HATCHERY ISSUES FOR SHELLFISH RESTORATION

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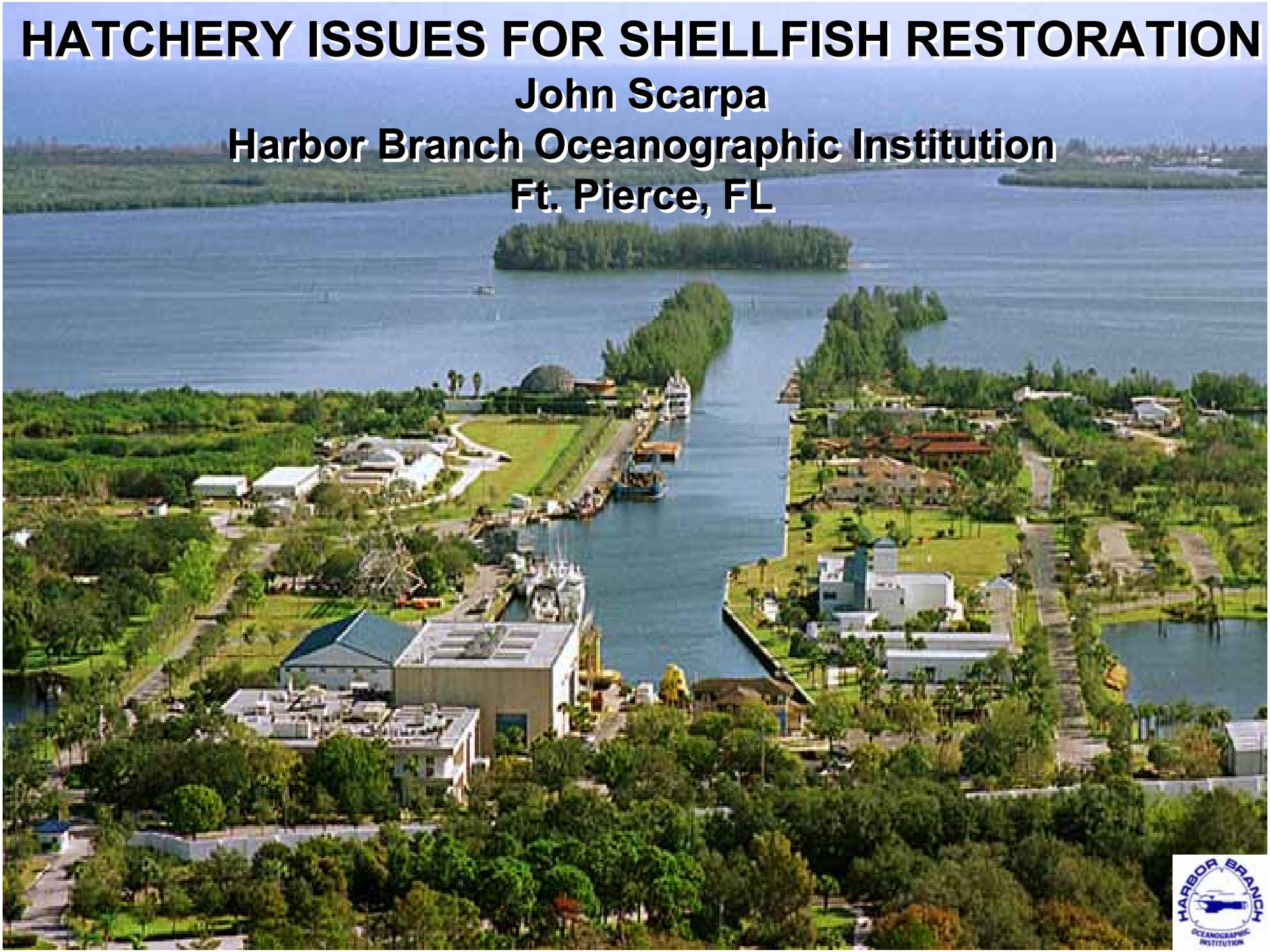
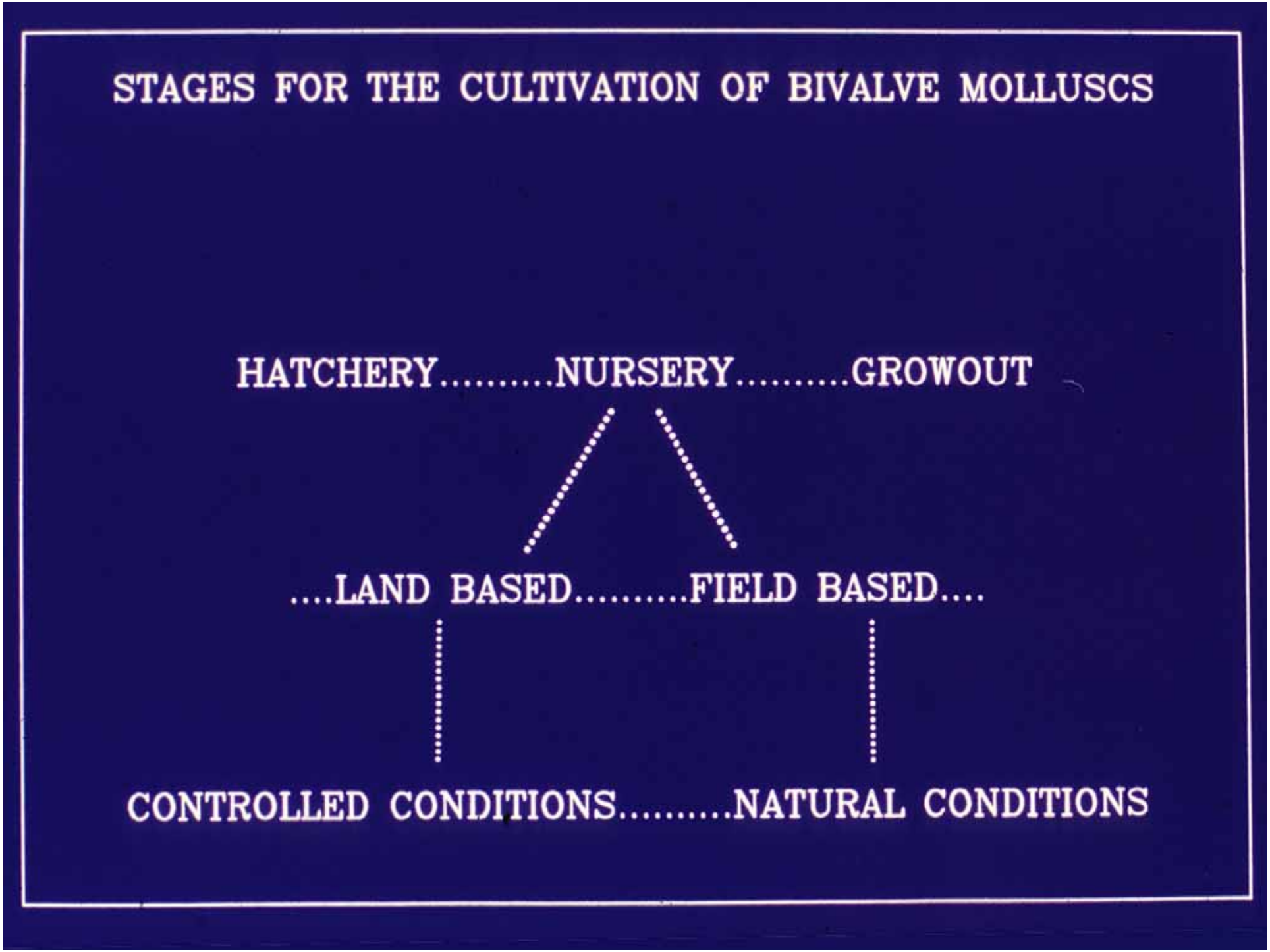


