



Advancing Community-Led Marine Restoration

*Insights from a Study Tour of Marine Restoration, Ocean
Farming, and Marine Monitoring Projects*

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Purpose and Background

I applied to the Winston Churchill Memorial Trust for travel support to connect with internationally leading marine restoration practitioners with the aim of advancing community-led marine restoration in New Zealand and illustrating how regenerative ocean farming can contribute to building a resilient ocean and resilient communities.

During the study tour, I met with community groups, Indigenous leaders, large non-profit organisations, philanthropists and grant funders, scientists and citizen scientists. I set out to understand how successful projects are initiated and who carries them forward on the ground - what drives momentum, enables long-term progress, and builds lasting impact. The central goal was to better understand how these diverse stakeholders collaborate in successful marine restoration efforts and to identify common elements that contribute to effective, enduring outcomes - such as strong partnerships, sustainable funding, knowledge-sharing, and community empowerment. This included examining how grassroots initiatives influence policy and decision-making at local, regional, and national levels.

Key drivers for marine ecosystem decline worldwide include imbalances in the marine food web, sedimentation, habitat loss, ocean warming with associated changes in species distribution (e.g., some kelp species can't survive beyond a certain temperature, while grazers may extend their range), the introduction of invasive species or the spread of marine diseases.

Human actions and resource management decisions have downstream impacts. Fishing pressure can disrupt the food web, land use practices contribute to sedimentation, and activities such as dredging and other physical disturbances modify or destroy critical habitats. Research and examples from around the world demonstrate that marine biodiversity decline can be halted and ecosystem resilience reverted through targeted actions, including effective biodiversity protection measures and managing marine areas with ecosystem integrity at centre of decision-making.

Indigenous and local communities play a critical role in driving meaningful change in places where they live and are deeply connected. Across New Zealand, hāpu, iwi and local communities are working to maintain, rebuild or improve their local marine environment to ensure our marine ecosystems can sustainably provide for us into the future. However, projects are often only carried out at small scale and with limited funding through grants or philanthropic foundations. The aim of the study tour was thus to identify different pathways to larger scale community-led conservation and restoration projects with relevance to New Zealand.

Key Findings

This report covers insights from travel undertaken in the second half of 2024 and was collated in early 2025.

The study tour covered projects across a wide geographic range and cultural context with a focus on temperate marine ecosystems, particularly kelp forests and sponge habitats. Countries and regions visited include the west coast of Canada and the United States of America (Alaska, Washington, Oregon and California), Portugal, Italy and Australia (Tasmania, Perth, Sydney).

It has been inspiring to witness the impact of indigenous- and community-led marine and coastal restoration projects, which are driving meaningful change at both local and regional levels. Currently, there are no established funding pathways for marine restoration and establishing viable business models solely around seaweed-based food products remains challenging in regions where seaweed is not traditionally consumed as food. Seaweed fertilizers and biostimulants require high volumes of farmed seaweed, which

can impact on the genetic diversity of local seaweed species. Investment in research and ecology is essential to assess and develop industry processes that support biodiversity outcomes.

Common Elements of Successful Restoration Projects:

- **Address key drivers of ecosystem decline** – such as habitat loss, overfishing, pollution, and climate change.
- **Empower communities** to lead and participate in positive change efforts.
- **Engage broad audiences** through education, outreach, and storytelling to build awareness and connection.
- **Ensure participation of all stakeholders**, including:
 - Indigenous and local communities
 - Decision-makers
 - Commercial operators
 - Consumers
- **Foster a deeper understanding of:**
 - The ecosystems these groups rely on
 - The long-term impacts their decisions have on ecosystem resilience
 - The sustainability of the ecosystem services provided

The study tour revealed several recurring themes and key insights that underpin effective marine conservation and restoration initiatives:

- **Strong community networks and partnerships are key.** These often build on communities, community groups or dedicated volunteers with specialised skills and a strong connection to place. Community groups can be more flexible and pivot as required to achieve long-term outcomes (the same can apply for private funding). However, **funding**, especially **for critical assets** - from smaller equipment to more expensive assets (such as boats), **remains a significant challenge**. Often there is no flexibility in grant rules to cater for marine projects and most funders lack understanding of the challenges and opportunities of supporting work in the marine space.

→ for more details, refer to the Marine Life Sanctuaries Society and the diverse network of organisations working Vancouver, Vancouver Island, Salish Sea & Cordova in the appendix.

- **Indigenous leadership and indigenous governance provide pathways to long-term environmental, social and economic outcomes** driven by values of the indigenous and wider communities. Projects are as varied as the local context with each project reflecting the desired outcomes that are at the heart of the respective community.

→ refer to The Native Conservancy, Cordova, Alaska and the Nanwakolas Council & Wei Wai Kum First Nation in the appendix for more examples.

- **Identifying common goals is key to building strong partnerships and respectful networks.** Independent facilitators can help shape shared understanding across the local community, the fishing sector, consumers, tourism operators, and the science community and government agencies. Individuals with understanding of local ecosystems, the ability to foster collaborations and mutual understanding between diverse stakeholders play a critical role. However, **roles and funding for community champions and facilitators at the right level are rare to find**.

→ for examples, refer to the Oregon & California and the Great Southern Reef Foundation in the appendix.

- **Long-term biodiversity monitoring is critical.** Monitoring change over time is crucial to establish a baseline and identify any changes and trends that might require management actions or are the

result thereof. **Outplanting and management of marine species** in the commercial and restoration context **must build on sound ecological knowledge** (including climate change impacts) **and genetic understanding**. We have over 1,000 native seaweed species in New Zealand, many with potential commercial applications, but due to a lack of investment, our knowledge of species diversity and life cycles is lagging behind.

→ refer to the [*Hakai Institute*](#) & Tula Foundation About the Hakai Institute and Tula Foundation – dedicated philanthropy with long-term impact *in the appendix for an example of a long-term philanthropic investment into biodiversity monitoring.*

- **A pathway for communities and organisations to provide input and engage with agencies is essential.** Without it, critical information is often missing when agencies make decisions on policy, funding, management, and monitoring plans. Too often, these relationships rely on individual agency staff rather than being intentionally fostered, making them vulnerable to staff turnover and institutional change.
- **Funding sources for community-led or local initiatives vary widely**, ranging from donations by passionate locals and grants to long-term investment by indigenous funds and large philanthropic organisations. New funding mechanisms are emerging for restoration projects. Funding is only one component and collaborations with research institutes, government agencies and businesses are other pathways for communities to achieve change. Many ocean focused philanthropy organisations have decades of experience in the marine space and a deep understanding of local and regional issues. New Zealand’s ocean philanthropy sector is in its early stages and could greatly benefit from the insights and experience of international counterparts.
- **Marine citizen science involving divers is more common overseas** with funding for coordinators and for the continuous development of programmes. Scientists and restoration **experts around the world were excited to try and learn about my immersive 360 marine videos and QR code use** and how it can be used to build ocean literacy and get the audience virtually “underwater”. Many of the visited groups are looking to adopt consumer grade 360 technology and incorporate it into their outreach initiatives.
- **There was great interest in indigenous-led projects and incorporating indigenous knowledge in the marine space from New Zealand** and I introduced overseas organisations to specific New Zealand projects where possible and provided more general information and links to mātauranga Māori resources.

Conclusion and Next Steps

One of the most significant insights from the study tour was the collapse of kelp forests in Australia caused by the range extension of the black longspined urchin (*Centrostephanus rodgersii*) and their unchecked proliferation due to a lack of natural predators, particularly crayfish (spiny rock lobster, *Jasus edwardsii*). The decline of these kelp forests has had devastating consequences for Australia’s abalone and crayfish fisheries and rural communities.

New Zealand is now at a similar stage to Australia. Increasing numbers of small urchins are now spreading across the reefs in New Zealand’s north east coast, including deep reefs beyond the reach of manual removal. Australia’s agencies missed this critical window to act and are now trying to rebuild crayfish populations and to restore kelp forests. Government agencies and decision makers in New Zealand must act now to avoid devastating ecosystem decline by urgently rebuilding crayfish population to control the spread of black urchins and minimise the impact of their range extension. While agencies are beginning to engage with communities to address kina barrens, these conversations must include the emerging threat of black longspined urchins on both the shallow and deep reefs along the north east coast.

Internationally, there are many examples, including indigenous-led conservation and restoration projects, that can inspire and inform initiatives in New Zealand. These models provide valuable insights into governance structures, funding pathways, research support, building community capacity and capability, and leveraging and developing sustainable and restorative marine economies. Likewise, innovative indigenous- and community-led initiatives underway in New Zealand can contribute valuable pathways and knowledge to global conservation and restoration efforts.

A valuable next step will be to assess opportunities for attracting funding and resources in more detail, and to develop clear pathways for implementing innovative, community-led approaches for marine restoration projects across New Zealand.

