SEA Fellows Summer Science Symposium

August 16, 2017 * University of Maine Darling Marine Center

Session A (2-3 PM)

Poster	Presenter(s)	Title	Authors & Affiliations
1	Abigale Shaughnessy	Shell game: Improving the shell quality and value of Maine's most valuable resource	Abigale Shaughnessy, University of Maine (abigale.shaughnessy@maine.edu); Richard Wahle, University of Maine; Curtis Brown, Ready Seafood Company
2	Alex McCarthy	Field and laboratory studies to examine effects of predators on growth and survival of Arctic surf clams, *Mactromaris polynema*, in eastern Maine	Alex McCarthy & Brian Beal, University of Maine at Machias and Downeast Institute (alexander.k.mccarthy@maine.edu)
3	Emilee Burris	Vertical migration of diatoms in the Damariscotta River Estuary	Emilee Burris,University of Southern Maine & University of Maine (emilee.burris@maine.edu); Jeremy Rich, Sean O'Neill, Elizabeth Gorse, & Julia Mackin-McLaughlin, University of Maine
4	Julia Mackin-McLaughlin	Monitoring abundances of cable bacteria, a novel organism in Damariscotta River mud	Julia Mackin-McLaughlin (julia.mackinmclaughlin@umit.maine.edu), Jeremy Rich, Sean O'Neill, Elizabeth Gorse, University of Maine; Emilee Burris, USM & UMaine
5	Margaret Aydlett	Temperature tolerance of the kelp *Alaria esculenta*	Margaret R. Aydlett, Charlotte T.C. Quigley, & Susan H. Brawley, University of Maine (margaret.aydlett@maine.edu)
6	Melissa Britsch	Improving scallop larvae collection by assessing varied collector materials at multiple depths	Melissa Britsch & Heather Leslie, UMaine (britschm@oregonstate.edu); Dana Morse, Maine Sea Grant, UMaine Cooperative Extension & Darling Marine Center; Nate Perry, Pine Point Oyster Co, LLC
7	Olivia Joyce	Abundance of spiny-headed worm parasites in Maine green crabs	Tyler Van Kirk, Olivia Joyce (olivia.joyce@maine.edu), Caroline Spangenberg, Allyson Redcay, Molly Westbrook, & Ian Bricknell, University of Maine
8	Shania Evangelista, Zachary Applebee, & Angela Wang	Extracting polysaccharides from seaweed	Shania Evangelista, Zachary Applebee, Angela Wang, & G. Peter van Walsum, University of Maine (shania.evangelista@maine.edu)
9	Tania Couture	Growing oysters in the face of climate change – learning from the life history of the European flat oyster	Tania Couture, McGill University & University of Maine (couturetania@hotmail.com); Sean O'Neill, & Matt Gray, University of Maine
10	Thomas Roerden	Cellulose nanofibers: a potential protectant of boat hulls	Thomas Roerden, University of Maine (thomas.roerden@maine.edu)

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SEA Fellows Summer Science Symposium

August 16, 2017 * University of Maine Darling Marine Center

Session B (3-4 PM)

