

# Aquaculture Extension Activities & Research Initiatives in the Inland Bays

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# My role as a Marine Advisory Specialist is to

- Work with government officials, industry representatives and academic researchers to engage in outreach and ***extension*** work across the state for programmatic focus areas
- Conduct applied scientific research on issues associated with fisheries, aquaculture and seafood in the state of Delaware

# What is extension?

- Connect university resources and expertise with local communities and user groups
- We might develop new information through original applied research, gather existing information for user needs, transmit information and skills through pamphlets, courses, workshops, lectures and meetings; provide technical reviews of research and policies; and stimulate new research to meet perceived needs
- More simply, we take complex information and show people how to use it to solve a problem

<https://seagrant.noaa.gov/extension>



What does fisheries and aquaculture extension look like in Delaware?

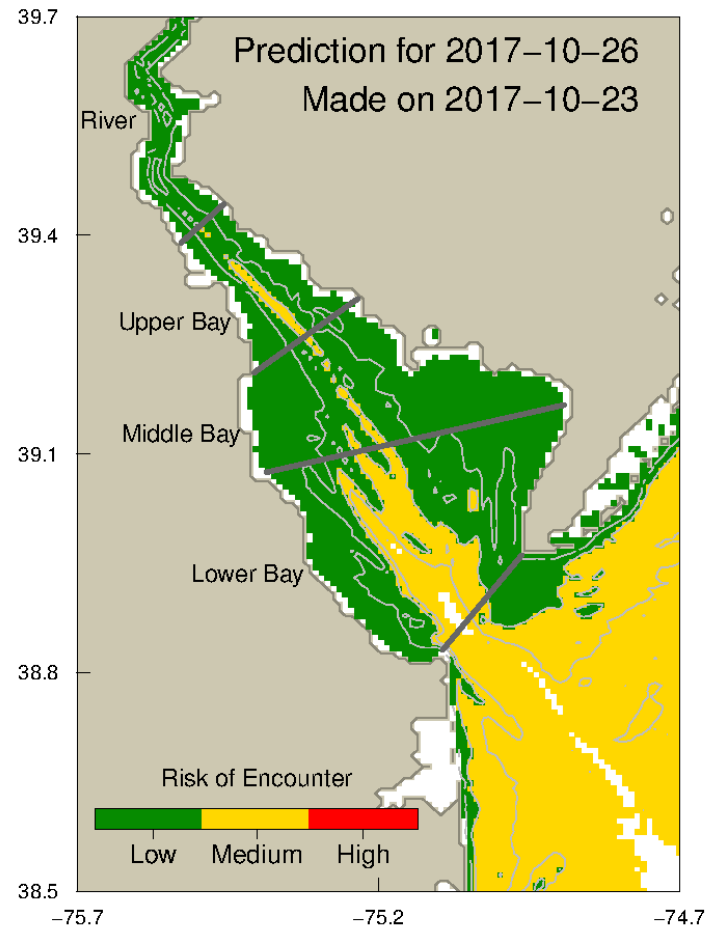
Electronic warnings (email and text) of Atlantic Sturgeon occurrence in Delaware Bay based on satellite derived predictive indices to commercial fishers.

# Atlantic Sturgeon Predicted Occurrence

Green indicates low risk of encountering Atlantic Sturgeon

Yellow indicates medium risk of encountering Atlantic Sturgeon

Red indicates high risk of encountering Atlantic Sturgeon



This product is developed for mature Atlantic Sturgeon using historic telemetry observations matched to date, bathymetry, and sea surface temperature and ocean color from NASA's MODIS AQUA satellite. The five regions (Delaware River, Upper Delaware Bay, Middle Delaware Bay, Lower Delaware Bay, and Atlantic Ocean) are divided into 5 meter depth bins.