Shellfish Retraining Programs

Community-based training in response to decreases in natural fisheries, closure of fisheries, and net ban.

Over 500 graduates - now a $13 million industry in FL.

Funded by:
Federal and state funds -
JTPA and FL Dept. of Labor
and Employment Security


STAGES FOR THE CULTIVATION OF BIVALVE MOLLUSCS
HATCHERY.....NURSERY.....GROWOUT
....LAND BASED.....FIELD BASED....
CONTROLLED CONDITIONS.....NATURAL CONDITIONS

Harbor Branch Clams, Inc.

Produces approx. 25% of the clam seed for Florida, and also supplies Georgia, S/N Carolina, and Virginia.

Support hatchery for the industry.

Edible Oyster
American or Eastern
Crassostrea virginica

- **Euryhaline: 5-35 ppt, >10 but <25 ppt**
- **Eurythermal: 0-30 C (intertidal), 20-25 C**
- **Hatchery: condition/induce**
- **Larvae: 50-300 μm, 14-28 days,**
- **Metamorphosis (setting): on hard surface, microcultch, cultch**

Hatchery

Hatchery Biosecurity Issues

- **Water Treatment for Disease Prevention**
  - **Filtration (1μm)**
  - **UV or ozone**
- **Effluent Treatment for Release Prevention**
  - **Retention (tanks, ponds)**
  - **Water Treatment (e.g., UV, O_3, Cl-)**
- **Culture Protocol to Prevent Cross Contamination (Disease and "Lines")**

Aquatic Animal Health Laboratory

Diagnostic and Analytical Services

Species:

- Shrimp
- Fish
- Bivalves

Services:

- Dot Blot
- PCR
- Histology
- Bacteriology…

Induced Spawning

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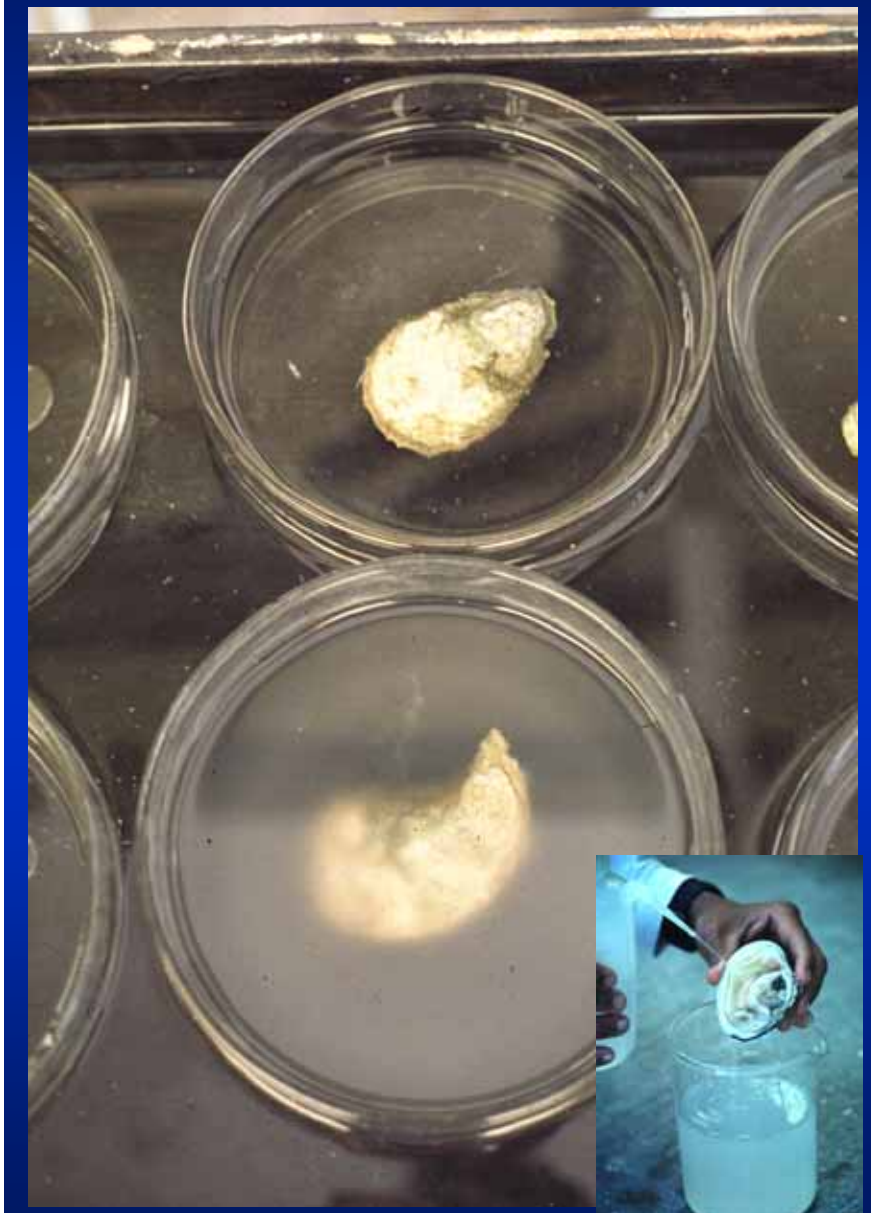

