

Application of Triploidy to an Emergent Oyster Culture Industry on Florida's Gulf Coast: Results of Growers' Trials

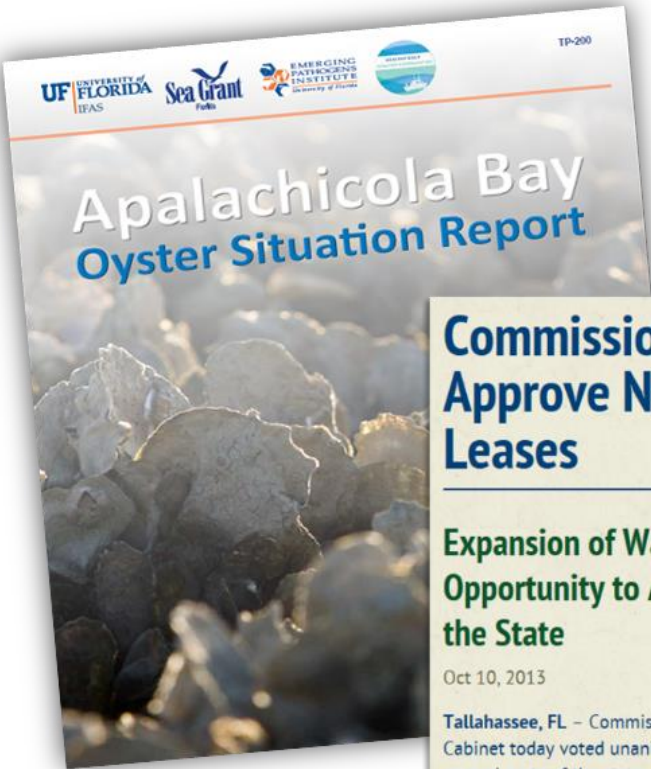
Leslie Sturmer, Carter Cyr and
Reggie Markham

University of Florida / IFAS
Shellfish Aquaculture Extension
Cedar Key, FL

UF | IFAS
UNIVERSITY of FLORIDA

Sea Grant
Florida





Oyster Culture on Florida's Gulf Coast: An Emergent Industry

Commissioner Putnam, Cabinet Approve New Aquaculture Leases

Expansion of Water Column Leases Brings Opportunity to Apalachicola Bay, Other Areas of the State

Oct 10, 2013

Tallahassee, FL – Commissioner of Agriculture Adam H. Putnam and the Florida Cabinet today voted unanimously to approve additional aquaculture leases in several parts of the state, primarily in Apalachicola Bay.

ed substantially in
cultivating oysters in
the most nutrient-rich
low-out time and



RATIONAL

- Fishery failure in Apalachicola Bay, 2012
- Water column leases approved, 2013
- Local community college certification program, 2014
- Infrastructure provided by hard clam aquaculture industry

Application of Triploidy to an Emergent Oyster Culture Industry on Florida's Gulf Coast

Demonstration project to evaluate an oyster breeding process under local conditions



OBJECTIVES were two-fold:

- 1) Document production performance, assess health, and evaluate quality of diploid (2N) and triploid (3N) oysters
- 2) Quantify effects of different culture methods and seasonal harvests

Funded by:



2015-18

GROWER TRIALS



Gulf of Mexico

FLORIDA

- Ten growers in 5 counties
 - Pine Island (PI), Lee County
 - Charlotte Harbor (CH), Charlotte County
 - Cedar Key (CK), Levy County
 - Oyster Bay (OB), Wakulla County
 - Alligator Harbor (AH), Franklin County
- Two seasonal trials
 - Winter conditions
 - Summer conditions



Bottom cages



Floating bags



Adjustable longline



Floating cages

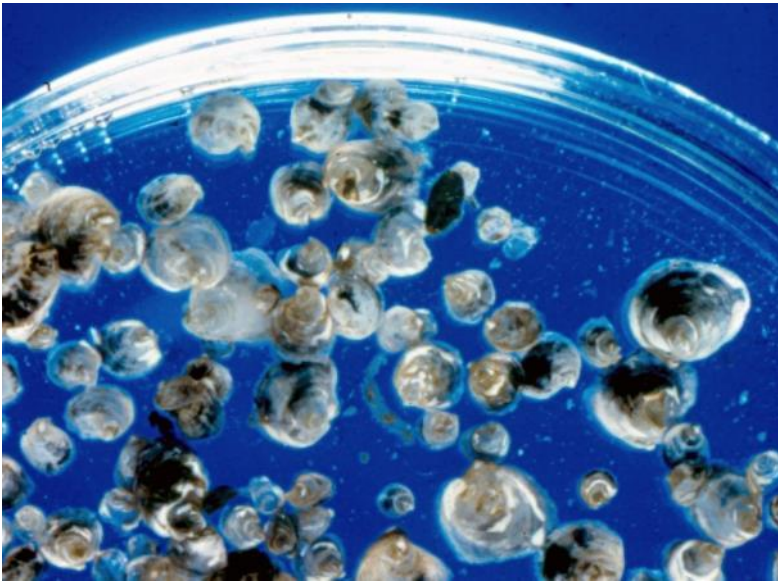
GROWER TRIALS

- Gear used
 - Bottom cages
 - CH, PI, CK-1
 - Floating bags
 - CK-2,3,4
 - AH-1,2
 - Adjustable longlines
 - OB-1,2
 - Floating cages
 - OB-3

SEED PRODUCTION

SPAWNS

- Trial 1: April 2016
 - 3N: FL west coast 2N♀ X LSU 4N ♂
 - 2N: FL west coast stocks, half siblings
- Trial 2: September/October 2016
 - 3N: LSU and AU hatcheries
 - 2N: FL west coast hatchery