Dissemination of Findings

Throughout the fellowship, I shared specific insights, outreach and education initiatives, media contacts, and relevant funding opportunities with community groups that are actively involved in marine restoration initiatives in New Zealand. Groups and insights shared include, among others:

- **Mohimohi Moana Project, Northland:** Shared a potential international funding opportunity, relevant outreach and education initiatives, and opportunities for media exposure.
- **Te Wairua O Te Moananui – Ocean Spirit Trust, Tutukaka:** Shared latest developments in kelp forest restoration and potential funding pathways.
- **South Taranaki Reef Project, Nga Motu Marine Reserve Society & MAIN Trust, Taranaki/South Taranaki:** Shared insights on relevant outreach, education, and awareness-raising initiatives, as well as effective communication approaches.
- **Dr Debbie Early, Endeavour Inlet, Marlborough Sounds:** Shared relevant outreach and communication approaches.
- **Torora Foundation, UNESCO Biosphere initiative, Otago:** Shared insights from UNESCO biospheres and similar initiatives, including community engagement opportunities.

I founded ***Explore Your Coast*** in 2023 to bring the ocean into people's life, raise awareness for the importance of coastal marine ecosystems, and to empower communities to document and monitor their local marine environment. I incorporated learnings from the study tour into the *Explore Your Coast* communications strategy and refreshed key messages. Catchment Studios offered their services in kind and **produced a social media reel about *Explore Your Coast* and Wellington's kelp forests**. We included the refreshed key messages and published the reel on Instagram in February 2025. The reel **gained over 126,000 views, reached over 109,000 accounts, and engaged over 6,900 users**, with the majority of new followers from Wellington and Auckland.

After returning to New Zealand, I created a portfolio of artworks with a focus on the diversity of local seaweeds, the beauty of giant kelp, and the unseen underwater forests of Wellington. I worked with Salty Slate Ltd and finalised the camera work and interviews with refreshed key messages for a short documentary. **The documentary *Seaweed, A Love Story* portraits my monitoring, outreach and restoration initiatives and incorporates my artwork as a new way of bringing the ocean into people's homes** (more on: <https://exploreyourcoast.co.nz/docu/>). The documentary will premiere soon and will screen at venues across New Zealand. **Q&A sessions and accompanying art exhibitions will provide opportunities throughout the year to connect with a diverse audience** – from anyone interested to learn about the marine environment and marine restoration, to marine experts and potential funders for larger restoration initiatives and community-led projects. I will further explore art and photography and continue to use immersive 360 videos and QR codes to engage new audiences and highlight what lies beneath the waves around New Zealand.

Appendix – Detailed Insights from the Study Tour

The chapters below outline specific insights from meetings during my study tour that I feel have relevance to New Zealand.

Vancouver, Vancouver Island, Salish Sea & Cordova

University of British Columbia (UBC), Martone Lab

Thanks to the Martone Lab¹ and in particular PhD candidate Alana Breitzkreuz who introduced me to the seaweed diversity of the BC coast during a low tide trip to Stanley Park and the subsequent visit to the university lab on Canada Day weekend. The Martone research group monitors seaweed communities along the BC coast, establishing baseline measures of species composition to help detect shifts in seaweed abundance and distribution in the future. Many of the Martone Lab alumni are working on seaweed and marine restoration projects.

The same species of seaweed can look quite different in different parts of the coastline. Seaweeds adjust their shapes in response to environmental factors such as currents and wave exposure and it was great to see the flume tanks mimicking different flow conditions and get an introduction to *Nereocystis luetkeana* ('Bull kelp' noting it is different to the species we call bull kelp in NZ) at cellular level through microscope slides.

Hakai Institute & Tula Foundation

The Martone Lab is also part of the *Sentinels of Change Project*² that was set up by the Hakai Institute to monitoring change in the Salish Sea bioregion. Sentinels of Change is a **decade-long community-cantered initiative** investigating patterns of invertebrate biodiversity, change, and resilience across the Salish Sea. The project establishes a network of community partners to work together to observe and investigate patterns of invertebrate reproduction and recruitment within a complex and dynamic natural and social seascape. The initiative **draws strength from place-based knowledge across the diverse communities** of the Salish Sea and works with partners to select sites and collect samples, providing materials and support as needed. **Participation offers training, education, and capacity-building within communities that can be transferable to other local projects and monitoring initiatives.** Taking part reinforces existing partnerships and forges new ones across a diversity of communities. Participants are encouraged **to inform and steer data collection efforts based on community needs and interests.** The Sentinels of Change Project progresses scientific knowledge and **aims to develop a sustainable ongoing biodiversity system for the Salish Sea.** Project staff is co-advised by UBC and Hakai Institute scientists. The initiative builds on decades of long-term scientific monitoring data sustained by dedicated philanthropy funding through the Tula Foundation.

Despite the importance of seaweed habitats and shifts in seaweed communities having significant downstream effects on marine ecosystems, **little is known about their thermal niche, reproductive timing, or successional dynamics of most seaweed species and many species still require taxonomic description.** This is also valid for the study of seaweeds and seaweed ecosystems in New Zealand. The Sentinels project offers an unprecedented opportunity to integrate field collections, recruitment methods, and molecular data (e.g., DNA barcoding, metabarcoding, eDNA) to investigate the seasonality, successional dynamics, and environmental tolerances of NE Pacific seaweeds.

Independent and secure long-term funding from the Tula Foundation allowed for sustained funding of long-term integrated marine and coastal biodiversity monitoring. This provides crucial baseline data to assess and predict change and inform marine management. Independent funding enabled sustained engagement of strategic partners and capacity development in diverse communities and across international borders. The independent funding also allows Tula Foundation to pivot and focus their investments in alignment with strategic opportunities and their focus areas.

¹ Research at the Martone Lab: <https://www3.botany.ubc.ca/martone/research.html>

² Sentinels of Change Project: <https://sentinels.hakai.org/about>

About the Hakai Institute and Tula Foundation – dedicated philanthropy with long-term impact

The roots of the **Hakai Institute**³ extend back to the early 2000s when the **Tula Foundation**⁴ helped conserve key coastal habitats in partnership with the Nature Conservancy of Canada. From **land securement**, the organization's focus shifted to **supporting science** on the BC coastal landscape **to guide stewardship**. One major hindrance was a lack of infrastructure to carry out the science. To fill that gap, the Hakai Institute ramped up its operations in 2009 with the purchase of the former Hakai Beach Resort fishing lodge on Calvert Island. The first official gathering in the spring of 2010 was the Coastal Guardian Watchmen conference bringing First Nations from across the BC coast to Calvert Island—an event we've hosted each spring since that time. Research began mostly in the immediate vicinity of Calvert Island. In 2014, the Hakai Institute expanded and opened a second ecological observatory on Quadra Island. Since then interests extended farther across the BC coast and to Washington and Alaska through strategic partnerships, expanding research capability and fostering Coastal dialogues.

Eric Peterson, born and raised on Vancouver Island, and Christina Munck are the co-founders and directors of Tula. Eric and Christina established Tula at the end of 2001 and moved to BC a couple of years later. The endowment for Tula came from the sale of a company Eric started about a decade earlier.

For nearly 10 years, the Tula foundation funded the **Hakai Magazine**⁵ to publish independent stories from around the world that explore science, society, and the environment from a coastal perspective. Hakai Magazine 'Coastal science and society' has kept the public informed about the most critical issues facing the largest habitat on Earth: the ocean. Funding reallocation meant that the Hakai Magazine had to close at the end of December 2024. The publish content includes long form articles investigating complex topics, quick reads as well as visual and infographics and podcasts will still be available on the Hakai Magazine website. Senior staff has joined **bioGraphic**⁶, an award-winning magazine by the California Academy of Science to deepen bioGraphic's ocean and coastal coverage and produce the best journalism on topics that are crucially important to the future of our planet.

Secure and sustained funding for in-depth journalism on coastal and marine topics from around the world, that features coastal communities and investigates complex and interrelated topics in long form is rare. Particularly the marine space, which is out of sight, out of mind and inaccessible to most people, high quality content and a pathway for indigenous and community voices is even more important and relies on journalists with a deep understanding of this space. The Hakai magazine filled a gap in creating important content. The investment portfolio by the Tula foundation Spending time travelling and meeting local communities working to restore the coast and their marine environment has highlighted that many of the smaller projects are building the foundation and holding the capability and relationships locally. However, larger non-for profits have generally more funding for marketing and outreach and receive more attention and sponsorship.

Marine Life Sanctuaries Society

Marine Life Sanctuaries Society (MLSS BC), a professional and citizen science community

'Relationships are key to success and funding is difficult to get'

MLSS BC⁷ is a passionate group of volunteers, scientists, professional divers, and motivated members of the community who have been leading Citizen Science efforts to protect the marine ecosystems in Átl'ka7tsem/Howe Sound for the past several decades.

The idea of forming a society had been buoyed around by long time scuba dive partners, Andy Lamb and Bernard Hanby, authors of the popular photographic and encyclopaedic book, Marine Life of the Pacific Northwest (published in 2005). In 1990, the Pacific Marine Life Sanctuaries Society, later renamed to MLSS, became a registered charitable organization. Throughout thousands of dives on the Central Coast of BC over a period of 25 years, they had observed a significant decline in populations of inshore rockfish species that were formally abundant. Coincidentally, they noticed

³ Hakai Institute: <https://hakai.org/about/>

⁴ Tula Foundation: <https://tula.org/about>

⁵ Hakai Magazine: <https://hakaimagazine.com/>

⁶ bioGraphic Magazine: <https://www.biographic.com/>

⁷ a) Marine Life Sanctuaries Society website: <https://mlssbc.com/>; b) Interview with past presidents Adam Taylor and Glen Dennison: <https://voyis.com/interview-adam-taylor/>;

a major increase in the targeting of live rockfish species by commercial interests and increased sport-fishing pressure. They decided it was time to take action, and establishing marine sanctuaries was deemed a promising approach.

