



Sussex Kelp
Recovery
Project

Progress & Impact Report

2021-2022

sussexkelp.org.uk

“This is a landmark decision for the management of the UK’s coastal waters. Sussex’s remarkable kelp forests will now have a chance to regenerate and provide a home for hundreds of species, creating an oasis of life off the coast, enhancing fisheries and sequestering carbon in our fight against climate change.”

Sir David Attenborough, in response to the
Sussex Nearshore Trawling Byelaw



Foreword by Henri Brocklebank

Chair of the SKRP Steering Group

Reflecting on the first two years of the Sussex Kelp Recovery Project (SKRP), I've been amazed by how much we've achieved together, and am delighted to share that with you in this report.

Supporting and studying the recovery of our once abundant Sussex kelp beds is a unique project – there's no template for this kind of work. We've had to work it out as we go along, and it makes me very proud that we have come so far.

This pioneering project began in March 2021, following the introduction of the Sussex Inshore Fisheries and Conservation Authority's Nearshore Trawling Byelaw. Though, as the campaign group 'Help Our Kelp', we'd been working in support of it, we had not anticipated the tremendous public interest the Byelaw would generate.

Championed by Sir David Attenborough, Help Our Kelp rallied over 2,500 people to sign a petition in the Byelaw's favour, helping it to become law. We're incredibly grateful to the media – who championed the inspiring story of fisheries management being steered by recognition of the ecosystem benefits provided by kelp – and to everyone who engaged with it.

With the Byelaw in place, our priority was to ensure its impact on historic kelp beds, marine life, fisheries and local communities

was monitored and recorded. With the aim of creating a comprehensive and coordinated monitoring, research and engagement programme, we sought out, and are so thankful for, the support of our partners and funders. This support includes funds raised by players of People's Postcode Lottery which enabled the Help Our Kelp partnership to evolve and reform under the banner of the Sussex Kelp Recovery Project.

In November 2021, a great sense of collective action was galvanised as we hosted the first [Sussex Kelp Summit](#). This hybrid live-stream and in-person event conveyed the scale of the project through inspiring talks and spectacular films from local and international marine scientists, conservationists, filmmakers and policymakers, as well as from local community groups and citizen scientists.

Now, two years on from the Byelaw's implementation, the big question is: 'Is there any more kelp?'. This is a surprisingly difficult question to answer at this stage. We know, from anecdotal and academic evidence, that the seabed is changing,

and with so many individuals and organisations contributing we're able to draw these two sources of information together.

Sussex divers and fishers have observed an increasing diversity of species, and vast, expanding blue-lipped mussel beds forming. Meanwhile underwater cameras, diver surveys and fisheries studies are recording changes in the ecosystem. The return at scale of the once historic kelp beds is not yet evident – but it is still early days. Critically, we know that precious remaining areas of kelp remain in good condition. Every year these release fresh spores into the water column, and it is these spores that will create our future kelp beds.

We're now reaching the end of our second year, making an important contribution to the UN Decade on Ecosystem Restoration 2021 – 2030, and our partnership has developed and evolved.

This is a collective journey, bringing together a huge network of local people and diverse organisations as well as scientific researchers from across the UK and beyond, all with a



Henri is the Director of Conservation Policy and Evidence at Sussex Wildlife Trust
Sussex Wildlife Trust

common vision for nature recovery on a grand scale. The research and outreach achieved to date would not be possible without the support of our key funders to whom much thanks is due.

This report marks the launch of a new phase – as we consolidate what we have learnt and embrace the continued momentum of our seabed's recovery. It has been an honour to chair the partnership and now to collectively share the SKRP's incredible journey with you.

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All activities undertaken by the SKRP are aligned to its principles and support its aims, which in turn contribute to the delivery of its mission and vision. The main body of this report is divided into different sections, each covering one of the five SKRP aims and detailing the activities that are collectively working to achieve it.



Cover image: Bognor Kelp
Paul Boniface

Executive summary

Historical records show that kelp beds once stretched along 40 km of the West Sussex coastline and extended at least 4km out to sea; in total covering over 176 km².

This vast underwater forest provided a vital habitat and nursery for fish and shellfish while providing other essential ecosystem services such as improving water quality, reducing coastal erosion and acting as a carbon conveyor to draw down carbon (see infographics on pages 30 and 36). Since the late 1980s however, 96% of Sussex kelp had disappeared; the ecosystem services it provided were lost, and the marine life that depended on it dramatically declined.

In 2018, seeking to protect essential fish and marine habitats and support sustainable inshore fisheries, the Sussex Inshore Fisheries and Conservation Authority (IFCA) compiled the evidence and created a compelling case to initiate a new piece of legislation: the Sussex IFCA Nearshore Trawling Byelaw.

Inspired by a film initiated by Big Wave Productions and supported by Sir David Attenborough, the Help Our Kelp campaign

rallied thousands of public supporters. This helped to get the Byelaw over the line and on 18 March 2021

it was introduced, protecting 304 km² of seabed along the Sussex coast from trawling.

Following the implementation of this landmark protection measure, the Sussex Kelp Recovery Project (SKRP) partnership was established with the aim 'to champion, study and facilitate the recovery of Sussex kelp and other essential fish habitats, through progressive, coherent and collaborative action'.

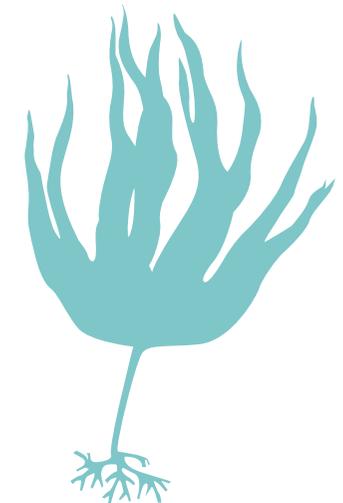
Fundamental to this is a programme of research which measures changes in the ecosystems, fisheries and local communities resulting from the Sussex Nearshore Trawling Byelaw, which allows benefits from the Byelaw and its associated impacts to be assessed and quantified.

Using pioneering techniques including towed underwater cameras, Baited Remote Underwater Videos and environmental DNA analysis, alongside surveys of shellfish and landings data, SKRP partners have established a baseline of the health of marine habitats and species within the protected area. ▶



Above: The short-snouted seahorse (*Hippocampus hippocampus*) is one of two species of seahorse native to Sussex which can be found within the protected area.

📷 Louise Foster/Sussex Wildlife Trust



Executive summary continued...

The SKRP research programme is a collaborative effort between research organisations, regulators, filmmakers, fishers, conservation groups, marine user groups and local communities.

Local fishers are participating in shellfish surveys, dozens of Masters students from local universities are learning important skills as part of the ecological fieldwork and over 120 sea users provided input to a survey on sediment.



A local diver in the water near Seaford at a site often used by Seasearch divers to provide data for marine conservation.

📷 Gerald Legg

Kelp recovery will take time and only by repeating these surveys annually for a period of 5 years or more will the SKRP be able to record how and at what rate kelp ecosystems recover from the impacts of trawling. This monitoring is also essential to assess the impacts of other factors such as storm events, sedimentation, pollution and climate change which could hinder recovery and undermine the benefits of the Byelaw.

Kelp provides commercial, recreational and aesthetic value to local communities, businesses and visitors. Public engagement is vital to raise awareness of the value of these coastal ecosystems and involve a wide audience – beyond the scientific community – in their recovery.

Over the past two years SKRP partners have reached millions of people through social media, TV and radio – with the Help Our Kelp film alone trending on BBC online and featured on BBC News. Additionally, regional events such as the Kelp Summit, along with presentations at conferences and at global events such as COP 26 have told the story of kelp to a world-wide audience. It is fair to say that what has happened in Sussex has firmly put kelp into the national conversation.



With the research programme now well underway, community engagement will be a key focus for the SKRP in the coming year with plans for a new website, events and regular updates via social media, supported by a dedicated SKRP Co-ordinator. Plans for an education programme to engage the next generation of kelp champions and ocean guardians are also being progressed, for which funding is being sought.

From the introduction of a landmark Byelaw led by Sussex IFCA which created one of the largest areas protected from trawling on the south coast, to the start of the Sussex Kelp Recovery Project partnership, to its collaborative research effort and first baseline surveys, to the communities and people that are passionate about restoring our seas, this report summarises the journey of Sussex kelp recovery so far and how a collective effort is literally putting kelp back on the map.

Our vision

The recovery of kelp and other essential fish habitats at scale in Sussex support a thriving and sustainable marine ecosystem that benefits nature, fisheries, coastal communities and our planet.

Our mission

To champion, study and facilitate the recovery of Sussex kelp and other essential fish habitats, through progressive, coherent and collaborative action.

Our principles

- Working in collaboration with organisations, groups and individuals.
- Using and promoting an adaptive, science-led approach.
- Putting nature and climate at the centre of decision-making.
- Only committing to a natural capital approach where this results in a positive result for nature.
- Sharing SKRP research, experience, learnings and progress.
- Acting as a point of contact for the recovery of Sussex kelp.

Our aims



Aim 1

To **support and monitor** the **natural recovery** of kelp and other essential fish habitats in Sussex, and the impact of the Sussex Nearshore Trawling Byelaw.



Aim 2

To **understand the ecological, social and economic value** of kelp and other essential fish habitats in Sussex.



Aim 3

To **identify and minimise damaging impacts** on existing and potential kelp habitat and other essential fish habitats.



Aim 4

To **assess the need for** and the feasibility of **active kelp restoration**.

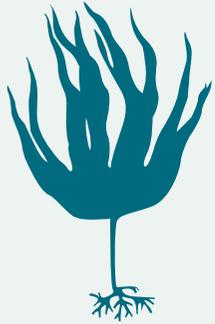


Aim 5

To **increase understanding and community engagement** in Sussex kelp and other essential fish habitats, so their importance to the environment and society is known, and to enable marine ecosystem recovery elsewhere.



2021-2022 Highlights



Conservation

304km²
of seabed protected from trawling by the implementation of the Sussex Nearshore Trawling Byelaw in March 2021.



Collaboration

40 organisations
brought together in a workshop to discuss the sources and impacts of sediment, a potential key pressure on kelp's recovery, in October 2021.



Community

Over 250k reached
by social media posts from the Sussex Underwater Facebook group, which beautifully documents kelp and marine life recovery following the Byelaw.



Communication

Over 1,000 people
viewed the livestream of the Kelp Summit, which showcased the importance of kelp and SKRP's journey via inspiring talks and presentations in November 2021.

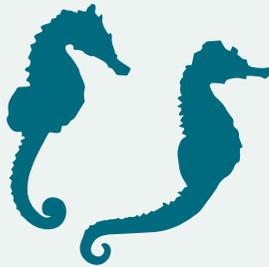


Citizen Science

120 Sussex sea users
including sailors, sea swimmers, commercial fishers and others provided their observations on changes to sediment in a Summer 2022 report.



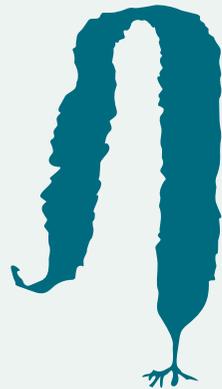
2021-2022 Research highlights



Environment

Leading-edge techniques

Baited Remote Underwater Video (BRUV) assessed seabed diversity and abundance (featured in New Scientist, July 2022), while eDNA samples identified species diversity in the water column.



Carbon storage

Uncovering historic carbon

To help inform the value of kelp as a blue carbon store, the rate of carbon draw-down and storage in sediments is being analysed from 24 sediment 'cores' taken from the seabed.



Surveillance

Recording 30km of seabed

For the fourth year in a row, towed video cameras surveyed 25 sites to monitor marine habitats in and outside the Byelaw area. At each site 300m of seabed footage is recorded generating video of 7.5km of seabed each year.



Socio-economic studies

Surveying fishers

Commercial fishers were surveyed in Autumn 2021 to capture fishing practices, incomes and attitudes to the Sussex Nearshore Trawling Byelaw.



Fisheries

Seafood health & value

Crab and lobster surveys were carried out at sites off Selsey, Brighton and Eastbourne to assess changes to the health and value of fisheries.



About Sussex kelp and the Sussex Kelp Recovery Project partnership

What is kelp?

Kelp are flat-bladed, large brown seaweeds commonly found around rocky shores. They often grow in dense 'forest' patches, creating some of the most biodiverse marine environments on the planet. Kelp can be thought of as 'marine trees' anchored to the seabed and creating a 'canopy' beneath which numerous species take shelter and find food.

The SKRP focuses on four historically common kelp species in Sussex (see infographic on [page 12](#)):

- Oarweed (*Laminaria digitata*)
- Tangle (*Laminaria hyperborea*)
- Sugar Kelp (*Saccharina latissima*)
- Furbellows* (*Saccorhiza polyschides*).

While occasionally seen exposed at low tides, most kelp are permanently submerged (subtidal). All kelp have a claw-like 'holdfast' to attach to rocks, pebbles and artificial structures. They are vulnerable to detachment during storms and are often found washed up on beaches.

Lifespan

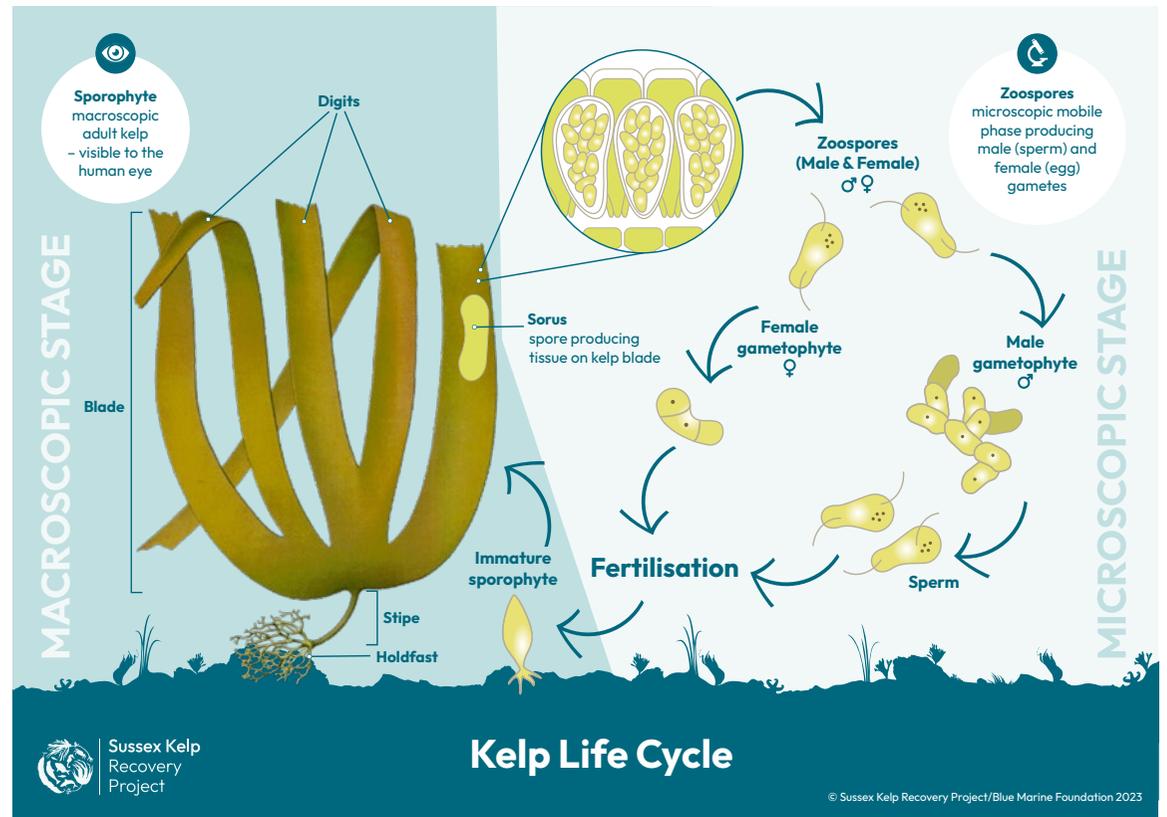
Some kelp are perennial and can live for over two decades (Oarweed and Tangle). In contrast, Furbellows is an

annual species living for just one year, while Sugar Kelp can be annual but often lives for two or three years.

Kelp lifecycle

Kelp starts its life as a free-floating microscopic organism called the 'gametophyte'. The kelp we see growing on the seabed is a 'sporophyte', and this is the final phase in its multi-staged life cycle. All young sporophytes develop a simple blade (not a leaf) and it's difficult to tell young species apart. They either continue to grow into a single large blade (Sugar Kelp) or develop a longer stipe (stem) and a wider blade to create the familiar 'trident' form where the blade splits into multiple fronds or digits (Oarweed, Tangle and Furbellows).

*Furbellows is not a true kelp, but is often considered a pseudokelp due to similar appearance and ecology.





Sussex Kelp Species



Oarweed

Laminaria digitata

Perennial – 4–6 yrs

Blade split into 5–12 digits

Short, smooth, bendy stipe

1–1.5m average adult length

Average depth range 0–15m

Tangle (aka Cuvie)

Laminaria hyperborea

Perennial – 5–18 yrs

Blade split into 5–20 digits

Long, rough, rigid stipe

1.5–2m average adult length

Average depth range 0–30m

Sugar Kelp

Saccharina latissima

Annual/Perennial – 1–4 yrs

Single long frilly blade

Short stipe

1–1.5m average adult length

Average depth range 0–30m

Furbellows

Saccorhiza polyschides

Annual – 1 yr

Blade split into 3–30 digits

Flattened stipe, bulbous holdfast

1–2m average adult length

Average depth range 0–35m



Sussex Kelp
Recovery
Project

Lengths are typical for Sussex. Source ref: Smale 2013 and Algaetraits 2022
©Sussex Kelp Recovery Project/Blue Marine Foundation 2023
Photos ©M.D. Guiry seaweed.ie

The origins of the Byelaw

In the late 1970s, abundant kelp beds between Selsey and Shoreham-by-Sea teemed with life, including important commercial species such as European Sea Bass, Black Sea Bream, European Lobster and Common Cuttlefish.

By the end of the century, 96% of the kelp had disappeared, along with the marine life it supported. Among the factors that caused the kelp to disappear were the great storm of 1987 and intensive fishing activity in the area using heavy trawl nets (trawling) which, when dragged along the seafloor can destroy seabed habitats.

