Lyme Bay Fisheries and Conservation Reserve

Ecological and Fisheries Data

November 2016

Introduction

BLUE's Lyme Bay scheme has achieved a "win-win" for fishing and conservation that is arguably unique. Fishermen have experienced increased catches, improved infrastructure and a higher catch per unit of effort. Their inshore vessels are now enjoying higher prices for their catch from a market that is prepared to pay more for fully traceable, sustainable fish. This has led to higher levels of contentment and a desire by younger generations to enter the industry. These benefits for fishermen have gone hand in hand with a measurable revival in marine habitats, rare species and most stocks of fish, which we set out in this document.

The benefits to the marine environment in Lyme Bay fall into two categories. The first, set out in Section 1 below, is attributable to the statutory closure to trawls and dredges in 2008 which has led to a steep improvement in the animals and plants on the seabed, and which in turn has provided more habitats and food for fish. However, the closure proved to be unfinished business both for the environment and for fishermen, prompting BLUE's intervention, as described below. The second category of benefits, set out in Section 2, is attributable to the Lyme Bay scheme of stakeholder-led fishery management that BLUE put in place in 2012, which has led to a recovery of fish and shellfish stocks and further boosted the recovery of the reefs by limiting the amount of gear dragged across them.

Overall, as a combined result of the ban on mobile gears and the collaborative approach introduced by BLUE, there has been since 2008 a four-fold increase in flora and fauna reef species, a doubling of scallop landings, a quadrupling of juvenile lobsters, a two-and-a-half times increase in landings of brown crabs and a quadrupling of flatfish catches.

Background

In 2008, in Lyme Bay a statutory order closed 60 nautical square miles or 206 square kilometres to mobile fishing gear, which was destroying nationally significant flora and fauna, notably corals and sea fans. (This area was increased to 90 nautical square miles in 2010.) Following the ban, between 2008 and 2012, use of static gear in the form of pots and nets increased to unsustainable levels, reducing catches and threatening further damage to the protected reefs. Relations between conservationists and fishermen were poor. Fishermen feared the imposition of a total ban on fishing with severe implications for their jobs, their livelihoods and the whole community.

BLUE's solution to this ecological, social and economic problem was a collaborative approach whereby we persuaded fishermen, conservationists, scientists and marine authorities to form a working group in 2012. The previously opposed parties were encouraged to draw up a voluntary code of conduct limiting fishing activity, restricting the amount of gear carried by each boat and agreeing to collect data to inform management of their fisheries.

Oliver Letwin, Conservative MP for West Dorset, said at the time: *"It is immensely good news that almost all those involved in Lyme Bay fishing have come together with all the bodies involved in seeking to preserve the ecological balance, and they have together drawn up a remarkable voluntary code, which offers a real prospect of sustainable fishing off this wonderful part of Britain's coastline… Lyme Bay is leading the way."*

To reward the fishermen for signing up to the voluntary code, BLUE invested in infrastructure, particularly chiller units which would ensure the freshness of the product. BLUE also formed a partnership with the Seafish Responsible Fishing Scheme (RFS) to audit the sustainability, traceability and quality required by the Reserve Seafood label, which is now commanding higher prices for fishermen involved.

Lyme Bay fishermen celebrating with BLUE the launch of the Reserve Seafood brand. See them describing the benefits of the scheme here (if you are reading this digitally).

Section 1 – Data showing the impact of the closed area

The Seabed

Lyme Bay's rocky reefs, pebbly sand and soft muddy sediments make it a UK marine hotspot supporting diverse marine species. It is important to protect these habitats in order to maintain both the nature conservation interest and healthy inshore fisheries.

Since the Government closed 206 km^2 of the bay to trawling and dredging in 2008, annual surveys carried out by the University of Plymouth have shown the marine environment is recovering rapidly.

Video surveys examined thirty 200m x 0.5m swathes of the seabed, focusing on reef colonies, each year from 2008 to 2013. The results show a dramatic increase in fauna and flora inside the closed area. Surveys from 2013 onwards are yet to be thoroughly analysed due to shortage of funds at Plymouth University, but initial results point to a continued increase in life.