Over a long period of time efforts by MLSS BC and **projects were driven by a small number of individuals who self-funded documentation of habitats, including running private boats and developing homemade equipment.** Eventually grants supported specific projects and MLSS BC now employs a project director and coordinator.

Through government collaboration, public outreach, and community partnerships, MLSS BC discovered, mapped, and protected the majority of sponge reefs in Átl'ka7tsem/Howe Sound. Since its mapping efforts, MLSS BC has expanded its conservation efforts to include rockfish (including young of the year) monitoring, lingcod egg mass monitoring, temperature monitoring, glass sponge research and documentation, and various community outreach efforts such as the Beach Interpretation Program. **Funding from various sources has been instrumental in sustaining citizen science research and documentation effort and sustaining community outreach programmes.**

Since its initiation, MLSS BC has been working to achieve greater protection of coastal waters through the creation of sanctuaries where absolutely no extraction of life, or mineral, is permitted within a marine protected area (MPA), with the ultimate goal of *"making the world a better place, one no-take marine protected area at a time"*.

MLSS BC reiterates that **the best methodology to support over-harvested marine life, and enable the ecosystems to return to a healthy sustainable state, lies in full no-take marine sanctuaries.**

Creating awareness about the status and effectiveness of different MPAs is key. Not all MPAs are completely protected from all types of extractions (e.g., fishing, trapping, seining, trawling, etc.). Most MPAs globally allow one or more forms of extraction. In Canada, for a marine sanctuary to exist and support sustainable marine life there can be no extraction whatsoever (full no-take initiative). Over time, the sanctuary (equivalent to NZ's **no-take marine reserve**) **will have a spill-over effect of marine life that will benefit the surrounding areas and populations.** The spill-over effect has been studied in New Zealand linking snapper populations in the Hauraki Gulf back to brood stock in the Goat Island Marine Reserve.⁸

Individual sanctuaries **need to be large and the protection needs to be enforced.** In Átl'ka7tsem/Howe Sound evidence has shown that there is **a prevalence of low compliance and a general lack of awareness of existing fishing regulations with rampant poaching,** especially in Rockfish Conservation Areas (RCAs) and enforcement of regulations has been a sorely lacking entity throughout Canada's coastal areas. Poaching and not enough resources for rangers is a problem in New Zealand as well.

MLSS BC continues to focus on a **stewardship programme at the community level to empower citizens to report on illegal fishing** and other such activities that are harmful to sustainable fisheries and the overall health of the ocean. The programme allows people to understand how to observe, record and report their observations to the Department of Fisheries and Oceans Canada. **MLSS BC advocate for education and awareness** so that citizens can understand the existing rules **and accurately report non-compliance to the appropriate federal or provincial conservation officers.**

MLSS BC believes that the **key to success lies in community engagement and education.** Humans are intimately involved and responsible for the sustainability of marine life and the habitats or ecosystems that support it. Despite this, the average individual has never seen many of the common creatures that live in the ocean. **Using science-based research, education, hands-on activities, photography and video documentation, MLSS BC endeavours to introduce local marine life to the general public, create an emotional attachment by citizens to marine life and to encourage a responsible approach to sustainable fisheries through the establishment of protected marine sanctuaries.**

MLSS BC work closely with the local dive community to monitor the health of marine life and habitats. Their long term monitoring programmes collect vital data which can be used to better inform conservation and management efforts by provincial and federal regulatory bodies. These programmes have also **created an extensive network of local citizen scientists who have become inspired marine stewards, directly involved in the caretaking of our ocean.** Citizen scientists commit thousands of volunteer hours each year and MLSS BC believes that their effort will achieve greater protection for coastal waters.

⁸ University of Auckland study, 2017: <https://www.scoop.co.nz/stories/SC1710/S00045/snapper-family-ties-provide-new-evidence-on-marine-reserves.htm>

Protecting Glass Sponge Reefs – a regional approach

'They've been quietly hanging on for more than 500 million years and they've got a fighting chance at 500 million more.'

The glass sponge reefs in the Pacific Northwest **were discovered only in the mid-1980s** and are **the only large-form, living examples of their type in the world**. The reefs reach the height of 6-8-storey building (some 13 stories and 13,000 years of age) and **they provide important nursery grounds and habitats for commercially important species** such as prawns and rock fish.⁹ Many of the fishing methods and fishing activities damage the reefs (bottom trawling, also the lines cutting across reef mounts even if the fishing boats sweep over the area, anchoring, prawn pot drops). Rock cods are a relative slow growing species that stay on one part of the reef and easily take fishing bait.

Átl'ka7tsem/Howe Sound is home to diverse marine ecosystems including areas of glass sponge reefs. Heavily impacted by industrialisation throughout the last century (heavy metal mining waste, industrial pollution), the area has undergone a positive ecological turnaround in recent years. However, close to Vancouver the region is home to 1.6-2 million people. **Pressure from climate change and increase in human activity continues to build**, which has led to community efforts to designate Átl'ka7tsem/Howe Sound as **UNESCO Biosphere**.¹⁰ **Over 50% of the glass sponge reefs have already been destroyed by trawling** (prawns) and diver surveys show that damage is still continuing to occur. Some of the shallower reefs can be found in 30m and 70m depth, just shallow enough for access by experienced and technical divers. However, environmental conditions and depth make it difficult to access the reefs. **Out of sight, there is a lack of awareness of the importance of these reefs as foundation species and more research could be done on the ecological significance of the reefs and their contribution to economically important fisheries**. The Biosphere designation provided acknowledgment of these important ecosystems and funding pathways (despite being small) to MLSS BC and opportunities to extend community partnerships. MLSS BC is working with first nation members to revive the Squamish language and to create signs showcasing the diverse ecosystems to the public while continuing to advocate for no-take zones.

Átl'ka7tsem/Howe Sound UNESCO Biosphere

The Átl'ka7tsem/Howe Sound UNESCO Biosphere¹¹ application and successive designation has helped to build networks between the many different community and conservation groups in the region.¹² Biospheres are comprised of core protected areas, buffer zones and transition zones and applicants need to demonstrate support from various agencies.¹⁰ The application also provided a pathway to bring the different levels of provincial, state and federal agencies to come together.

Ocean Wise

On World Oceans Day 2017 the Ocean Wise Conservation Association was officially launched, building on Vancouver Aquarium's 60 plus years of commitment to marine ecosystems. The intention was to transform the Vancouver Aquarium from an aquarium with conservation, research and education programmes to a globally focused ocean conservation organization.¹³ Financial impacts of the COVID-19 pandemic saw the aquarium sold and Ocean Wise become a fully independent conservation organisation with a focus on: whales, ocean pollution and plastic,

⁹ a) Unique 'glass' reefs that built European landscape protected from trawler (published Feb 2017):

<https://environmenttimes.co.uk/news/item/478-unique-glass-reefs-that-built-european-landscape-protected-from-trawlers>; b)

Glass sponge reefs thought to be extinct are discovered to be thriving in ocean depths:

<https://bioone.org/journals/bioscience/volume-58/issue-4/B580403/Glass-sponge-reefs-thought-to-be-extinct-are-discovered-to/10.1641/B580403.full>; c) <https://www.nsnews.com/local-news/8-more-glass-sponge-reef-refuges-created-in-howe-sound-3095074>; d) Technical divers have created the documentary 'Moonless Oasis' showcasing the work by MLSS BC and other

organisations. Moonless Oasis: <https://oceanographicmagazine.com/features/glass-sponge-reef-howe-sound/>. The full documentary is available via free streaming in Canada only.

¹⁰ About UNESCO Biosphere's: <https://www.unesco.org/en/mab/wnbr/about>; British Columbia's three Biosphere regions:

<https://www.hellobc.com/stories/get-to-know-the-3-unesco-biosphere-regions-in-bc/>

¹¹ Átl'ka7tsem / Howe Sound UNESCO Biosphere: <https://www.howesoundbri.org/>

¹² Marine Stewardship Initiative is another example working to restore herring habitat. MLSS staff observed more whales returning with increasing herring numbers. <https://howesoundguide.ca/search-for-slhawt-herring/>

Coastal Restoration Society, a non-profit organization supporting the environmental remediation goals of First Nations, provincial, and federal government agencies has become a leader in industrial-scale restoration and stewardship projects in coastal communities and inland waterways. <https://www.coastrestore.com/about>

¹³ More about Ocean Wise: <https://ocean.org/about-us/>

sustainable seafood ('Ocean Wise' certification), education, and youth programmes, and kelp forest restoration. Ocean Wise collaborated with the Kelp Forest Alliance¹⁴ to publish a guidebook on **kelp forest monitoring**, and is **working with local kelp hatcheries** on reseeding kelp forests towards their goal of restoring 5,000ha with hatchery operation processes still a work in progress. Ocean Wise is still aiming to restore 5,000ha, but is looking at an extended timeline. Funding for each of the work streams predominantly comes from private funders and sponsorship. The **inflatable 360 video projection dome** stood out as an opportunity to engage groups of people in immersive ocean experiences.

