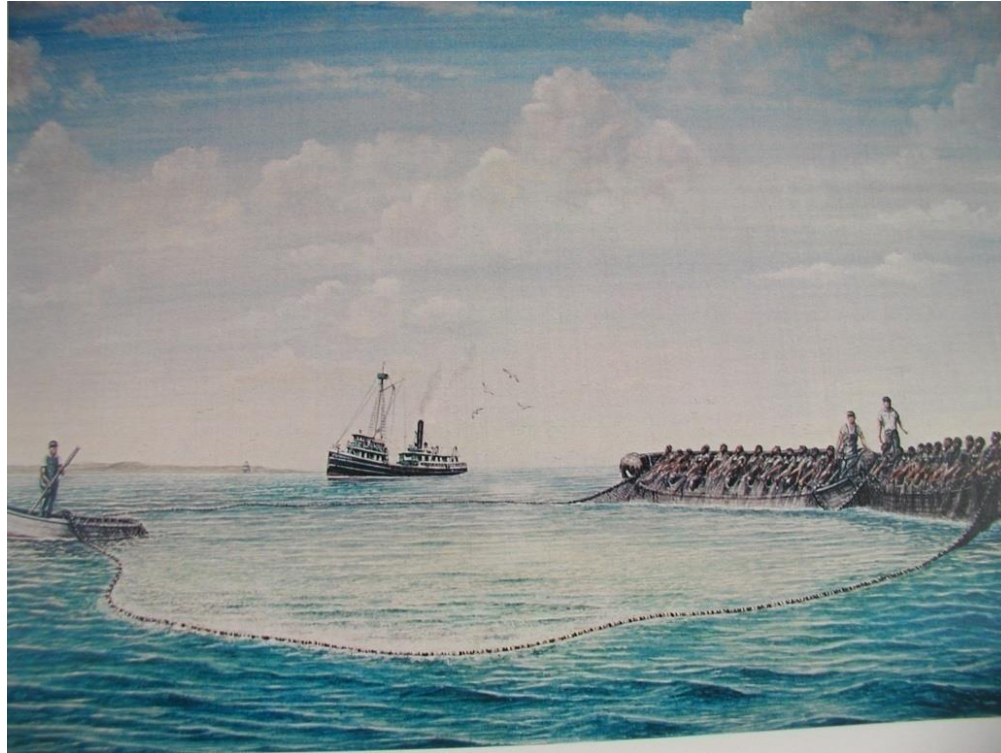


**NOAA**  
**FISHERIES**

## Brief History of the Gulf Menhaden Purse-Seine Fishery



Ray Mroch  
NMFS Beaufort Laboratory

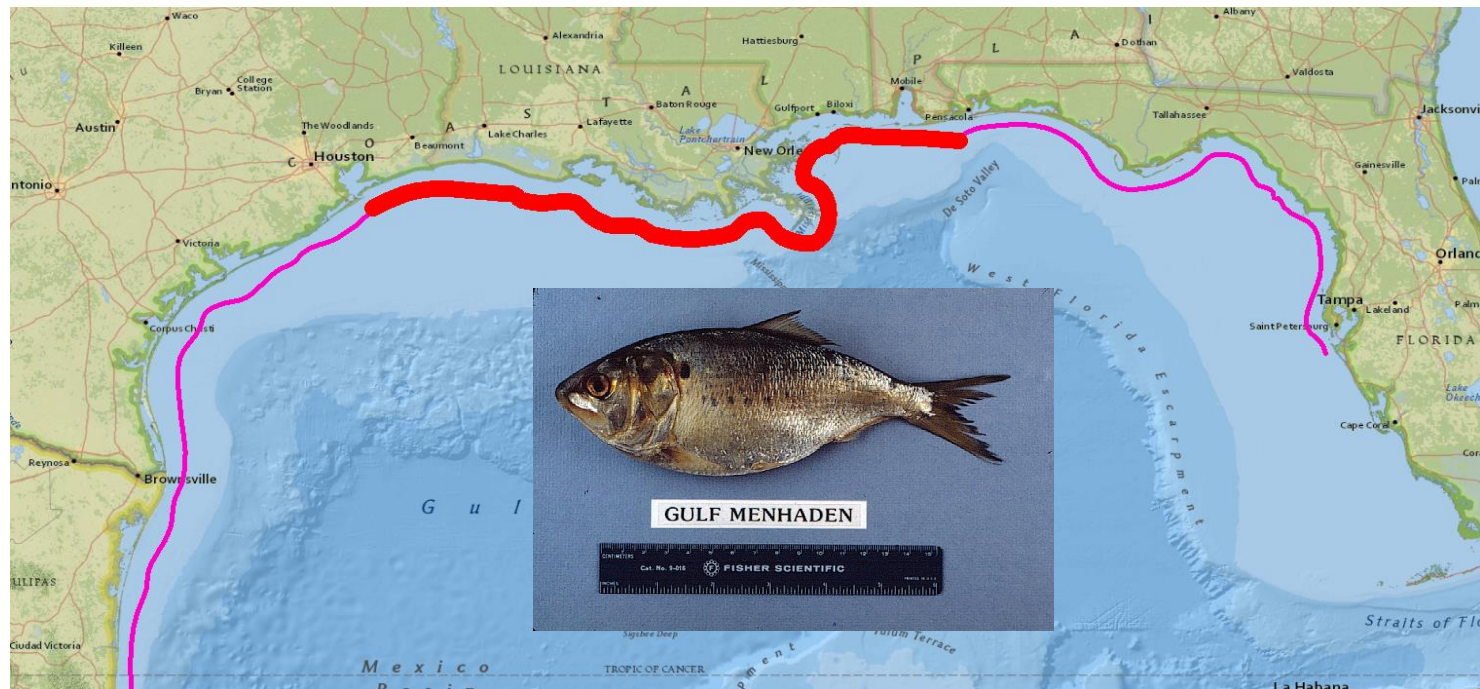
SEDAR 63 Review – November 6, 2018

Scientific name: *Brevoortia patronus* (Family: Clupeidae)

