LINK Parliamentary Briefing:

Highly Protected Marine Areas (HPMAs)

May 2023

Summary

There is a very strong global evidence base showing that Highly Protected Marine Areas (HPMAs) have a positive impact ecologically and can support the fishing industry. HPMAs, also known as marine reserves or no take zones, act as nurseries and refuges and as such benefit marine species and habitats both within the protected area and outside them.

Evidence from across the world shows that, on average, twice as much total fish biomass and fish density is found in the protected area than outside. These benefits can happen quickly, within a few years of protection, and can have a 'spillover' effect into surrounding waters.

To maximise both conservation and socio-economic benefits, HPMAs should be bordered by buffer zones to benefit low impact fishers. With such zones HPMAs can benefit sustainable fishing, and those engaged in it, while at the same time helping build up fish and other marine species populations across the wider sea and for future generations.

However, success will depend upon a collaborative approach with all stakeholders, including local communities, fully involved and engaged with support, access to advice and scientific evidence and independent scrutiny. The Scottish Government's Just Transition outcomes are key in delivering success for coastal and island communities as well as Scotland's marine biodiversity.

Background

The marine environment is one of Scotland's greatest assets and a vital resource for communities who rely on marine activities like fishing and wildlife tourism. However, evidence[1] shows a continuing decline of our marine ecosystems, impairing their ability to provide the life-sustaining benefits we all depend on.

In the Bute House Agreement, the Scottish Government committed to designate at least 10% of our seas as "Highly Protected Marine Areas" (HPMAs). HPMAs are areas of the sea that are placed under strict protection to support ecosystem recovery and protect against climate change. This is in line with internationally agreed standards for nature recovery and resilience (e.g. Global Biodiversity Framework Target 3), and follows the EU's own 10% target for strict protection.

The effects of strict protection at sea have been widely documented globally, and growing evidence highlights the ecological and socioeconomic benefits of these marine reserves or no-take zones. The following briefing provides a non-exhaustive summary of the science available regarding HPMAs in the world.

Ecological benefits within HPMAs

Various HPMAs can be found worldwide, and research demonstrates their benefits on marine life within and outside their boundaries. The MPA guide helpfully provides a map of 226 MPAs, 114 of which are equivalent to the proposed Scottish HPMAs.[2] HPMAs are equivalent to "marine

[1] https://marine.gov.scot/sma/assessment/biogenic-habitats

[2] Based on IUCN definition of MPA fully protected areas means no extractive or destructive activities are allowed.

reserves"or "no take zones" and have been abundantly studied across the world, in both tropical and temperate waters. Hundreds of surveys, often summarised in global or regional studies[3], show that protecting the marine environment from damaging activities leads to a sharp increase in abundance, average body size and biomass of marine species [4].

A 2019 synthesis of current scientific evidence shows that HPMAs can provide greater benefits than lighter forms of protection.[5] Placing areas of the sea under strict protection allows marine species to recover, by providing them a refuge to grow, age and reproduce. In their analysis of 24 no-take zones in the highly pressurised Mediterranean Sea, Giakoumi *et al*. (2017)[6], demonstrated that high levels of protection have significant ecological benefits for fish biomass and equally positive effects for fisheries' target species. The total fish biomass and density were on **average twice as much in fully protected areas than outside**. The study also highlighted that there was no difference in total fish biomass between partially protected and unprotected areas.

Ecological benefits can be observed within no-take zones only a few years after their creation, with increase in populations within two to five years[7]. The impressive case of the Cabo Pulmo protected areas, in the Gulf of California, showed **an almost five-fold increase of the fish biomass only a decade after its creation**[8]. Closer to home, research carried out in the small no take zone in north Lamlash Bay since 2010 shows a dramatic improvement - measured biodiversity has increased by 50%, while the populations of commercially important species are 2-3 times higher within the no take zone[9]. King Scallop, (*Pecten Maximus*) populations have increased almost four-fold, with the scallops being older and producing more eggs[10]. Surveys undertaken between 2012 and 2018 highlight similar effects on European lobsters.[11] **The experience in Lamlash Bay clearly demonstrates the potential spillover benefits to Scottish fishers from even small areas of strict protection.**

Another great example of a successfully implemented HPMA is the French Marine Park of la Cote Bleue[12], created in 1982. The no-take zone of Carry-le-Rouet was created in 1983 and a second no-take zone, the reserve of La Couronne was created in 1996. Local fishermen played a key role in the creation of La Couronne HPMA, and the management of the two no-take zones: continuous dialogue between local authorities and fishermen led to management measures beyond the Carry-le-Rouet HPMA boundaries. In their study of six no-take zones in the Mediterranean Sea, Harmelin-Vivien *et al* (2008)[13] confirmed an increase in the abundance, biomass and size of fishes inside marine reserves. They observed that the average biomass within the marine reserve of Carry was 16.3kg, compared to 2.4 kg outside the area.

---

[3] https://doi.org/10.3389/fmars.2019.00749

[4] Biomass can be defined as the total quantity or weight of organisms in a given area or volume.

