

Institution: University of York		
Unit of Assessment: 7 - Earth Systems and Environmental Sciences		
Title of case study: Enhancing the protection of marine ecosystems in the UK and globally		
Period when the underpinning research was undertaken: 2010 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (eg job title):	Period(s) employed by the submitting HEI:
Bryce Stewart	Senior Lecturer	2007 to present
Callum Roberts	Professor	1995 to Jul 2020
Julie Hawkins	Senior Lecturer	1996 to Jul 2020
Bethan O'Leary	Research Fellow	2016 to present
Period when the claimed impact occurred: Aug 2013 - Dec 2020		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>Longstanding, leading marine conservation research at York led to impacts at the local, national and international level on marine policy and practice, and helped define both national and global aspirations in marine protection. York's research demonstrated the success of the Lamlash Bay No Take Zone (NTZ), Scotland, which is now regarded as an international model of good practice and made a key contribution to the evidence base for the 2020 Benyon Review of Highly Protected Marine Areas in England. Working with COAST (Community of Arran Seabed Trust) and other organisations, York research played an instrumental role in building the evidence base for the 2014 designation and protection of the South Arran Marine Protected Area (MPA) in the Firth of Clyde, Scotland, which is already delivering environmental and socio-economic benefits and led to a motion calling for more NTZs to be created within Scotland.</p> <p>As a result of York's MPA expertise, Pew Charitable Trusts requested York to undertake a review of international ocean protection targets. The review was used as the evidence base at the 2016 IUCN World Conservation Congress, where an 89% majority voted to recommend 'at least 30% ocean protection by 2030'. After the vote, the UK government launched the Global Ocean Alliance, which 30 countries have signed up to, and the target has been included in the draft post-2020 global biodiversity framework under the UN Convention on Biological Diversity. The target has also been supported by numerous non-governmental organisations such as Greenpeace UK, Campaign for Nature, and the Wildlife Conservation Society.</p>		
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>Research published in 2010 by Ruth Thurstan (MSc & PhD student 2006-11) and Professor Callum Roberts [3.1] highlighted a long history of overfishing and loss of biodiversity in the Firth of Clyde, Scotland. This work gained considerable attention in the media and from the Scottish government. In the same year, Leigh Howarth (MSc & PhD student 2009-14), in collaboration with the Community of Arran Seabed Trust (COAST) and supervised by Dr Bryce Stewart, did the first peer-reviewed survey of the Lamlash Bay No Take Zone (NTZ) in the Firth of Clyde, Scotland's first (and still only) highly protected marine reserve [3.2]. Monitoring of biological recovery in Lamlash Bay by York staff and students has continued annually, and in 2014 was expanded to include the newly designated and much larger South Arran Marine Protected Area (>250km² versus 2.67km²). All of the York research at Arran between 2010 and 2020 has been supervised or conducted by Stewart. The annual sampling programme has expanded from SCUBA surveys to a multi-pronged approach, including video and photoquadrats of the seabed, baited remote underwater video (BRUVs) for fish, and work with local creel fishermen to survey crustaceans (lobsters and crabs). This has resulted in six peer reviewed journal articles [e.g. 3.2-3.5]. Results have revealed strong recovery of certain species within the marine reserve, including commercially valuable scallops and lobsters (up to four-fold increases in density), along with a reliance of certain species on habitat recovery and interactions between the dynamics of different species. In order to provide baseline data for the South Arran MPA before the management measures were implemented in 2016, York worked with COAST to conduct and analyse broad-scale SCUBA and hand-held video surveys over the summers of 2014 and 2015. These surveys were repeated in summer 2019 and demonstrated spectacular recovery</p>		

after only 3.5 years of protection, particularly of king scallops (6.2 fold increase in density), but also of crabs, annelid worms and fish [3.5].

