Cedar Key Aquaculture Workshop

Enhancing Production of Cultured Clams in Florida by Triploidy

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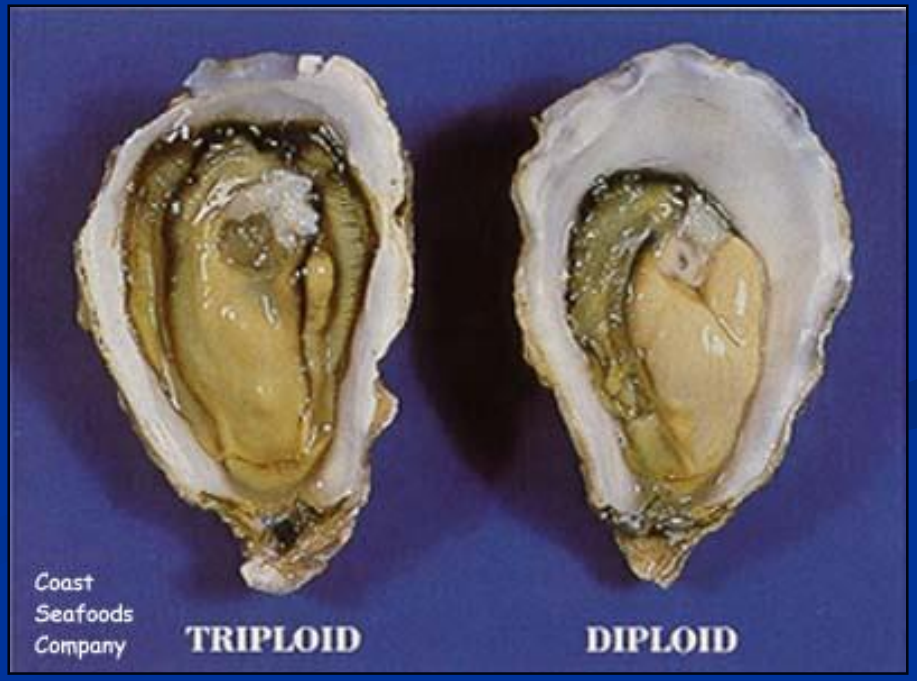
Hypothesis

- Hard clam mortalities from summer stressors can be reduced by creating sterile clams through the basic breeding technique of triploidy
- Triploidy: Three sets of chromosomes

Why triploidy?

- Need for hardier clam strains
- Triploid organisms divert energy from reproduction to energy storage and growth
- Triploidy has been used in PNW oyster aquaculture



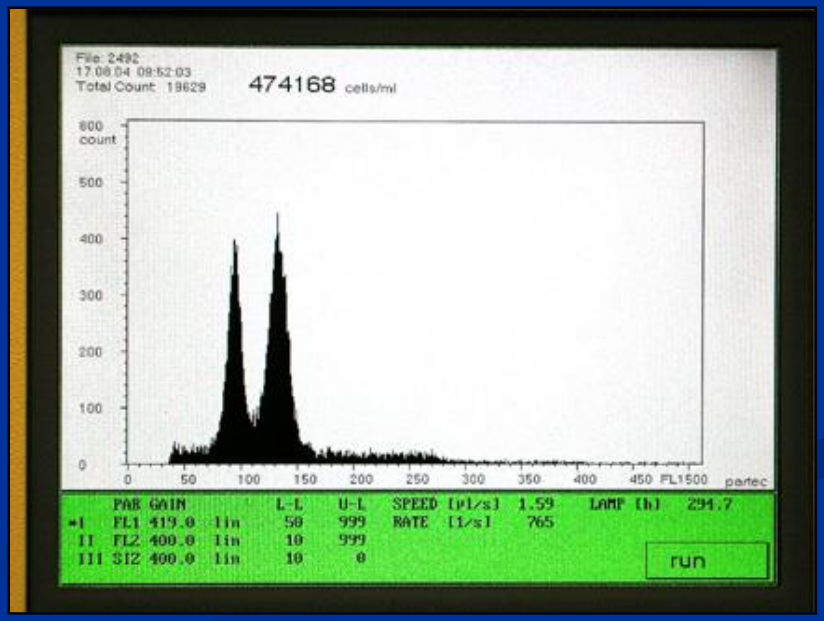
Specific objectives

- Create replicate diploid/triploid families
- Compare growth & survival during grow-out
- Compare physiological responses to stress
- Examine economics

