MONITORING UPDATES:
Water Quality
Summer Temperatures
Clam Health

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Water Quality Monitoring
Decision Support Tool for Clam Producers

- Collaborative project
  - University of Florida
  - FL Department of Agriculture and Consumer Services
- Partnership with USDA
  - Risk Management Agency
  - Funding renewed for 2010-12
- Allows for continued operation of remote sensing technologies in open-water clam farming

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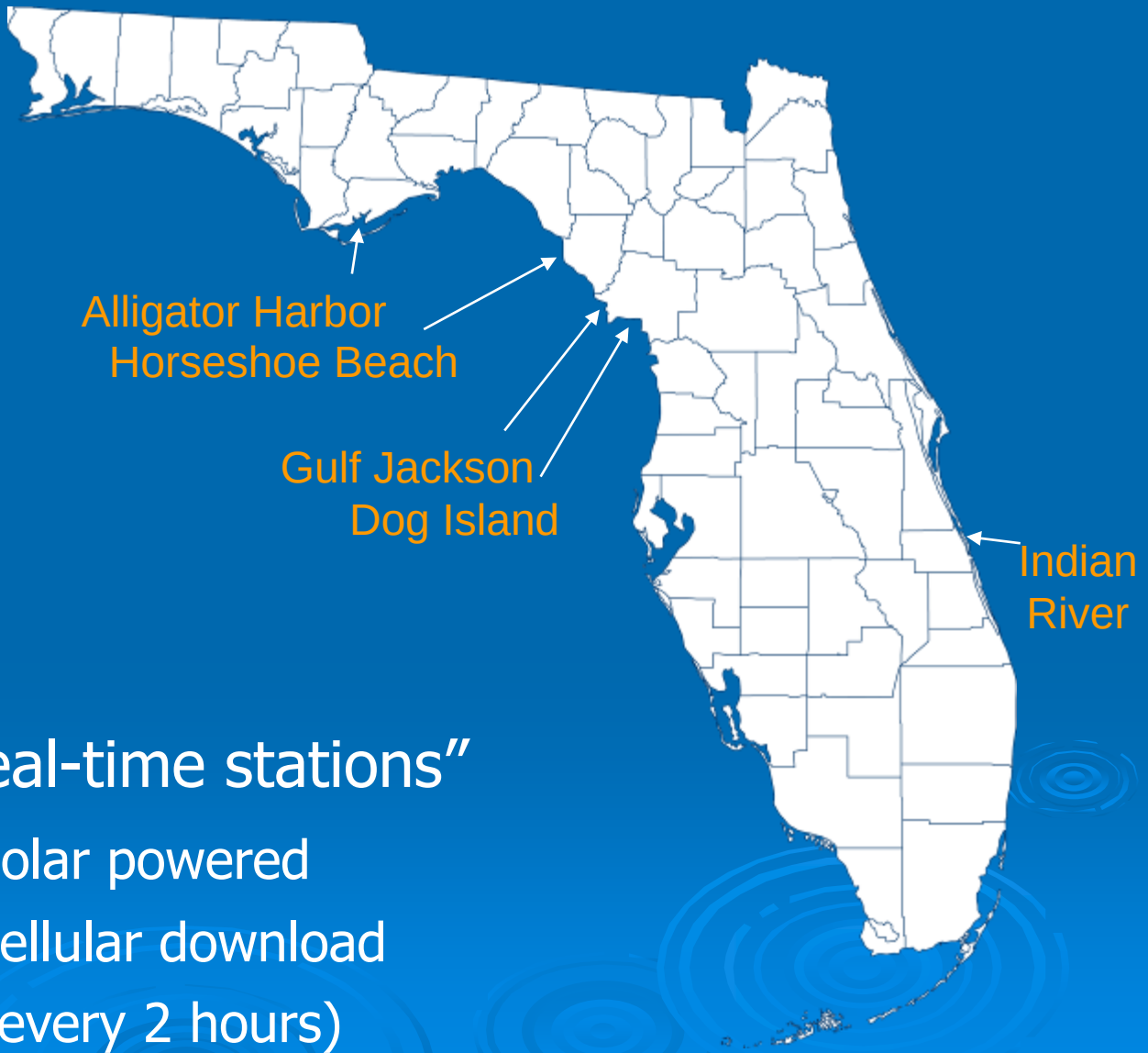
FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES DIVISION OF AQUACULTURE

USDA

Monitoring Equipment

- Campbell Scientific Weather Stations
- YSI, Inc. Sondes 6600
- Continuous recording (every 30 minutes)
  - Water temperature
  - Salinity
  - Dissolved oxygen
  - Turbidity and depth
  - Air temperature
  - Wind speed and direction