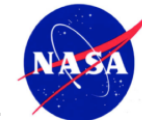
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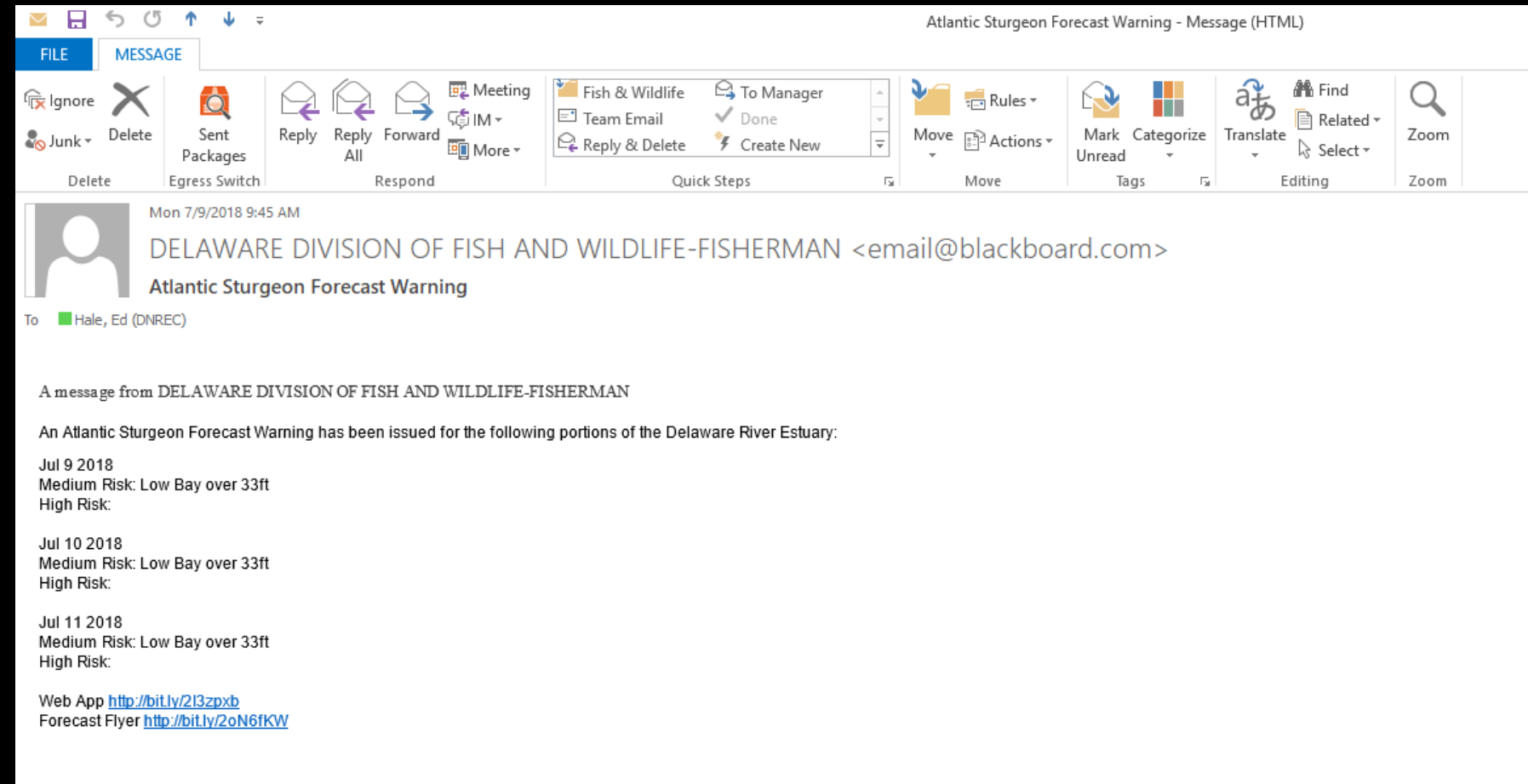
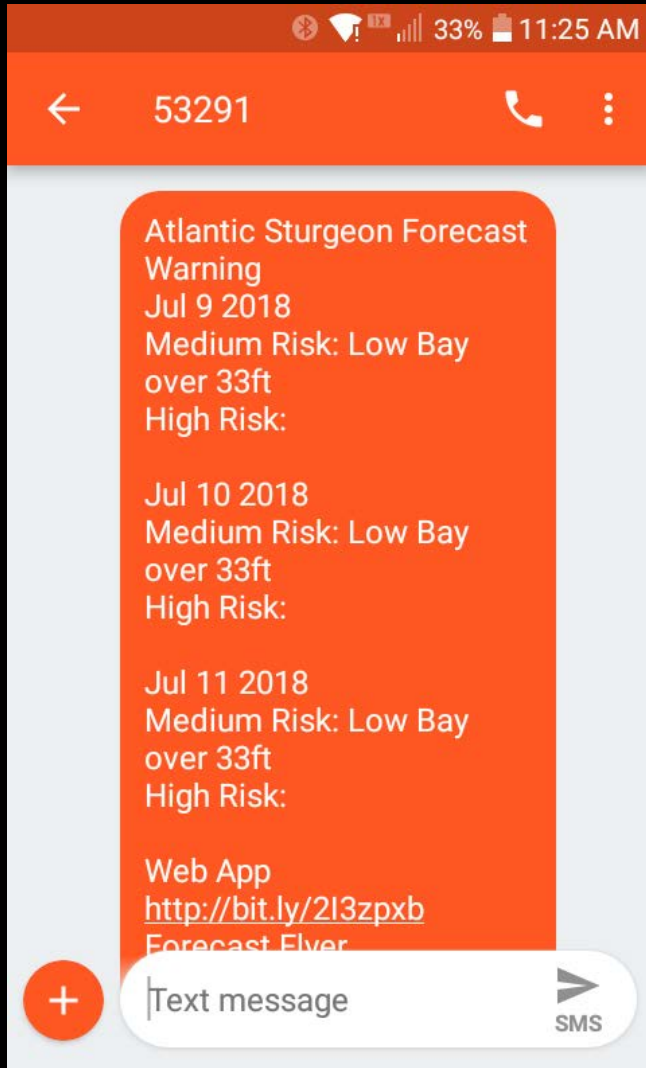
[Ed.hale@state.de.us](mailto:Ed.hale@state.de.us) Delaware Division of Fish  
and Wildlife 3002 Bayside Drive Dover, DE 19901

