

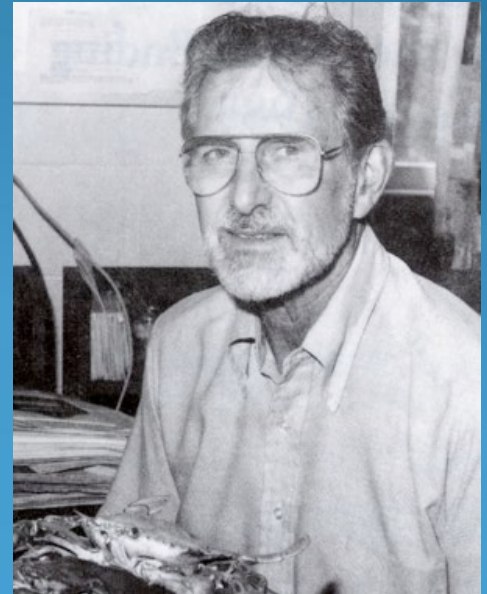
# *Climate-related Hydrology and Juvenile Population Abundances*



*Harriet Perry, Lillian Collins, and  
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# What Drives Blue Crab Populations ?

In the beginning  
there was  
Van.....and the  
word was climate !



# Review of Population Drivers GOM

Eugene Turner 1970s/80s, Joan Browder 1989

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- Production linked to wetlands in northern Gulf of Mexico
- Marsh loss to subsidence and erosion critical problem...productivity maintained because of “edge effect”. This level of productivity not sustainable in the long-term.

# Population Drivers GOM

Livingston (1976), Heck and Coen (1995), Rackosinski et al. (1999)

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Early studies emphasized importance of temperature and salinity;  
1950's Van's "Crabs and Climate" ....heating/cooling degree days

1970s - Recognized the importance of biotic factors in structuring population levels of blue crabs; influence of salinity thought to be operating extrinsically by structuring the surrounding biotic community.

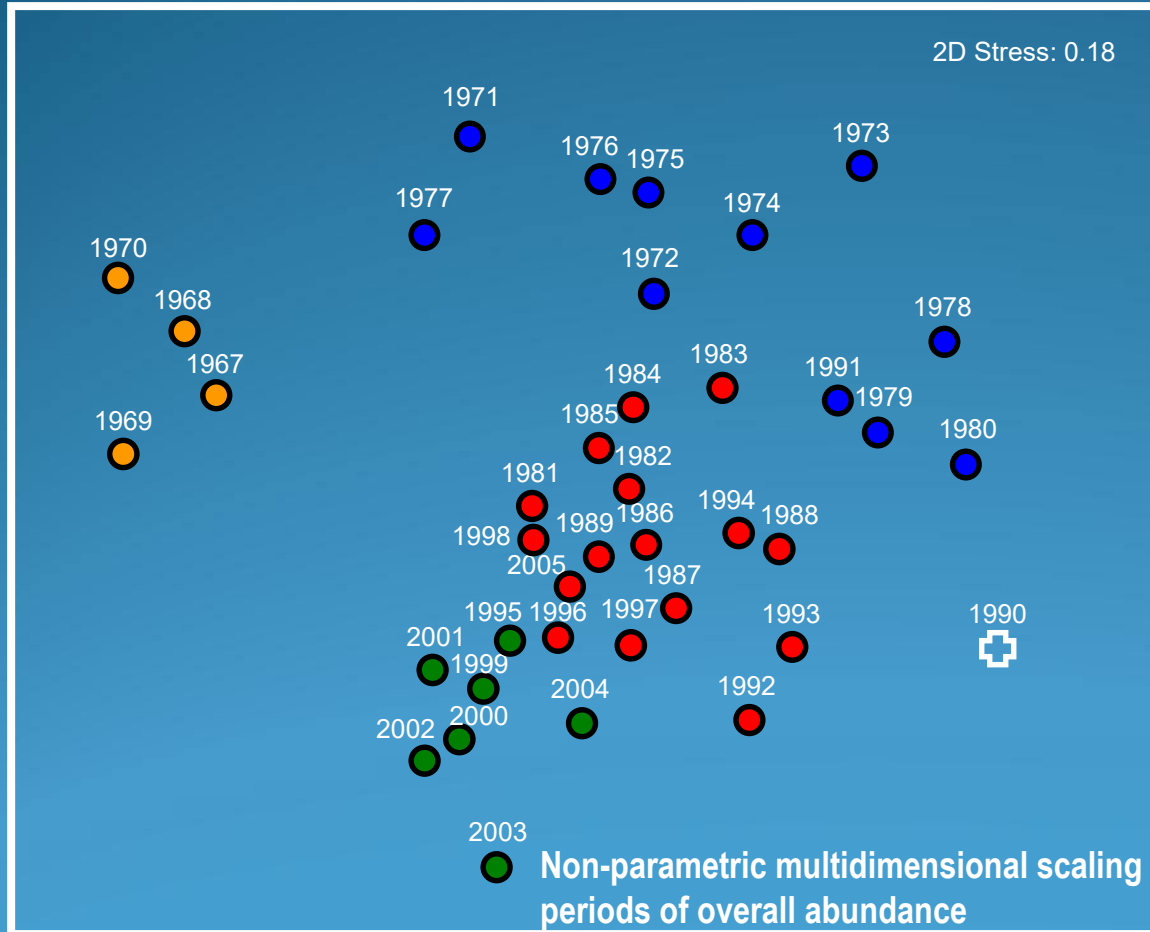
1995 - identified predation as a major source of natural mortality in juveniles; noted presence of a large and diverse suite of predators, few predation-free refuges, and year round predation activity.