Results to Date

Polar Body 2 release

Flowcytometry output



Cytological and Flow-Cytometric Data from Triploid Induction Experiments

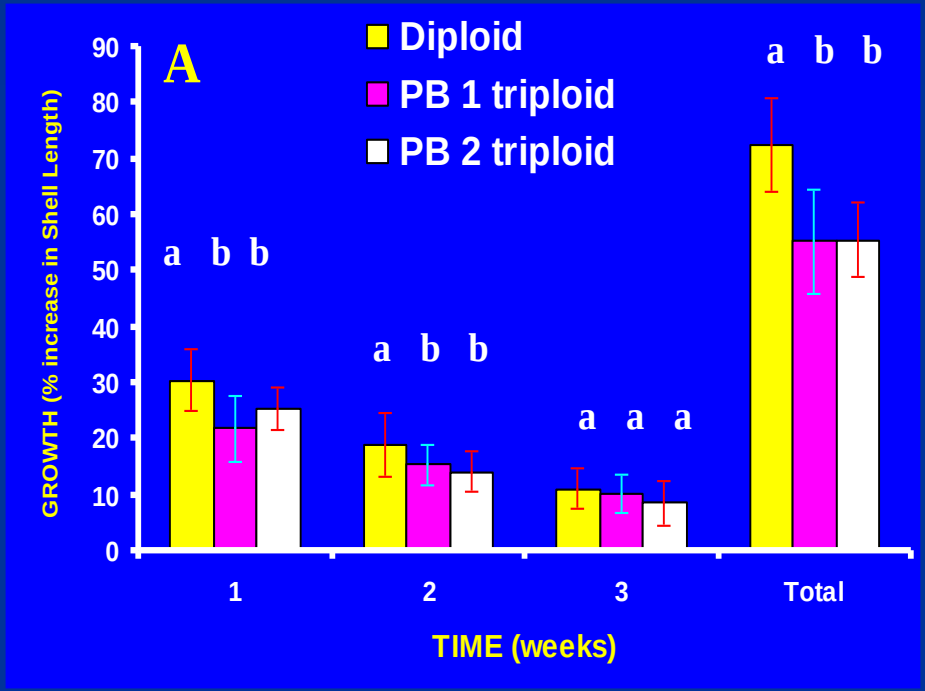
Trial #, treatment		Cytological Data (% of fertilized eggs)				Triploid (%)
		Pre-fertilized	Pre-PBI	Pre-PBII	Post-PBII	
1	PBI	55	50	7	43	39
	PBII		3	30	67	0
2	PBI	5	83	2	3	0
	PBII		23	77	0	0
3	PBI	1	100	0	0	0
	PBII		0	100	0	0
4	PBI	5	90	10	0	93
	PBII		0	44	56	33
5	PBI	0	85	0	0	33
	PBII		28	72	0	83
6	PBI	6	55	0	21	77
	PBII		56	39	5	86
7	PBI	5	41	0	1	48
	PBII		66	26	8	57
8	PBI	4	69	2	8	26
	PBII		36	48	13	69

