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# New Zealand Marine Studies Centre

Annual Report

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The New Zealand Marine Studies Centre (NZMSC) provides a window into marine science at the University of Otago. It offers marine education programmes for all ages to foster understanding and appreciation of New Zealand's unique marine environment and responsibility towards its conservation.

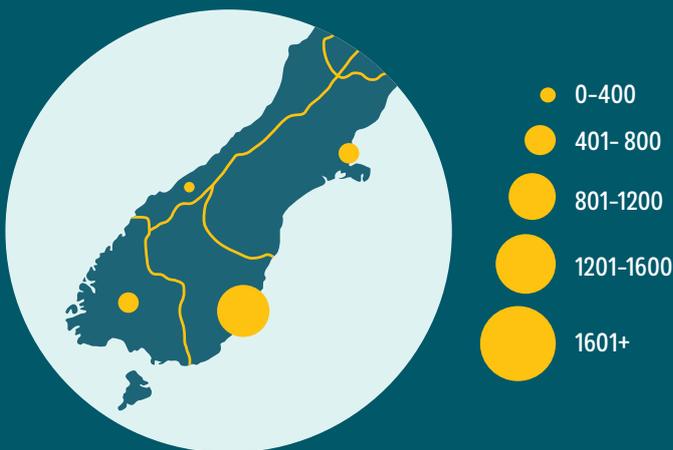
# Marine science for southern New Zealand schools

The New Zealand Marine Studies Centre (NZMSC) education programmes engage primary and secondary school classes across southern New Zealand in science learning through field trips to local marine habitats, boat journeys and practical sessions in our specialist marine science teaching laboratory. Access to seawater aquaria, live marine species, and a range of scientific equipment and expertise create learning opportunities not available in a classroom. Students develop science skills and an understanding of marine issues, learn about science careers, participate in and contribute to scientific research, and engage in environmental action and stewardship (kaitiakitanga).

Our programmes link to The New Zealand Curriculum and focus on the Nature of Science strand, support achievement for a diversity of students, including Māori and Pasifika, and are tailored to meet specific learning outcomes. Multi-day programmes provide students with opportunities to challenge their science ideas, develop skills in instrument use and experimental design, and work together with science mentors to answer real-world questions.

These programmes are partially supported through a Ministry of Education Learning Experiences Outside the Classroom contract (2018–21).

## Number of students visiting NZMSC in 2019



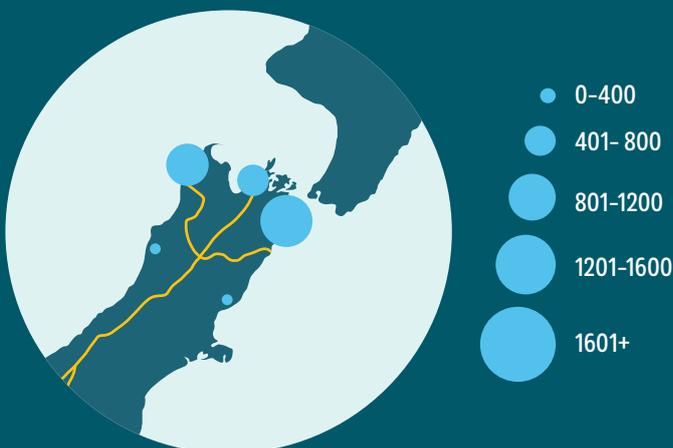
## Dunedin programme

Students and schools travel from all over Otago, Southland, South Canterbury and South Westland to participate in our curriculum-linked marine science programmes delivered at the New Zealand Marine Studies Centre (NZMSC) and Portobello Marine Laboratory on the shores of Otago Harbour.

## Nelson outreach programme

With an educator based in Nelson, the NZMCS programmes extend to Nelson, Marlborough, Tasman, North Canterbury and West Coast schools. The programmes are delivered through a range of coastal sites, school camp venues and other science institutions (including Cawthron and the Nelson Marlborough Institute of Technology), and several charter boats are used.

## Number of students visiting NZMSC (Nelson) in 2019



## Secondary teacher feedback

100% of secondary teachers said the programme increased their students' understanding of the nature of science.

“ Great discussions of how scientists work together and constantly critique their work. How measurements need to be regularly taken as evidence. ”

“ Personal growth of students, authentic science experience, challenge. ”

“ I love visiting the Marine Science Centre as it offers opportunities for our girls which we are unable to provide at school. With your expertise, resources and facilities, you are able to extend our girls (and my knowledge) even further within this topic. ”

Teachers also highlighted that the programme was beneficial to their own learning:

“ Very good professional learning development. ”

“ Strengthens my understanding of the nature of science and links to current scientific knowledge. ”

## Nelson Highlights

### Aquaculture Experiences

To extend our Year 13 Biology programme (3.1) in which students carry out an independent investigation on mussel response to their environment, an “Aquaculture Taster Day” was developed for junior secondary school students. The impact on students' understanding of aquaculture and the wider environment is summarised in the following comment from a participant: “Aquaculture is limitless. It isn't all about fish, and lots of science is involved.” Both programmes are supported by Cawthron Institute, SpatNZ Ltd and the NMIT Aquaculture Department.

