OVERWINTERING ALTERNATIVES FOR EASTERN OYSTERS (*CRASSOSTREA VIRGINICA*) FARMED IN DELAWARE BAY

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Introduction

- Oysters are often farmed intertidally in Delaware Bay, where they provide habitat as they filter the turbid waters
- High mortalities can occur during winter months due to ice and harsh temperature fluctuations, reducing efficiency and profitability for farmers (Figure 1)
- This study aimed to reduce mortalities by overwintering oysters in cold storage.

A

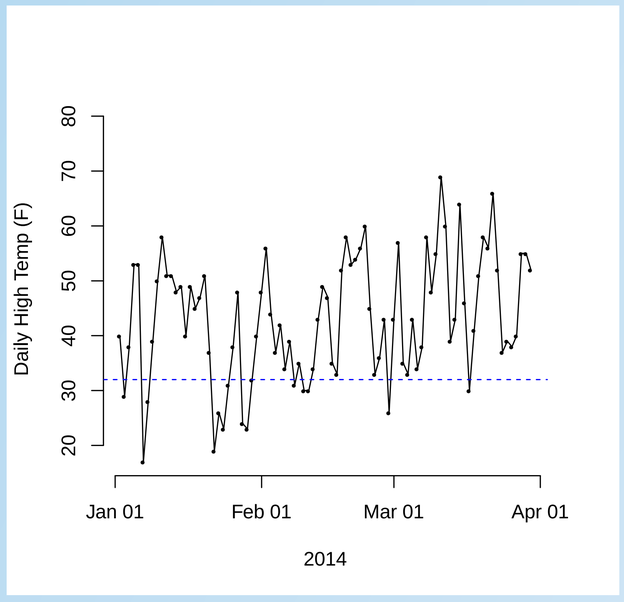

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Figure 1: (A) High temperatures during winter 2014 show numerous freeze-thaw cycles that stress oysters. (B) Delaware Bay oyster farm in winter during warm period above freezing. (C) Same farm when temperatures fall below freezing

Methods

- Two year-classes of oysters were placed in three treatment groups (intertidal flats, subtidal, cold storage)
- Oysters remained in treatments from December 2019 until March 2020, when they were returned to the intertidal farm
- Survival was assessed month thru October 2020
- Size and weight were measured in December, March, June, and October to calculate condition index.
- Dermo and MSX disease prevalence was assessed in December, June and October.

A

Year Class	Intertidal	Subtidal	Cold Storage
2018	5 bags	5 bags	5 bags
2019	5 bags	5 bags	5 bags

B

C

D

Figure 2: (A) Schematic of experimental design. (B) Sampling on the intertidal flats. (C) Oysters stored subtidally. (D) Oysters held in cold storage.

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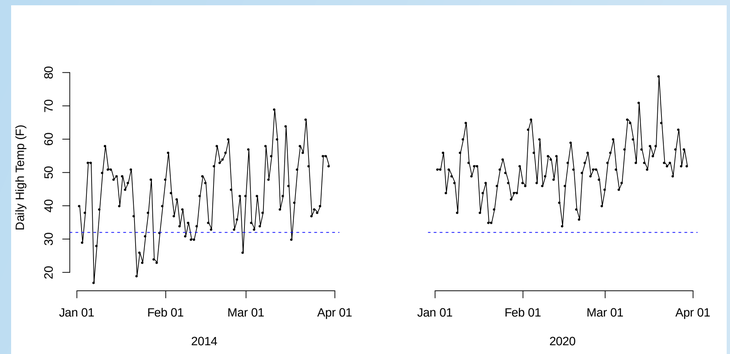
Results

Figure 3: Winter of 2020 experienced no daily high temperatures below freezing in contrast to the high variability winter of 2014.



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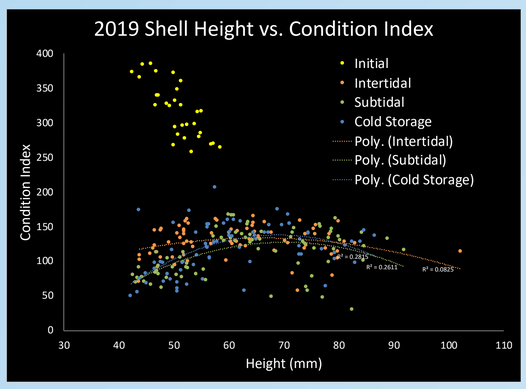