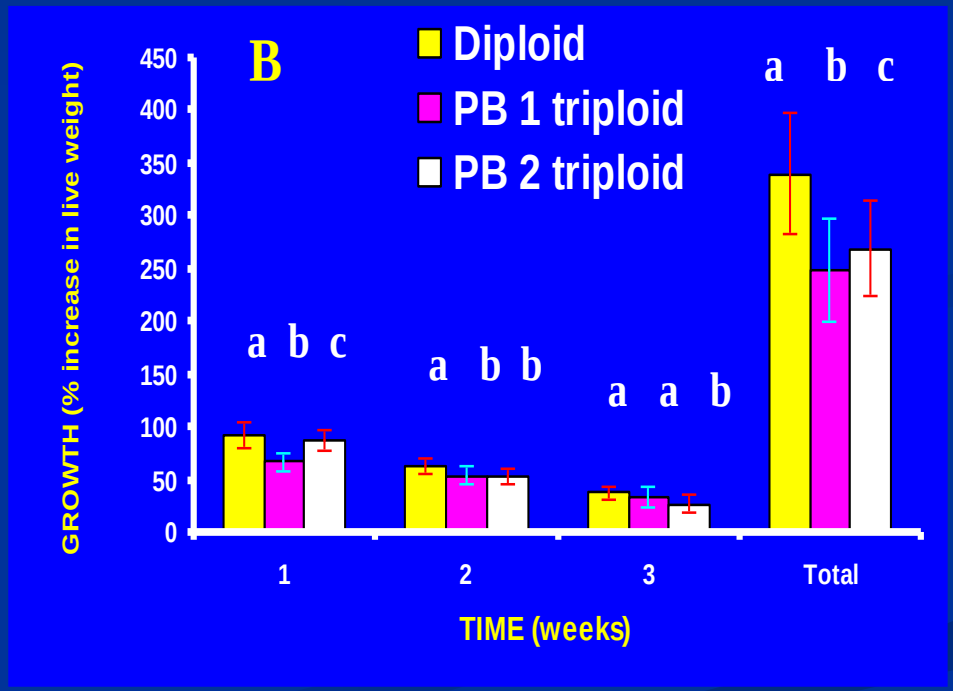
Results to Date

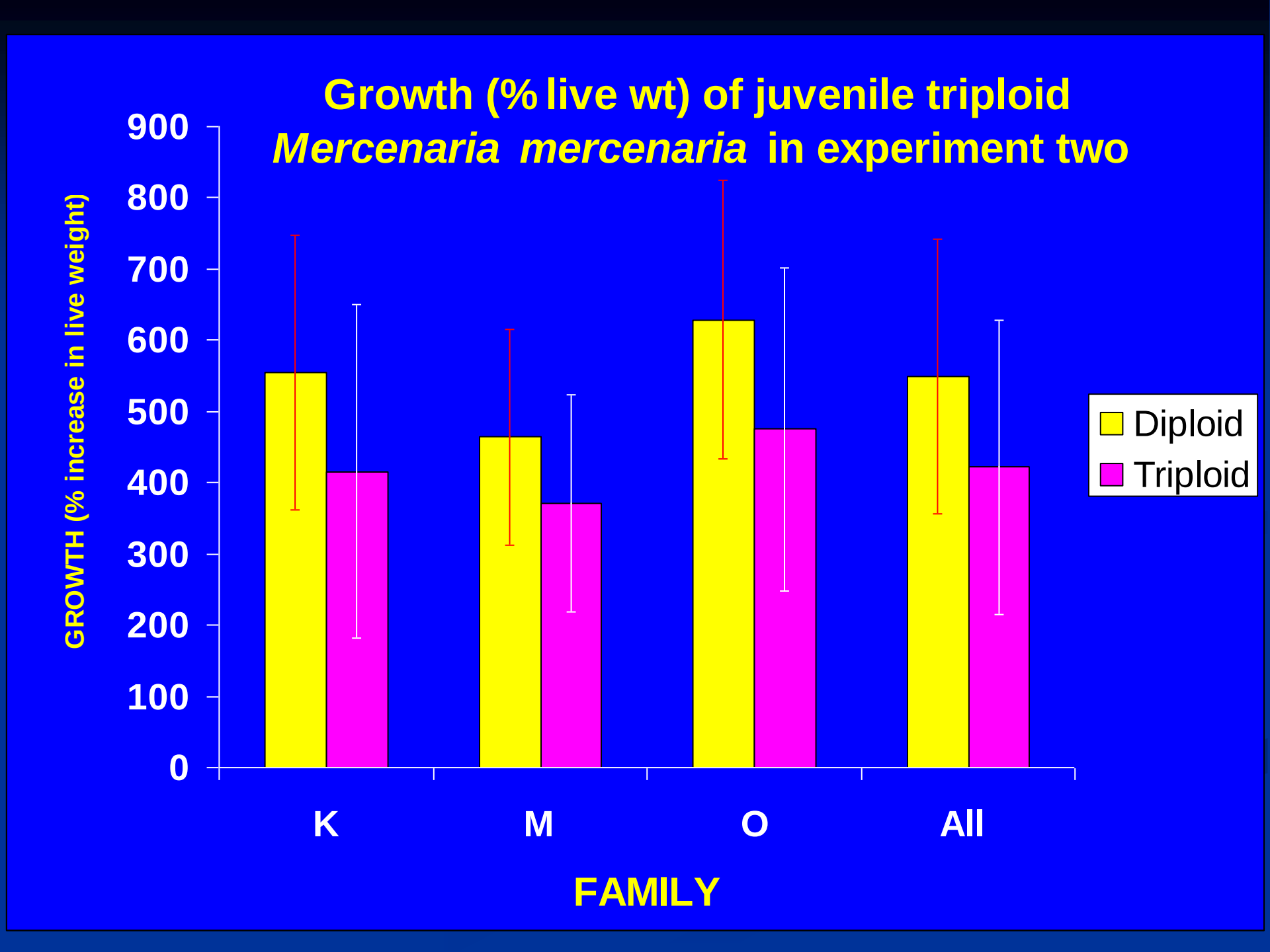
Susan Laramore and Eman El-Wazzan
Florida Tech grad students