In 2010 an inshore habitat map – commissioned by Sussex Inshore Fisheries and Conservation Authority (IFCA) and created by University of Brighton – showed how habitats in the area



Historic records show dense kelp beds in West Sussex at the start of the 1980s.

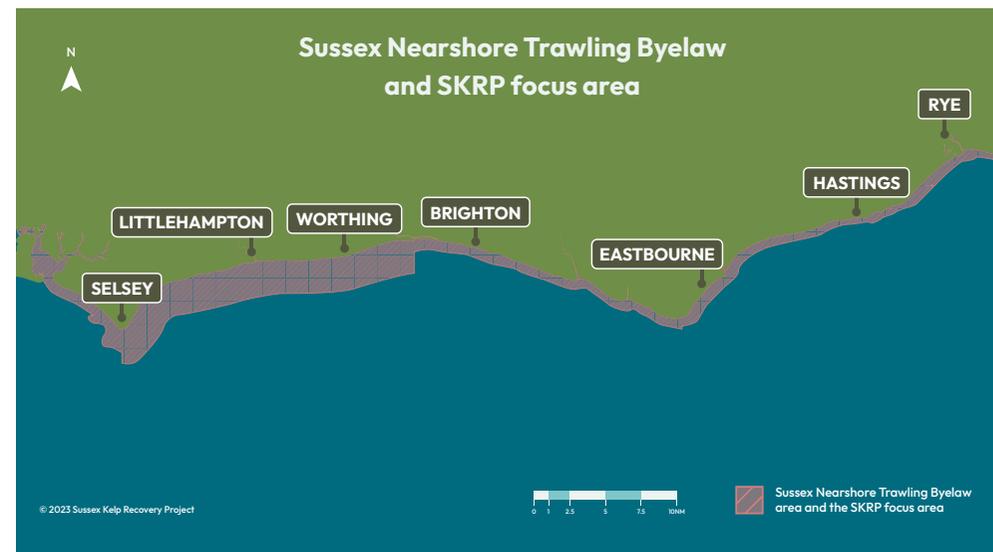
had changed and ignited discussions about kelp's role in the ecosystem. Over subsequent years Sussex IFCA, who manage the area from the shoreline out to 6 nautical miles, created a compelling case to initiate a new piece of legislation which aimed to protect essential fish and marine habitats, and support sustainable inshore fisheries: the Sussex Nearshore Trawling Byelaw.

Inspired by an iconic film made by Big Wave Productions, local and national organisations came together as the 'Help Our Kelp' group to promote the Byelaw and campaign for its implementation.

Championed by Sir David Attenborough, Help Our Kelp generated huge public support and on 18 March 2021, trawling was prohibited from 304 km² of the Sussex coast.



By 2019, only 4% of kelp beds remained.



In turn this launched the largest kelp recovery project in the UK, when in Spring 2021, Help Our Kelp's partners, along with Sussex IFCA and others, came together to form the Sussex Kelp Recovery Project partnership, and collectively support the aims of the Byelaw.

Sussex Nearshore Trawling Byelaw and SKRP focus area

The Sussex Nearshore Trawling Byelaw area extends along the entire Sussex IFCA district, between 0.75km to 1km from Chichester Harbour in the west to Rye Bay in the east (as shown above).

A larger area of protection is in the west, which extends 4km seaward between Selsey Bill and Shoreham-by-Sea. Historic records show that this area was once covered by dense kelp beds and is therefore the initial focus for SKRP research and activities.

Byelaw timeline

Overleaf: The pathway to the Byelaw's implementation has been captured by the Marine Conservation Society to provide learnings for future ecosystem-based fisheries management.

Key milestones The Sussex IFCA Nearshore Trawling Byelaw 2019

1959 1987 1990 1995-98 2001-03 2005 2010

Background

Evidence of expansive kelp forests from historical diver surveys and anecdotal stories. Anglers become interested in netting and trawling restrictions. Highly productive static gear commercial fisheries associated with kelp. Anglers become interested in netting restrictions.



Baseline shift

Council reports expansive kelp across West Sussex and a large storm washes kelp ashore making local people unhappy, the issue is discussed in parliament.

Increased fishing inshore

Advances in fishing technology and changes in Sea Fisheries Committee (SFC) legislation lead to increased inshore trawling with larger trawlers allowed inside the 3 mile limit. Divers record decline in kelp across the Sussex district and static gear fishermen observe a decline in commercial species off west Sussex.

Changes for trawling

Inshore pair trawlers allowed to target bass and bream west of Shoreham-by-Sea in the late spring and early summer. SFC District extended out to the 6 mile limit and a New Vessel Length Byelaw prohibits boats over 14m in the District*. In 1998 a trawling exclusion byelaw that prohibits trawling from 58 km² of the District between May and October is introduced recognising presence of juvenile flatfish species.

*Grandfather rights were given to vessels over 14m already operating in the area

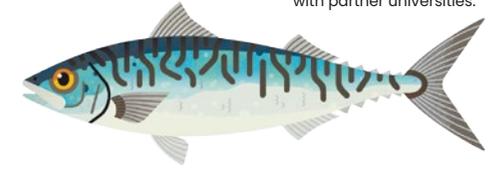
Monitoring & Enforcement

Significant changes in SFC management & leadership result in a strategic approach to the collection of marine habitat and fishing activity data to inform future management. Local fishermen and divers go to parliament to raise concerns about trawling.

In 2003 the new Patrol Vessel 'Watchful' becomes operational. Patrol & enforcement increased and there are prosecutions for vessels over 14m found fishing in the District.

Policy shift

The Millennium Ecosystem Assessment values ecosystems and the services they provide to human well-being. As a result, ecosystem services were increasingly considered within environmental management.



Sussex IFCA steps up Research

Sussex IFCA is formed and continues habitat & fishing effort research alongside development of long term juvenile fish survey. Habitat mapping projects undertaken with partner universities.

October 2018 July 2018 December 2017 January 2017 2016 2012 2012

Final management options

Draft final management options are considered by the Authority. Towed camera surveys carried out to determine baseline seabed quality before restrictions. A natural capital approach was applied, and a condition assessment model was utilised.

Management options

Analysis of the informal consultation is prepared and shared with Sussex IFCA members through the Committee structure and further evidence is provided alongside the draft management options.

Informal consultation

Information about potential management interventions were shared online and stakeholders were consulted. Feedback was collected through online and paper surveys, seven public drop-in sessions and targeted communication. Stakeholders responded through email and letters and a report collated and analysed these responses.

Collating Evidence

Evidence to support the need for management intervention on trawling is collated. This includes data about fishing activity, marine habitats and available evidence about potential future recovery. Information Sheets produced to support informal consultation.

Byelaw review phase

Sussex IFCA reviews towed gear management and proposes new trawling restrictions with the aim to allow the natural capital of valuable sensitive sites inshore to reach its full potential and deliver improved ecosystem services. Particular emphasis is placed on recovering productive static gear fisheries that have declined. New netting management restrictions are considered in parallel.

Management approach

Using extensive inshore habitat data, Sussex IFCA systematically examine the type and extent of natural capital assets within the District, their sensitivity, diversity, associated ecosystem services and value. The angling community begin a three-year survey looking at juvenile fish along the Sussex coast.

Management review

Sussex IFCA carry out a public consultation to help identify management priorities alongside their statutory duties to introduce management on MPAs and review byelaws. Local anglers and some commercial fishers identified in this consultation that nearshore trawling was an issue in the west.

March 2019 September 2019 September 2019 2020 March 2021

Draft byelaw

Management option and draft byelaw text options presented to the Authority members by officers. Members of commercial industry present at the meeting. Independent economic analysis of two pair trawler teams carried out. Only small remnants of kelp remains, and the owner Big Wave productions offers to make a film about it.

Byelaw made

Quarterly authority meeting the byelaw was MADE with commercial industry present. Big Wave productions makes a film about the kelp in Sussex which is narrated by Sir David Attenborough. It is shared with the Sussex Wildlife Trust, Marine Conservation Society, Blue Marine Foundation and the IFCA.

Formal consultation

Launched on the 12th September 2019 and closed on 10th October as outlined by Defra. Sussex IFCA provide information online, post (on request) and at seven drop-in sessions. 'Help Our Kelp' campaigns for the byelaw involving media and lobbying the government. Sussex Wildlife Trust sets up a web page linking to the consultation. There are 2,500 responses.

Quality assurance & Confirmation

In January the Authority approve the final text of the Byelaw following examination and consideration of consultation responses. In February, the Byelaw and impact assessment sent to Defra and MMO for quality Assurance. Background research about seabed quality continues. The 'Help Our Kelp' campaign continues through school engagement, talking with local fishermen and helping anglers write letters of support. Local MPs receive letters of support and check on the progress of the byelaw within government.

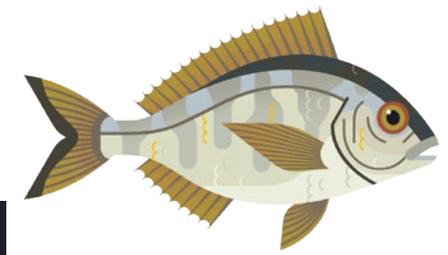
Implementation

The Secretary of State signs off the byelaw making it enforceable in law. The Authority immediately issues comprehensive guidance to fishers on the new Byelaw for enforcement purposes. Compliance response is excellent with no infringements detected to date (Jan 2023).

Future

There are several future plans as a result of the byelaw including monitoring and enforcement by the IFCA. The formation of the Sussex Kelp Restoration Project who will fund additional social and environmental research. Big Wave productions will produce further films about kelp. A citizen's charity is aiming to use volunteers to replant kelp along the coast.

Local authorities are interested in a Sussex Bay Marine Park used to engage local people with the ocean and investigate carbon storage of kelp. It has also been a catalyst for looking into other marine management issues such as sedimentation and national authorities are keen to observe the recovery of the trawling ban area compared to MPAs.



The partnership behind the Sussex Kelp Recovery Project

The Sussex Kelp Recovery Project (SKRP) is a partnership of organisations working together to champion, study and facilitate the recovery of Sussex kelp and other essential fish habitats, through progressive, coherent and collaborative action.

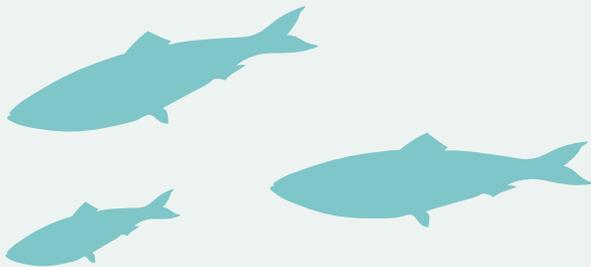
Formed in 2021 after the Sussex Nearshore Trawling Byelaw was introduced, each partner brings their own unique skills, experience and focus. There is no lead organisation; partners work together to set the SKRP vision and strategy.

In Spring 2023, the project partnership comprised seven organisations: Adur & Worthing Councils; Blue Marine Foundation; Sussex Inshore Fisheries and Conservation Authority; Sussex Wildlife Trust; University College London; University of Brighton and Zoological Society of London.

Several organisations closely support delivery of SKRP aims, research and outreach including Big Wave Productions, University of Portsmouth, University of Sussex, Marine Conservation Society and Sussex Underwater.

SKRP also engages a wider community of organisations, groups and individuals who support the recovery of Sussex kelp.

This community includes the many local citizen scientists who help collect essential data. As of March 2023, the SKRP have worked with more than 50 organisations as part of this network.



Organisations in the SKRP partnership



Sussex
Wildlife Trust



**BLUE MARINE
FOUNDATION**



Sussex
Inshore Fisheries and
Conservation Authority



**Zoological
Society
of London**



**ADUR & WORTHING
COUNCILS**



University of Brighton



The SKRP research programme

Marine research has historically been limited in the English Channel by the misconception that the area is too shallow, too busy and too murky to support a great variety of marine life.

The SKRP is addressing this knowledge deficit by embarking on a comprehensive, detailed and integrated seabed monitoring and research programme.

Key aims are to monitor how kelp and other essential fish habitats in Sussex change now the impacts of trawling have been removed, and to assess the benefits they provide ecologically, socially and economically.

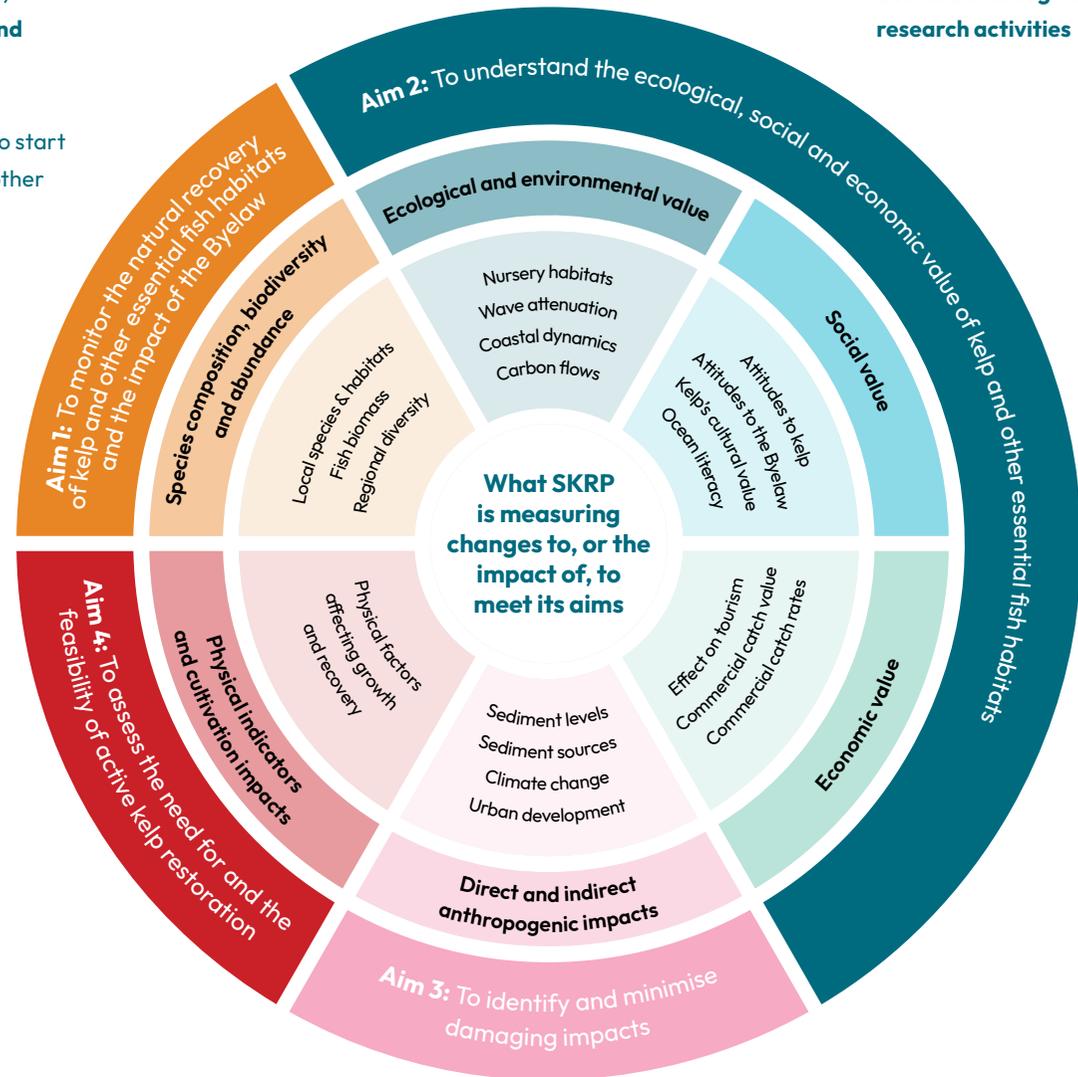
This is vital on two counts. Firstly, **understanding and quantifying the value of kelp and other essential fish habitats across many measures can improve how they are perceived by society and encourage recovery efforts elsewhere.**

Secondly, it is essential that the impact of the Sussex Nearshore Trawling Byelaw (one of the largest trawling exclusion areas in the UK) on commercial fisheries is comprehensively assessed, so that policy implications and intended outcomes can be evidenced. **The SKRP's working hypothesis is that the Byelaw will lead**

to an improvement in the abundance of many commercial fish species, but this needs to be rigorously and objectively tested.

The research programme will also start to answer questions around the other impacts that could be hindering kelp recovery, and as such steer the future activity of the SKRP partnership and that of other stakeholders in the area.

How SKRP aims are delivered through individual research activities



Kelp recovery

– key considerations and expectations

Robust and scientific measures of change and recovery are essential

If the ambitions of the project are realised and kelp beds and other essential fish habitats thrive across the area, more than anecdotal evidence will be needed to demonstrate the project's benefits and promote similar marine recovery elsewhere.

Hence the cornerstone of SKRP's research is to monitor habitats robustly and consistently over many years so that trends can be confidently reported. To fulfil this SKRP utilises many different research methods including underwater cameras, eDNA, citizen science observations, commercial catch surveys, sea user surveys and more, so that a rich and holistic view of the impact of recovery, both in the sea and to society, can be provided.

Nature's recovery takes time

Even when key pressures have been removed from an area, the recovery of complex ecosystems can take years and even decades. In Lyme Bay in the Western English Channel where a trawling ban was also introduced, significant recovery of the rocky reef ecosystems was only observed after more than three years had passed.

Substantial increases in the extent and density of kelp are not anticipated for a few years following the trawling exclusion in 2021. This is due to species characteristics of the kelp most likely to recover: Oarweed (*Laminaria digitata*) for example, reaches maturity after 18-20 months so the earliest any will reproduce in Sussex is in 2023.

Initial environmental surveys support this view and have not shown a difference in the amount of kelp growing at 25 annual monitoring sites within and outside the Sussex Nearshore Trawling Byelaw area. This is hugely valuable information and provides the SKRP with a solid baseline for future comparison and assessment.

Anecdotally there are some positive signs of recovery. During 2022, kelp was reported at several sites and in the winter of that year, large healthy kelp fronds were washed up along West Sussex beaches. In the coming year, the SKRP hope to see these positive signs reflected in its scientific monitoring.