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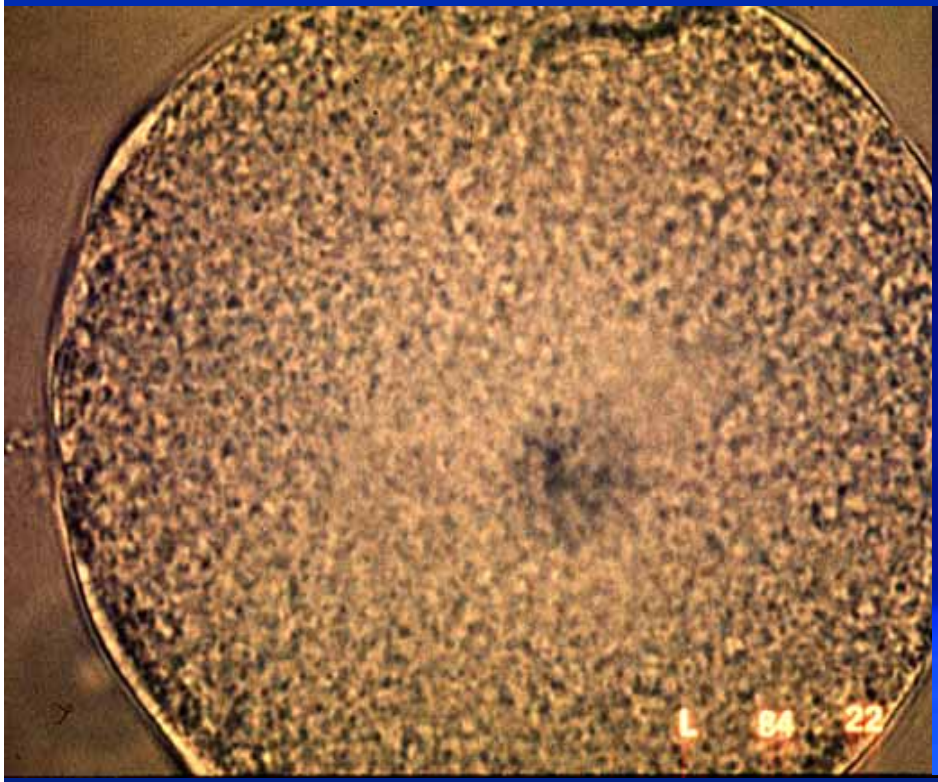
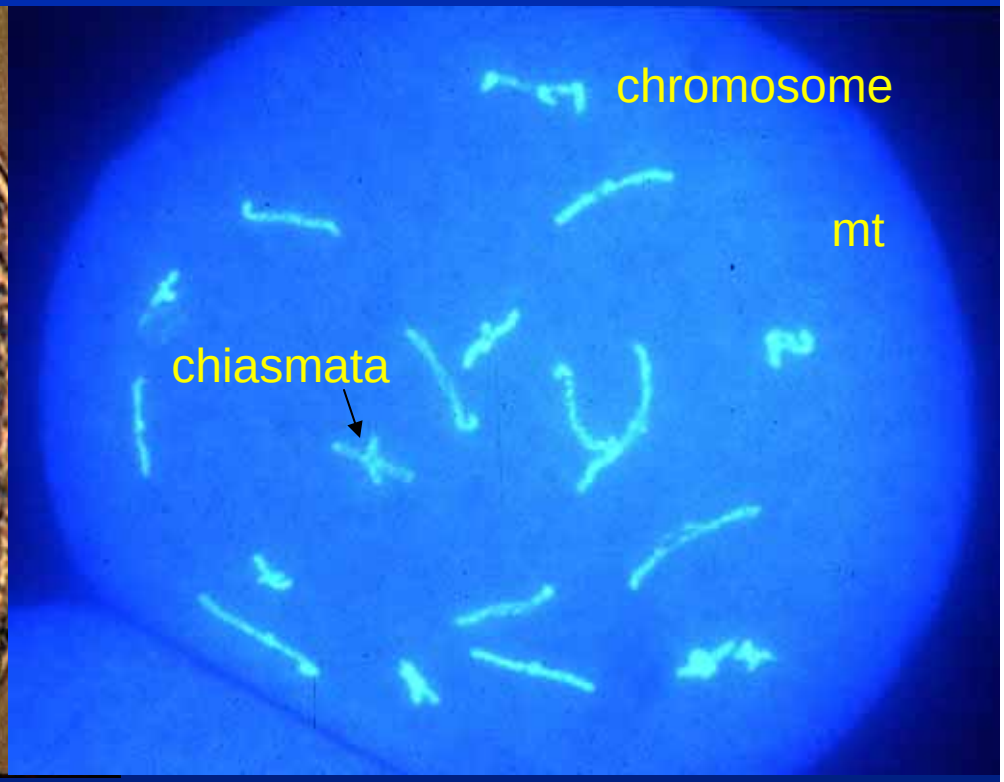
Maryland