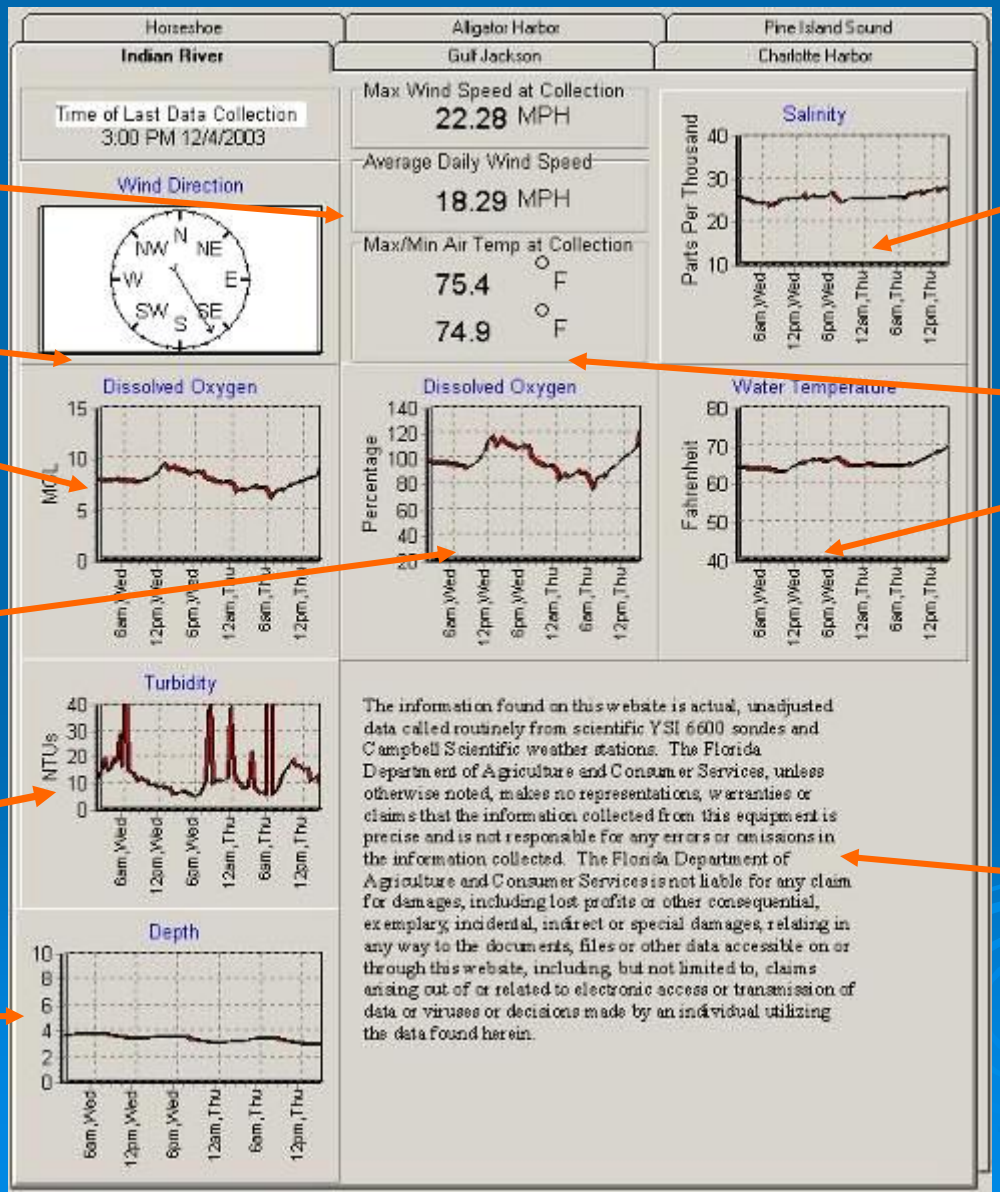
Station Locations



- "Real-time stations"
  - Solar powered
  - Cellular download (every 2 hours)

Uncorrected real-time data posted immediately

www.FloridaAquaculture.com



Wind speed

Wind direction

Dissolved O_2 (mg/L)

% Dissolved O_2

Turbidity (NTUs)

Depth (feet)

Salinity (ppt)

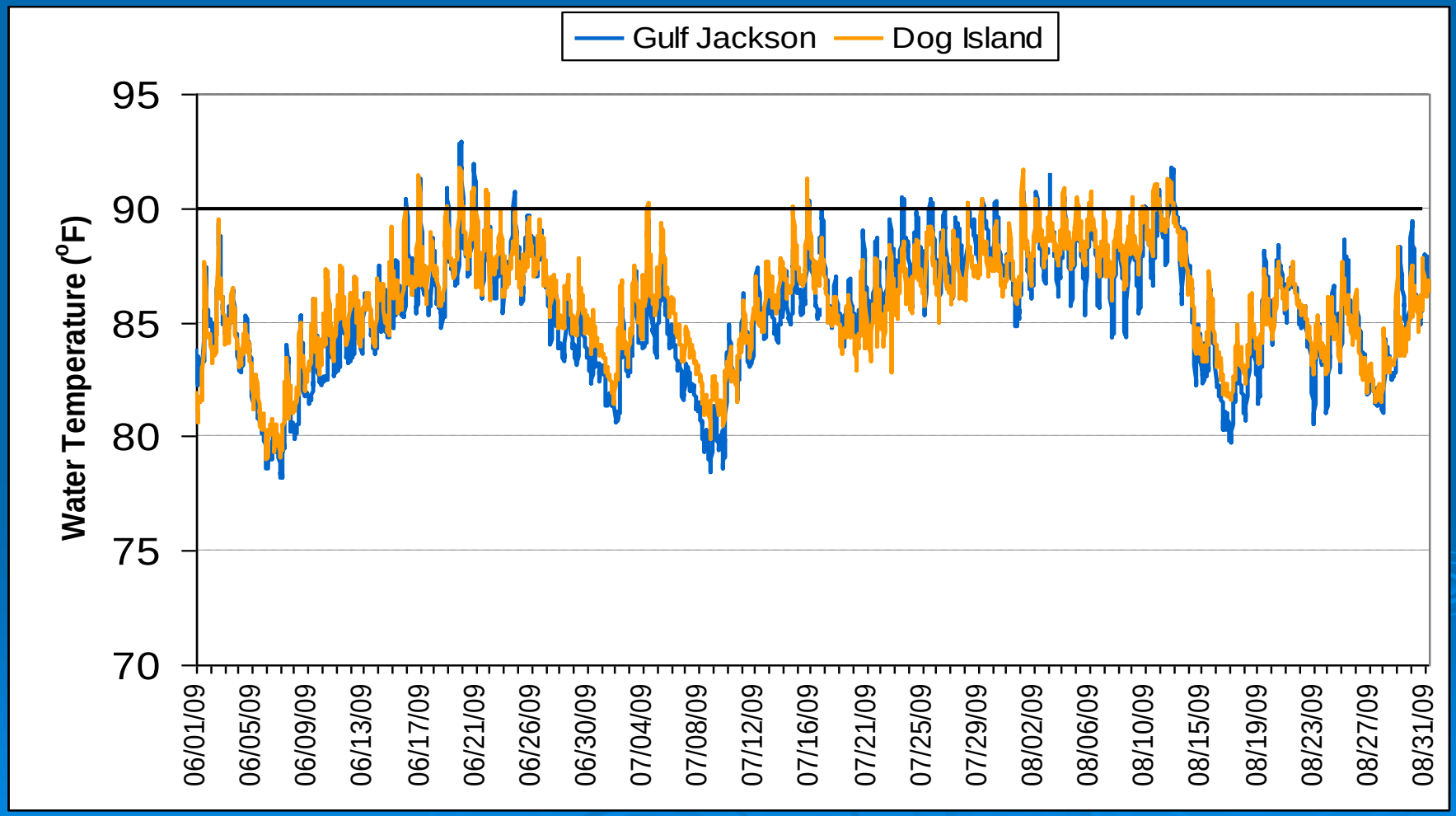
Air temperature

Water temperature (°F)