Breece, M. W., D. A. Fox, D. E. Haulsee, I. Wirgin,  
and M. J. Oliver. 2017. Satellite Driven  
Distribution Models of Endangered Atlantic  
Sturgeon Occurrence in the Mid-Atlantic. ICES  
Journal of Marine Science fsx187.





# Messages are delivered via Blackboard Connect System to email and phone numbers



# Partnering with DESU to conduct DE Shellfish Growers Forums to generate information exchange among industry representatives

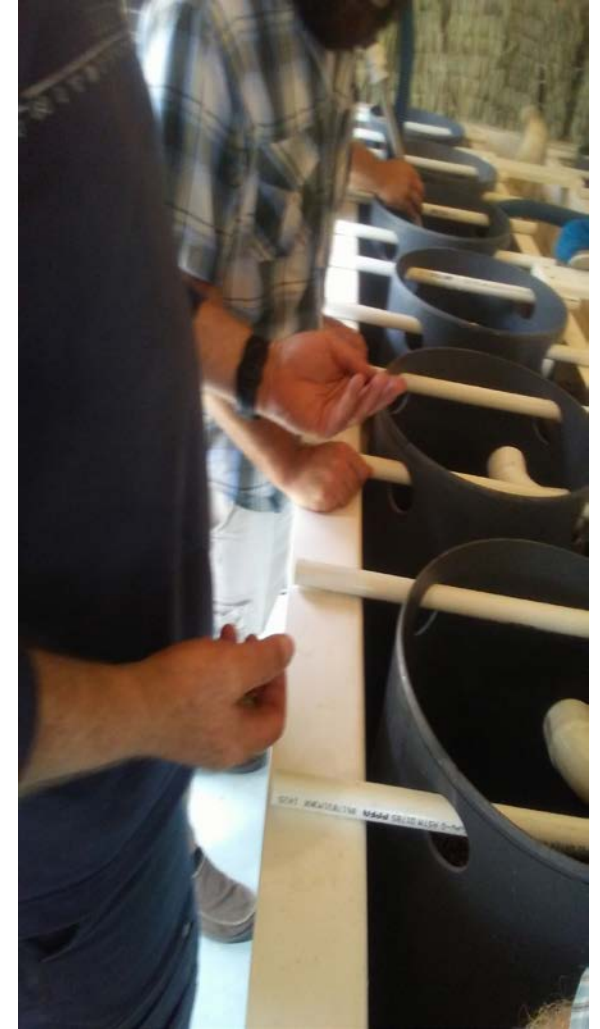
- Connecting aquaculture industry stake holders with necessary researchers, regulatory agents and other industry representatives based on their own interests to help facilitate economic growth using sustainable and environmentally beneficial techniques





# Site visits to meet with shellfish farmers

- Discussions of aquaculture techniques, potential partnerships, new opportunities, and other issues as needed



## Article featuring the ecological and economic benefits of oysters and oyster farming with a partnership for the oyster stout with area breweries in Wilmington, DE

Kicking off Wilmington Beer Week tonight with the Out & About Oyster Stout Release Party at [Two Stones Pub Wilmington](#). Both the party and the ale were very enjoyable!

Here are some of the collaborators making a toast: (l-r) [Andrew H Rutherford](#) of [Stitch House Brewery](#), [Bob Barrar](#) of [2SP Brewing Company](#), [Rob Pfeiffer](#) of [Wilmington Brew Works](#), [Ed Hale](#) of [UD Sea Grant](#), and [Jerry DuPhily](#) of [Out & About](#).

Look for the Oyster Stout available on tap at all of these locations -- as well as [Ernest & Scott Taproom](#)-- as well as a Out & About Tapping Party this Wednesday night at [Stitch House Brewery](#)!