Meiotic Maturation

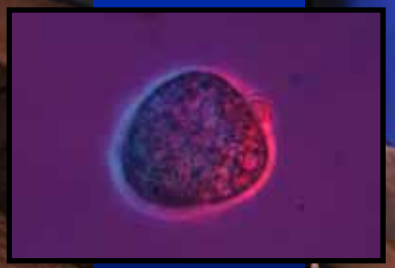
Oocyte



Prophase



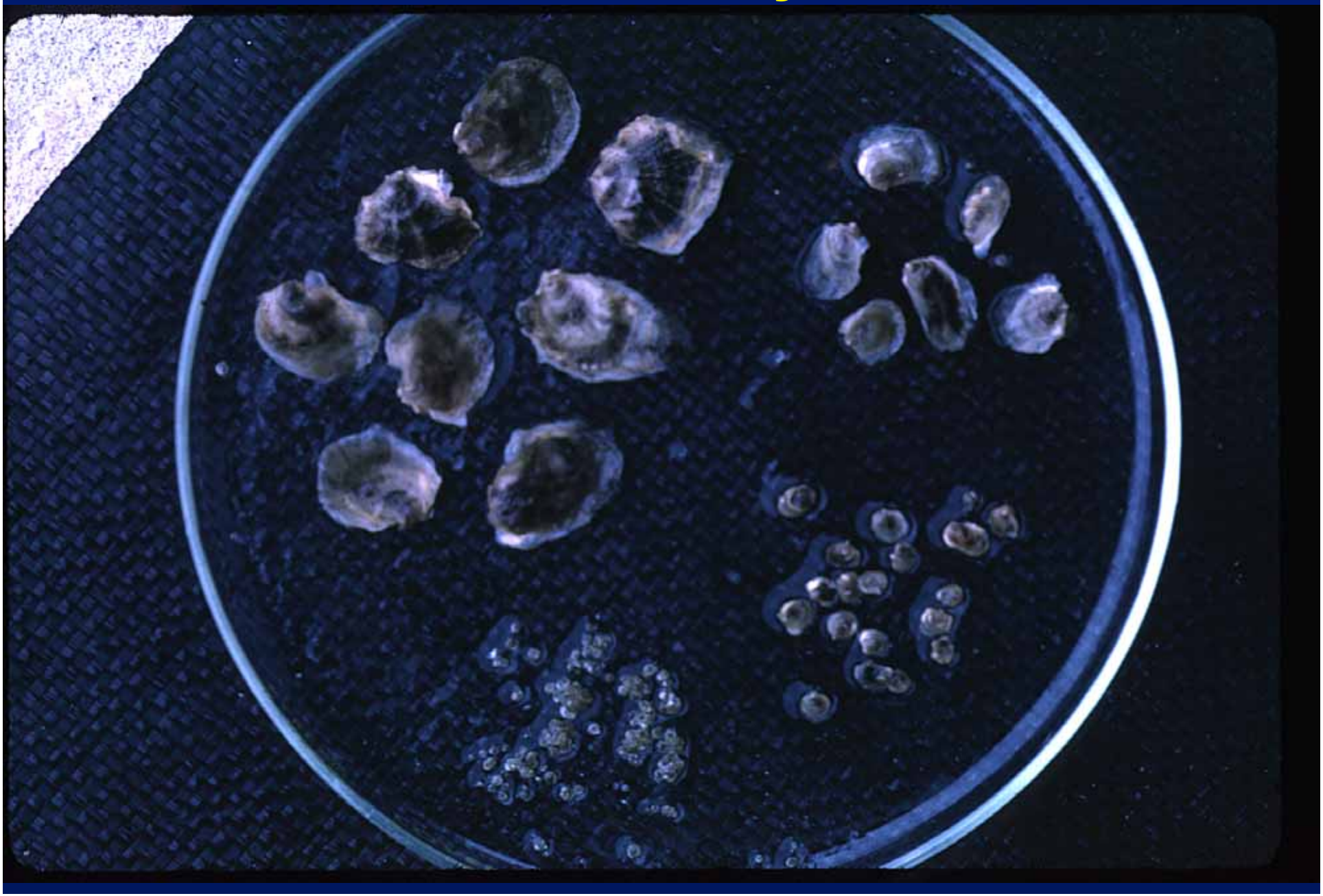
Culling of “Slow” Growers



“Setting”