The UN's globally adopted Convention on Biological Diversity coverage target for marine protected areas (MPAs) was $\geq 10\%$ by 2020. Due to York's demonstrable and longstanding experience in the area of marine conservation and protected areas, such as the research at Lamlash Bay, **Roberts**, **Hawkins**, and Dr Bethan **O'Leary** were approached by Pew Charitable Trusts to find out whether the target of 10% was sufficient and, if not, how much of the ocean we need to protect [3.6]. A total of 144 studies were reviewed to assess whether the UN target was adequate to achieve, maximize, or optimize, six environmental and/or socioeconomic objectives: representation of biodiversity; ensuring ecological connectivity among protected sites; avoidance of population collapse; avoidance of adverse, fisheries-induced evolution; enhancement of fisheries yield; and meeting the needs of multiple stakeholder groups. The results consistently indicated that protecting a much higher percentage of the sea is required to meet goals (average 37%, median 35%, modal group 21–30%), greatly exceeding the 2.2% of the sea protected at the time of the research and the 10% target. It was concluded that the UN's 10% target was insufficient to protect biodiversity, preserve ecosystem services, and achieve socio-economic priorities. Instead, increasing coverage of MPAs to at least 30% of the sea would produce a much greater likelihood of meeting conservation and management goals.

3. References to the research (indicative maximum of six references)

- 3.1.** Thurstan RH & Roberts CM (2010) Ecological meltdown in the Firth of Clyde, Scotland: two centuries of change in a coastal marine ecosystem. PLoS ONE 5(7): e11767. <https://doi.org/10.1371/journal.pone.0011767> *The first peer-reviewed scientific study to recognise the degraded state of the Firth of Clyde. Widely circulated in the media. Entered to REF2014.*
- 3.2.** Howarth LM, Wood HL, Turner AP, Beukers-Stewart BD (2011) Complex habitat boosts scallop recruitment in a fully protected marine reserve. Marine Biology 158: 1767-1780 <https://doi.org/10.1007/s00227-011-1690-y> *The first peer-reviewed scientific study of Scotland's only no-take marine reserve.*
- 3.3.** Howarth LM, Roberts CM, Hawkins JP, Steadman DJ, Beukers-Stewart BD (2015). Effects of ecosystem protection on scallop populations within a community-led temperate marine reserve. Marine Biology 162: 823–840. <https://doi.org/10.1007/s00227-015-2627-7> *Peer reviewed and widely circulated in the media.*
- 3.4.** Howarth LM, Dubois P, Gratton P, Judge M, Christie B, Waggitt JJ, Hawkins JP, Roberts CM and Stewart BD (2016). Trade-offs in marine protection: multispecies interactions within a community-led temperate marine reserve. ICES Journal of Marine Science 74: 263-276 <https://doi.org/10.1093/icesjms/fsw166> *Peer reviewed and widely circulated in the media.*
- 3.5.** Stewart BD., Howarth LM, Wood H, Whiteside K, Carney W, Crimmins E, O'Leary BC, Hawkins JP, Roberts CM. (2020). Marine conservation begins at home: How a local community and protection of a small bay sent waves of change around the UK and beyond. Frontiers in Marine Science. <https://doi.org/10.3389/fmars.2020.00076> *Peer reviewed overview of 25 years of campaigning, research and policy influence at Arran. Widely circulated in the media*
- 3.6.** O'Leary, B.C., M.Winther-Janson, J.M. Bainbridge, J. Aitken, J.P. Hawkins and C.M. Roberts (2016) Effective Coverage Targets for Ocean Protection. Conservation Letters <https://doi.org/10.1111/conl.12247> *Peer reviewed and widely circulated in the media.*

4. Details of the impact (indicative maximum 750 words)

York's longstanding, well-regarded research in the field of marine protection has had a number of impacts ranging from the local to international scale, influencing policy via provision of evidence bases and demonstrating the positive environmental outcomes that marine protected areas can provide. York's staff have been internationally recognised for this work, with **Roberts** being an advisor to the [Pew Bertarelli Global Ocean Legacy Program](#), **Stewart** being a member of the [ICES Scallop Working Group](#), and **O'Leary** presenting at the [United Nations](#).

