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A Parasite in Maine - The Story of a MSX Outbreak

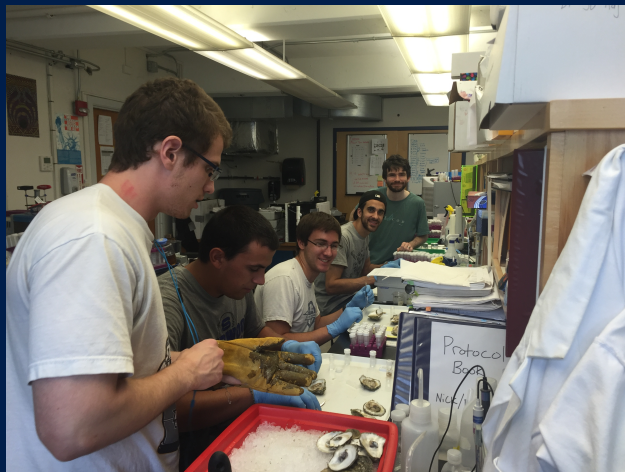
Timothy Bowden

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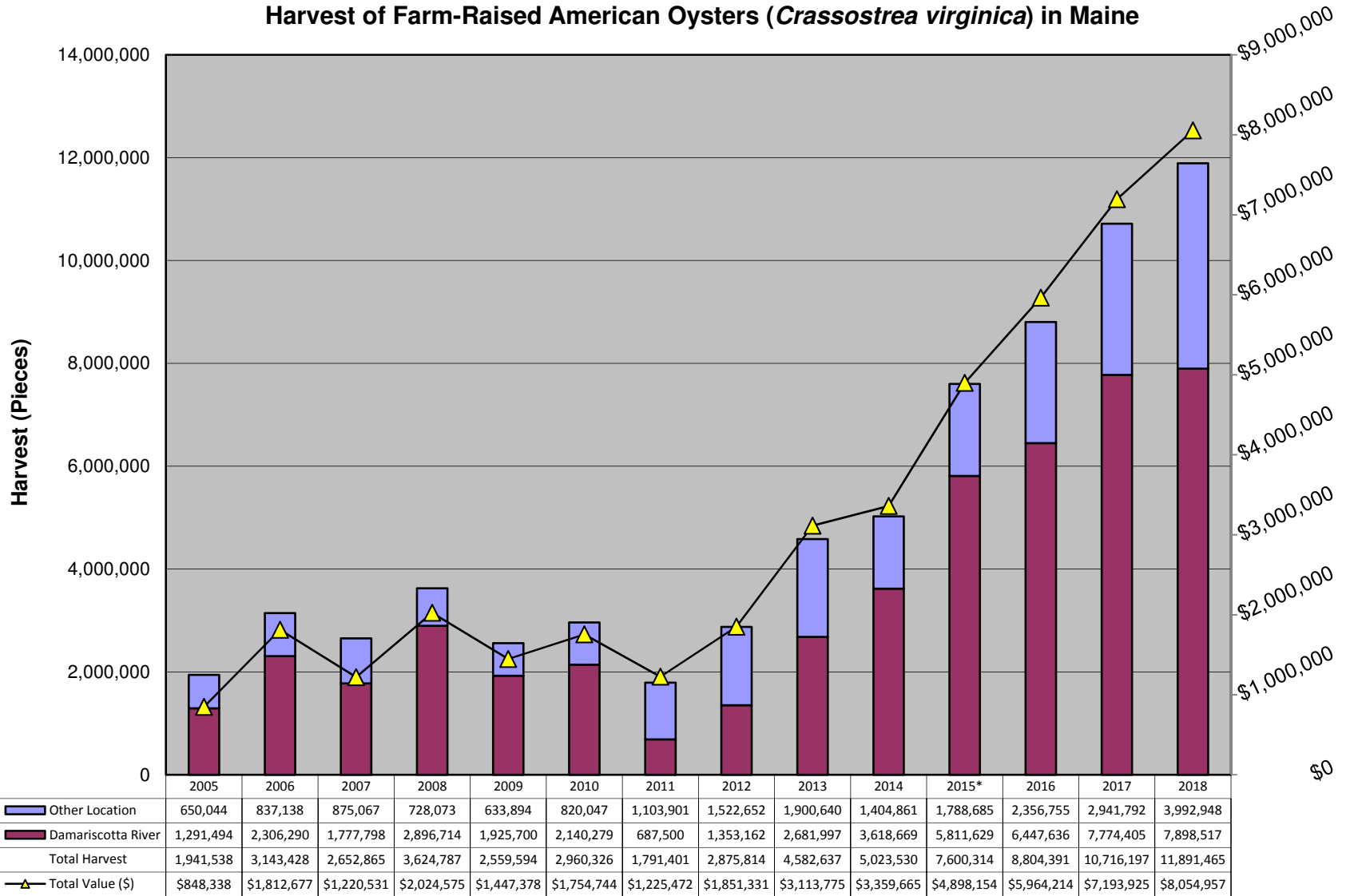


