as a natural fertilizer to promote seagrass growth.

Piney Point Led to All Clams on Deck

- Three years ago Piney Point spilled 215 million gallons. We had to do more.
- Hired federal lobby team
- Senator Boyd, Rep. Robinson, championed state appropriation of $2.5 mil
- NOAA bill - $2.5 mil
- Manatee County match of $500 K

What is Needed Now

- Clams for restoration.
- We need a sales stream.
- The metrics for clams is that I pay 21 cents. 11 Cents goes to the farmer and 10 cents to the bagger and tagger.
- Sexually mature clams propagate and live another 33 years. This is 33 years of filtering water and fertilizing seagrass.
- These clams should get 25 cents with no cost share.
- Restructuring and facilitating the permitting processes.

Our GSI Research

Working to provide the data and scientific research that will prove the efficacy for using bivalves and seagrass as a biological mitigation strategy to promote biodiversity and coastal resiliency.,

- Restabilize sustainable populations of bivalves.
- Create high value jobs for working water fronts.
- Develop mitigation and carbon credits.
- Help address our seafood deficit with high quality fresh Florida seafood.
- Promote coastal resiliency and biodiversity.

Thank You!

Ed Chiles

- Email: echiles@chilesgroup.com
- Phone: 1-941-778-8700
- Website: chileshospitality.com

CHILES
HOSPITALITY

Sea Grant Aquaculture: Past, present and future

LaDon Swann, Sea Grant Network Aquaculture Liaison and director MS-AL Sea Grant Consortium

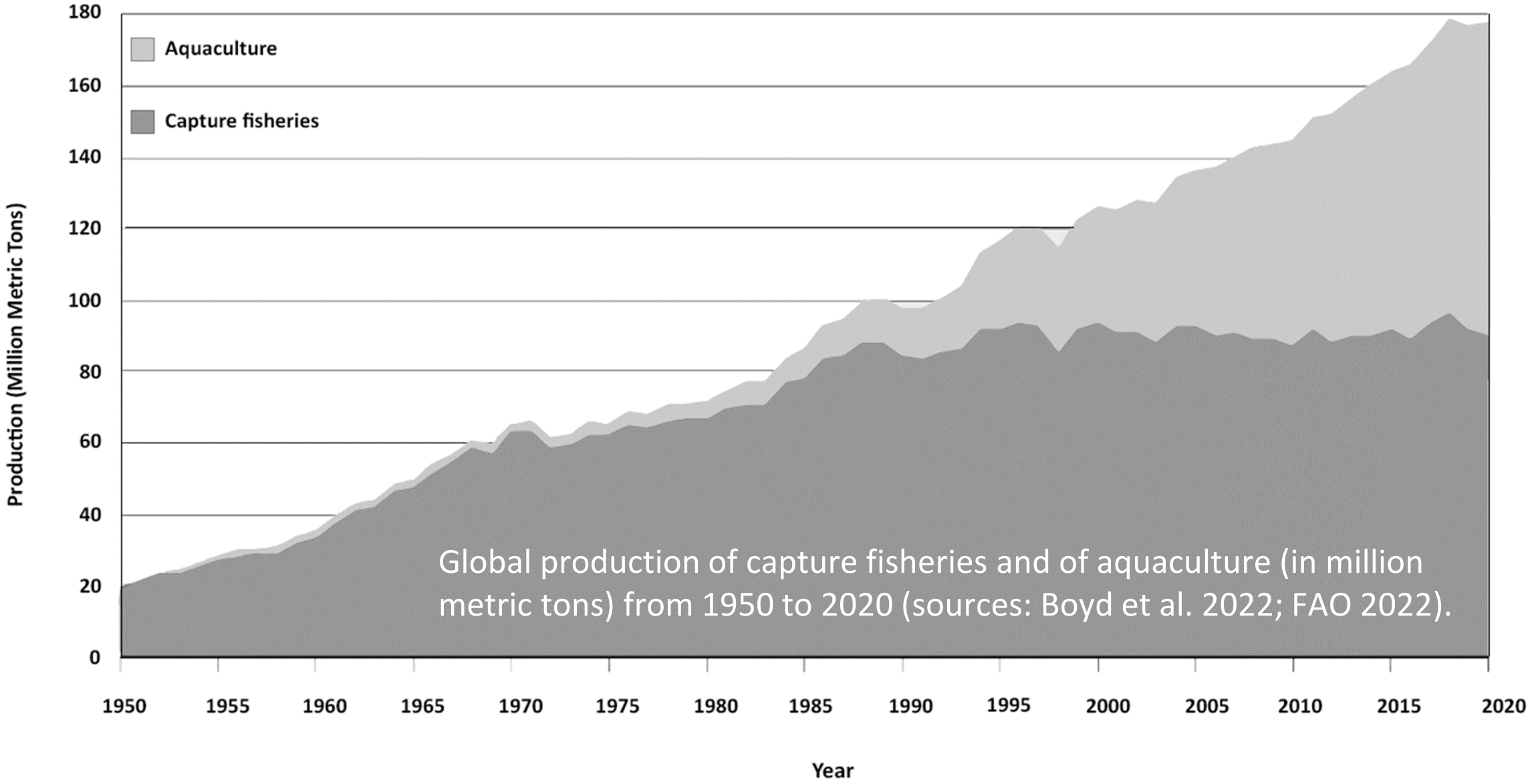
Mark Rath, Aquaculture Manager, NOAA Sea Grant