### Virtual Dives

Immersive experiences are now possible for Nelson students thanks to a new underwater drone donated by Port Nelson. Students are investigating the marine critters that live under the wharfs and pilings at the marina, and monitoring the settlement of encrusting plants and animals alongside scientists.



**In 2019, the NZMSC programme engaged more than 15,449 people.**

**4,742** school students and teachers attended educational programmes at the NZMSC.

**3,837** school students, teachers and community members participated in the Aquavan programme.

**3,151** family and interest group participants engaged in marine experiences.

**5,719** school students and teachers attended programmes in the Nelson/Marlborough/Tasman region.

## Tertiary student recruitment.

**64%** of the University of Otago's first-year marine science students (MARI 112) from the South Island had previously engaged in NZMSC education programmes and/or used NZMSC resources (32% of New Zealand students).

**33%** had participated in NZMSC secondary science programmes (11% of New Zealand students).

# Science extension and enrichment

More than 169 Year 6–12 students (35% Māori, 12% Pacific) from schools around the South Island participated in eight multiday and residential programmes (4–8 days in length). These research-based programmes provide able and enthusiastic students with an in-depth experience and understanding of the marine world. These programmes are partially supported through a Ministry of Education Opportunities for Gifted Learners contract (2019–20).

- Science and the Sea – for Year 6–8 students (4-day programme)
- Making Sense of the Marine World – for Year 10 students (8-day residential programme)
- Deep Thought Expedition – for Year 11 and 12 students (5-day residential programme, based on the RV Polaris II)

“ Amazing experience, fantastic mentors. Hugely important for increased confidence in using scientific processes and working alongside other peers. Highly recommended. ”

*(Making Sense of the Marine World parent)*

“ I think this is a fantastic programme and it has been so beneficial for my daughter, especially in terms of new knowledge, communication skills, confidence and friendships. ”

*(Deep Thought Expedition parent)*

## Opportunities for Māori students

Three multiday programmes provide an in-depth experience and understanding of the marine world, highlighting Māori values. The students work together to build knowledge, develop skills and extend understanding.

- Te Ara Wai Ki Ye Oranga – for Year 9 students (5-day programme)
- Te Rauawa o Te Pahi – for Year 10 students (6-day residential programme)
- Rangitahi o Te Moana – for Years 11 and 12 students (5-day residential programme, based on the RV Polaris II)



“ Kia ora. A big thank you to everyone involved in the programme. My daughter had a wonderful time learning about the benthic zone. She has always been extremely interested in the marine environment and your course has only strengthened her resolve to further a career in this field. ”

*(Rangitahi o Te Moana parent)*

“ My son, who never really talks about school, couldn't stop talking about his days on this programme. He achieved excellence in his end of year science exam after he got achieved and not achieved for his other subjects and I attribute this to the experiences he had on this programme – really engaging him with the purpose and worth of science. ”

*(Te Ara Wai ki te Oranga parent)*

## Opportunities for Pacific students

This multiday programme used culturally relevant values and issues to increase student engagement, ownership and enjoyment of science. The marine context provided the opportunity to link the learning back to the home of the Pacific people. A highlight of the programme was the evening session, in which the students shared their learning with their families and the Pacific community.



- Mapu kimi-ara Pasifika – for Year 6–8 students (4-day programme)

“ This programme was amazing. My daughter had an opportunity to connect with the ocean, which is such an important part of Pacific lifeways. She was proud to be a Samoan and to know that our ancestors were skilled and knowledgeable about the marine world. She is so excited about science now. Fafetai tele lava. ”

*(Mapu kimi-ara Pasifika parent)*

# Aquavan travelling programme



The Aquavan, equipped with chilled recirculating seawater tanks and a mobile touch tank, transports marine life to classrooms, community halls and showgrounds. Through fun, hands-on workshops, people of all ages engage in learning more about local marine species and their importance in the ocean food web, as kai moana and as indicators of change.

These programmes are partially supported through an MBIE Curious Minds Grant (2019) and University of Otago Alumni donations.

## Discovering our Coastal Connections

Travelling from river mouth to source, the Aquavan Catchments Programme highlights connectivity between river health and the coastal environment. Using live marine species, a 3D catchment-model, science equipment, hands-on investigations and field studies, it demonstrates how activities upstream affect the coastal environment, and encourages local ownership and improved management. In 2019, the Aquavan visited catchment communities in Otago, Southland, South Westland and South Canterbury, involving 46 schools and running six teacher workshops (1,925 students, 223 teachers).