Distribution: from southwest Florida to Gulf of Campeche, Mexico

Center of distribution: northern Gulf of Mexico (western Florida to eastern Texas)

Anderson (2006): single genetic stock in the northern GOM...”no organized structure of gulf menhaden populations which would indicate distinctive genetic stocks”



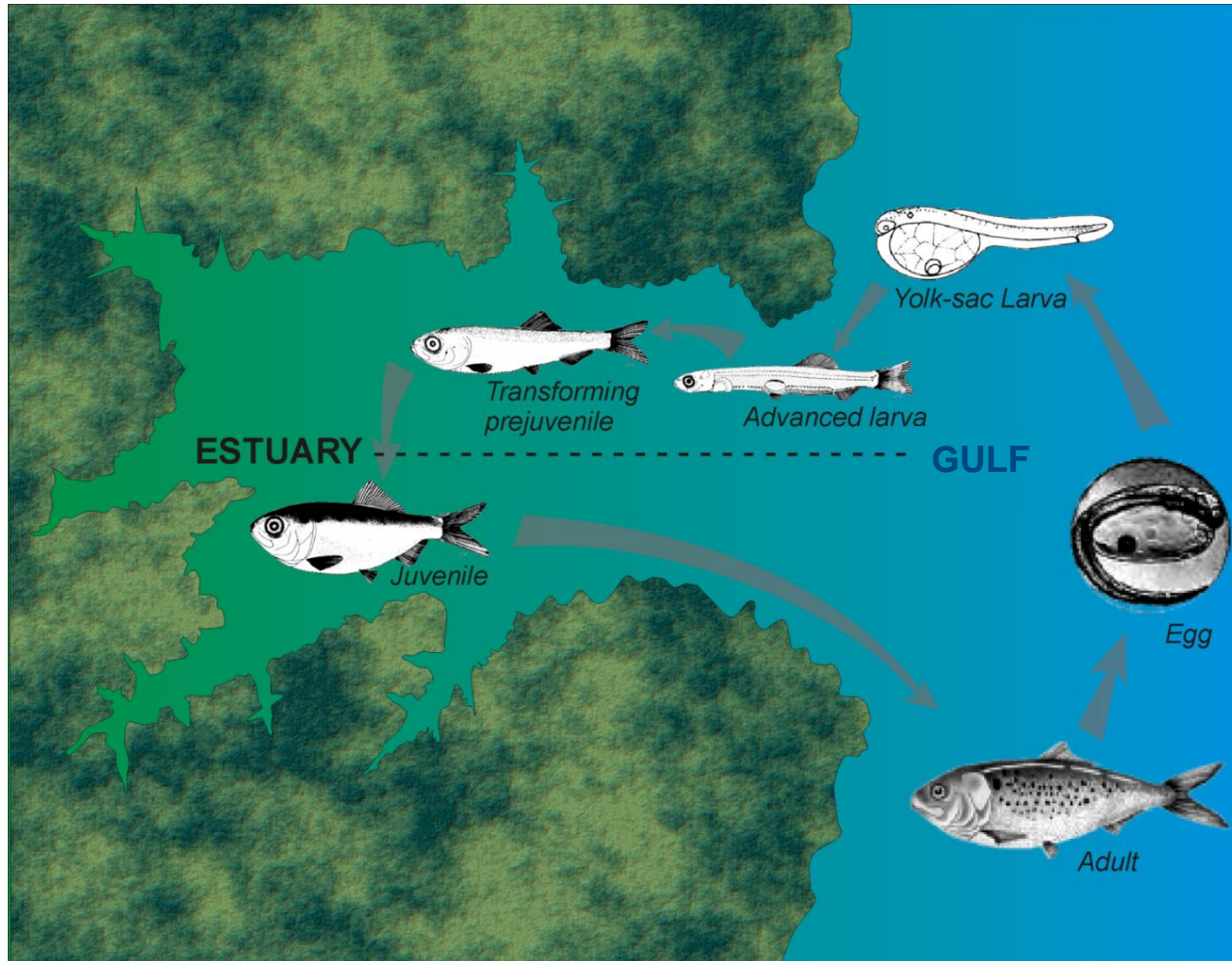
# Gulf Menhaden



- Distribution: Ubiquitous in northern GOM
- Salinity tolerance: Euryhaline
- Life History: Obligate filter-feeder; marine, but estuarine-dependent
  - Juveniles most efficient filtering phytoplankton, and some zooplankton
  - Adults most efficient filtering zooplankton
- Schooling behavior: forms dense, near-surface schools warmer months of the year
- Prey for numerous coastal fishes, sea birds, and marine mammals
  - Important energy pathway from primary producers to predatory fishes, sea birds, and marine mammals
- Schools are targets of a large industrial purse-seine fishery



