Natural History and Control of the Mud Worm, *Polydora cornuta* on a Delaware Bay, New Jersey Oyster Farm

Lisa M. Calvo, Haskin Shellfish Research Laboratory, Rutgers University
New Jersey Sea Grant Consortium

Betsy Haskin, Betsy's Cape Shore Salts

William Schroer, Allegheny College

Rose Petrecca, Institute of Marine and Coastal Sciences, Rutgers University

Haskin Legacy

Extensive sand flats

Fine sediments

Plenty of surface areas, sediment, & mud worms
= serious bio-fouling problem

Polydora spp. Delaware Bay

P. cornuta

P. websteri

Polydora cornuta (formerly P. ligni)

- North America, Gulf of Mexico & Europe
- Opportunistic polychaetes
- Family Spionidae
- Common invertebrates in coastal, estuarine, and marine environments
- Tube builders
- Feed by extracting organic material from their surroundings
- Populations can be dense, 14,000 per m^2 (Zajac)
- Can cause of extensive oyster mortalities

http://marine1.bio.sci.toho-u.ac.jp/tokyobay/ikimono/index.html?page=bio_4.html

Objective

- Determine temporal variability in abundances of *Polydora spp.* larvae and peak settlement periods

- To inform and improve the efficacy of treatment timing and options

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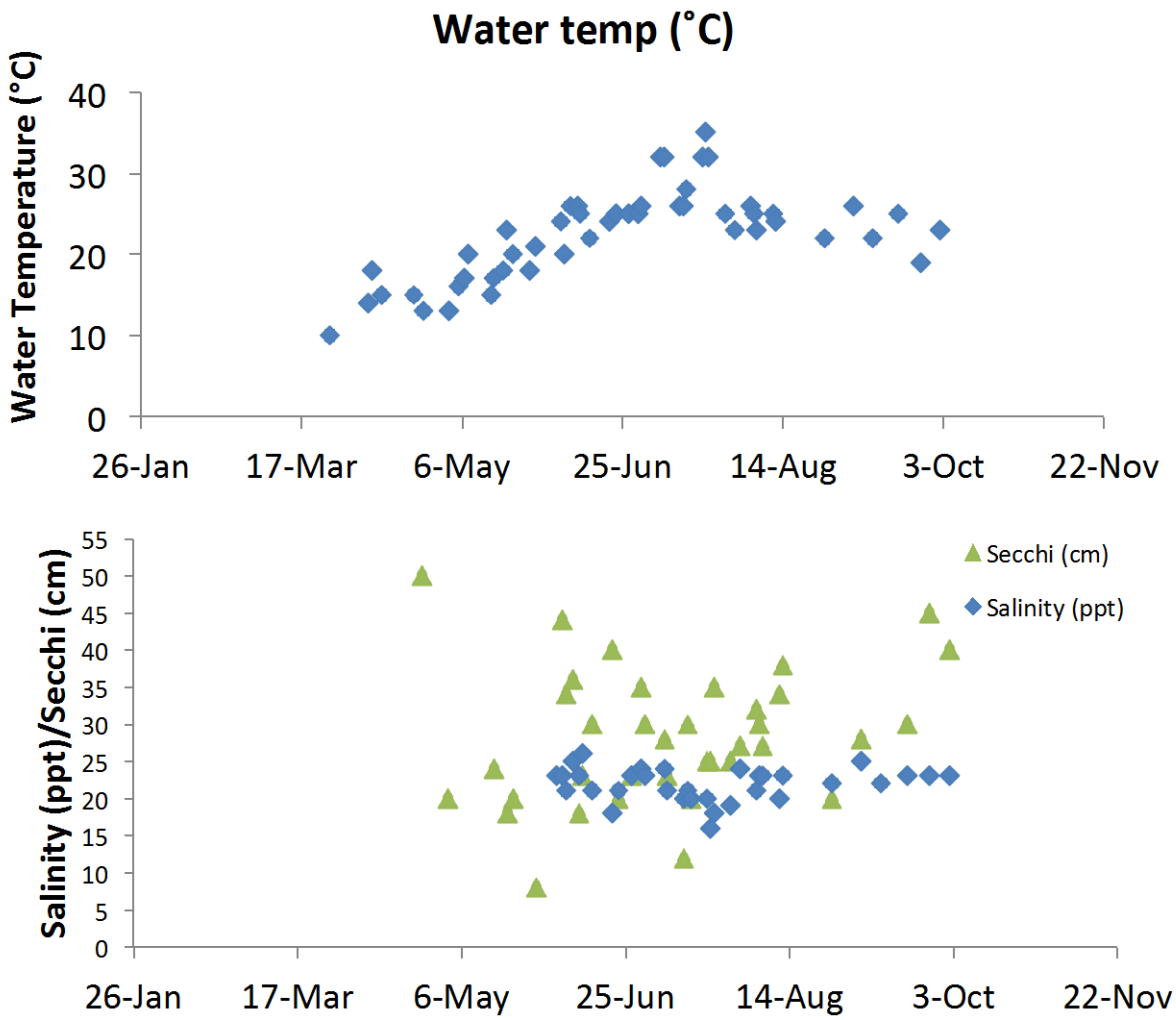
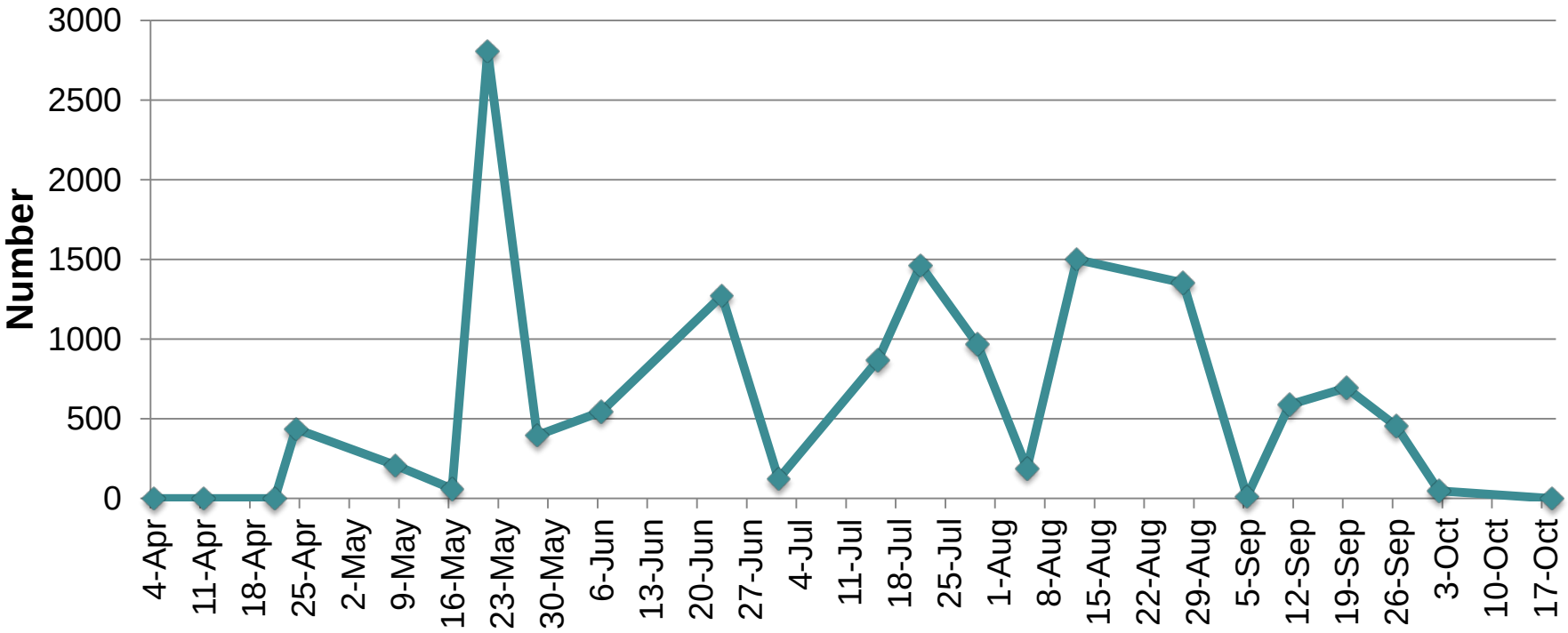
Methods