Charles Weirich, Aquaculture Manager, NOAA Sea Grant

April 10, 2024

Sea Grant

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE



Global production of capture fisheries and of aquaculture (in million metric tons) from 1950 to 2020 (sources: Boyd et al. 2022; FAO 2022).

NOAA Sea Grant Aquaculture

Sea Grant provides funding, technical assistance and professional development to support a sustainable U.S. aquaculture industry through research, education and engagement programs at 34 Sea Grant programs

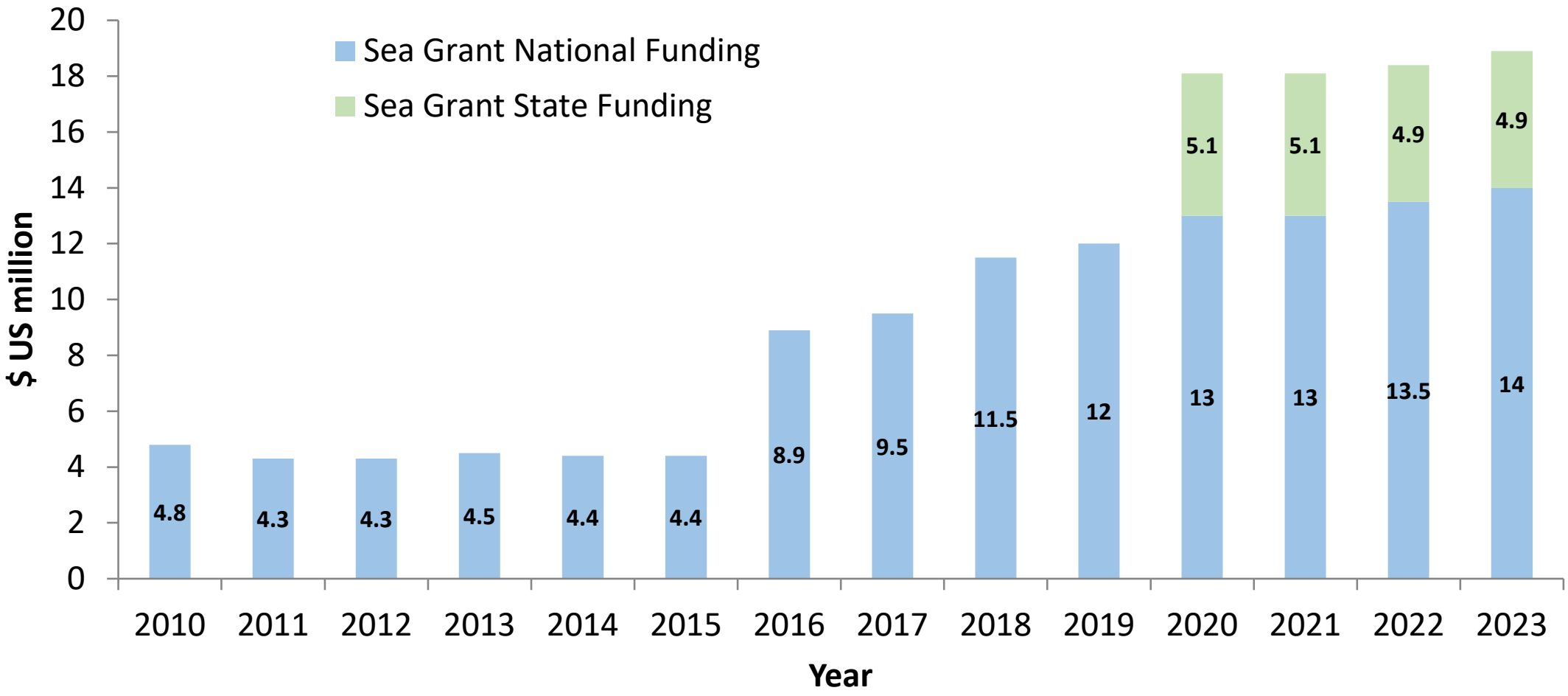
34 Sea Grant Programs

The National Oceanic and Atmospheric Administration (NOAA) National Sea Grant College Program (Sea Grant), through national, state, and territory-based investments, has a long history of supporting coastal, marine, and Great Lakes aquaculture development in the U.S.

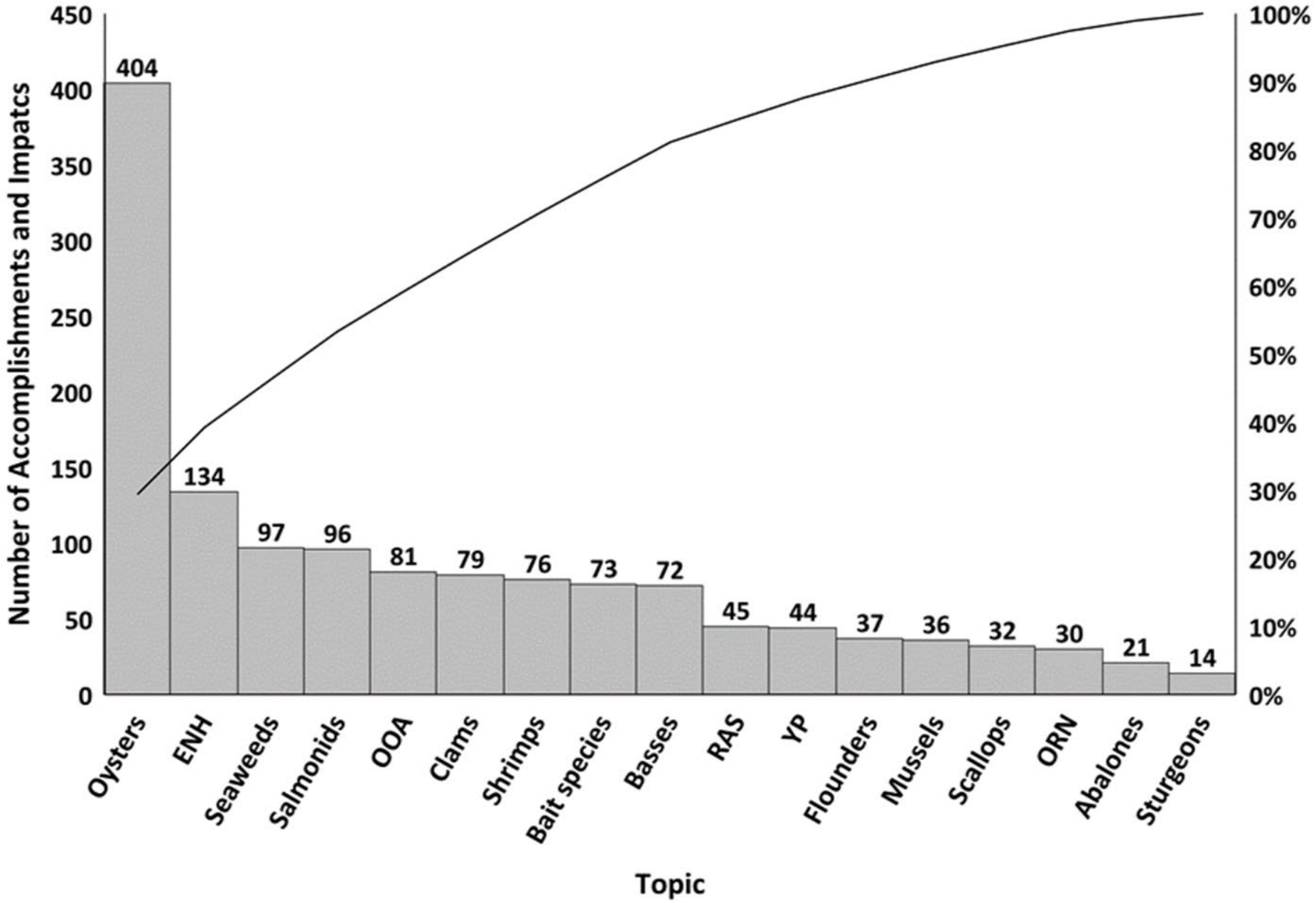
Sea Grant has supported programs on topics including:

- Production methods and systems
- Nutrition
- Diseases
- Physiology
- Genetics
- Workforce development and training
- Processing
- Food safety
- Business development
- Economics and marketing
- Site selection
- Permitting
- Stock enhancement and restoration

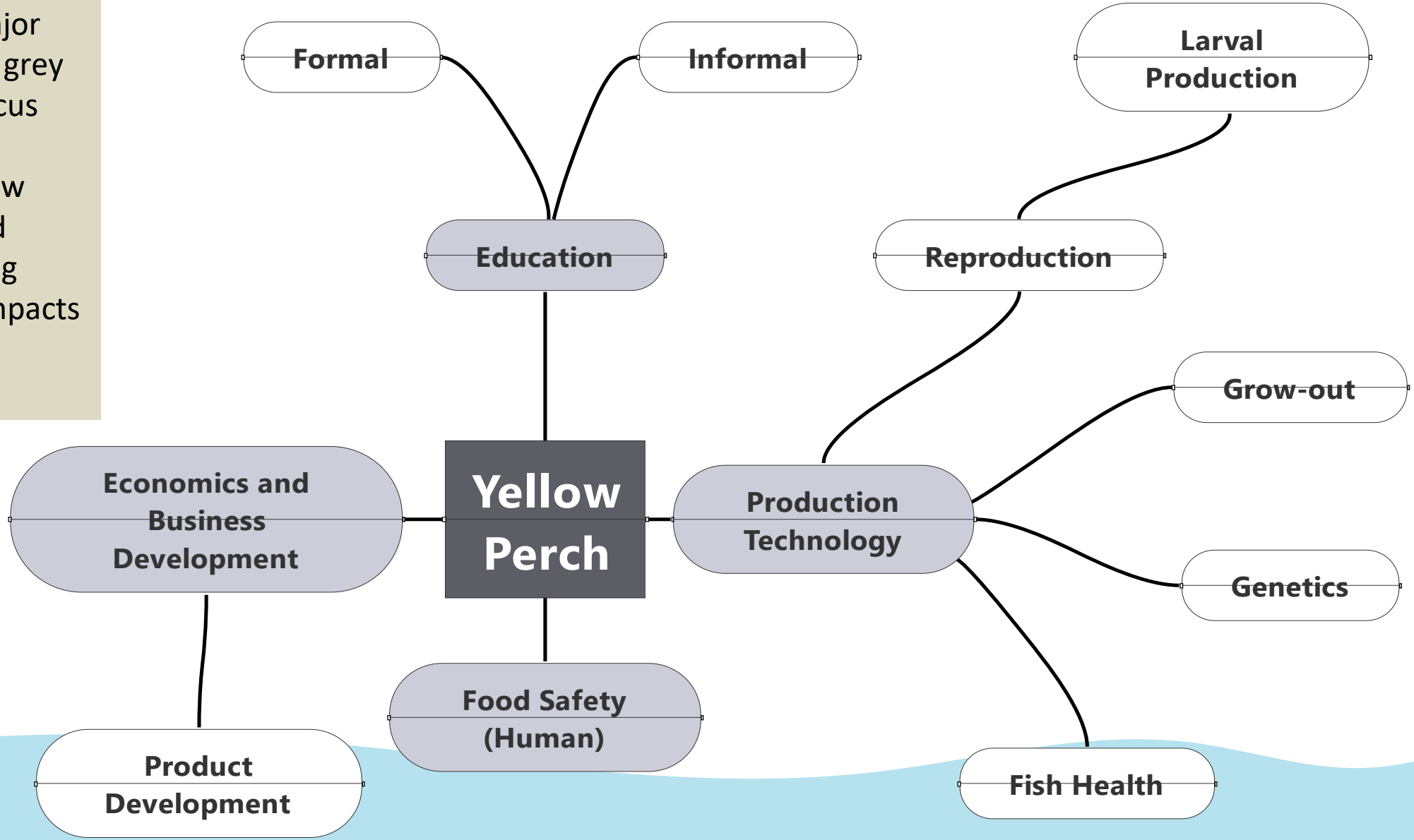
Sea Grant Aquaculture Funding History



17 aquaculture phylogenies focused on species or production systems identified by the 2019 expert panel which were developed from 78 topics identified via annual reporting data obtained through 2018. The phylogenies contained 1,458 accomplishments and impacts which are shown in order of frequency. Approximately 80% of the accomplishments and impacts are contained in the first 9 phylogenies. ENH = enhancement, OOA = open ocean aquaculture, RAS = recirculating aquaculture systems, YP = yellow perch, ORN = ornamentals.



Spaghetti diagram of major focus areas (denoted by grey background) and sub-focus areas (denoted by white background) of the yellow perch phylogeny created using 44 annual reporting accomplishments and impacts submitted by Sea Grant Programs through 2018.



Recent National Sea Grant Funding Opportunities

- **2023**
  - Aquaculture Economics & Markets Collaborative
  - Aquaculture Technologies & Education Awards
  - Aquaculture Supplemental Funding
  - Aquaculture Workforce Development Projects

Recent National Sea Grant Funding Opportunities

- **2022**
  - Early Stage Propagation Strategies
  - Marine Finfish Juvenile Production Technologies
  - Advanced Aquaculture Collaboratives Continued
  - Aquaculture Information Exchange Creation
  - Aquaculture Supplemental Funding