A PARASITE IN MAINE – THE STORY OF A MSX OUTBREAK



Timothy J. Bowden
School of Food and Agriculture

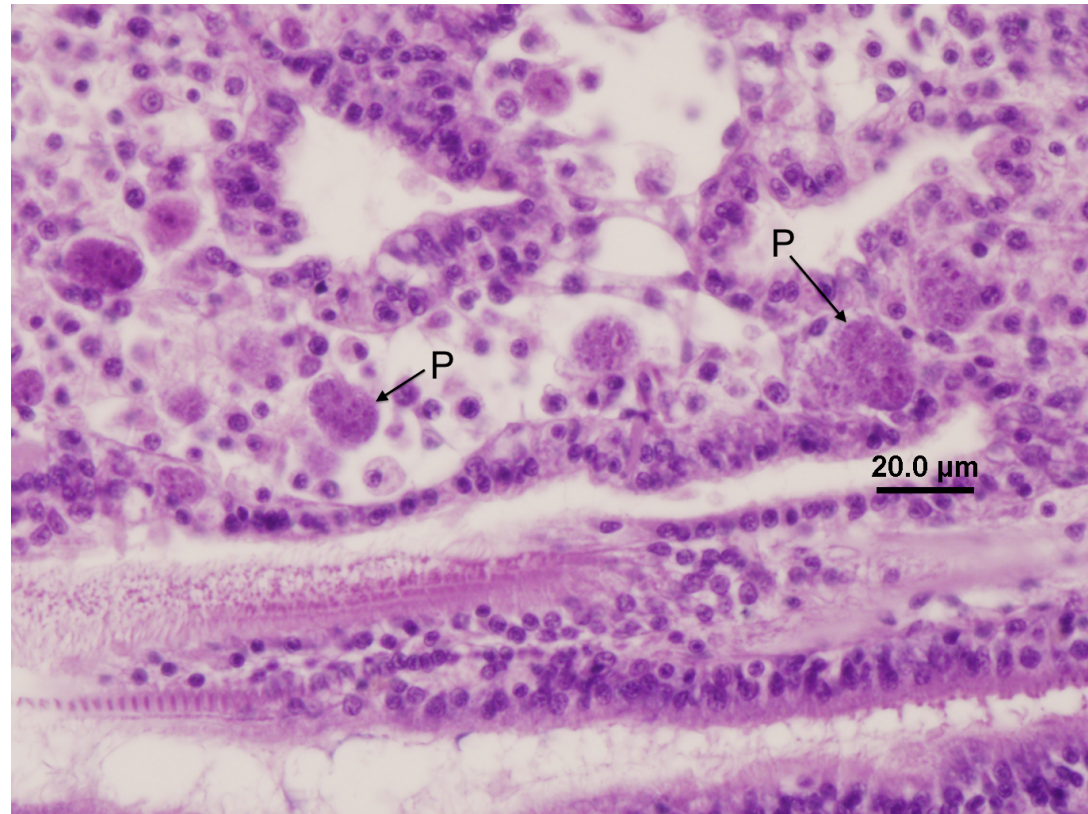
Harvest of Farm-Raised American Oysters (*Crassostrea virginica*) in Maine



* DMR began collecting LPA harvest data in 2015.