Poster	Presenter	Title	Authors & Affiliations
11	Alwyn Ecker	Using environmental data to improve oyster farm site selection in Maine	Alwyn Ecker, Wheaton College & UMaine (ecker_alwyn@wheatoncollege.edu); Cassandra Leeman, Eckerd College & UMaine; Tania Couture, McGill Univ. & UMaine; Matthew Gray & Damian Brady, UMaine
12	Brittany Dimick	Roles of zooplankton and bivalves on Maine estuarine ecology	Brittany Dimick, University of Southern Maine (brittany.dimick@maine.edu); Rachel Lasley-Rasher, University of Maine & University of Southern Maine; Karen Wilson, USM; Damian Brady, UMaine; Tom Kiffney, Colby College & UMaine
13	Cassandra Leeman	Quantifying nitrogen loading to Casco Bay from the Presumpscot River	Cassandra Leeman, Eckerd College & University of Maine (cassandra.leeman@maine.edu); Whitley Gilbert & Damian Brady, UMaine
14	Dylan Schlichting	Use of vegetation farms as a solution to coastal erosion for Saco, Maine	Dylan Schlichting, Brandon Lieberthal, & Kimberley Huguenard, University of Maine (dylan.schlichting@maine.edu)
15	Helen Reese	Effects of rising temperature on the growth and development of larval lobsters	Helen Reese, Amalia Harrington, & Heather Hamlin, UMaine (helen.reese@maine.edu)
16	Isabelle Russell	Wastewater impacts on Casco Bay water quality	Isabelle Russell, Southern Maine Community College (isarus024@gmail.com) & Theodore Willis, University of Southern Maine
17	Kyle Capistrant-Fossa	Reporting on opportunities for the future of sea vegetable aquaculture in Maine	Kyle Capistrant-Fossa & Susan Brawley, University of Maine (kyle.capistrantfossa@maine.edu)
18	Rory Morgan	Laboratory and field trials to examine effects of predators on growth and survival of Arctic surf clams, *Mactromeris polynyma*, within the soft-bottom intertidal zone	Rory E. Morgan & Brian Beal, University of Maine at Machias and Downeast Institute (rory.morgan@maine.edu)
19	Taylor Donovan	Measuring blue mussel growth rates in Downeast Maine	Taylor Donovan & Skylar Bayer, University of Maine and Downeast Institute (s1049101@monmouth.edu)
20	Tom Kiffney	Validation of turbidity, chlorophyll, and CDOM in the Damariscotta River for Sentinel-2 remote sensing sroducts	Tom Kiffney, Colby College & UMaine (tkiffney@colby.edu); Jordan Synder & Damian Brady, University of Maine

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ABSTRACTS for the SEA Fellows Summer Science Symposium

August 16, 2017 * University of Maine Darling Marine Center

Session A (2-3 PM)

#	Presenter(s)	Title	Authors & Affiliations
1	Abigale Shaughnessy	Shell game: Improving the shell quality and value of Maine's most valuable resource	Abigale Shaughnessy, University of Maine (abigale.shaughnessy@maine.edu); Richard Wahle, University of Maine; Curtis Brown, Ready Seafood Company

The American lobster is Maine's most valuable export commodity. Hardshell lobster commands the highest price because they survive shipping to overseas markets, but much of Maine's summer production comes as perishable, low-value, softshell lobster. Lobster processors inquire whether holding over low-quality lobsters, to increase their hardness and value, will enhance profitability, rather than the standard process of receiving and shipping lobsters in under 48 hours. In a collaborative experiment with Ready Seafood Co., in Portland, we are conducting week-long trials to evaluate the joint effects of temperature and feeding on shell hardness and blood protein levels, an indicator of lobster health. Shells are graded by hand into four categories used in the trade. Hemolymph total protein levels are quantified on the Brix percentage scale with a refractometer. Preliminary results show improved shell grade, but decreased protein levels across treatments, an early indication the method may have some promise.

#	Presenter(s)	Title	Authors & Affiliations
2	Alex McCarthy	Field and laboratory studies to examine effects of predators on growth and survival of Arctic surf clams, Mactromaris polynema, in eastern Maine	Alex McCarthy & Brian Beal, University of Maine at Machias and Downeast Institute (alexander.k.mccarthy@maine.edu)

Arctic surfclams, Mactromeris polynyma, are a commercially under-utlilized species along the coast of Maine. Efforts are underway to examine hatchery, nursery, and growout techniques to create a new culture candidate for this species. Research conducted at the Downeast Institute to rear cultured juveniles in the soft-bottom intertidal has shown predation to be a major bottleneck to large-scale production. To understand this biological hurdle, both field and lab experiments were designed. Experimental units with a double layer of netting was deployed in the field to determine if survival rates of caged surfclams would be higher than in units with a single layer of netting. The lab experiment examined whether green crabs, Carcinus maenas, have a preference for surfclams over soft-shell clams, Mya arenaria. These experiments will yield information which will improve growout methods for hatchery-reared juveniles.