LAND-BASED NURSERY

- Trials 1&2
 - 3N & 2N: Nurse in wellers at commercial facility in Cedar Key

SEED DISTRIBUTION

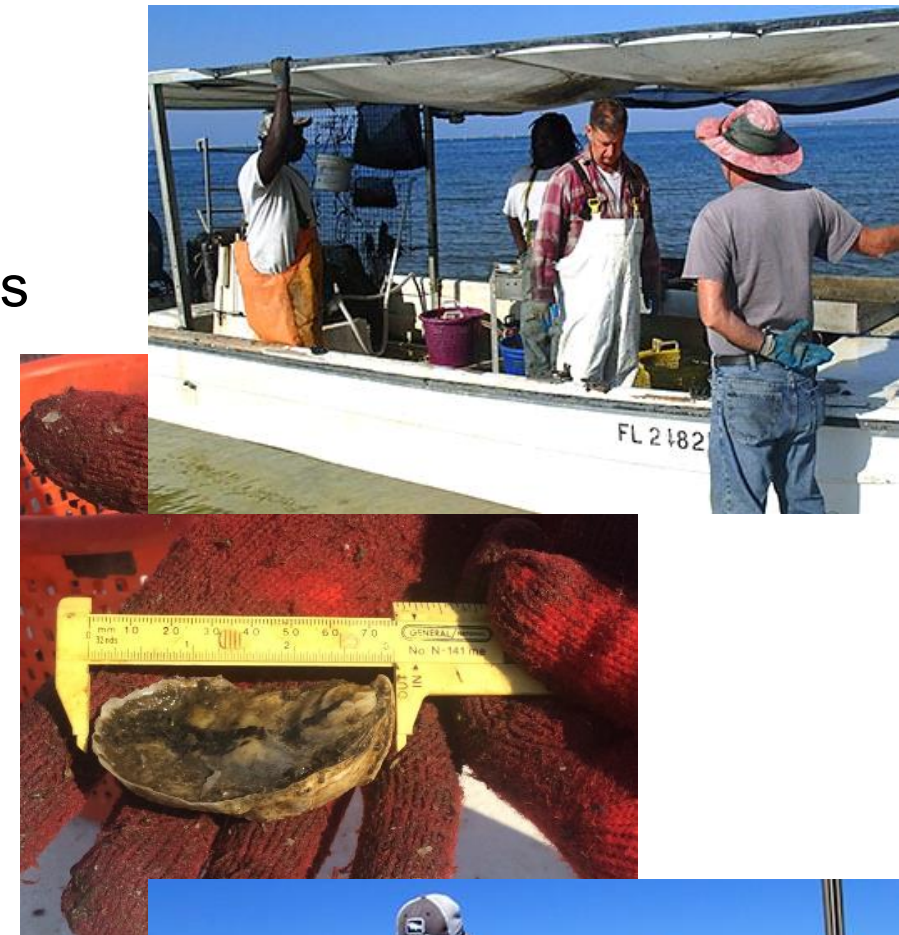
Grower Trials	Diploid Seed		Triploid Seed		Plant Dates
	#	SH (mm)	#	SH (mm)	
1	2500	24	2500	24	22 Jul-2 Aug 2016
2	2500	21	2500	26	22 Mar-5 Apr 2017



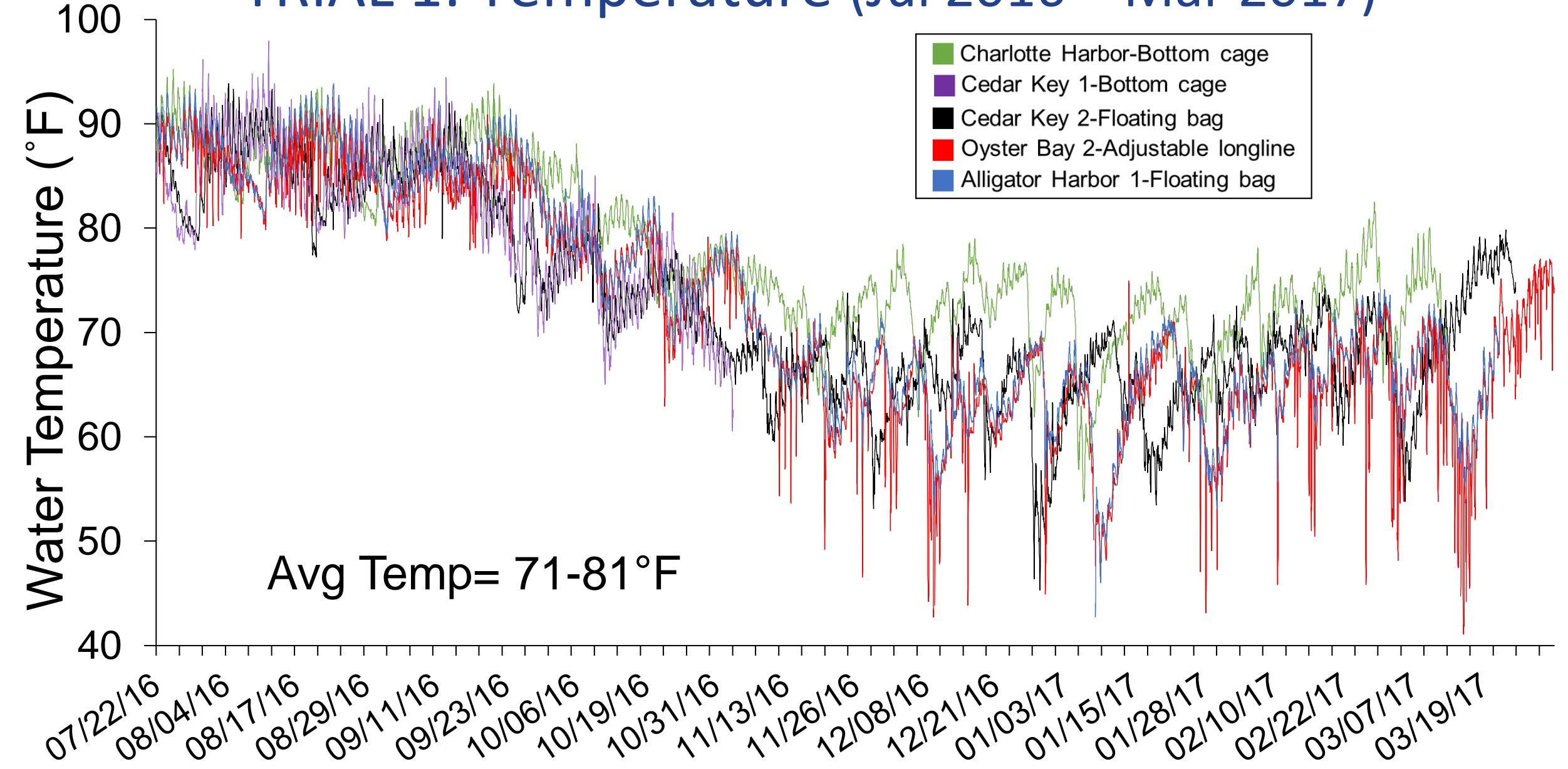
HARVEST / SAMPLE COLLECTION

- Growers were asked to stock 3-4 “sample” bags/baskets at final density and not to harvest from them
- “Sample” bags/baskets maintained as others
- After 7-8 months, bags/baskets were collected
- Live oysters were counted per bag to estimate survival
- Oysters from each bag were measured for growth