MSX Background

- Protozoan parasite
- Multinucleated sphere unknown
- *Haplosporidium nelsoni*
- First identified in Delaware Bay in 1957
- Soon after in Chesapeake Bay
- Initial outbreak killed up to 95% of planting ground oysters
- Parasite reported along entire US East coast
- Although present in Maine, MSX was not an issue until...



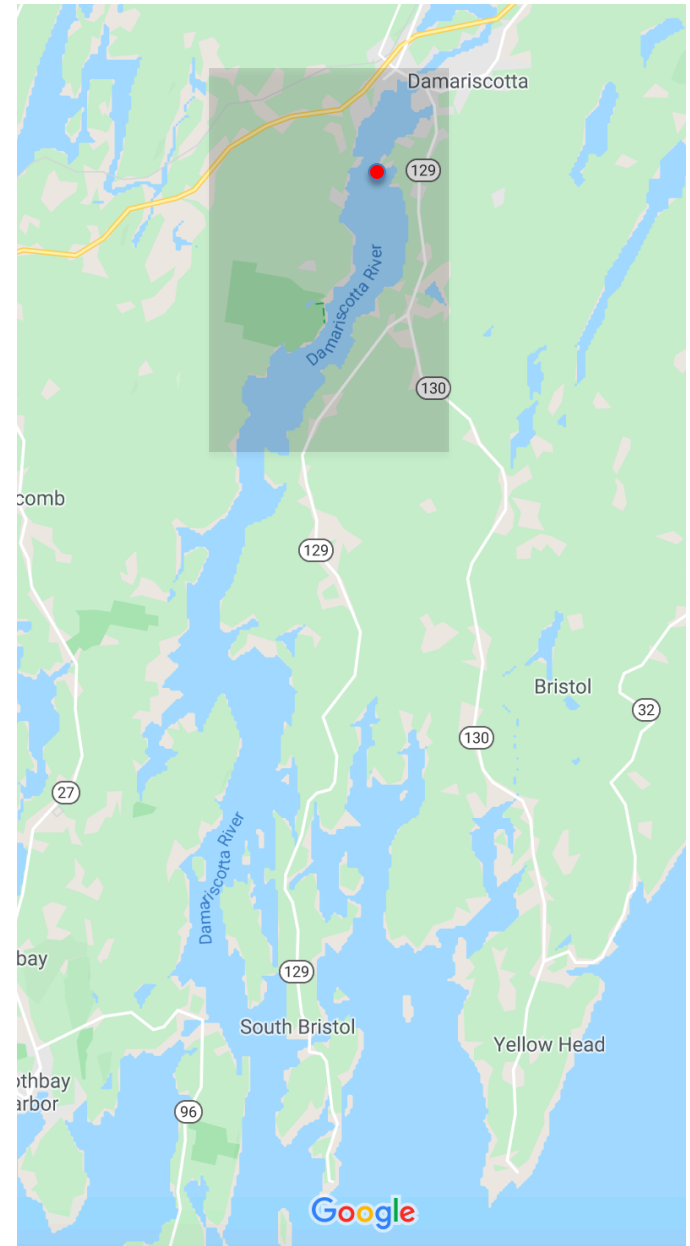
MSX Outbreak

- In 2010, MSX reappeared in the Damariscotta estuary causing substantial mortalities of up to 90% on some sites
- A subsequent survey (DMR) showed the parasite prevalent from 30-90% in some areas
- In 2011 the industry was advised to switch to 'resistant' oyster strains



