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Overwintering Trials of the *notata* Quahaug in PEI

Background

Long cold winters in PEI can contribute to unacceptable levels of mortality in shellfish, particularly oysters and quahaugs. As part of the assessment of the *notata* quahaug (*Mercenaria mercenaria*) for aquaculture development in PEI, the Department of Fisheries, Aquaculture and Environment studied survival rates of *notata* and native quahaugs during three overwinter periods between 1999 and 2002. Methods used to hold the quahaug seed including bags on bottom, suspended bags, bags on rebar tables and seed in bottom plots are all used by industry. This study examined each of these techniques closely to determine which might represent the best technique to reduce overwinter mortality in 0+ (first year) quahaug seed.

Methods

During the winter of 1999-2000, hatchery produced 0+ *notata* quahaugs were compared to hatchery produced native 0+ quahaugs for differences in survival rates. The trial was repeated during the winters of 2000-2001 and 2001-2002, utilizing *notata* quahaugs only. Four different holding methods were utilized for the trials:

Method 1.

Bags (Vexar 4 mm mesh) containing quahaugs were held directly on top of the substrate in the Bideford River in approximately 15 feet of water.

Method 2.

Bags containing quahaugs were held on a rebar rack positioning the quahaugs approximately 2 feet above the bottom in 15 feet of water in the Bideford River.

Method 3.

Bags containing quahaugs were placed in an aluminum cage, and attached to a suspended longline in the Bideford River. The longline was sunk approximately 4 feet below the surface to avoid ice damage.

Method 4.

Quahaugs were seeded in 3ft² plots located in the intertidal zone in the Vernon River. The plots were covered with netting for 24 hours to allow the quahaugs time to dig into the substrate, temporarily protecting them from predators.

For all methods, the quahaugs were overwintered at densities of 250/ft². In 1999 the average size of the quahaug seed was 19.7 mm for the *notata* quahaugs and 20.4 mm for the native quahaugs. In 2000 and 2001, only *notata* quahaug seed was available from the Ellerslie hatchery. The average sizes of the *notata* seed were 20.1 mm in 2000 and 16.2 mm in 2001. The quahaugs were placed at the overwintering locations on November 3, October 20 and November 5 during 1999, 2000 and 2001, respectively. The quahaugs were recovered in the spring of each year as soon as possible after ice out on April 4, May 11, and May 1 (Methods 1,2&3) and May 28 (Method 4) during 2000, 2001 and 2002 respectively. Live quahaugs were counted and expressed as a percentage of the original number of quahaugs in the trial.

Results

The results from the 1999-2000 trial comparing *notata* and native quahaugs are recorded in Table 1. Three year (1999-2002) overwintering results utilizing *notata* quahaugs only are shown in Table

2. In Table 1 the results from the 1999-2000 trial showed slightly lower survival rates for *notata* over the native quahaug. During the three years, the lowest survival rates occurred in the quahaugs that were either held directly on the bottom in bags or in the substrate (Methods 1 and 4). This

Table 1. *Notata* vs. native quahaug overwintering results 1999-2000.

| Method | Stock | % Recovery* | % Survival | % Loss** |
|--------|---------------|-------------|------------|----------|
| 1 | Native | 96.7 | 63.3 | 36.7 |
| | <i>Notata</i> | 96.1 | 54.8 | 45.2 |
| 2 | Native | 97.1 | 84.4 | 15.6 |
| | <i>Notata</i> | 96.7 | 71.6 | 28.4 |
| 3 | Native | 98.7 | 86.0 | 14.0 |
| | <i>Notata</i> | 97.3 | 77.7 | 22.3 |
| 4 | Native | 72.4 | 68.9 | 31.1 |
| | <i>Notata</i> | 86.1 | 78.3 | 21.7 |

* Includes empty shells and live animals.

** Includes dead and missing animals.

occurred during a longer than normal period of ice cover in the winter of 2000-2001. A reduction in the mortality rates might be possible if broodstock is selected from quahaugs that survive several extended winters in PEI. Based on Table 2, the highest survival rates for all Methods (1- 4) occurred in 2001-2002 using quahaug seed from broodstock that had survived three winters.

Conclusion

This study clearly demonstrates that overwinter mortality is a significant factor in the production of native or recently introduced *notata* quahaugs in PEI. It appears that overwintering survival can be increased by suspending quahaugs within the water column particularly during long winters with extended periods of ice cover. However, survival rates of quahaugs held on or in the substrate may not be significantly different from quahaugs overwintered in the water column during winters with shorter (normal) periods of ice cover. Survival rates can be expected to vary between years and may be site dependent.

Table 2. *Notata* quahaug overwintering results 1999-2000, 2000-2001 and 2001-2002.

| Method | % Recovery* | | | % Survival | | | % Loss** | | |
|--------|-------------|-------|-------|------------|-------|-------|----------|-------|-------|
| | 99/00 | 00/01 | 01/02 | 99/00 | 00/01 | 01/02 | 99/00 | 00/01 | 01/02 |
| 1 | 96.1 | 95.1 | 95.9 | 54.8 | 14.5 | 78.6 | 45.2 | 85.5 | 21.4 |
| 2 | 96.7 | 98.8 | 81.3 | 71.6 | 77.5 | 80.4 | 28.4 | 22.8 | 19.6 |
| 3 | 97.3 | 98.2 | 94.8 | 77.7 | 65.1 | 93 | 22.3 | 35.5 | 8.9 |
| 4 | 86.1 | 81.0 | 86 | 78.3 | 5.8 | 80.1 | 21.7 | 94.2 | 19.9 |

* Includes empty shells and live animals.

** Includes dead and missing animals.

lower survival rate in Method 1 may have resulted when the bags on the bottom became covered in sediment, smothering the quahaugs. In addition, some difficulty recovering all of the quahaugs from the mud (Method 4) may have also contributed to the percent loss of quahaugs. The results showed that the superior method to overwinter *notata* quahaugs during the first winter was in the water column using either Method 2 or Method 3. The highest losses (94.2%, Method 4)

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