Other species may recover and spread first

In marine habitats, successional change is expected in a similar way to terrestrial rewilding. The presence, absence and abundance of species is anticipated to change over time until a dynamic mature community is formed.

Pioneer species, the first colonisers of newly available habitat are often seen to establish rapidly in the initial stages of succession. **In Sussex, a key indicator of early signs of recovery could be observations of extensive areas of Bootlace Weed (*Chorda filum*),**

which has been previously associated with Sugar Kelp habitat in the area. Similarly in 2022, divers observed vast new expanses of mussel beds (*Mytilus edulis*) within the trawler exclusion zone. These beds stabilise the substrate offering a new ecological niche as succession progresses.

The coming years are an exciting time for the SKRP as we learn how nature responds to the removal of a key pressure. What species and habitats will return? What will thrive and what won't? How might the changes impact people as well as the seabed?

Aim 1

To support and monitor the natural recovery of kelp and other essential fish habitats in Sussex, and the impact of the Sussex Nearshore Trawling Byelaw

Aim 1: Overview

What does it mean to support and monitor the natural recovery of kelp and other essential fish habitats as outlined in the first of SKRP's aims?

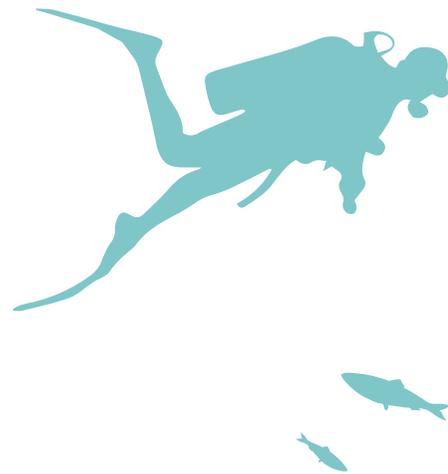
For the partnership this means removing manageable pressures (such as trawling) that have prevented habitats from returning, and observing to learn where, when and how the ecosystem recovers.

'Letting nature lead' by giving it time to recover on its own is a key principle of rewilding – and the SKRP is a rewilding project. The benefit of delaying interventions such as planting or seeding kelp means the SKRP can learn what comes back naturally, what doesn't and why. From there it can ascertain if and what interventions may be needed in the future, as per Aim 4.

But waiting and watching is not as simple as it sounds. Assessing changes in such a complex and dynamic ecosystem and over such a large scale (the total Sussex Nearshore Trawling Byelaw zone is 304km²) is a huge challenge. Marine research is inherently more complicated than on land and there's no single technique or activity that can evaluate kelp recovery on its own. Hence the SKRP's research programme includes a variety of

methods across sites that allow it to see how habitats and species change where trawling has been excluded and compare this with nearby areas where trawling continues.

Covered on the following pages are cutting-edge scientific techniques and technologies, PhDs, and citizen science; activities that when combined help to create a holistic picture of Sussex seabed ecology and a baseline from which to monitor its recovery in response to the Sussex Nearshore Trawling Byelaw.

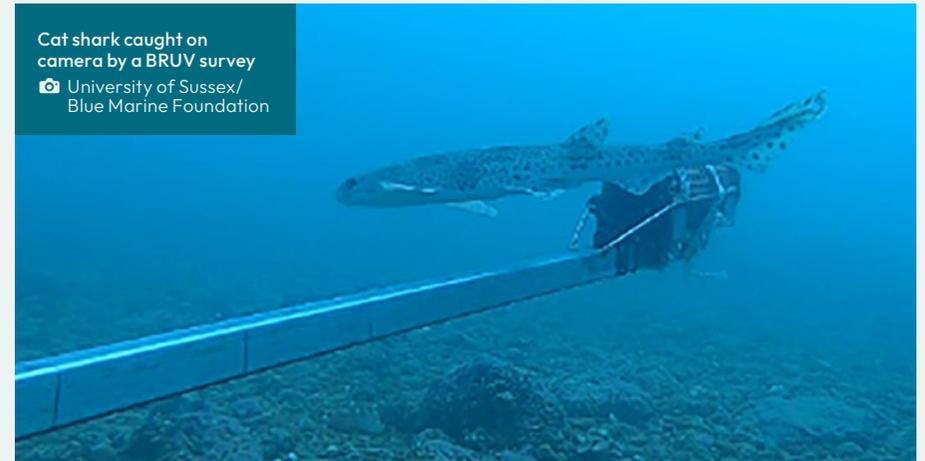


Activity & achievements

Aim 1: Summary

- 56 hours of BRUV footage analysed
- 25 sites surveyed annually using towed underwater cameras
- 81 species detected through environmental DNA analysis
- Around 400 kelp samples taken for genetic analysis
- Sussex Kelp Recording Scheme initiated
- 5 volunteer seabed monitoring site surveys undertaken
- Acoustic tags placed on 64 Black Bream and an acoustic array deployed
- 2 PhD (doctorate) projects underway
- 7 MSc (Masters) Degree projects completed or initiated
- 3 BSc (Bachelors) Degree projects completed

Cat shark caught on camera by a BRUV survey
University of Sussex/
Blue Marine Foundation



Environmental monitoring

The western part of the Sussex Nearshore Trawling Byelaw zone between Selsey Bill and Shoreham by Sea, which is the focus for SKRP monitoring and research, is a vast area with a shoreline roughly 50 miles long. Its scale, coupled with the inherent challenges of undertaking underwater research, means there is no robust way to definitively identify and map kelp recovery across its

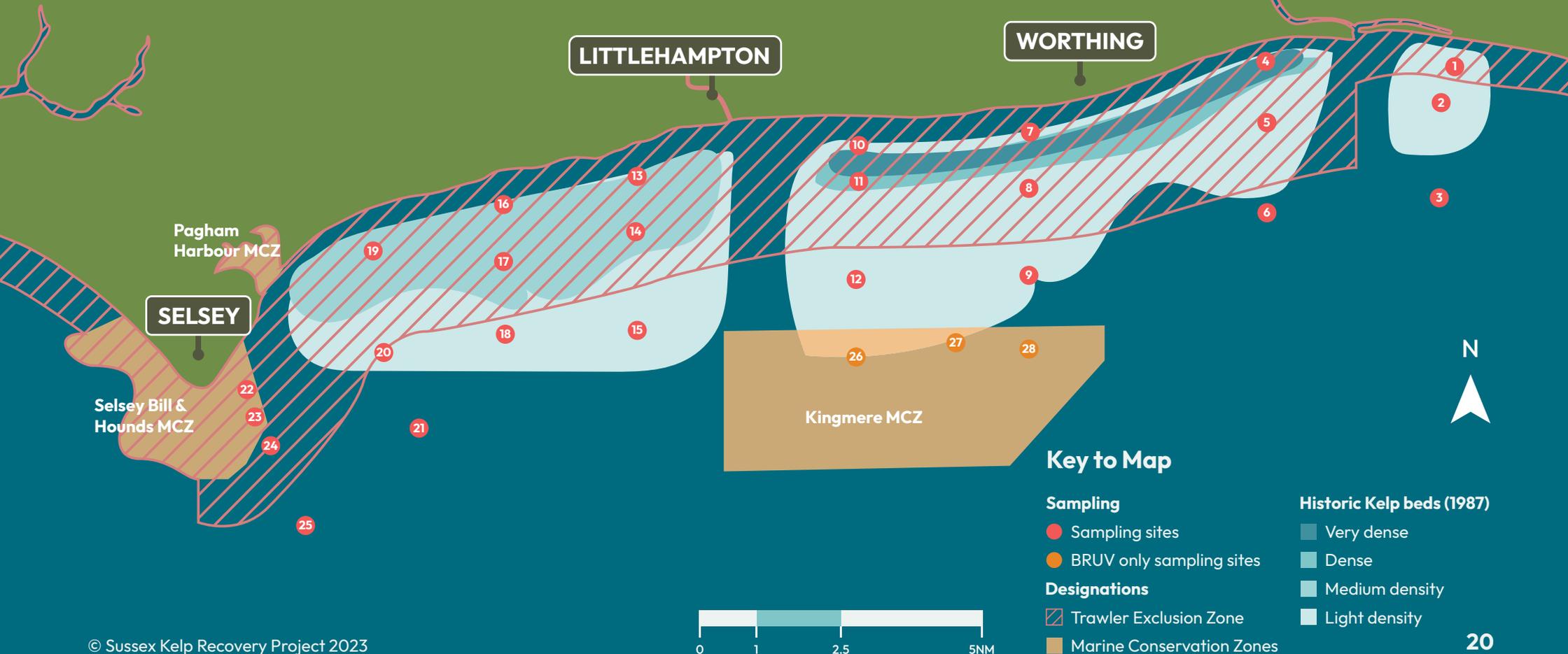
entirety. Instead, SKRP research seeks to combine different approaches and create a representative view based on a systematic survey of the area.

The below map depicts the environmental monitoring sites that make up this survey. These span the historic kelp area, including off Worthing where kelp was once very dense

(shown in dark blue). Sites extend outwards from the shore in triplicate so that a range of depths can be assessed and include those within and outside the Byelaw zone for comparison.

The 25 red dots denote a fixed GPS coordinate at which three research methods are deployed: BRUV units (3 used per site), eDNA

sampling and towed benthic cameras. Three further sites shown as orange dots are located inside the Kingmere Marine Conservation Zone (MCZ). Here, only BRUV surveys are carried out as the terrain is unsuitable for towed camera surveys and eDNA is unfunded.



BRUV surveys

How will the ecosystem in Sussex Bay change following the implementation of the Sussex Nearshore Trawling Byelaw?

To understand what species are using the area and how this changes over time, the University of Sussex with support from Blue Marine Foundation deployed BRUVs at 28 sites including those where kelp was historically dense in July 2021 and 2022.

BRUV surveys use Baited Remote Underwater Video (BRUV) cameras.

These provide a non-extractive, cost effective way of recording the presence of reef-associated and benthic (bottom dwelling) species and assessing diversity and abundance.

Over 60 minutes of footage were recorded at each site generating more than 28 hours of video for analysis undertaken by Masters students from the university each year. Footage is assessed to glean species diversity and abundance, and the composition of fish and shellfish communities attracted to the bait. BRUV surveys will be continued over the coming years to identify and track changes.

Learnings to date

- Overall species richness was similar inside and outside the Byelaw area and there was no significant difference between 2021 and 2022.
- Fewer invertebrate species were recorded in 2022 (14) compared with 2021 (24).
- Although no kelp was observed at any of the sites, there was more short algal cover in 2022 which could obscure the smaller benthic animals.
- There were low numbers of herbivores and detritivores compared to 'mesopredators' such as Small-spotted Catsharks (*Scyliorhinus canicular*), Conger Eels (*Conger conger*) and Spiny Spider Crabs (*Maja brachydactyla*).
- The lack of herbivores indicates a lack of vegetation and decaying organic matter, allowing predators to become dominant.

What can we expect in the coming years?

As kelp and other essential fish habitats recover, the composition of mobile benthic species is likely to change and an increase in herbivores may be seen.



University of Sussex Masters students, Eva Edgeworth (front) and Jamie Bamber (middle) deploying Baited Remote Underwater Video cameras with their supervisor Mika Peck (rear).
© University of Sussex

Right: Over 28 hours of footage is captured each year recording the different habitats and marine life across the Byelaw area.

© University of Sussex/Blue Marine Foundation



BRUV surveys are being supported by Barclays and Green the UK business sponsors: Stephens Rickard, GoCardless, 427 Marketing, Coolstays, Outpost VFX, OMG Tea.

Towed benthic camera surveys

Sussex IFCA successfully conducted a 4th year of towed camera surveys in 2022 aboard their patrol vessel 'Watchful'. At each site shown on [page 20](#), a camera was towed in a transect (straight-line) for around 300m to record the seabed terrain. The videos are analysed by researchers at Zoological Society of London (ZSL) based on four criteria:

- **Substrates:** What substrates do we see (sand, pebbles, shingle etc.) and which are suitable for kelp?
- **Kelp:** How much kelp do we see? Where is it? Which species are present?
- **Other habitats:** Which essential fish habitats are in the area?
- **Notable species:** What is the presence and abundance of habitat forming species?



Crew of Watchful retrieve a towed benthic camera covered in Bootlace Weed.
Sussex IFCA

Learnings

- Kelp has yet to be seen in these videos but a large fluctuation in the abundance of Bootlace Weed (*Chorda filum*) has been observed between survey years, with the highest abundance in 2020 and 2022.
- Other valuable seabed habitats observed include aggregations of Dead Man's Fingers (small white corals) in the deeper sites off Shoreham, while southeast of Selsey, beds have contained thousands of brittlestars.
- Although these habitats might not all be suitable for kelp, some are essential fish habitats that are an important part of the mosaic of a healthy and diverse seabed.

Towed camera surveys are funded by Sussex IFCA and ZSL, with contributions from Platform Earth and PTES.



Top right: Towed videos showing Bootlace Weed.

Middle right: Towed videos showing a brittlestar bed.

Bottom right: Footage from a towed camera survey deployed in summer 2022.

Sussex IFCA



eDNA analysis

Environmental DNA (eDNA) is genetic material – or traces of DNA – contained within the microscopic skin cells, scales and faeces that animals leave behind in the environment. This is akin to an organism leaving a ‘fingerprint’ that shows they have been present in an area and can still be detected in aquatic environments 7–21 days after they’ve gone.

Using this method enables researchers to build a more detailed understanding of which species live in the environment than is possible by identifying species on sight.

Water samples were taken in 2021 and 2022 by the University of Sussex at 25 survey sites shown on [page 20](#). These were analysed by NatureMetrics whose world-leading biodiversity technology compared the samples to a DNA database to identify the species that were present at the sites and how common they are in a particular area.

In 2021, 81 species were detected through eDNA analysis. Some of the species only detected by eDNA monitoring included Atlantic Herring (*Clupea harengus*), Common Stingray (*Dasyatis pastinaca*) and Dover Sole (*Solea solea*).

Results from the 2022 survey are being analysed and will be published in 2023.

eDNA analysis has been funded by Blue Marine Foundation and Sussex Wildlife Trust, with additional support from NatureMetrics.

University of Sussex researcher Alice Clark collects water samples for eDNA analysis.

 University of Sussex

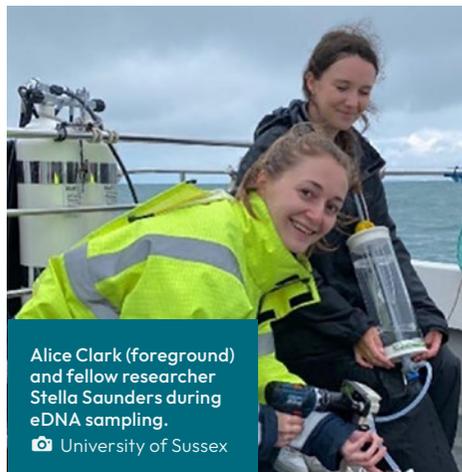


Biodiversity after the Byelaw

PhD project: Coastal rewilding and food security: understanding restoration pathways using BRUVS (Baited Remote Underwater Video Surveys) and environmental DNA (eDNA).

Alice Clark, University of Sussex

The BRUV and eDNA monitoring referenced in previous pages provide different views of the marine environment. BRUV surveys make it easy to count the abundance of species, but only identify those that live on or near the seabed and that are attracted to bait. eDNA meanwhile, can identify herbivore and other 'camera-shy' creatures who've been in the water column, but is less reliable for



Alice Clark (foreground) and fellow researcher Stella Saunders during eDNA sampling.
University of Sussex

assessing species abundance. Therefore, data from both methods needs to be brought together to provide a more complete picture.

Alice Clark, part of the team collecting data, is doing just that.

Sampling in July 2021 served as a baseline survey allowing Alice to see which species were already in the area. As this was done so soon after the implementation of the Sussex Nearshore Trawling Byelaw, it was anticipated that kelp would not yet be present and that sites in and outside of the Byelaw area would be very similar to one another, which was consistent with her findings. Samples from 2022 are being analysed.

“Year upon year we hope that kelp will recover and with it, that biodiversity recovers as well”

This student project is part of the South Coast Biosciences Doctoral Training Partnership (SoCoBio DTP).

This is funded by the Biotechnology and Biological Sciences Research Council (BBSRC).

The history of Sussex kelp

PhD project: Investigating the history of Sussex kelp habitats and their impacts on local communities.

Madison Bowden-Parry, University of Exeter.

Our current knowledge of the historical extent of kelp off the Sussex coast, and the subsequent timings and drivers of decline along this section of coastline is limited, as is the impact of its decline on local communities.

Madison will address this lack of knowledge in her PhD using a variety of approaches to investigate the long-term dynamics and decline of Sussex kelp beds. Using fisheries data, government records and ecological evidence, she will interrogate qualitative historical data sources such as newspaper articles and undertake semi-structured interviews with fishers and local community members.



Vast quantities of kelp would wash up on Worthing beach as per this photo from the 1960s, indicating the density of nearby kelp beds.

David Nicholls



“By investigating the dynamics of this habitat over the last century, we can understand its social-ecological significance over time and space, and use the insights gained to inform future restoration and management goals.”

This PhD is funded and supported by the Centre for Doctoral Training in Sustainable Management of UK Marine Resources (CDT SuMMeR).

Population genetics

How diverse are Sussex kelp? Does Sussex have unique kelp populations? Where are the sources for natural kelp recovery? Is the Isle of Wight a natural barrier to the movement of kelp spores? Do farmed kelp mix with natural populations?

These questions can start to be answered by researching the population genetic patterns of kelp. Examining the DNA of kelp species from along the south coast can reveal how groups are related and interconnected.

This is important to understand because rapid recovery can lead to genetic bottlenecks and populations that are not resilient to the fast-changing conditions expected in coming years. In contrast, recovery with high genetic diversity is more likely to provide

resilient and healthy populations and this is what SKRP hopes to see.

This work began with the collection of around 400 sub-samples of kelp from sites along the south coast shown in the map below.

Collections have been made by SKRP partners and community volunteers (with special thanks to Claire Lathbury). Initial testing has begun in the molecular laboratories of Zoological Society of London and will progress further when more funding has been secured.



Autonomous Reef Monitoring Systems

Three Autonomous Reef Monitoring Systems (ARMS) have been deployed in Sussex to assess kelp spore availability and the diversity of life on the seabed. The units have been installed at the wreck of the Indiana which is located about one mile south of Worthing Pier. Panels will be examined after one year to assess the species composition of newly settled organisms.