Sampling Locations

- Oyster cultivation occurs predominantly in the northern end of the estuary
- Red dot indicates Hall Point
- Samples taken from a commercial site and an associated natural bed population
- Samples taken 2012, 2014, 2016 and 2019

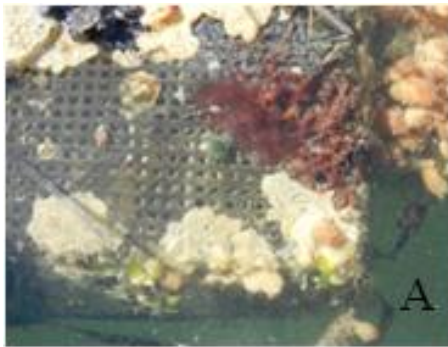


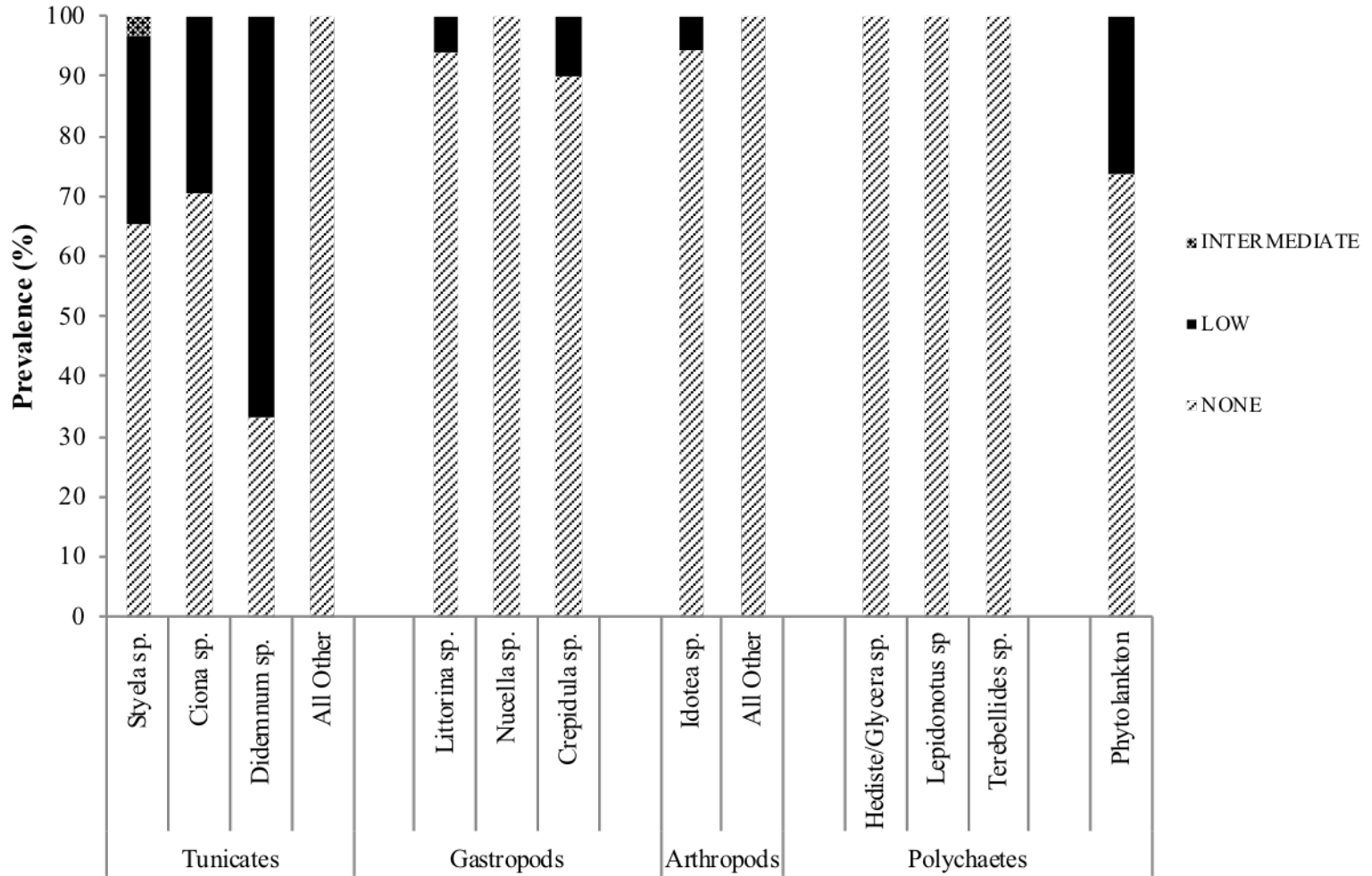
Percentage prevalence of MSX

	2012		2014				2016		2019	
	Hall Point	Commercial	Jacks Point	Hall Point	Commercial	Dodge Lower Cove	Hall Point	Commercial	Hall Point	Commercial