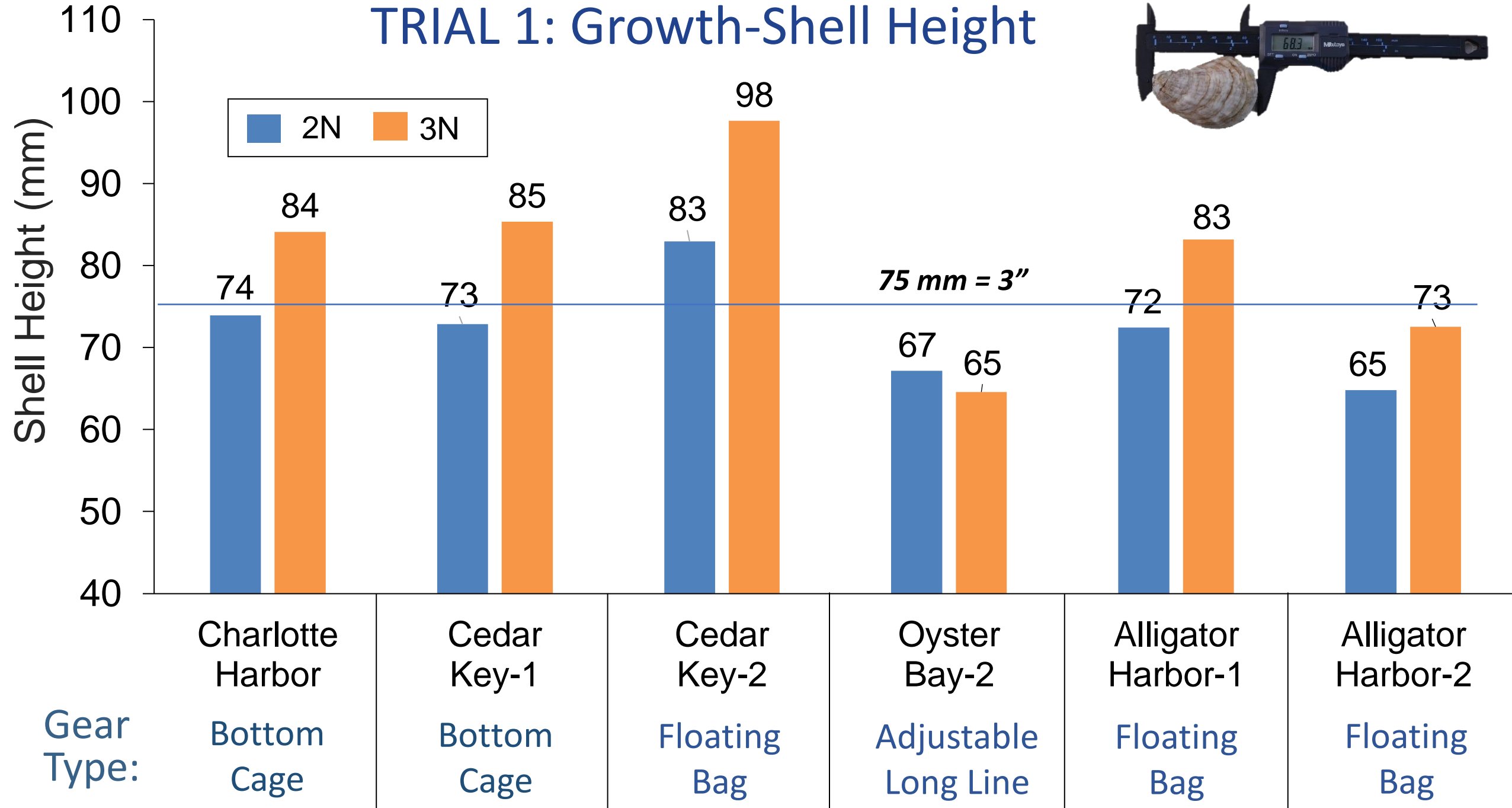
Grower Trials	Harvest Dates	Growout Time	Growout “Season”
1	22 Mar-5 Apr 2017	8 months	Winter
2	24 Oct-26 Nov 2017	7-8 months	Summer



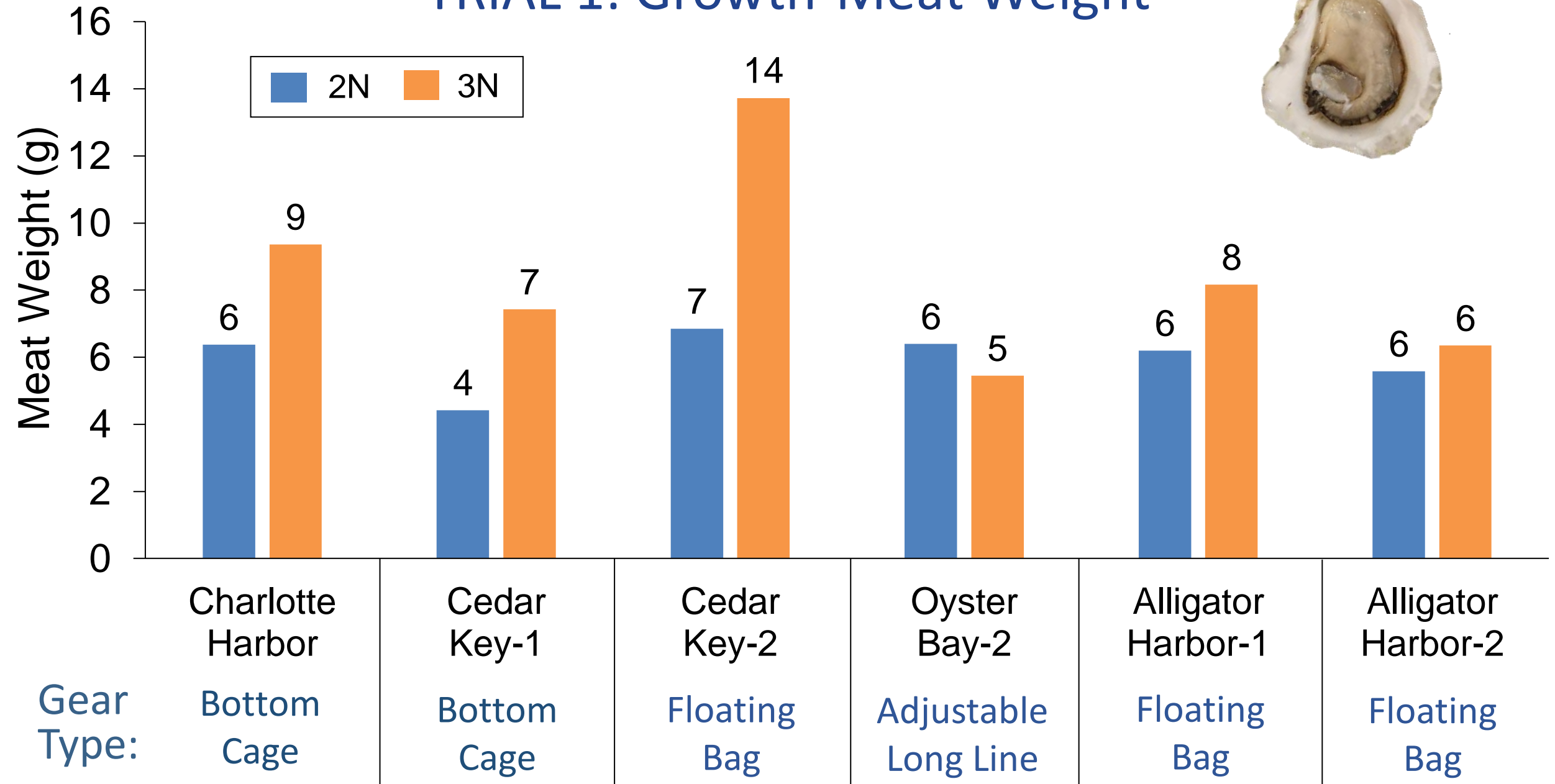
TRIAL 1: Temperature (Jul 2016 – Mar 2017)



