

# 200 Proof

## Distilling Data from the Oyster Bar



Carol B. McCollough

Phillips Wharf Environmental Center

MGO Coordinators' Meeting

March 26, 2015

Chesapeake Beach, MD

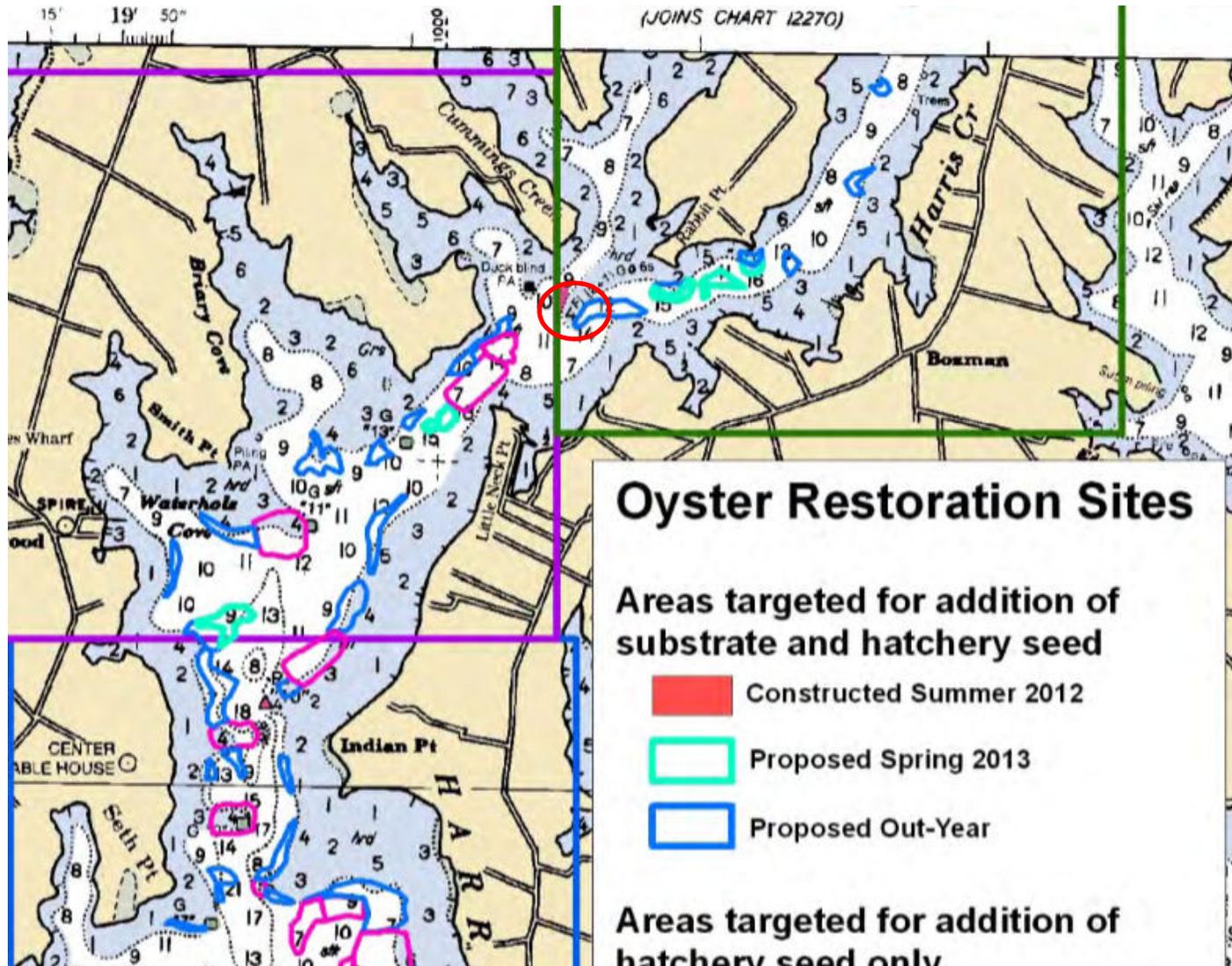
# Do MGO Programs Achieve Restoration Goals?