#	Presenter(s)	Title	Authors & Affiliations
3	Emilee Burris	Vertical migration of diatoms in the Damariscotta River Estuary	Emilee Burris,University of Southern Maine & University of Maine (emilee.burris@maine.edu); Jeremy Rich, Sean O'Neill, Elizabeth Gorse, & Julia Mackin-McLaughlin, University of Maine

Oyster aquaculture may influence microbes such as benthic diatoms in positive or negative ways. To examine this issue, sediment cores were collected from three sites in the Damariscotta River in mid-coast Maine where most of the state's oyster cultivation occurs. To measure migration rates, photos of each core were taken every hour once diatoms were exposed to light. Surface percent cover was determined with ImageJ. Diatom surfacing was observed within the first hour of light exposure and peaked at around 4 to 5 hours of light. The longer the cores were held in the lab on a light/dark cycle, the less migration into the sediment during the dark period occurred. The dominant diatom genus observed in the cores is *Gyrosigma*, which is known to be a vertical migration genus. Diatom migration maybe an important part of the estuary because migration could play a role in productivity of the diatoms.

4	Julia Mackin-McLaughlin	Monitoring abundances of cable bacteria, a novel organism in Damariscotta River mud	Julia Mackin-McLaughlin (julia.mackinmclaughlin@umit.maine.edu), Jeremy Rich, Sean O'Neill, Elizabeth Gorse, University of Maine; Emilee Burris, USM & UMaine

Cable bacteria are newly discovered microbes in marine sediments that are of broad applied interest as they conduct electricity and clean up the environment. These electrogenic microorganisms are capable of a unique respiration method which involves transporting electrons over centimeter-scale distances, linking oxygen reduction at the sediment-water surface interval with sulfide oxidation in deeper, anoxic zones. Surprisingly, we observed abundant cable-like bacteria in surface sediments from the Damariscotta River in 2016. The cable-like bacteria were found in association with benthic diatom mats growing at the sediment surface. Since this observation, we have continued to look for cable bacteria in Damariscotta River sediments, using microscopic observations and depth micro-profiles of oxygen, pH, and hydrogen sulfide, as an indicator of activity of cable bacteria. Based on these measurements, the prevalence of cable bacteria is patchy in diatom mats. Similarly, diatom mats do not always favor cable bacteria. The goal for this research is to further our understanding of cable bacteria and their role in potentially maintaining a healthy ecosystem.

5	Margaret Aydlett	Temperature tolerance of the kelp *Alaria esculenta*	Margaret R. Aydlett, Charlotte T.C Quigley, & Susan H. Brawley, University of Maine (margaret.aydlett@maine.edu)

Sea vegetable aquaculture is growing and can help to sustain Maine’s coastal communities, but its success depends on strains that will be resilient to global warming. Our research aims to determine how tolerant the kelp Alaria esculenta is to thermal stress using strains isolated from downeast versus southern Maine. Kelp gametophytes are microscopic; however, sporophytes mature into commercially valuable blades. In this research, gametophytes from an earlier acclimation experiment were kept at 12°C or gradually (2°C/day) exposed to higher temperatures up to 34°C. Previously acclimated gametophytes were cultured on line at UMaine’s CCAR under conditions that promoted fertilization and produced juvenile sporophytes. Preliminary analysis suggests that gametophytes from downeast Alaria are less heat-tolerant than gametophytes from southern Maine, and reached their LD50 at a lower temperature. Additionally, juvenile sporophytes from previously heated gametophytes had larger surface areas than controls. These findings have implications for Maine aquaculture and coastal ecology.