Existing data review

In 2022, Sussex Wildlife Trust commissioned a literature review of the benthic habitat data available for Sussex dating from the 1980s onwards. The review found considerable information exists, and categorised sources and their findings in the report. However, it also concluded that the scale and detail of information is patchy across the SKRP area. In addition, models of the Sussex nearshore benthic habitats do not agree with each other at a local scale due to the limitations of individual methods used. This reinforces the need for SKRP to use multiple methods and bring diverse sources of information together.



Dr Ray Ward installing ARMS at the wreck of the Indiana, off Worthing.

📷 Dr Ray Ward

Building a map of kelp in Sussex

To assess an area as large as the Sussex Nearshore Trawling Byelaw zone for signs of kelp recovery, multiple methods must be utilised, and the diving community are a key part of this.

Volunteer divers and Seasearch

In 2022, twelve volunteer divers accompanied leading marine scientist Dr Ray Ward from the University of Brighton to investigate thirteen locations where it is thought kelp could establish. Kelp was identified at three of these sites and while just a single furbellows (*Sacchariza polyschides*) was observed at one, the kelp cover at the remaining two was the best seen in decades. This is promising but more data is needed to attribute this to the introduction of the Byelaw.

Volunteer Seasearch divers carried out a series of dives in the area in 2021 and 2022. Kelp was found at six sites. The data captured by Seasearch is currently being analysed and will be published later in 2023.

Royal Navy divers

In September 2022, a Royal Navy training exercise recorded video during more than 50 dives at locations where kelp was prevalent in the 1950s and 1980s. The data from this will be published later in 2023.

Sussex Underwater observations

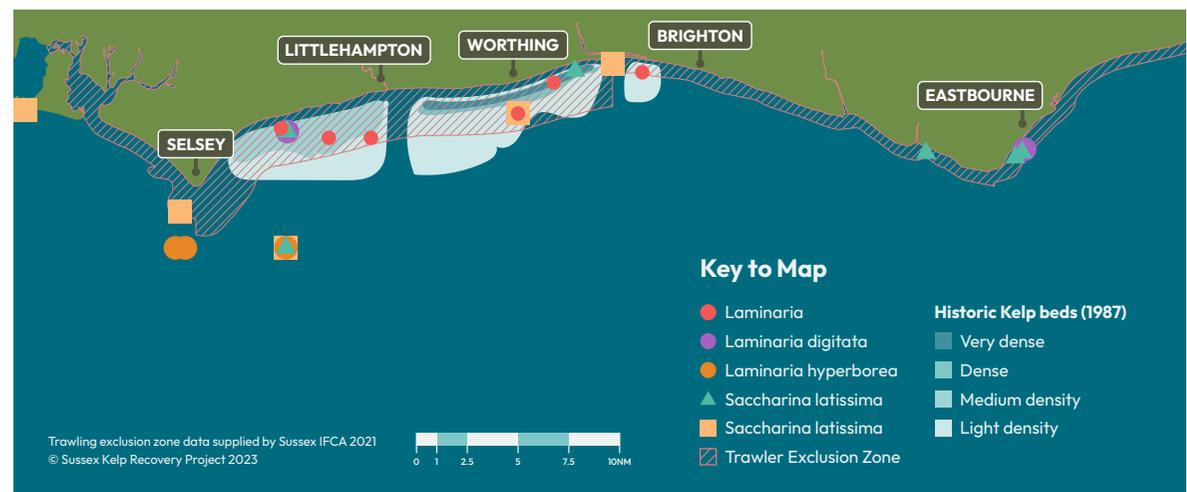
Sussex Underwater diver Eric Smith is regularly in the waters of Sussex Bay. In the summer of 2022 he noticed several new patches of blue-lipped mussel beds. Swimming along one to discover its size, he was amazed to find it spanned a whole kilometre in width. In the coming years the SKRP seeks to set up standardised mechanisms to measure the growth and development of other essential fish habitats, like these mussel-beds, developing in the Byelaw area.

Above: Royal Navy training exercise that produced video at 50 sites.
© Dr Chris Yesson

Right: 2021 records of kelp in Sussex.

Sussex Kelp Recording Database

To draw together the information collected by volunteer divers, Seasearch, the Sussex Kelp Recording Scheme, annual surveys and other activities, the Sussex Wildlife Trust developed a centralised Sussex Kelp Recording database. This repository will help researchers answer a key question: “What is the state of Sussex kelp beds now?” and aid the production of kelp distribution maps such as the version below from 2021, which shows how few sites were known at the time.



Calling all citizen scientists!

Citizen science is a growing discipline enabling the public to participate and collaborate in scientific research and increase scientific knowledge. Below are three ways local people can help deliver SKRP aims and get involved in extraordinary research.

The Sussex Kelp Recording Scheme

Sussex Wildlife Trust developed a bespoke recording scheme for Sussex kelp which allows anyone and everyone to contribute to restoration efforts via a handy App. Whether you're an occasional beach walker or an avid scuba diver, you can record the kelp you've seen on the beach or out to sea, and play your part in the Sussex Kelp Recovery Project.

[Register to take part here.](#)

Sussex Seasearch

Seasearch is a project for volunteer scuba-divers and snorkelers who have an interest in underwater life, want to learn more, and want to help protect the marine environment around the coasts of the UK.

Sussex Seasearch is coordinated by the Sussex Wildlife Trust and is part of a UK-wide project organised by the Marine Conservation Society.

[Find out about Sussex Seasearch here.](#)

Underwater footage

If you are an underwater photographer and are happy to share your existing footage along with the precise location of the filming, the SKRP can use it to map the distribution of kelp and other species. To take part contact: livingseas@sussexwt.org.uk



A citizen scientist recording kelp observations in the app.
Big Wave Productions

Aim 2

To understand the ecological, social and economic value of kelp and other essential fish habitats in Sussex



Aim 2: Overview

Kelp beds are some of the most productive and biodiverse habitats on the planet. They provide vital habitat in the form of shelter, feeding, spawning and nursery grounds for a huge diversity of fish and marine life, helping sustain healthy fish populations and therefore livelihoods and local economies.

Recovery of Sussex kelp beds will increase the abundance and diversity of a myriad of species by providing space, food and protection. Many of these are of commercial importance such as bass, Black Sea Bream, crab, lobster and cuttlefish.

To assess the benefits of kelp recovery and the ecosystem services it provides for people, nature and the economy, SKRP partners have initiated a number of projects. These include annual monitoring of crab and lobster populations, analysis of commercial fish and shellfish landings, and the use of innovative technology to understand the movement of fish throughout the English Channel.

Researching the value of kelp as a blue carbon store and conveyor is also being assessed through a four-year study analysing carbon in kelp and the sediments where kelp detritus collects.



Engaging the local fishing community is of huge importance to the SKRP; to harness their knowledge, facilitate their participation in research and support the future of local fisheries as key beneficiaries of recovered kelp and other essential fish habitats. Working with local fishing communities, sea users and residents throughout Sussex to maximise and monitor the socio-economic benefits of kelp recovery will be an increasing focus of future work.

Activity & achievements

Aim 2: Summary

- 36 crab and lobster surveys
- Shellfish landings data analysis
- Socio-economic survey of commercial fishers
 - 19 fishers interviewed
- Fishing communities engaged in Selsey, Bognor, Worthing
- 2x MSc projects completed



Lobster (*Homarus gammarus*).
Mark Coombes/Sussex IFCA

Kelp Ecosystem Benefits



Kelp beds provide **spawning and nursery grounds** for many species including black seabream, cuttlefish and bass, supporting **significant commercial and recreational fisheries**



Kelp forms the base of **complex food webs, providing food** for herbivores, eaten in turn by predators such as seabirds, seals, and dolphins



Kelp acts as a **carbon conveyor**, drawing down carbon faster than many land plants, some of which is **fixed into marine sediments**



Kelp beds and the animals they support create superb wildlife experiences **supporting recreational business and tourism**



Kelp provides **shelter and feeding grounds** for seals and dolphins



Kelp beds provide a **natural coastal defence** by creating a physical buffer and absorbing energy from wave action and storm surges



Kelp provide a multi-dimensional habitat supporting many invertebrate species – **one kelp can support up to 80,000 individual animals**



Drift seaweed washed up on beaches can be **used as fertilizer**



Kelp **detritus provides vital food** and nutrients for filter feeders such as mussels



Crab and lobster surveys

In September 2021, six months after the Sussex Nearshore Trawling Byelaw was introduced, a baseline study of the crustacean pot fishery off Selsey Bill was undertaken by Blue Marine Foundation, Sussex IFCA and local skipper Dan Langford on his boat the Rapid Return.

12 survey sites were chosen: 5 inside the Byelaw area and 7 control sites outside. These sites needed to be consistent and so were chosen for their similarity of habitat (rocky reef), and other biotic factors (depth, tidal flow, exposure, seabed temperature) that could influence abundances of Edible Crab (*Cancer pagurus*) and European Lobster (*Homarus gammarus*).

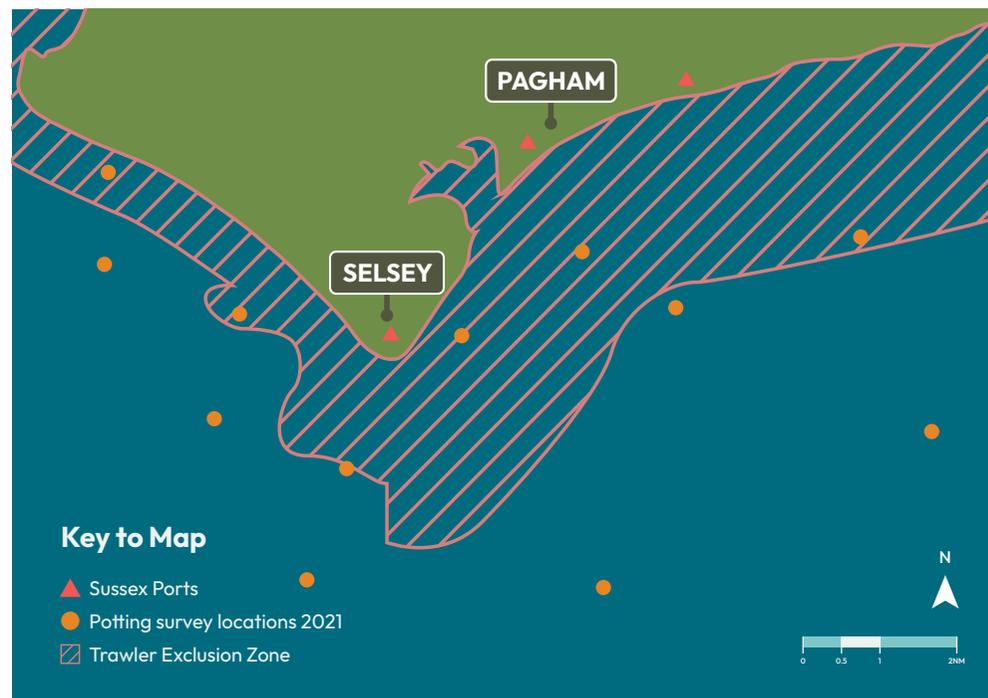
Strings of 20 pots were deployed at each site. The abundance, size, weight, sex and condition of Edible Crab, European Lobster and Spiny Spider Crab caught in the pots were recorded before returning the catch to the sea. Twenty-four further surveys were carried out at the same sites off Selsey in August 2022, eighteen months after the Byelaw. Additional surveys were also carried out from Brighton and Eastbourne in September 2022 with local fishers Neil Messenger and Joe Watt. Data from these surveys is being analysed and when combined with further annual surveys, will provide data to monitor any changes in the fishery associated with the anticipated recovery of the historic kelp beds.

Learnings

- The data did not show any significant differences between survey sites inside and outside the Byelaw area in terms of the size, wet weight, sex ratio and condition of both crab and lobster.
- There was no significant change between the years.

Hypothesis: In just two years the lack of any significant differences is to be expected as the ecological status of areas inside and outside the Byelaw area are still similar. Over time, greater changes between these areas is anticipated.

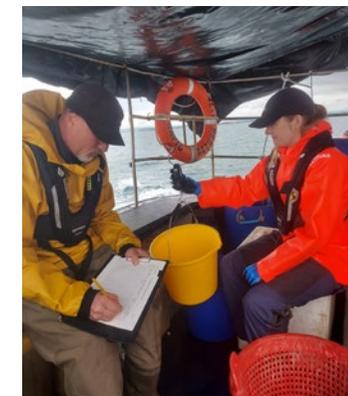
The data represents a baseline against which future data can be compared, and assuming other variables do not change significantly, any changes can be attributed with confidence to the effects of the Byelaw rather than other influencing factors.



Above: Crustacean pot fishery survey locations near Selsey.

Researchers from Sussex IFCA (Jen Lewis, left photo) and Blue Marine Foundation (Emily Bulled and Steve Mcauliffe, right photo) measure crab and lobsters on board the Rapid Return.

📷 Blue Marine Foundation



Commercial fisheries landings data

Fisheries landings data, captured by Sussex IFCA and the Marine Management Organisation (MMO), provides insights into fish populations and economics. The total value of Sussex fisheries is a measure of local economic status, while landings per unit effort (LPUE) can be an indication of the health of fish populations.

SKRP chose ten indicator fisheries to monitor (see table right), which either use kelp as a shelter or nursery, or are indicators of a healthy community e.g. the presence of rays indicate the food web is healthy and capable of supporting larger predators. Meanwhile, Common Cuttlefish were chosen as they are likely to be one of the first species to recover as they lay many eggs and can use rocky habitats for spawning.

A long-term dataset is needed to see the overall trend as fisheries are expected to grow slowly, while results vary annually and can be easily influenced by external changes such as license restrictions. In addition, as the data is gathered at a scale larger than the Sussex Nearshore Trawling Byelaw area, it will take time for changes to be identified at a more localised scale.



Learnings (to be compared to future datasets)

- The total value of landings in 2020 was £6,671,166, and in 2021, £5,957,870.
- The total value of landings of key species of interest in 2020 was £6,319,991, and in 2021, £5,469,863.
- Across 2020 and 2021, total live weight of landings of key species was 6,456 tonnes, which is 91.8% of the total landings across all species (7,034 tonnes).
- Whelks are the dominant fishery in the Sussex IFCA district by some margin in terms of live weight and value, accounting for 72.1% of landings by weight, and 51.8% of landings by value across 2020 and 2021.

10 Indicator Fisheries	
Demersal*	Black Sea Bream
	European Sea Bass
	Pollock
	Dover Sole
	Plaice
Shellfish	Ray
	Common Cuttlefish
	Edible Crab
	European Lobster
	Whelk

*Demersal – fish that live and feed near the seabed, as opposed to Benthic (live on the seabed) and Pelagic (live in mid-water).

Notes: The data presented is for vessels under 10 metres landing into Sussex ports, and which have been fishing in ICES squares 30E9 and 30F0 (the ICES squares which encapsulate the Sussex IFCA District). As such, it is the best approximation of landings that can be attributed to the inshore fleet operating within the Sussex IFCA district, using national landings data available via the MMO. This is not a perfect representation however, because vessels under 10 meters will fish outside the district and some vessels under 14 meters will fish inside the district. However, given the high incidence of under 10's fishing within the district, this data is more likely to detect any change in landings that may be attributed to management of trawling by Sussex IFCA.

Shellfish landings data

Localised shellfish landings data is available for Sussex through the Shellfish Permit Byelaw implemented by Sussex IFCA.

As part of the Shellfish Permit Byelaw, permit holders are required to send in monthly catch returns when fishing for shellfish. Catch returns focus specifically on the following groups:

- European Lobster (*Homarus gammarus*)
- Edible Crab (*Cancer pagurus*)
- Common Cuttlefish (*Sepia officinalis*)
- Whelk (*Buccinum undatum*)
- Spiny Spider Crab (*Maja brachydactyla*)
- Prawns (*Palaemon spp.*)
- Velvet Swimming Crab (*Necora puber*)

Fishers undertaking potting are required to detail their landings (by weight in kg) from potting activity throughout the district, the number of pots deployed per trip, and the number of trips undertaken to deploy these pots over the month. This provides a general understanding of the total number of pots each fisher is deploying over each month (number of pots deployed per trip x number of trips taken). Landings Per Unit Effort (LPUE) per pot is then calculated from total weight of a species landed per month (kg)/total number of pots per month used to target each species.

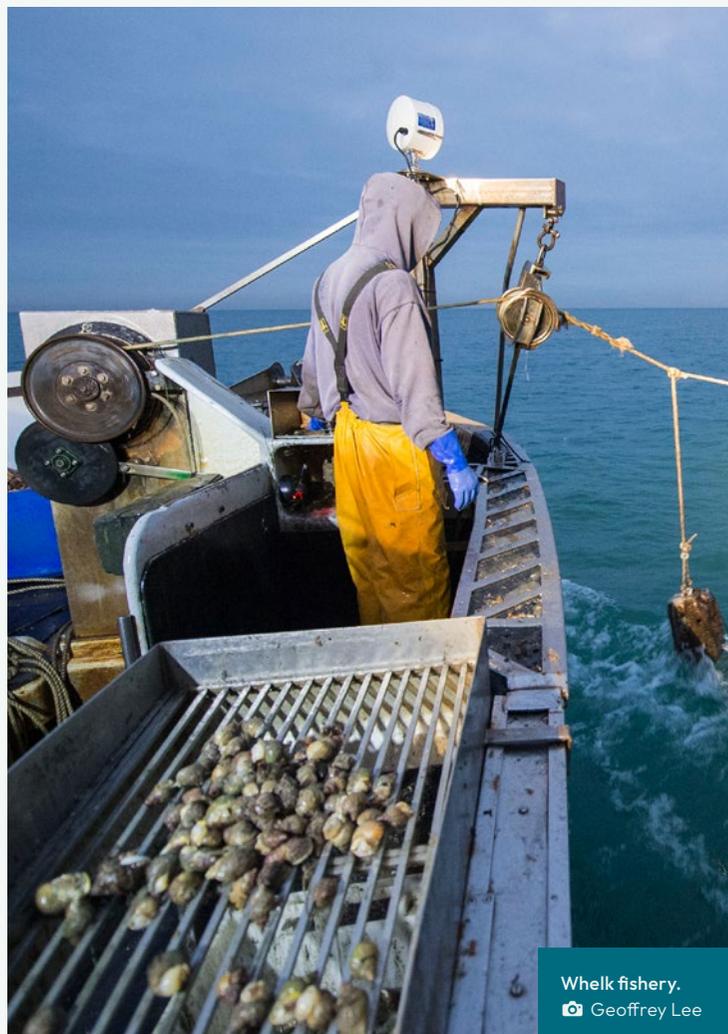


Table: 2020-2021 Shellfish Fisheries Landings returns. Source: Sussex IFCA

Fishery	Measure	2020	2021
Common Cuttlefish	Catch weight (tonnes)	139.5	55.6
	% of SxIFCA Shellfish Catch Returns	11.1	4.6
	LPUE (kg/pot)	2.8	1.5
Edible Crab	Catch weight (tonnes)	73.9	54.7
	% of SxIFCA Shellfish Catch Returns	5.9	4.3
	LPUE (kg/pot)	0.37	0.29
European Lobster	Catch weight (tonnes)	11.6	8.6
	% of SxIFCA Shellfish Catch Returns	0.9	0.7
	LPUE (kg/pot)	0.06	0.05
Whelk	Catch weight (tonnes)	1034.3	1114.9
	% of SxIFCA Shellfish Catch Returns	82.1	90.3
	LPUE (kg/pot)	1.8	1.8

Fish Intel data

The cross-Channel Fish Intel project uses innovative technology to understand the movement of fish at key sites along the coastlines of southern England, northern France and Belgium, and is another means to measure the impact of the Sussex Nearshore Trawling Byelaw.