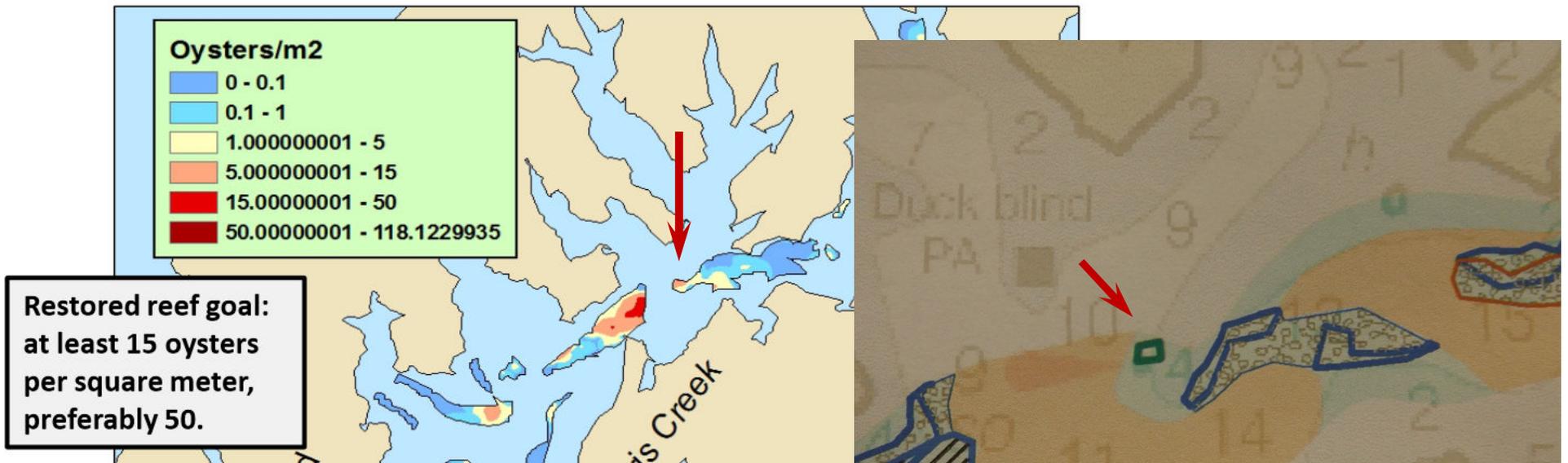
Restoration goals are defined in the **2011 Restoration Goals, Quantitative Metrics and Assessment Protocols for Evaluating Success on Restored Oyster Reef Sanctuaries** document developed by the Oyster Metrics

Workgroup and submitted to the Sustainable Fisheries Goal Implementation Team of the **Chesapeake Bay Program**

- Minimum oyster density  $\geq 15$  oysters / m<sup>2</sup>
- Target oyster densities  $\geq 50$  oysters/m<sup>2</sup>
- At least 2 year classes on the bar
- Multiple year classes 2 years post-restoration
- 30% of bar area covered in oysters

# Camp Werthehekawee





Rabbit Island bar,  
Harris Creek, Talbot Co.

0.2 acre box  
115' x 74' x 96' x 80'

On the short dimension,  
the site is only 2  
workboat lengths across.

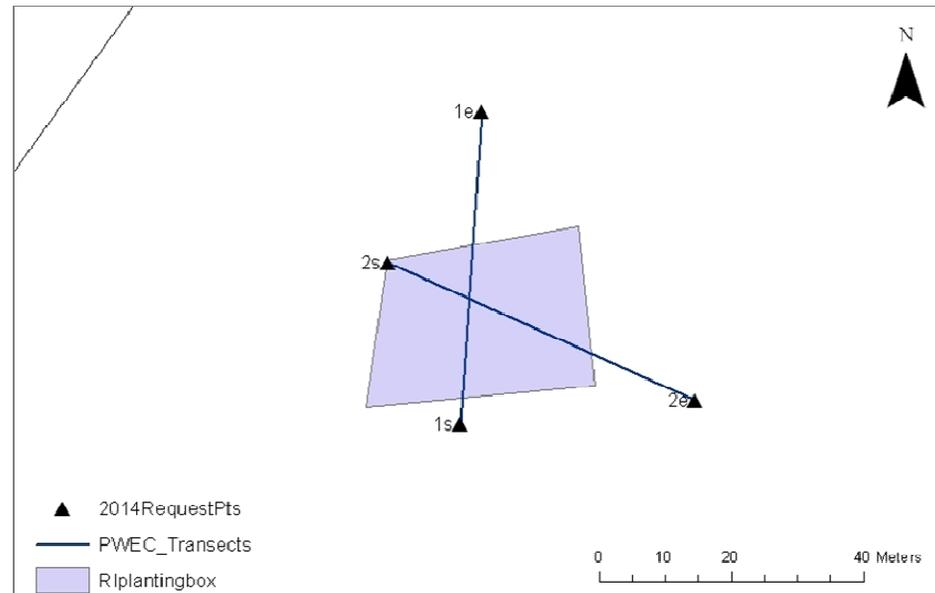


# How Can We Find Out If We're Meeting Goals?

- **Dive sampling** is necessary to obtain good density data. Patent tong sampling could be used instead. PWEC recruited the UMD dive team from Paynter Labs to collect samples during their regular sampling cruise in Harris Creek.
- **Dredge sampling** is preferred to obtain sufficient oysters to generate strong age data. Patent tong sampling would be as good. PWEC biologists assisted DNR with the Fall Survey on Harris Creek and were allowed to sample our restoration site. We provided our data to DNR in return.

