Excess nitrogen enters ocean waters from various sources, such as sewage treatment plants and lawn fertilizers, causing rapid phytoplankton growth. M. mercenaria eat these plankton, thus absorbing some of the excess nutrients (Newell 1992). When these clams are harvested and taken to land, the nitrogen is taken out of the water, reducing eutrophication. (Figure 1).

Objectives:
• Quantify ecosystem services that M. mercenaria provide
• Obtain an profile of the phytoplankton community, based on species present and abundance

MATERIALS AND METHODS
The feeding physiology of Greenwich hard clams (Figure 2) in the field was determined using a technique called the biodeposition method (Riisgaard 2001), which involved real-time collection of water samples, clam feces, and clam pseudofeces for determination of organic and inorganic matter (Figure 3a and b).

Plankton community composition at eight stations was determined from samples preserved in lugols solution and enumerated in an Utermohl chamber using light microscopy.

RESULTS AND DISCUSSION
The relatively high assimilation efficiency (43% in the first experiment and 69% in the second experiment) shows that most of the organic matter ingested was used by the clams. The relatively low proportion of material in the water that was rejected by the clams as pseudofeces (13% and 9%) also supports the notion that most of the particulate matter in the water was high quality food.

Diatom species typically dominated the plankton community at the study sites (Figure 5). Diatoms are the preferred food of M. mercenaria especially Skeletonema and Chaetoceros. M. mercenaria do not typically like to eat dinoflagellates and some species can be toxic to them (Kraeuter and Castanga, 2001). Dinoflagellates became more abundant in late July. There did not appear to be a negative effect on the clam’s feeding due to this increase, indicating that there was still ample high quality food available in the plankton community.

The biodeposition experiments were only performed at Greenwich Point Park (star in Figure 4), and we were interested in whether this location was representative of Greenwich waters in general. The plankton community was examined at eight locations across Greenwich Harbor, and the assemblages were quite similar at 7 of the 8 stations (Figure 4), including the station closest to the site of our biodeposition experiments.

CONCLUSIONS AND FUTURE WORK
Conclusions
• M. mercenaria in Greenwich Harbor are excellent and effective nutrient recyclers
• Greenwich Harbor is a great place to grow clams, based on the abundance of diatoms present in the water

Next Steps
The data reported here on processing of particulate matter by clams will be converted into estimates of nitrogen removal. Nitrogen removal by clams in Connecticut waters can be given a dollar value based on the existing Nitrogen Credit Exchange Program run by CTDEEP. In 2014, nitrogen credits were valued at $5.61 per pound.

REFERENCES

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