Sunset coral, Lyme Bay, copyright Colin Monroe 2013

Overall Abundance and Diversity

The overall number and diversity of species inside the Reserve increased significantly between 2008 and 2013. Results show the average number of individual specimens found in areas surveyed rose by 380% between 2008 and 2013 (Fig 1). Many of these species form reefs that provide food and shelter to other species including fish. The species observed included anemones, sea fans and sponges, all of which provide shelter and habitat for fish. Over time these were not only greater in number (over 300%) but larger in size. The larger the size of species in the communities, the more stable the seabed.

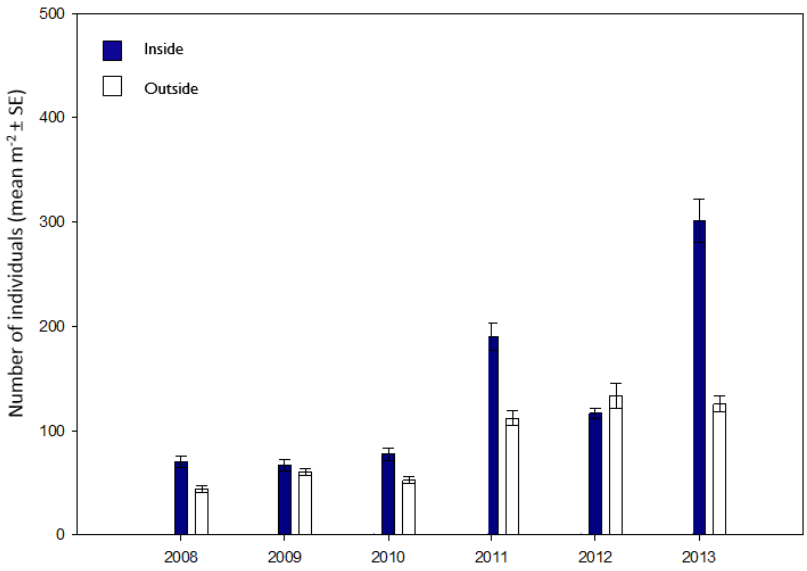


Figure 1| The average number of individuals per sample site found inside and outside the Reserve between 2008 and 2013.

The higher numbers of sea fans or soft corals, are of benefit to skate and dogfish. Both species attach their eggs to these structures on the seabed. Catch data and anecdotal evidence from fishermen report an increase in number of skate since the creation of the Reserve in 2012.

The overall number of species in the Reserve is also shown to have increased between 2008 and 2013. In 2013 an average of 32 species per 200m x 0.5m area were identified in 30 sites compared with just 19 on average per site in 2008 – an increase of 84% inside the Reserve, compared with no notable increase outside the Reserve (Fig 2).

A total of 156 benthic species were recorded in the Reserve in 2013 with many settling and surviving in new areas.

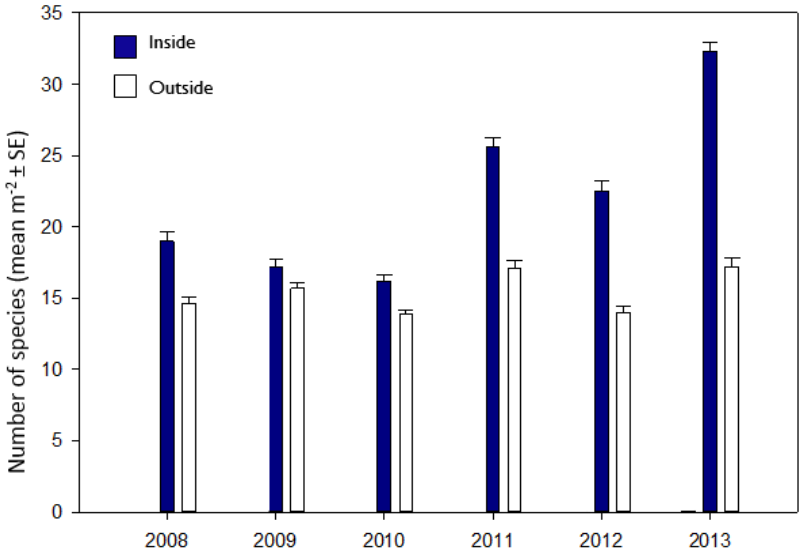
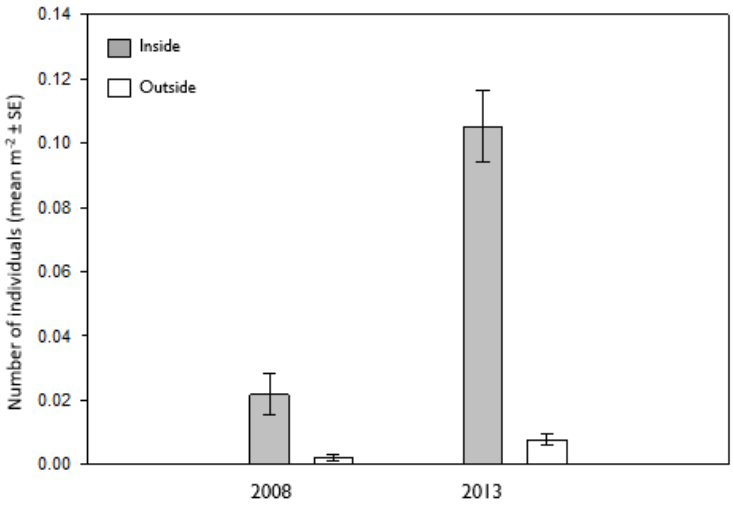