# May 2014 Dive Sample

2 transects - 10 0.25 m<sup>2</sup> quadrats (2.5 m<sup>2</sup> total area)



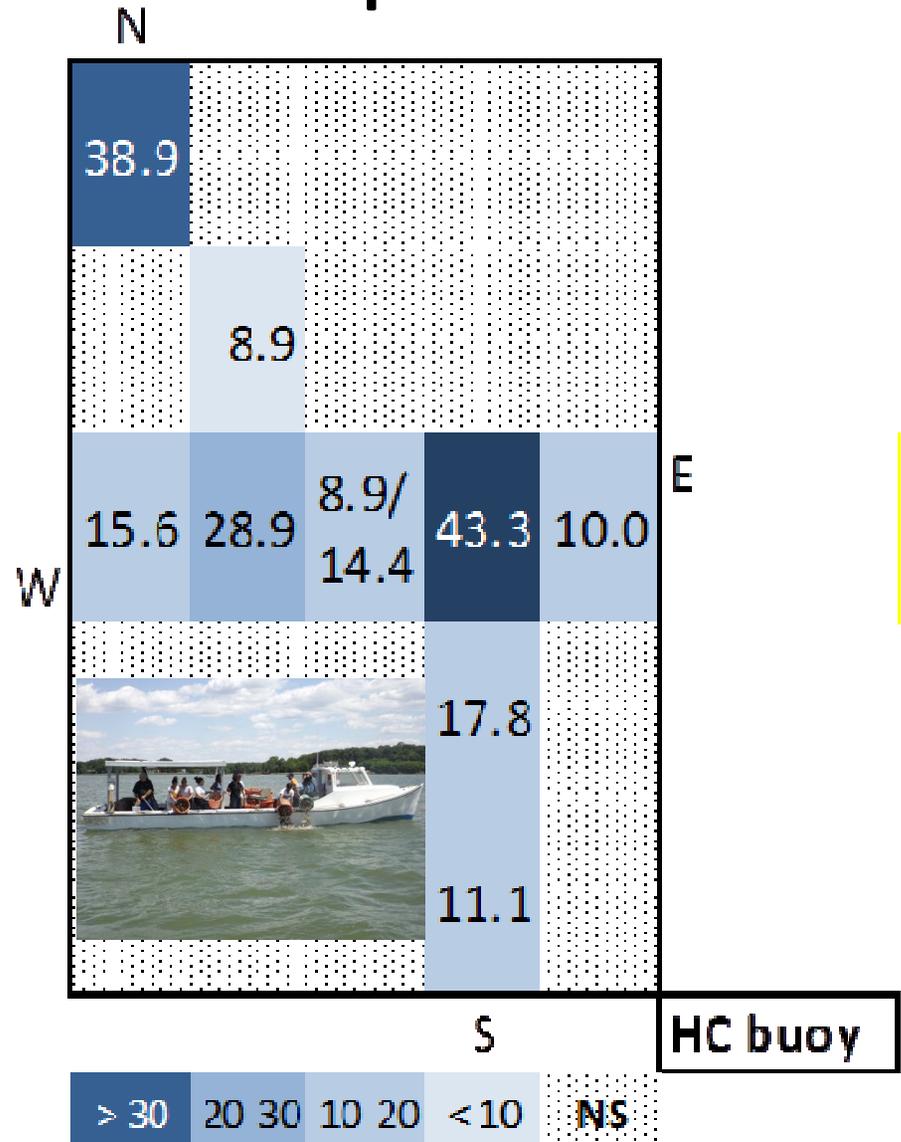
|         | live | boxes | clumps | singles | mean<br>shell<br>height | min shell<br>height | max shell<br>height | median<br>shell<br>height | %<br>mortality | mean<br>density |
|---------|------|-------|--------|---------|-------------------------|---------------------|---------------------|---------------------------|----------------|-----------------|
| on site | 178  | 17    | 27     | 50      | 82.6                    | 43                  | 183                 | 83.5                      | 8.7%           | 19.8            |
| outside | 17   | 3     | 0      | 17      | 105.5                   | 65                  | 140                 | 110.0                     | 16.7%          | 1.7             |

# May 2014 Dive Sample

Densities 8.9 to 43.3 oysters/m<sup>2</sup>.

- mean density of 19.8 oysters/m<sup>2</sup>.
- > minimum threshold of 15 oysters/m<sup>2</sup> recommended by the Oyster Metrics Workgroup
- substantially > the mean density of 1.7 oysters/m<sup>2</sup> found on the surrounding hard bottom.