- Weekly plankton samples collected April-October
  - 100 micron net, hand-towed 2.5 minutes
  - Larvae counted and setiger number determined (n=20)
- Shell strings deployed weekly
  - Three replicate strings, each with 5 shells
  - Photo documented, scored, mud weight and worm abundance determined
- Shell bags deployed entire season
  - Three replicate shell bags. Five shells sampled weekly from each replicate.
  - Fouling scored, mud weight and worm abundance determined

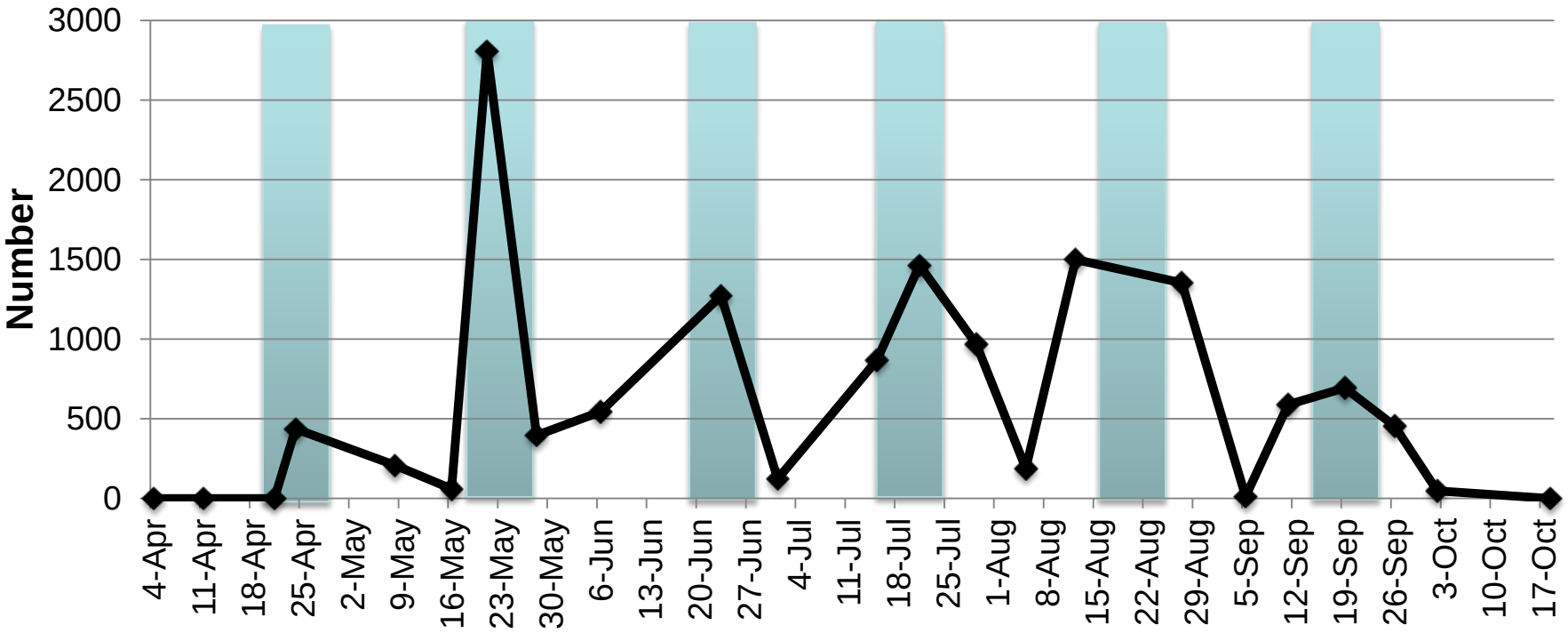

Water temp (˚C)
Water Temperature (°C)
40
30
20
10
0
26-Jan
17-Mar
6-May
25-Jun
14-Aug
3-Oct
22-Nov
Salinity (ppt)/Secchi (cm)
55
50
45
40
35
30
25
20
15
10
5
0
Secchi (cm)
Salinity (ppt)
26-Jan
17-Mar
6-May
25-Jun
14-Aug
3-Oct
22-Nov

