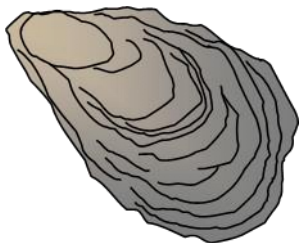


Oyster Model

Objective: evaluate potential impacts of future changes in hypoxia on living resources in Chesapeake Bay – oysters provide a test organism

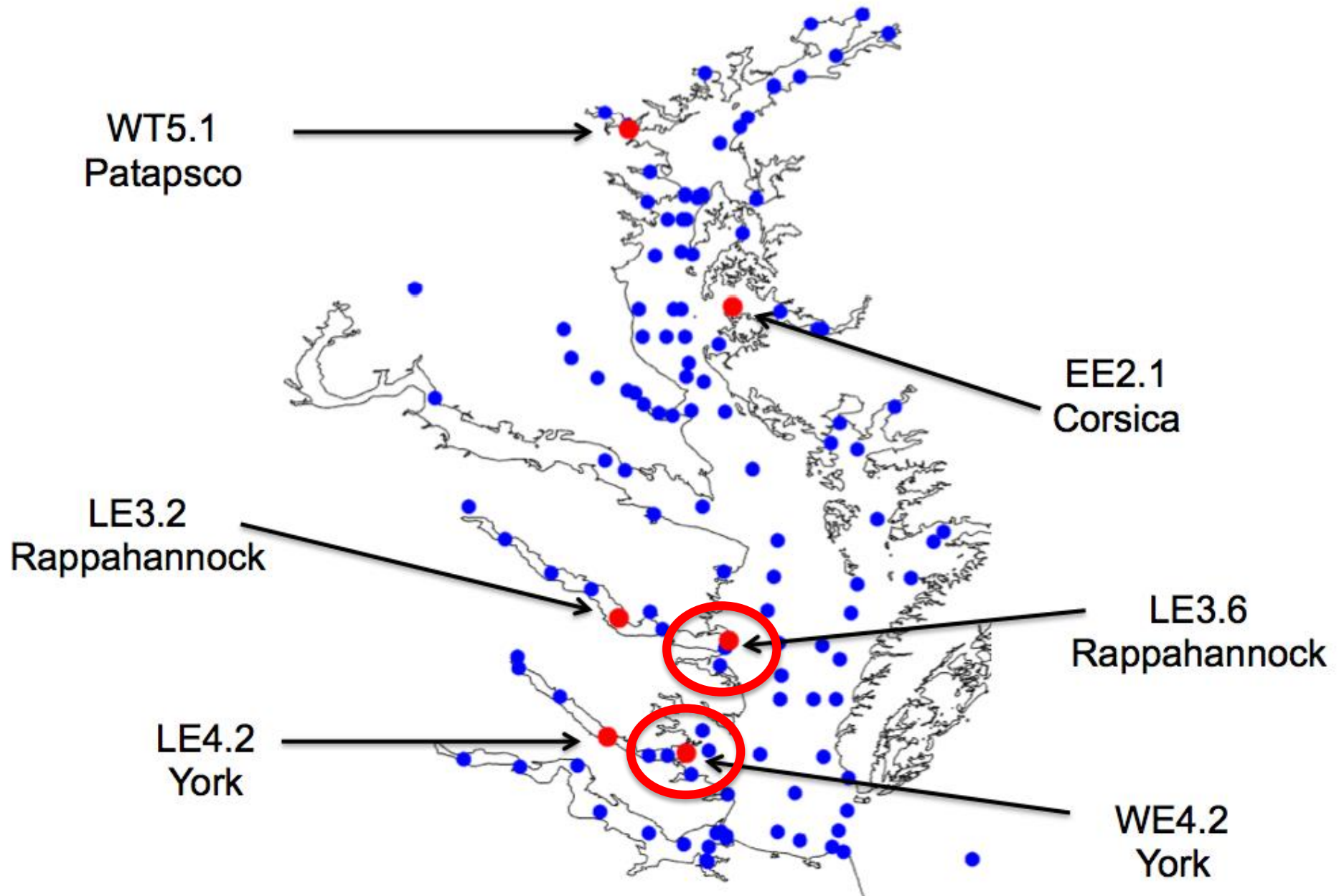


Oyster Model

- Focus is *Crassostrea virginica* (Eastern oyster)
- Model simulates post-settlement population dynamics (growth, reproduction, mortality)
- Includes larval, Dermo disease, MSX disease and genetics submodels
- Inputs are temperature, salinity, food, turbidity, bottom velocity
- Outputs are total number, population size frequency, reproductive capacity, mortality distribution, disease prevalence and intensity
- Model applied in a time-dependent mode at specific locations in Chesapeake Bay