AQUACULTURE
INFORMATION EXCHANGE

Recent National Sea Grant Funding Opportunities

- **2021**
  - Addressing Economic and Marketing Needs of the U.S. Aquaculture Industry
  - “Food From the Sea” Careers Program
  - Addressing the Impacts of Multiple Stressors on Shellfish Aquaculture through Research/Industry Partnerships
  - eeBLUE Aquaculture Literacy Mini-Grants Program
  - National Aquaculture Extension Coordinator
  - Addressing COVID-19 Impacts to Seafood Resources

FY24	FY25	FY26	FY27	FY28
NAI - Production	NAI - Business Support	NAI - Production	NAI - Business Support	NAI - Production
Aquaculture Supplemental	Aquaculture Collaboratives	Aquaculture Supplemental	Aquaculture Collaboratives	Aquaculture Supplemental
Technology & Education Travel Grants	Technology & Education Travel Grants	Technology & Education Travel Grants	Technology & Education Travel Grants	Technology & Education Travel Grants
Aquaculture Internships Program	Aquaculture Internships Program	Aquaculture Internships Program	Aquaculture Internships Program	Aquaculture Internships Program
Opportunities as Needed	Legal Issues	Opportunities as Needed	Legal Issues	Opportunities as Needed

From FY 2018 to FY 2022

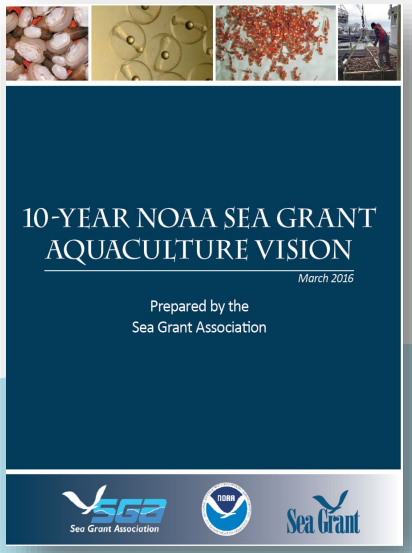
- Estimated average annual **economic impact** of Sea Grant's investments in aquaculture was **$69.2 M** per year.
- Created or sustained an estimated average of **1,156 aquaculture-related jobs** and **567 businesses** per year.
- Publication of 328 peer reviewed aquaculture journal articles.
- Other metrics include increased knowledge, understanding, and capacity to make informed decision.