Growth Study w/Juveniles

Growth (%) in shell length (A) and live weight (B) of juvenile triploid *Mercenaria mercenaria*





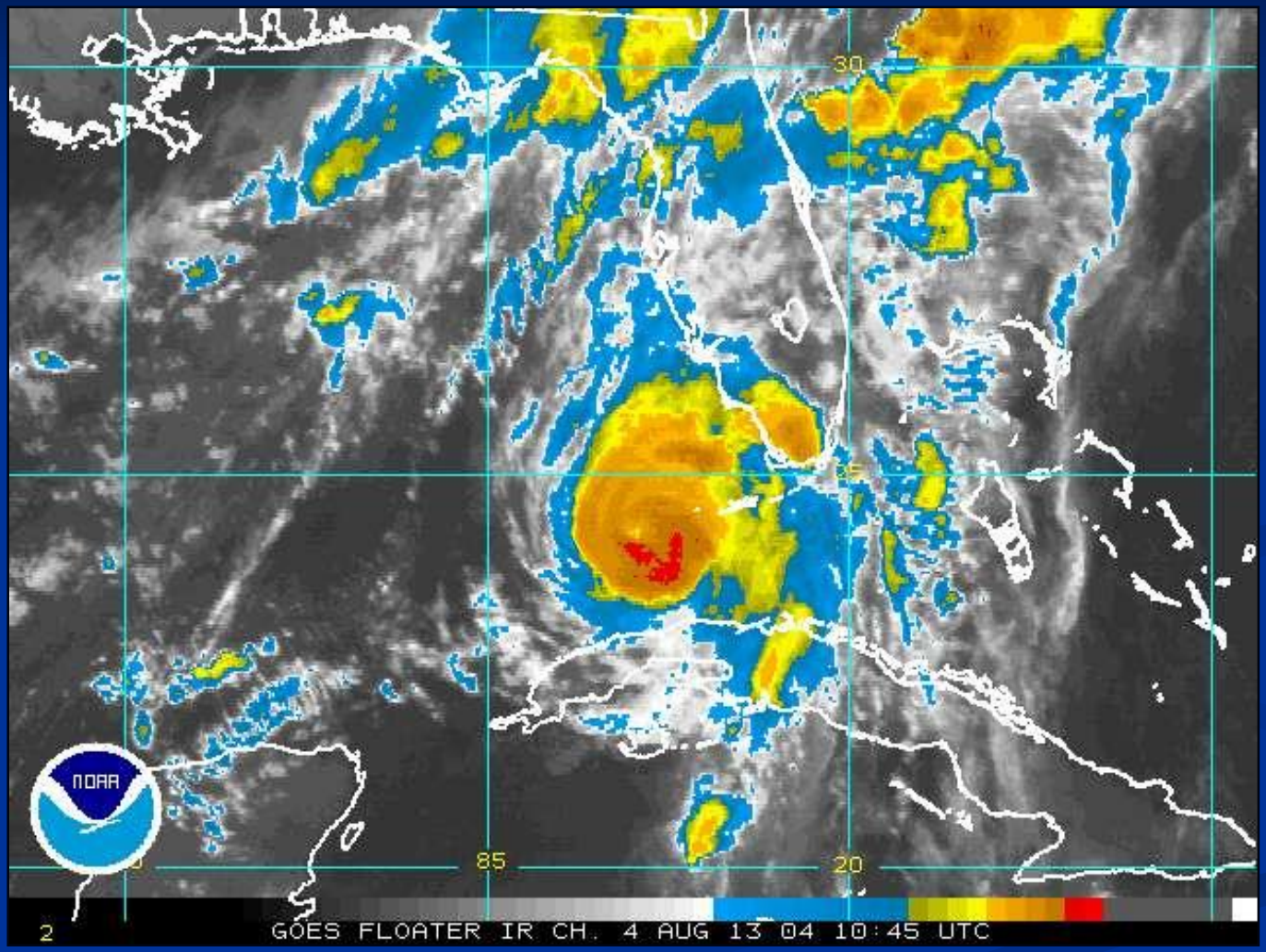

Growth (% live wt) of juvenile triploid
Mercenaria mercenaria in experiment two
GROWTH (% increase in live weight)
900
800
700
600
500
400
300
200
100
0
K
M
O
All
FAMILY
Diploid
Triploid

Results to Date

Leslie Sturmer, grow-out

Clam samples

Results to Date



Hurricane Charley