Figure 2| The mean number of species per site found inside and outside the Reserve from 2008 to 2013.

Bryzoans

Ross coral (*Pentapora fascialis)* is a type of bryzoan or sea sponge and is one of several species that form reefs providing nurseries for juvenile fish. Prior to the closure in 2008, the number of species recorded was very low. In 2013 however, the survey showed numbers in the Reserve had increased four-fold (Fig 3).

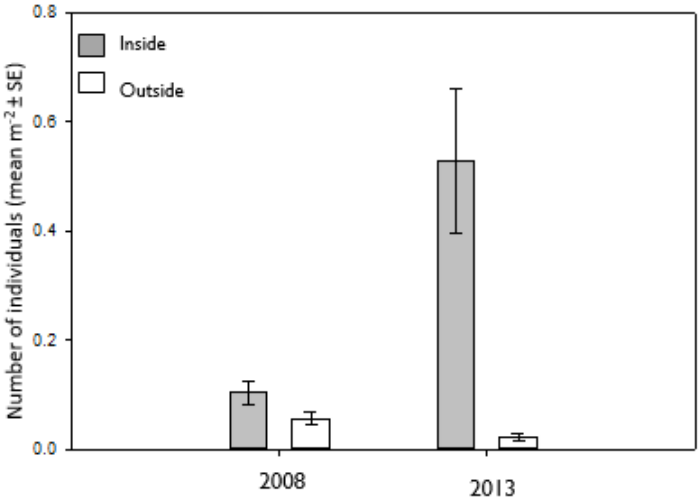
Figure 3| The mean number of bryzoans *(Pentapora fascialis)* per site found inside and outside the Reserve in 2008 and in 2013.



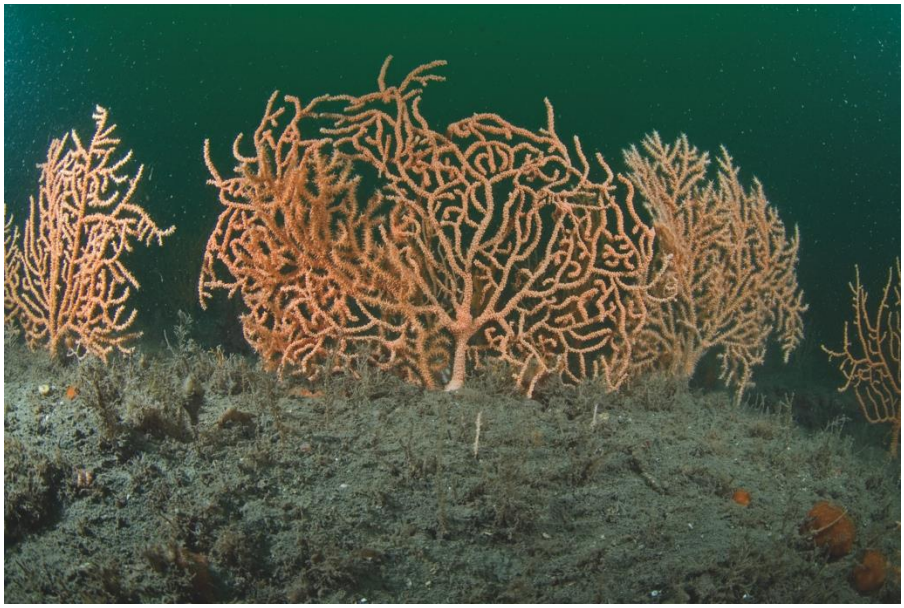
Branching sponges

Figure 4| The mean number of branching sponges per site found inside and outside the Reserve in 2008 and 2013.