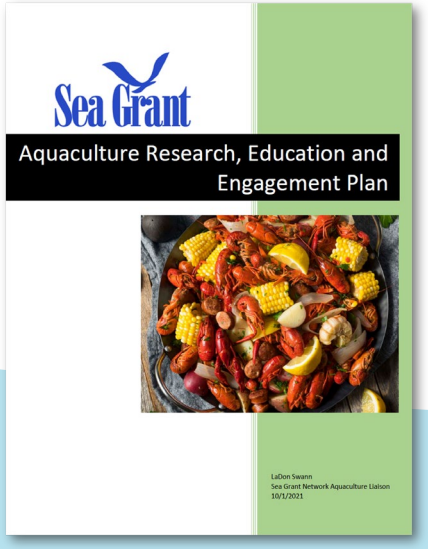
Sample of Florida Sea Grant Impacts

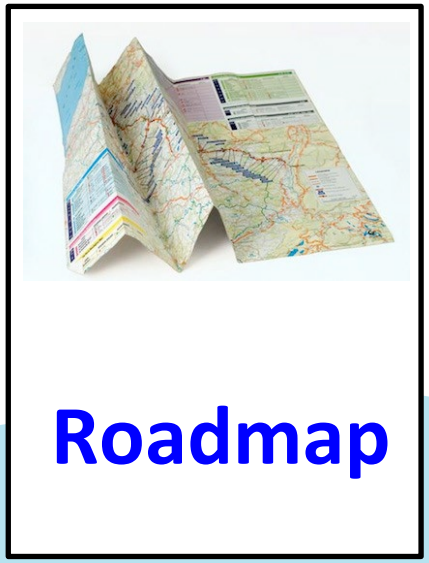
- Provides expanded training opportunities that enable low-income shellfish harvesters to more easily access and complete training that is required for them to obtain or retain their state license.
- Connected oyster aquaculture businesses with student interns whose salaries were funded by FSG. Students received training and valuable work experience in a growing sector while business owners received additional staff and support towards resolving production bottlenecks.

Sea Grant Aquaculture Planning

- 2016 the Sea Grant Association published its 10 year Aquaculture Vision.
- 2021 the Sea Grant Network released its Research, Education and Engagement Plan.
- 2023-2024 Sea Grant Aquaculture Roadmap. High-level and concise document with recommendations and seminal impacts