# Gulf Menhaden Life Cycle

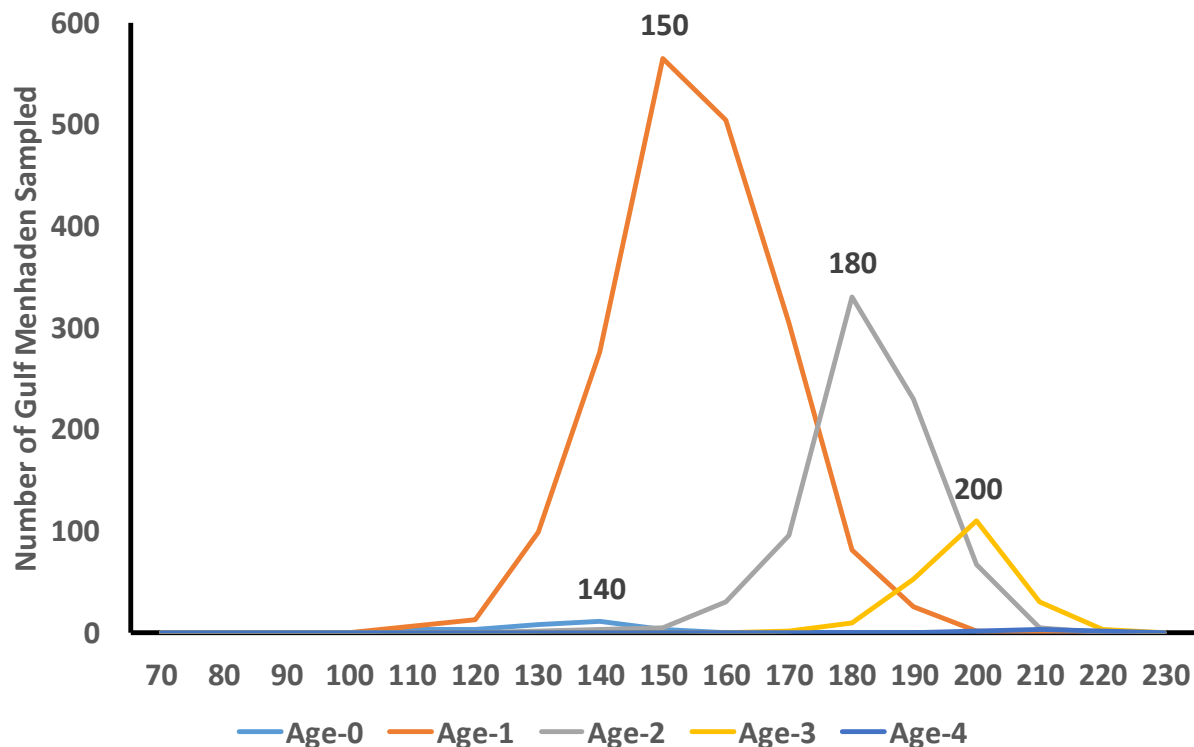


# Gulf Menhaden: generally small in size

- Average size of specimens in port samples for 2017 (n = 4,311)
  - Mean FL: **164mm** (19.9mm sd)
  - Mean Weight: **88g** (32g sd)

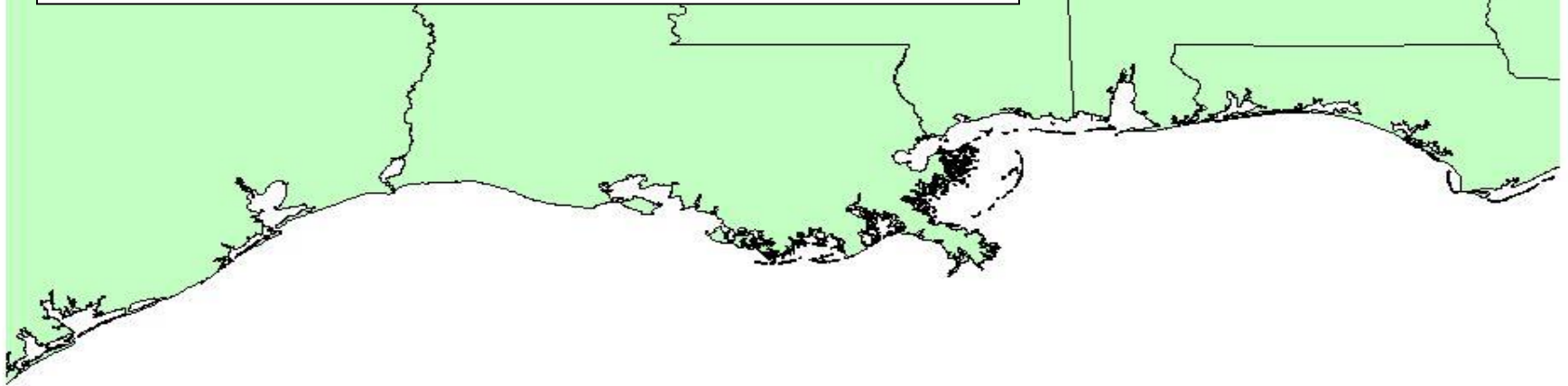
## Age composition of 2017 port samples

age-0	<1%
age-1	65%
age-2	26%
age-3	7%
age-4	<1%



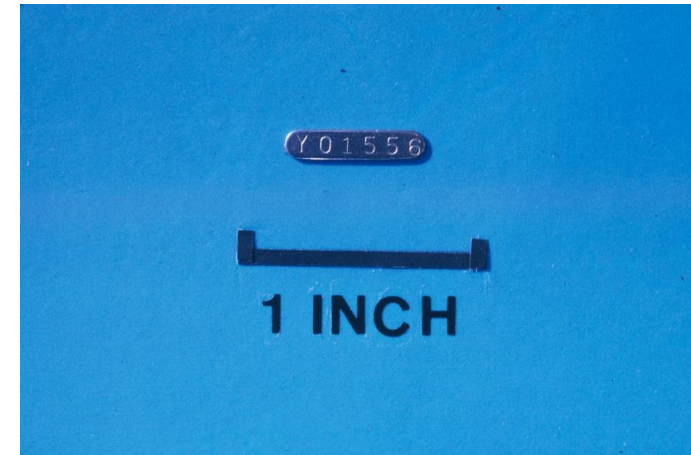
## Migrations of Gulf Menhaden

- Juveniles and adults tagged w/ internal ferro-magnetic tags
- Tags recovered on magnets in fish factories