Fish are tracked using acoustic telemetry to gain an understanding of how nearshore habitats are used by individual species. The overall aim is to collect data that can be used to inform an ecosystem-based approach to fisheries management.

The Sussex element of this project – a partnership between Sussex IFCA, University of Plymouth, Sussex Wildlife Trust and Natural England – is focused on two species: Black Sea Bream (*Spondyliosoma cantharus*) and European Sea Bass (*Dicentrarchus labrax*), and their movement in and outside of the Sussex Nearshore Trawling Byelaw area. This will enable the SKRP to assess whether the movements of fish change as the kelp beds and other essential fish habitats return.

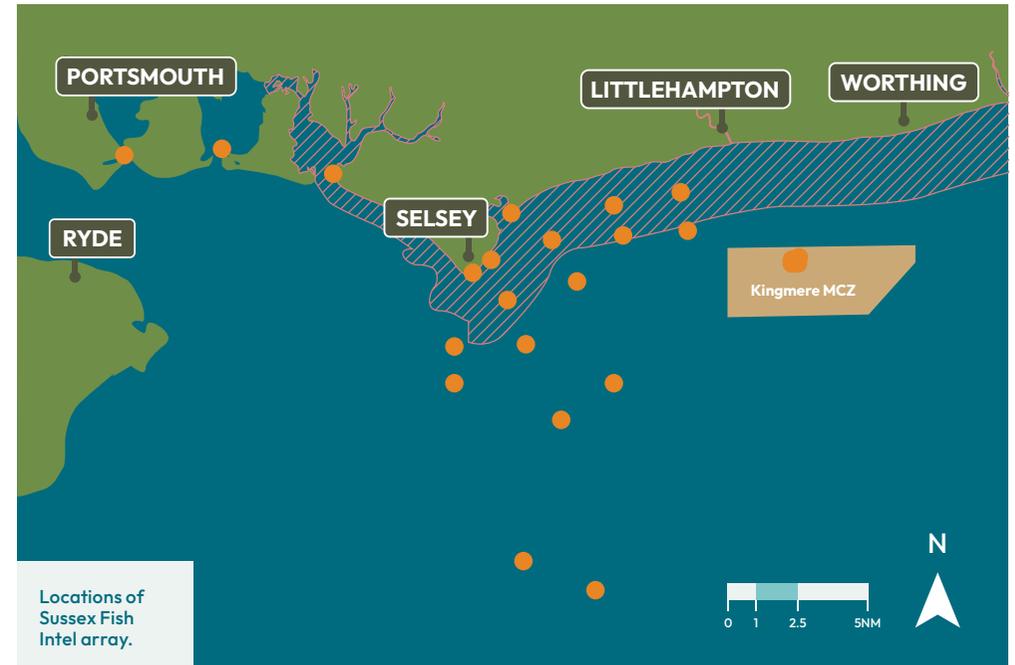
78 European Sea Bass and 65 Black Sea Bream were tagged with transmitters and released in the Sussex IFCA District.

Nearshore and coastal receivers deployed in the area (including major estuaries and the Kingmere Marine Conservation Zone (MCZ), a known breeding site for Black Sea Bream) pick up their movements.

Learnings

- Black Sea Bream are resident in Kingmere MCZ for a portion of the year but were completely absent from June-July onwards. It's too early for definitive conclusions about why this occurred.
- A single tagged European Sea Bass swam to the Netherlands and back within 15 days. This shows their nomadic capability.
- There appear to be two separate populations of European Sea Bass, one which remained offshore, and one which predominately inhabited nearshore habitats. This may reflect resident versus migratory populations, but more data is needed to confirm this.

Data downloads from the receivers are being analysed by the University of Plymouth and a detailed report is due in 2023.



Support and funding from the European Regional Development Fund via the Interreg France (Channel) England programme, concludes at end of March 2023, but there are plans to maintain this research into future years.

Fish Intel in Sussex is also supported by funding from the Pebble Trust.



Black Sea Bream being measured as part of the tagging process.
© Sussex Wildlife Trust

Kelp as a blue carbon store

Like all photosynthesising organisms, kelp removes carbon from the atmosphere by absorbing carbon dioxide and converting this into tissue. This 'organic' carbon will return to the atmosphere if the tissue breaks down through natural processes such as rotting. In this way kelp plays a vital role in cycling carbon through the ecosystem.

Due to climate change, there is great interest in finding ways to sequester (capture) and store atmospheric carbon over long periods of time (>100 years), otherwise known as carbon storage.

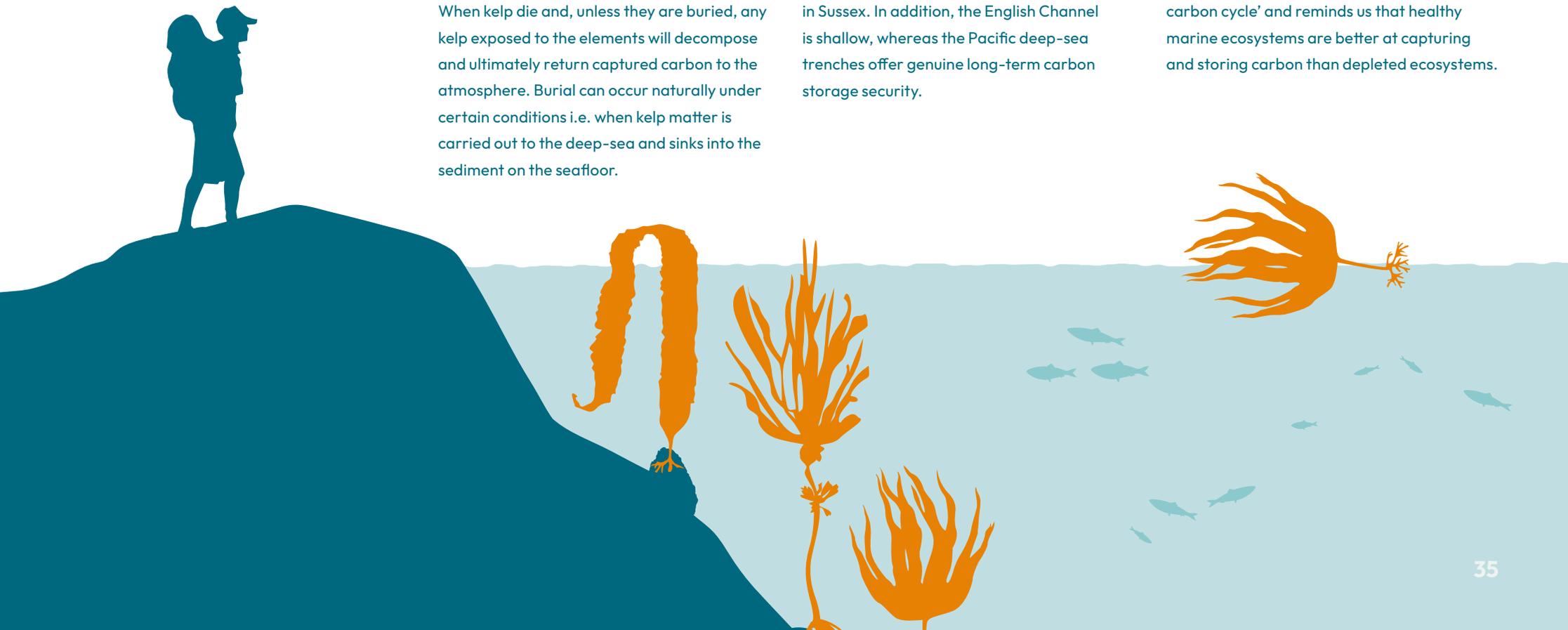
The key mechanism for carbon storage from plants is its emersion into the creation of new soil. However, kelp are Algae – which are distinct from plants– and do not possess a buried root structure as their holdfast sits on top of and attaches to a firm substrate. When kelp die and, unless they are buried, any kelp exposed to the elements will decompose and ultimately return captured carbon to the atmosphere. Burial can occur naturally under certain conditions i.e. when kelp matter is carried out to the deep-sea and sinks into the sediment on the seafloor.

It is however, very difficult to measure the amount of kelp being buried and it is likely to be highly variable due to characteristics of local currents and seabed topography. This means there is uncertainty over the value of kelp habitat as a carbon store.

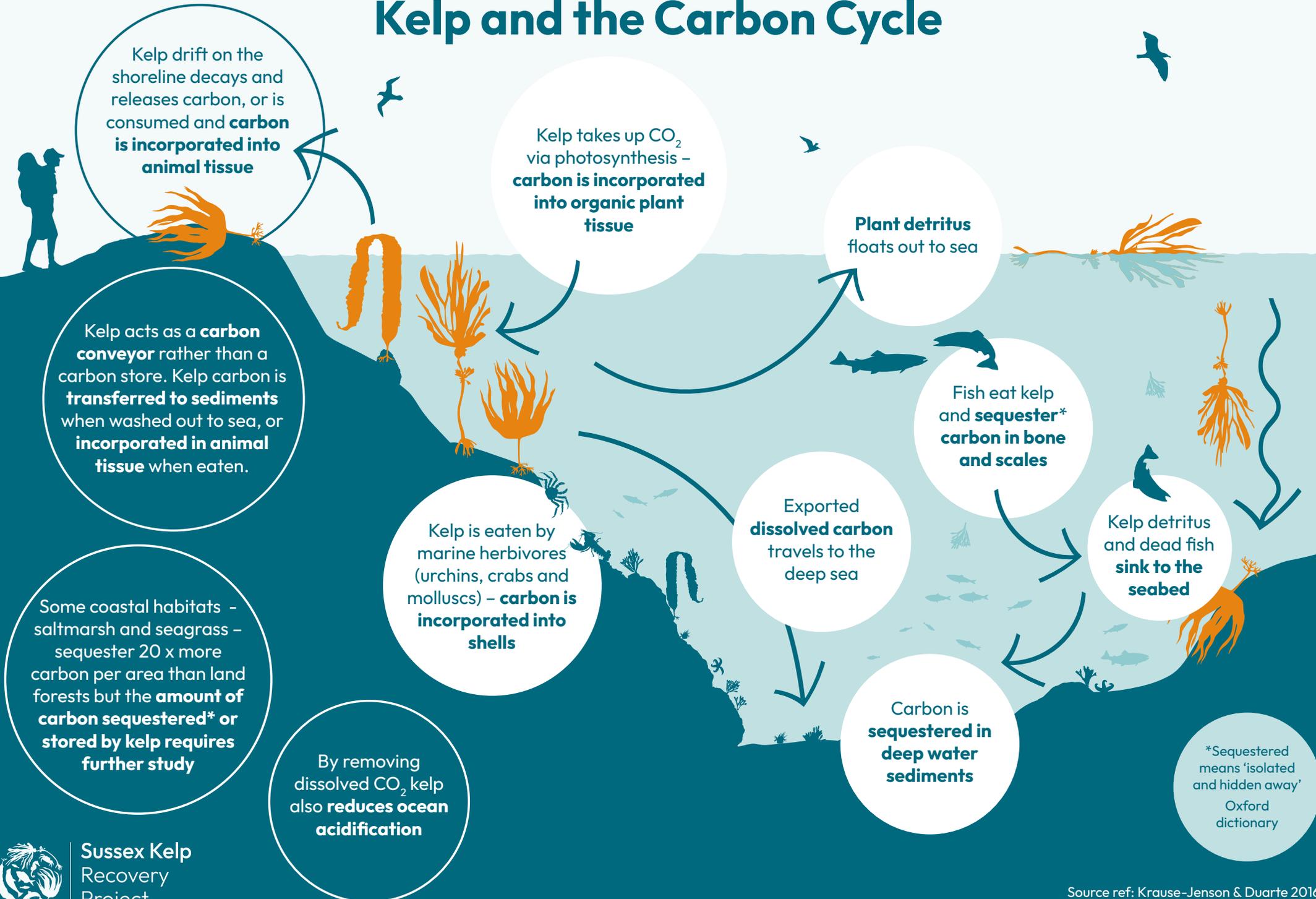
Most of the research to date on this topic has been based on the giant kelp species (*Macrocystis pyrifera*) found on the Pacific coast of North America which has very different characteristics to the species found in Sussex. In addition, the English Channel is shallow, whereas the Pacific deep-sea trenches offer genuine long-term carbon storage security.

The Sussex Kelp Recovery Project aims to provide some answers to questions around kelp carbon cycles at a local level and may even inform the development of a quantifiable kelp carbon sequestration rate, though this is still some years away.

Ultimately, kelp is a key species in a broader ecosystem and the presence of kelp will stimulate other parts of the trophic levels in Sussex seas, with all marine life being carbon based. This is referred to as 'animating the carbon cycle' and reminds us that healthy marine ecosystems are better at capturing and storing carbon than depleted ecosystems.



Kelp and the Carbon Cycle



Kelp drift on the shoreline decays and releases carbon, or is consumed and **carbon is incorporated into animal tissue**

Kelp takes up CO₂ via photosynthesis – **carbon is incorporated into organic plant tissue**

Plant detritus floats out to sea

Fish eat kelp and **sequester* carbon in bone and scales**

Kelp detritus and dead fish **sink to the seabed**

Exported **dissolved carbon** travels to the deep sea

Carbon is **sequestered in deep water sediments**

*Sequestered means 'isolated and hidden away'
Oxford dictionary

Kelp acts as a **carbon conveyor** rather than a carbon store. Kelp carbon is **transferred to sediments** when washed out to sea, or **incorporated in animal tissue** when eaten.

Kelp is eaten by marine herbivores (urchins, crabs and molluscs) – **carbon is incorporated into shells**

Some coastal habitats – saltmarsh and seagrass – sequester 20 x more carbon per area than land forests but the **amount of carbon sequestered* or stored by kelp requires further study**

By removing dissolved CO₂ kelp also **reduces ocean acidification**

Blue carbon student projects

PhD project: valuation of Sussex Bay kelp carbon storage and sequestration potential.

Claude Annels, University of Brighton

Many factors affect the contribution of brown algae to the carbon stocks in sediment. Two examples of this include the variability of species and their decomposition rate; the slower rates of decomposition in deeper waters with perpetual or intermittent anoxia (absence or deficiency of oxygen) result in higher storage.

This PhD will investigate 40 sites across Sussex Bay at a variety of depths and locations using sediment cores to evaluate carbon sequestration rates over time and to identify the sources of carbon e.g. whether it is from kelp or animal tissue.

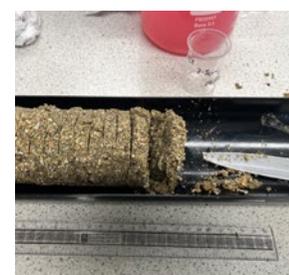
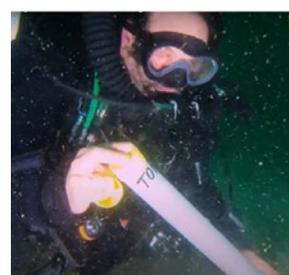
Seabed samples will be analysed using radionuclide dating techniques and stable isotope analysis to provide a geochronology and establish the provenance of carbon origin. Novel technology using eDNA barcode and primer sequences will pinpoint the carbon patronage. To date eight sites have been sampled and 24 cores collected, with analysis ongoing at the University of Brighton and partners.

“It is anticipated that the identification of the baseline of carbon’s storage in Sussex provided specifically by macroalgae, will inform the degree of impact of environmental factors such as substrate and bathymetric profile”.

This PhD is part-funded by the Pebble Trust and Platform Earth.

The process of collecting a sediment core and being cut into segments for analysis.

Big Wave Productions



PhD Student Claude Annels with Tom Voice and Chris Hayes from Brighton Sub-Aqua Club.
© Dr Roy Ward

Socio-economic surveys

To assess the social and economic value of the Byelaw to the Sussex inshore fishing community, a baseline socio-economic assessment was undertaken in Autumn 2021 by Blue Marine Foundation in partnership with University of Plymouth and Sussex IFCA.

Along with analysis of landings and fishing effort data for the Sussex fleet, a questionnaire was used to gather information on local fishers' individual fishing practices, income, wellbeing, as well as their views on the Sussex Nearshore Trawling Byelaw, current fisheries status and management, and future fisheries management options. The survey also captured information on where they sold their fish and ideas for supporting future sales strategies.

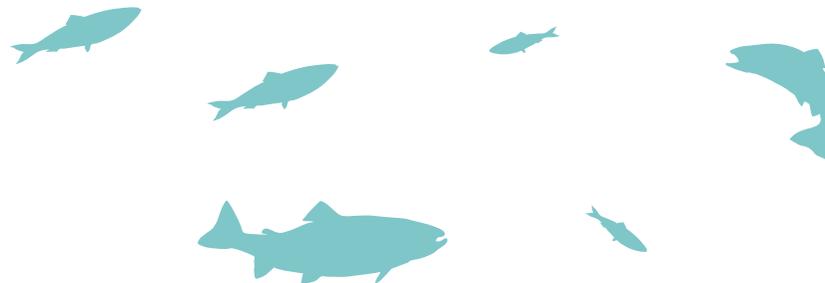
Nineteen fishers responded and were interviewed, which – whilst a small percentage of the total fleet – were representative of the main fishing practices with 74% from under 10m vessels and 26% from over 10m vessels.