Vital Kelp

Vital Kelp Seed Nursery produces kelp 'seed' for kelp farmers and restoration projects.¹⁵ The hatchery focuses on the Sunshine Coast region (north of Vancouver) to avoid movement of biological material from one region to another. By keeping it local they are creating local jobs, working with Indigenous Communities and striving to truly understand and steward local resilient kelp beds under rapidly changing climate conditions. Vital Kelp is welcoming new collaborations and are grateful for the many connections and opportunities they have received to further kelp science in the Salish Sea! **Vital Kelp have grown kelp for 6th season and the 6th season is the first season they received funding!**

Seaweed farming for commercial and restoration purpose

Reliable and scalable processes and research and development in the hatchery, on farm and in the processing of seaweed is required to develop seaweed farming to scale for restoration and commercialisation. In countries that have a successful industry (such as Korea) the demand for seaweed is well established as a food product or as ingredients for other sectors. Broad support across research intensive areas of the industry is available (taxonomy/genetics, development of cultivars, processing and product development). There is a concerted and deliberate approach from the government to support the research and industry sector and build required expertise and capability to drive the sector. In countries with a fledgling seaweed sector, both the demand and supply for seaweed for restoration and commercialisation need to be developed, as well as a shared understanding for the barriers and opportunities across the sector. This requires a minimum scale of production to make businesses viable which in return requires investors to come on board who can see return on their investment. Other small advanced economies are more successful than New Zealand in building technology clusters and leveraging the capacity and capability across industry, research and government and lowering the barrier to entry for all industry participants. This helps avoid competition for research and private funding in areas that are crucial for the development of the industry overall, accelerates industry development and supports the industry to become competitive internationally. The need for kelp forest restoration is immense internationally and innovative funding pathways have still to be developed. Both in restoration and commercial settings, the hatchery and operation processes have to be effective and efficient and build on ecological understanding.

Cascadia Seaweed

Cascadia Seaweed¹⁶ is Canada's largest kelp cultivator, growing local seaweeds from seed on low-impact ocean farms. Infrastructure includes anchors on the seafloor, floats on the surface and tensioned ropes in between. Cascadia Seaweed previously also investigated food products, however successfully pivoted the business to grow, process and produce seaweed-based products for regenerative agriculture - biostimulants and agrifeeds. Cascadia Seaweed is working with First Nation tribes as part of Cascadia Nature-based Solutions and has successfully closed a Series A investment round that will allow the business to scale operations.

John White, Marine Division Director at **Snuneymuxw First Nation**: "Our elders speak of a once abundant kelp population and having a relationship with the Salish Sea that sustained us as First Nation people. The restoration of kelp in our area is a key component to rejuvenating our salmon, water animals, and other benthic habitat" After site selection and trials in 2023 Cascadia Seaweed outplanted *Nereocystis luetkeana* (Bull kelp) at the start of

¹⁴ Kelp Forest Alliance: <https://kelpforestalliance.com/>

¹⁵ Vital Kelp in the news (July 2024): <https://www.coastreporter.net/in-the-community/how-the-vital-kelp-initiative-aims-to-restore-the-coasts-kelp-forests-9120771>

¹⁶ The story of Cascadia Seaweed and indigenous partnerships: <https://www.cascadiaseaweed.com/story>
Recent Series A investment round: <https://globalaginvesting.com/ga-canadas-cascadia-seaweed-raises-c4m-in-series-a-for-west-coast-expansion-and-innovation/>

2025 at four sites in Snuneymuxw Territory.¹⁷ These sites will be monitored through the Canadian spring to assess growth and impact.

The Tsawout / S̓TÁUTW First Nation tribe shared their work on indigenous-led conservation and the kelp farm project with Cascadia Seaweed at the 7th International Marine Conservation Congress (IMCC) 2024. A short article and videos are available online (IPCA¹⁸, Guardian programme supported by Hakai Institute): <https://tsawout.ca/international-marine-conservation-congress/>

Cascadia Seaweed was named on **Canada's 2024 Foresight 50 list**, recognizing the business as one of Canada's **most investible clean-tech ventures** and raised C\$4 million (US\$2.8 million) in a Series A funding round. Investors included WWF Impact, Vere Ventures, Potato Impact Partners, VertueLab Climate Impact Fund, Realize Impact, and others. Cascadia Seaweed will build a commercial-scale seaweed biorefinery on the West Coast, expand their ocean cultivation operations, and scale up sales and marketing for our liquid kelp extracts and livestock products.

There is a strong network across Vancouver and Vancouver Island of research groups and research centres (private and public), marine focused not-for-profits and marine/technical experts that work for First Nation tribes or independently to support community-led projects. Funding from the Government of Canada is also available through Canada's Oceans Protection Plan and the Aquatic Ecosystems Restoration Fund (AERF).¹⁹

Bamfield Marine Science Centre & Kelp Rescue Initiative

'Knowledge isn't power until it's applied'

'Successful kelp restoration starts with asking the right questions, building strong partnerships, and creating scalable solutions'

The **Kelp Rescue Initiative** (KRI)²⁰ builds on 50-plus years of kelp research at Bamfield Marine Science Centre (BMSC)²¹ and **brings together research experts across a broad range of areas relevant to kelp forest and coastal restoration** who collaborate with First Nations, policy makers and environmental organisations and others to accelerate effective kelp restoration solutions. BMSC provides a base for the restoration team with dedicated staff from programme managers, scientific leads, culture technicians, operations managers, First Nation Liaisons, and more. BMSC facilities allow for shared use of specialised equipment and have space for KRI's requirements.

Discussions with research teams from the **University of Victoria** highlighted the importance of **historic baseline data, fieldwork to gain further ecological insights (using divers and ROVs), remote sensing, and modelling**. These are crucial to predict future trends, assess **where kelp survival will be feasible**, and **identify areas where kelp forests provide significant seasonal ecosystem services**. Research experts are confident that the cultivation and hatchery processes can be developed to provide the required seed stock for large scale restoration.²² However, environmental conditions and what happens in the field to any seedlings will remain a challenge.

The Western Canadian Universities Marine Sciences Society, a charitable organization whose members include UCalgary, University of Alberta, University of British Columbia, Simon Fraser University and University of Victoria, was established the **Bamfield Marine Sciences Centre** as a shared campus more than a half-century ago. About two years ago, the BMSC's 50-plus years of kelp research was formalized by creating the **Kelp Rescue Initiative**. "The Kelp Rescue Initiative is the first research project under that multi-university umbrella charity where we can dedicate the focus solely to supporting kelp restoration," says Dr. Sean Rogers,²³ PhD, director of the BMSC, and a professor of ecology and evolutionary biology in the Department of Biological Sciences in UCalgary's Faculty of Science.

¹⁷ Snuneymuxw First Nation Green Gravel: <https://www.snuneymuxw.ca/2024/09/24/nurturing-nature-the-kelp-restoration-project-and-its-crucial-impact/>

¹⁸ Indigenous Protected and Conserved Area (IPCA), about: <https://conservation-reconciliation.ca/about-ipcas>

¹⁹ Government investment under Canada's Oceans Protection Plan: <https://www.newswire.ca/news-releases/protecting-coastal-aquatic-ecosystems-in-british-columbia-through-important-restoration-work-852411600.html>

²⁰ Kelp Rescue Initiative: <https://kelprescue.org/>

²¹ About KRI and BMSC: <https://ucalgary.ca/news/ucalgary-students-help-research-and-restore-ocean-kelp-forests>

²² Equipment innovation: <https://industrialplankton.com/photobioreactor/seaweed-bioreactor-system/>

²³ From: <https://ucalgary.ca/news/ucalgary-students-help-research-and-restore-ocean-kelp-forests>

Bamfield Marine Science Centre is a shared facility with operational funding from five Canadian Universities. It was established over 50 years ago through the Western Canadian Universities Marine Sciences Society, a charitable organization whose members include University of Calgary, University of Alberta, University of British Columbia, Simon Fraser University and University of Victoria. MBSC provides access to specialised and general marine science facilities in the lab and in the field, including scuba diving. BMSC is hosting university courses and runs school programmes and public outreach events.

The remote village of Bamfield has about 300 residents with 700 Nation members living in the wider area and 10,000 tourists visiting in the summer peak season to experience the outdoors. Attracted by BMSC and the existing science and technology expertise **businesses with hatchery capacity, aquaculture and processing capacity have created an innovative cluster in the remote village**, including Canada's largest supplier of high-quality kelp seed

North Island College

The North Island College (NIC) is located in Campbell River on Vancouver Island. NIC is working on more applied research and research questions that are of interest to First Nations and local community. NIC's Centre for Applied Research²⁴, Technology and Innovation connects expert staff and students with local businesses and organizations, provides grants to leverage investments, supports research project development and manages projects as required. Programmes and projects include Canada's Seaweed Innovation Hub that provides cross-sector innovation support, a state-of-the-art lab and processing equipment and transfers knowledge and provides training to First Nations, industry and community organizations. NIC improves seaweed processing methods, develops seaweed food products and innovates in other areas relevant to seaweed and aquaculture.

Applied research capability with funding pathways is critical in supporting early stage businesses, First Nations and other organisations as well as supporting process and product innovation in established businesses.

Nanwakolas Council & Wei Wai Kum First Nation

The Nanwakolas Council²⁵ provides services to member First Nations in their stewardship of lands and waters. This includes specific technical expertise, operational support and information, facilitation and other services. The Council supports the work of the First Nations' Guardians and advocates for the protection of the member First Nations' Aboriginal rights when engaging with governments. The member First Nations also work collectively through Nanwakolas Council.