Disclaimer

Continuous water quality database

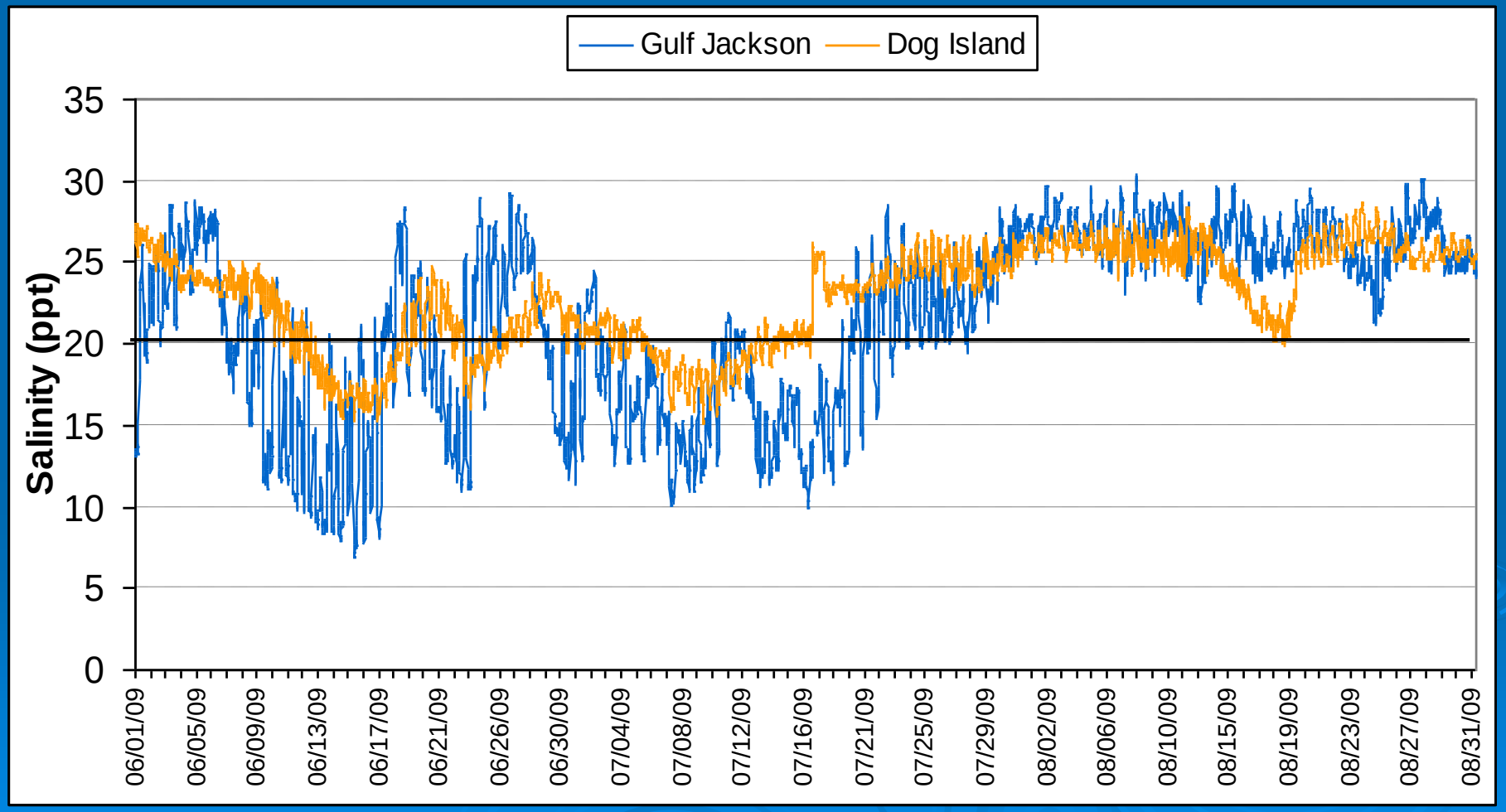
- Archived data provided in “farmer friendly” monthly and annual graphs
  - Details of temporal variability revealed



Gulf Jackson and Dog Island Lease Areas (Levy County)
June - August 2009

Continuous water quality database

- Trends in environmental conditions in relation to clam production emerging
- Long-term data set is being developed