# Applied scientific research on issues associated with fisheries, aquaculture and seafood in the state

## New Initiatives

- Spurring economic growth and enhancing the environment through the development of an oyster remote setting system in Delaware -*Open*
- DE Shellfish Aquaculture: Training to Support an Emerging Industry –*Open*
- Staging a Spiny Dogfish (*Squalus acanthias*) Renaissance by Examining Potential Markets for an Underutilized Fishery- *Denied*
- Thermal Control of Dermo Disease on Oyster Farms –*Open*
- Conservation of juvenile Atlantic Sturgeon in the Delaware River Basin-*Denied*
- Examining the effect of soak time on the at-vessel and post-release mortality of Dusky and Sandbar Sharks in mid-Atlantic gillnet: can soak time limits reduce mortality?-*Open*
- Characterizing the ecological role of apex predators in the Delaware Bay Ecosystem and their potential impacts on managed species-*Open*
- Improving and deploying an electronic warning system for Atlantic Sturgeon to commercial fishers in Delaware Bay-*Open*
- Fueling Economic Investment by Kick-starting Oyster Aquaculture in the DE Inland Bays-*Denied*





## Existing Cooperative Research Activities

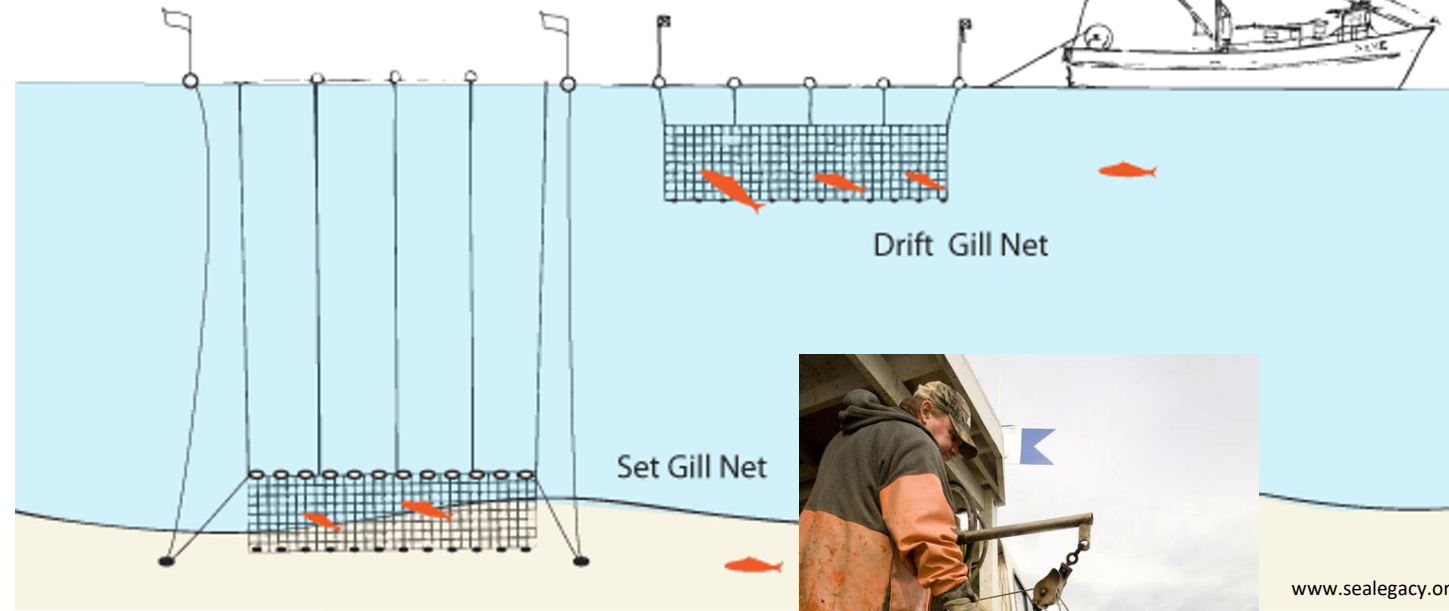
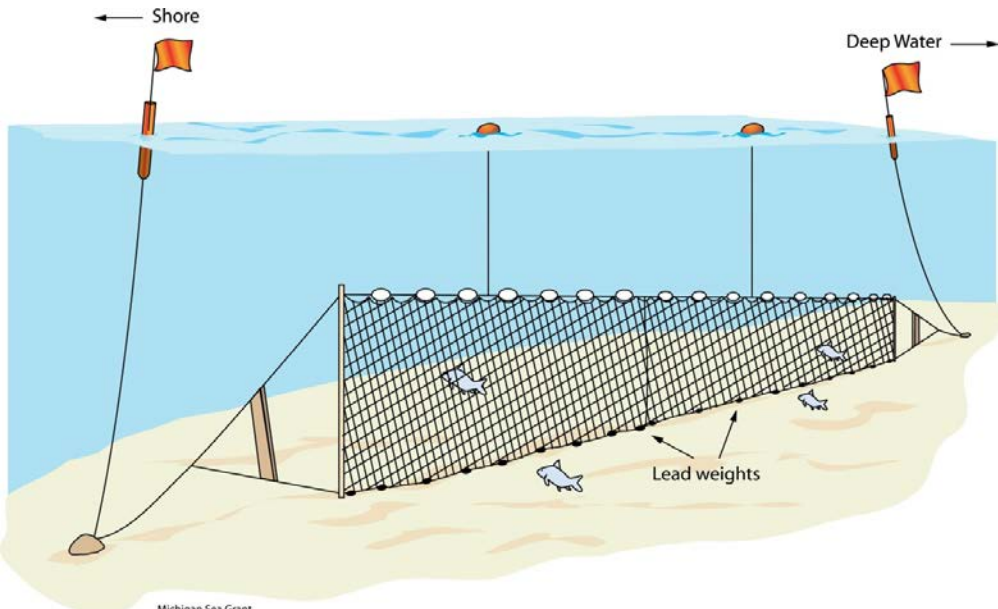