Learnings

- Respondents using static gear, on average, had higher job and income satisfaction, and had lower levels of stress. This aligns with previous studies regarding social and economic

evaluation of commercial fisheries undertaken in Lyme Bay where trawling was excluded in 2008.

- The study demonstrated mixed views with regards to the implementation of the Byelaw with 40% in complete support and 45% completely against the Byelaw.
- Those who were in favour of the Byelaw stated protection of the habitat and possible increase in fish stocks, along with improving gear safety as their reasons.
- Two respondents stated they had already observed a positive effect on kelp area and fish abundance following implementation of the Byelaw.

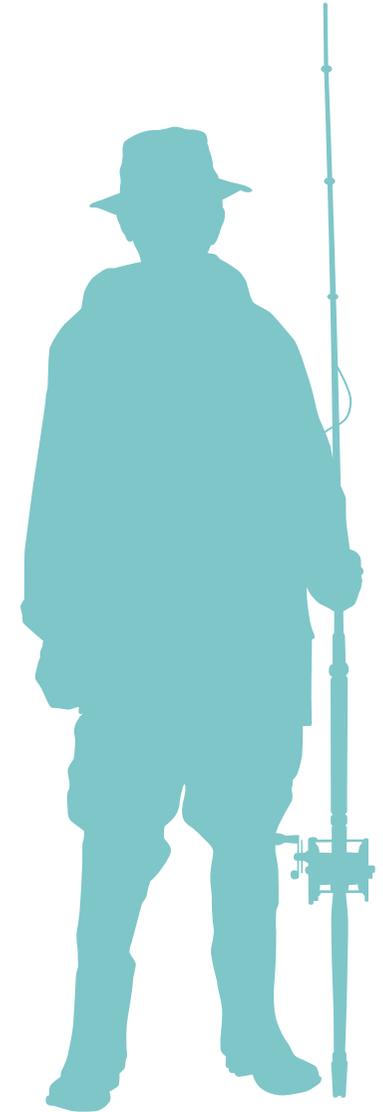


In a previous survey carried out by a Masters student from University of Portsmouth, 24 commercial and recreational fishers in 2020 reported more support for the then proposed Byelaw than against, with the majority of recreational fishers being supportive and noting that any short-term losses would be worth the long-term benefits.

Next steps

The data from the 2021 socio-economic survey can be used as a baseline against which to assess future changes in fishing activity, and perceptions and value in response to anticipated recovery of the benthic fauna and flora resulting from the Byelaw.

The plan is to undertake a further survey in 2025, including the same respondents as well as others, to represent a wider proportion of the fleet.



Engaging local fishers

Engaging the local fishing community is of huge importance to the SKRP: to harness their knowledge, engage them in research and support the future of local fisheries as key beneficiaries of the recovery of kelp and other essential fish habitats.

Blue Marine Foundation, Sussex Wildlife Trust and Adur & Worthing Councils have worked with fishing communities in Selsey, Bognor and Worthing to help develop collaborative conservation, research and marketing initiatives.

As well as working with individual skippers on crab and lobster surveys, Blue Marine Foundation hosted an evening event in Selsey in June 2022, together with Sussex Underwater and Mulberry Marine Experiences, to showcase the diversity of marine life off Selsey and SKRP's research programme. The free evening was fully booked with over 45 attendees including local fishers, divers, freedivers, residents and local councillors.

In Bognor, Blue Marine Foundation highlighted the journey of local fisher Clive Mills who returned to sea after 20 years and is championing the revival of Bognor's beach fishing community.

Clive is one of many local fishers who has reported an increase in the abundance and

diversity of fish in the area since the Sussex Nearshore Trawling Byelaw was introduced.

Sussex Wildlife Trust and Blue Marine Foundation are working with the Bognor Fishermen's Association to support their vision of creating an educational hub and fishmarket.

In Worthing, Adur & Worthing Councils have worked with local day boat fishers to identify the support they need to market and sell their catch, including plans to renovate the Rotunda into an ice store and market area.

Adur & Worthing Councils also commissioned a study to assess the viability of a locally sourced, responsibly caught fish brand for Sussex Bay and aim to roll out local pilots where there are supportive fishers and engaged consumers.

Top right: Bognor Fishermen's Association with Blue Marine Foundation and Sussex Wildlife Trust.

📷 Sam Fanshawe

Right: Bognor fisher Clive Mills.

📷 Blue Marine Foundation



Aim 3

To identify and minimise damaging impacts on existing and potential kelp habitat and other essential fish habitats

Aim 3: Overview

What may be hindering kelp's recovery?

Though kelp was once abundant in Sussex, a number of factors that have changed since the 1980s may prevent it coming back despite the implementation of the Sussex Nearshore Trawling Byelaw. These factors include poor water quality, increased sedimentation, changing water temperature and storm events.

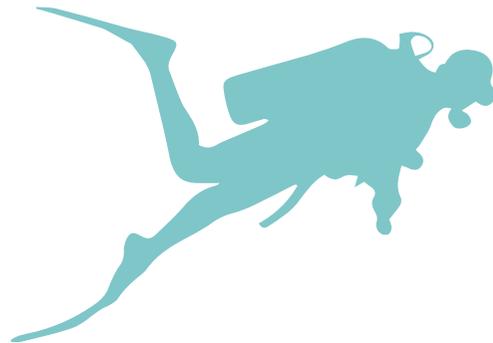
To support kelp recovery, the SKRP is assessing the potential sources and impacts of other non-fishing pressures to understand which factors may pose the most significant barrier and which if any of these can be better managed to improve conditions for natural recovery.

Sediment has been the focus of this work over the past two years as it has been highlighted by many Sussex stakeholders as an issue of concern, not only for kelp recovery, but for local shellfish populations as well.

Sedimentation is a natural process arising from land run off, erosion and wave scour, but human activity whether on land – such as farming and urban development – or in the sea – such as trawling and dredging, have increased the levels of sedimentation and nutrient loading into coastal environments over recent decades.

Sediment has consistently been linked to the disappearance of kelp forests in many areas around the world. Increased levels can negatively impact both the growth and reproduction of kelp through physical scouring and smothering of the rocky substrate that kelp needs for settlement, and by increasing turbidity which reduces the levels of light in the water column needed for growth.

A programme of work was initiated in 2021 to assess the sources and impacts of sediment on kelp habitats.



Activity & achievements

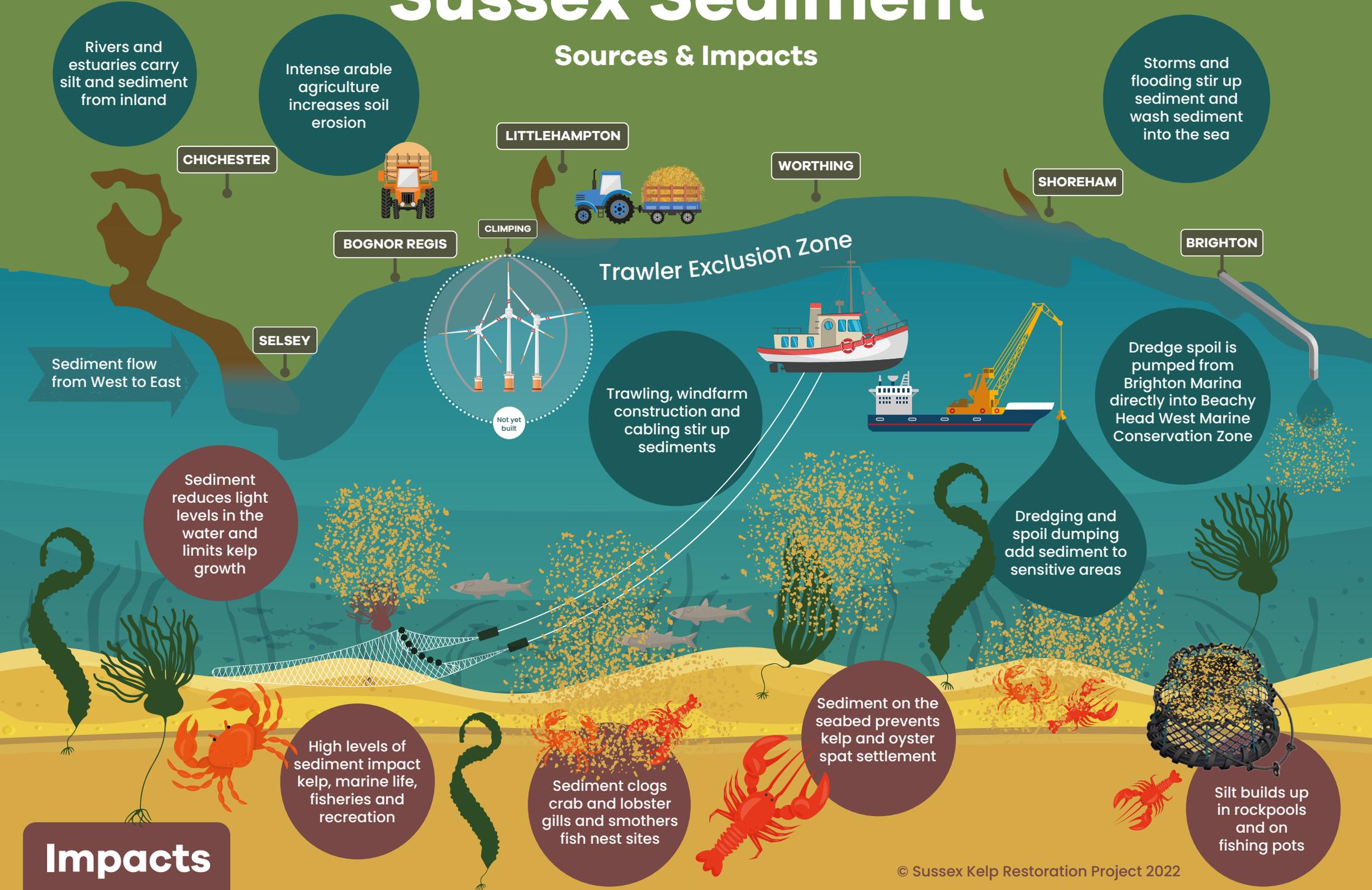
Aim 3: Summary

- Sediment sources and impacts desk-based review
- Sediment workshop with 40 participants from 25 organisations
- Sediment sea user survey with 129 respondents
- 8 x sediment cores sampled
- Review of barriers and optimal conditions for kelp recovery
- 2 x PhD projects initiated



Sussex Sediment

Sources & Impacts



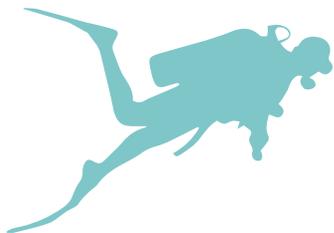
Impacts

Sediment: sea users survey

To help understand if and how sediment has changed in the area, the SKRP mobilised over 120 Sussex sea users to provide their observations.

A wealth of information is held by local people, many of whom have been in, on or near the sea in Sussex Bay at least once a week for many years. To capture this information, a *Sussex Sea Users Sediment Survey* was broadcast in early 2022. This asked sea users to relay any changes in the type and level of sediment they had seen, as well as the location of any changes. It also canvassed their observations on the impact of sediment on fisheries, their recreational activities and marine life generally.

The 129 responders included commercial and recreational fishers, divers, snorkellers, surfers, swimmers, beach walkers and others. 80 respondents provided data (including coordinates) to describe the location where changes to sediment had been seen. These were added to an [interactive map](#).



Learnings

- 67% of respondents had noticed a change (of which 90% saw an increase) in the amount of sediment in one or more coastal environments – in the water, on the seabed, in rockpools.
- ‘In the water’ was the environment where a change to sediment was most observed (57% of all respondents). 41% of respondents observed a change to the amount of sediment on the seabed and 55% of those who’d listed rock pooling as an activity observed a change in Sussex’s chalk-based rockpools.
- Silt was the most commonly seen texture of sediment, followed by ‘muddy’ and ‘patchy’.
- Respondents believe there are various sources of sediment. Dredge spoil dumping was identified as the largest source of sediment by more people than other sources.

Some responses from the Sediment Sea Users Survey Report

“I fish here every day. Over the last 12 months I have been upset by the amount of dredging silt dumped inshore... Especially as I watch the tides push it straight back”

“As soon as sediment decreases we find dramatic increases in growth of kelp & other plant life”

“The silt blocks out sunlight and decreases the oxygen. Coating breeding areas and nesting sites moving fish that have been coming to this area for years to other areas”

“Reduction of crustaceans due to loss of habitat. Subsequent reduction of fish species which used to prey on the shrimps and prawns. Sewage smell from Eastbourne treatment plant”

“All marine life over the reef has reduced but most noticeable are the lack of lobsters inhabiting the gullies and crevices in the rockpools that are now regularly full of silt”

“Lack of light has effected the whole area over the last thirty years and ear infections have increased dramatically in the past few years amongst the public using the sea”

“Over 17 years we have been diving, along the shore at Selsey a noticeable decline in lobsters, crabs plus fish species. The closer you get to the shore the worse it is”

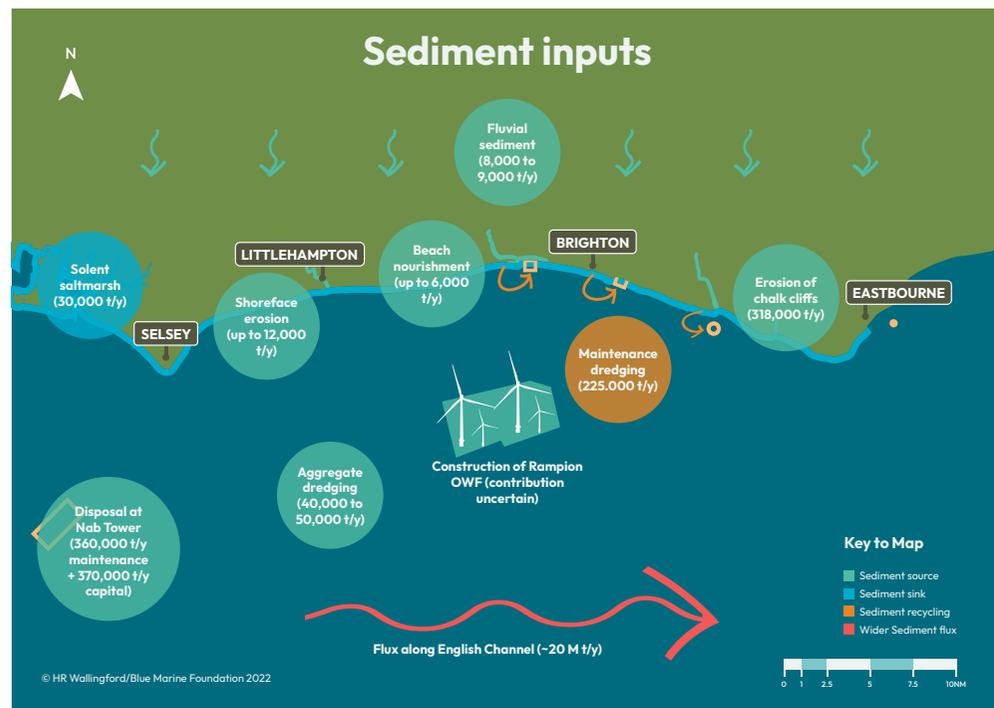
“Sea fishing (Angling) from Sussex coastline in Shoreham, Littlehampton and elsewhere, is terrible these days. There are no fish left, not even mackerel! Where have the fish gone?”

Sediment reports and workshop

Many of the sources of sediment, both natural and anthropogenic are simultaneously occurring in or adjacent to Sussex coastal waters.

An initial literature review managed by Blue Marine Foundation and funded by the Sussex Wildlife Trust's 2021 Postcode Planet Trust award, summarised the available information on the sources and impacts of sediment on Sussex kelp habitats and inshore fisheries, and informed next steps.

The first step was to convene a **Sussex Sediment Sources and Impacts Workshop** in September 2021. This online event brought together 40 stakeholders from 25 organisations including government agencies, NGOs, universities and community groups, to share research, evidence and concerns about the impacts of sediment



“One of the most useful workshops I have attended recently in terms of the relevance of presentations and the commitment demonstrated by those attending.”

– Sussex Sediment Sources and Impacts Workshop attendee

on kelp and local fisheries. The workshop identified additional sediment data sources, opportunities for further research and collaboration, and potential management interventions. A report summarising the outcomes from the workshop was published and the event can be watched on [YouTube](#).

To inform further work and appropriate targeted measures to reduce sediment inputs and mitigate the impact of sediment on natural kelp recovery and local fisheries, Blue Marine Foundation commissioned HR Wallingford to prepare a **report on Sussex**

Left: Summary fine sediment budget for West Sussex coastline. Source reference: HR Wallingford 2023. Sussex coast sediments and kelp. Report commissioned by Blue Marine Foundation.

sediment sources, sinks and the regulatory framework. The report summarised previous studies on sediment transport, sources and sinks in Sussex waters; recent trends in sediment levels; potential future trends linked with climate change, coastal development and marine activities; and the regulatory and policy framework relating to management of sediment inputs.

The above groundwork will feed into a regional **Sussex Sediment Monitoring and Adaptive Responses Workshop** to be organised in May 2023 by Blue Marine Foundation in conjunction with the Crustaceans Habitat and Sediment Movement (CHASM) project partners and funded by the Rewilding Innovation Fund. The workshop will bring together the key stakeholders involved in monitoring and regulating sediment inputs to Sussex coastal waters, together with local fishers and sea users who have observed the changes and impacts of sediment on local habitats and fisheries.

The aim of the workshop is to set out a framework for development of a Sediment Monitoring and Adaptive Response Plan to manage anthropogenic inputs of sediment and optimize the conditions for healthy natural kelp recovery.

The impact of sediment on kelp

PhD project: The impact of Suspended Particulate Matter (SPM) on kelp recovery in Sussex Bay.