TRIAL 1: Growth-Shell Height



TRIAL 1: Growth-Meat Weight



TRIAL 1: Survival

Winter: Jul/Aug 2016 – Mar/Apr 2017

Location	Gear	Survival (%)	
		Diploid	Triploid
Charlotte Harbor	Bottom Cage	71	85
Cedar Key-1	Bottom Cage	91	89
Cedar Key-2	Floating Bag	99	98
Alligator Harbor-1	Floating Bag	99	99
Alligator Harbor-2	Floating Bag	97	98



Charlotte Harbor, Charlotte County



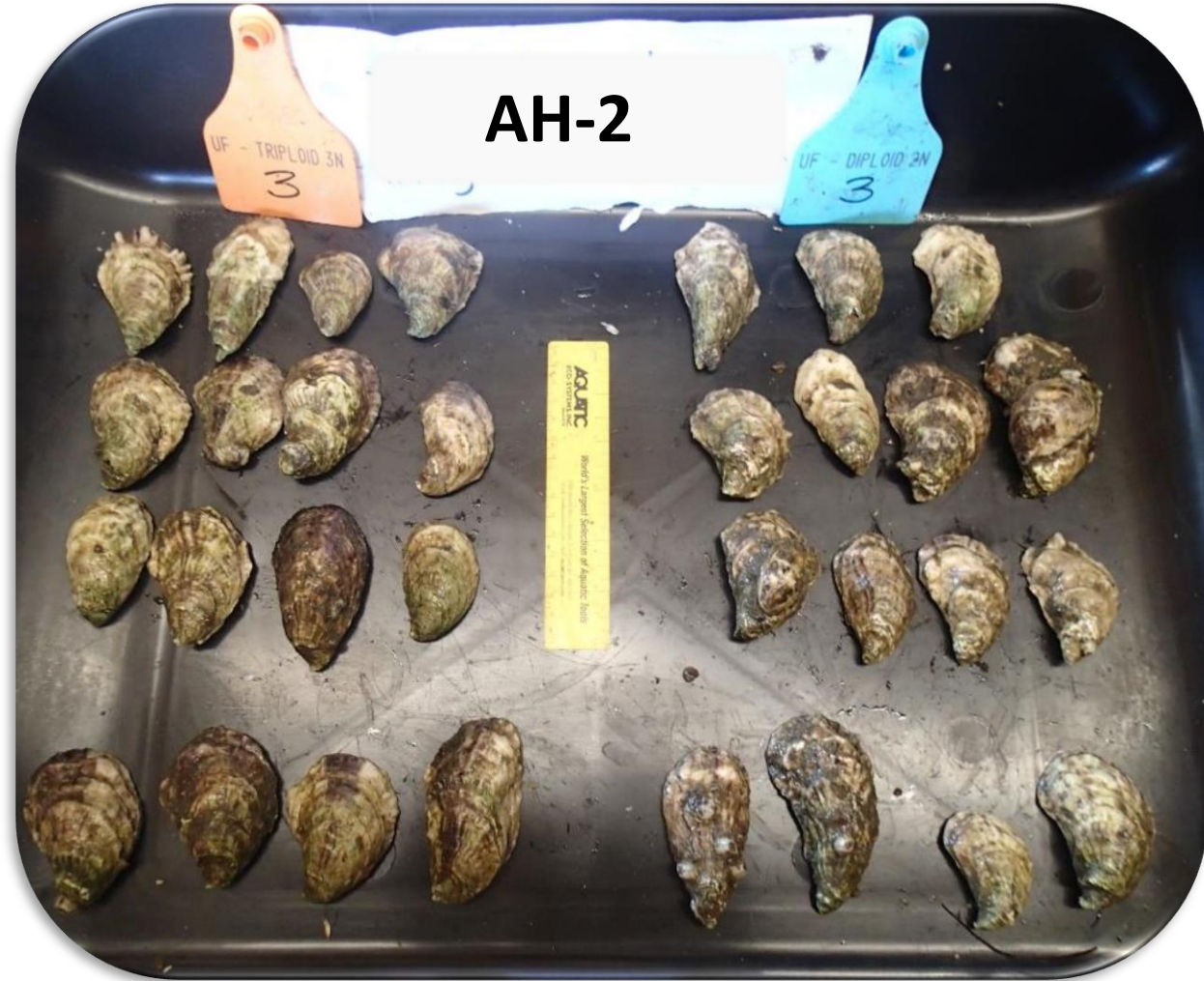
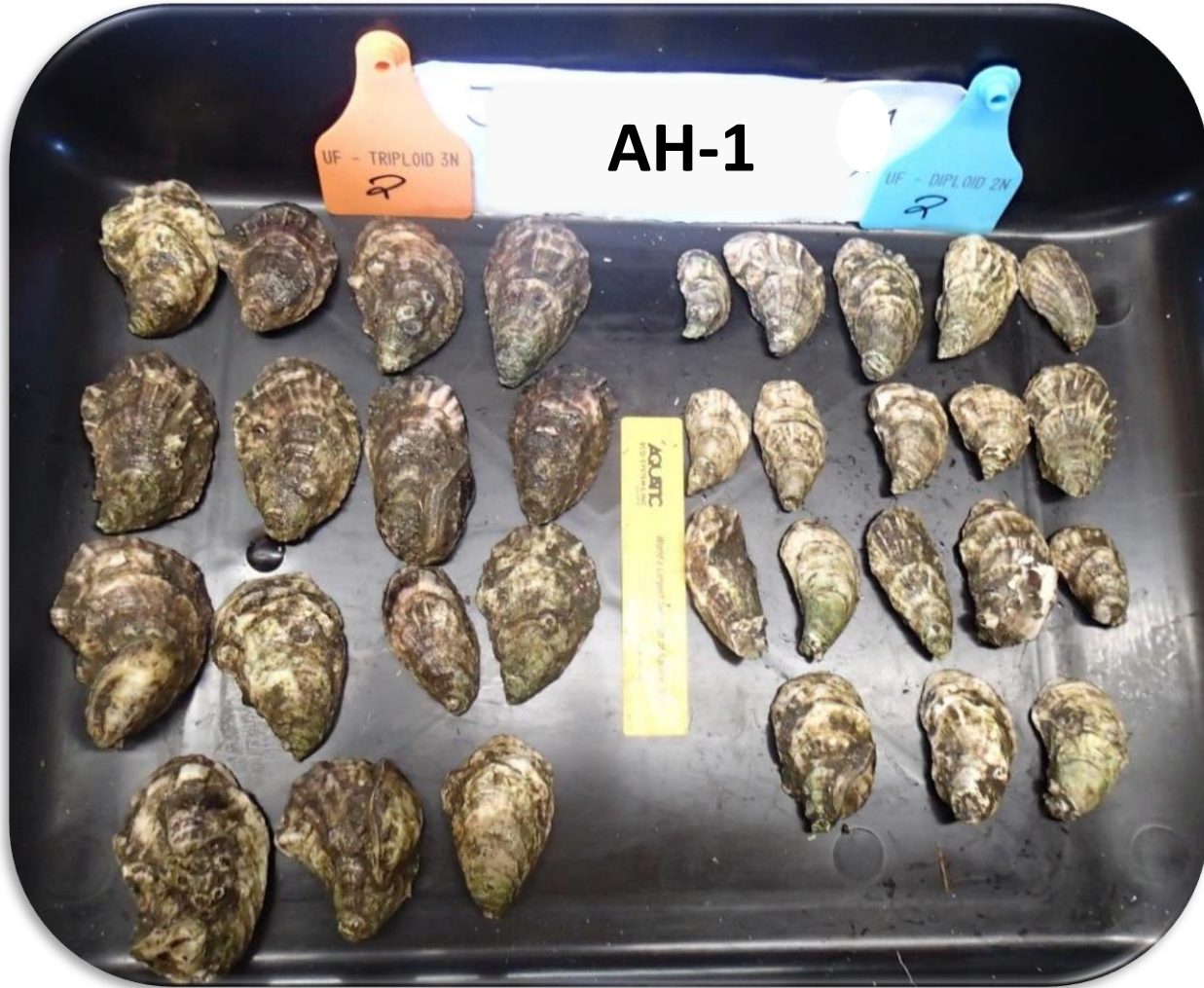