Working with the community to protect and recover Isle of Arran marine ecosystems

In the words of Howard Wood OBE, co-founder of COAST, '*The scientific advice, research and wider collaboration with Professor Callum Roberts, Dr Julie Hawkins and yourself [Dr Bryce Stewart] has been the most significant aspect of the success of COAST, the NTZ and the MPA, along with our community support.*' [5.1] York researchers have collaborated with COAST, a community-led organisation on the Isle of Arran, since 2004 and provided key scientific advice behind COAST's campaigns. As a result of the success of the Lamlash Bay NTZ (established 2008), where York research had demonstrated the recovery of both biodiversity and commercial species [3.2], COAST proposed the formation of the South Arran MPA, which was successful [3.5]. Perhaps the most high-profile of the 30 MPAs designated in Scotland in 2014, it covers over 250km². Howard Wood stated: '*Without the University of York's partnering with COAST from 2010 in research monitoring of the NTZ... we would have lacked the science to back up our case. However, just as importantly the stream of media coverage that was generated helped to keep up the momentum, informing and generating local and national public support*' [5.1]. Highlights of this media coverage include the New York Times (6,000,000 digital/print subscribers, NYT April 2020) and BBC's Springwatch 2018 (1,600,000 viewers, BARB) [5.2a-c]. Greenpeace UK chose Lamlash Bay NTZ as one of only three MPAs in the world to demonstrate '[Why ocean sanctuaries are so important](#)', as part of their 2018 campaign for the world's largest ocean sanctuary in the Weddell Sea (Antarctica), now signed by over 2,300,000 people [5.3].

Along with the environmental benefits of the NTZ and MPA demonstrated by York [3.5], a 2019 review by the Scottish government found that stakeholders and businesses on Arran believe the NTZ and MPA has had a positive impact [5.4]. The protected areas are thought to provide an additional tourist attraction for the area, and local community groups have galvanised around the MPA, organising events and activities to raise awareness and educate people about the marine environment. For example, COAST has opened a new marine education centre, which had over 11,000 visitors in 2018 [5.4].

Our close partnership with COAST has also helped them gain international recognition and influence. Highlights include their chairman, Howard Wood, being awarded an OBE and the Goldman Prize (the world's largest grassroots environmental prize) in 2015 [3.5]. A further significant development since 2014, inspired by the success of COAST, is the [Coastal Communities Network](#), a collection of 17 community groups right around the coast of Scotland, who have already campaigned successfully for improved management of their local coastal areas, including Scotland's first Demonstration and Research MPA in Fair Isle [3.5]. **Stewart** provides scientific advice to this network.

Using our findings to influence Scottish & UK government policy on marine protected areas
Even more significantly, York's work has been vital in ensuring that Scottish MPAs receive adequate protection, so that they are not just 'paper parks', which do not prevent damaging fishing activities taking place within them. A highly contentious issue during Scottish government consultations on MPA management was whether to allow mobile towed bottom fishing gears (trawls and scallop dredges), or only low impact fisheries (creeling and diving). York research was frequently cited in the responses to these consultations, and Kenneth Gibson MSP and Claudia Beamish MSP mentioned COAST's work during debates [5.5a-b]. There was significant opposition from some mobile gear fishers against the protection measures because they would be unable to fish within the MPA. Despite this, the Scottish government announced significant protection of the MPAs, which came into force in 2016 [3.5]. York's work in Lamlash Bay and wider research on the effects of scallop dredging was pivotal to this decision; a last-minute challenge from the mobile gear fishing industry in January 2016 was rejected by Rural Affairs and Climate Change Committee, with York research used by the Scottish fisheries minister in his speeches during this debate [5.5c]