*'Stewardship of the marine environment [...] requires information and knowledge about the state of the waters and the wildlife and plant life within them, understanding what is changing and why, planning ahead for what needs to be done to keep them healthy, keeping a watchful eye on what is happening in the traditional areas, and upholding and protecting our Aboriginal rights and Indigenous Laws related to the marine environment.'*²⁶

Working with Nanwakolas Council, Wei Wai Kum First Nation have developed a 10-year stewardship vision for their Guardian Programme²⁷ and are working towards obtaining sustainable funding to grow the programme.

About the Land Back Movement

Retrieved from: <https://tsawout.ca/land-back/>

The Land Back movement in Canada is a grassroots Indigenous-led movement that advocates for the return of Indigenous land to Indigenous peoples. It is rooted in the recognition of Indigenous land rights and seeks to address historical and ongoing injustices stemming from colonization, dispossession, and forced assimilation.

The movement emphasizes the importance of land not only as a vital resource for Indigenous communities but also as a fundamental aspect of Indigenous identity, culture, and self-determination.

²⁴ North Island College Centre for Applied Research: <https://www.nic.bc.ca/about-us/research/carti/projects/>

²⁵ About the Nanwakolas Council: <https://nanwakolas.com/about-us/>

²⁶ Nanwakolas Council – Taking Care of the Marine Environment: <https://nanwakolas.com/waters/>

²⁷ Wei Wai Kum First Nation Guardian Programme: <https://coastfunds.ca/stories/wei-wai-kum-guardians/>;
<https://www.indigenousguardianstoolkit.ca/communities/wei-wai-kum-first-nation>

Land Back calls for the return of lands, territories, and resources to Indigenous peoples, challenging existing colonial structures and promoting Indigenous stewardship and governance over their ancestral lands.

The Native Conservancy, Cordova, Alaska

'Preserving culture and protecting habitat.'

The Exxon Valdez oil spill had a profound impact on the environment around Cordova and subsequent initiatives to protect land and ocean by Eyak people.

Dune Lankard is an Eyak Athabaskan Native of the Eagle Clan who founded and co-founded the Eyak Preservation Council, the Fund for Indigenous Rights and the Environment, the Resisting Environmental Degradation of Indigenous Lands Network. Dune is the executive Director of the Native Conservancy. Dune's efforts have led to the preservation of over 1 million acres of critical habitat in the Copper River Watershed and Exxon Valdez Oil Spill Zone.

The Native Conservancy works for the ongoing preservation of traditional Eyak lands and protection of djiLqaad (the Bering River) and aanguu'nAw (the Copper River) from resource extraction and corporate control (Land Back movement). Revitalizing native culture, health and spirituality is intrinsically linked to a healthy habitat that sustains traditional food sources and allows for subsistence practices – achieved through conservation management at large scale that allows for sustenance harvest and sustainable lifestyles (including small scale, local businesses) without destroying habitats on land and in the ocean.

Dune Lankard is an Ashoka Fellow since 2006:²⁸ The description of Dune Lankard's work for the fellowship describes Dune's extensive work and efforts: ***'Dune's solutions are more powerful than any act of civil disobedience. They are implemented through an integrated web of organizations and coalitions that address the legal, political, environmental, and most importantly, the financial angles of the problem. For thousands of years Native Alaskans have relied on their traditional knowledge of the sea, ice, land, and animals to thrive in a harsh environment. The plentiful natural resources of Alaska provide a basis for the survival of these communities. By convincing Native communities and policymakers that it is in their long-term economic interest to preserve renewable sources of food, energy and water, Dune is helping indigenous peoples protect some of the world's last wild places with strategies that are environmentally, culturally and economically sound.'***

More about Dune's work is available in his own words online.²⁹

Puget Sound Restoration Fund

Puget Sound Restoration Fund designs, tests and spearheads in-water actions to restore Puget Sound's marine habitats, species, and waters – for people and place. So get your boots on and let's go!

The main focus of Puget Sound Restoration Fund (PSRF)³⁰ is restoring marine habitat (bull kelp, Olympic oysters) and habitat enhancing species (pinto abalone) that are critical to the food web and support the wider marine ecosystem in Puget Sound. ***PSRF (founded in 1997) works collaborative and encourages positive, place-based projects.*** Key elements are: improved water quality, increased abundance of native species, additional acres of restored habitat, enhanced ecological benefits, and re-forged connections with healthy marine resources.

PSRF has very strong science programme with ecologists and technicians who work in the lab and in the field. Restoration methods are developed by PSRF to a stage where community partners can be integrated in the delivery of conservation programmes.

The programmes involve different community partners and engages ***individuals, families and organisations to get involved and connect to healthy marine ecosystems and resources*** (i.e. community shellfish farms). PSRF has developed ***effective key messages*** and the meeting provided a fantastic opportunity to discuss how the

²⁸ Ashoka Fellowship: <https://www.ashoka.org/en-us/fellow/dune-lankard>

²⁹ a) A Native Perspective on Regenerative Ocean Farming: <https://www.greenwave.org/blog-who-farms-matters/dune-lankard>; b) Healing our waters, healing ourselves through a sustainable economy: <https://imagine5.com/essay/healing-our-waters-healing-ourselves-through-a-sustainable-economy/>; c) Salmon stories: <https://salmonstate.org/salmon-stories/dune-lankard>

³⁰ Puget Sound Restoration Fund: <https://restorationfund.org/>; introduction on YouTube: <https://youtu.be/Y80KbAI2oDU>

communication strategy can apply in the New Zealand context. Community partners are still reliant on their funding to keep small aquariums going. Often this relies on strong local support from individuals.

Above/Below – Ocean Literacy

Above/Below³¹ is an ocean literacy campaign to raise awareness about kelp forests in the Northeast Pacific. The web story, *The Mysterious World of Bull Kelp*, is celebrating the power of art and science to tell the bull kelp story.

‘Above/Below believes in the power of art to create a sense of wonder and foster curiosity about the ecology of the ocean’s kelp forests. Art creates spaces for ideas and people to gather, learn, ask questions, and connect. When the art is inspired by bull kelp and its stories—magic happens!’

Kelp Node – Cross-boundary network to restore kelp forests

The Kelp Node³² brings together diverse participants & partners from British Columbia and Washington. Over 150 individuals participate in the Kelp Node across six interconnected working groups. Understanding, protecting and restoring kelp ecosystems requires collaboration and a common framework. The Kelp Node aims to build a roadmap for expanding kelp ecosystem planning and conservation in the Pacific Northwest, through working groups that are organized to address specific actions including citizen science (‘participative science’). The initiative is supported by the Tula Foundation.

Oregon & California

Like in British Columbia and in the Salish Sea Region there are many groups in Oregon that have shared interest in kelp forest and healthy marine ecosystems, and that collaborate with each other or complement each other in outreach and research activities.

- The **Oregon Kelp Alliance (ORKA)**³³ represents diverse interests in kelp forest ecosystems, and includes commercial urchin divers, researchers, managers, conservationists, tribal members, tour guides, sport divers, chefs, and other community members.
- The **Oregon Sea Grant**³⁴ is supporting the Oregon Kelp Alliance with a programme development grant to promote coordination and development of pilot kelp restoration projects.

Here to Listen, Help, Engage

Oregon Sea Grant is a cooperative programme between NOAA and Oregon State University with core-funding from NOAA Sea Grant. Oregon Sea Grant and partners (local governments, agencies, tribal agencies, industry, and philanthropy) are working to address ongoing, unexpected, and emerging needs of Oregon’s coastal communities and ecosystems. ***Oregon Sea Grant funds an independent position as a liaison between the fishing community, researchers and the public which has helped building better understanding of future pressures, research needs and seafood sustainability*** (local seafood tours³⁵).

- The **Oregon Coast Aquarium**³⁶ is an independent non-profit organization with education and conservation programmes centred at the aquarium in Newport. The ***aquarium dive team runs the dive surveys*** for the Oregon Marine Reserve Programme.
- The **Elakha Alliance**³⁷ is a non-profit organization working to bringing back Oregon’s Sea Otters. Outreach and feasibility studies on ***restoring a healthy sea otter population*** is underway with a ***focus on community engagement and partnerships. Most people are surprised there are no otters left on Oregon’s coast.***
- **Oregon State University Port Orford Field Station**

Broad intersection of research on ecology and marine megafauna.³⁸ The Field Station is also closely linked with the small community of Port Orford and potential economic opportunities (Food from the Sea,

³¹ Above/Below: <https://bullkelp.info/>

³² Kelp Node: <https://kelpnode.org/>

³³ Oregon Kelp Alliance: <https://www.oregonkelp.com/>

³⁴ Oregon Sea Grant: <https://seagrant.oregonstate.edu/outreach-and-engagement>

³⁵ Seafood on the dock: <https://seagrant.oregonstate.edu/outreach-and-engagement/shop-dock>

³⁶ Oregon Coast Aquarium: <https://aquarium.org/conservation/>

³⁷ Elakha Alliance: <https://www.elakhaalliance.org/>; Strategic initiatives: <https://www.elakhaalliance.org/learn/our-plan-2/>

³⁸ Gray Whales and bull kelp: <https://yachatsnews.com/rise-in-sea-urchins-off-oregon-coast-appears-to-have-indirect-negative-impact-on-local-gray-whales-osu-study-finds/>

Aquaculture, Blue Economy Initiatives). **'Blue jobs are here now'**. An introduction of ORKA by Tom Calvanese is available on YouTube.³⁹

Kelp forest decline through overgrazing by sea urchins is extensive along the Oregon Coast, particularly in southern Oregon where the reef systems are more extensive. Nature based solutions have to be found to restore kelp forests along Oregon's coast – the coastline is extensive and access is limited.