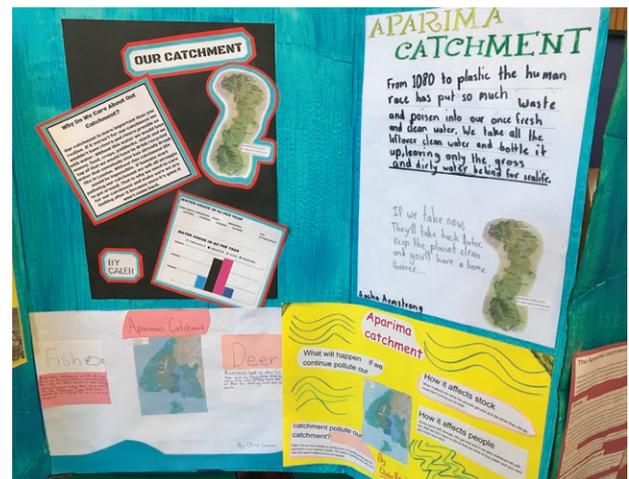


100% of teachers said the programme was very valuable for their students, enabled their learning and understanding beyond what is possible in the classroom, and developed their connection with the coastal environment.

- “ All activities linked back to local environment and how our actions connect to the coastal environment. ”
- “ Probably the most valuable external learning opportunity for our students that our school has seen for years. ”
- “ The explanation, activities, specimens and the visual effects allow children to develop and connect with our coastal environment. ”

## Community Learning

The Aquavan participated in 15 community events and field days, with more than 1,700 public visitors, providing opportunities to develop networks, share good practice and develop knowledge and skills for environmental action. Linking the school programme with community days provided an opportunity for the students to share their learning with their family/whānau.



- “ The Aquavan has been instrumental in raising public awareness of the concepts of ki uta ki tai (everything is connected from the mountains to the sea) and integrated catchment management within the region. The format for presenting these concepts stimulated much interest and conversation in the Southland community around some of the critical challenges facing Southland and the rest of the country. We consider that the Aquavan and its accessible science is a great way of helping communities on their journey towards better environmental outcomes. ”

*(Chief Executive, Environment Southland)*



# Citizen science projects

## Marine Metre Squared (Mm2) Citizen Science

This project encourages communities to get involved in long-term monitoring of the coastal environment. The development of protocols and collection of data over time allows communities to assess change in their local shoreline and supports stewardship and restoration projects. This project helps to build a picture of the biodiversity, distribution and abundance of seashore animals and plants in New Zealand's marine environment.

Mm2 Citizen Science continues to grow and develop with more than 2,300 people registered (69% North Island, 31% South Island). More than 1,786 surveys were completed country wide.

## Seaweek (Mm2) workshops



During Seaweek (2–10 March), Sally Carson travelled the length of the country delivering workshops for schools, teachers and communities about the Mm2 Citizen Science project, and how it can be used to involve students in environmental action and to investigate issues of local concern.

## Sediment and Seashores Case Study



The Sediment and Seashores project involved Dunedin school students working alongside scientists collecting data to understand the impact of dredging and sediment disturbance on the rocky intertidal communities in Otago Harbour. The 3-year project was supported by the Otago Participatory Science Platform. A film about the project was made by Lana Young, a Science Communication graduate from the University of Otago.

[www.mm2.net.nz/resources](http://www.mm2.net.nz/resources)

## Data Quality and Citizen Science

To assess the value of citizen science, Aless Smith (MSc student) compared the Mm2 survey data collected by students through the Sediment and Seashores Case Study with data

collected by marine scientists in the same area. The results highlighted that when the project is facilitated, and students are trained, the data is comparable with that collected by scientists. Aless presented this work at the Citizen Science Conference in Raleigh, North Carolina, USA.

## Intertidal BioBlitz



Over 230 schools and community volunteers contributed to an intense search for intertidal species over a tidal cycle at two Otago sites: Karitane and Pleasant Estuary. Using the iNaturalist platform, the project recorded 140 observations and identified 87 species. BioBlitz, alongside Mm2, is a valuable tool for intertidal monitoring, and the project has generated recommendations for future use.

## Shark Spy

The coastal community reports shark sightings throughout the year.