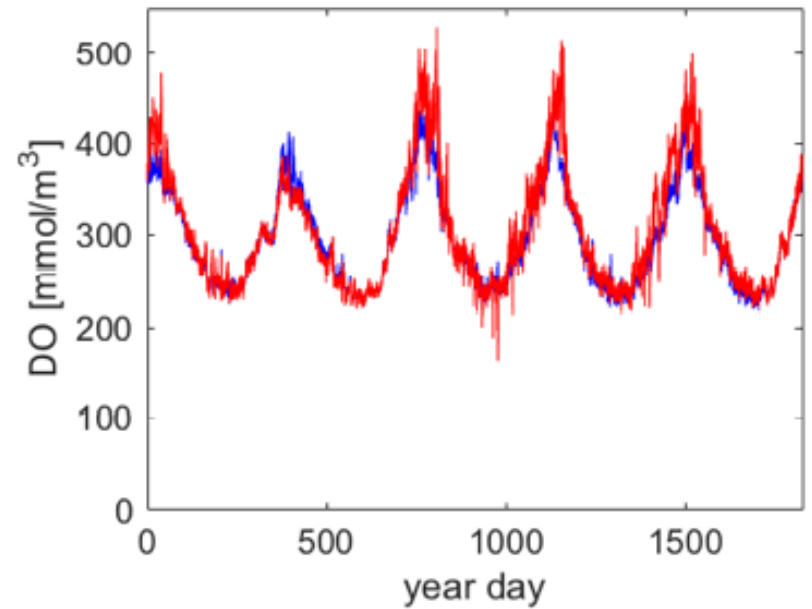
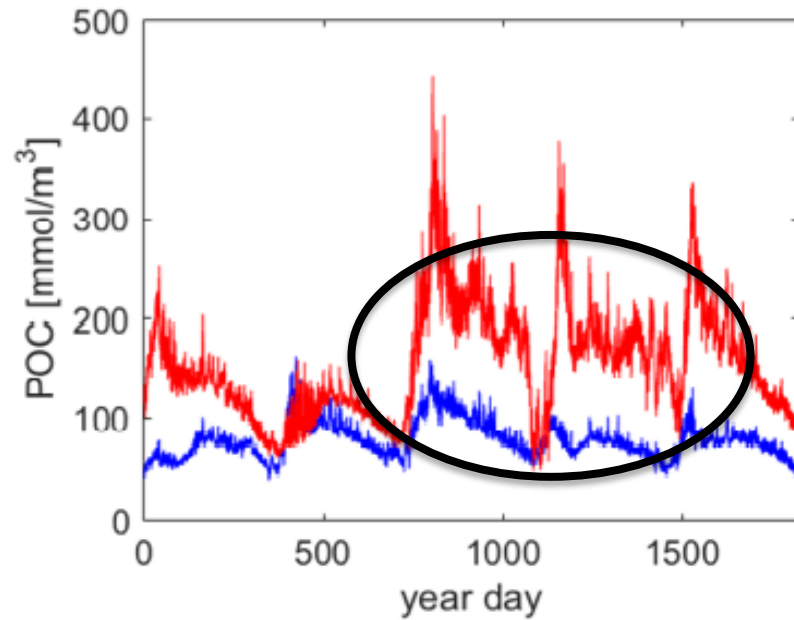
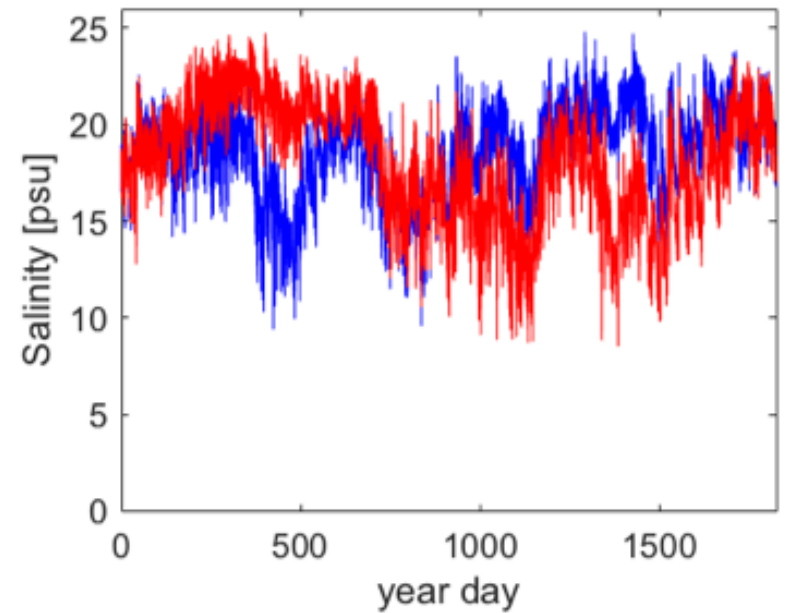
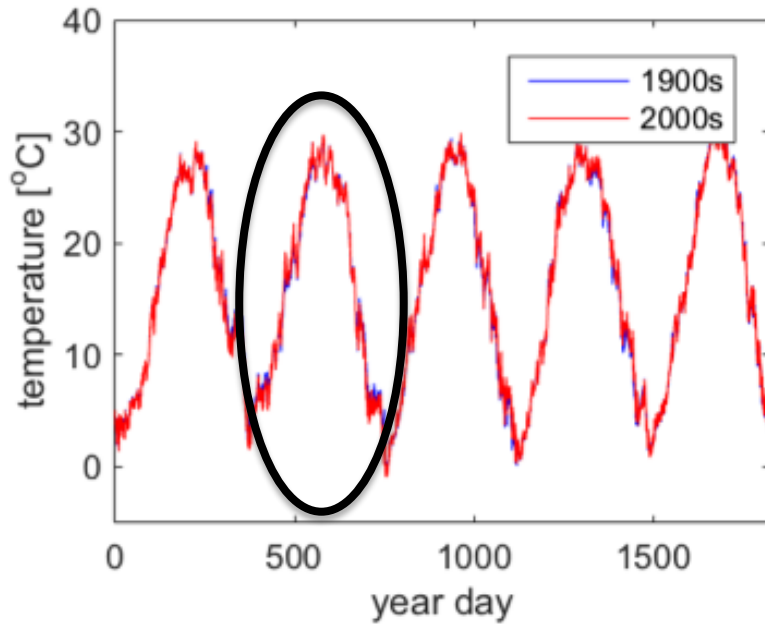