Mean values of different parameters measured for PB2 triploid clams cultured in Cedar Key

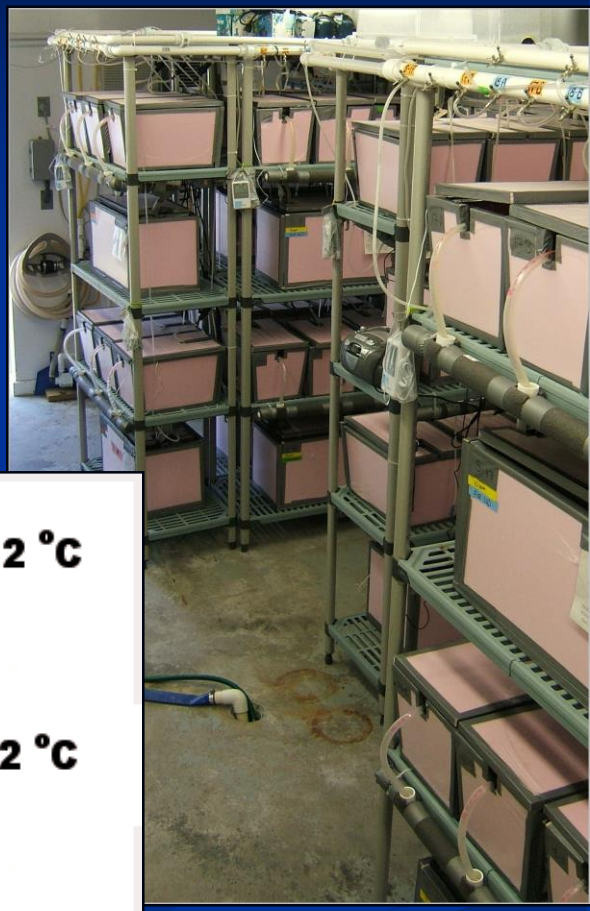
	Diploids			Triploids			T-test
	N	Mean	SD	N	Mean	SD	Signif.
Shell Length	32	23.4	± 3.5	13	19.7	± 3.2	0.002
Shell Width	32	11.3	± 1.7	13	9.3	± 1.5	0.000
Live Weight	32	3.33	± 1.32	13	1.97	± 0.85	0.001
Dry Meat Weight	18	0.104	± 0.039	7	0.068	± 0.026	0.034
Condition Index	18	5.6	± 0.5	7	6.6	± 0.5	0.000