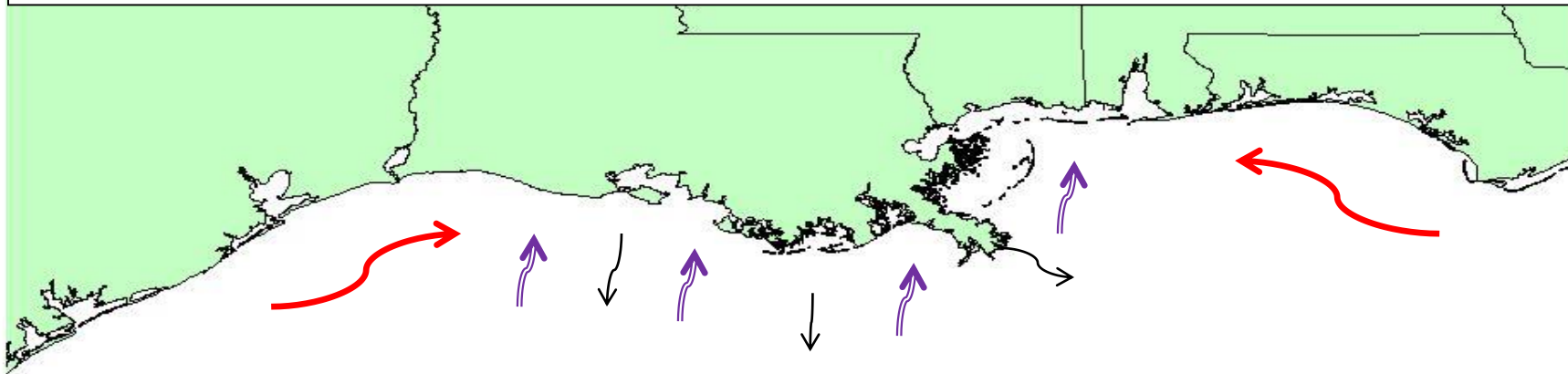
## Tagging Efforts

- 1969-1972 about 75,000 adults tagged (Pristas et al. 1976)
- 1970-1985 about 237,000 juveniles tagged (Ahrenholz 1991)



## Migrations of Gulf Menhaden - Ahrenholz (1991):

- do not exhibit extensive migratory pattern
- lack systematic seasonal movements; tend to mix slowly [cf. Atlantic menhaden]
- distribute in spring along US Gulf coast in near-shore waters (1 to 8 fathoms [ $\sim$ 2-15 m])
- in fall, move offshore to deeper waters for winter (4-48 fathoms [7-80 m])
- no major east-west component of annual migration
- multiple-yr tag recoveries showed tendency to move to center of their range from eastern and western extremes of range



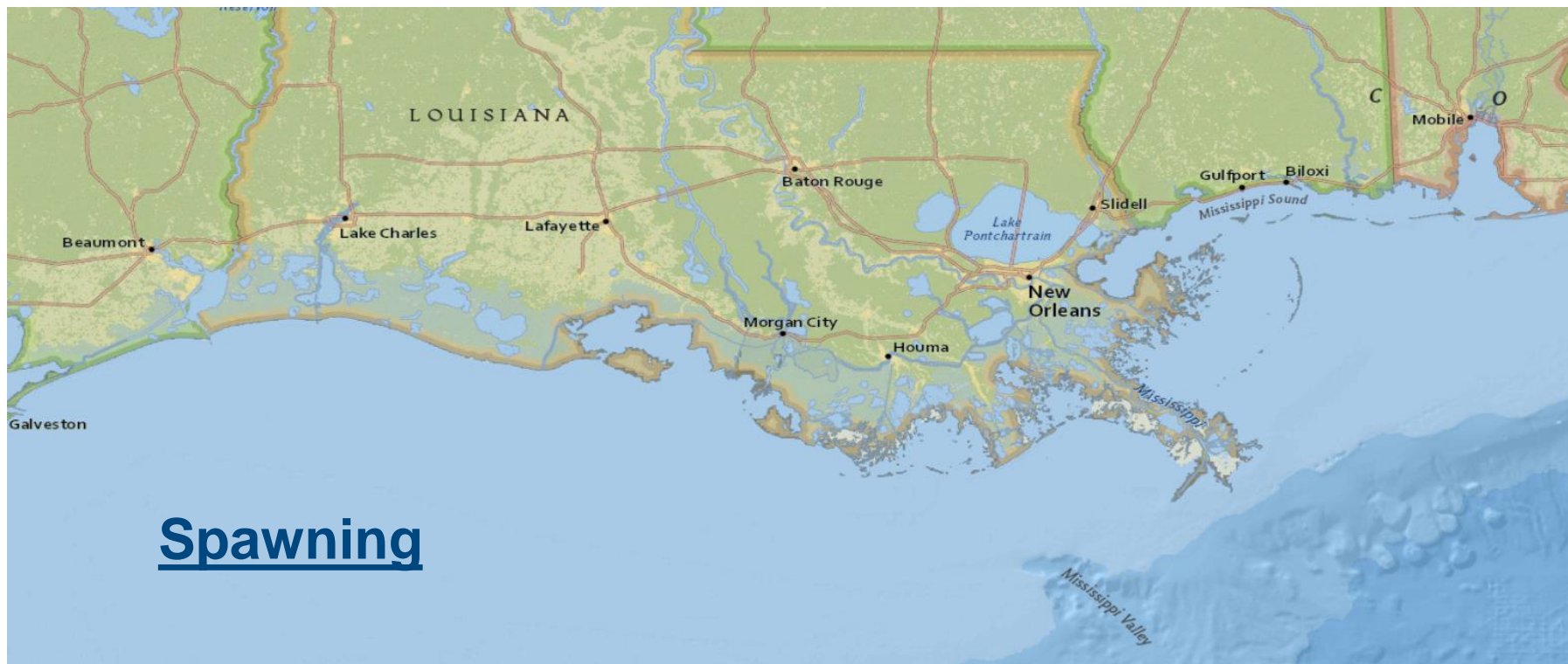
Juveniles and adults tagged w/ internal ferro-magnetic tags



Tags recovered on magnets in fish factories







## Spawning

Summarized in Ahrenholz (1991)

- spawning not directly observed
- spawning season and areas inferred from egg and larval collections and gonadal development
- Spawning Season – October through March, with peak in mid-winter
- Spawning Areas – nearshore to 60 miles offshore along the entire US Gulf coast



# Other Species in the Commercial Catch

<1% of the landings in the reduction fishery (Ahrenholz 1981)