Cedar Key,
Levy County



Oyster Bay,
Wakulla County

Alligator Harbor, Franklin County



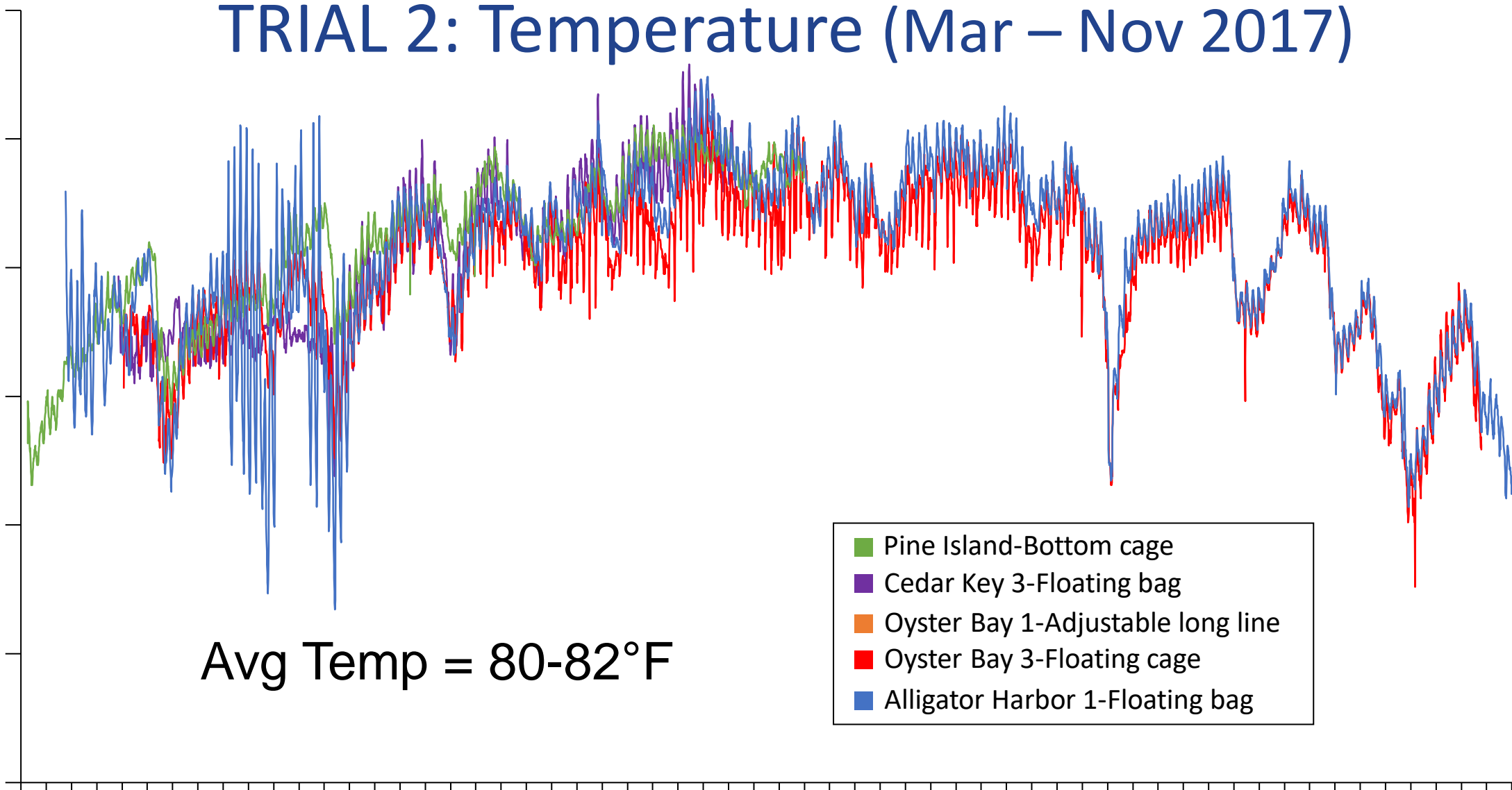
TRIAL 2: Temperature (Mar – Nov 2017)