“ Shark Spy was very valuable. It's important to gather positive data in a climate of uncertainty for children who think the world is going to end. Able students such as this worry so it's great to use science in a positive way. This is an important link to participating in and contributing to big ideas. ”

*Secondary science teacher and Surf Lifesaving Club Leader*

“ This was a hands-on opportunity for the students to learn outside of the labs, which was invaluable. It was beneficial to me to see my students engaged in co-operative group work and relationship building. ”

*Year 10 teacher*

“ To be out on the water 'experiencing' science is not replicable in the classroom. Rob earned so much respect for treating the children like scientists, and empowering them. It was a great experience for the children. ”

*Year 6 teacher*

# Educational resources

NZMSC's resources guide teachers to use the local coastal environment to teach science in the classroom and support families to explore the local seashore.

“ We have used the website to download lesson plans to teach when back at school, and for assessment to report to parents and the board of trustees. An awesome help for the classroom teacher. ”

*Primary teacher.*

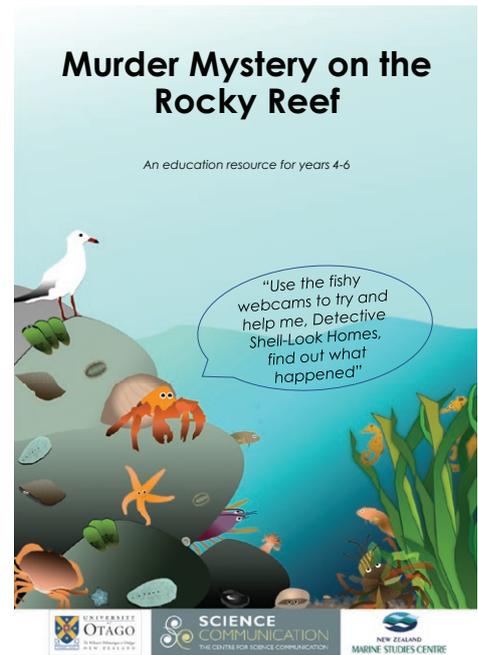
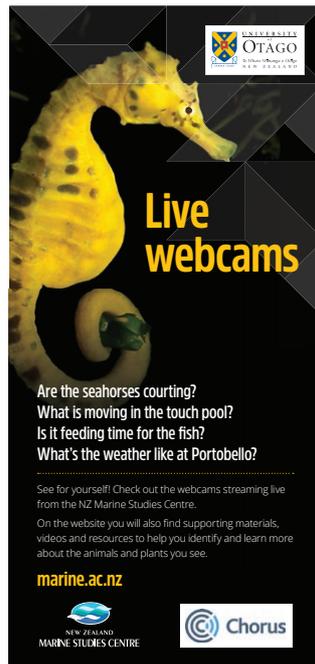
## Fishy Web Cam

The underwater world is invading classrooms and living rooms via cameras installed in the NZMSC's seahorse, fish and touch tanks, and at the wharf at Portobello. Educational resources have been developed to support the use of the web cams in the classroom.

## Murder Mystery

Who murdered Coco the cockle? Students use the touch pool web cam to collect and investigate the evidence. Notes and videos provide further details, allowing students to build their case and determine who is responsible for the death.

The resource was developed by Emily Colquhoun, an intern from the Centre of Science Communication.



## Art Poster – Life Between the Tides

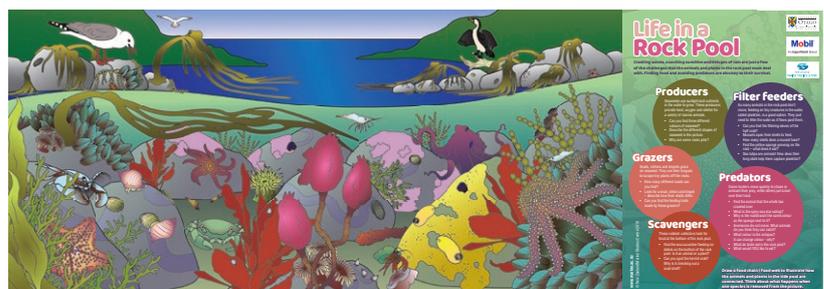
A watercolour poster illustrating the strange and amazing marine life found on the rocky shore at low tide was released during Seaweed Week. The collaboration with California-based artist Corlis Schneider began in 2011 when she visited the NZMSC as an intern. Production of the poster was supported by Mobil Oil New Zealand Ltd.



## Activity Poster – Life in a Rock Pool

In celebration of World Oceans Day (8 June) the NZMSC released an interactive poster – Life in a Rock Pool – aimed at primary / intermediate students. Questions on the poster prompt the students to look more closely and learn about feeding behaviours.

The illustration, which was also created by Corlis Schneider, was used on both the poster and the Centre's Aquavan. Printing of the poster was kindly supported by Mobil Oil New Zealand Ltd.





Full details of the school programmes we offer, public events and projects we organise, and the free resources available to teachers and educators, can be found on our website and through social media.

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