6	Melissa Britsch	Improving scallop larvae collection by assessing varied collector materials at multiple depths	Melissa Britsch & Heather Leslie, UMaine (britschm@oregonstate.edu); Dana Morse, Maine Sea Grant, UMaine Cooperative Extension & Darling Marine Center; Nate Perry, Pine Point Oyster Co, LLC

Maine's commercial scallop farming industry is growing, but is hindered by the high price of collectors required to gather the spat (i.e., larvae) of giant sea scallops (*Placopecten magellanicus*). Here we compare alternatives to the commonly used spat collector, to determine which type and deployment depth yields the highest quality spat, as measured by the average size of spat and the total number/volume of spat per collector. We found that the average individual size and total volume of scallop spat collected did not differ by collector material. We also found that collectors deployed at medium depth yielded higher volumes of spat than those deployed at other depths. Scallop farmers may use this information to deploy more cost-effective and efficient spat collectors, thereby creating additional opportunities to expand the commercial scallop farming industry.

7	Olivia Joyce	Abundance of spiny-headed worm parasites in Maine green crabs	Tyler Van Kirk, Olivia Joyce (olivia.joyce@maine.edu), Caroline Spangenberg, Allyson Redcay, Molly Westbrook, & Ian Bricknell, University of Maine

The European green crab *Carcinus maenas* is an invasive species to the East coast of the United States, where the absence of major predators results in a significant threat to native ecosystems and shellfish fisheries. The green crab is the intermediate host of the Acanthocephalan parasite *Profilicollis botulus*, which uses the Eider duck *Somateria mollissima* as its definitive host. The parasite has been known to exhibit polycyclic behavior, potentially impacting other species such as the American lobster *Homarus americanus*. Some have proposed green crabs as sustainable bait for the lobster industry, however more information is needed to understand the full ecological impact of this parasite on the crabs. During the months of May-August 2017, weekly batches of crabs were taken from 3 alternating bio-regions and examined for parasite prevalence and intensity. Data from different locations and years are compared to examine regional, temporal, and environmental impacts of the parasite infections.

8	Shania Evangelista, Zachary Applebee, & Angela Wang	Extracting polysaccharides from seaweed	Shania Evangelista, Zachary Applebee, Angela Wang, & G. Peter van Walsum, University of Maine (shania.evangelista@maine.edu)

The aquaculture of marine algae is an extensive global industry occurring in approximately 35 countries. Seaweed is the main industrial source of algal polysaccharides such as carrageenans, alginates, and agars. A polysaccharide is a polymer of monosaccharides (simple sugars) linked together byglycosidic bonds. In Maine, seaweed farmers at UMaine's Darling Marine Center have been most successful growing brown seaweeds and kelps such as sugar kelp which exhibit three main polysaccharides: fucoidan, laminaran, and alginate. Fucoidan and laminaran have antioxidant and bioactive nutraceutical properties while alginate has uses for food but is also valuable as a versatile material for biomedical applications. Our current experiments are being done based upon a noted conventional extraction method. The goal is to use data from this experiment along with methods to optimize the extraction procedure to improve yield and quality, as well as, to compare a variety of seaweed samples.

9	Tania Couture	Growing oysters in the face of climate change – learning from the life history of the European flat oyster	Tania Couture, McGill University & University of Maine (couturetania@hotmail.com); Sean O'Neill, & Matt Gray, University of Maine

Ocean acidification is a growing threat to aquaculture, especially for production of calcifying species. However, brooding oyster species may have inadvertently adapted their larvae to cope with changes in pH due to naturally low oxygen conditions found in the brood chamber. We examined the brood chamber of the European flat oyster, *Ostrea edulis,* by using micro sensors to probe inside of oysters to determine O2 and pH contents. We also examined the growth of oyster larvae extracted from the chamber and observed their development under low and high pH conditions. Collectively, these studies sought to understand if brood chamber environment may explain a possible evolutionary pressure that allows O. edulis larvae to cope with lower O2/ pH environments. These findings have implications for how oyster aquaculture operations in the future may adjust to deal with acidifying oceans caused by climate change.