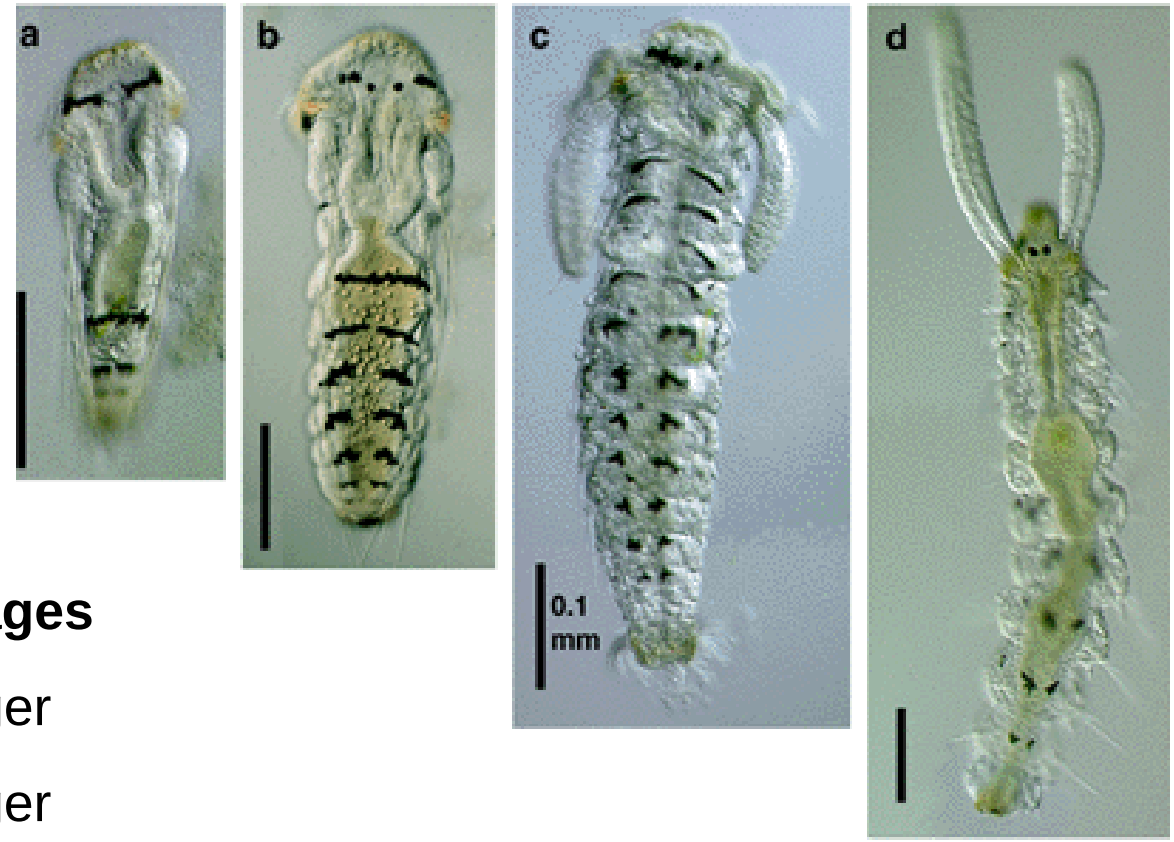
Overwintering Polydora

Planktonic Larvae Abundance



Planktonic Larvae Abundance & Full Moon





Larval Stages

a. 3-setiger

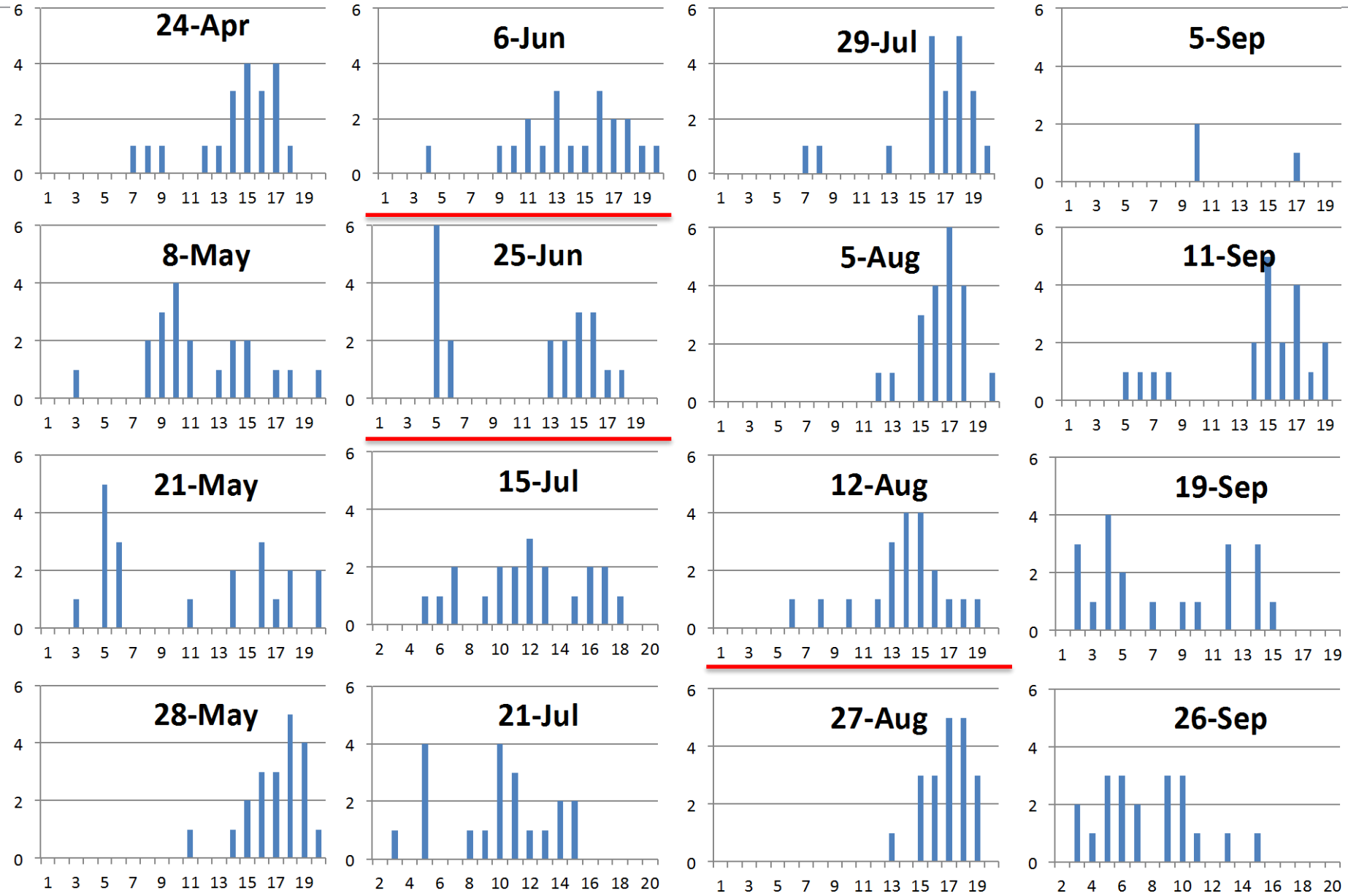
b. 8-setiger

c. 17-setiger

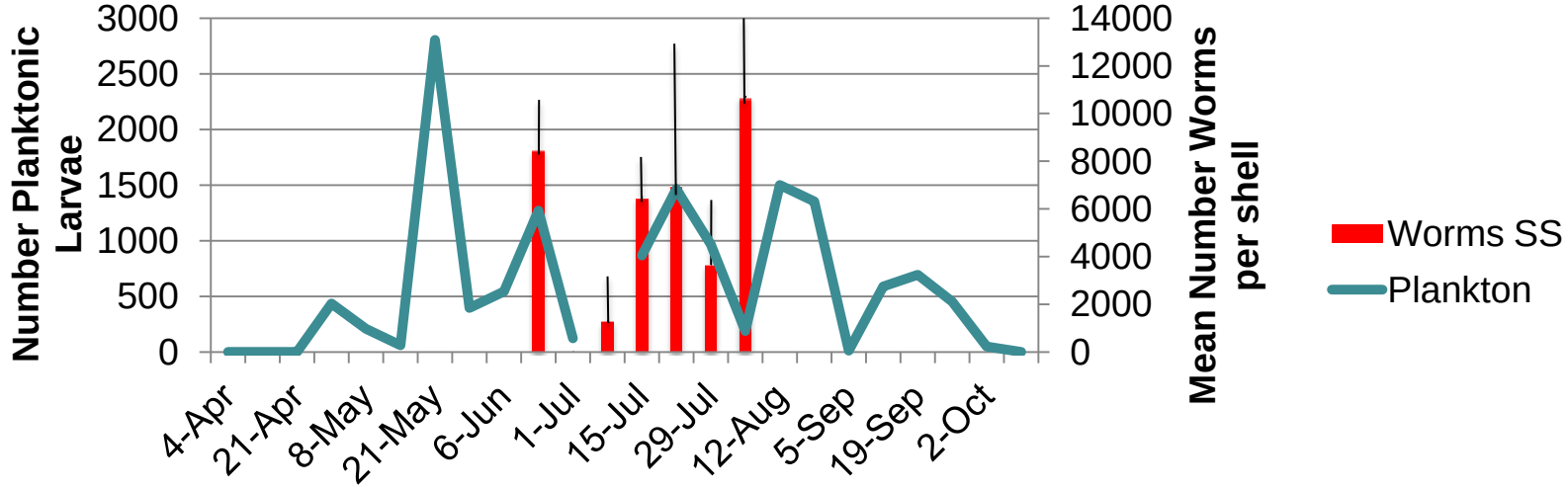
d. Newly metamorphosed juvenile

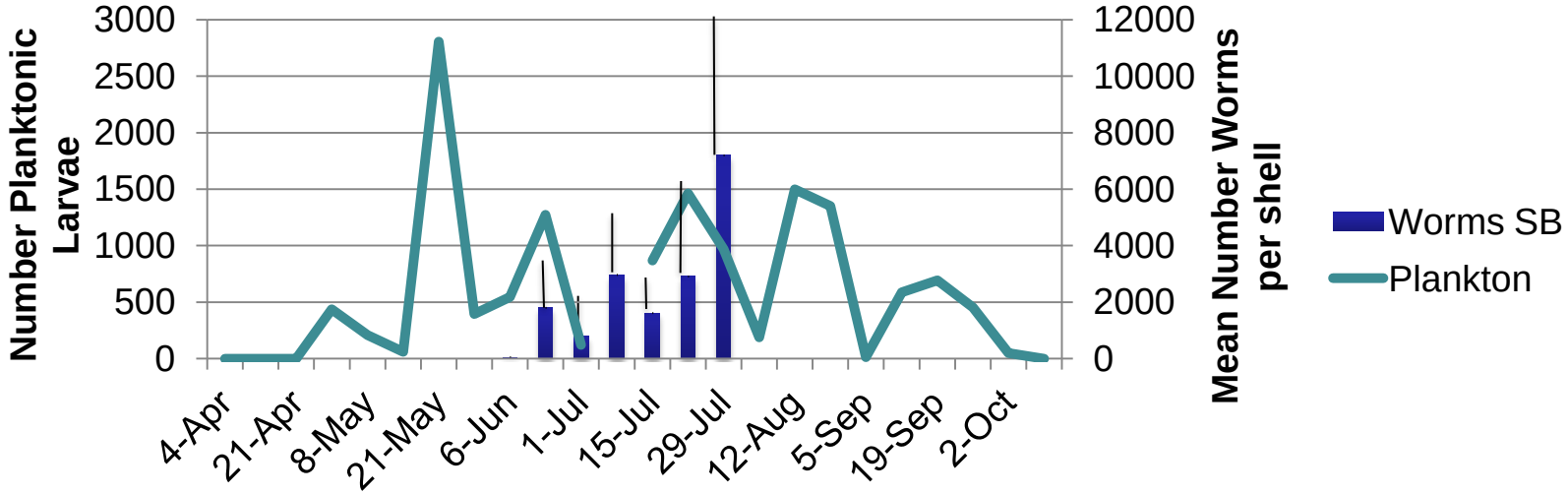
Scale bars, 100 µm

http://hermes.mbl.edu/BiologicalBulletin/MMER/IRV/IrvFig2.html