May	-	-	0	0	0	0	-	-	0	0
June	-	-	0	0	0	-	29	31	0	0
July	-	-	33	3	7	0	-	-	0	0
August	50	46	27	17	3	-	-	-	?	?
September	50	50	20	27	33	53	-	-	?	?
October	19	22	40	23	20	-	-	-	?	?

MSX Reservoir Species

- In 2012 we also sampled dominant biofouling organisms found around production sites
- Tunicates, gastropods, arthropods, polychaetes and plankton samples
- Analyzed by qPCR (Wilbur et al 2012)

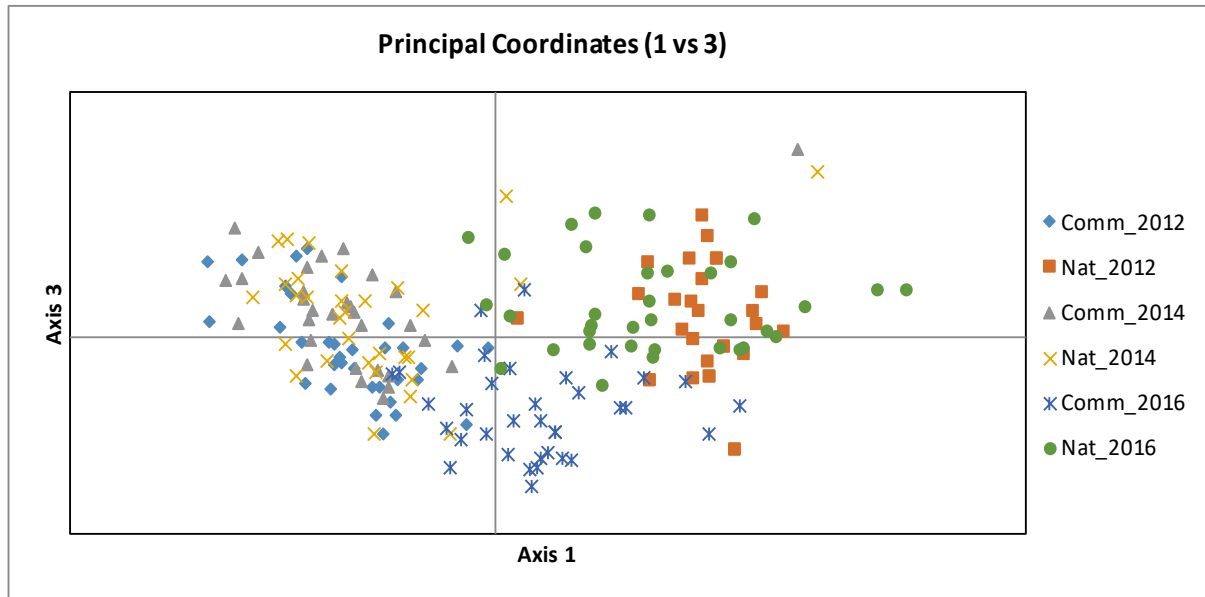
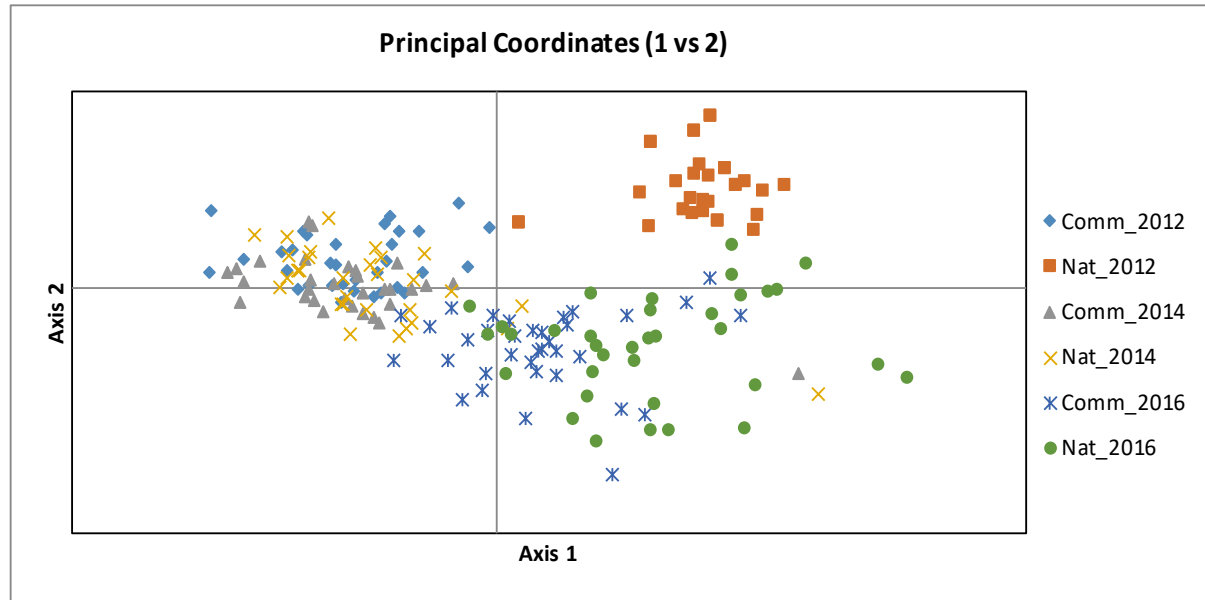