Branching sponges are another rocky reefs around the species that form They are particularly UK coastline. valuable commercial important for and lobsters due to the species like crabs provide during their shelter they 2008 to 2013 species early years. From sponges increased by of branching 411% (Fig 4).



In the same time period, pink sea fans, a nationally important species listed as vulnerable, increased by almost eight times. Pink sea fans provide shelter and support to juvenile scallops – a species which has also increased in number since the start of the Reserve.



Pink sea fans, Lyme Bay, copyright Colin Monroe, 2013

Closed area impact – conclusions

The above data from Plymouth University shows a marked increase in the abundance of marine life and the numbers of species inside the Reserve compared with outside the Reserve, providing compelling evidence that protection of the seabed from trawling makes a critical difference to habitats.

However, while the statutory closure of the Lyme Bay reefs area to bottom-trawling in 2008 stopped damage to seabed habitats, the authorities failed to foresee how attractive the area would then become to potters and netters who could leave their gear fishing for days without fear of losses from trawlers. The resultant threat to shellfish stocks meant that fishermen were faced with a crisis as to how to earn a living.

BLUE's intervention in 2012 not only safeguarded jobs for fishermen within the scheme, but also, thanks to a detailed code of conduct, led to continued habitat recovery and improvements in shellfish and finfish stocks, detailed below in Section 2.

Section 2 - Sustainable Fishery

Measures which are boosting recovery

Since BLUE's partnership began in 2012 all 42 boats in the Reserve operate under a voluntary code of conduct and adhere to a memorandum of understanding. Boats fish using static gear only and adhere to detailed fishery management measures. All 42 boats are under 10m in size and are usually operated by a single fisherman. The main types of gear are pots (targeting crabs, lobsters and cuttlefish), fixed nets and rod and line for finfish, and diving for scallops. All gears have a low to zero impact on the seabed and are highly selective.

In addition to the recovery in the seabed habitat outlined in Section 1, the voluntary regulation of fishing effort in the Lyme Bay scheme has significantly influenced the impact of fishing on the Reserve's ecology. Main measures to further boost the recovery of marine habitats and species include:

- **Pot limits** – these reduce the amount fishermen can catch at one time and combat increased activity as fishermen move into the Reserve to exploit higher catches.

- **V-notching** – this practice helps protect the lobster stocks by removing breeding females from landed catch.

- **Escape hatches** – these small hatches in lobster pots ensure undersized lobsters can escape and grow to adult sizes.

- **Protection of eggs** laid by fish such as cuttlefish on pots and other gear is ensured by leaving them in the water in sheltered areas until they have hatched. This measure is very important for cuttlefish - listed nationally as vulnerable by the Marine Conservation Society.

- **Net sizes** are limited to 800 yards for individual nets and 3200 yards for the total deployed. Minimum mesh size is a requirement to ensure only adult target species are captured.

- **iVMS units** on board all boats monitor where fishing occurs ensuring compliance with the scheme and allowing the fish to be labelled 'fully traceable' under the Responsible Fishing Scheme.

Since the Scheme began in 2012 catches for target fish have risen impressively, as detailed in Figures 5 to 9. Interviews with fishermen conducted on site in Lyme Bay by BLUE in October 2016 also support these findings. For example:

"Landings of my top species; crab, lobster and flatfish have increased 33%, 40% and 70% respectively since the formation of a fishery partnership.

- Reserve Fisherman, October 2016*[1]

[1] Fishermen interviewed by BLUE in October 2016 requested quotas and data on catch to remain anonymous because they currently feel threatened by DEFRA measures to restrict their catch allowance.

Shellfish

Shellfish such as crab, lobster and scallops account for the highest volume of landings from inside the Reserve. Few shellfish species caught in the UK are subject to annual quota limits so changes in catches are a good indication of increasing abundance in the Reserve.

King scallop

King scallops are hand caught by divers inside the Reserve. Results from the Plymouth University study show that the number of king scallops doubled between 2008 and 2013 in the Reserve. In 2014 king scallops were estimated to be seven times more abundant inside the Reserve compared with areas that remained open to towed fishing gears.