10	Thomas Roerden	Cellulose nanofibers: a potential protectant of boat hulls	Thomas Roerden, University of Maine (thomas.roerden@maine.edu)

Cellulose Nanofibers (CNF) is a renewable and biodegradable resource that can potentially be used in boat coating application, to help resist the growth of bacteria and sticking of barnacles on the undersides of boats. Thin paper like films of CNF were testing in water in order to test disintegration rates for long term stability. The films were made by different methods, and with different solid percentages and salt concentrations. Comparing similar films but at different salt concentrations showed that films disintegrated more with salt in the film than those without. Additional studies will be performed to see if higher solid percentages results in higher film retention. Few tests were run to see how the films disintegrate in moving water at certain water velocities.

Session B (3-4 PM)

Poster	Presenter	Title	Authors & Affiliations
11	Alwyn Ecker	Using environmental data to improve oyster farm site selection in Maine	Alwyn Ecker, Wheaton College & UMaine (ecker_alwyn@wheatoncollege.edu); Cassandra Leeman, Eckerd College & UMaine; Tania Couture, McGill Univ. & UMaine; Matthew Gray & Damian Brady, UMaine

Despite the expanding oyster aquaculture industry in Maine, one of the major concerns of new growers is site selection. Currently, selection is through trial and error. The primary objective of this study was to determine environmental drivers of oyster growth to better understand what environmental conditions promote oyster production. Spat of the American oyster, *Crassostrea virginica*, 3 mm in size were caged and monitored in the mid and upper Damariscotta River Estuary. This estuary currently accounts for >60% of oyster production in Maine. Sampling of the oysters included weekly shell height and weight measurements; as well as monthly dry tissue weights. Water quality was monitored using remote sensing water quality monitoring instruments. Environmental drivers were modeled and applied to satellite imagery to create habitat suitability maps for oyster production throughout Maine's coastline.The results of this study will help identify suitable oyster habitat throughout Maine's coastline and aid stakeholders in selecting sites for aquaculture.

Poster	Presenter	Title	Authors & Affiliations
12	Brittany Dimick	Roles of zooplankton and bivalves on Maine estuarine ecology	Brittany Dimick, University of Southern Maine (brittany.dimick@maine.edu); Rachel Lasley-Rasher, University of Maine & University of Southern Maine; Karen Wilson, USM; Damian Brady, UMaine; Tom Kiffney, Colby College & UMaine

Aquaculture of marine bivalves is one of the fastest growing industries in Maine. A single adult bivalve may filter up to 50 gallons of water per day. In large population this effective filtration can reduce phytoplankton biomass and change nutrient dynamics in estuarine systems. Given the grazing pressure associated with bivalve aquaculture, we need to better understand how other grazers, such as zooplankton, will be affected. Bivalves can serve as both competitors and predators of zooplankton. Additionally, aquaculture cages and floats may provide structural refuge for zooplankton communities. Our goal is to understand potential interactions between bivalves and zooplankton populations in three Maine estuaries: Damariscotta River, Penobscot Bay, and Casco Bay. We will determine the abundance, composition and potential grazing impacts of zooplankton communities collected from the three estuaries. Differences in phytoplankton requirements among bivalves and zooplankton taxa will be discussed as well as implications on higher trophic levels.

13	Cassandra Leeman	Quantifying nitrogen loading to Casco Bay from the Presumpscot River	Cassandra Leeman, Eckerd College & University of Maine (cassandra.leeman@maine.edu); Whitley Gilbert & Damian Brady, UMaine

Excess nitrogen in estuaries impairs water quality, affecting ecosystem health. Understanding the sources and pathways through which nitrogen enters an estuary is important for managing and maintaining it's health. Casco Bay, Maine, while considered healthy, exhibits signs of excess nitrogen input. This study quantifies the nitrogen load from the Presumpscot River, a primary Casco Bay tributary. To provide context, the nitrogen load from this study site is compared to that of the Patuxent River, a Chesapeake Bay tributary. A main component of Chesapeake Bay's poor health is excess nutrients, with tributaries as a major pathway, making it an ideal estuary for comparison. Quantifying the nitrogen load from the Presumpscot River provides a piece of knowledge toward understanding the nitrogen dynamics of Casco Bay. This work brings us one step closer to effectively managing and mitigating excess nitrogen, and ultimately, maintaining the health of Casco Bay.