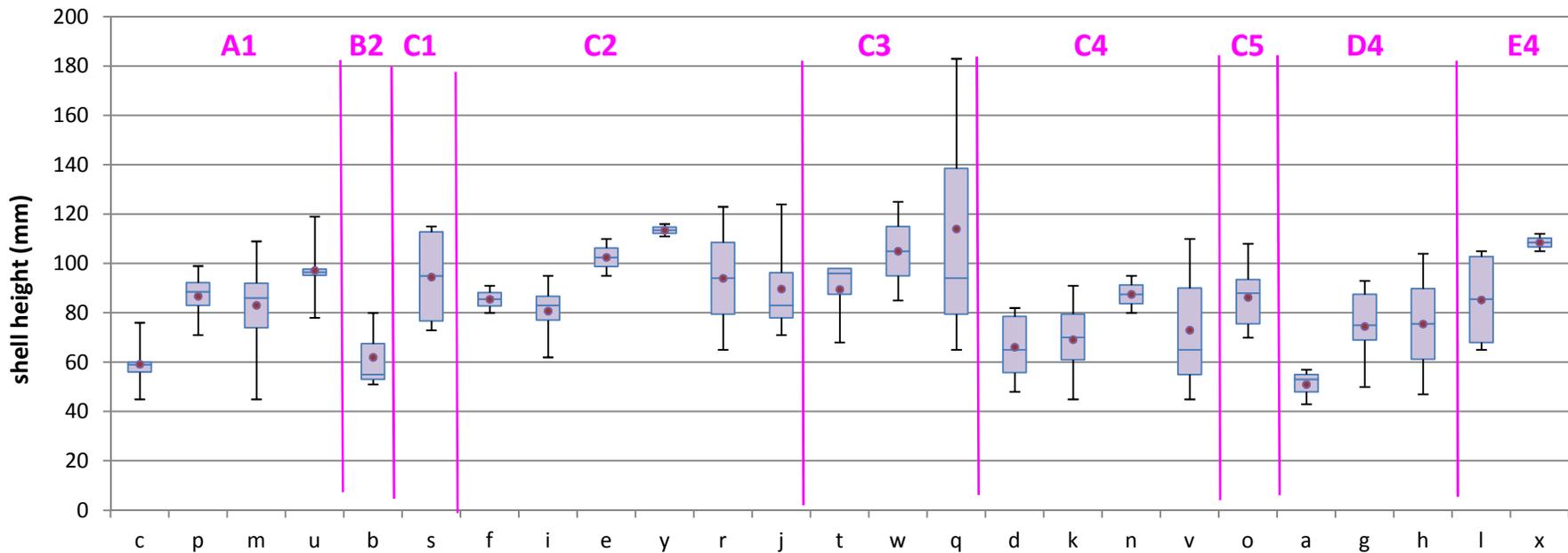
The density diagram shown was used to focus the 2014 planting in the SW quadrant of the restoration site.