The 2010 research highlighting the degradation of the Firth of Clyde marine ecosystem by Thurstan and **Roberts** [3.1] led to a series of actions from the Scottish Government, including the Clyde 2020 Summit in April 2013, which brought together >100 stakeholders with interests in

the Clyde. The Scottish Cabinet Secretary for Rural Affairs and the Environment, Richard Lochhead MSP, highlighted the 'trailblazing' work of COAST and the Lamlash Bay NTZ [5.1]. Following this event, the [Clyde Marine Planning Partnership](#) (CMPP) was established in 2016 to deliver the Clyde Regional Plan (CRP), one of only two regional marine plans being developed in Scotland to date. These statutory plans will provide more local ownership and decision making, thereby improving marine resource use and ecosystem health. Based on his research in the area, **Stewart** was elected to the key scientific advisory panel ([Clyde 2020 Research Advisory Group, RAG](#)) in 2015. Output and advice from the RAG is helping to shape the CRP and is having a significant impact on the development of relevant policies. As one of the first plans of its kind in Scotland, it will serve as a benchmark for future plans in other regions. In December 2020, a motion was brought to the Scottish Parliament by Kenneth Gibson MSP calling for more NTZs in Scottish waters. In the ensuing debate the motion received cross-party support, with the Lamlash NTZ and the work by the University of York and COAST mentioned numerous times, e.g. *'The establishment of the Lamlash Bay no-take zone in 2008 was a ground-breaking decision...I recognise COAST's continued efforts to work with academic partners, most notably the University of York.....produced a substantial evidence base.'* (Minister for Energy, Connectivity and the Islands, Paul Wheelhouse, MSP). Kenneth Gibson reported on a 2020 survey (supervised by **Stewart**) which revealed that *'Arran residents and businesses consider research undertaken in Lamlash Bay to be "very important" economically...unsurprising given that marine reserves enhance local fisheries and create jobs and new incomes through eco-tourism'*. Joan McAlpine MSP added *'With the success of the no-take zone in south Arran, we see a way ahead'* [5.5d].

In June 2019, then UK Secretary of State, Michael Gove, announced the Benyon Review to examine whether and how the strongest protections for areas of sea, known as Highly Protected Marine Areas (HPMAs; equivalent to NTZs), could be introduced in England. **Roberts** was appointed to the review advisory panel due to his expertise in the area. As Lamlash Bay is still one of only 4 NTZs in the UK, and by far the best studied, it was a key focus of this review. The review team interviewed **Stewart** and sent a delegation to visit COAST in Lamlash in August 2019. **Stewart** also provided written evidence to the review in October 2019. The review published its final report in June 2020, citing **Stewart** et al (2020) [3.5] and recommended the designation of at least 5 new HPMAs, stating *'The Lamlash Bay case study demonstrated how community support, strong science and political will can be a deciding factor in a successful 'protection designation'* [5.6].

Utilising our expertise in marine protected areas to stimulate international policy change

In 2016, Pew Charitable Trusts prepared a motion for the IUCN World Conservation Congress as a result of our research [3.6], which demonstrated that the current 10% target of ocean protection was insufficient. This event was attended by 1300+ government, civil society and indigenous peoples and member organisations and proposed raising the ocean protection target to 'at least 30% of each marine habitat in a network of highly protected MPAs and other effective area-based conservation measures'. The ultimate aim was to create a 'fully sustainable ocean, at least 30% of which has no extractive activities, subject to the rights of indigenous peoples and local communities.' The motion cited [3.6], stating: 'MINDFUL that scientific evidence supports full protection of at least 30% of the ocean as reviewed to reverse existing adverse impacts, increase resilience to climate change, and sustain long-term ocean health' [5.7]. The motion was passed by an overwhelming majority of national delegations, with 89% in favour.

The study was also instrumental in supporting key points in a scientific consensus statement produced by nations who are party to the Ocean Sanctuary Alliance, a partnership of UN Member States and leaders. The consensus statement was developed in 2016 with **Roberts**, a member of the scientific steering committee. The statement notes that the science justifies 30% coverage of MPAs, citing [3.6], and states therefore, that '10% [MPA coverage] should therefore be viewed as an important waypoint rather than the endpoint for ocean protection' [5.8a].