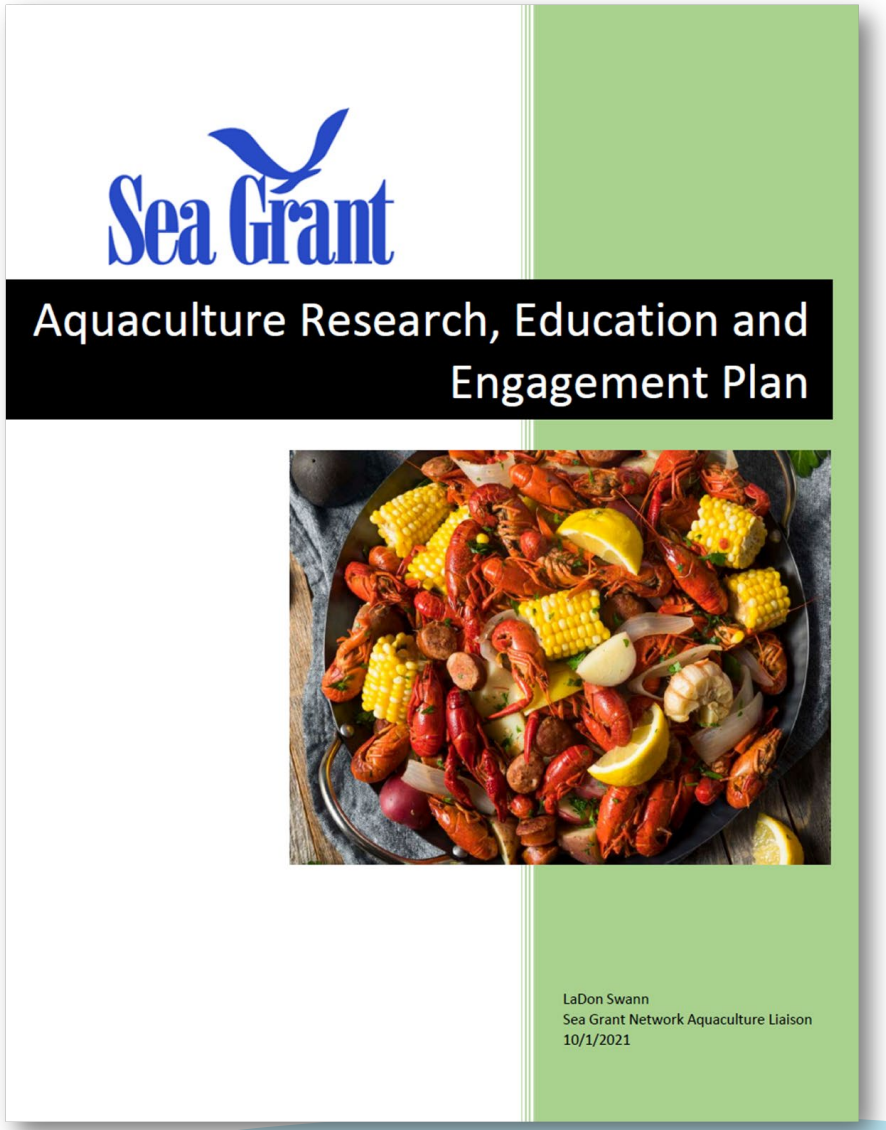






2015 Vision Investment Summary

Focus Area	Areas to Invest Resources		
	Research	Outreach	Partnership
Commerce	Detailed economic analysis of cost of production for various species and systems.	Business and marketing worKshops.	Nurture partnerships with ongoing marketing programs with industry organizations and other marketing efforts.
Permitting and Policy	Extensive background analysis of state laws and policies.	Law and policy workshops and facilitate dialogue among permitting agencies.	State and federal permitting agencies and the private sector.
Current and Emerging Species	Hatchery and seed stock production technologies and production protocols for emerging species.	Applied demonstration workshops, support outreach personnel to work directly with existing and new aquaculture producers.	Research institutions, agencies and the commercial sector.
Production Systems	Production system and emerging species hatchery and seed stock production technologies and production protocols.	Applied demonstration workshops and support outreach personnel to work directly with existing and new aquaculture producers.	Integrate and leverage existing infrastructure capacity at partner institutions to enhance outreach and demonstration capacity.
Seafood Safety and Quality	Develop new and enhance existing seafood safety tools and new products.	Develop new and enhance existing seafood safety services and technology transfer programs.	Develop new partnerships and leverage existing partnerships with seafood safety agencies (e.g. FDA and USDA).



Sea Grant Aquaculture Research, Education and Engagement Plan

Focus Areas

- Commerce
- Permitting and Policies
- Current and Emerging Species
- Production Systems
- Seafood Safety and Quality
- Aquaculture Literacy and Workforce Development (NEW)

Roadmap will spell out roles of Sea Grant's functional and thematic areas, and seminal impacts.

Roadmap Milestones

1. Steering committee: NSGO, the SGA, the NSGAB, and aquaculture industry
2. Review current Vision, REE, other Sea Grant, NOAA Office of Aquaculture and the interagency Subcommittee on Aquaculture planning documents
3. Obtain input for the Roadmap
4. Draft a Roadmap
5. 2,500 copies and web-based storyboard
6. Provide routine update guidance.
7. Evaluation guidance

Thank You

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DISCUSSION

Greg Vaday

- ECONOMIC DEVELOPMENT REPRESENTATIVE FOR FLORIDA
- U.S ECONOMIC DEVELOPMENT ADMINISTRATION (EDA)

HELPFUL RESOURCES

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