Work needs to be done to restore ecosystems that can sustain coastal communities economically **and local coastal communities and fishers have the skills** to work with researchers and **to implement solutions. Investments into blue jobs can enable this.**

ORKA - 2024 Oregon Kelp Forest Status Report

2024 Oregon Kelp Forest Status Report by ORKA⁴⁰ highlights how important systematic and long-term monitoring is to better steward kelp forest ecosystems. *'A targeted monitoring programme will help identify early indicators of future ecosystem loss or recovery, pinpoint the drivers of kelp forest loss, select effective restoration strategies, and empower communities to better understand and become involved in stewarding local kelp forests.'* The report includes recommendation on future monitoring programmes and notes indigenous peoples' rights to their traditional lands and waters and having the opportunity to collect, access, and analyse data. The report also includes and references Reef Check data. **Reef Check's Kelp Forest Monitoring programme**⁴¹ is a community science programme that has already contributed valuable data along the West Coast and is a valuable tool for individuals to engage in marine monitoring, management, and stewardship.

The report **recommends funding for community science and Indigenous science as part of kelp forest monitoring programmes to enable improved stewardship of kelp forest ecosystems into the future.** In addition, **workforce development programmes focused on training and equipping coastal residents** should be supported **where they live** as an essential part of stewardship strategies.

Sequoias, tall redwood conifers, build iconic forests along the California coast. **'Sequoias of the Sea'** is a documentary in the making that will highlight the plight of the northern California kelp forests which have mostly disappeared.⁴²

The **Marine Conservation Institute**⁴³ **takes a global look at effective marine biodiversity and ecosystem protection.** Flagship initiatives are **the Marine Protection Atlas**,⁴⁴ which **tracks progress towards marine conservation goals** and the **Blue Parks Initiative**.⁴⁵ **Marine Protected Areas are categorised based on the conservation outcomes** with the primary goal of identifying and tracking fully and highly protected areas as the international community works toward 30% protection by 2030. Categorisation by the Marine Conservation Institute is based on the latest scientific information. The **Blue Park Standards**⁴⁶ are available online. Currently, Blue Parks cover only 1% of the world's ocean. The Marine Conservation Institute also awards small grants under the **Blue Sparks initiative** to **acknowledge community and protection efforts in the early stages** towards the Blue Park standards.⁴⁷

The **Sunflower Star Laboratory**⁴⁸ **in Moss Landing** develops methods and mobilises resources to grow sunflower stars at the scale needed for recovery of the populations after the devastating sea star wasting disease outbreak and subsequent sea urchin explosion. The Sunflower Star Lab works collaboration with universities, aquariums, and

³⁹ Tom Calvanese, Protecting Oregon's Kelp Forests: <https://www.youtube.com/watch?v=cAitVa5rnOI>

⁴⁰ ORKA 2024 Oregon Kelp Forest Status Report: <https://www.reefcheck.org/publications/>

⁴¹ Reef Check Kelp Forest Programmes: <https://www.reefcheck.org/kelp-forest-program/kelp-forest-monitoring-and-mpas/> and <https://www.reefcheck.org/kelp-forest-program/kelp-restoration/>; The Tolowa Dee-ni' Nation (Kelp Guardian Programme) <https://www.youtube.com/watch?v=KqCydngigQg>

⁴² Sequoias of the Sea – fundraising and documentary trailer: <https://sequoiasofthesea.org/>

⁴³ Marine Conservation Institute: <https://marine-conservation.org/mission/>

⁴⁴ Marine Protection Atlas: <https://marine-conservation.org/mpatlas/>

⁴⁵ Blue Parks: <https://marine-conservation.org/blueparks/> and <https://oceandecade.org/actions/blue-parks/>

⁴⁶ The Blue Park Standard: <https://marine-conservation.org/blueparks/criteria/>

⁴⁷ 2024 Blue Parks Small Grants: <https://oceandecade.org/news/2024-blue-parks-small-grants-awarded-to-six-marine-conservation-projects/>

⁴⁸ Sunflower Star Laboratory: <https://www.sunflowerstarlab.org/>

research laboratories. Community support, including funding and providing space was critical in establishing the facility at Moss Landing. Work also builds on the Roadmap to Recovery for the Sunflower Sea Star developed by the Nature Conservancy.⁴⁹ The young team from the Sunflower Star Lab brings new ideas and collaborations to a critical component of restoring kelp forest ecosystems.

Keith Rootsart founded the ***Giant Kelp Restoration Project (G2KR)⁵⁰ in Monterey in 2018*** after he had observed first-hand the decline of kelp forests and resulting loss of biodiversity in Monterey. The project obtained a permit to clear urchins from the (by now) barren Tanker's Reef in Monterey Bay. Over subsequent years G2KR built a strong group of volunteer divers and removed urchins in the 100,000s from the reef. Reef Check divers monitored the project site and control areas and documented how giant kelp forest returned to the cleared area. In collaboration with PADI and NAUI dive centres, the volunteers received training as Kelp Restoration Diver. SUP boarders and kayakers can contribute and monitor the kelp canopy. The G2KR team also runs education and outreach events.

Building on their restoration experience the G2KR team engages actively in meetings with different permitting and management agencies in Monterey. While some submissions are under consideration, the team has built a new airlift that will be used by commercial fishers to vacuum up unhealthy purple urchins to land, sort, and sell them to ranchers and composters. Recreational divers will collect red urchins from the same areas.

The ***Monterey Abalone Company⁵¹*** hatch red abalone in a hatchery and finish the rearing process in cages beneath the Municipal Wharf in Monterey. The company started business in the 1990s, when wild abalone nearly got depleted and the commercial fisheries was closed. The area below the wharf is now an innovative, successful, environmentally-sound work space that contributes to the local economy. The abalone are fed with hand-harvested giant kelp. The Monterey Abalone Company and other local kelp harvesters coordinate their harvest through the Monterey Kelp Cooperative and harvest more during more abundant seasons to ensure sustainability. Purple urchins will now be ranches at the wharf to support urchin removal in Monterey Bay.

Portugal

SeaForester

SeaForester⁵² is '*Restoring The Forgotten Forests In Our Ocean*'. SeaForester is also co-leading the Green Gravel Action Group with a focus on global commercialisation and upscaling of the green gravel technique (more on the Green Gravel Action Group is covered under the University of Western Australia below).

SeaForester founder Pål Bakken⁵³ has a lifelong connection to the ocean. He was born on an island in Norway, and after finishing a degree in business, Pål started what became the ***first Norwegian seafood company in Japan***, which went on to ***become the market leader for fresh Atlantic salmon in the country***. Pål learned about seaweed cultivation in Asia and a few years later, after he moved to Portugal he turned to seaweed again and ***founded Seaweed Energy Solutions, a pioneer in seaweed cultivation in Europe with extensive knowhow across the seaweed value chain. Pål wants to put life back in the sea and is convinced that must be done by reintroducing marine forests where they have disappeared***. He holds a BSc in Finance & Marketing from the University of Oregon and started SeaForester in 2016. ***Pål's private investment has provided a stable financial foundation for the development of SeaForester***.

In 2021 SeaForester established a nursery in Peniche and have since demonstrated the success of different methods for replanting seaweed forests. SeaForester works with a wide network of research partners, funders (including larger non-government organisation) and local/regional government agencies on the development of the nursery processes and implementing restoration projects across Portugal. Supporting the development of the nursery processes is the polytechnic in Peniche with funding through the European Economic Area grant programme. The set-up in Peniche

⁴⁹ Roadmap to Sunflower Sea Star recovery: <https://www.nature.org/en-us/newsroom/ca-threatened-sunflower-sea-star-proposed/>

⁵⁰ Giant Kelp Restoration Project (G2KR): <https://g2kr.com/>

⁵¹ Monterey Abalone Company: <https://www.montereyabalone.com/our-story> and <https://www.mercurynews.com/2025/02/02/sv-chat-growing-abalone-beneath-the-monterey-wharf>

⁵² SeaForester: <https://www.seaforester.org/>

⁵³ About CEO and SeaForester founder Pål Bakken: <https://www.seaforester.org/about-us>

provides a **Hub for the operations in Portugal and the mobile hatchery setup is ideally suited to support projects in other areas / countries and for training and upskilling**. There's been **increasing interest from smaller businesses and the private and corporate sector to support marine restoration projects**.

Bottom-up restoration projects have worked well across different initiatives when drivers for decline can be addressed by the communities and regulators. The municipality of Cascais was very supportive and already active in the marine environmental space and also supported SeaForester outreach events.

A report on the opportunity to restore Norway's underwater forests and more resources are available online.⁵⁴

Portugal's Dive Community

Many of the dive shops' staff have a marine biology background, are super passionate about marine protection and marine biodiversity. However, there are no SCUBA based citizen science projects that the divers were aware of in Portugal.⁵⁵ I shared ideas with the divers on how to get started and identify achievable project goals and use underwater imagery for outreach.