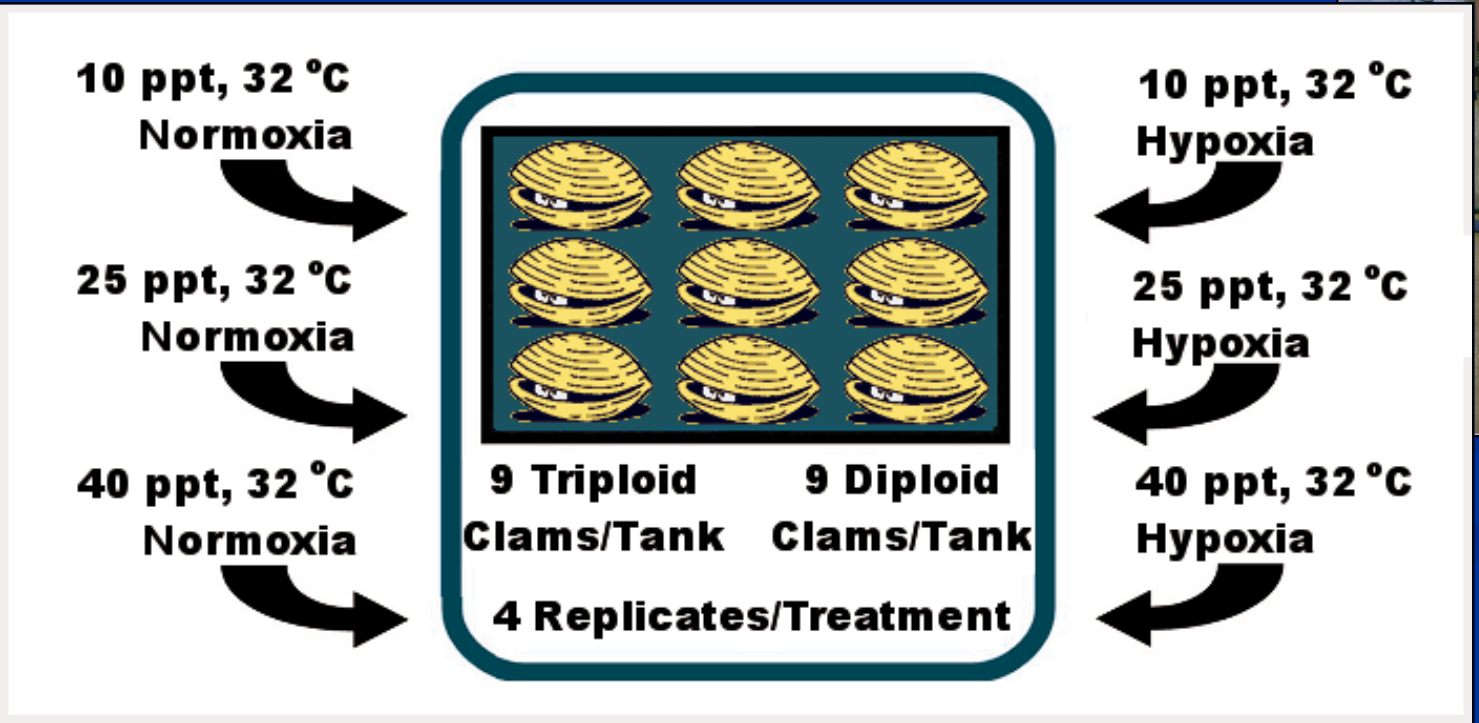
Four hurricanes hit Florida in 2004 and destroyed 80% of all clams planted for the study. Data presented is from only one group of clams cultured in Cedar Key and sampled in December 2004. Triploid clams were estimated at 42-70% before the hurricanes, but only 29% after. Triploid clams were significantly smaller for all parameters measured except condition index. Histological analysis indicated 50% of diploid clams had spawned, whereas 100% of triploids had no gonad.