# What is a fishery?

- Generally, a fishery is an activity leading to harvesting of fish. It may involve capture of wild fish or raising of fish through aquaculture;
- A unit determined by an authority or other entity that is engaged in raising or harvesting fish. Typically, the unit is defined in terms of some or all of the following: people involved, species or type of fish, area of water or seabed, method of fishing, class of boats, and purpose of the activities (FAO);
- The combination of fish and fishers in a region, the latter fishing for similar or the same species with similar or the same gear types (Madden & Grossman 2004).



# Commercial fishing gear used in DE



[www.sealegacy.org](http://www.sealegacy.org)

# First State Fisheries

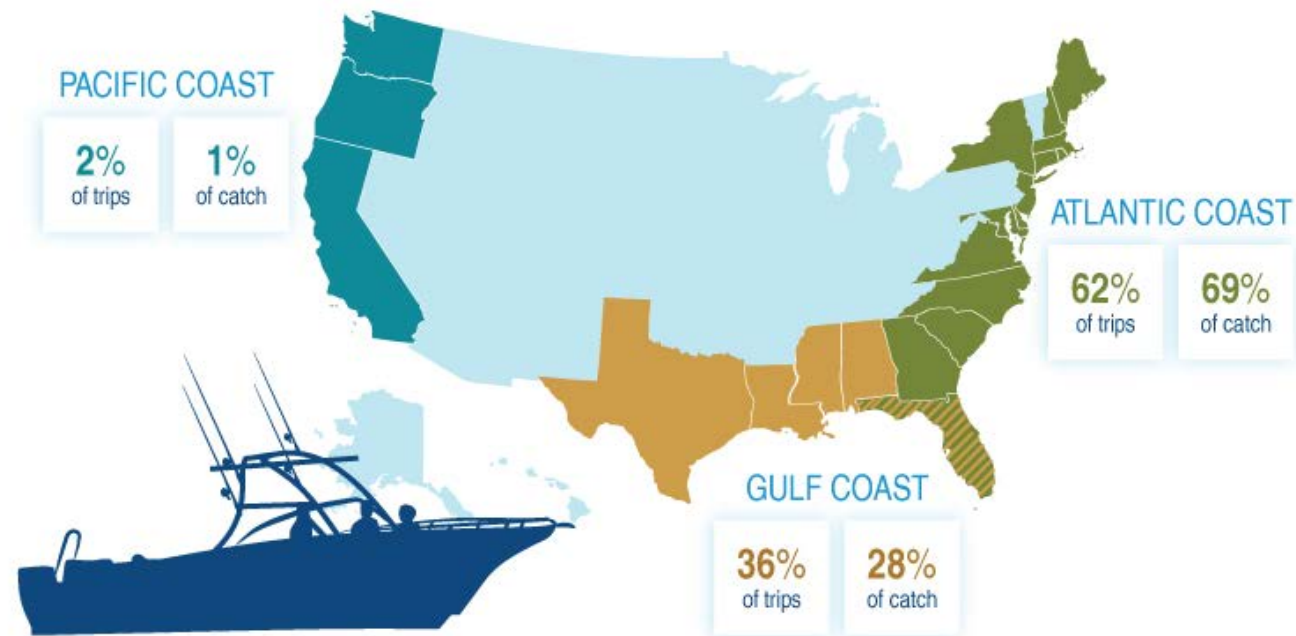
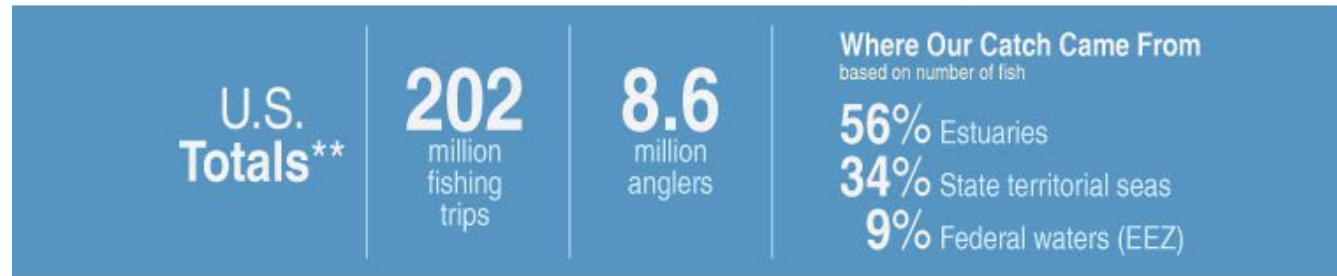
- 2016 Value Added
  - Commercial fishery value added \$16 million
  - Recreational fishery value added \$110 million
  - Total economic impact \$126 million