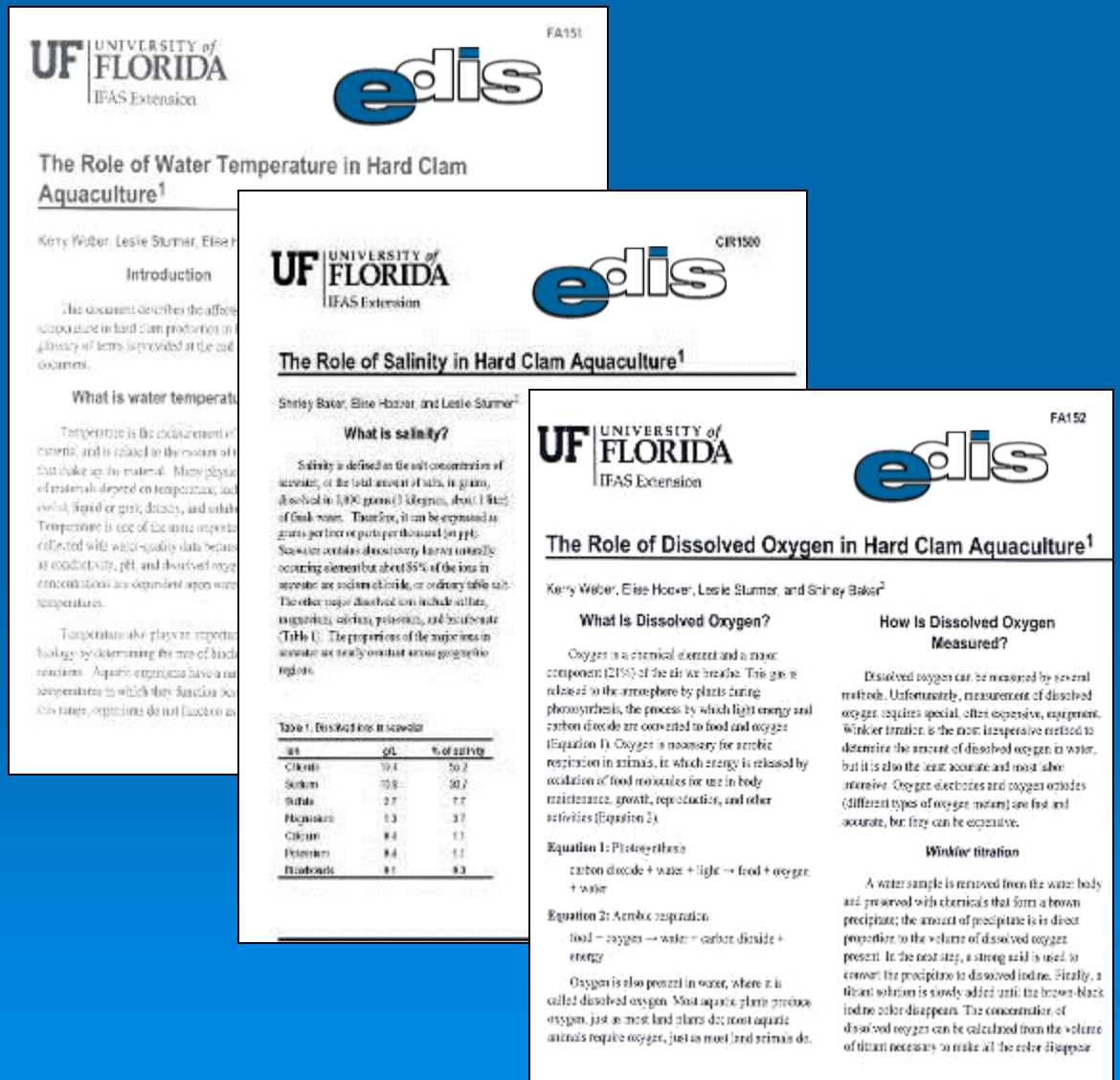


Gulf Jackson and Dog Island Lease Areas (Levy County)
June - August 2009

Water quality fact sheets

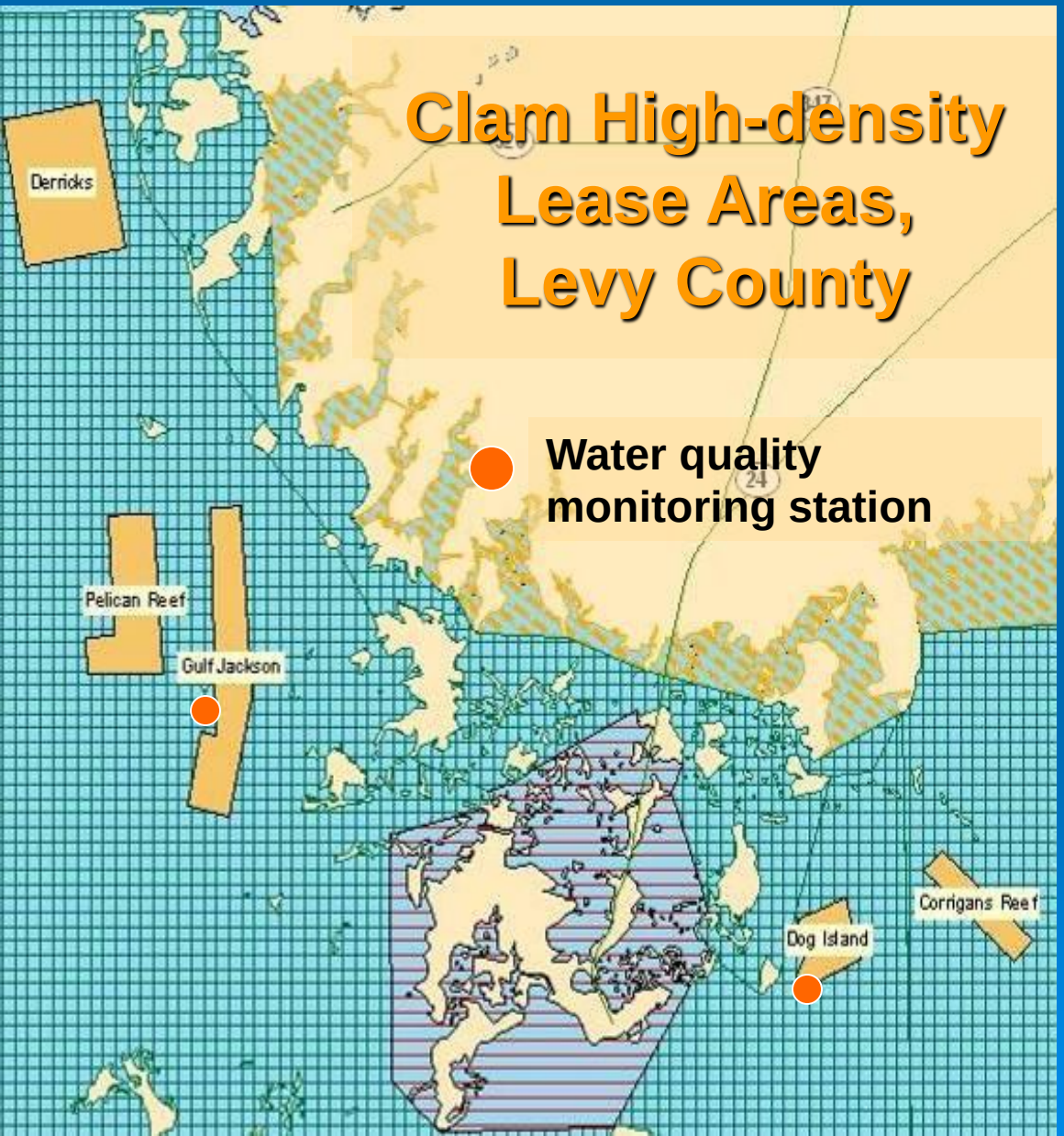
available at website: **http://edis.ifas.ufl.edu**

FA151, FA152, CIR1500



- How measured
- Why variable
- How affects clam physiology
- What are signs of stress
- How affects clams
- How to manage crop in response to
  - Water temperature
  - Salinity
  - Dissolved oxygen

Water Temperature Monitoring



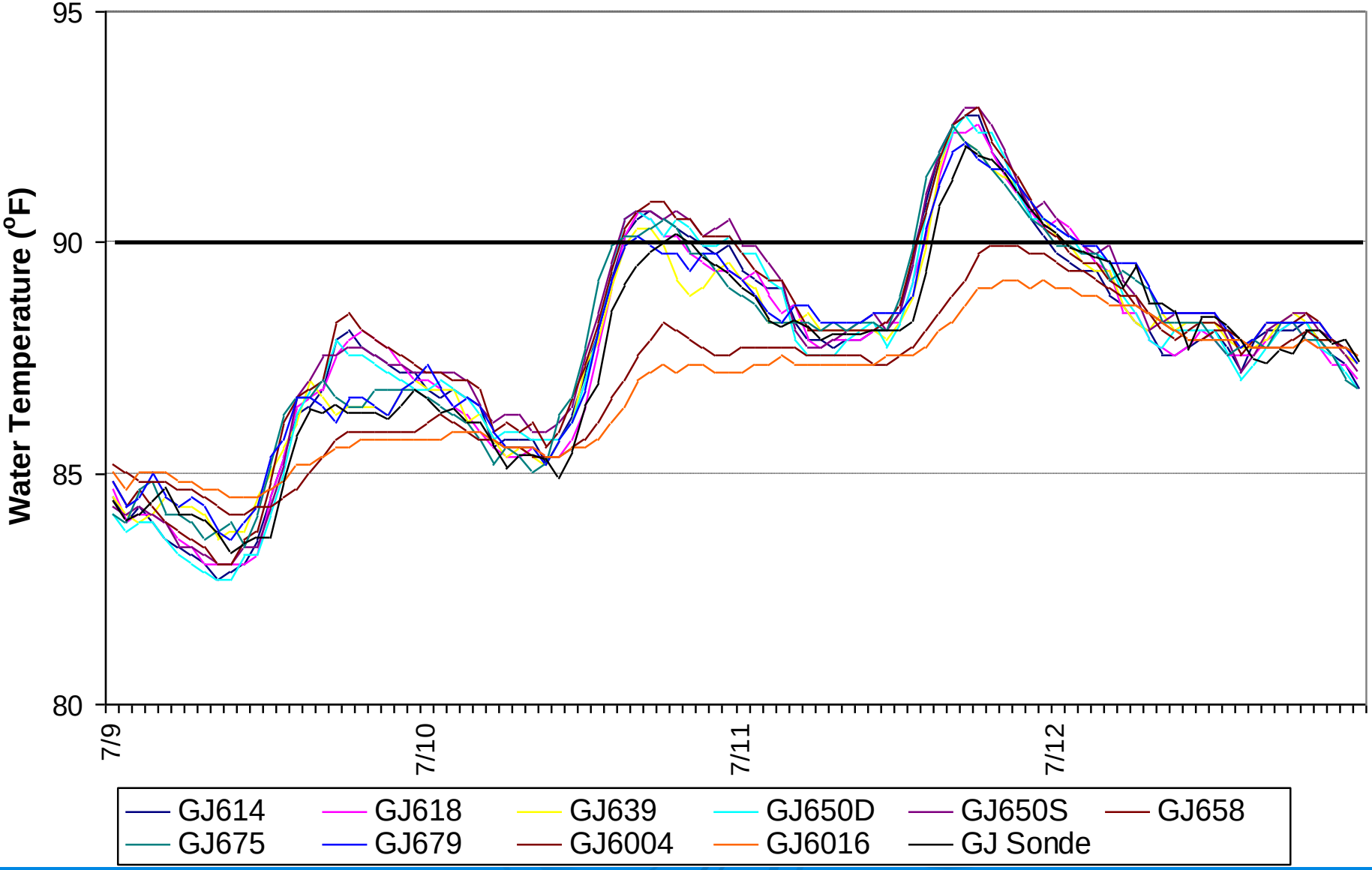
- Need to better understand water temperature during summer months and their affect on clam production
- Inexpensive data loggers distributed to participating growers provides detailed and broad coverage