# May 2014 Dive Sample

## Shell Heights by Clump

Box Plots sorted by grid

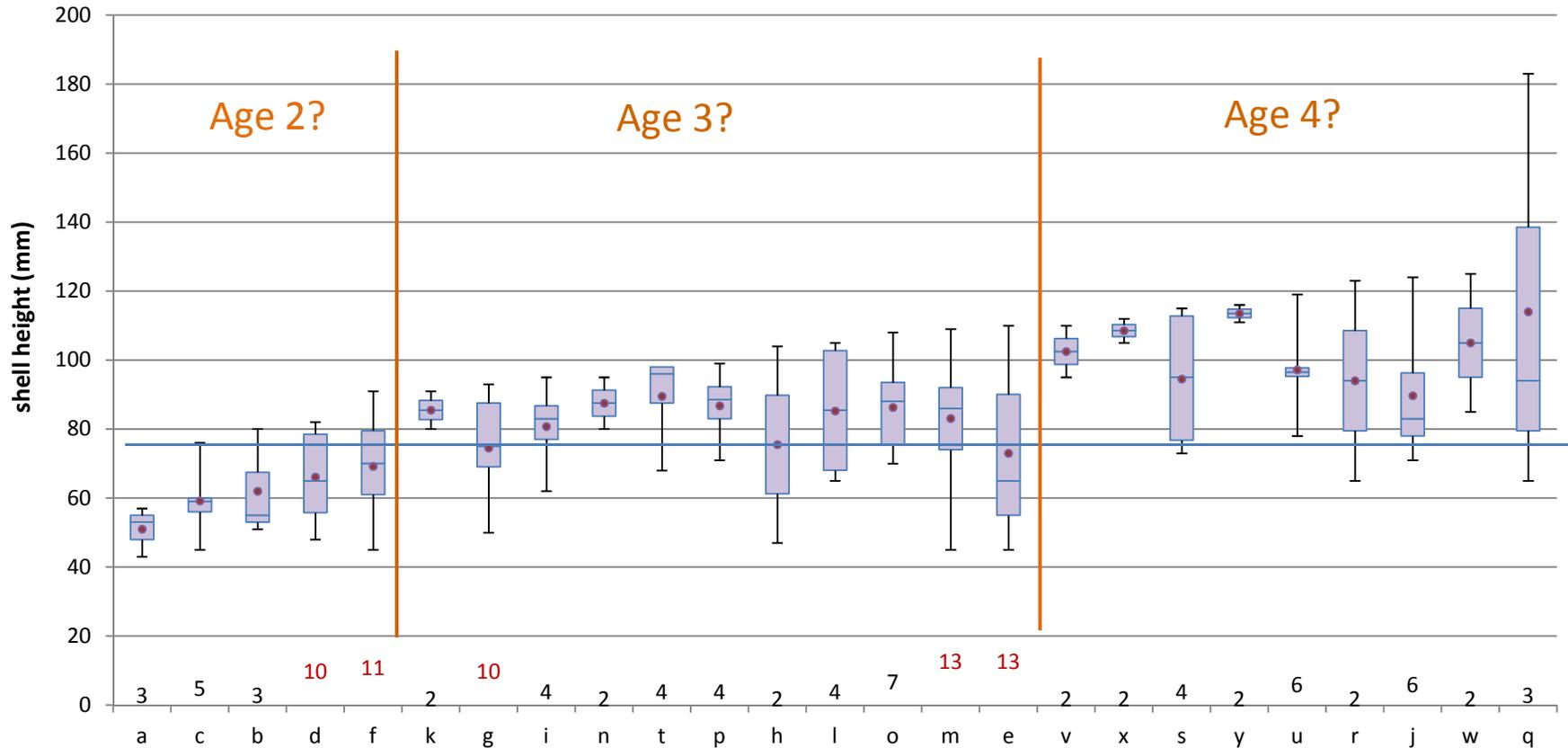


|    |    |    |    |    |
|----|----|----|----|----|
| a1 | a2 | a3 | a4 | a5 |
| b1 | b2 | b3 | b4 | b5 |
| c1 | c2 | c3 | c4 | c5 |
| d1 | d2 | d3 | d4 | d5 |
| e1 | e2 | e3 | e4 | e5 |

# May 2014 Dive Sample

## Shell Heights by Clump

Box Plots sorted by maximum shell height



128 oysters in 25 clumps

# MFS 2014 Dredge Sample



|                  |                     |
|------------------|---------------------|
| SALINITY         | 11.2                |
| TEMPERATURE      | 14.8° C             |
| DEPTH            | 8'                  |
| TOW DISTANCE     | 54'                 |
| SAMPLED AREA*    | 13.4 m <sup>2</sup> |
| VOLUME COLLECTED | ~1.1 bu             |
| SAMPLE SIZE      | 0.5 bu              |



|           | live | N/bu | proportion<br>of sample | min shell<br>height | max shell<br>height | typical<br>size | boxes | mortality |
|-----------|------|------|-------------------------|---------------------|---------------------|-----------------|-------|-----------|
| MARKET    | 52   | 104  | 27.4%                   | 76                  | 120                 | 85              | 3     |           |
| SMALL     | 136  | 272  | 71.6%                   | 50                  | 75                  | 55              | 6     |           |
| SPAT*     | 2    | 4    | 1.1%                    | 32                  | 35                  | 33.5            |       |           |
| * natural | 380* |      |                         |                     |                     |                 |       | 4.7%      |

**\*28 oysters / m<sup>2</sup>**

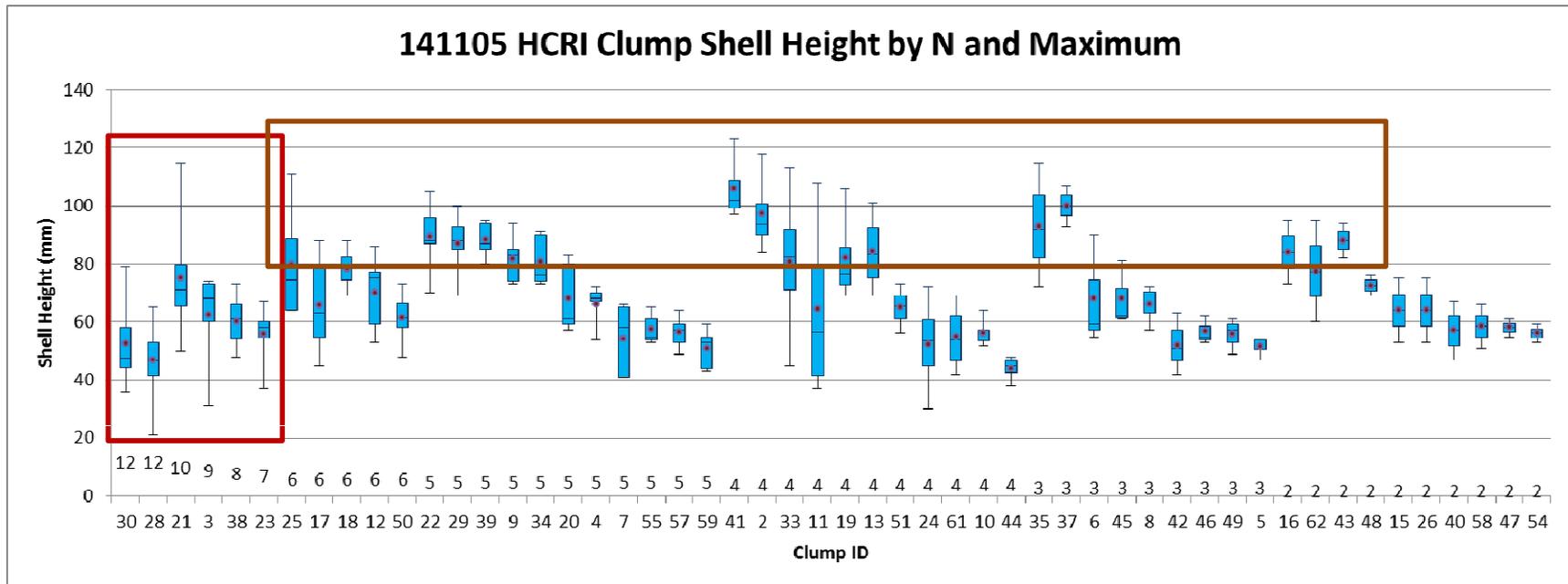
# MFS 2014 Dredge Sample

- Clumps were assessed visually for density (oysters/clump), oyster shell height, and oyster robustness (thickness).
- 322 oysters were measured and grouped by clump.

|        | N   | mean shell height |
|--------|-----|-------------------|
| market | 107 | 92.3              |
| small  | 215 | 57.8              |

- It was reasonably easy to distinguish oysters from the 2013 (smallest) and (largest) 2010+ year classes by size alone.
- The 2010+ year class oysters were also very robust. It proved impossible to visually differentiate between the 2011 and 2012 year classes.