Chesapeake Bay Program Stations

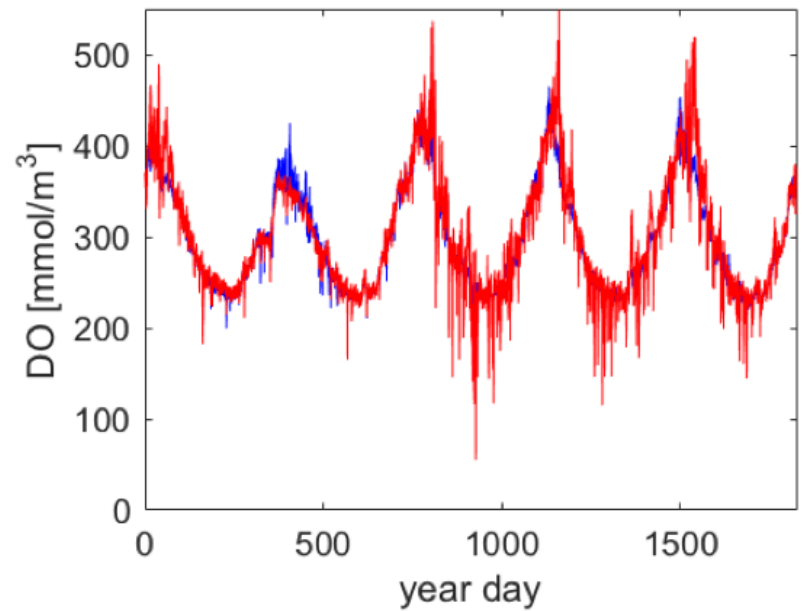
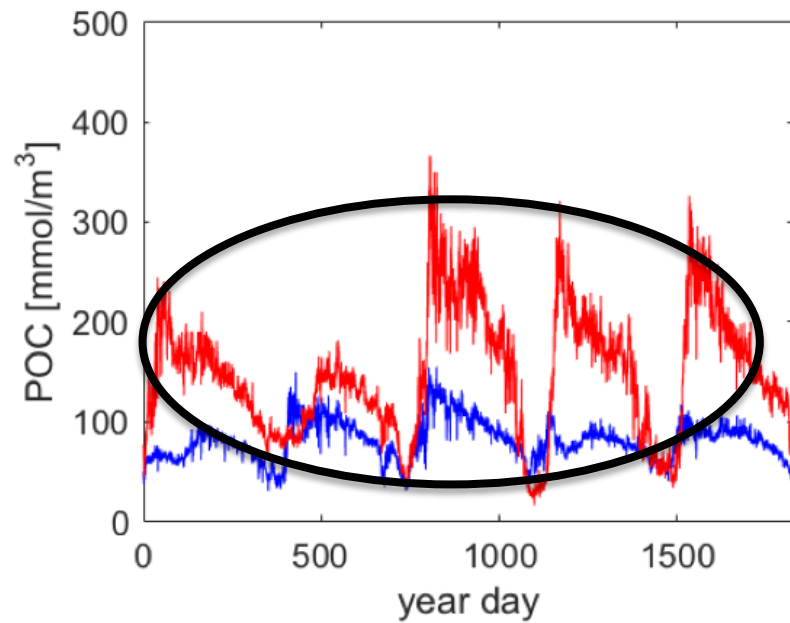
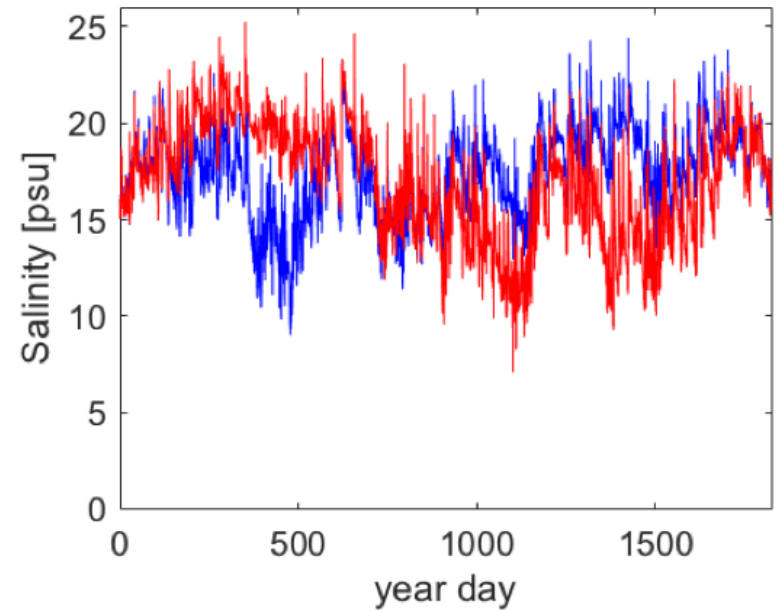
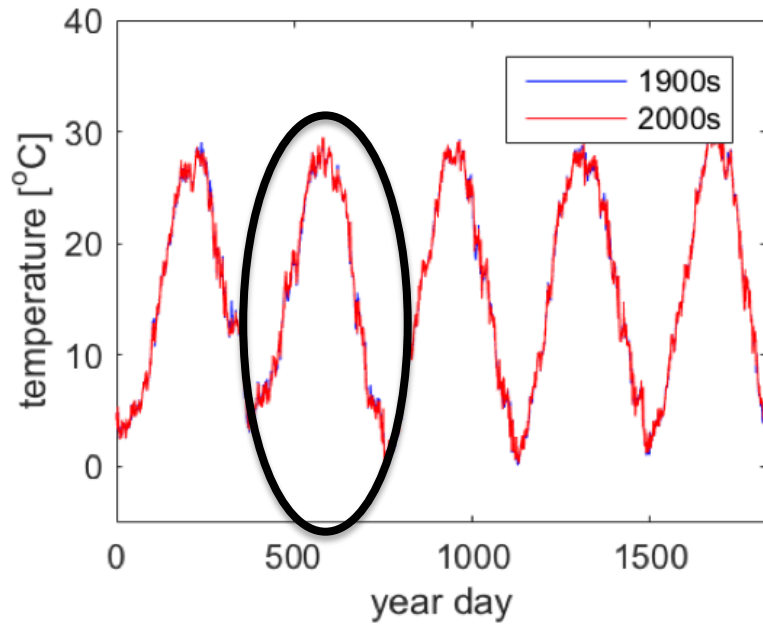