Water Temperature (°F)

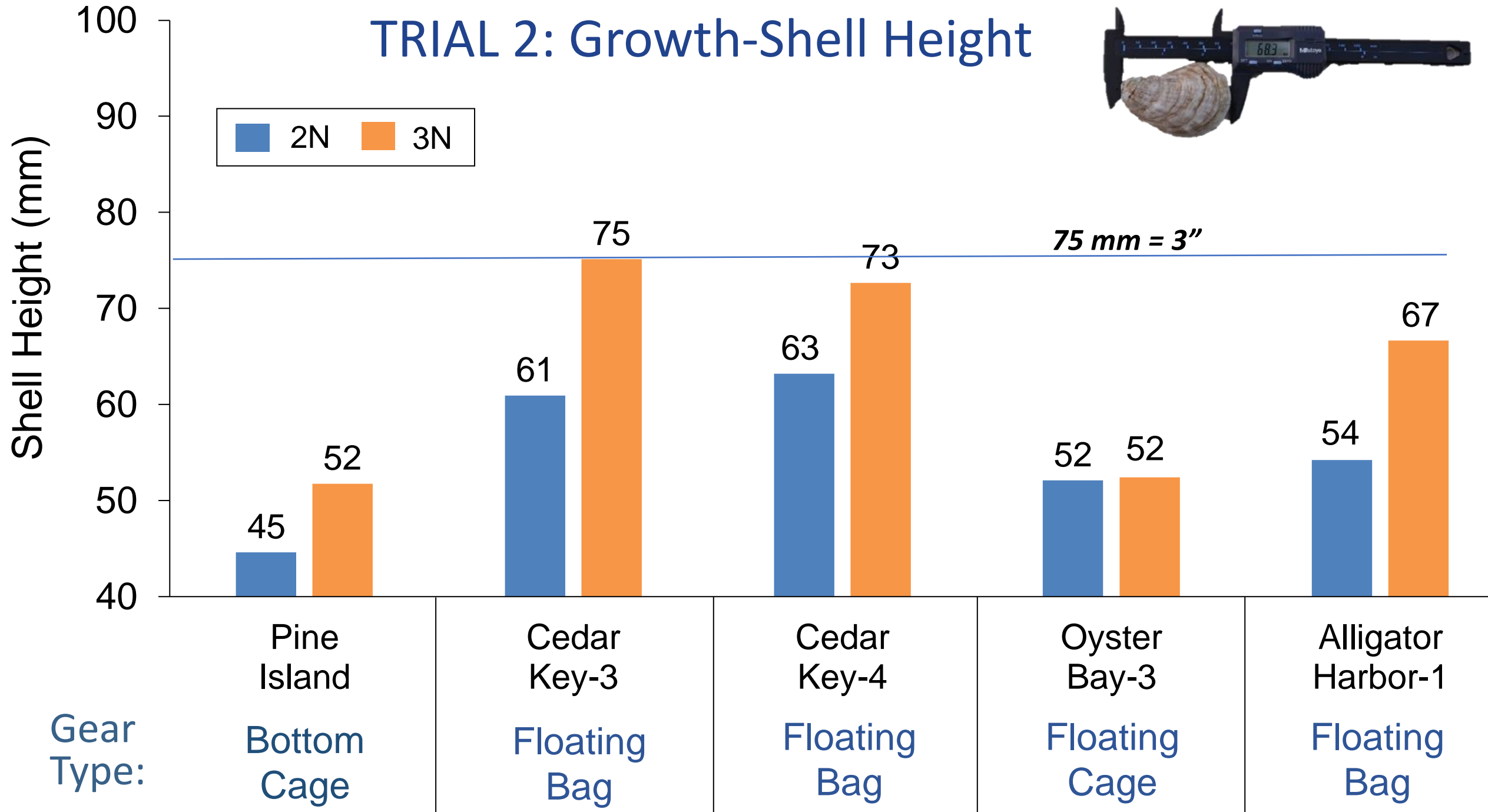
Avg Temp = 80-82°F

- Pine Island-Bottom cage
- Cedar Key 3-Floating bag
- Oyster Bay 1-Adjustable long line
- Oyster Bay 3-Floating cage
- Alligator Harbor 1-Floating bag