Marianne Glascott, University of Sussex

Marianne is undertaking a three year study to assess the source (land run-off, erosion, rivers, outflows, storms); composition (organic, inorganic and toxic elements); and impacts of SPM on kelp through three strands of research:

1 Understanding SPM composition and distribution in the Sussex Bay area by direct sampling. This will include marine environments, river systems and aquifers entering Sussex Bay. The research will sample fresh and marine water interfaces, and nearshore coastal environments where the University of Sussex currently monitor kelp forest and biodiversity recovery. Analysis of

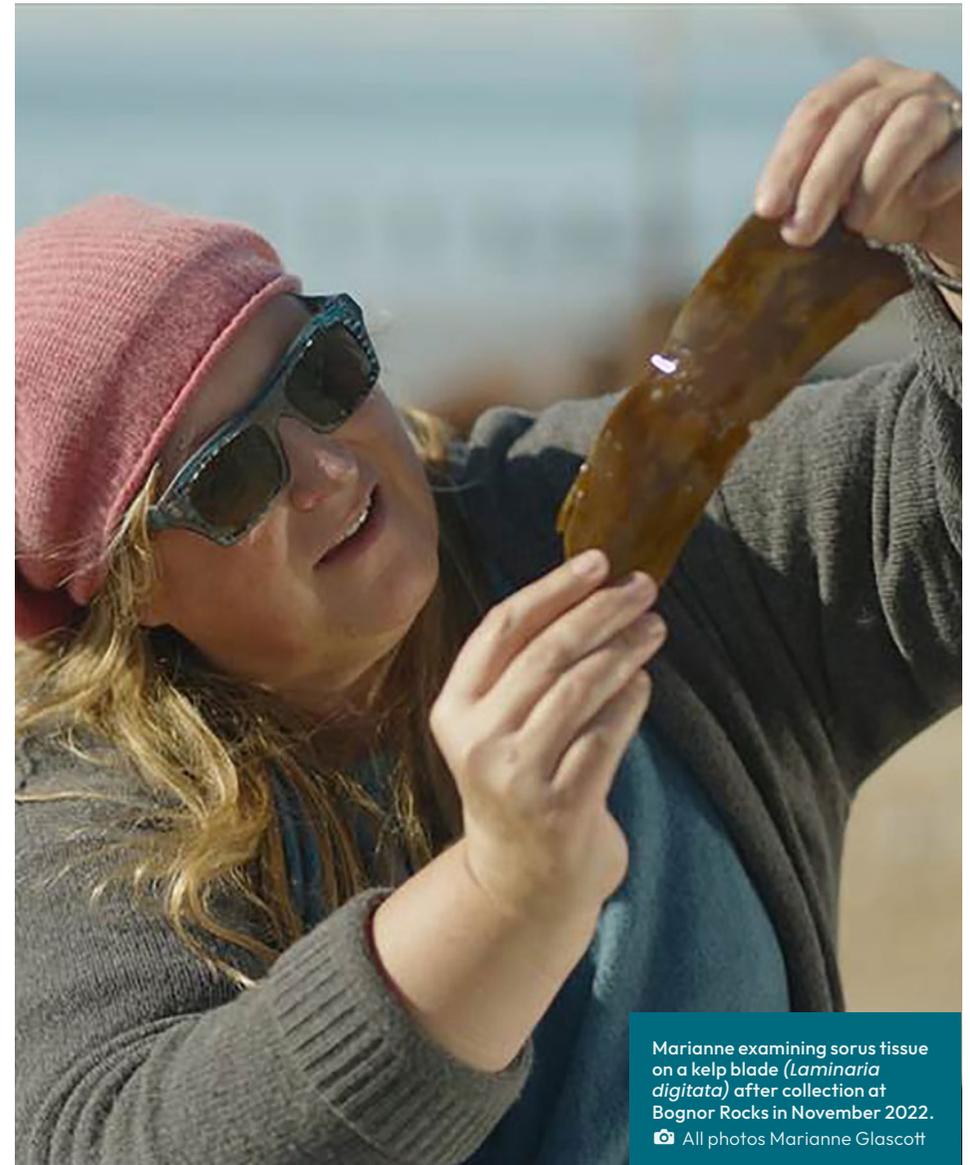
The range of sediments smothering kelp blades: both pictures were taken on the same day at Lulworth Cove Dorset on *Laminaria digitata* blades.



the samples will enable identification of the components and determine the range of SPM levels in the area. The project will also engage citizen science by harnessing local volunteers to assist in physicochemical and turbidity monitoring at inshore kelp restoration trial sites.

- 2 Assessing the impact of SPM on kelp growth using controlled experiments in aquaria.** A kelp lab has been established at the University of Sussex to support this work. The development of an ecotoxicology test for kelp will enable a laboratory-based assessment to examine the impact of SPM on kelp growth and reproduction. This will enable an evaluation of SPM risks to kelp.
- 3 Providing a baseline understanding of the sediment budget, profile and dynamics within Sussex Bay.** This research involves evaluating sources, contaminant transfers, impacts, and destination of SPM to underpin our understanding of changes to water clarity and the photic zone within Sussex Bay and its implications for kelp ecosystem recovery.

Marianne's work is being funded by a scholarship from the University of Sussex.



Marianne examining sorus tissue on a kelp blade (*Laminaria digitata*) after collection at Bognor Rocks in November 2022.
All photos Marianne Glascott

Aim 4

To assess the need for
and feasibility of active
restoration

Aim 4: Overview

The SKRP partnership follows the ethos of rewilding and letting nature lead. This means giving natural processes and ecosystems time to recover with minimal human intervention following removal of a key pressure (in this case, trawling).

Natural recovery is likely to result in more resilient ecosystems that are adapted to the prevailing conditions than actively managed habitats created by planting or seeding kelp.

Letting nature lead is key to understanding if other habitats and species are more adapted to the current conditions in Sussex Bay compared to the environmental conditions in the 1980s when the kelp was last abundant. There are many factors that can affect the specific species and community composition that recolonise including: water temperature, sediment levels, the presence of grazers, and levels of disturbance caused by natural events such as storms or human activities such as coastal development and pollution events.

Although the SKRP would love to see the species of kelp that were lost come back and the ambitions of the project are based around this, if it doesn't return, but other species or essential fish habitats do, that is a successful outcome if those habitats are diverse, healthy and support biodiversity.

Human intervention through active restoration techniques that have been adopted in other parts of the world may yet be considered in the future, but the SKRP believe it is too early to deploy them without understanding what nature is doing on its own.

Recovery takes time, so it may take several years before the SKRP fully understands what is happening on the seabed or can observe significant change. The SKRP may then decide that, based on the evidence, it is necessary to give nature a helping hand by undertaking active restoration activities.

However, active restoration initiatives like planting or seeding kelp can be a resource intensive and uncertain process. SKRP partners are assessing the factors that may affect kelp settlement and growth, to better understand the optimal conditions and technique required for any active restoration to be successful, and avoid wasting effort if those conditions cannot be met.

Kelp beds.
📷 Daniel Smale



Aim 5

To increase understanding of and community engagement in Sussex kelp and other essential fish habitats, so that their importance to the environment and society is known, and to enable marine ecosystem recovery elsewhere



Aim 5: Overview

Kelp beds and the marine life and fisheries they support provide commercial, recreational and aesthetic value to local communities, businesses and visitors alike. Public engagement is vital to raise awareness of the value of these coastal ecosystems and involve a wide audience beyond the scientific community in their recovery.

A common vision for kelp and nature recovery on a grand scale is shared by a wide network of local people, organisations, scientific researchers, students, fishing communities and government bodies throughout Sussex.

Over the past two years SKRP partners and supporters have reached millions of people through innumerable and diverse events. These have included talks to local school children, outreach with fishers along the Sussex coast, briefings at climate and environmental conferences, as well as global and political events such as COP26, in Glasgow 2021. In addition to these, TV, radio and newspaper articles have picked up the story of kelp and broadcast them to millions of people.

The younger generation is playing a key part with dozens of university degree students participating in research (Annex I). Plans for an educational programme to engage the next generation of kelp champions and ocean guardians are also being progressed for which funding is actively being sought.

With the research programme now well underway, community engagement will be a key focus for the SKRP in the coming year with plans for a new website, more events and regular news via social media, supported by a dedicated Sussex Kelp Recovery Co-ordinator.



Activity & achievements

Aim 5: Summary

- Kelp Summit – cross-sector inspirational meeting
- Over 3,000 views of the SKRP Science Film
- 16 University student projects
- Primary school art competition
- Engaging with the fishing community
- Kelp story presented at over 100 events
- BBC1 film about local diver and kelp champion Eric Smith underway



Student research is an important part of SKRP. Already three BSc projects, nine MSc projects and four PhD projects have been involved. (Left to right: Maddison Bowden-Parry, Claude Annels, Marianne Glascott, Alice Clark).

📷 Dr Chris Yesson

The Kelp Summit

November 2021

The first Sussex Kelp Summit was held thanks to funding from players of the People's Postcode Lottery.

Over 100 people including international experts, local fishermen, community groups and youth ambassadors came together in person at the Ropetackle Arts Centre in Shoreham to celebrate and share the journey of the first six months of the SKRP.

A series of presentations highlighted why kelp is important locally as well as globally, and shared the SKRP's initial research to establish baseline data. It also demonstrated how people and coastal communities are at the heart of the project and are actively involved from championing the underwater world to contributing to critical citizen science. The event was live streamed and recorded, and the event has been viewed over a thousand times since on YouTube.

Another highlight of the Kelp Summit were a series of truly inspiring films that brought the passion of local people and those in the SKRP partnership to life.

Two short films by Big Wave Productions premiered on the day. The first showcased the work of [Sussex Kelp Recovery Project scientists](#) (viewed over 3,000 times by March 2023). The second was a preview of *'The Man Who Loves Kelp'* – a film which tells the powerful journey of local free-diver Eric Smith who has been exploring Sussex waters since the 1950s – and which is now being made into a BBC1 Special and feature documentary.

Blue Marine Foundation premiered the film [Bognor Fishing – Back from the Brink](#) which captures the story of local fisherman Clive Mills, as he brings fishing back to the heart of the Bognor Regis community.



Eric Smith in the Big Wave Productions film 'The Man Who Loves Kelp'.
Big Wave Productions



Left: Catrine Priestley from Sussex Underwater shares their work at the Kelp Summit.
Sussex Underwater

Meanwhile, local community group, Sussex Underwater also shared incredible images from their dives in [Wave of Awareness](#), available on YouTube.

In addition to the films, an exhibition of artwork from local and international artists, Sarah Wiltshire (aka Seaside Mocher) and Dr Gil Mualem-Doron, founder and director of The Socially Engaged Art Salon, Brighton created the backdrop to a truly memorable day.

Community champions: Sussex Underwater

Sussex Underwater was set-up by a group of local divers who'd witnessed first-hand the destruction of the seabed and the disappearance of marine life over many years.

Heartbroken about what had been lost, they felt this had gone unnoticed and unchallenged because to so many people, what's under the sea is out of sight, and out of mind.

On a mission to change this by helping people discover what's under the sea, they created the Sussex Underwater Facebook page in 2021. Following the trawling exclusion, this group set out to document a long-harboured hope: the return of kelp and other essential fish habitats in Sussex Bay.



“In the second year of the inshore trawler ban off Sussex we are seeing unbelievable changes in fish and bottom structure...vast mussel beds are binding the seabed back together with large plaice feeding on them. I filmed the first electric ray I had seen for 40 years, and trigger fish turned up in several spots. Also, large sting rays are back in numbers from Selsey to Worthing and we were honoured to share the sea with a pod of 30 dolphins last week that swam and played around the boat. We Are Winning!”

– Eric Smith, Sussex Underwater, reports on his sightings from July 2022

Two years on, their joy-filled and educational videos and photos share the wondrous diversity of kelp and other marine life coming back to the area. Their following has also grown: the Sussex Underwater Facebook group is 9,000 members strong; some posts have reached more than 100k people; and they regularly give educational and inspiring talks about kelp and marine life recovery on radio, press and television, as well as at schools and conferences.

Sussex Underwater are truly kelp's ambassadors.



Above: The Sussex Underwater team (from left to right): Eric Smith, Paul Boniface, Catrine Priestley, Jessie McGregor and Dominic Liddiard, stand with Gonzalo Alvarez (centre) Chairman of the United Nations Association – Climate and Oceans, during an Ocean Symposium run by United Nations Association and Sussex Wildlife Trust, Nov 22.

[Sussex Underwater](#)



Right: Some of the Sussex Underwater Facebook posts.



Kelp on air and on screen

The SKRP has been fortunate to have exceptional film footage right from its inception with Big Wave Productions' award-winning Help Our Kelp campaign film narrated by Sir David Attenborough. This reached millions of people and generated interest internationally as well as locally in the Sussex Nearshore Trawling Byelaw process.

[Watch the Help Our Kelp film here ►](#)

This was followed in November 2021 with another high-quality film from Big Wave Productions showcasing the science that had been taking place in the first six months of the project.

[Watch the Science film here ►](#)

Using these films and others made by partners, SKRP has been taking its message to local communities, practitioner gatherings and more. Steering Group members and their colleagues have given numerous presentations, some of which are available via Sussex Wildlife Trust's YouTube channel. These have ranged from generalist events, and topic-specific activities like Blue Marine Foundation's hosting of a fisherman's film evening in Selsey, to the highest profile global conferences such as COP26.

March 2023 sees the launch of a refreshed Sussex Kelp Recovery Project [website](#) from which the latest project news will be broadcast. The SKRP also has a growing number of dedicated supporters who receive SKRP updates and are informed and consulted on activities, with more to follow in 2023.

More frequently, [Sussex Underwater](#) convey marine recovery to their thousands of followers daily using exceptional underwater and seascape footage, photos and stories.

Many artists have also supported the project including Anne Krinsky who displayed an information panel on SKRP alongside her

exhibition Wetlands / Shifting Shorelines on Worthing's Seafront. Meanwhile, also in Worthing, fellow artist Sarah Gillings painted a mural that depicts the underwater kelp beds of Sussex on an Adur & Worthing Councils' coastal office building.



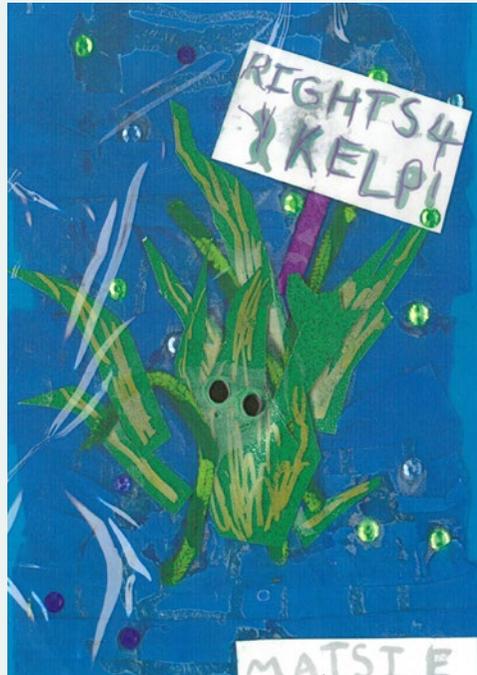
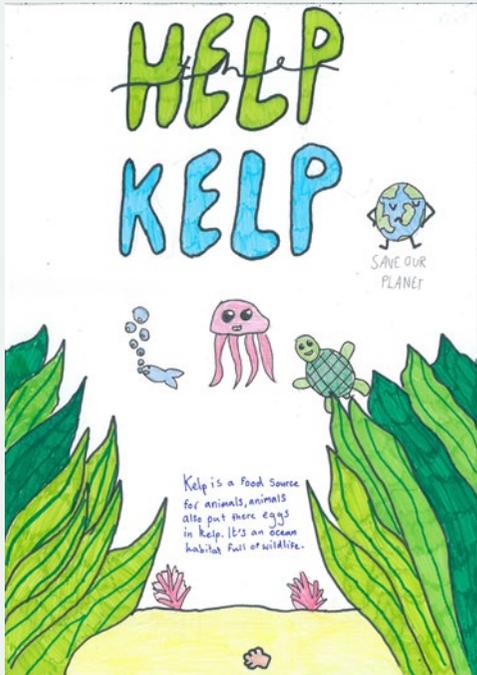
A mural in Worthing by artist Sarah Gillings reflects the fish and plants found in the sea off the Sussex coast and highlights the need to preserve sea life.

Robert Dove

Inspiring marine conservationists of the future

Restoring the health of our seas is vital. But though the challenge is enormous, it is not impossible. A recent report suggested our oceans could be restored by 2050 with global effort and ambitious action. The recent (March 2023) UN High Seas Treaty has committed to protecting 30% of the high seas by 2030. This is our chance and our window for action.

The Sussex Kelp Recovery Project and partner initiatives such as Wild Coast Sussex have sought to inspire the next generation of ocean conservationists to take up the mantle, using the motivating story of kelp and the many creatures it supports as part of its ecosystem.

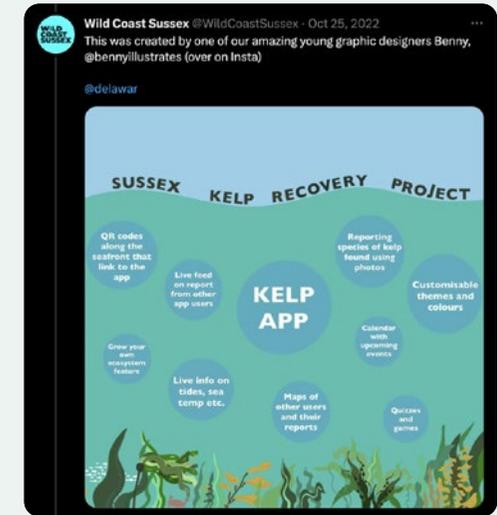


Presentations, beach walks, quizzes and more have been used to engage young people at local schools, colleges and at events such as the Youth Climate Summit and the Worthing EYE conference.

Sussex Underwater have also been sharing their extraordinary films and spending time inspiring children and teenagers across the region.

At the same time, meaningfully engaging with young adults can be a challenge. A Wild Coast Sussex hosted Hackathon in 2022 held at the De La Warr Pavilion in Bexhill sought to tackle this very question and asked 16-25 year olds to find creative solutions to marine issues in Sussex, including how to engage their peers. Ideas on the day included developing a bespoke app and finding interactive ways to educate users on kelp research. Over the coming years, the SKRP seeks to put their suggestions into action.