Biofouling Organisms

Population Genetics

- 30 animals per site per time point
- Commercial and Hall Point Natural bed
- 20 microsatellite markers per sample



Publications

54, Bull. Eur. Ass. Fish Pathol., 34(2) 2014

Prevalence of the protozoan parasite
Haplosporidium nelsoni in the Eastern oyster,
Crassostrea virginica, within the Damariscotta
River Estuary, in Maine, USA in 2012

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Journal of Shellfish Research, Vol. 35, No. 4, 851–856, 2016.

**SURVEY OF POTENTIAL RESERVOIR SPECIES FOR THE OYSTER PARASITE
MULTINUCLEATE SPHERE X (*HAPLOSPORIDIUM NELSONI*) IN AND AROUND
OYSTER FARMS IN THE DAMARISCOTTA RIVER ESTUARY, MAINE**

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Bull. Eur. Ass. Fish Pathol., 37(6) 2017, 235

Prevalence of the protozoan parasite
Haplosporidium nelsoni in the eastern
oyster, *Crassostrea virginica*, within the
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in 2014 and 2016 as measured by PCR

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Review

Pathogens of marine bivalves in Maine
(USA): A historical perspective

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Ellie L. Irish ^{a, b}, Madeline M. Schuldt ^{a, c}, Sarah E. Kingston ^c, Theodore J. Bishop ^{a, d}, Nicole A.
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- Maine Agriculture and Forestry Experimental Station
- Maine EPSCoR
- Maine Food & Agriculture Center
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