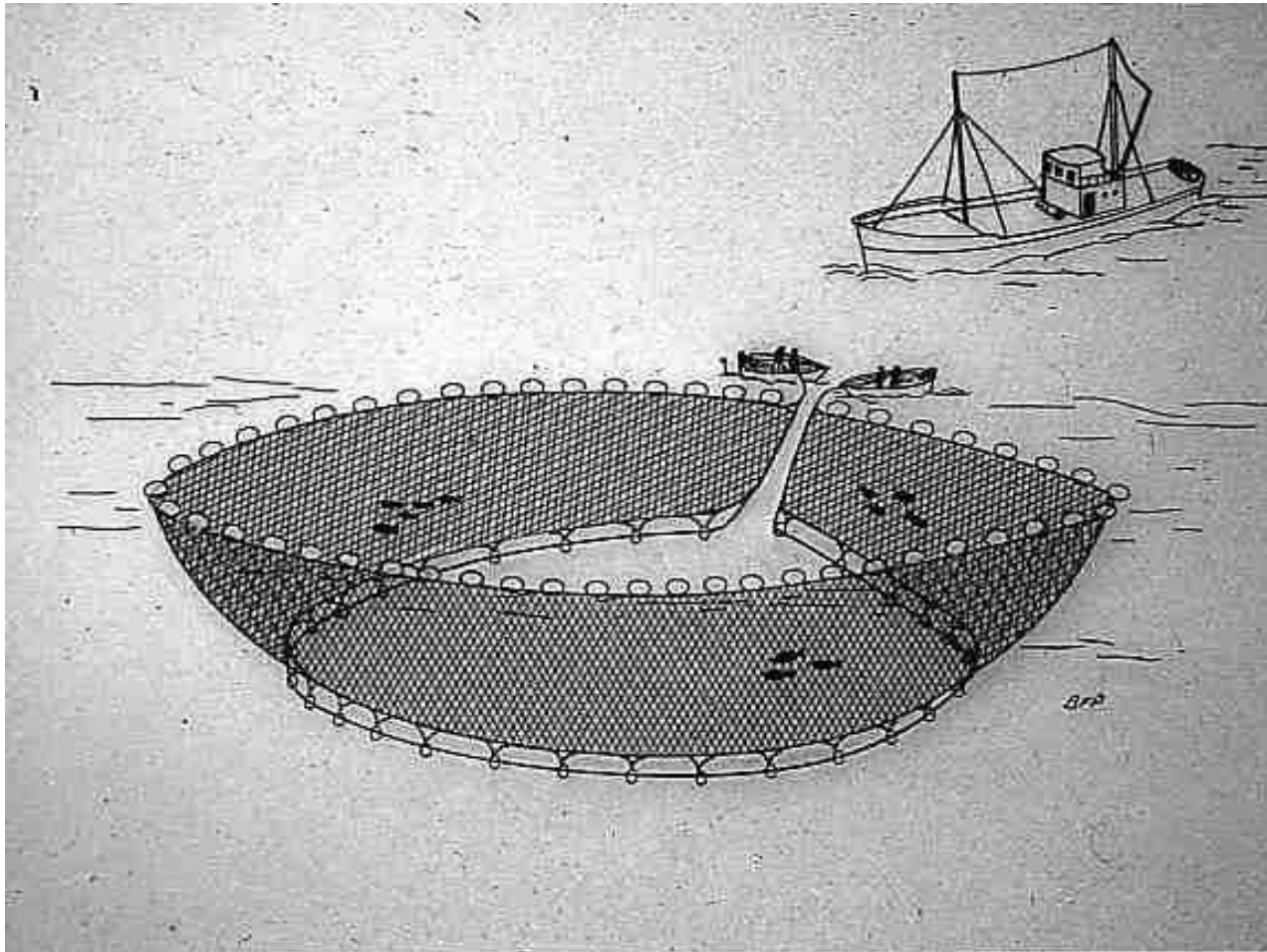


*Brevoortia gunteri*  
finescale menhaden



*Opisthonema oglinum*  
Atlantic thread herring

# The Reduction Purse-Seine Fishery for Gulf Menhaden





Current fleet of ~33 purse-seine vessels, or 'steamers',  
range ~150-200 ft long (45-60 m)



Lauren A 449 net tons

Crew of ~14

Many of recent entrants to the fleet are converted oil rig supply vessels

By 2011, entire fleet has changed over to slides or ramps for purse boats on stern