FEUS 2018



## 2017 U.S. Recreational Fisheries Saltwater Trips and Catch\*



\* Based on revised MRIP estimates. Comparisons to previous figures are not appropriate.  
\*\* Alaska data not available for 2017.  
Hawaii contributed 1% and <1% of national trips and catch, respectively.  
Puerto Rico contributed <1% of national trips and <1% of catch.



**NOAA FISHERIES**

# 2016 Aquaculture Production Highlights

## Marine & Freshwater National Totals

### VALUE

**\$1.5**  
billion

**21%**  
of U.S. seafood  
production & fishery  
products by value

#### MARINE

**\$418.3**  
million

#### FRESHWATER

**\$719.8**  
million

### PRODUCTION

**633**  
million pounds

**16<sup>th</sup>**  
in global  
aquaculture  
production

#### MARINE

**86**  
million pounds

#### FRESHWATER

**547**  
million pounds

## Marine Species Totals

Oysters

**\$192 million**  
37 million pounds

Clams

**\$138 million**  
10 million pounds

Salmon

**\$68 million**  
36 million pounds

Mussels

**\$10 million**  
0.9 million pounds

Shrimp

**\$10 million**  
4 million pounds

## Regional Marine Totals



\* Alaska and Hawaii are included in the Pacific region for aquaculture production.



**NOAA FISHERIES**

# Definition

- Aquaculture is the farming of aquatic organisms, including fish, mollusks, crustaceans and aquatic plants
- Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.
- Farming also implies individual or corporate ownership of the stock being cultivated