Water Temperature Monitoring

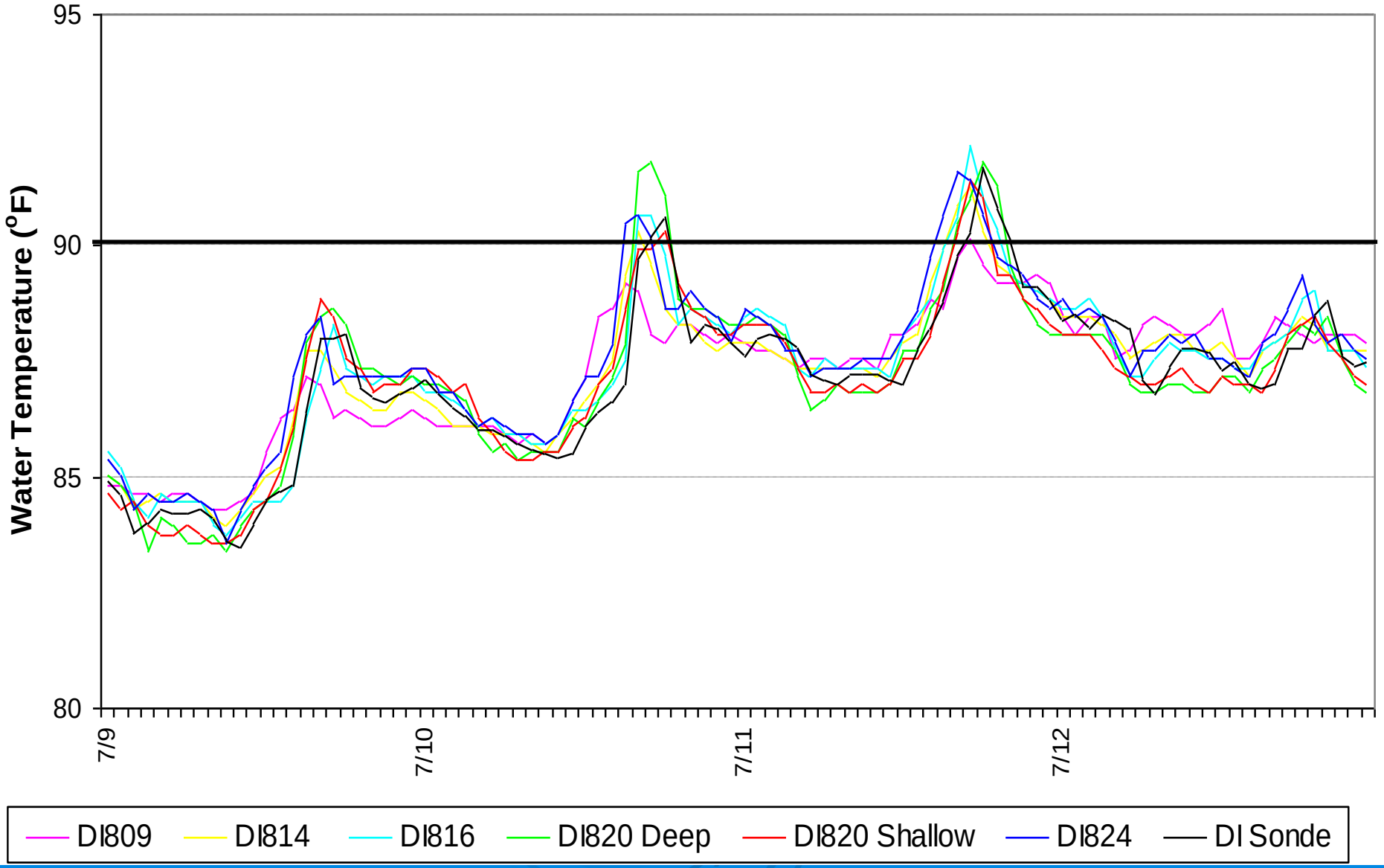
- Deployed by growers inside bags
  - 17 leases in 2007, 8% coverage
  - 29 leases in 2008, 14% coverage
- Beginning to adequately describe temperature variability within and among high-density lease areas
  - Water depth
  - Bottom configuration
  - Substrate characteristics
  - Tidal and wind current
  - Other parameters
- Develop site-specific planting and harvesting strategies

HOBO® Pendant Temperature Data Logger (2.3 x 1.3 x 0.9 inches)

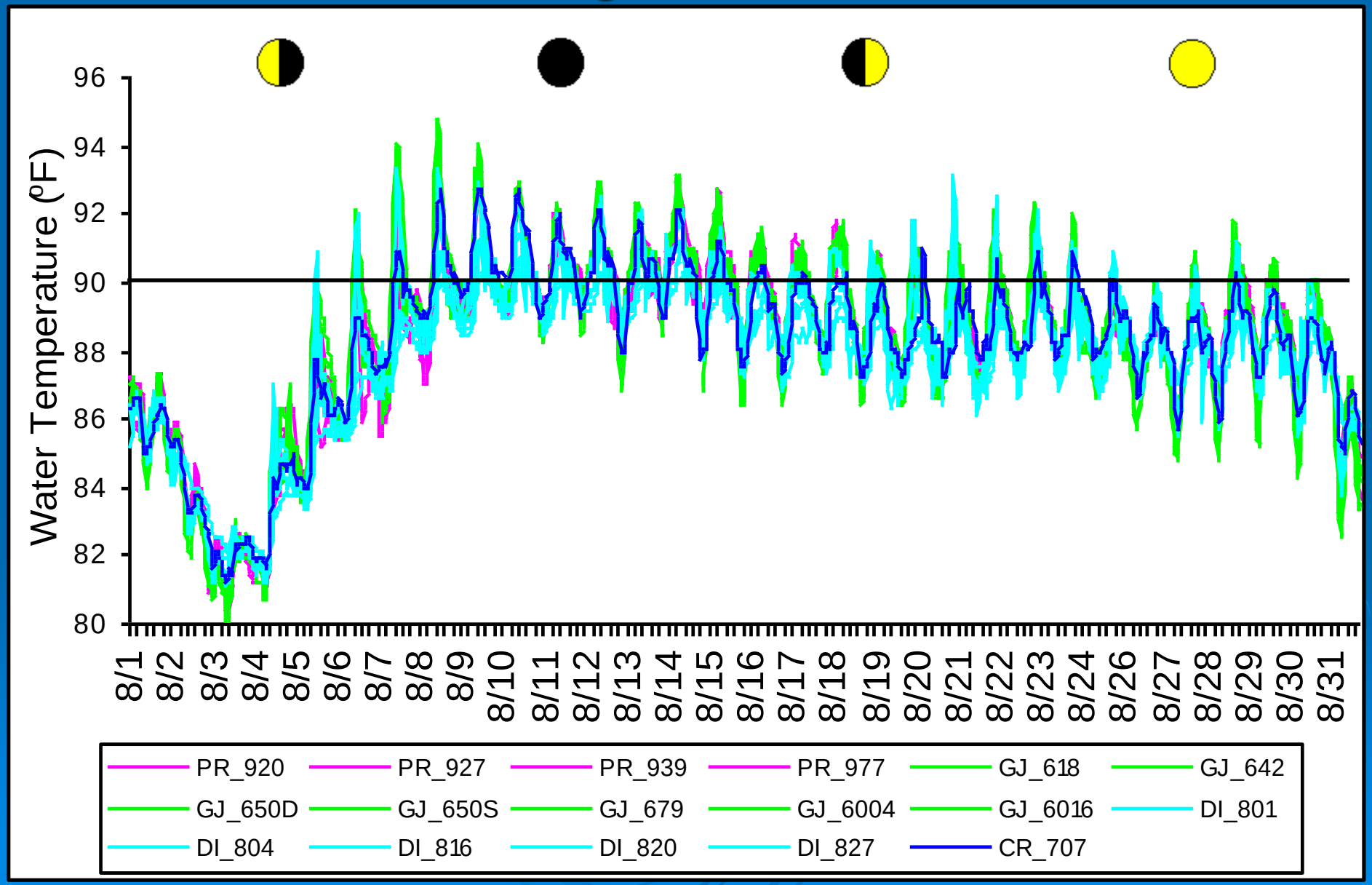
Gulf Jackson, Cedar Key Leases (n=11)
July 9-13, 2008