[5] https://doi.org/10.3389/fmars.2019.00749

[6] Giakoumi, S., Scianna, C., Plass-Johnson, J. *et al.* Ecological effects of full and partial protection in the crowded Mediterranean Sea: a regional meta-analysis. *Sci Rep* **7**, 8940 (2017). https://doi.org/10.1038/s41598-017-08850-w

[7] DOI: 10.1016/S0169-5347(03)00189-7 *"Increases in protected populations are often rapid, frequently doubling or tripling in two to five years"*

[8] https://ocean.si.edu/conservation/solutions-success-stories/cabo-pulmo-protected-area

[9] https://www.arrancoast.com/recovery-of-lamlash-bay-ntz/

[10] DOI: 10.1007/s00227-015-2627-7

[11] https://www.law.ed.ac.uk/sites/default/files/2021-04/Marine%20Briefing%205%20(updated)%20-%20ACC.pdf

[12] https://people.mio.osupytheas.fr/~boudouresque/Documents_conservation/Leleu_Kevin_These_2012.pdf

[13] Harmelin-Vivien M, Le Diréach L, Bayle-Sempere J, Charbonnel E, García-Charton JA, Ody D, Pérez-Ruzafa A, Reñones O, Sánchez-Jerez P, Valle C (2008) Gradients of abundance and biomass across reserve boundaries in six Mediterranean marine protected areas: Evidence of fish spillover? Biological Conservation 141:1829-1839

Ecological and socioeconomic benefits beyond HPMA boundaries

Research worldwide[14] [15] [16]demonstrates that, if implemented and managed well, HPMAs can have positive effects beyond their boundaries, supporting marine activities such as fisheries or tourism. As populations within the HPMAs increase in size, and individuals grow larger and live longer, they can reproduce more. This enhanced reproductive potential can then lead to the replenishment of populations adjacent to the no take areas – a "spillover" effect to fished areas[17] [18]. The spillover effect arises firstly, through the export of eggs and larvae outside the marine reserve, and secondly from the movement of juvenile or adult animals from the no take zone to adjacent waters.[19] Studies in the Mediterranean confirmed the role of marine reserves in sustaining local fisheries for commercial species such as the spiny lobster, *Palinurus elephas*. Harmelin-viven *et al* (2007), observed a spill over effect in all the reserves they studied, thus demonstrating the long-lasting effects of strict levels of protection[20].

Studies of Highly Protected areas from around the globe reflect the financial benefits for local communities from recreation and tourism[21]. The network of marine reserves in New Zealand is often cited as a successful case[22]. The country pioneered marine reserves by establishing its first no-take zone in 1977. Beyond observing ecological benefits and an increase of the biomass within the reserves, researchers highlighted the sharp increase in popularity of the protected areas. The first no-take zone created became a major tourist attraction and is estimated to be worth several million dollars per year to the district.[23]

Spillover of fish was measured at up to 1959m from one of the reserve boundaries, and averaged over 500m across all the sites (Harmelin-Vivien *et al,* 2008). Evidence shows that the extent of the spillover effect depends on the pressure in the adjacent waters. Indeed, the spillover effect is predicted to be "smaller" in areas where adjacent waters are highly pressured.[24]

However, HPMAs cannot be considered in isolation of other marine policies and management processes. Pauly et al. 2002[25] states that: "Marine protected areas (MPAs), with no-take reserves at their core, combined with a strongly limited effort in the remaining fishable areas, have been shown to have positive effects in helping to rebuild depleted stocks."

In order to maximise the conservation and economic benefits of HPMAs, LINK recommends that no take zones should be buffered by low impact fisheries zones, prioritising sustainable fishers who can benefit from the immediate spillover effect. Creating buffer zones would help protect low impact fisheries from displacement by giving them preferential access to waters. This would be part of

[14] https://www.science.org/doi/10.1126/science.294.5548.1920
[15] https://www.nature.com/articles/s41598-021-82371-5#citeas
[16] https://www.sciencedirect.com/science/article/pii/S0169534703001897
[17] https://theconversation.com/study-vindicates-the-benefits-of-no-fishing-zones-on-the-great-barrier-reef-39366
[18] https://doi.org/10.1016/S0169-5347(03)00189-7
[19] https://www.nature.com/articles/s41598-021-82371-5
[20] https://doi.org/10.1016/j.biocon.2008.04.029
[21] https://doi.org/10.1016/j.jenvman.2009.05.010Get rights and content
[22] https://doi.org/10.1016/j.biocon.2014.01.014
[23] https://doi.org/10.1016/j.biocon.2014.01.014
[24] https://doi.org/10.1016/j.biocon.2008.04.029
[25] Pauly, D., Christensen, V., Guénette, S., Pitcher, T. J., Sumaila, U. R., Walters, C. J., ... & Zeller, D. (2002). Towards sustainability in world fisheries. Nature, 418(6898), 689-695

meeting the Scottish Government's Just Transition outcomes[26], underpinned by the 5 principles for a Just Transition, as set out by the Just Transition Commission[27] in 2022.

A collaborative approach with all stakeholders is essential to achieving conservation objectives, and to build support among stakeholders and wider society. LINK believes that successful engagement must include improved stakeholder participation with clear expectations, wider strategy and support mechanisms for affected activities, use of best available science and independent scientific scrutiny of proposals.

For more information contact:

Calum Duncan Convener of the Marine LINK Group,
calum.duncan@mcsuk.org

Or

Fanny Royanez, Marine policy officer
fanny@scotlink.org

[26] https://www.gov.scot/publications/transition-fairer-greener-scotland/pages/6/
[27] https://www.gov.scot/publications/making-future-initial-report-2nd-transition-commission/pages/2/