Microcultch Preparation

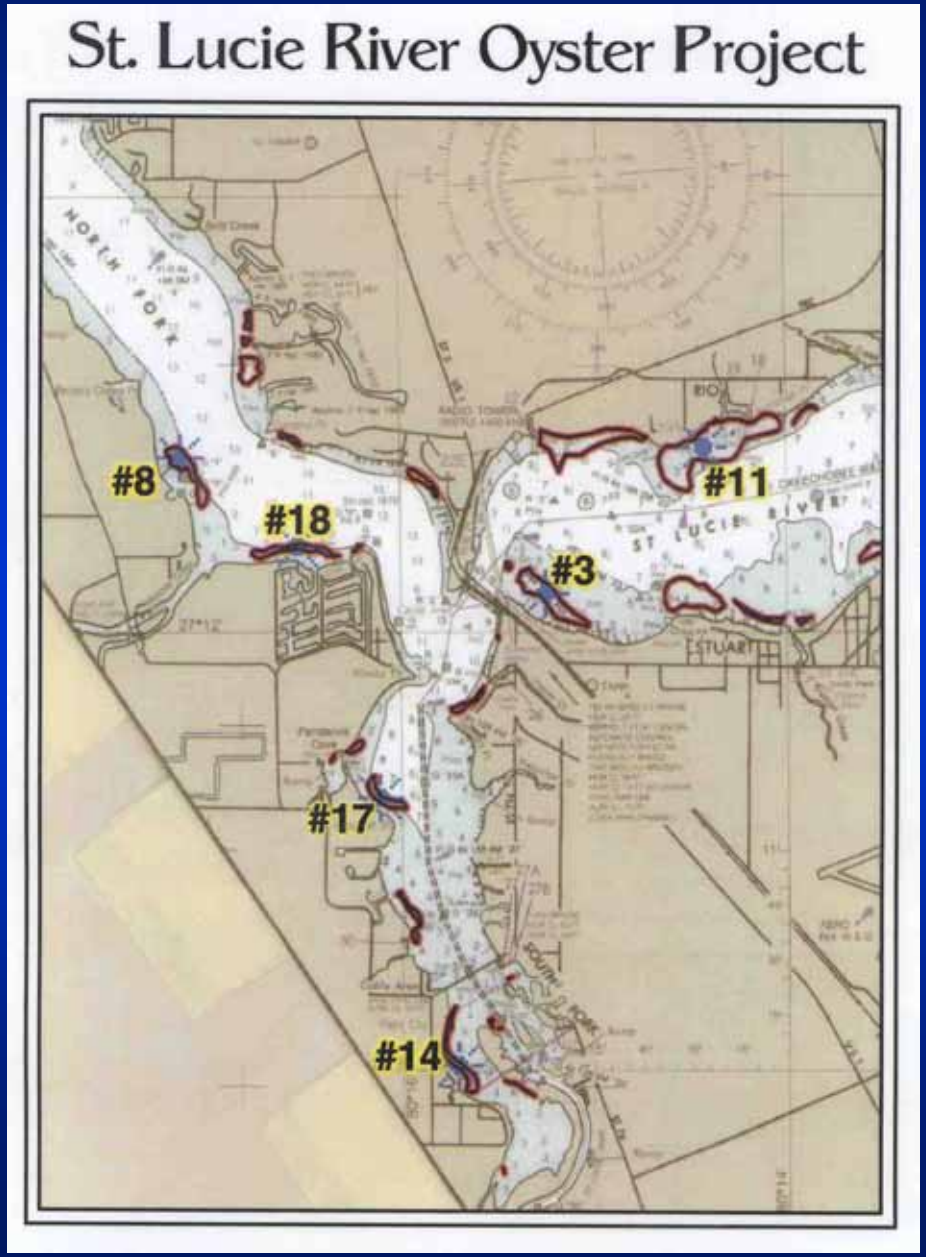
Microcultch Oysters



Oysters on Cultch

Spat on Shell (SOS)

Genetic Diversity - Geographic



Induced Spawning

♂

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Effective Parental Number

$$N_e = \frac{(4N_mN_f)}{(N_m + N_f)}$$

Where:

N_e = Effective Parental Number (20?)

N_m = Number of Contributing Males

N_f = Number of Contributing Females

Effective Parental Number

♀	♂	Total Spawners	Ne
10	10	20	20
9	11	20	19.8
8	12	20	19.2
7	13	20	18.2
6	14	20	16.8
5	15	20	15
1	19	20	3.8
7	18	25	20.2
6	30	36	20
5	195	200	19.5

Breeding Contribution
Equal Gametic (nuclear/mt)

	♂a	♂b	♂c	♂d	♂e
♀A	Aa	Ab	Ac	Ad	Ae
♀B	Ba	Bb	Bc	Bd	Be
♀C	Ca	Cb	Cc	Cd	Ce