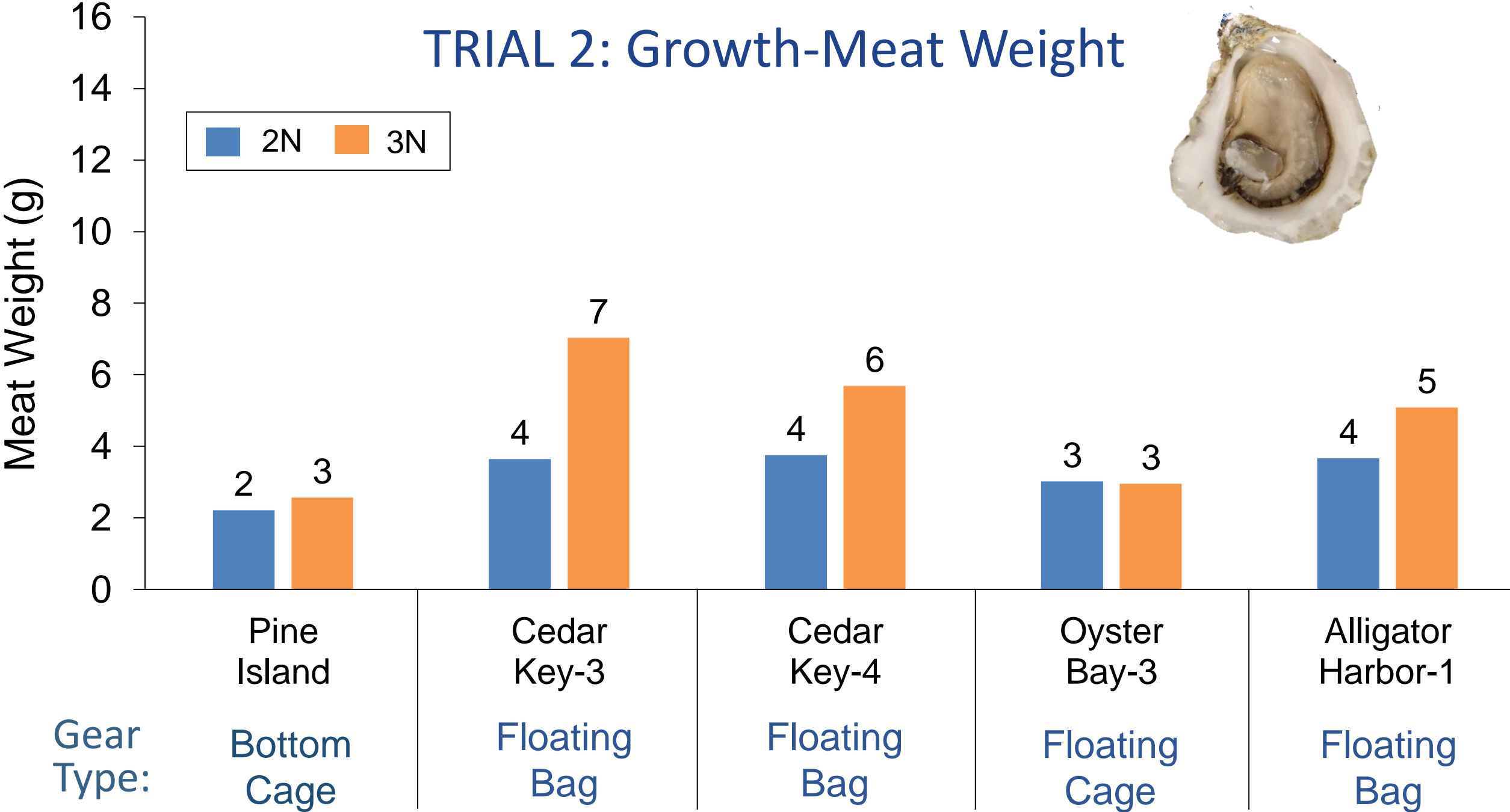
3/15/2017 3/27/2017 4/9/2017 4/21/2017 5/3/2017 5/16/2017 5/28/2017 6/9/2017 6/22/2017 7/4/2017 7/16/2017 7/29/2017 8/10/2017 8/22/2017 9/4/2017 9/16/2017 9/28/2017 10/11/2017 10/23/2017 11/4/2017



TRIAL 2: Growth-Shell Height



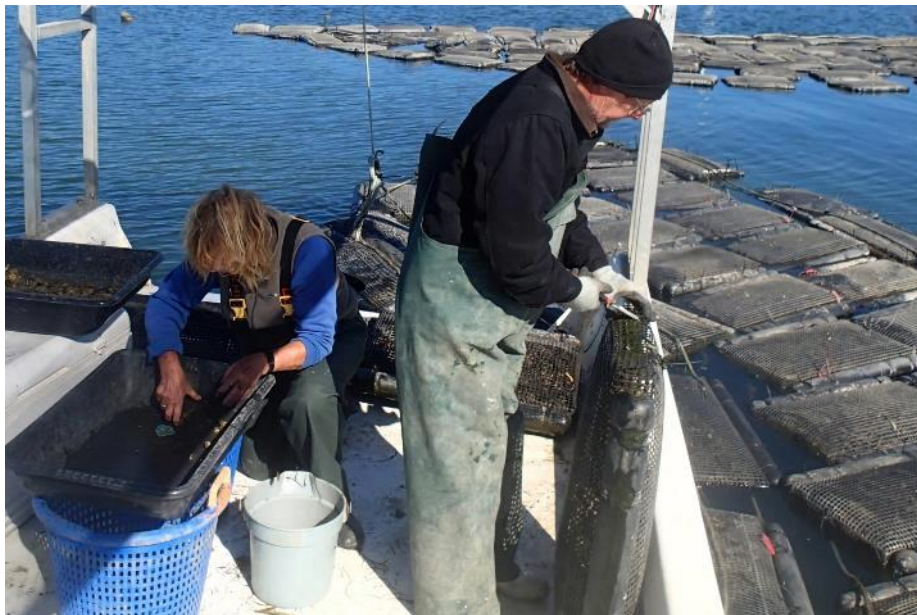
TRIAL 2: Growth-Meat Weight





TRIAL 2: Survival

Summer: Mar/Apr 2017 – Oct/Nov 2017



Grower	Gear	Survival (%)	
		Diploid	Triploid
Cedar Key-3	Floating Bag	68	68
Cedar Key-4	Floating Bag	70	57
Oyster Bay-3	Floating Cage	82	85
Alligator Harbor-1	Floating Bag	67	92