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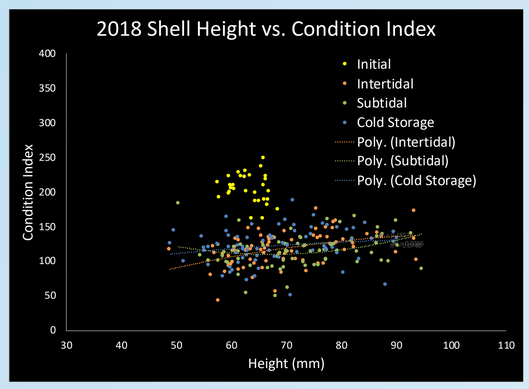


Figure 4: Oysters have a greater condition index (CI) in December as they prepare for winter. (A) younger oysters have a higher CI (B) older age class of oysters have slowed their growth rate

Figure 5: Oysters were placed into treatments with low Dermo and sustained low Dermo levels until June, increasing to lethal levels (>1.5) by October.

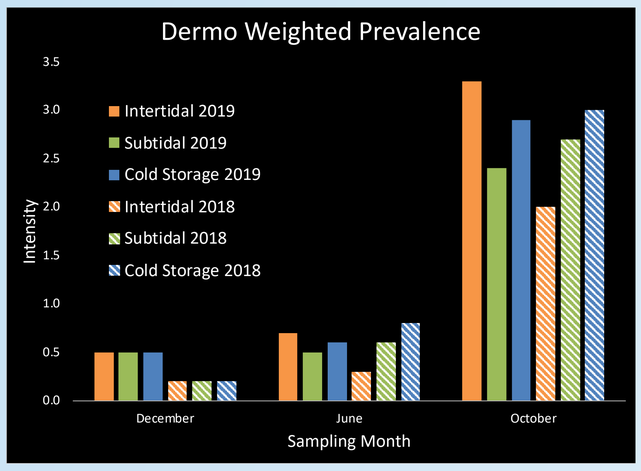


Figure 6: Oysters were in relatively good condition at the start of the experiment.

Condition dropped across all groups by March and remained low through October with no consistent differences across treatments.

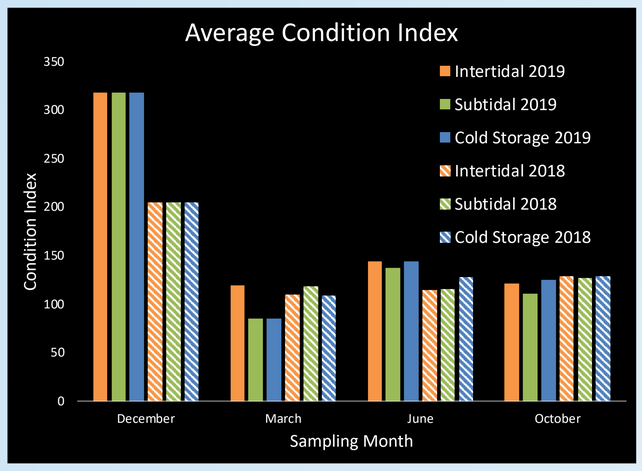
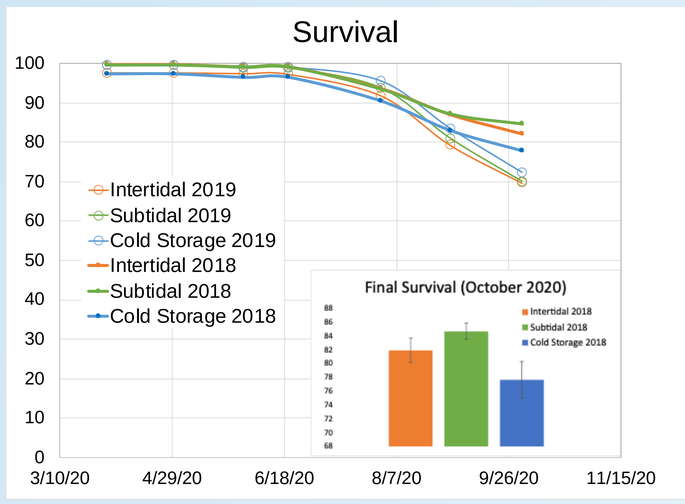


Figure 7: Survival was high through June, then started to decline as Dermo increased.

Survival was higher in 2018 class, suggesting susceptible oysters had died during the previous year.

Final survival for the 2018 year-class was lowest for cold storage oysters.



Conclusion

Because 2020 was a mild winter, all treatment groups performed similarly. These results indicate that cold storage is a viable alternative to overwinter oysters. In harsh and variable conditions (e.g., 2014), oysters in cold storage are expected to perform better.