These trends are supported by landings data which show that in 2014 numbers of dive caught scallops in the Reserve were more than two times that of 2008 (Fig 5) and that individual fishermen are catching more:

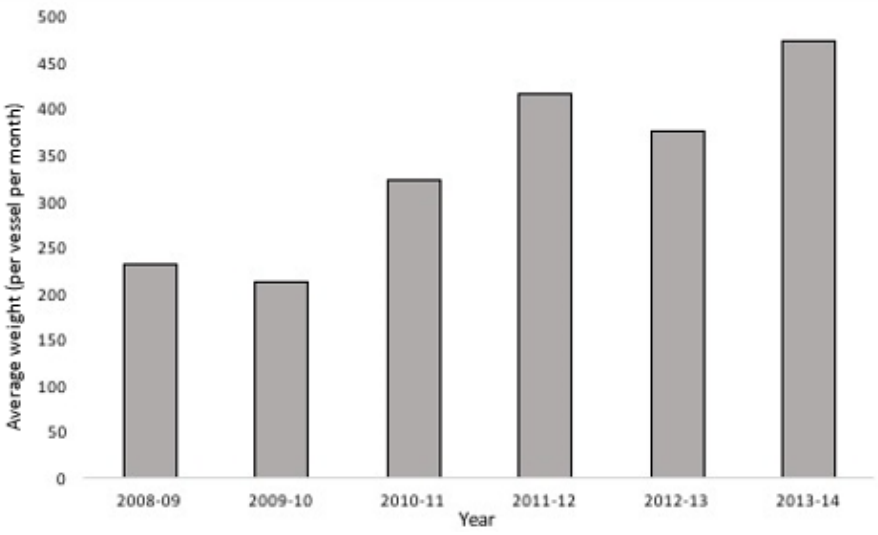


Figure 5| The average number of king scallops landed (weight) per vessel per month from inside the 2008 to 2014 Reserve.

Anecdotal evidence is also suggestive of a strong increase:

"I could have lived down there [on the sea floor] ten years ago and not caught anything like I'm catching now in one dive"

- Reserve Scallop Diver, Autumn 2016

Because hand-dived scallops are requested by retailers and restaurants offering sustainable fish, Lyme Bay scallops fetch at least a 20% premium and can be guaranteed hand-dived. (Many supposedly hand-dived scallops offered for sale in the UK are in fact dredged so Reserve Seafood scallops will increasingly attract a premium.)

European lobster

Lobsters are caught in pots and traps on the seafloor and are often fished for alongside crabs. Between 2008 and 2012 increased potting activity inside the Reserve saw few improvements in numbers of lobsters. Since BLUE's partnership started in 2012, however, lobsters have responded positively to management measures.

An annual potting study carried out by Plymouth University and commissioned by BLUE caught and released 246% more lobsters in 2015 than in 2013 (Fig 6). The same study also looked at juvenile lobster populations and found an increase of 450% in three years (Fig 7).

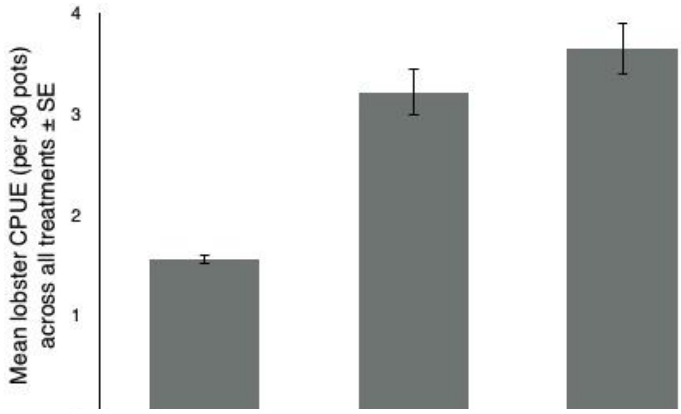


Figure 6| The mean number of lobsters caught (and then released) in 30 pots. This suggests greater abundance and lower Catch Per Unit of Effort (CPUE) in the Reserve from 2013 to 2015.