CB Biogeochemical Model

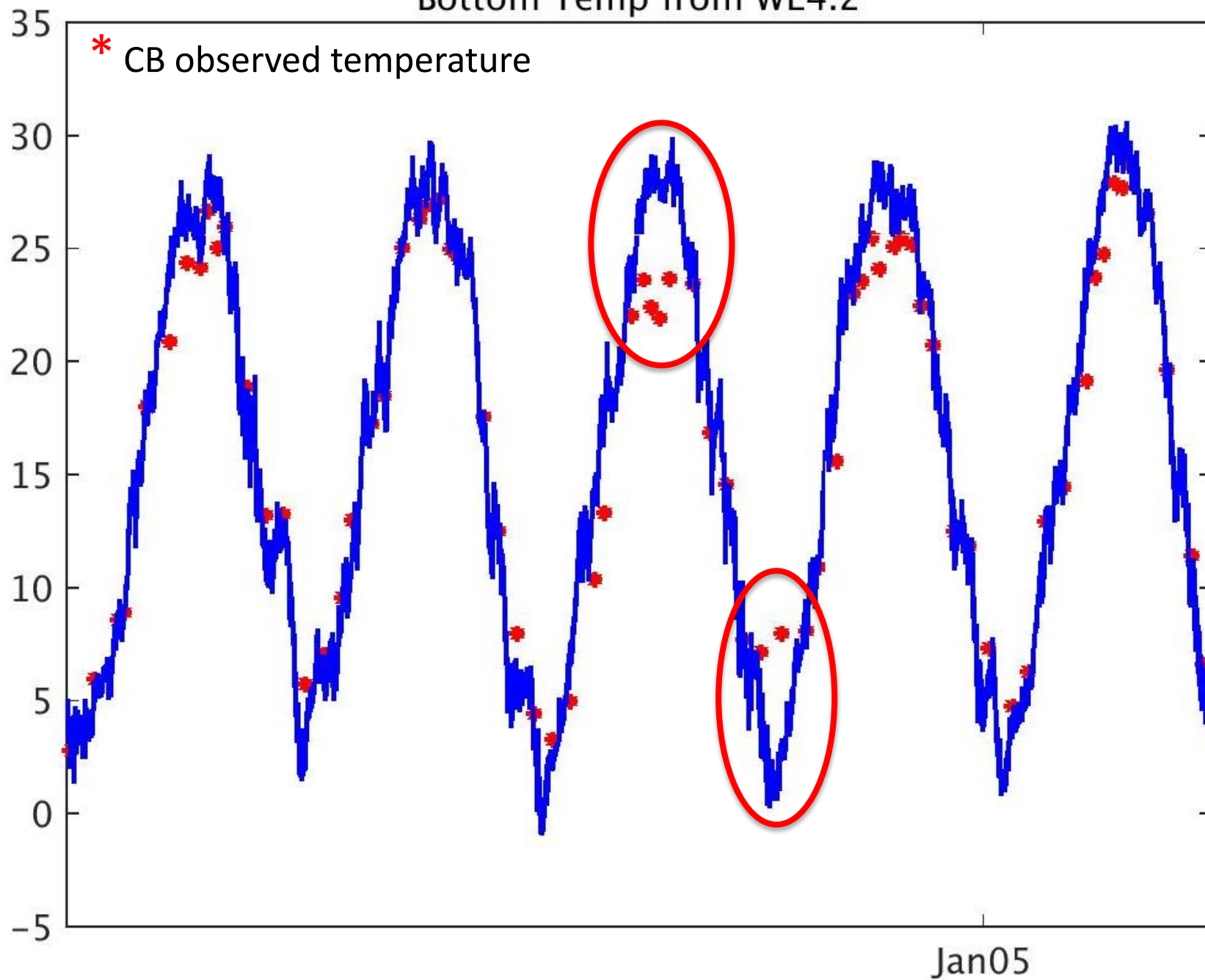
WE4.2



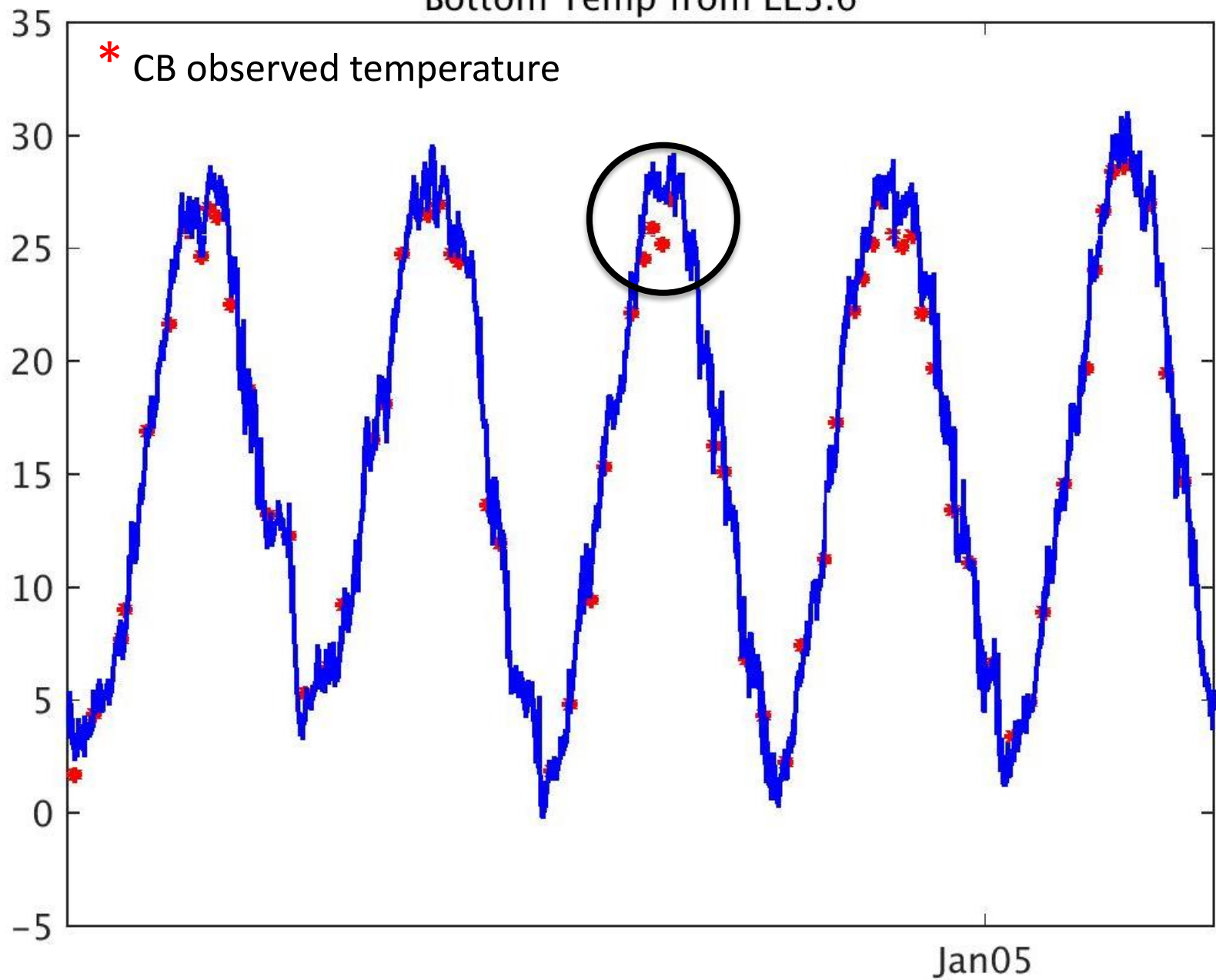
LE3.6



Bottom Temp from WE4.2



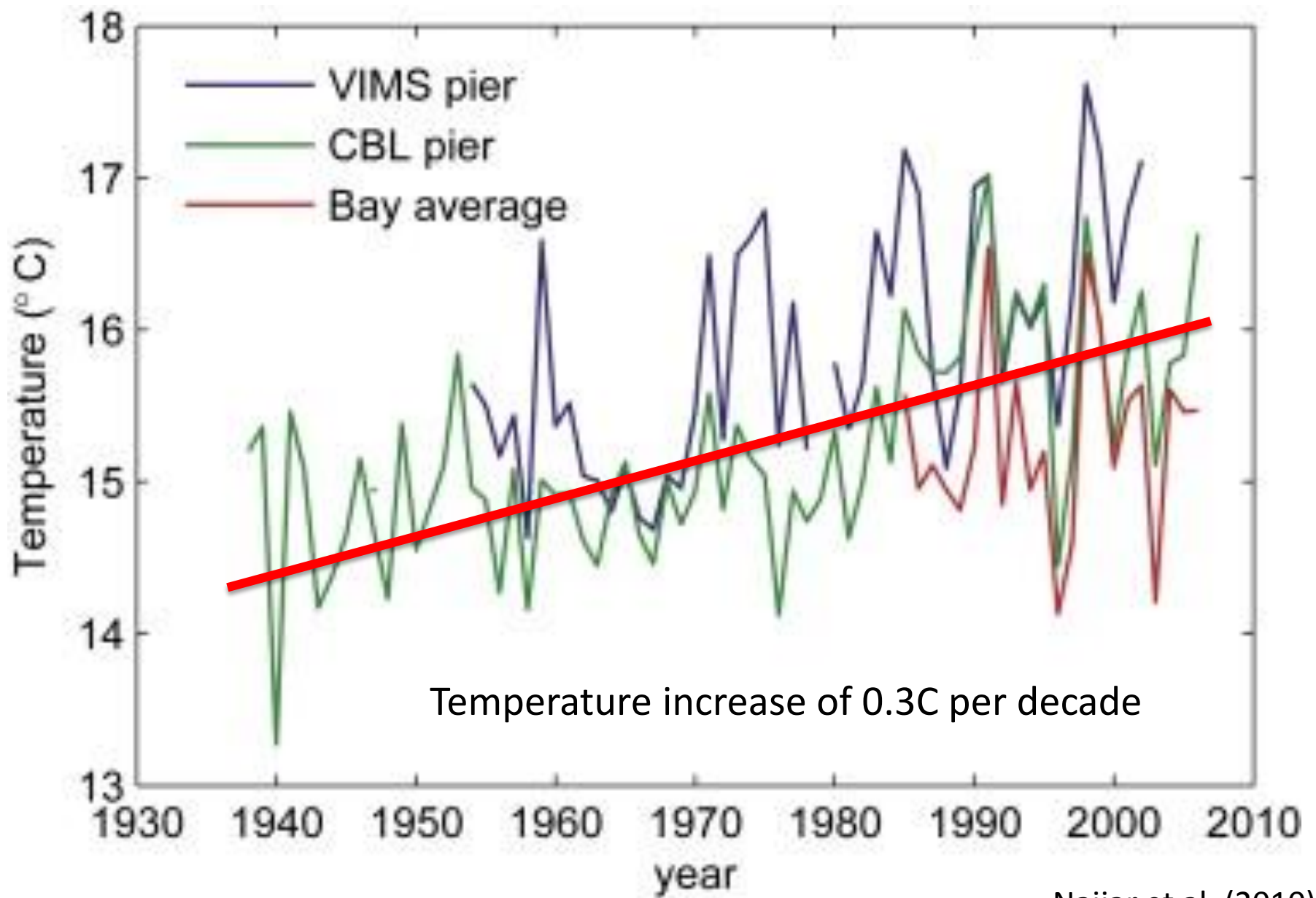
Bottom Temp from LE3.6



Oyster Model Forcing

- Input salinity and velocity time series from CB simulations
- Used CB monitoring program bottom temperature for 2000-2005 for the oyster model
- Adjust CB monitoring program bottom temperature for 1900-1905
- Adjust food values for 2000-2005