## Schools generally located by spotter pilots



**Airplanes assist on about 70% of sets**

**A daylight fishery;  
operates Monday through Friday**

**About 28-week fishing season:  
3<sup>rd</sup> Monday in Apr through Nov 1,  
approx. 140 days**

**Vessels make at least one  
set on ~70% of available  
fishing days**

**Median number of sets per  
fishing day, 4 - 5**

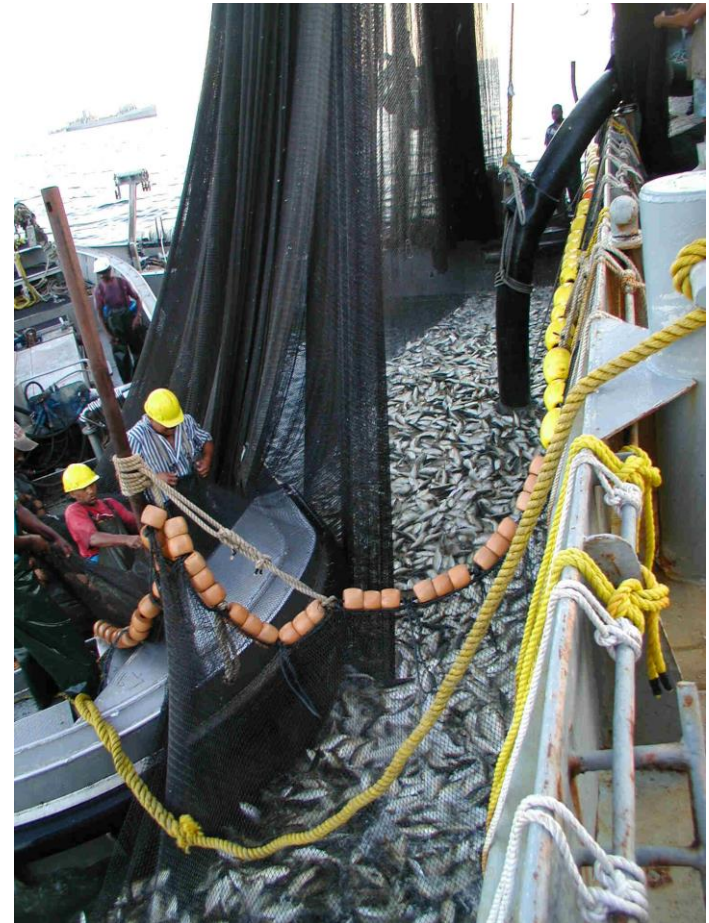
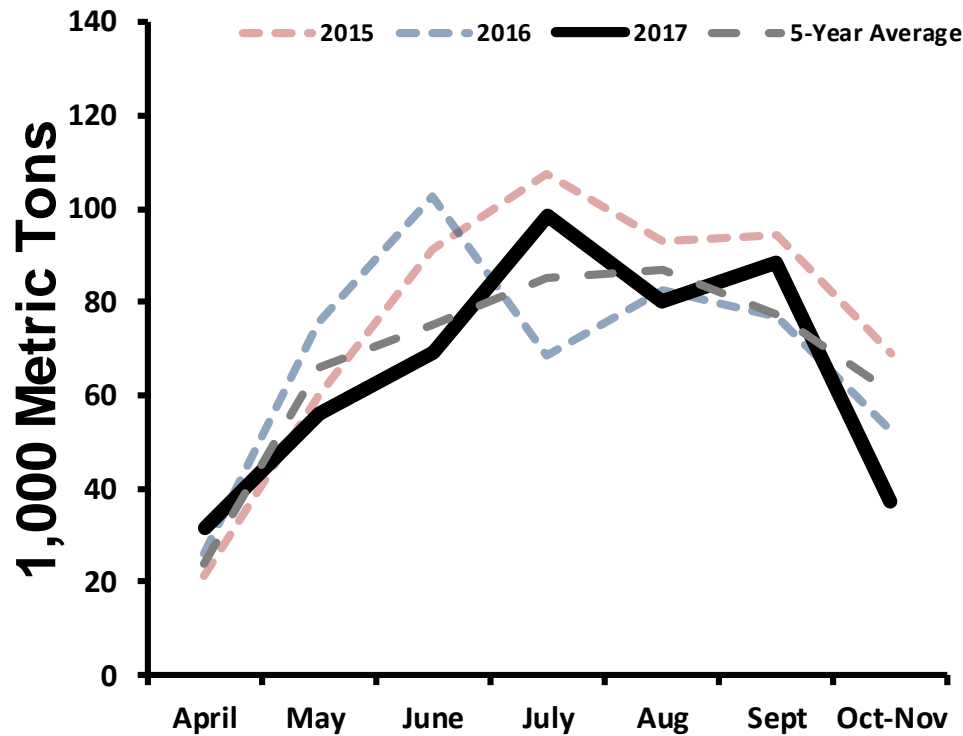
**Median catch per set 17 –  
22 metric tons**



**‘Webbing’ wings of net into the purse boats**

In past 20 years, ~84% of the landings occur in Louisiana,

In the last 5 years, >90%



Pumping catch aboard 'steamer'



## A “Nearshore” Fishery

Majority of sets within 3 miles (~5 km) of shore

**Spotter pilots report concentrations of fish to vessels**

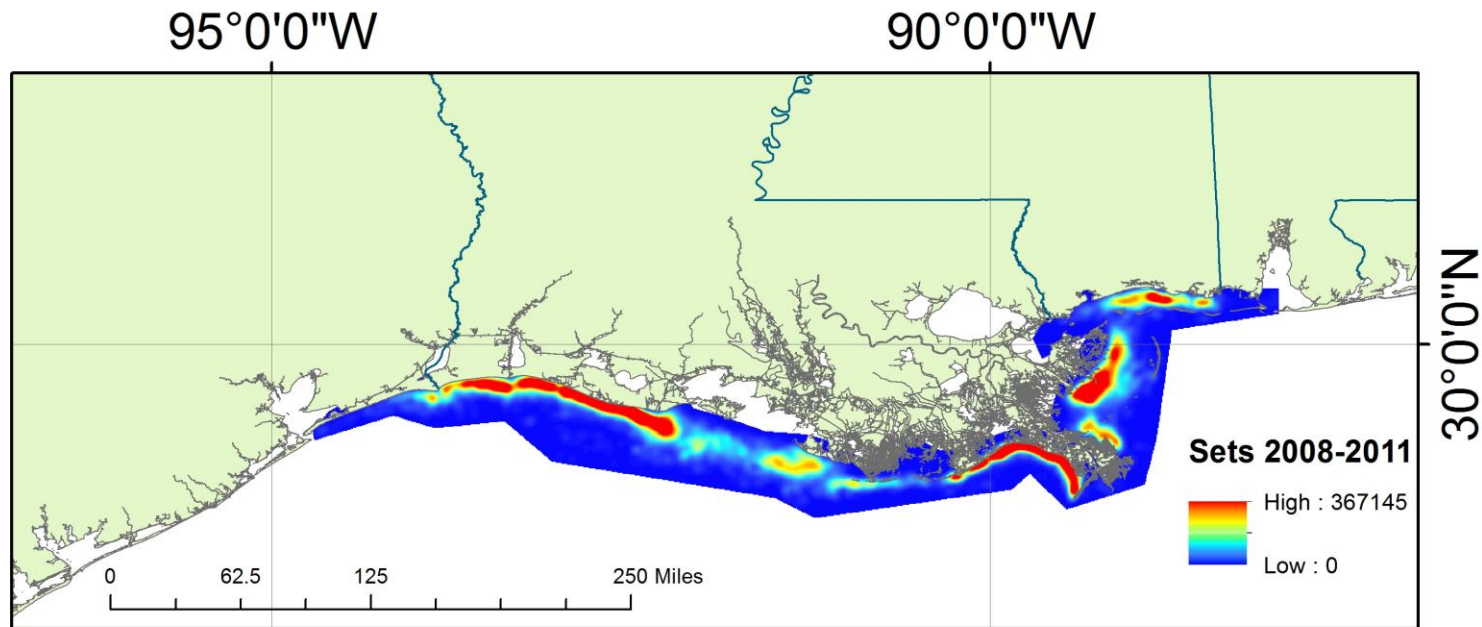
**Spotter pilots direct the setting of the net via radio**