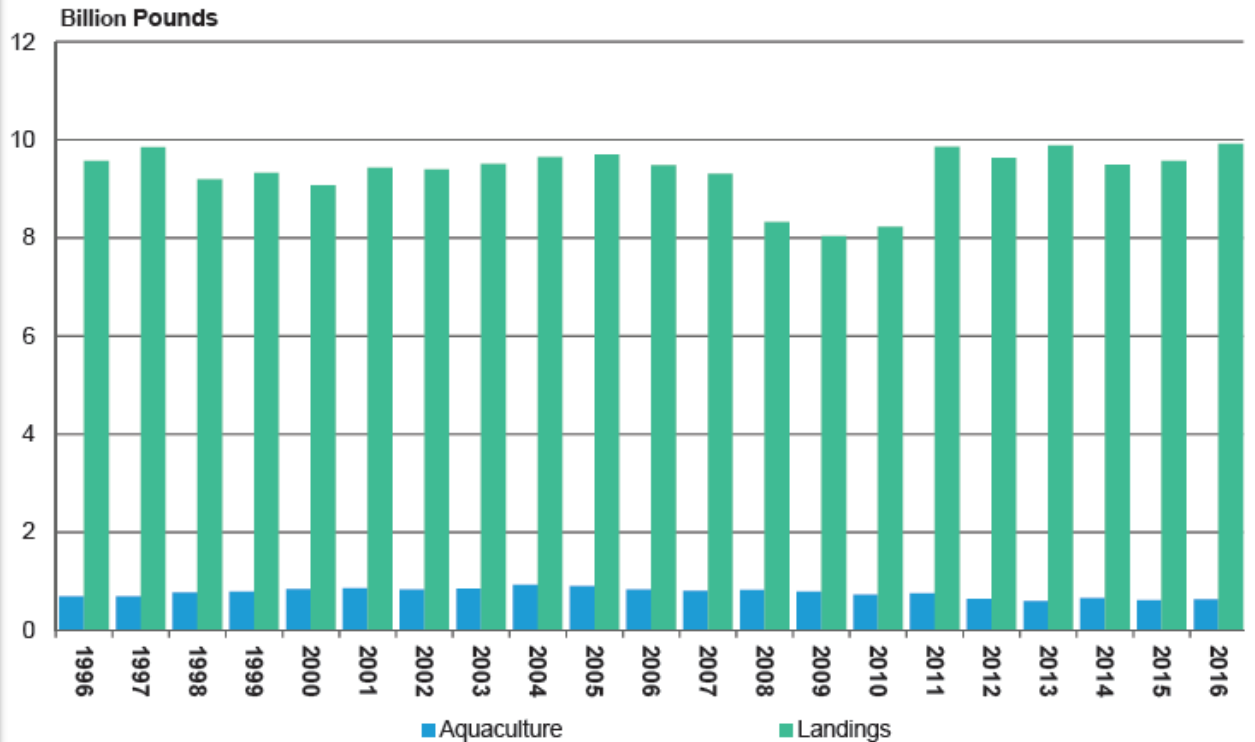
FAO 1988

Key Points

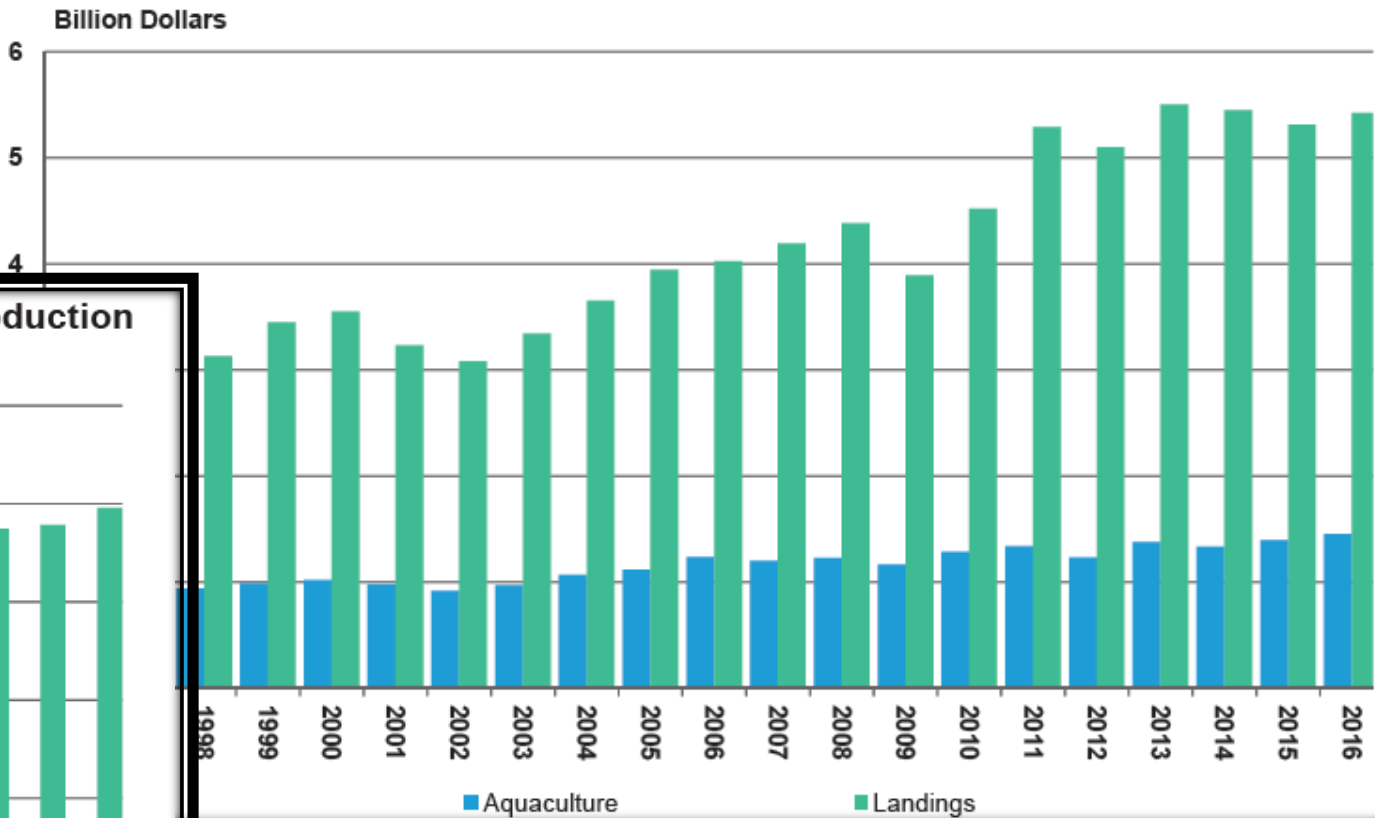


# Current national aquaculture production vs. fisheries production

Volume of Domestic Commercial Landings and Aquaculture Production

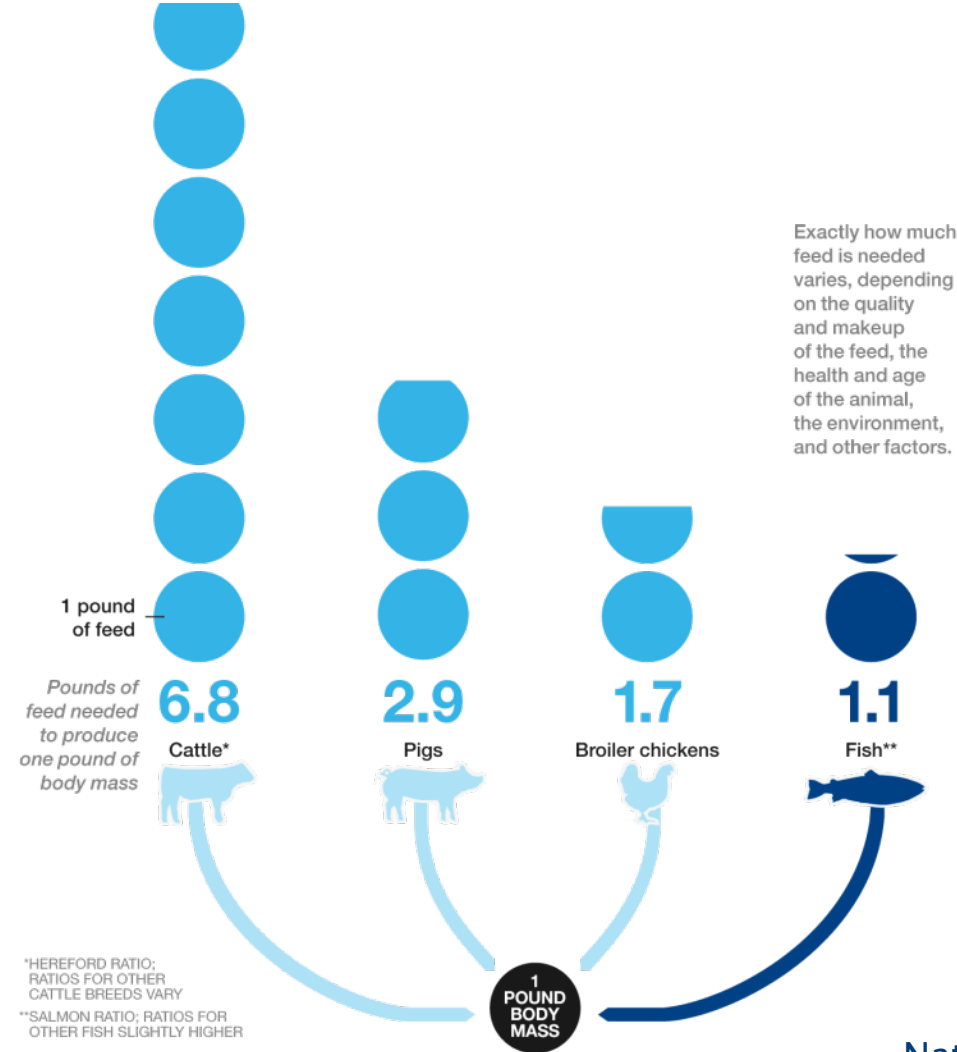


Value of Domestic Commercial Landings and Aquaculture Production



Fisheries of the U.S. 2017

# Aquaculture vs. Agriculture



National Geographic Magazine 2014

# AQUACULTURE IN DELAWARE

# Industry

- Few commercial aquaculture producers in DE
  - Historically dominated by finfish production
    - ex. Tilapia, Striped bass, Hybrid striped bass
- Until 2013 DE was one of two coastal states that lacked a shellfish aquaculture industry
  - Positive economic impact of shellfish aquaculture
  - Increased numbers of shellfish will also positively impact water quality

# Industry Status

- Finfish Aquaculture
  - Blair View Farm in Houston, Delaware
    - Produce tilapia in closed, recirculating systems for live markets
    - Only farm in this sector
  - Delmarva Aquatics in Smyrna, Delaware
    - Production of eggs, fry and fingerlings of hybrid and straight striped bass and yellow perch for domestic and international markets
    - Distributor/hauler of other cultured and wild fish
- Misc. Aquaculture
  - Crab shedding (peeling)
  - Pond stocking
  - American eel capture/live-haul
  - Live bait
  - Aquaponics multiple start-ups
- Shellfish Aquaculture
  - Young industry but evolving
  - Poised for growth





# Shellfish Mariculture Comes to DE 2017



- First, commercial sale 2018
- 8 current leases
- “Dewey Beach Selects”
- Delaware Blue Hens
- Dewey Oyster Co.
- Nursery Operation



Photos Credit: Mr. Chris Redefer

# Questions

Sustainable fisheries and aquaculture produced seafood generates significant economic revenue and provide a healthy, nutritious food option while maintaining healthy coastal ecosystems

- Aquaculture can be environmentally and economically beneficial
- Extension agents take complex information and show people how to use it to solve a problem



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