# MFS 2014 Dredge Sample



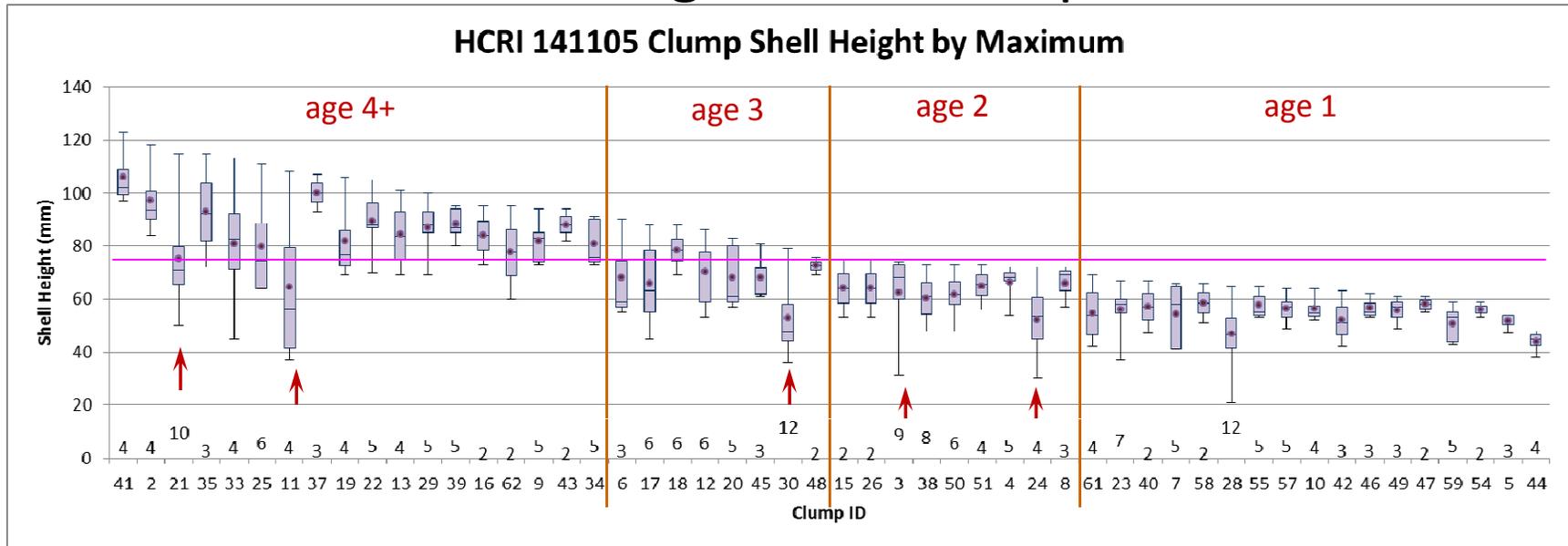
Large clumps are usually younger oysters, most likely age 1. They have not broken apart with growth or disturbance, and may contain both very small (runt) and atypically large (whopper) oysters.

Older oysters are more often found as singles or in smaller clumps of 2-5.

Knowing the typical setting density of each year class you plant is also helpful.