14	Dylan Schlichting	Use of vegetation farms as a solution to coastal erosion for Saco, Maine	Dylan Schlichting, Brandon Lieberthal, & Kimberley Huguenard, University of Maine (dylan.schlichting@maine.edu)

The city of Camp Ellis, located on Saco Bay, is under increasing environmental and economic threat from coastal erosion, losing up to 60 cm of land per year. Previous attempts to mitigate erosion, including rock jetties along Saco River, exacerbated the problem by impeding natural sand restoration. The establishment of vegetative farms, such as kelp or seagrass, along the coastal zone is under consideration as a green mitigation solution due to the vegetation's natural ability to attenuate incoming water waves. This project considers the practicality of this plan from engineering, socioeconomic, and climatological perspectives. High variability exists within the literature, however wave attenuation rates for kelp and seagrass farms can be upwards of 26% and 98%, respectively. Seagrass farms and a beach renourishment program have the potential to reverse the effects of erosion, and they are relatively inexpensive to develop. However, they would require an infrastructure investment and consistent maintenance.

15	Helen Reese	Effects of rising temperature on the growth and development of larval lobsters	Helen Reese, Amalia Harrington, & Heather Hamlin, UMaine (helen.reese@maine.edu)

The American Lobster (*Homarus americanus*) is Maine's largest and most productive fishery. Ocean temperature critically influences lobster biology and distribution. In this study, I am exploring how rising temperatures affect the development and condition of larval lobsters and its potential implications for the future of the fishery. Lobsters were reared from hatch under four nominal temperature categories: 14, 16, 18, and 22˚C. Upon reaching stage IV, larvae were removed from treatments, photographed, and had their hemolymph drawn. ImageJ software was used to measure morphological traits to detect any asymmetry in normally symmetrical features and total hemocyte counts was used assess immune function and health of the larvae. In previous studies, larvae expressed some level of asymmetry in claw size and midline-to-eye measurements, as well as higher hemocyte counts, at the temperature extremes. This suggests that rising ocean temperatures will negatively impact future productivity, not only in the lobster fishery, but for similar crustaceans and aquaculture species.

16	Isabelle Russell	Wastewater impacts on Casco Bay water quality	Isabelle Russell, Southern Maine Community College (isarus024@gmail.com) & Theodore Willis, University of Southern Maine

Water treatment facilities condition waste water, and release it back in to the surrounding body of water to be recycled. Macroalgae could be used to absorb excess nitrogen introduced into the Casco Bay estuary during the summer season if the correct growing conditions are identified. We set up two monitoring stations: the South Portland sewer outfall (BUG) and the second off Cushing Island in the mouth of Casco Bay, remote from potential sewer influence. Data were collected for photoactive radiation, salinity, total nitrate, total phosphorus, and temperature from 1m to 11m. We recorded higher temperatures and lower light levels at depth at BUG. Nutrient levels at BUG were also higher. The next step is to compare conditions at BUG to those found during peak growing season at established kelp farms in Casco Bay.

