

2014 Summary of Research

Prepared for Royal Bright Yacht Club

Prepared by Monash University

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Overview

The 2013-14 summer was a busy one for the researchers in the Marine Evolutionary Ecology Group out of Monash. Some projects were completed while other major projects began. The research at RBYC has taken on greater importance globally as new collaborators from Oxford University (UK), Gothenberg Uni (Sweden) have been drawn to this amazing field site right next to Melbourne. Our lab has grown to 3 postdoctoral researchers, 6 PhD students, 2 honours students and 3 research assistants and all rely on the generosity of RYBC to complete their research.

Introduction

Our group studies marine benthic communities. These communities are made up of many different plant and animal species that attach to hard substrates and live together in dense assemblages. Such animals obtain food by filtering out tiny plants and animals suspended in the water; we call this "filter feeding". This process is essential for keeping the water clean.

Sabella spallanzanii, a large fan worm common in all subtidal habitats around Port Phillip Bay



Our research

We want to find out how marine communities function. We work on the 'fouling' organisms that grow on pier pilings, pontoons and (unfortunately), boat hulls. We use these communities as miniature rainforests, taking advantage of their small size and quick assembly time to ask fundamental questions about biology that are not practical in full size rainforests.

We also are asking basic questions that, surprisingly, have never been addressed, such as "How much food do these marine invertebrates actually consume each day?" and "Do they remove specific portions of the plankton?" Our research involves hanging rectangular PVC panels from the side of the marina. We then monitor the different types of species that settle on those plates and at which the rate they grow.

You may be interested to know that we have previously determined that our work does not alter species composition or abundance, or result in the introduction of any species not previously established in the area; we merely monitor what is already there.

First research project from Brighton has been accepted for publication!

Scientists communicate the discoveries they make by publishing their findings in the scientific literature, usual in the form of scientific journals. This work is first reviewed by a panel of experts before being accepted and is a long, gruelling process, with many potential papers being rejected from several journals before ultimately being accepted. Data collected from research conducted in the first field season at RBYC in 2012-2013 was recently accepted for publication at the prestigious journal

Ecology. The work in collaboration with Robin Svensson at Gothenburg University in Sweden examined whether the number of species that can live in a community was limited by space or food. Robin used some new techniques to manipulate the availability of food and found that competition for food in fouling community is fierce, even when free space is available, there can be little food available for colonising species. This finding probably explains why fouling communities tend to grow out in three dimensions from their attachment point, all the food adjacent to the surface is exhausted and they need to reach further out into the water column, just like trees reaching higher to access sunlight over their competitors. These results also suggest that the amount of food in the water column and the density of fouling organisms on surfaces may be correlated, with interesting implications for how water quality and nutrient pollution might affect the rate at which boat hulls are fouled. The paper on this work is still at the printing presses but we will provide a pdf to RBYC as soon as it becomes available. This work is the first of many to formally acknowledge the generous support of our research by RBYC by allowing us access to the marina.

Unusual heat wave in the bay

For the first time since detailed recordings began, sea water temperatures in Port Phillip Bay briefly exceeded 26°C in January 2014. This unusually high temperature definitely stressed the marine invertebrate communities with dieback observed across multiple sites across the bay. All of the communities that we monitor quickly bounced back however and initial indications suggest that native species survived the heatwave better than some of the invasive species.

Collaboration with Oxford University

The use of RBYC as an outdoor laboratory has attracted international attention and a collaboration with Professor Tim Coulson from Oxford University has begun. Tim usually works on much more charismatic organisms such as the wolves of Yellowstone Park in the US and sheep on the island of St Kilda but he has been drawn to our work at RBYC because our system is so easy to study and experiment upon. This work is in the early stages but initial studies are very promising and we are braced for an increase in the proportion of British accents within our research group this summer.

Honours students study RBYC tubeworms

Annie Guillaume and Evatt Chirgwin recently completed their Honours Theses studying reproduction in the tubeworms that grow on the pier pilings at RBYC (see picture below). These worms form large colonies that shelter many species that live in these colonies and nowhere else and therefore important habitat-forming species. They live exclusively in the intertidal and are therefore exposed to high summer temperatures, making them potentially vulnerable to future increases in temperature.

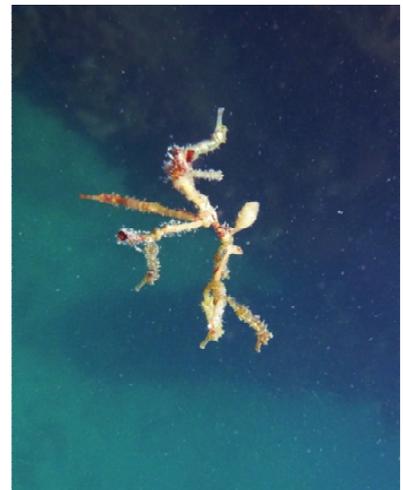
Annie studied whether parents in this species alter their eggs and sperm when they are exposed to higher temperatures, and whether these alterations have any consequences for offspring. Her research will help us predict how marine animals may cope with future climate change. Evatt's research focused on estimating how much evolutionary potential these tubeworms have for evolving to higher temperatures and found that they have potential to evolve to moderate increases in temperature but not large increases. Both Annie and Evatt received first class marks and are now taking well deserved breaks.



Future projects and concluding remarks

With the introduction of new honours and Ph. D. students (from Canada, Chile, Alaska, Sweden and Taiwan) in, we will continue the theme of our current research, focusing on factors which influence the ecology and abundance of species. During this year, we also intend to publish our current findings in the scientific literature. In the past, we have always acknowledged field sites in our publications, and we will be sure to inform RBYC of any further publications that come from work conducted at Brighton.

If you have any questions about this research, or anything else relating to the marine life in the bay, such as the identification of species, please feel free to talk to us next time we visit. For more information about our research, you can also visit www.meeg.org.



Juvenile seahorses attached to a floating piece of seaweed

From everyone in the Marine Evolutionary Ecology Group at Monash University, we thank you again for your time, support and help in making this research possible. We look forward to our continued work with you throughout the year.