**59% of catch harvested 0-3 miles from shore**

**96% of the catch harvested 0-10 miles from shore**

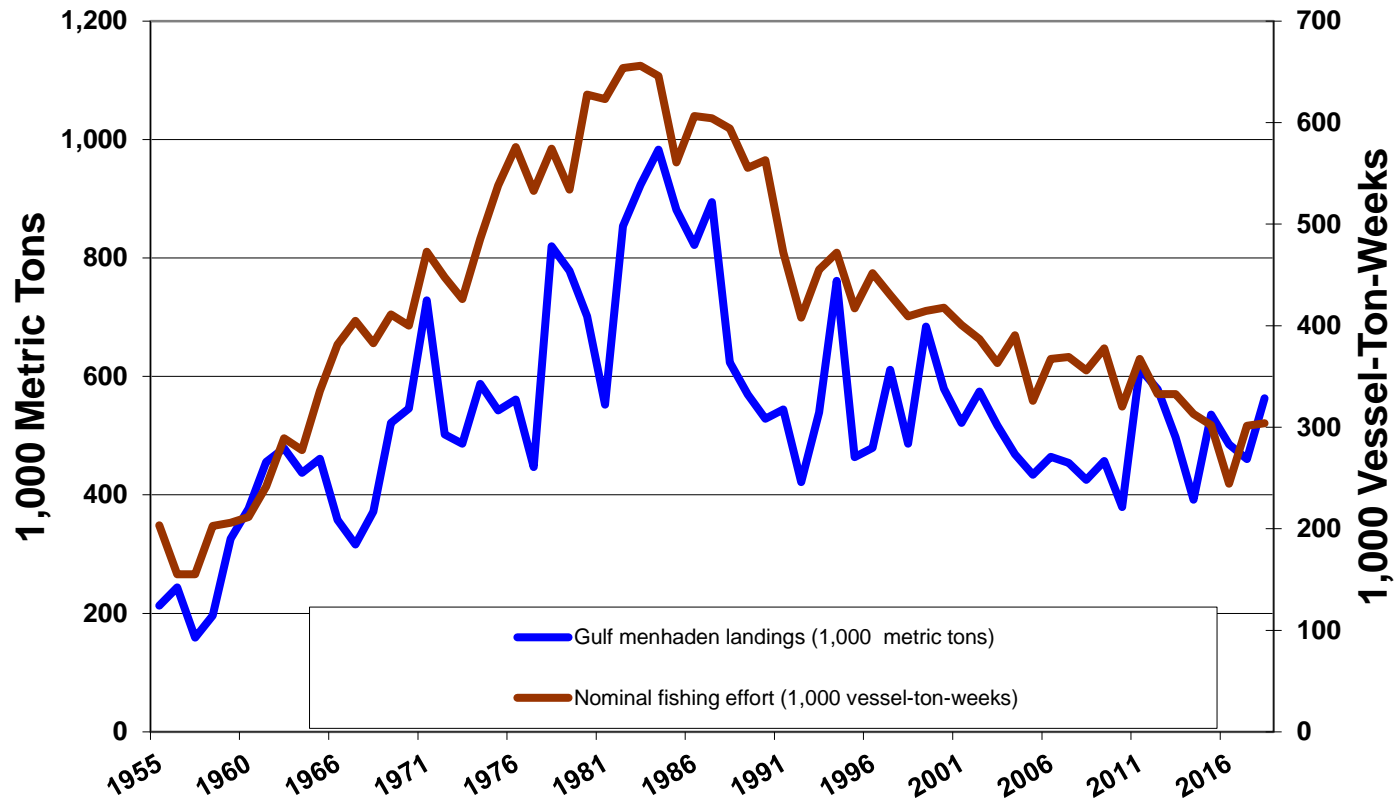






Density or “hot spot” plot of catches 2008, 2009, and 2011,  
excluding 2010 due to BP DWH

# Landings and Nominal or Observed Fishing Effort for the Reduction Purse-Seine Fishery



Vessel-ton-week is one vessel fishing at least one day of a given week multiplied by its net tonnage

# Time Line for the Fishery

## Late 1940s and 1950s: Beginnings

- After WWII, several established menhaden companies on the Atlantic coast move some or all of the operations to the US Gulf coast
- Number of fish factories grows from five in 1948 to ten in the late 1950s
- Number of vessels increases from ~40 in 1948 to ~73 by 1959
- Landings steadily improve to ~326,000 metric tons in 1959



## Time Line for the Fishery

### 1960s and 1970s: Expansion

- Number of plants grows to 13 in 1965
  - fleet size increases to 82 vessels
- Landings continue to improve
  - reach 728,500 t in 1971 and 820,000 t in 1978
- Many older wooden “steamers” retired; new larger steel vessels enter the fishery
- Factories modernize and expand their processing capacities





## Time Line for the Fishery

### 1980s: “Boom years”

- Landings exceed 800,000 t for six consecutive years, 1982-1987
  - peak landings for the fishery of **982,800 t** in 1984
  - 11 factories and 81 vessels in the fishery in 1984
  - several consecutive good year classes enter the fishery
- Commodity prices for fish meal and fish oil plummet ~1985
  - major consolidation within the fishery
- Down to 7-8 factories in the late 1980s and ~75 vessels



# Time Line for the Fishery

## 1990s: Consolidation

- Product prices improve, but consolidation within the fishery continues
  - 1990: nine factories and 75 vessels
  - 1991: seven factories and 58 vessels
  - 1999: five factories and 55 vessels
- Landings vary widely from 421,400 t in 1992 to 761,600 t in 1994