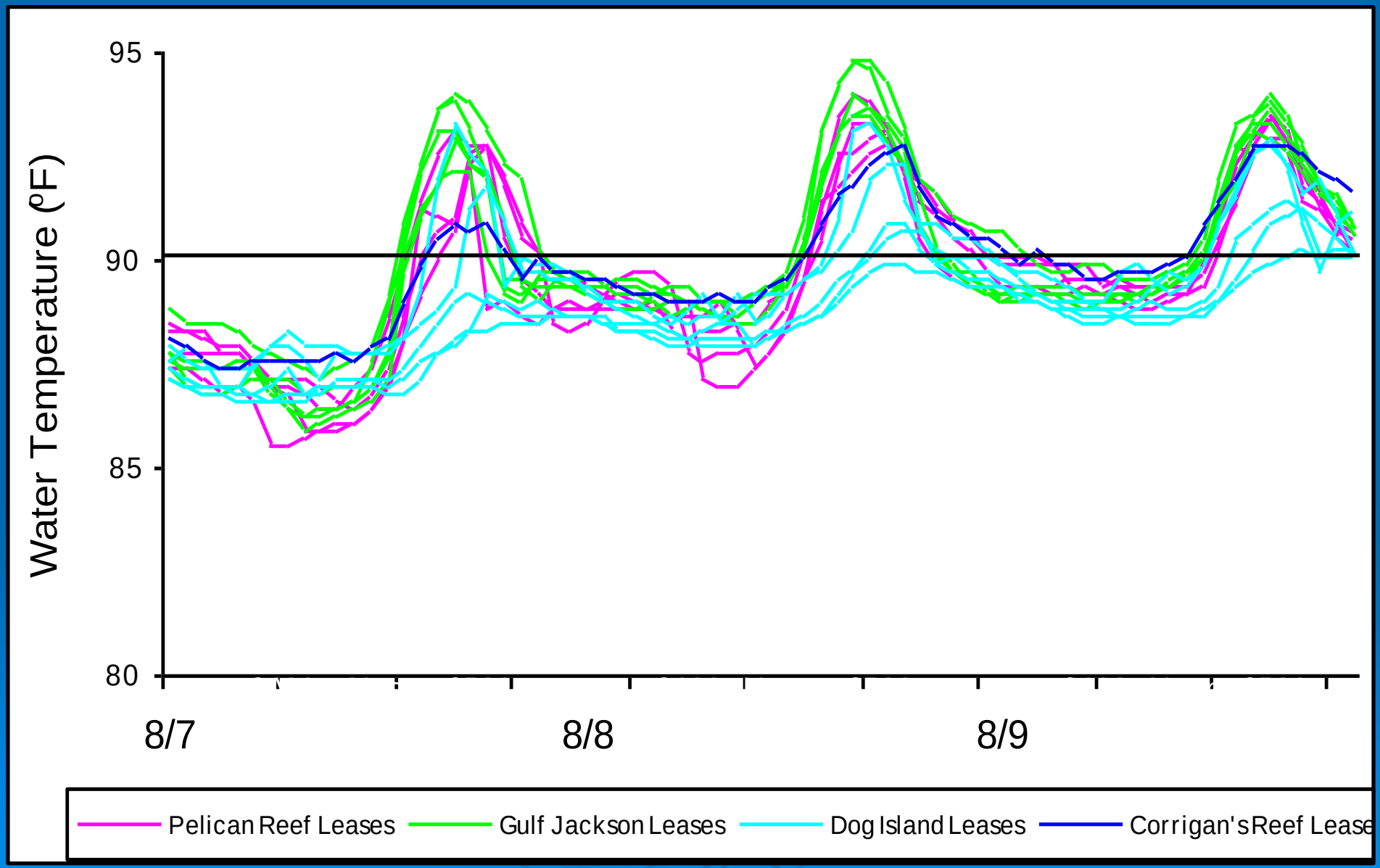
Dog Island, Cedar Key Leases (n=6)
July 9-13, 2008



Cedar Key Leases (n=17)
August 2007



Cedar Key Leases (n=17)
August 7-9, 2007



What's going on in 2009-10?

- 39 data loggers deployed in 2009
- Temperature monitoring from May through October 2009 – RETURN LOGGERS SOON
- Chlorophyll mapping at selected leases in 2010
  - Provide indication of food quantity
- Hydrogen sulfide monitoring at selected leases in 2010
  - Provide indication of sediment quality

Clam Health Monitoring

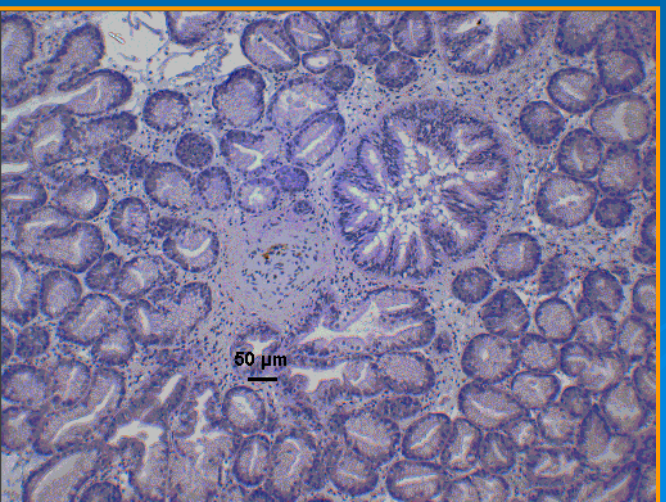
- Program initiated in 2007-8 to examine harvest-size clams during summer at Cedar Key lease areas
- In 2009 samples submitted to UF FAS Diagnostic Lab in response to specific events in June and September
  - Clams examined for obvious lesions
  - Gill biopsy examined under light microscope
  - Two sections of body prepared for routine histologic slides