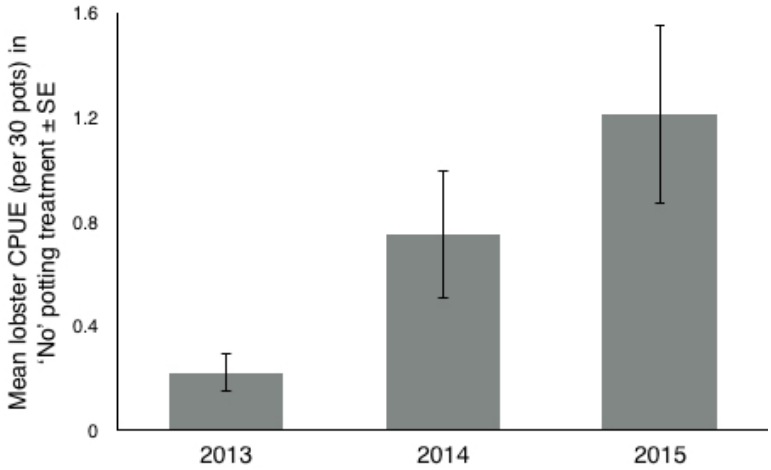


Figure 7| The mean number of juvenile lobsters caught (and then released) in 30 pots. This data on juveniles not only suggests improved abundance and Catch Per Unit of Effort (CPUE) in the Reserve from 2013 to 2015, but is also promising for the future of the lobster fishery as these juveniles come to maturity.

A 2014 CEFAS (Centre for Environment, Fisheries and Aquaculture Science) report on the Lyme Bay lobster fishery highlighted that "current voluntary measures are better than those in place in other areas of the country". The report added that the ban on taking berried (pregnant) lobsters and the voluntary restriction on the number of pots, as well as other practices such as V-notching and escape hatches, will "ensure the sustainability of the lobster fishery in the long term".

These findings are also backed up by anecdotal evidence from fishermen:

"Five years ago it would be a good day if you caught two lobsters in a pot. Today you pull up a pot and there can be up to 26 small lobsters – all about five years, indicating this could be the first benefits of our efforts."

- Reserve Fisherman, October 2016

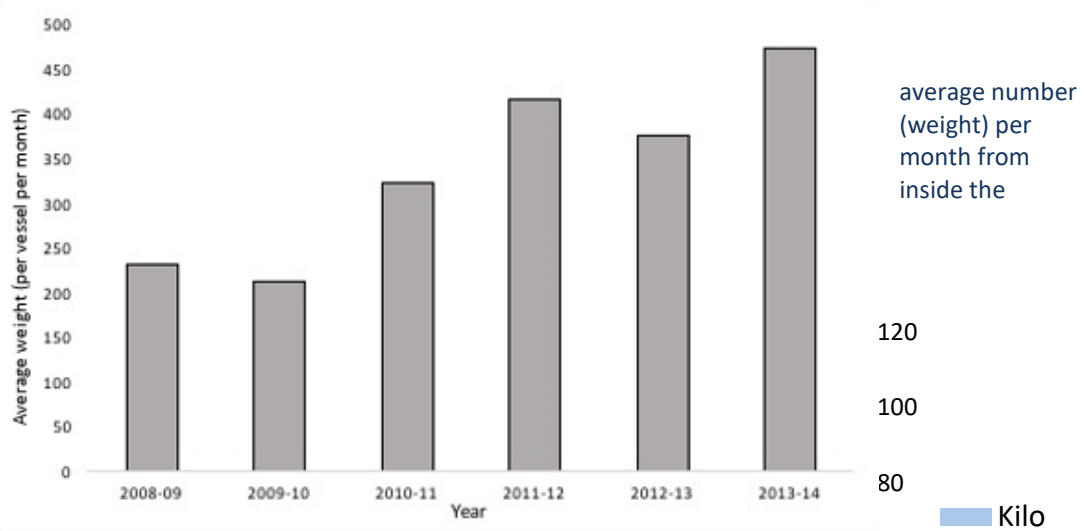
Edible crab

Caught in traps, crabs are one of the top fish targeted by fishermen. As bottom feeders, they are also a good indicator of the overall health of the marine ecosystem.

Aubrey Banfield, Lyme Bay fisherman, shows a good size crab potted in the Reserve.