Italy

The Marine Protected Area of Miramare

The **Miramare Marine Protected Area**⁵⁶ was created in 1973 as a marine park and transferred into a marine reserve in 1986 (the first to be established in Italy along with Ustica). The Miramare MPA is **Italy's smallest marine reserves** with 30 hectares of marine-coastal biodiversity fully protected and 90 hectares of buffer zone to mitigate the impact on night fishing on the fully protected area.

Since 1979 Miramare has been part of the worldwide network of **UNESCO Biosphere Reserves** programme,⁵⁷ to promote and demonstrate a balanced relationship between the human community and the ecosystems. The area represents a significant site for research (it is also a Specially Protected Areas of Mediterranean Importance site), training and environmental education, and an area where sustainable development best practices can be tested. The Miramare Biosphere Reserve stretches along a large coastal area and includes the overlying karst landscape.

The **Marine Biodiversity Centre** (BioMa)⁵⁸ is housed in a wing of the former stables of Miramare Castle. The environmental study centre is open year round and showcases the diverse environments of the Gulf of Trieste and the Miramare Marine Protected Area. **The exhibition are interactive, educational and immersive (including 360 videos)**.

Secure and continued funding for the management of the Miramare MPA **allows scientific and trained staff to run the long-term monitor the MPA** (one of the staff members has been involved in monitoring for over 30 years), **to develop and run citizen science activities (snorkel and SCUBA)** and **to develop outreach activities and educational experiences further**.⁵⁹ The MPA also has a **Science and Art Curator role**. Funding comes from different agencies. For example, regional funds support art and exhibits, and upkeep of buildings and the ministry supports research.

MPA staff collaborate and keep developing links with other restoration projects in the wider region (REEForst, eDNA to detect mussel parasites). Staffing levels increase from 15-20 people to 40 people in summer to support delivery of the MPA activities.

⁵⁴ Links to SeaForester reports and other resources: <https://www.seaforester.org/resources>

⁵⁵ Project Baseline data base link: <https://projectbaseline.org/currently-active-teams/>

⁵⁶ Miramare Marine Reserve, Trieste: <https://www.ampmiramare.it/en/the-miramare-mpa/>

⁵⁷ UNESCO reaffirms Biosphere status: <https://www.intrieste.com/2024/07/07/unesco-confirms-recognition-for-miramare-biosphere-reserve/>

⁵⁸ The Marine Biodiversity Centre: <https://www.ampmiramare.it/en/what-is-the-bioma/>

⁵⁹ Trieste's "The Sea Begins in the City" Art & Science track: <https://www.ampmiramare.it/en/dissemination/the-sea-starts-from-the-city/>

Reef Check Mediterranean Sea

Reef Check Mediterranean Sea (RCMed)⁶⁰ has developed monitoring programmes suited for the context of the Mediterranean Sea.

Since 2001, over 2,000 people were trained by RCMed and over 900 EcoDivers contributed to over 6000 surveys, delivering over 621000 observations. **The methods focus on** the distribution (presence/absence), abundance, and depth range **of selected key marine species as proxies for the ecological status of monitored areas**. The indicator species include algae, invertebrates, and fishes, were selected by a combination of criteria. This includes ease of identification and being a key indicator for changes due to local pressures and climate change. **The dataset is openly accessible and has proven to be useful for several scientific purposes**. In addition, the commitment of **volunteers promotes marine stewardship, environmental awareness and marine conservation**.

The focus on easy to identify species without the need for monitoring transects allows **training to be delivered in a much shorter timeframe compared to more onerous monitoring protocols and leaves more time for divers to focus on searching for the indicator species**.

RCMed **collaborates with marine protected areas** and **supports the training and expertise** on how to use the monitoring data. In the early stages Associate Professor Massimo Ponti (University of Bologna) ran programmes through dive clubs. Benefits for divers include rare access to highly protected areas and otherwise not publically accessible dive sites in MPAs.

Sponge restoration, Costa del Sud

In the south of Italy, university researchers work with dive centres on the restoration of sponge reefs. Upright growing sponges that get dislodged from the reef by fishing gear or anchoring can regrow on suitable hard surfaces. The researchers developed methods and trained experienced divers to reattach dislodged sponges to hard surfaces and reefs. This involved advanced divers and depth of 25-30m.

Australia

Joint New Zealand and Australia Marine Science Conference

Themes discussed over the conference days:

- Biodiversity and productive marine ecosystems are the critical foundations from which we derive long-term economic, cultural, and social benefits.
- Resilience can be built, and ecosystems restored, by directly addressing the key drivers of decline.
- Communities can do more when they are empowered to be involved. In Australia, Traditional Owners deliver key actions with sustainable government funding. A leading example is the Traditional Owners Taskforce for the Great Barrier Reef.⁶¹
- Stopping further decline is essential, while at the same time, we have to scale up marine restoration efforts exponentially.

Prickly problems

Large numbers of small black longspined urchins (*Centrostephanus rodgersii*) were recorded in Australia a decade ago in areas that are now barren. Crayfish are a natural predator of urchins and help keep populations in check—even small crayfish predate on juvenile urchins. Without sufficient crayfish numbers, barren areas have rapidly spread along large stretches of Australia's coastline over the past 10 years.

In New Zealand, we are now seeing a similar proliferation of black longspined urchins, and **there is an urgent need to rebuild predator populations to avoid the widespread kelp forest collapse that has occurred in Australia**.

⁶⁰ Reef Check Mediterranean Sea: <https://www.reefcheckmed.org/> and <https://www.researchgate.net/publication/353940913> The Reef Check Mediterranean Underwater Coastal Environment Monitoring Protocol

⁶¹ Great Barrier Reef Traditional Owners Taskforce: <https://reefto.au/> and <https://www.ourreefstories.com.au/>

Trials have shown that kina removal can support natural kelp forest recovery. However, **large-scale restoration will only succeed if predator populations are restored**. In New Zealand, **key predators include snapper, blue cod, wrasses, other reef fishes, and crayfish**. While funding for **kina removal** is available, these efforts **must be integrated with predator recovery strategies to achieve lasting results**.

Ocean Literacy

Marine topics are part of the curriculum at the primary school level in New Zealand. **In secondary schools**, teachers often focus on subjects where they feel most confident, which can mean that **marine topics are overlooked**. **Incorporating ocean and marine content into teacher development programs is an effective way to close this gap**.

Art and storytelling are powerful tools to foster ocean connection. There is a need for more marine-focused resources tailored to secondary schools and beyond. Additionally, creating more informal engagement opportunities for people of all ages can help connect adults to the ocean and raise awareness of marine issues.

Great Southern Reef Foundation

The Great Southern Reef Foundation (GSRF)⁶² is building an identity for Australia's extensive and interconnected system of temperate reefs to connect 16 million Australians who live within 50km of the GSR to their local marine ecosystems. With over 8,000 km of coastline across southern Australia, **the GSR is characterised by kelp forests and a diverse range of habitats from shallow rocky reefs to deep sponge gardens and has strong similarities to New Zealand**. GSRF receives support from various philanthropic organisations, larger organisations and donors.

The **GSRF supports research partnerships,⁶³ develops place-based educational resources** that align with Australia's curriculum, **and produces and distributes content that inspires grassroots engagement with temperate reefs**. Building on the latest available scientific knowledge **the foundation is advocating for the GSR at highest level through the Parliamentary Friends of the GSR**.

Visual content and stories are key to build connections to the underwater world **and inspire people to act**. The GSRF has created *White Rock*, a **45-minute documentary exposing the hidden impact of longspined sea urchins devastating Australia's kelp forests**. The urchin overgraze on kelp forests and the colourful invertebrates of the reef and leave only barren 'white' rock behind. *White Rock* exposes the threat and presents tangible solutions to save Australia's kelp forests before it is too late.

Eagle Hawk Dive Centre

Staff from the **Eagle Hawk Dive Centre⁶⁴ have experienced and documented change** in Tasmania's marine environment and the disappearing kelp forests. Long-term records of visited dive sites provide a timeline of kelp-forest decline, with dive sites further and further away from the dive centre.⁶⁵ **The team includes marine biologists who have built extensive local knowledge from thousands of hours spent diving around the Tasmanian coast**. Eagle Hawk Dive Centre provides photography and film services and has worked with professional underwater photographers and videographers. **The Dive Centre uses their local knowledge to advocate for better marine protection, to trial kelp forest restoration, and to collaborate with researchers on restoring Tasmania's kelp forests**.⁶⁶ The team is also looking at documenting the vibrant reefs as they are now so change can be seen with increasing numbers and wider impact of the black longspined urchins.