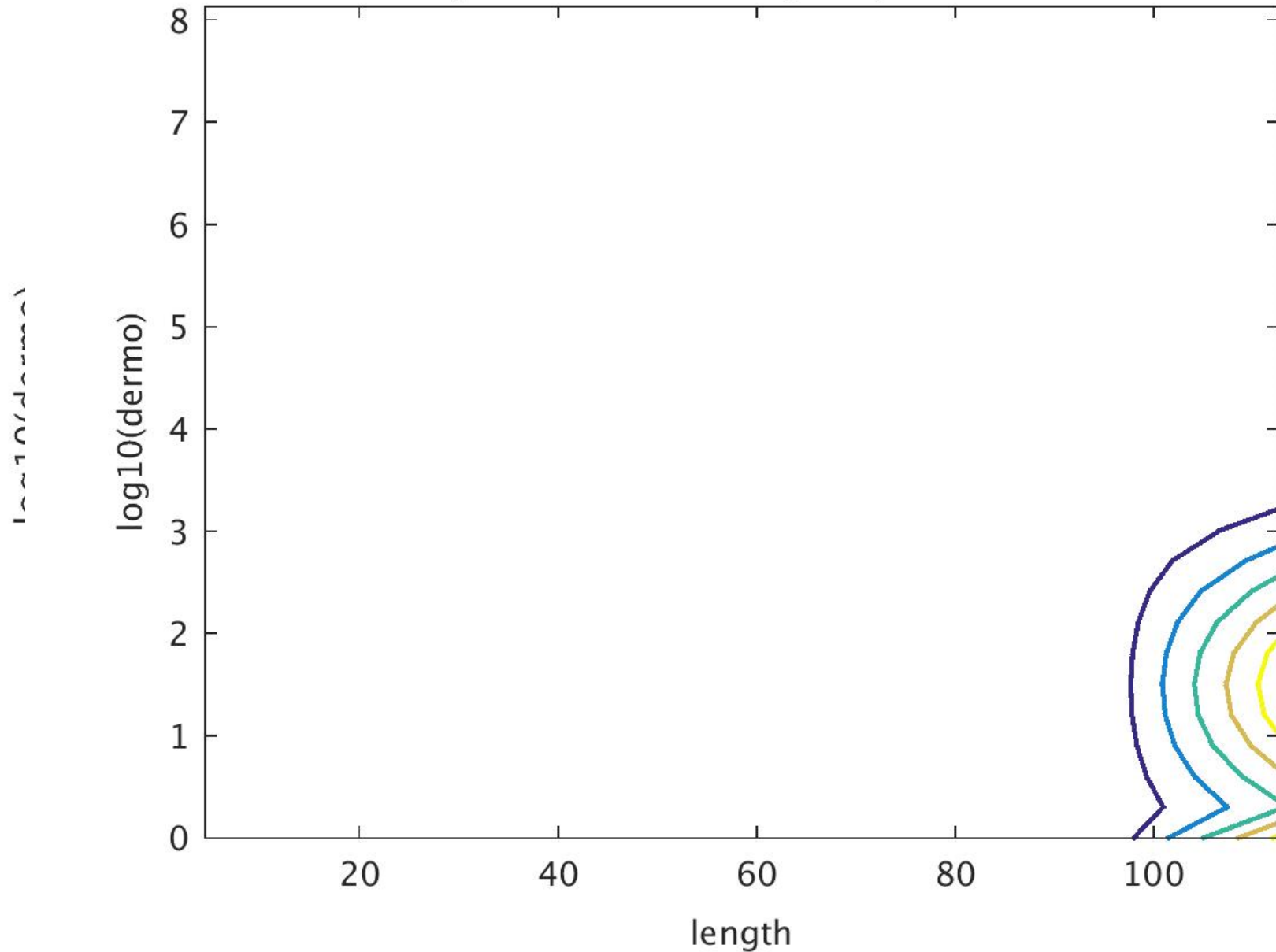
Adjustments

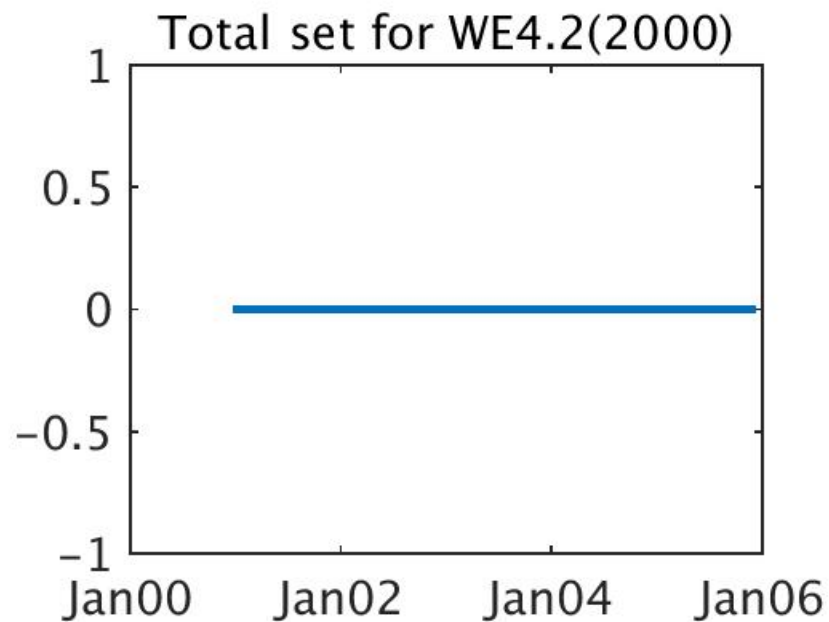
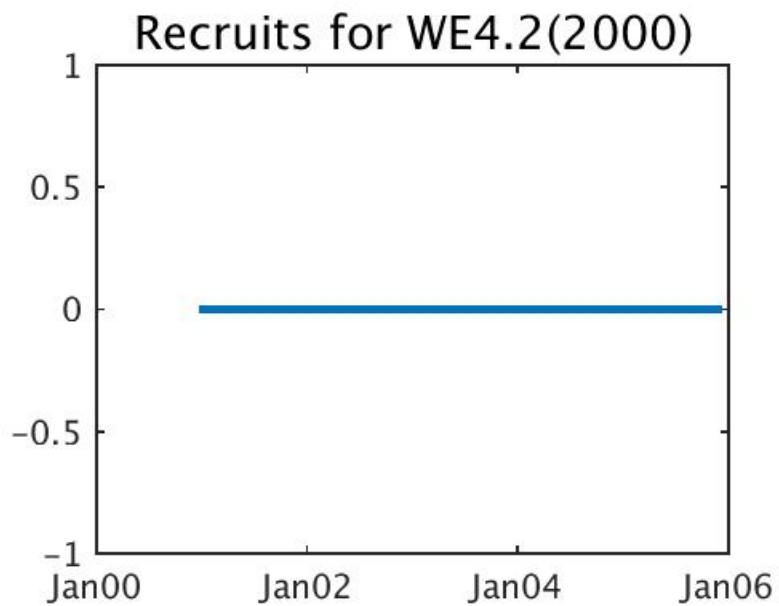
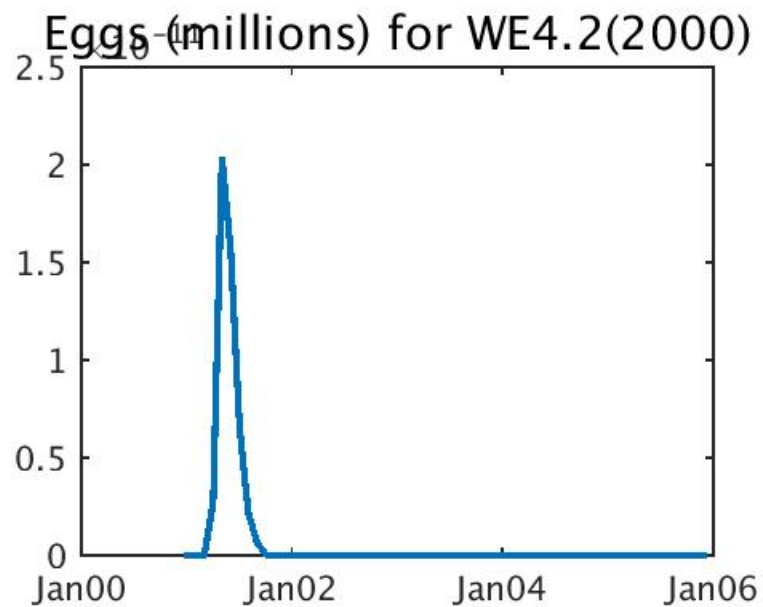
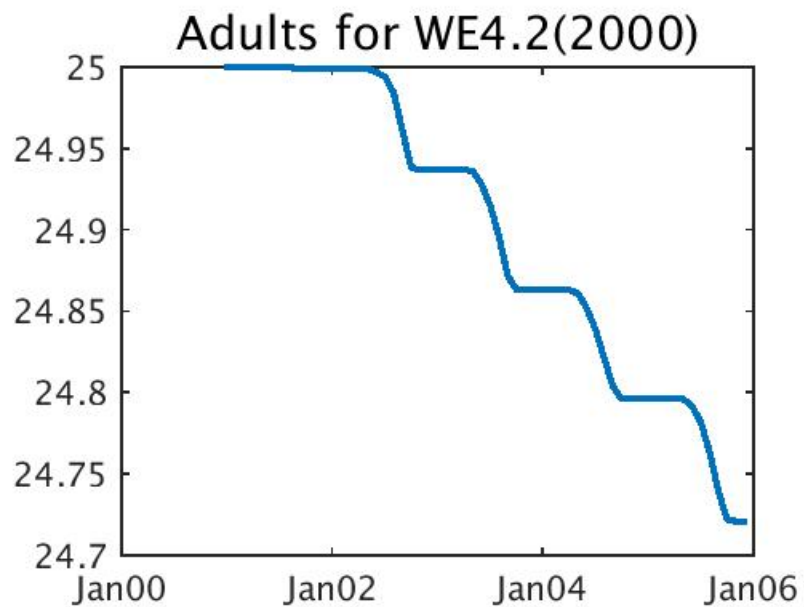
- Used temperature trend to adjust 1900-1905 temperatures to cooler values (3 degree reduction)
- Food values are the sum of POC
- Used 1900 POC values as food input
- Reduced 2000-2005 food by one-third
- More detritus (non-food) in current POC time series



