SEMAC Research Farm Network:
Test of Effects of Oyster Density on Growth and Survival
2005 Field Season

RFN Research Plan 2005:
A. Determine the effects of density on oyster growth and survival
   a. Collaboration between CCCE/SEMAC and RFN shellfish growers
      i. Each participant received 2 3-tier triple oyster racks (9 slots)
      ii. Placed bags of the appropriate density according to experimental
treatment assignment: 3 replicates of each of 5 densities
         1. Stocked 50, 100, 150, 200 or 250 oysters per bag
         2. Seed delivered at 9-13 mm; initially kept in 3 mm spat bags
         3. Growers tend and maintain bags and tiers

Mortality

There was no effect of oyster stocking density on oyster mortality (ANOVA, P = 0.561, F = 0.749, dF = 4,80), nor any interaction among density and farm (P = 0.839, F = 0.716, dF = 28,80). There was a significant effect of farm (P < 0.001, F = 18.022, dF = 7, 80), with one farm, the site in Pleasant Bay, Orleans, experiencing mortality (a mean of 11.4% mortality ± 2.5% SEM per bag) while the others experienced virtually none.

Fig. 1. Differences in oyster mortality grown at different farm sites. Different letters indicate significant differences (P ≤ 0.05)
Growth

Overall, over the course of this past season there was no effect of oyster stocking density (P = 0.386, F = 1.052, dF = 4,80), nor any interaction between density and farm site (P = 0.655, F = 0.868, dF = 28,80). Shell length did differ significantly among farms (P < 0.001, F = 128.821, dF = 7,80); comparing the farms (Fig. 3), Dennis and Martha’s Vineyard had the smallest oysters, while Wellfleet and Yarmouth had the largest.

Analysis of Variance
Dependent Variable: Oyster Shell Length
N = 120, R² = 0.921

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum-of-Squares</th>
<th>df</th>
<th>Mean-Square</th>
<th>F-ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocking Density</td>
<td>38.398</td>
<td>4</td>
<td>9.600</td>
<td>1.052</td>
<td>0.386</td>
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<tr>
<td>Farm</td>
<td>8232.023</td>
<td>7</td>
<td>1176.003</td>
<td>128.821</td>
<td>0.000</td>
</tr>
<tr>
<td>Density*Farm</td>
<td>221.818</td>
<td>28</td>
<td>7.922</td>
<td>0.868</td>
<td>0.655</td>
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<tr>
<td>Error</td>
<td>730.320</td>
<td>80</td>
<td>9.129</td>
<td></td>
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</tbody>
</table>

Fig. 2. Lack of differences in shell length of oysters grown at different stocking densities.
2005 Conclusions:
These data indicate that at least during the first growing season, there was no difference in the average survival or oyster shell length among the five tested densities. Thus, over the tested range, farmers could stock oysters at the highest density and not suffer any growth or survival ‘penalties’.

Additionally, there were once again significant differences among farms in terms of survival and growth. One site, the farm in Pleasant Bay (Orleans), suffered from heavy oyster drill mortality, which was insignificant at any other site. And to date the sites in Dennis and Martha’s Vineyard tend to exhibit relatively slow growth, while the sites in Lewis Bay (Yarmouth) and Wellfleet tend to experience relatively fast growth.
Effects of Oyster Densities Experiment:
Effects of Farms and Year 2005 - 2006

Significant oyster mortality was seen only in Orleans, caused by drills.
Orleans

Wareham

Cape Cod Cooperative Extension – SEMAC RFN Effects of Density on Oyster Growth and Survival 2005-2006
2006 Conclusions:

- Results depend heavily on site location of experiment.
- With increasing oyster densities, some sites had higher growth at the higher tested densities.
- Growth in second year oysters in the top rack level exceeded those in the middle and bottom rack levels; no significant differences during the first year.