♀D	Da	Db	Dc	Dd	De
♀E	Ea	Eb	Ec	Ed	Ee

Breeding Contribution
Un-Equal Gametic

	♂a	♂b	♂c	♂d	♂e
♀A	Aa	Ab	Ac	Ad	Ae
♀B	Ba	Bb	Bc	Bd	Be
♀C	Ca	Cb	Cc	Cd	Ce
♀D	Da	Db	Dc	Dd	De
♀E	Ea	Eb	Ec	Ed	Ee

Breeding Contribution
Un-Equal Gametic

	♂a	♂b	♂c	♂d	♂e
♀A	Aa	Ab	Ac	Ad	Ae
♀B	Ba	Bb	Bc	Bd	Be
♀C	Ca	Cb	Cc	Cd	Ce
♀D	Da	Db	Dc	Dd	De
♀E	Ea	Eb	Ec	Ed	Ee

Breeding Contribution
Un-Equal Gametic/Larval Survival

	♂a	♂b	♂c	♂d	♂e
♀A		Ab		Ad	
♀B					
♀C			Cc	Cd	
♀D					De
♀E		Eb	Ec		

Breeding Contribution
Unintended Selection (nuclear/mt)

	♂a	♂b	♂c	♂d	♂e
♀A	Aa	Ab			
♀B	Ba	Bb			
♀C					
♀D					
♀E					

Questions

- What is the mission of restoration?
- How do we balance genetic diversity with repopulation; which is more important?

This is Oyster Restoration!