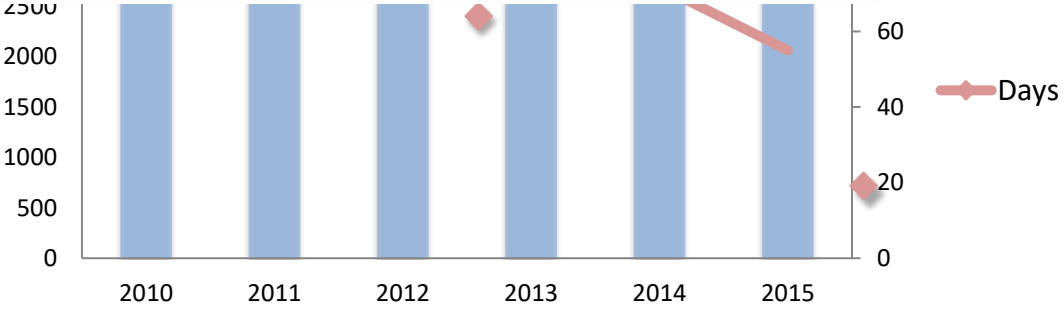
In 2014, average monthly landings of edible crab were approximately 450 kilos - more than two and a half times those in 2008 (Fig 8 below). Individual catch records from fishermen showed a reduction of fishing effort by almost half from 2010 (109 days) to 2015 (55 days) to catch the same amount of crab (Fig 9 below).

Figure 8| The of crabs landed vessel per 2008 to 2014 Reserve.



average number (weight) per month from inside the

Figure 9| The number of crabs caught by one fisherman (blue bars) and days at sea (red line) indicating a falling Catch Per Unit Effort (CPUE) in the Reserve from 2013 to 2015.



The fact that the fisherman caught as many crab as he thought he could sell in fewer days meant he was able to focus on catching other target species on remaining days.

Finfish

A wide range of finfish are caught using fixed nets and rod and line in the Reserve throughout the year. Most of the finfish caught commercially are subject to annual quotas which limit the amount fishermen can catch. As such, landings cannot be used as sole indicators of changes in numbers of finfish. But a useful indicator is that more fish of different species are being caught in the Reserve and fishermen are diversifying their catch. The Reserve Seafood label has allowed the partnership to track the types and amount of fish being caught and provides a market for a wider range of finfish such as pollack, mackerel and skate.

Variety of fish

BLUE's provision of chiller units and ice making facilities allows fish to be iced and stored as soon as it is lifted onto the boats. This allows fishermen to supply fish of the highest quality – commanding a higher price – and waste less. It has also allowed fishermen to sell a range of species regardless of quantity or fragility. This has brought significant benefits to fishermen's income and standard of living;

"Before the scheme, I would cut up many white fish I caught for bait or would have to drive two hours to market as they would not keep. Being able to get fish on ice the minute it's caught and stored in the chiller unit until it can be picked up has increased the amount I can earn and taken time off my working day."

- Reserve Fisherman, October 2016

The ability to make use of all species caught has meant more varied types of fish are being recorded in the Reserve. Catch records for 2015 to 2016 show 29 species were sold through Reserve Seafood (Fig 10).

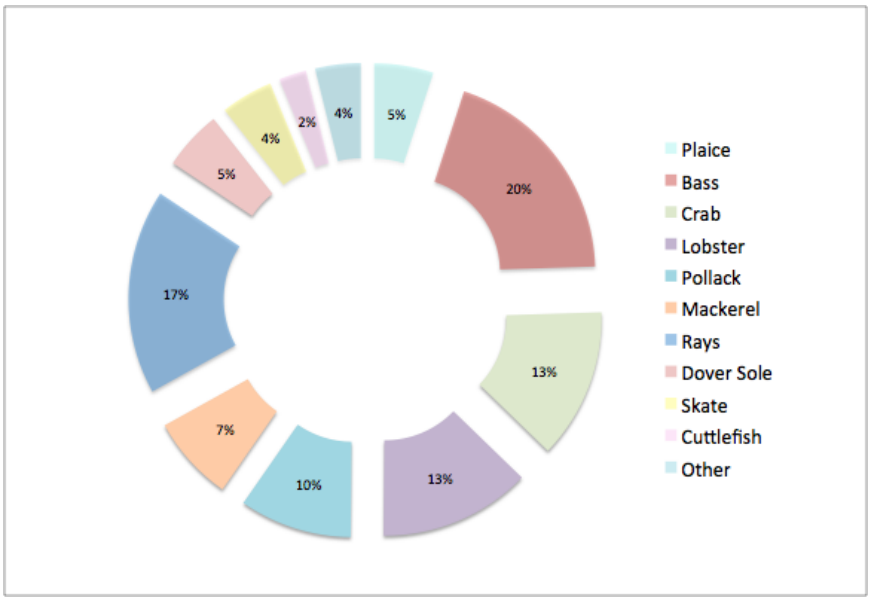


Figure 10| Types of fish caught and sold through Reserve Seafood from 2015 to 2016.