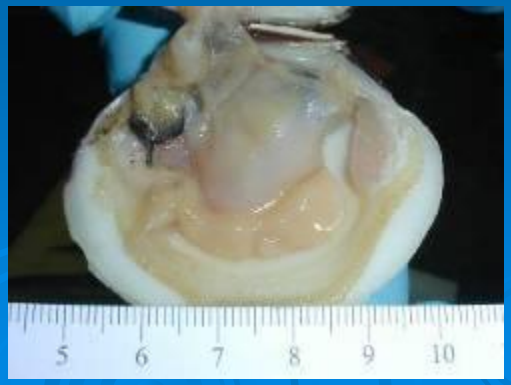
Dr. Denise Petty, DVM

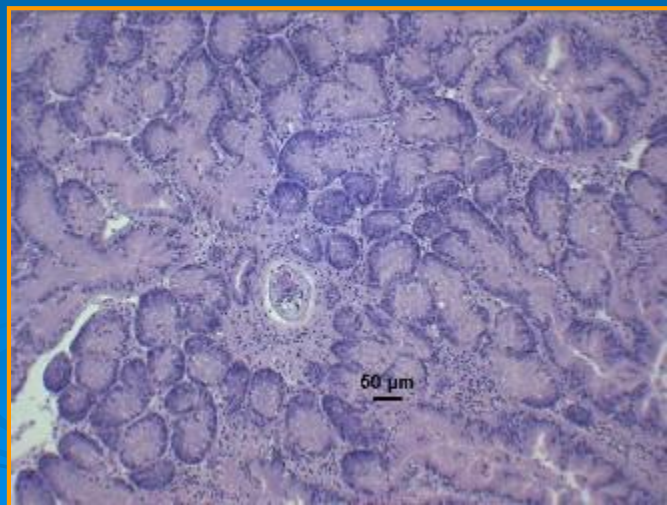
Health Results

- Copepods observed within mantle cavity
- Gill biopsies – within normal limits
- Histologic results still pending
- So far, no pathogens observed, i.e., QPX
- No problems observed in market size clams examined
- Baseline established

Leptinogaster major

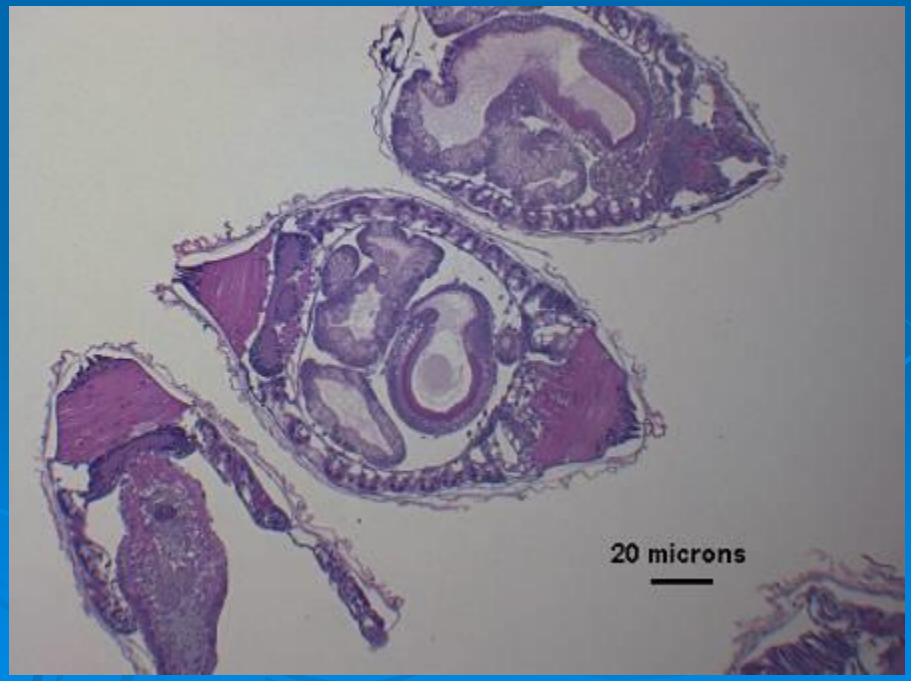






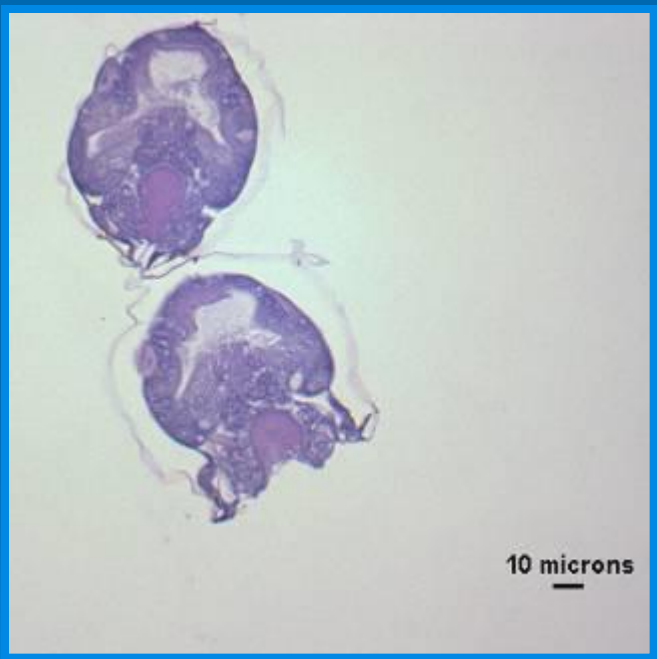
Clam Seed Health

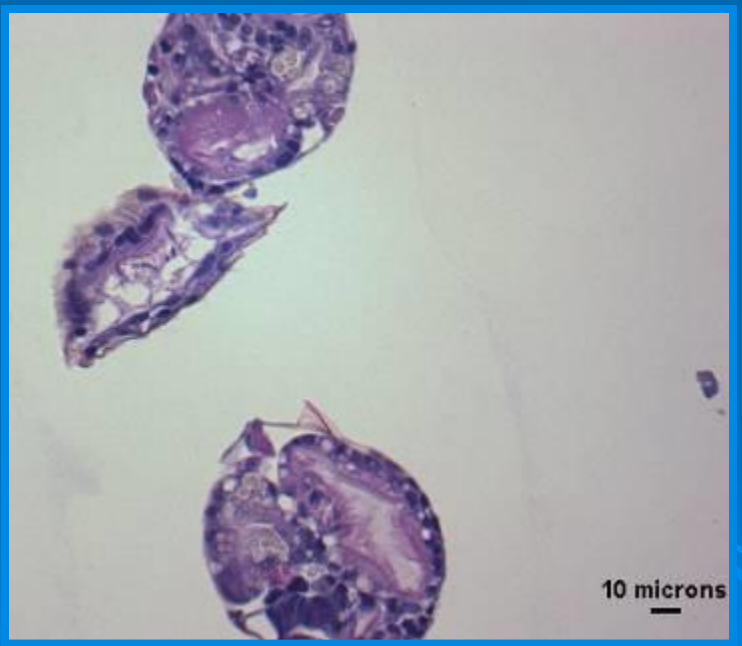
- Program initiated in 2007-8 to visit Florida hatcheries
- In fall of 2008 “hands-on” laboratory sessions conducted
- Hatchery personnel instructed in
  - Bacterial cultures of algal stocks and seed clams
  - Normal anatomy of seed clams
  - Water quality monitoring
- In 2009 specimens voluntarily submitted for histologic examination and bacterial culture
  - Broodstock
  - Larvae and Seed
  - Algal cultures
  - Source water