Ovster Number WE4.2(2000) month: 1

Oyster Number WE4.2(2000) month: 13

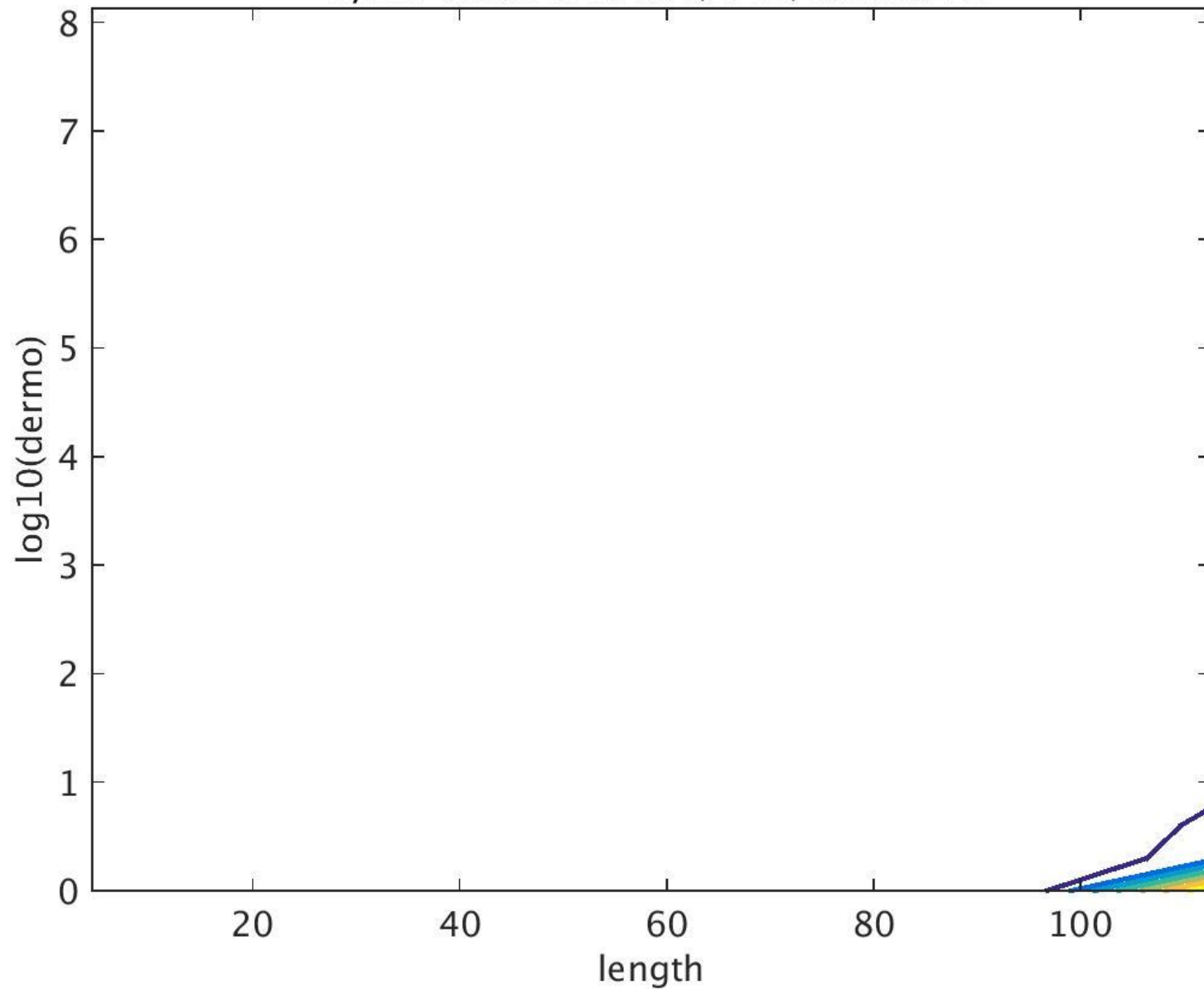




Oyster Number WE4.2(1900) month: 1

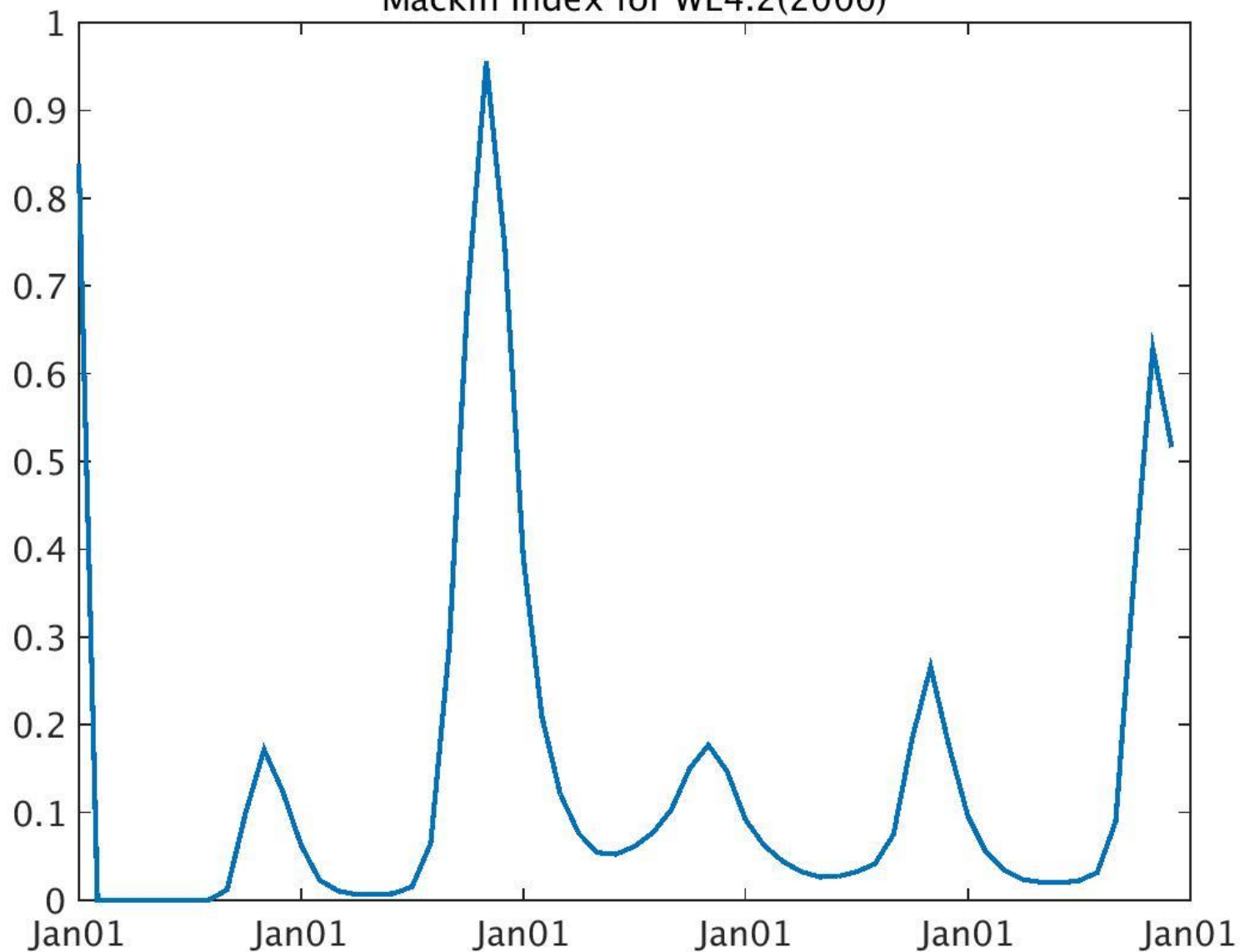
8

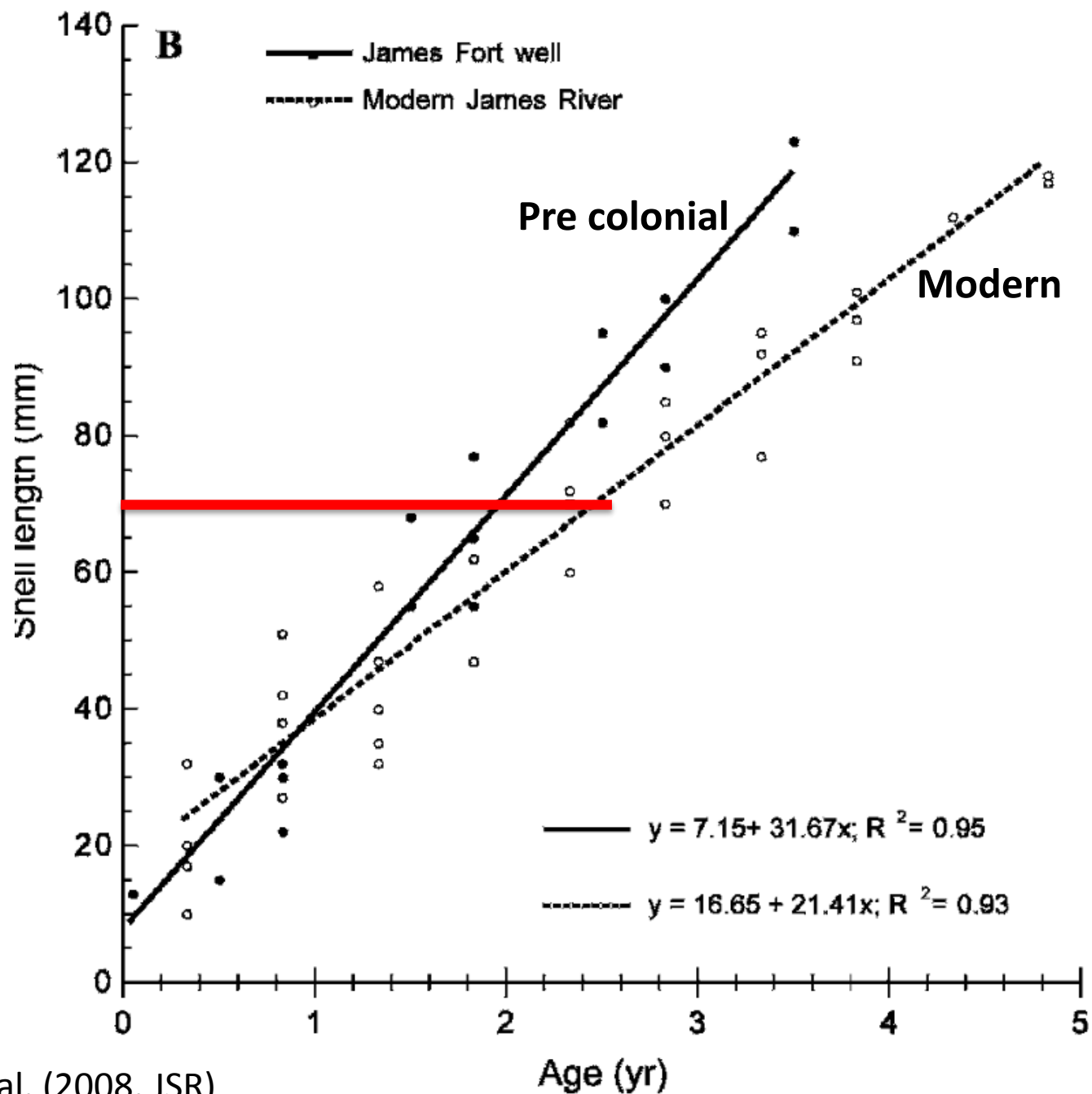
Oyster Number WE4.2(1900) month: 13



Mackin Index for WE4.2(1900)

Mackin Index for WE4.2(2000)





Possible Results

- Increased temperature in 20th century released Dermo pathogen
 - When did temperature exceed pathogen threshold?
- Change in food composition between 1990 and 2000 affects growth rates
 - More 'food' is available but of the wrong form?



Next Steps?

- Continue refinement of input time series
- Implement additional simulations to compare past and current conditions and effects
- Modify oyster model to include explicit oxygen dependencies on physiological processes
- Input simulated environmental conditions to evaluate effects on Chesapeake Bay oysters