Some of these species such as bass, cuttlefish and turbot have low populations on a national level. The rise in the frequency of landings may be an indication that healthy local populations are returning for some species.

Bass

Bass is an important target species in Lyme Bay, but the fish are highly migratory and the stock is managed at a European level, so stock levels within Lyme are not indicative of the success of the reserve. Spawning stock has been declining since 2010 due to a failure, until 2015, to control industrial fishing. In 2016 the European Commission recommended what BLUE advised two years ago, that commercial fishermen should only use hooks.

Flatfish

Flatfish such as sole and plaice command a high price at market and are caught alongside other fish in fixed nets on the seafloor. During interviews with fishermen in the Reserve in October 2016 many stated the size and abundance of flatfish had increased since BLUE's partnership began in 2012. For lemon sole, levels of catch could indicate a larger population as it is not subject to a quota limit. Catches in 2014 increased by 386% compared with catches in 2012.

Due to the larger sizes of flatfish, many fishermen now sell to a higher price market. The larger sizes of fish mean they will be more mature and produce more eggs.

Rays

Shallow coastal waters around the UK, including Lyme Bay are key nursery areas for rays. Rays are an important catch for UK inshore fishermen and a variety of species are caught in nets inside the Reserve; thornback rays, blonde rays and undulating rays. Despite the quota limits, fishermen have reported an increasing abundance of rays, particularly thornback;

"It's full of juvenile rays and our catches are getting bigger - hopefully we can get some recognition for our efforts which has seen a sustainable population return to the bay."

- Reserve Fisherman, October 2016

At present, the majority of ray fisheries in the UK have been labelled vulnerable and unsustainable in the Marine Conservation Society's (MCS) Good Fish Guide. The measures taken under BLUE's partnership appear to be helping numbers to rise. As of October, the partnership is in the process of negotiating with MCS to get the designation changed for the area.

Lyme Bay Banfield, the Reserve. **fisherman, Aubrey setting his pots inside**

More fish, better livelihoods

The scheme has not only boosted recovery of the ecology and fish stocks in the Reserve but has had significant benefits for fishermen's livelihoods. A Plymouth University Ecosystem Services report published in 2015 highlighted a range of benefits experienced by fishermen within the Lyme Bay working group compared with those outside the scheme. For example, the report states:

"As of 2010, static fishermen part of the working group had the highest job satisfaction and income scores and the lowest perceived levels of stress and conflict compared to static and mobile operators outside the Reserve."

– Plymouth University Ecosystem Services report 2015

The scheme has seen fishermen achieving higher prices for their catch. The fact that catch levels are also improving is a double benefit:

"The ability for us to be involved in the management measures on the ground has allowed us to see 20% - 50% increases in income from our improved catches."

– Reserve Fisherman, October 2016

There are issues which are at the moment beyond the grasp of the partnership that runs the Reserve. For instance, bass catches are at unsustainable levels. Fishermen in the Reserve can only do so much to improve the situation, for example, by fishing for them with rod and line. However, BLUE has successfully influenced fisheries policy at government level to stop the damaging fishing methods used by the larger offshore vessels.

Conclusion

The Lyme Bay Fisheries and Conservation Reserve has brought impressive and measurable benefits to both fish and fishermen.

A wider roll-out of the scheme could lead to further economies of scale for Reserve Seafood, with the possibility of a national label that rewards fishermen for fishing sustainably and encourages a growing number to do so.

Roll-out would also mean more thorough-going research to track improvements in both marine habitats and catch data so that success could be unequivocally demonstrated.

BLUE is confident that Lyme is a template for sustainable UK fishing, not only in the protected areas which now take up a quarter of the UK coastline, but in other areas that choose to adopt the same methods and create their own reserves. It could transform the future of UK inshore fishing, reversing declines in marine life and reinvigorating coastal communities.