2000s - Factors that increase or decrease refuge availability/suitability now known to be important regulators of abundance and include predator-prey interactions

# Population Drivers GOM

Sanchez-Rubio et al. (2011)

2011 - Linked juvenile blue crab abundances in Louisiana and Mississippi to global climate regimes and their influence on GOM hydrology



Years of like abundance were, with two exceptions, sequential

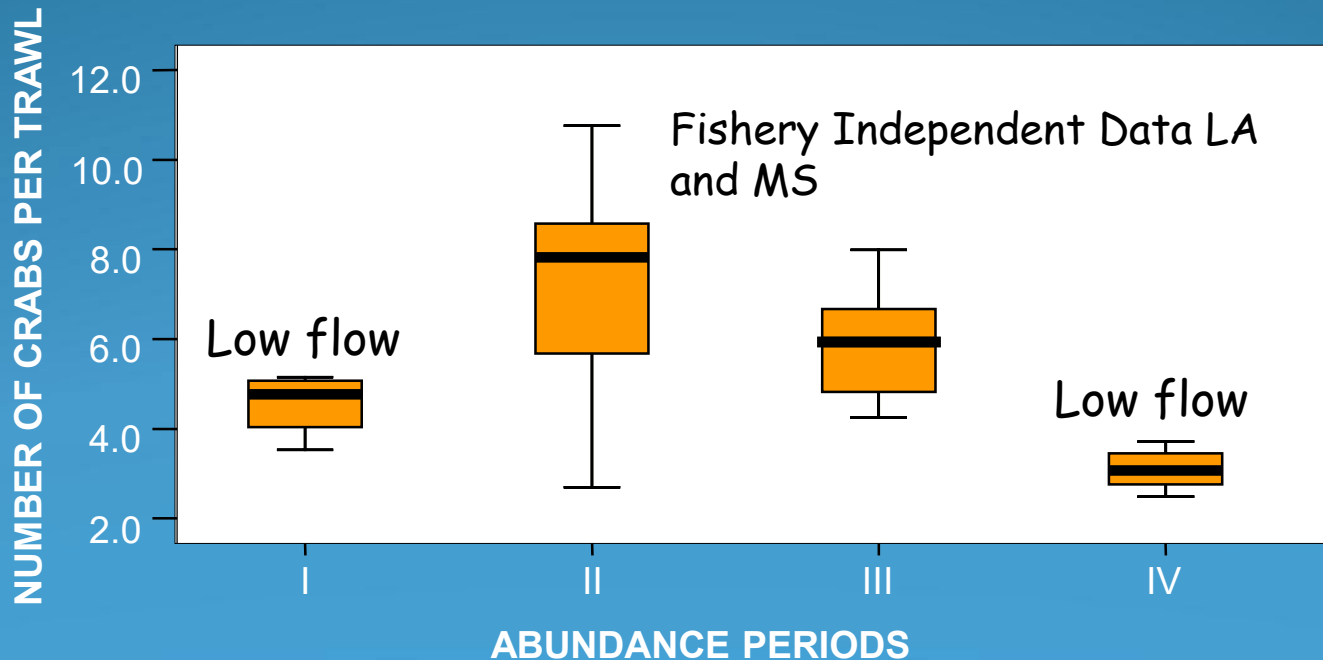
● Period I    ● Period II    ● Period III    ● Period IV

Pairwise ANOSIM Test:  $R > 0.57$

# Population Drivers GOM

Sanchez-Rubio et al. (2011)

Louisiana drives the fishery economically and biologically; Mississippi and Atchafalaya riverflows heavily influenced by decadal/multi-decadal global climate regimes; high flow years associated with elevated catches of juvenile blue crabs in the northern GOM.



# River Discharge Linked to Blue Crab Abundance in Texas, Louisiana, and Florida

More (1969), Guillory (2000), Wilbur (1992, 1994)

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Four rivers are responsible for 90% of the freshwater discharge into the northcentral GOM: Atchafalaya, Mississippi, Pearl, Pascagoula. Hydrology in the northcentral GOM responds to decadal/multi-decadal climate regimes imposed by Atlantic oscillations (AMO, NAO).

Rivers with basins located entirely within the coastal area respond strongly to inter-annual climate conditions driven by the Equatorial Pacific Oscillation, ENSO (El Nino, La Nina).

Eastern and western regions ENSO events influential.



# Freshwater Inflow Critical Driver of Blue Crab Populations

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## High River Flow and Low Salinities

### Reduce Predation

Decrease predator diversity and numbers:  
more stenohaline predators driven from  
estuary

### Enhance habitat availability/suitability

Increase areal extent low salinity un-  
vegetated habitats

Increase the areal extent marsh-edge  
habitats