Laboratory challenges

Temperature: 90°F
Salinity: 10ppt, 25ppt, 40 ppt
Oxygen: Normoxic or Hypoxic

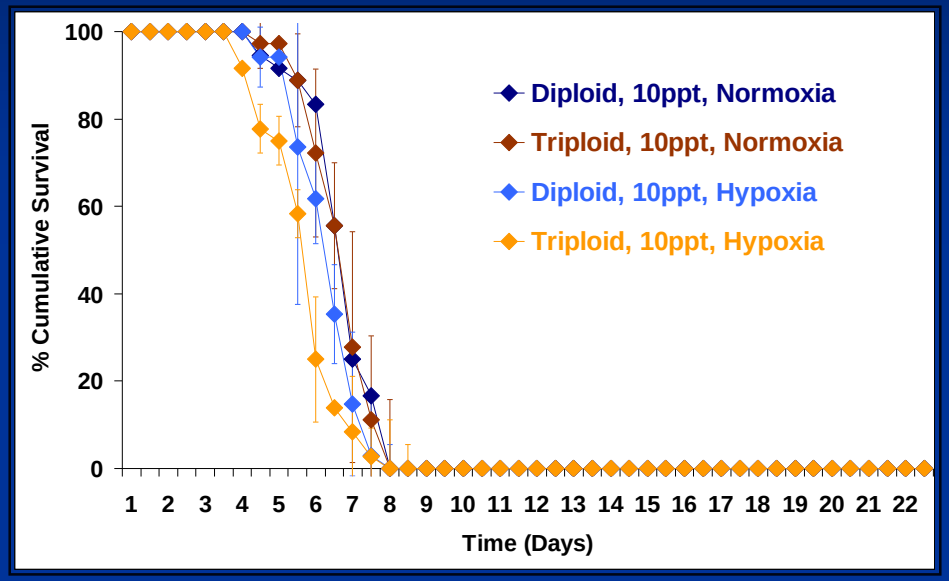
Survival & burial 2 size classes



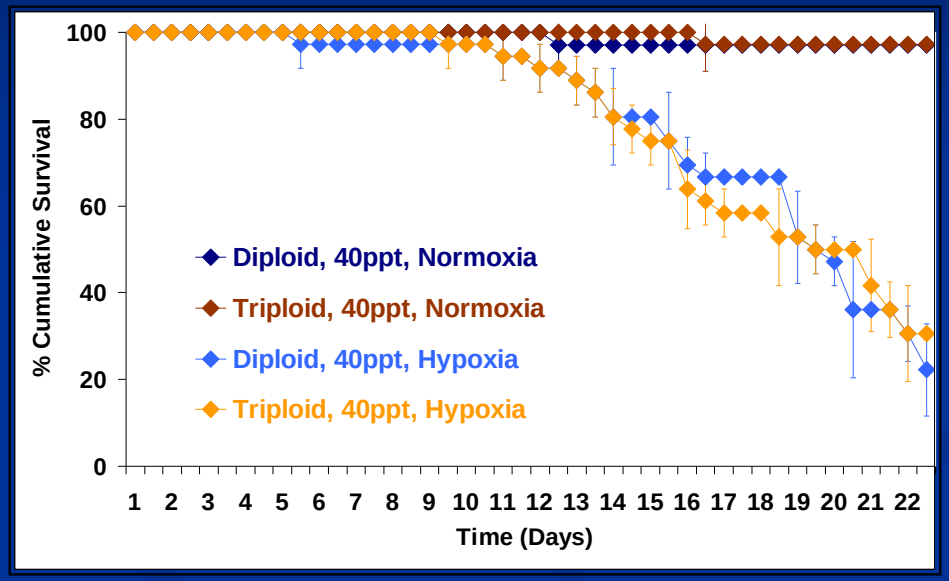


Survival – 10 ppt and 40 ppt

10 ppt

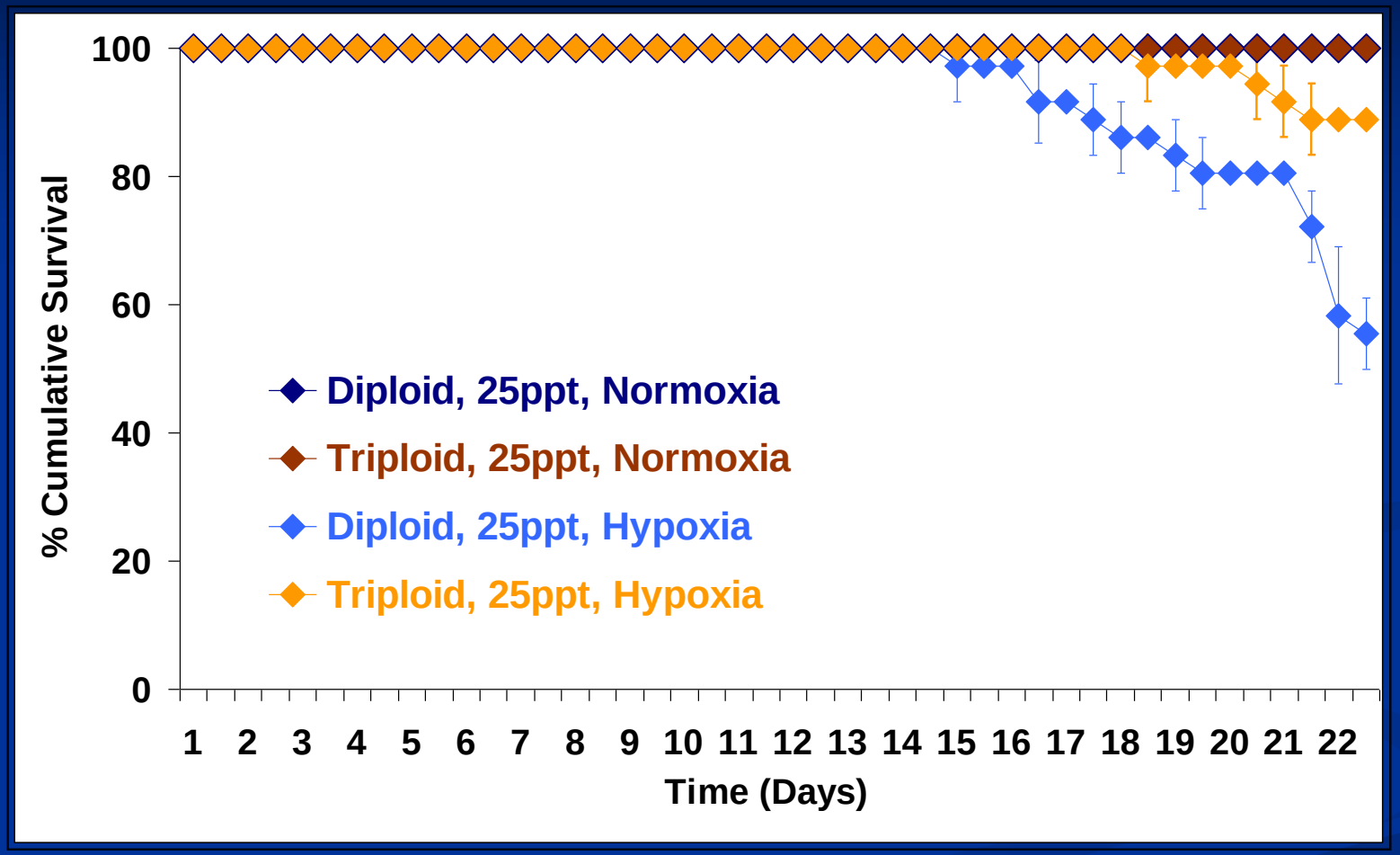


40 ppt



At salinity extremes, triploid clams have no advantage over diploid clams

Survival – 25 ppt



- Triploidy may increase survival under hypoxic conditions at normal salinities

Work in Progress

- Replicate PBII triploids and sibling diploids were produced again for ongoing field studies
- Compare energy budgets (metabolic rates, feeding rates) of triploid and diploid clams
- Economic survey - Chuck Adams, UF
- Expect to be completed by end of this year