# MFS 2014 Dredge Sample

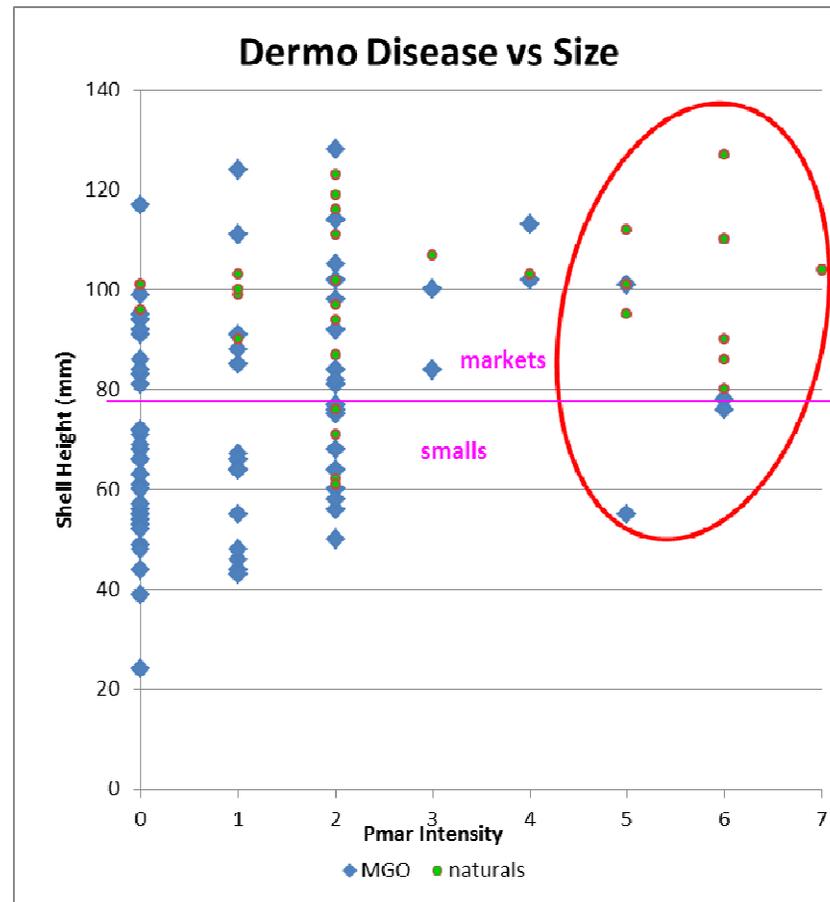
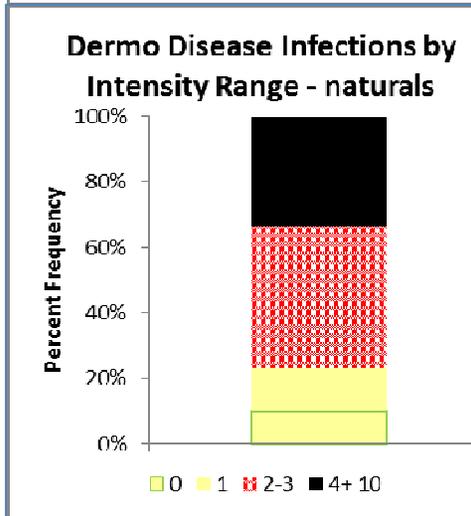
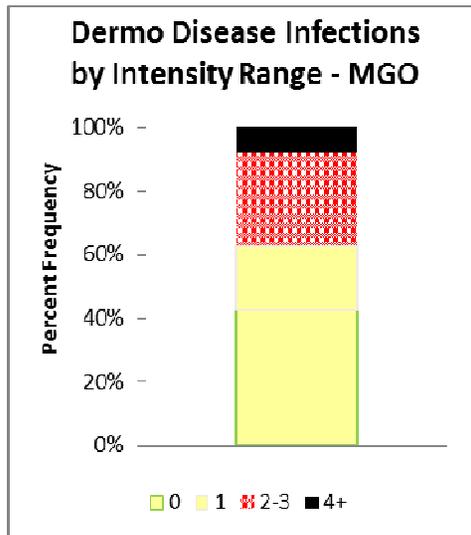
## estimated ages from clump data



**Who's Who???**

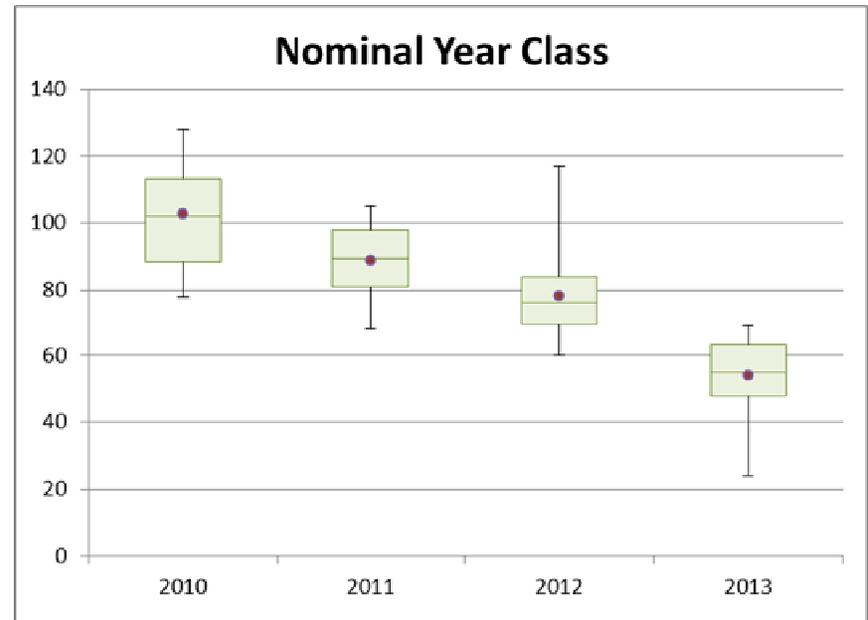
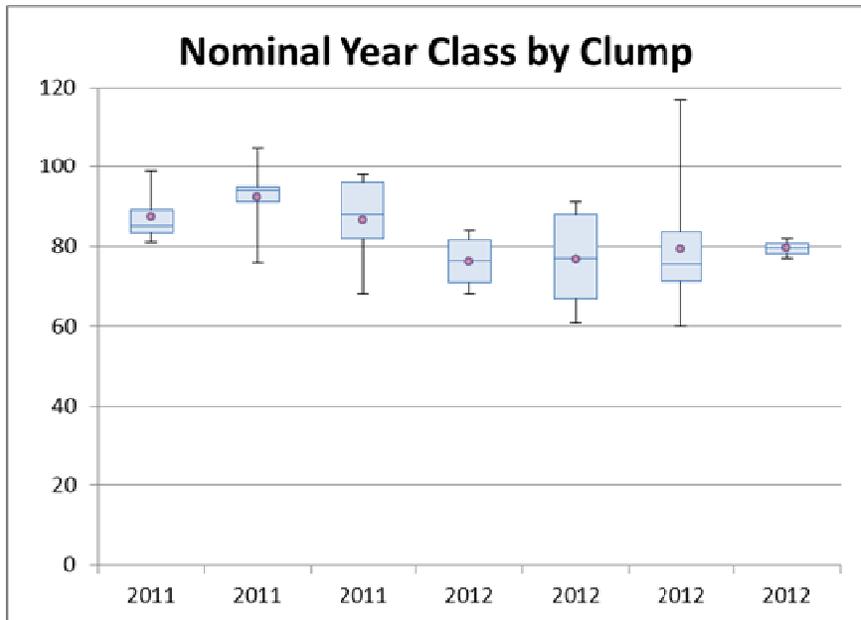