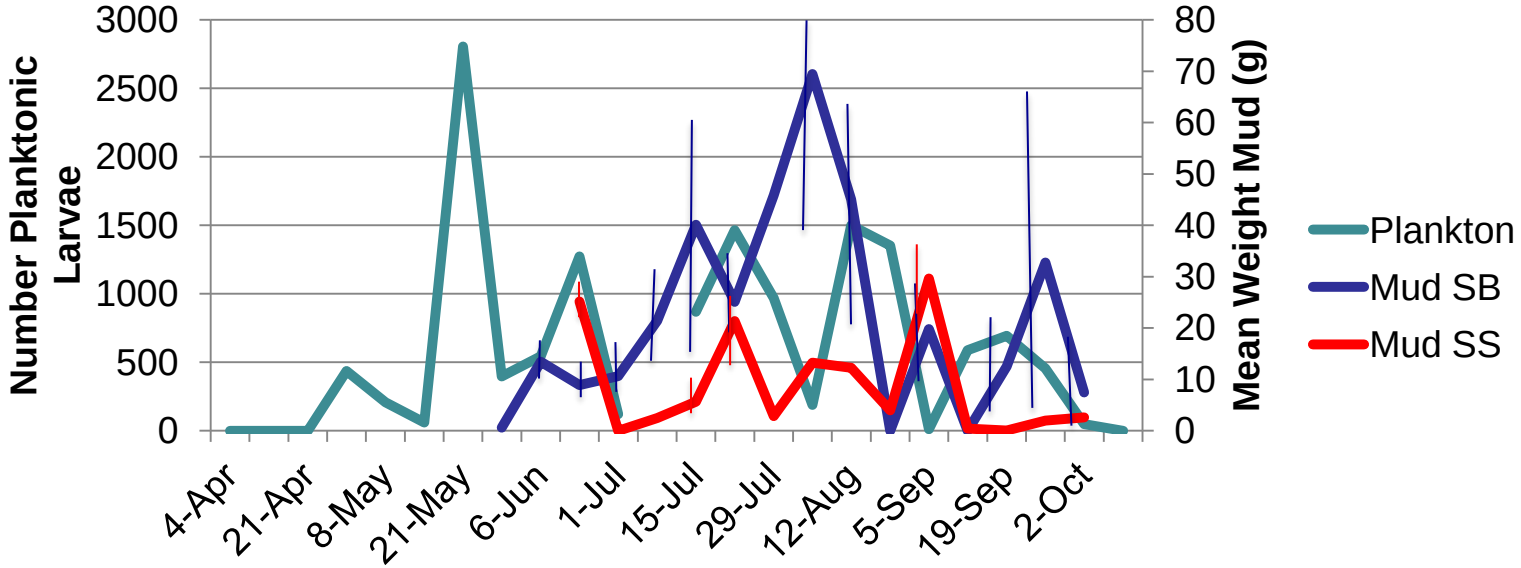

24-Apr
6-Jun
29-Jul
5-Sep
8-May
25-Jun
5-Aug
11-Sep
21-May
15-Jul
12-Aug
19-Sep
28-May
21-Jul
27-Aug
26-Sep

Polydora Settlement and Population Abundance





Degree of fouling (mud weight)



Summary Results

- Egg-bearing adult worms were observed in March, indicating the presence of overwintering infestations on the farm.
- Fluctuations of the condition and intensity of fouling mud tube colonies occurred throughout the spring and summer months.
- Planktonic larvae abundances peaked every four weeks during the course of the study (May-September).
- Planktonic larvae abundances occurred at regular intervals coinciding with the full moon.
- The largest peak in planktonic larvae occurred in mid-May and the heaviest fouling was observed in July.

Farm Implications

- How do we use this information to improve bio-fouling control?
  - Target overwinter infestations/reduce reservoir population
  - Rotate bags to direct bottom or elevated racks
- Are Polydora larvae from local/farm source?
- Do current farm practices exacerbate Polydora bio-fouling (increased worm fecundity as result of continuous disturbance)?
- Annual variability?

Thanks to:

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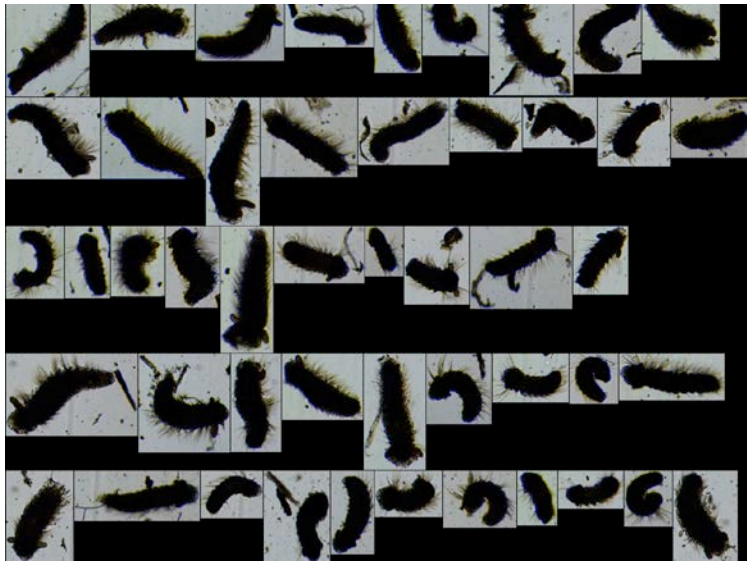
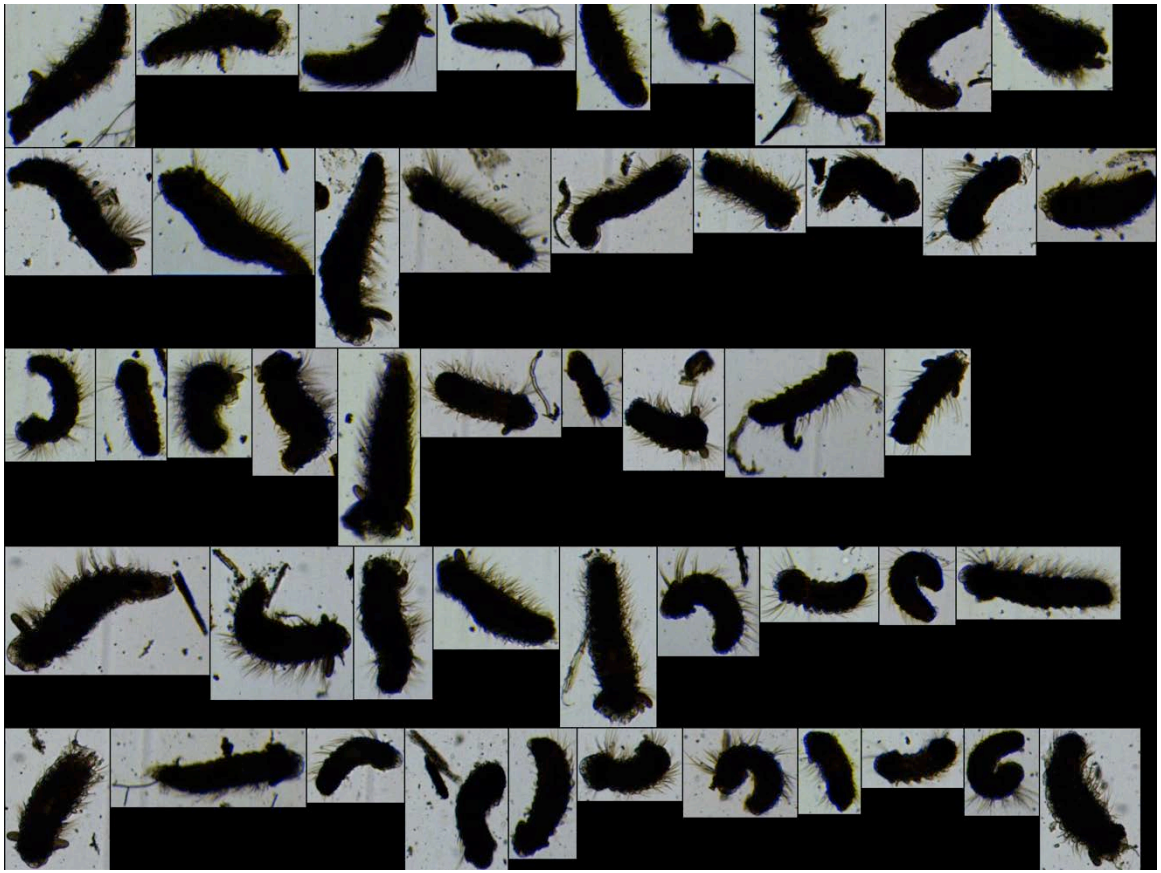


George H. Pound, New Brunswick, N. J.
Polydora mud in oyster.
Delaware Bay.
Polydora ligni: sub adult worm.
Ventral view Anterior end.
Polydora ligni adult worms
anterior posterior ends. Holdfast on
posterior end diagnostic.
Polydora ligni: Delaware
Bay. Advanced scorute stage
Early formation peristomial cirri

Extensive Sand Flats



FlowCam Images of *Polydora* spp.