

Evolution and Ecology at the UNSW

Sydney Institute of Marine Science (SIMS)

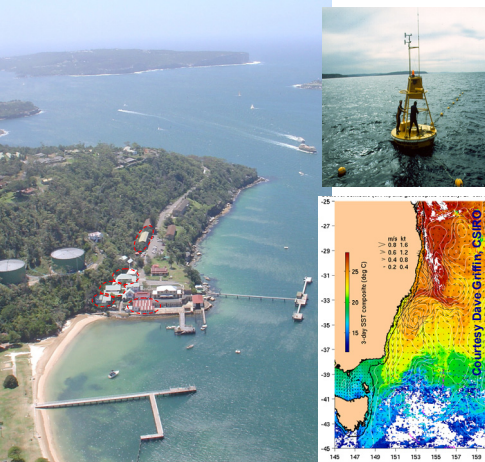


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OVERVIEW

SIMS - Is a collaboration of marine scientists from the 4 Sydney based universities – UNSW, Univ. of Technology Sydney (UTS), Macquarie University, and Univ. of Sydney. Associate members include Univ. of Wollongong, Univ. Newcastle, Defence Science & Technology, NSW-DPI (Fisheries) and the Australian Museum. We are renting 4 buildings from the Sydney Harbour Federation Trust at the Chowder Bay Precinct on Middle Head (Mosman – just near Taronga Zoo). There is a lecture theatre for 45, a laboratory has been completed and a \$500K seawater system is now complete (funded by ARC-LIEF). A 5th building is rented by UNSW with 7 offices upstairs and a laboratory for 37 students will be built downstairs.

SIMS is one of 5 national nodes of the IMOS program:



IMOS – the Integrated Marine Observing System

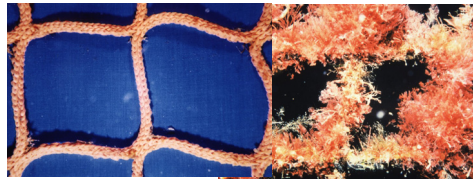
– is part of the National Collaborative Research Infrastructure Strategy (NCRIS) - is an Australian Government initiative to enhance Australia's marine research effort. IMOS is supported by a grant of \$50 million over 5 years from the Australian Government Department of Education, Science and Training (DEST), supplemented by nearly equal contributions from participating operators. SIMS is responsible for 3 facilities (circled), totalling \$4.5M.



SOME CURRENT PROJECTS

Natural products from the ocean

The marine environment has been a rich source for the identification and development of novel technologies. Marine bioprospecting for novel pharmaceuticals and other bioactives has in the past focused on eukaryotes such as seaweeds and sponges. However, the development of recent molecular tools for characterization of microbial communities, and an increased understanding of the biofilm mode of life for bacteria, has demonstrated that the diversity, ecology and physiology of marine microorganisms is poorly understood. These microbial communities represent an enormous, and largely untapped source of novel genes and metabolites. Bioprospecting at SIMS will focus on marine microbes.



In 2 weeks, a salmon cage goes from 1 to 5 tonnes wet weight due to fouling organisms. Natural products from seaweeds are used as anti-fouling compounds.

Urban Fisheries Ecology

Habitats in urban waterways are subject to high fishing pressure, yet are frequently altered or degraded and support few larval fish for future fisheries (i.e. "recruitment limited"). Recreational fisheries predominate in ports and harbours, and have often been declared as recreational fishing havens, with the recreational license funds being used for rehabilitation and to buy-out commercial fishers.

Using IMOS technology research at SIMS will examine restocking of fish to urban waterways, the conservation of endangered sharks, the effects of rivers on estuarine fisheries and the implementation of marine protected areas.



Juvenile mullet and larval prawns are reared to a suitable ecological and economic size, and released into appropriate habitats (rather than just at the boat ramp as

The red tide turns



Scientists link sewage outfalls to red tide events

Red tides of a carnivorous dinoflagellate *Noctiluca* were thought to be due to sewage outfalls. In fact in only one instance did we find evidence of this off Port Hacking. All other red tides were the result of upwelling off central NSW, and oceanographic transport

SOME CURRENT PROJECTS

Ecology of ports and harbours

Chowder Bay has access to wide variety of marine habitats, including seagrass beds, kelp forests, intertidal rocky reefs and soft sediments, all of which support highly diverse plant and animal assemblages. Research into the ecology of these habitats at SIMS will lead to an understanding of marine biodiversity, the physical and biological processes that influence the structure of these habitats, their responses to natural and anthropogenic disturbances, and how they can best be protected from threatening processes.

Marine and estuarine environments in close proximity to urban areas face increased nutrient and toxicant loads, leading to reduced water quality, changes to marine habitats, reduction in coastal fisheries, and increased risks to human health. Research at SIMS will examine how ecological processes are affected by increased nutrients and toxicants, develop methods to track changes in water quality, and guide management and remediation strategies for polluted sites.

Aside from habitat destruction, invasions by alien species are the most significant threats to regional biodiversity on a global scale. These may threaten economically valuable resources and result in the extinction of many native species in both terrestrial and aquatic systems. Recent evidence suggests that climate change may facilitate non-indigenous species invasions to new habitats and displacement of native species from areas already colonised by an invading species. Many of the traits that make species good invaders may also make them more tolerant of climatic warming or pollution. Little work has been carried out on how climate change or pollution may facilitate invasion by non-indigenous species, or affect interactions among their prey and competitors.



Pre-settlement, larval bryozoans (a common fouling organism) are injected into a chamber to test for the effects of heavy metals (copper) influencing marine communities in ports and harbours.