# Time Line for the Fishery

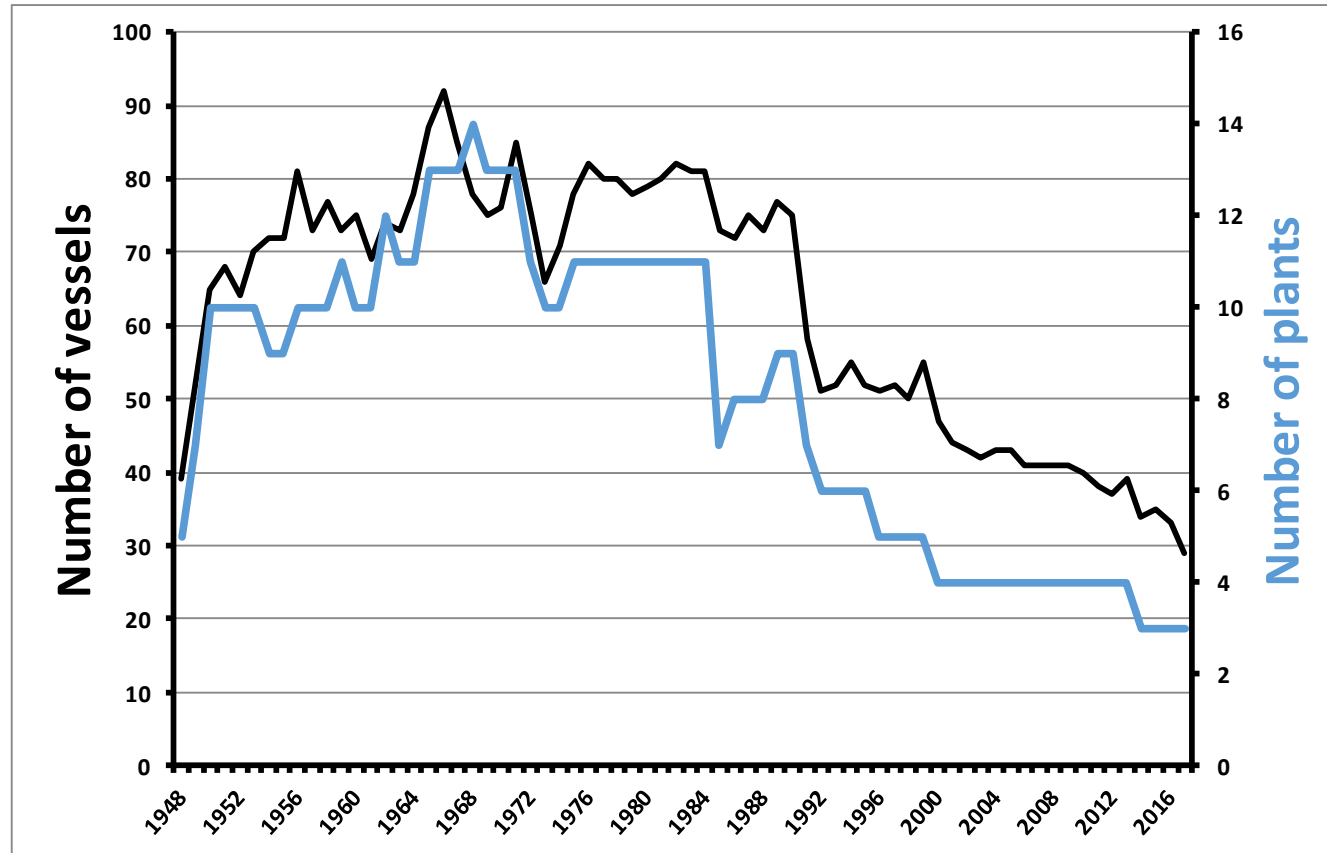
## 2000-2011: Current state of the fishery

- Worldwide commodity prices for fish meal and fish oil improve substantially
- Fishery reduces to four factories by 2000, but remains fairly stable with four factories and ~40 vessels through 2011
- Only two surviving companies
  - Omega Protein w/ three factories and Daybrook Fisheries w/ one factory
- Landings fairly stable; average ~ 490,700 t for the period
- Factories/vessels receive major damage from Hurricanes Katrina and Rita in 2005 and Hurricane Ike in 2008
- Major restrictions to fishing on traditional fishing grounds during summer 2010 because of BP DWH Disaster
- Landings rebound in 2011 to 613,300 t



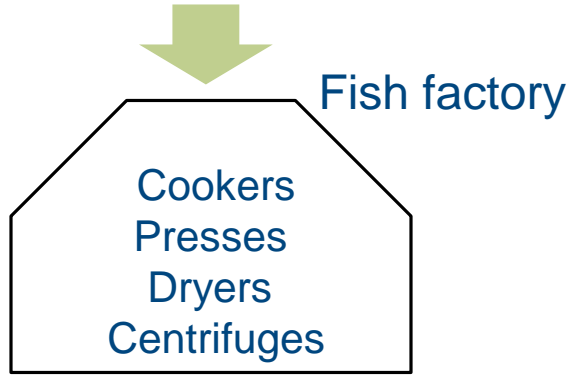


# Number of vessels and fish factories, 1948-2017





# Processed Products



Fish meal

Fish oil

Fish solubles

Poultry feed  
Swine feed

Aquaculture feed

Pet feeds

Feed ingredient

Edible oils  
(omega-3's)

Feed additive

Enriched meal



# Bait Purse-Seine Fishery off Louisiana and Florida Panhandle

## Catch used mostly as bait for blue crab and crawfish fisheries



In Louisiana, two older and “moth-balled” reduction steamers used to purse seine for gulf menhaden for bait starting in the late 1980s

- bait company at Cameron, LA, closed in ~2000
- bait company at Morgan City, LA, closed in 2007
- occasionally unloaded at nearby menhaden factories if fish were too small for bait markets

In Florida, significant purse-seine bait fisheries off the Panhandle curtailed after the Florida Net Ban of 1995



- Historically, majority of gulf menhaden landings for bait came from Louisiana and Florida
- Bait landings only about 1-2% of total gulf menhaden landings