Left: Children From Brunswick Primary and Windlesham Primary were asked to create their own 'Help Our Kelp' posters which were proudly displayed at the Kelp Summit. At the event, attendees voted on which were the best, with the two posters left winning prizes.



Above: Live tweets from the Hackathon hosted at the De La Warr Pavilion.

Safeguarding nearshore marine habitats at scale

Between January and August 2022, the Marine Conservation Society set out to piece together a detailed account of the circumstances, events and actions that led to the successful implementation of the Sussex Nearshore Trawling Byelaw in 2021.

This was primarily achieved through 42 interviews with those in the commercial fishing industry, authority representatives, marine businesses, academics, eNGOs and other sea users. The goal was to ensure that the voices included were diverse in terms of stakeholder group and geographic location.

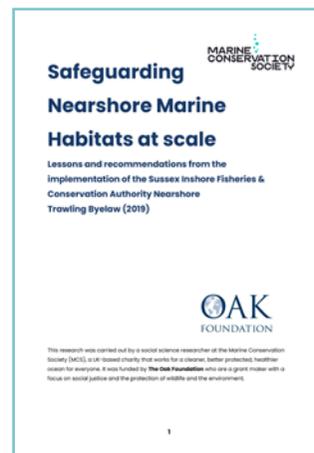
“Interviewees highlighted a few interesting shifts in perceptions about the sea because of the Byelaw. Notably, for many interviewees, the ocean has been shifted from ‘out of sight out mind’ into direct focus”

Learnings

In analysing the Sussex Nearshore Trawling Byelaw’s process, the report identified the following:

- Clear, honest **communication** throughout the process was critical.
- **Access** to information and participation was key.
- Effective **collaboration** was a feature of both the statutory process and advocacy activity.
- Some stakeholders considered that they had unjustly lost out due to the Byelaw and measures to address such wider-scale just transition issues should be considered.
- Seeing the **bigger picture**: the need to think about marine resource management issues in context.

From these, the report identified eight recommendations for people working to safeguard coastal seas at scale (right).



Eight recommendations for people working to safeguard coastal seas at scale provided in the Safeguarding Nearshore Marine Habitats at scale report.

<p>1</p> <p>Shift the management approach</p>	<p>2</p> <p>Pay Attention to Framing</p>
<p>3</p> <p>Utilise Diverse Evidence</p>	<p>4</p> <p>Maintain strong stakeholder relationships</p>
<p>5</p> <p>Enable Nature Connection</p>	<p>6</p> <p>Share Targeted Information</p>
<p>7</p> <p>Consider Just Transition</p>	<p>8</p> <p>Work in Context</p>

Annex 1: Student projects

SKRP Aim	Degree Level	Date	Title	Institute
1	BSc	2021	Exploring the Effectiveness of Marine Conservation Zones in West Sussex, using Baited Remote Underwater Videos (BRUVs)	University of Sussex
	BSc	2021	Setting a baseline in marine fauna community composition using BRUV systems in West Sussex	University of Sussex
	BSc	2022	A comparative study on marine research methods and monitoring ecosystem recovery of kelp forests	University of Plymouth
	MSc	2021	Kelps of the UK and Ireland: evidence of changes in abundance and distribution over the past half century	University of Sussex
	MSc	2021	Recoding Community Composition Across Different Areas of Protection Using BRUVS.	University of Sussex
	MSc	2021	Using eDNA to assess inshore fish communities in kelp associated ecosystems	University of Sussex
	MSc	2021	Using historical remote sensing data to create kelp habitat maps for the West Sussex Coast	IMBRSea/ZSL
	MSc	2022	Assessing the effectiveness of eDNA to monitor the coastal inshore waters of Sussex	University of Sussex
	MSc	2022	Monitoring seaweed habitats in a kelp restoration zone	Imperial College London/ZSL
	MSc	2022	To help the Sussex kelp restoration project through the remote sensing of kelp forest in UK waters	University of Sussex
	PhD	2021-25	Coastal rewilding and food security: understanding restoration pathways using BRUVS (Baited Remote Underwater Video Surveys) and environmental DNA (eDNA)	University of Sussex
PhD	2022-26	Investigating the history of Sussex kelp habitats and their impact on local communities	University of Exeter	
2	MSc	2022	Evaluation of shoreline dynamics and assessment of historical coastal change in Sussex, England: The potential impact of kelp habitat loss	UCL
	MSc	2022	Assessing the effects of the Sussex Kelp Restoration Project on wave power and longshore sediment transport at the Sussex coastline	UCL
	PhD	2021-25	Evaluation of Sussex Bay kelp carbon storage and sequestration potential	University of Brighton
3	PhD	2022-26	Understanding the impact of suspended particulate matter on kelp recovery in Sussex Bay	University of Sussex

Wider Sussex marine recovery initiatives



Sussex Bay

Sussex Bay is an initiative borne out of the remarkable momentum towards seascape restoration in Sussex in recent years. It provides a clear identity for our wider ‘blue’ geography in Sussex – our intertidal rivers, coast and seas – as the ‘blue mirror to the South Downs’.

The Sussex Bay initiative is placing its initial focus on strategic funding and “natural capital” approaches for projects in the area, including the DEFRA backed Adur River Restoration project, the Pevensey Bay to Eastbourne Coastal Management Scheme, as well as the Sussex Kelp Recovery Project.

Supported by the DEFRA Natural Environment Investment Readiness Fund (NEIRF), Sussex Bay is working with seabed owners The Crown Estate to explore high integrity natural capital assessment and financing models that will unlock the major funding required to recover habitats at the scale and pace needed to tackle climate change and biodiversity loss.

In partnership with the UK Seascape Restoration Research Network, our coastal local authorities, SKRP and other local projects, Sussex Bay is working to create the UK’s first “Blue Natural Capital Lab” to test and learn how to finance blue nature’s recovery.

Right: Paddleboarders on Cuckmere River.
📷 Pete Karici/istock.co.uk



Above: Kitesurfers on the Sussex coast.
📷 Adur & Worthing Councils

Left: Fishing boat with flags.
📷 Adur & Worthing Councils



UK Seascape Restoration Research Network

The coastal zone between the Solent and Sussex Bay is home to one of the largest concentrations of seascape restoration activities in the UK. Given the rapid decline of crucial native habitats, such as saltmarshes, oyster reefs, kelp beds and seagrass beds, it is critical to scale up and coordinate these local restoration efforts.

The UK Seascape Restoration Research Network was established in January 2023 by a collective of five south coast research institutions: Universities of Portsmouth, Brighton, Sussex, Surrey and the National Oceanography Centre in Southampton.

Given the wealth of experience in seascape restoration generated by the active restoration work in the Solent to Sussex Bay area, this project will draw upon the real-life experience of local researchers, practitioners, policymakers and potential investors to co-develop a long-term seascape restoration research strategy that better integrates

finance and biodiversity into future seascape restoration initiatives. The partnership will initially focus on the Solent to Sussex Bay area and subsequently scale up nationally.

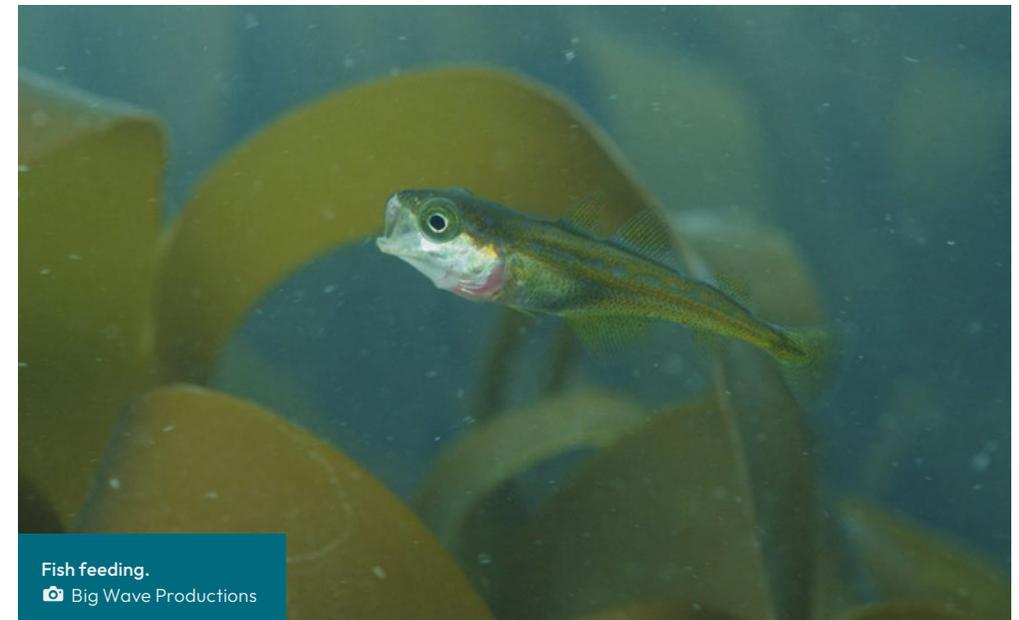
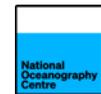
We will hold local and national workshops throughout 2023. If you would like to join the network, attend events and help to unblock opportunities for better seascape restoration, please message the project coordinator Karolina Skalska (karolina.skalska@port.ac.uk).

“At the moment, there are many restoration projects with lots of people working on them. Our aim is to bring finance, biodiversity and regulation stakeholders together and unblock opportunities for better seascape restoration.”

– Steve Fletcher, Chief Investigator, University of Portsmouth



UK SEASCAPE RESTORATION RESEARCH NETWORK



Fish feeding.
Big Wave Productions

Weald to Waves

Weald to Waves is a collaborative project to establish and monitor a 100-mile nature recovery corridor across Sussex.

The project is led by a growing network of farmers, land managers, councils, researchers, wildlife charities, schools, gardeners, and community groups.

The corridor will run from the High Weald to Sussex Bay, blending terrestrial and marine environments. Across the 100-mile route, the project is working with regional partners to channel advice, funding and capacity to boost connectivity, soil and water health and the quantity and quality of habitats.

The map and corridor plan are catalysing a range of fresh engagement with Sussex nature recovery; with land managers and

community groups pledging to take part and join the project through conservation projects, land use changes, surveying, campaigning, and reporting. It will take in three of Sussex's key rivers and the recovery of the Sussex kelp forms a key part of this narrative and will emphasise the importance of land use in Sussex on the marine environment.

With sedimentation being a priority topic for the SKRP, the management of water bodies up-stream on the Arun, Rother, Adur, Ouse and Cuckmere are of relevance to kelp recovery. In time, many species that are benefited by kelp will use the tidal elements of



Farmer and co-founder of Weald to Waves James Baird, who farms where the land meets the sea, and the recovering kelp at Climping.
Times Photographer Richard Pohle

Sussex Rivers, which in turn will benefit other species. Likewise, healthy river systems will send cleaner water downstream to enrich the kelp ecosystem.

Over 70% of Sussex is agricultural land. With land managers as the driving force along the corridor, the project is a real chance to address and influence land management decisions that ultimately affect the success of the kelp restoration. James Baird, co-founder of the project, farms the Climping Gap, one of the remaining areas of undeveloped Sussex Bay coastline, where the land meets the sea and the recovering kelp.

“We’re asking farmers and land managers to put nature at the forefront of their decision-making across their landholding. That is a radical shift and it will lead to the sea change in attitudes and farming practices that we so badly need.”

– James Baird



Right: Weald to Waves vision of a nature corridor through Sussex.



CHASM:

Crustaceans, Habitat and Sediment Movement

The Crustaceans, Habitat and Sediment Movement (CHASM) project, initiated in 2020, aims to understand the environmental, physical and climatological changes which may have impacted crab and lobster habitats around Selsey Bill. This will improve understanding of the marine environments, with a view to developing improved management practices to support sustainable crustacea habitats, while fostering collaboration with other local initiatives.

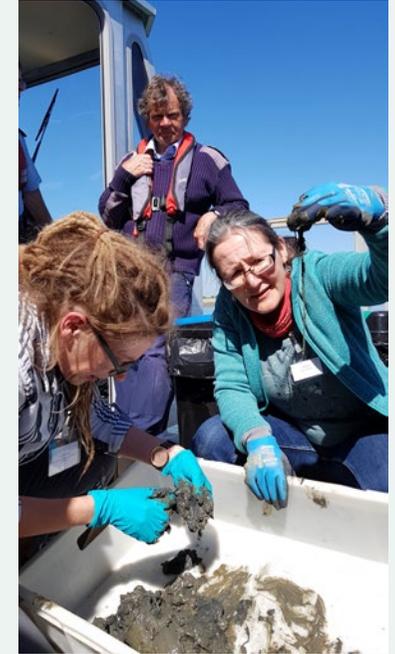
In its study of sediment within the marine environment, CHASM is a key contributor to the understanding of how this pressure may impact the recovery of Sussex kelp.

Their focus on sediment came from observations by fishers that crab and lobster catch on the Manhood Peninsula coast had been greatly reduced in recent years, particularly lobster, while the amount of sediment on the seabed and rocks locally had increased.

CHASM scientists presented their findings at the SKRP Sediment Sources and Impacts Workshop in 2021. In 2023, they are co-hosting a follow up sediment workshop with Blue Marine Foundation where their latest work will help steer the workshop's output: the development of a framework for a Sediment Monitoring and Adaptive Response Plan.

CHASM's research has been informed by their work with local fishers, and a programme of activities that include seabed mapping, analysis of sediment compounds, research into sea surface temperature changes, and findings from a telemetry unit and sondes in the Chichester Harbour and Marina areas. A short 2022 film sets out CHASM's aims and objectives and features Selsey fishers describing the changes they've seen over the years and the impact to their businesses.

[Watch the film here](#) ►



Top: CHASM project leads - Dr Heidi Burgess, Dr Charlie Thompson and Jane Cunningham.

📷 Martin Davies

Middle: Carrying the sonde on a lobster pot to the boat at Selsey.

Bottom: Sonde data logger.

📷 All other photos: Jane Cunningham

Top right: Charlie and Heidi looking at bio samples.

An underwater photograph of a kelp forest. The scene is filled with tall, dark brown kelp stalks rising from the seabed. The kelp has long, yellowish-brown blades that fan out at the top. Interspersed among the kelp are patches of bright pink and red seaweed. The water is slightly hazy, creating a soft, ethereal atmosphere. In the upper left corner, there is a large, stylized graphic element consisting of overlapping curved shapes in shades of teal, light blue, and white.

Future outlook and acknowledgements

Future outlook

From the introduction of the landmark Sussex Nearshore Trawling Byelaw in March 2021 to the formation of the Sussex Kelp Recovery Project partnership, to its collaborative research effort and first baseline surveys, to the communities and people that are passionate about restoring healthy seas, **this report summarises the journey so far and how a collective effort is supporting kelp recovery and literally putting kelp back on the map.**

The return of Sussex kelp will take time. Annual surveys over the next 5-10 years are needed to record how and at what rate kelp ecosystems recover from the impacts of trawling. Monitoring is also essential to allow the SKRP to assess the impacts of other factors such as storm events, sedimentation, pollution and climate change which could hinder recovery and undermine the benefits of the Byelaw.

With the research programme now well underway, community engagement will be a key focus for the SKRP in the coming year with plans for a new website, more events and outreach with schools and local communities, supported by a dedicated Co-ordinator.

This is a collective journey, bringing together a wide network of people and organisations, with a common vision for nature recovery on a grand and pioneering scale. With early signs of kelp returning, along with reports of more fish, the SKRP is hopeful to be able to say (in the words of Eric Smith, the godfather of Sussex kelp recovery) "We are winning!"

The coming years are an exciting time for the SKRP as the partnership deepens its understanding of how nature responds to the removal of a key pressure. It has been an inspiring journey so far and we hope you will join us in helping our kelp recover to benefit people, nature and climate.

Eric Smith delights at seeing kelp washed up on the beach again in the winter of 2022.

📷 Eric Smith



How can I help the kelp?

Members of the SKRP Steering Group are often asked 'What can I do to help the kelp?'. Help has come in a multitude of ways from film-making to funding, to collecting evidence and information, to sharing contacts, images and stories.

The single most important thing that any of us can do is share this exciting journey and ensure that the recovery of the Sussex seabed is a shared endeavour, told by multiple voices for many years. The vast Sussex kelp beds were lost because they weren't visible enough. Hidden under the sea, very few people saw what was happening. Our hope is that the local sense of pride in this fascinating and beautiful ecosystem will grow over the coming years. To 'help the kelp' please share its story, stay tuned in to updates as they happen and [donate](#) to our work through our website.

Individual thanks are impossible, there are too many people supporting the SKRP to give every name, from our local divers and fishers, educators, to statutory bodies and local authorities, charities and businesses. People have been inspired and fascinated in the scientific aspects of the recovery, but also how the work relates to communities and can be supported by the arts.

In the last few years, we have met new people, new organisations and made connections and links that will change the way we all work into the future.

What is happening here in Sussex is incredibly important to us locally, but it is also important nationally – showcasing fisheries management based on ecosystem services, as well as what nature's recovery can look like.



Grey Seal Swimming.
Big Wave Productions

Thank you

Funding the co-ordination of the partnership's work has been made possible by an award from Postcode Planet Trust thanks to funds raised by players of People's Postcode Lottery and two community owned solar farms – Ferry Farm Community Solar and Meadow Blue Community Energy who are donating a percentage of their profits to support our work on kelp recovery.

The research programme of the partnership has received generous support from numerous funders. These funders have been noted in the report where relevant. Of particular note is funding by the Pebble Trust via Sussex Wildlife Trust and funding from Barclays and Platform Earth through the Blue Marine Foundation.

We have also been supported by contributions through our website, including through individual sponsored activities, fundraising, and corporate donations. Artists have generously donated their kelp related designs so that these products can help raise awareness of the project and contribute to the recovery.

Everyone working on the SKRP Steering Group extends a huge thank you to all of these individuals and organisations for making this work possible.



sussexkelp.org.uk

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Sussex Kelp Recovery Project: Progress & Impact Report 2021-2022

📷 Dominic Liddiard @ Sussex Underwater



Sussex Kelp Recovery Project