The 30% by 2030 goal has generated extensive attention and media coverage. After discussing the science behind the target with **Roberts**, Lewis Pugh, endurance swimmer and UN Patron of

the Oceans, promoted the message as he swam the length of the English Channel in 2018 [5.8b]. Shortly after, the then Environment Secretary, Michael Gove, announced that the UK would support and pursue the goal, stating, '*Protection of our oceans is a global challenge which requires global action. The UK has already safeguarded vast swathes of precious marine habitats, but we must go further.*' [5.8c] Pugh stated it was '*a landmark decision*' and, '*It took my breath away. If this is supported by other nations and followed through, it will be the most important moment for ocean conservation in history.*' [5.8b]. Thirty countries have since joined the Global Ocean Alliance led by the UK [5.8d], which is aiming to include the first international legally binding environmental instrument for the protection of biological diversity in the world's seas and oceans (which includes areas beyond national jurisdiction) in the post-2020 global biodiversity framework under the UN Convention on Biological Diversity (CBD). As of July 2020, the target had been included in the draft framework for post-2020 [5.9a].

A large coalition of conservation organisations are now actively campaigning for the new target. Greenpeace commissioned York to lead on their '[30X30 A Blueprint for Ocean Protection](#)' report, which the Head of Oceans at Greenpeace UK states, '*has been vital for both supporting our own campaigns, and international collaborations, such as the UK led Global Ocean Alliance*' [5.3]. Conservation International, Campaign for Nature, National Geographic Society, Oceans 5, The Pew Charitable Trusts, and the Wildlife Conservation Society have submitted an intervention urging the CBD to commit to a target of protecting and conserving at least 30 percent of the ocean by 2030 [5.9b].

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1. Letter of support from Howard Wood OBE, Chairman of COAST (Dec 2020)

5.2. a) New York Times (Aug 2015): [A Scotsman's Mission Ends in a Fishing Bay Restored](#); b) BBC 2 Springwatch (7 Jun 2018, ep8): [Youtube - Springwatch visit the Lamlash No Take Zone on Arran](#), including an interview with **Stewart**; c) BBC Springwatch viewing figures, BARB

5.3. Letter of support from Head of Oceans, Greenpeace UK (Jan 2021)

5.4. Scottish Government (2019): [Monitoring the Socio-economic Impacts of Marine Protected Areas: 2019 Report](#)

5.5. a & b) Scottish parliamentary debates: [Clyde 2020 Good Environmental Status](#) (Mar 2014) and [Scottish inshore fisheries](#) (Apr 2014); c) Scottish Rural Affairs, Climate Change and Environment Committee meeting (Jan 2016): [debate on a motion to overturn the management measures in Scottish MPAs, section 19](#); d) Meeting of the Scottish Parliament (Dec 2020): [No take zones: 109-122](#)

5.6. Benyon Review Into Highly Protected Marine Areas (2020): [Final Report](#)

5.7. IUCN World Conservation Congress (2016): [Resolution WCC-2016-Res-050-EN](#) on protecting 30% of the sea by 2030

5.8. a) The UN Ocean Sanctuary Alliance (Mar 2016): [Consensus Statement on MPAs](#); b) Lewis Pugh Journal (Sept 2018): [The One Reason we are Missing Environmental Targets & UK calls for 30% Ocean Protection](#); c) UK Govt press release (Sept 2018): [Gove calls for 30 per cent of world's oceans to be protected by 2030](#); d) Defra press release (Oct 2020): [Global Ocean Alliance: 30 countries are now calling for greater ocean protection](#)

5.9. a) Convention on Biological Diversity (Jul 2020): [Draft monitoring framework for the post-2020 global biodiversity framework for review](#); b) Campaign for Nature (Aug 2019): [Campaign for Nature and 30X30 Ocean Alliance Submit Intervention to the Convention on Biological Diversity](#)