Hatchery Results

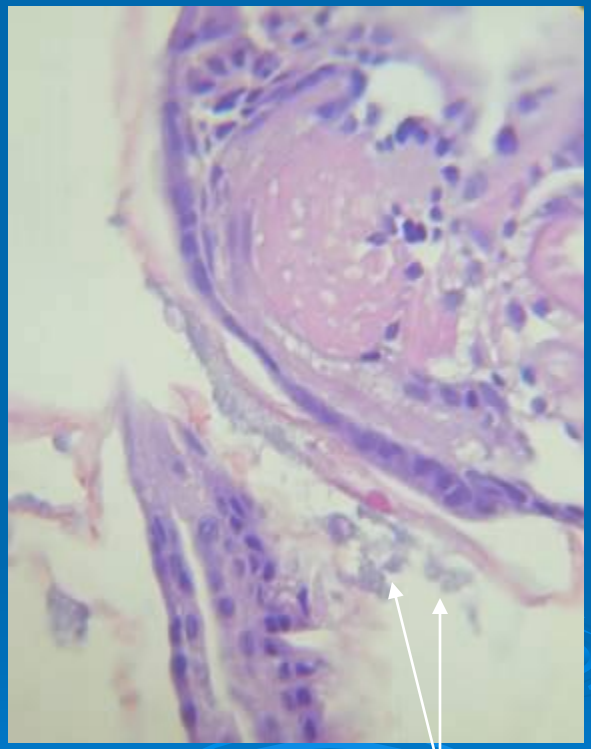
- Most common issue, if any:
  - Bacterial infections of larvae
  - Bacterial and/or ciliate contamination of algal cultures





Diagnostic Testing

- Testing includes:
  - Water quality parameter analysis
  - Bacterial cultures of algal stocks, water, and larvae
  - Histology of larvae and adult stocks
  - Identification of phytoplankton (Susan Badylak or Mary Cichra)

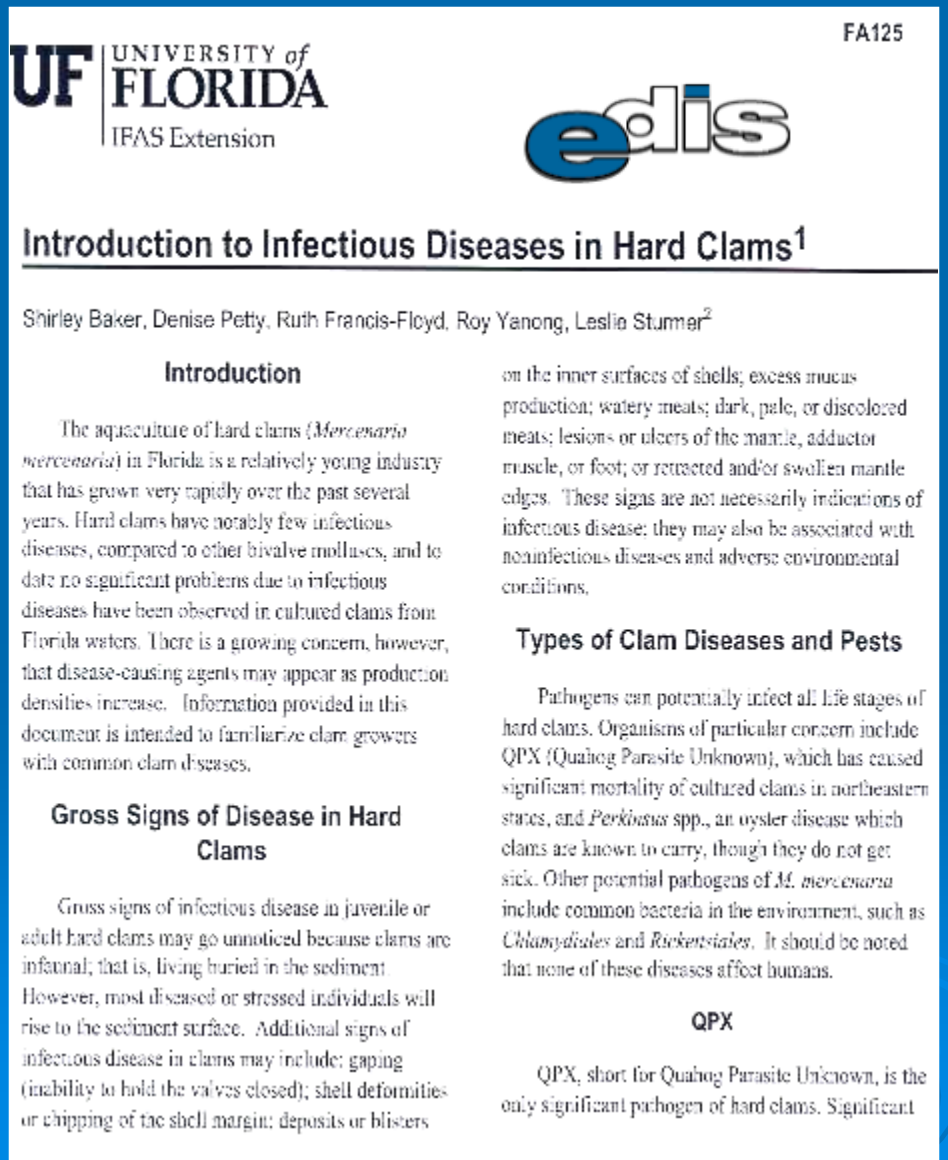


Act quickly when mortalities occur!

- Animals should be collected for diagnostic testing as soon as mortality is observed. Timing is critical!
  - The primary problem may resolve before a sample of animals is collected. Often, these animals are the survivors and tests will be negative.
  - Many larvae are required to run a variety of tests; be generous.

Clam health fact sheet

available at **http://edis.ifas.ufl.edu**, FA125



FA125

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edis

Introduction to Infectious Diseases in Hard Clams[1]

Shirley Baker, Denise Petty, Ruth Francis-Floyd, Roy Yanong, Leslie Sturmer[2]

Introduction

The aquaculture of hard clams (*Mercenaria mercenaria*) in Florida is a relatively young industry that has grown very rapidly over the past several years. Hard clams have notably few infectious diseases, compared to other bivalve molluscs, and to date no significant problems due to infectious diseases have been observed in cultured clams from Florida waters. There is a growing concern, however, that disease-causing agents may appear as production densities increase. Information provided in this document is intended to familiarize clam growers with common clam diseases.

Gross Signs of Disease in Hard Clams

Gross signs of infectious disease in juvenile or adult hard clams may go unnoticed because clams are infaunal; that is, living buried in the sediment. However, most diseased or stressed individuals will rise to the sediment surface. Additional signs of infectious disease in clams may include: gaping (inability to hold the valves closed); shell deformities or chipping of the shell margin; deposits or blisters on the inner surfaces of shells; excess mucus production; watery meats; dark, pale, or discolored meats; lesions or ulcers of the mantle, adductor muscle, or foot; or retracted and/or swollen mantle edges. These signs are not necessarily indications of infectious disease; they may also be associated with noninfectious diseases and adverse environmental conditions.

Types of Clam Diseases and Pests

Pathogens can potentially infect all life stages of hard clams. Organisms of particular concern include QPX (Quahog Parasite Unknown), which has caused significant mortality of cultured clams in northeastern states, and *Perkinsus* spp., an oyster disease which clams are known to carry, though they do not get sick. Other potential pathogens of *M. mercenaria* include common bacteria in the environment, such as *Chlamydiales* and *Rickettsiales*. It should be noted that none of these diseases affect humans.

QPX

QPX, short for Quahog Parasite Unknown, is the only significant pathogen of hard clams. Significant

- Gross signs of disease in clams
- Types of clam diseases and pests
  - QPX, a"slime-net" protist
  - *Perkinsus* spp. (Dermo)
  - Chlamydiales
  - Rickettsiales
  - Pest metazoans
  - Granulomas
- Significance in Florida