17	Kyle Capistrant-Fossa	Reporting on opportunities for the future of sea vegetable aquaculture in Maine	Kyle Capistrant-Fossa & Susan Brawley, University of Maine (kyle.capistrantfossa@maine.edu)

The seaweed *Wildemania amplissima* is under development for sea vegetable aquaculture. Ideally, it will join other economically valuable *Bangiales taxa* (e.g., Pacific nori, Atlantic laver) to advance aquaculture. Native to Maine, *Wildemania*'s fast growth during summer makes it an ideal candidate to enable year-round aquaculture. We collected zygotospores from wild blades to establish the sporophytic phase ("conchocelis") on oyster shells in culture. Experiments are underway to determine the temperature and photoperiod needed to complete the life history and have spores to seed lines. Additionally, predation by ciliates on algal seed stock is one of the most serious issues affecting nurseries in the aquaculture industry. Chemicals known to kill ciliates are being tested against adult sea vegetables, their seed stock stages, and ciliates isolated from algae. Preliminary results show that algae tolerate betadine, which suppresses their microbiome. Quinine, however, killed macroalgae during four week incubations. Experiments to solve the ciliate problem continue.

18	Rory Morgan	Laboratory and field trials to examine effects of predators on growth and survival of Arctic surf clams, *Mactromeris polynyma*, within the soft-bottom intertidal zone	Rory E. Morgan & Brian Beal, University of Maine at Machias and Downeast Institute (rory.morgan@maine.edu)

Arctic surf clams, *Mactromeris polynyma*, are a subtidal species that could be a viable new intertidal culture candidate in Downeast Maine. Prior studies have demonstrated that these clams are preyed on heavily in the soft-bottom intertidal, which, to date, has prevented this species from becoming a commercial entity. The work presented here is among some of the first attempts to grow this species in this region. To provide new information about growth and survival in the intertidal, both field and laboratory studies were conducted. The field experiment used a generalized completely randomized block design to assess whether the colorful siphon or a chemical signal (e.g., a pheromone) attracts predators. The lab experiment used possible crustacean predators to examine damage inflicted on the experimental units housing the surfclam juveniles. Once the attractant feature and predator species are known, a more focused field study can be conducted to examine parameters required to enhance survival.

19	Taylor Donovan	Measuring blue mussel growth rates in Downeast Maine	Taylor Donovan & Skylar Bayer, University of Maine and Downeast Institute (s1049101@monmouth.edu)

Successful blue mussel (*Mytilus edulis*) aquaculture requires sites that support rapid growth rates. But identifying such areas can be difficult because environmental conditions that impact growth may vary among both mussel beds and years. To determine if local or yearly conditions affected growth rates, I conducted a growth-ring analysis for five geographically separate populations in Downeast Maine hypothesized to differ in growth rates. Mussels generate an annual growth ring, which I used to estimate age and calculate annual growth for multiple years in the same individuals. Growth rings from a wide size range of individuals from each site were used to create growth curves, which were used to compare growth for different population and year combinations. My results thus far show that both population location and year do affect growth.

20	Tom Kiffney	Validation of turbidity, chlorophyll, and CDOM in the Damariscotta River for Sentinel-2 remote sensing sroducts	Tom Kiffney, Colby College & UMaine (tkiffney@colby.edu); Jordan Synder & Damian Brady, University of Maine

As Maine's shellfish aquaculture expands, site selection is crucial for the success of new oyster farms. Satellites are useful tools for determining viable areas for oyster growth along Maine's coastline. Previous research with the Landsat-8 satellite created an oyster suitability index (OSI) using temperature, chlorophyll *a*, and turbidity to identify promising aquaculture sites. Chlorophyll *a*, turbidity, and colored dissolved organic matter were measured *in situ* at two sites in the Damariscotta River, and will be to compared to values derived from satellites Sentinel-2A and 2B. The Sentinel's sensors have the potential to measure these parameters at a spatial scale of 10m (compared to the 30m resolution of Landsat 8) allowing for better measurements within narrow estuaries. It also has higher temporal resolution than Landsat-8, increasing the potential of collection during cloud free days. Results will be used to fine-tune the existing OSI, increasing its accuracy and usability for oyster growers.

SEA Fellows thanks UMaine's Darling Marine Center and University of Maine at Machias' marine field station, the Downeast Institute, along with SEANET and the Maine EPSCoR at UMaine, for support. For more information, please contact Dr. Heather Leslie (heather.leslie@maine.edu) or Dr. Brian Beal (bbeal@maine.edu).