⁶² The Great Southern Reef Foundation: <https://greatsouthernreef.com/> and <https://greatsouthernreef.com/faq>

⁶³ The Great Southern Reef Foundation Partnership: <https://greatsouthernreef.com/gsrp>

⁶⁴ Eagle Hawk Dive Centre: <https://eaglehawkdive.com.au/>

⁶⁵ GSRF video about Tasmania's declining kelp forests, Reviving Giants: <https://www.youtube.com/watch?v=rCRnCbD1X7g>

⁶⁶ Saving Tasmania's giant kelp forests ABC News In-depth (climate change effects and black longspined urchin): <https://www.youtube.com/watch?v=FUhr13gBeg>; Feature in The Guardian: <https://www.theguardian.com/environment/ng-interactive/2020/feb/24/the-dead-sea-tasmanias-underwater-forests-disappearing-in-our-lifetime>; 2012-2013 changes captured in a video: <https://www.youtube.com/watch?v=eRfxFZ4ndlg>; University of Tasmania / IMAS: <https://www.utas.edu.au/about/news-and-stories/articles/2024/working-together-to-safeguard-threatened-giant-kelp-forests>; Giant kelp forests on Tasman Peninsula survive marine heatwave, brings 'hope' amid climate change: <https://www.abc.net.au/news/2024-03-26/back-roads-tasman-peninsula-giant-kelp-forest-restoration/103560140>

The Nature Conservancy Australia

The Nature Conservancy (TNC) is part of the Tasmanian Giant Kelp Restoration Project, a partnership between, the Institute for Marine and Antarctic Studies (IMAS) at The University of Tasmania, Natural Resource Management South (NRM South) and CSIRO, Australia's national science agency. The project aims to develop methods for large-scale Giant Kelp restoration and bring together the knowledge, experience and capacity of a wide range of partners and stakeholders. The Tasmanian Giant Kelp Restoration Project *receives funding from Google.org Charitable Giving and* other foundations. Google also *supports outreach through its Arts and Culture platform*⁶⁷ and use of artificial intelligence⁶⁸ to support kelp forest restoration. In June 2023, *TNC launched the Kelp tracker 2.0*⁶⁹ to enable Australians to submit historic and current sightings of giant kelp.

University of Western Australia

The Wernberg & Filbee-Dexter Labs⁷⁰ at the University of Western Australia are *co-leading the Green Gravel Action Group (GGAG)*,⁷¹ *a network of kelp restoration experts and practitioners*. The GGAG *shares the latest insights and advances in restoration techniques* while *identifying common barriers and opportunities* faced by teams around the world. A key message is the critical importance of marine protection and maintaining the kelp forests that still exist, alongside scaling up restoration efforts. The GGAG is also looking at innovative pathways to finance kelp restoration work.

Sydney Institute of Marine Science

The *Sydney Institute of Marine Science (SIMS) is a collaborative research and training institute* bringing together researchers from *four New South Wales (NSW) universities* plus state and federal marine and environmental agencies.⁷²

Under the banner of *Project Restore*,⁷³ SIMS aims to combine the methods and technologies of four flagship restoration projects, which have operated largely independently of one another so far. Together, *the projects provide a template for restoration of whole seascapes within urban harbours and waterways*:

- Operation Posidonia - Seagrass restoration⁷⁴
- Operation Crayweed - Restoring Sydney's Underwater Forests⁷⁵
- Living Seawalls⁷⁶
- Fish Habitat enhancement⁷⁷

Project Restore focuses not only on individual habitats but also on fostering *connection between habitats and the connection to the community surrounding the restoration sites*. *Key to the success* of the restoration projects underway has been *significant improvements of the water quality in Sydney Harbour* that have contributed to marine ecosystem decline initially.

The Marzinelli⁷⁸ group at University of Sydney is working with Operation Crayweed to re-establish crayweed habitats in Sydney harbour and to ensure genetic diversity in the restoration sites.

The project *received small grants* from the NSW government to *make the project more accessible to local communities* and eventually secured a grant supporting scientific work. *Outreach and communication is key in getting wider support and the team raised funds for a documentary about the project*⁷⁹. Media exposure resulted in

⁶⁷ Google Arts and Culture: <https://artsandculture.google.com/project/invisible-forest>

⁶⁸ How Google AI is supporting Giant Kelp forests: <https://www.youtube.com/watch?v=9m7Yg5tqnOE>

⁶⁹ Kelp Tracker 2.0: <https://www.natureaustralia.org.au/newsroom/supporting-giant-kelp-forest-restoration-with-kelptracker/>

⁷⁰ Weinberg and Filbee-Dexter Labs at the University of Western Australia: <https://wernberglab.org/>

⁷¹ Green Gravel Action Group: <https://www.greengravel.org/>

⁷² The Sydney Institute of Marine Science: <https://sims.org.au/>

⁷³ Project Restore: <https://projectrestore.sims.org.au/the-project#about>

⁷⁴ Project Posidonia: <https://projectrestore.sims.org.au/the-solution/operation-posidonia> and <https://www.operationposidonia.com/>

⁷⁵ Operation Crayweed: <https://www.operationcrayweed.com/>

⁷⁶ Living Seawalls: <https://projectrestore.sims.org.au/the-solution/living-seawalls> and <https://www.livingseawalls.com.au/>

⁷⁷ Fish Habitat enhancement: <https://projectrestore.sims.org.au/the-solution/fish-pods>

⁷⁸ Ziggy Marzinelli: <https://www.sydney.edu.au/science/about/our-people/academic-staff/e-marzinelli.html>

⁷⁹ Operation Crayweed documentary: <https://www.youtube.com/watch?v=wpAWZXMxzkM>

further outreach opportunities, fundraising support from the public,⁸⁰ by a private philanthropist and from corporate sponsors. The project now includes 10 restoration sites and more than half of the sites are expanding without further intervention. Engagement also shifted public perception of what Sydney Harbour looks like and should look underwater.

The Opportunity and Urgency to Act

The international community recognises the need to implement effective biodiversity protection measures⁸¹ and manage ecosystems to maintain their integrity and functions. In New Zealand, the coastal marine space is already under pressure. Recent amendments to the Hauraki Gulf/Tikapa Moana Marine Protection Bill permit commercial fishing in 'highly protected' areas.⁸² Court rulings have repeatedly directed government agencies to provide better advice to ministers, including effective management options to reverse the effect of overfishing while better engaging with mana whenua.⁸³ Government fast-track proposals could see the world largest mining operation in the shallow waters of the South Taranaki Blight, which would cause vast amounts of fine sediment and significant impacts on extensive areas of New Zealand's coast.⁸⁴ In addition, proposed changes to the Fisheries Act could lead to less transparency and oversight of the sector.⁸⁵ On international stage, New Zealand remains the only country continuing bottom trawling in the South Pacific, while Australia has recently abandoned this highly destructive practice.⁸⁶

Across large areas of New Zealand's coastal marine space, cumulative pressures are pushing marine ecosystems to tipping points and the brink of rapid decline. Models and prediction of fishery productivity are overly optimistic, overestimating recovery potential, and there are still too few field observations from across the country to provide an accurate picture.⁸⁷

Communities are deeply invested in their local environment. They are already contributing to monitoring change, leading restoration projects and provide input for better decision making. Their involvement is critical for achieving better long-term economic, social, cultural and environmental outcomes.

Decision-makers urgently need to and can take action now by engaging meaningful with communities and incorporating the latest scientific evidence and local knowledge, while starting to build community capacity and capability and investing in sustainable economic opportunities for the future.

⁸⁰ Operation Crayweed fundraising: <https://seatrees.org/products/kelp-restoration-sydney-australia>

⁸¹ The United Nations High Seas Treaty (also known as the Agreement on Biodiversity Beyond National Jurisdiction or BBNJ) and the Kunming-Montreal Global Biodiversity Framework (GBF) commit the international community to protect and conserve 30% of the world's oceans by 2030 to halt and revert biodiversity loss. However, ocean protection quality is lagging behind quantity: <https://marine-conservation.org/on-the-tide/how-are-we-doing-protecting-30-percent-of-ocean-areas-by-2030/>

⁸² Amendments to the Hauraki Gulf/Tikapa Moana Marine Protection Bill: <https://www.nzherald.co.nz/nz/conservation-minister-tama-potaka-was-told-not-to-allow-commercial-fishing-in-hauraki-gulf-protection-zones-documents-reveal/4VAFJVZBURGIHPVTW55IR4R7KI>

⁸³ Environmental Law Initiative court victory: <https://www.eli.org.nz/updates/crayfish-case-high-court-victory>

⁸⁴ Fast tracking seabed mining: <https://www.thepost.co.nz/nz-news/360523867/seabed-mining-opposition-flares-fast-track-bill-forges>

⁸⁵ Open consultation on the Fisheries Act: <https://www.beehive.govt.nz/release/consultation-opens-fisheries-reforms>

⁸⁶ Deep sea trawling – New Zealand and Australia: a) <https://www.nzherald.co.nz/nz/nz-wants-to-catch-australias-quota-of-orange-roughy-in-the-south-pacific-and-higher-limits-for-how-much-deep-sea-coral-bottom-trawlers-take/ZOEAA2IV5BHPTGKLOHUXVLWHMY/>; b) Opinion by Helen Clark <https://earth.org/it-is-time-for-new-zealand-to-cease-bottom-trawling/>; c) <https://www.rnz.co.nz/national/programmes/morningreport/audio/2018924757/nz-appears-to-walk-away-from-deep-sea-trawling-restrictions>; d) <https://newsroom.co.nz/2025/02/25/nz-blocks-south-pacific-seamount-protections-two-years-running>

⁸⁷ Hauraki Gulf Crayfish stock assessment: <https://researchspace.auckland.ac.nz/items/8ba9248f-efbb-43bb-9883-325bb3c998ec>; Stock assessment models overstate sustainability of the world's fisheries: <https://www.science.org/doi/10.1126/science.adl6282>; Possible Futures of New Zealand's Seaweed Ecosystems: <https://www.tandfonline.com/doi/epdf/10.1080/0028825X.2023.2245786>