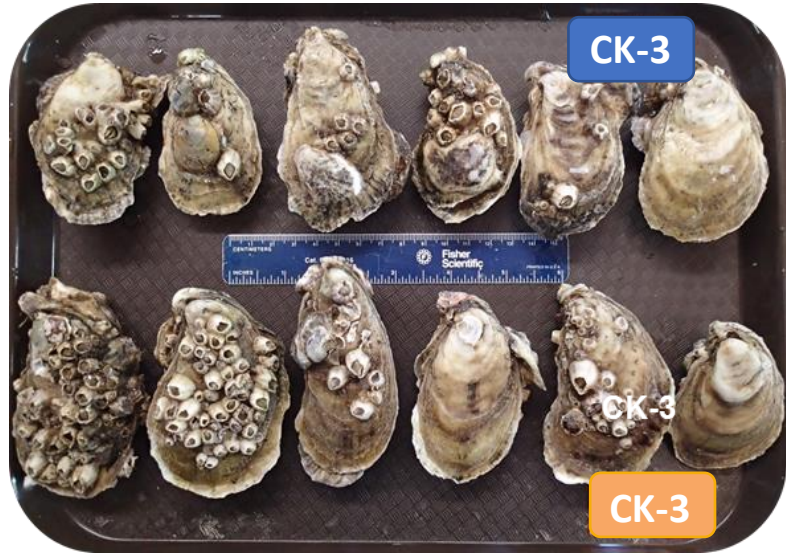
TRIAL 2: Biofouling

$$= \text{Fouling weight} / \text{Shell weight} \times 100$$

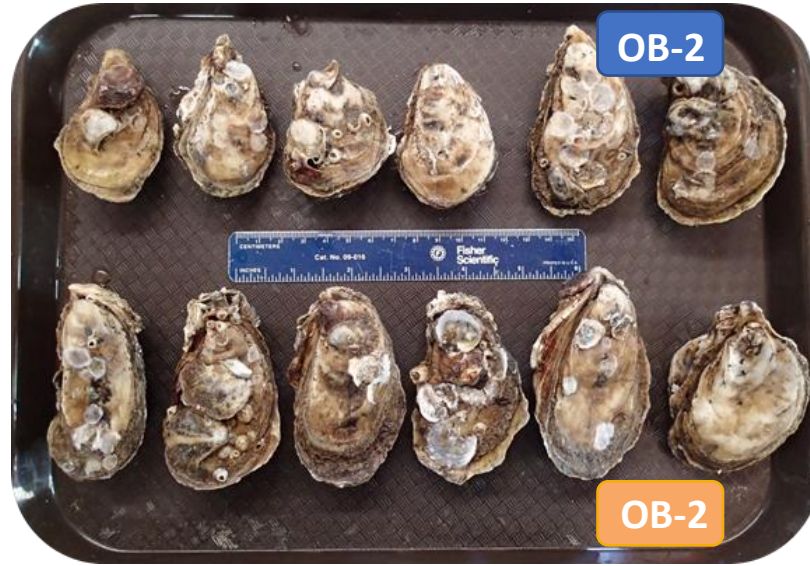


Grower	Gear	Biofouling (%)	
		Diploid	Triploid
Cedar Key-3	Floating Bags	65	37
Cedar Key-4	Floating Bags	118	47
Oyster Bay-2	Adjustable Longline	22	33
Oyster Bay-3	Floating Cages	7	22
Alligator Harbor-1	Floating Bags	26	9

Cedar Key



Oyster Bay



TRIAL 2

Alligator Harbor



Floating Bag



Adjustable Longline



Floating Bag

Floating Bag

Floating Cage

A close-up photograph showing a person's hands holding several oysters. The oysters are dark, wet, and appear to be freshly harvested. They are being held over a large black bucket filled with more oysters. The background is slightly blurred, showing what appears to be a boat or a similar outdoor setting.

SUMMARY

- Multiple demonstration sites were established at commercial shellfish aquaculture leases on Florida's Gulf coast
- Production differences related to ploidy type, farm location, gear type, and season were documented

November 2017

Application of Triploidy to an Emergent Oyster Culture Industry on Florida's Gulf Coast

SUMMARY

- Potential advantages of triploidy, such as faster growth, shorter crop times, and year-round quality oyster meat were demonstrated



Oyster Farming Demonstration Project

Application of Triploidy to the Emergent Florida West Coast Industry

This project allows for large-scale demonstration and evaluation of an oyster breeding process to local conditions on Florida's west coast by oyster growers. The objectives are two-fold:

1. Document production performance, assess health, and evaluate the quality (sensory characteristics) of diploid (2N) and triploid (3N) oysters under commercial conditions, and
2. Quantify the effects of different culture methods, salinity regimes, and seasonal harvests.

SCOPE OF WORK: Oysters from two ploidy types (triploids – 3N and diploids – 2N) and two seasonal spawns (spring and fall) are being provided to certified growers, who have obtained approval from DACS to culture oysters on their shellfish aquaculture leases. Eleven growers in four west coast counties (Charlotte, Franklin, Levy, and Wakulla) are using a variety of culture systems (floating bags, bottom cages, and adjustable lone lines), which allows for evaluation of site and gear interaction on ploidy type. University of Florida (UF) faculty are also culturing oysters at their research lease off Cedar Key to document growth and survival and evaluate gear types, stocking densities, and antifouling coatings.

For additional information about this project,
view the news blog posted at

<https://shellfish.ifas.ufl.edu/oyster-demo-project/>



Seed Provided to Growers in July

July 27, 2016

Single-set triploid oyster seed were produced by crossing Cedar Key stocks with sperm from tetraploid stocks maintained at Louisiana Sea Grant's oyster hatchery. [Read more](#)



UF Plants Seed in August

September 14, 2016

Triploid and diploid oyster stocks were also planted by UF at their experimental lease located within the Dog Island Lease Area off Cedar Key on August 4. [Read more](#)



Hurricanes Impact Oyster Trials

October 7, 2016

After meandering around the Gulf of Mexico as a tropical depression, Hurricane Hermine gathered steam and headed straight for the Big Bend coast on September 2. [Read more](#)



UF Oyster Growout Study Initiated

November 1, 2016

This article summarizes the growth of diploid (2N) and triploid (3N) oysters cultured at the UF experimental lease within the Dog Island Lease Area near Cedar Key. [Read more](#)



Financial Characteristics and Risks

January 2017

Another component of the Oyster Culture Demonstration Project is to document economic costs and benefits associated with diploid versus triploid oyster production along the west coast of Florida. [Read more](#)



Sampling UF Field Trials

February 2017

A similar number of oysters provided to project participants were also cultured at the UF experimental lease off Cedar Key so that growth and survival could be documented monthly during growout. [Read more](#)



Harvesting Growers' Field Trials

March 2017

Ten growers in four west coast counties participating in this project received oyster seed (2500 of each ploidy type, 20-22 mm in shell height) during July 2016 to grow on their leases. [Read more](#)



Harvesting UF Field Trials

April 2017

Six months after seed oysters (average 25 mm in shell height) were stocked into 14 mm mesh Vexar bags (October 2016), they were harvested in April 2017 (12 months from spawn). [Read more](#)



Next Crop of Seed Distributed

April 2017

To quantify the effects of seasonal harvests on ploidy type, several spawns using tetraploid oysters held from the spring 2016 spawn were attempted in the fall. [Read more](#)



Consumer Evaluation of Oysters

May 2017

Oysters typically acquire their flavor from their growing environment and are frequently named after their harvest



New UF Growout Study Initiated

June 2017

The second phase of the demonstration project evaluates the performance of diploid and triploid oysters planted in earl



Sampling UF Field Trials

September 2017

As in the first phase of the demonstration project, oysters were also cultured at the UF experimental lease off Cedar Key in