# MFS 2014, Dermo Disease



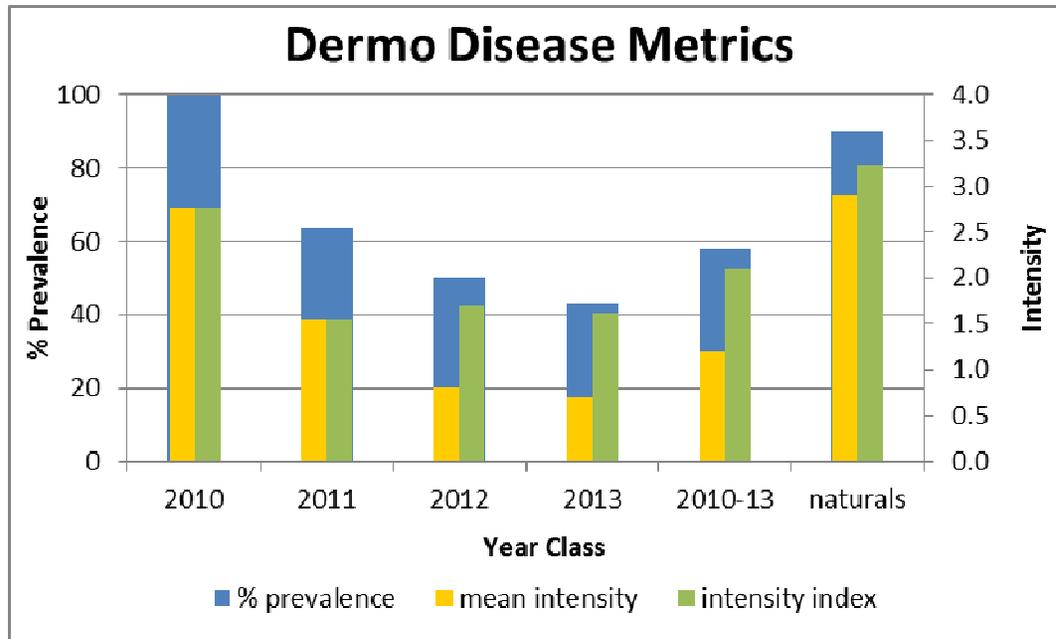
# MFS 2014, Dermo Disease

using box plots to assign year class to clumps with similar visual characteristics



# MFS 2014, Dermo Disease

| Nominal Year Class | N  | mean shell height (mm) | size range (mm) | % prevalence | mean intensity | intensity index |
|--------------------|----|------------------------|-----------------|--------------|----------------|-----------------|
| 2010+              | 13 | 102.6                  | 78-128          | 100          | 2.8            | 2.8             |
| 2011               | 14 | 88.8                   | 68-105          | 63.6         | 1.5            | 1.5             |
| 2012               | 20 | 78.2                   | 60-117          | 50.0         | 0.8            | 1.7             |
| 2013               | 30 | 54.1                   | 24-69           | 43.3         | 0.7            | 1.6             |
| 2010-13            | 77 | 74.9                   | 45-128          | 58.3         | 1.2            | 2.1             |
| naturals           | 30 | 97.5                   | 61-127          | 90.0         | 2.9            | 3.2             |



# Is TIGO Achieving Restoration Goals?

## 190 Proof

- **Yes: > 15 oysters / m<sup>2</sup>** on average
- Yes: approaching 50 oysters / m<sup>2</sup>
- **Yes: At least 2 year classes** on the bar
- **Yes: 4+ year classes** more than 2 years post-restoration **AND Evidence of natural spat set**
- Uncertain: 30% of bar covered? Side-scan sonar would answer this question, or a patent tong survey, although the latter would be very destructive to the bar.

X-Clacks-Overhead: GNU Terry Pratchett

