



Sussex Kelp
Recovery
Project

UK Kelp Research and Monitoring Workshop Report

Thursday 3rd April 2025

Bramber House, University of Sussex



Sussex Kelp
Recovery
Project



Environment
Agency



NCEA
Natural Capital
and Ecosystem
Assessment



BLUE
MARINE
FOUNDATION

Paul Boniface/Sussex Underwater

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Introduction

Sussex Kelp Recovery Project partners hosted the first UK Kelp Summit on 2 April 2025, bringing together over 180 representatives from scientific, government, and environmental NGO sectors to share knowledge and research on the status of kelp in UK waters.

55 of those representatives explored the requirements for a national kelp research and data framework at the Kelp Research and Monitoring Workshop on 3 April 2025.

The workshop was facilitated by Blue Marine Foundation and funded by Sussex Wildlife Trust, Environment Agency and Ernest Kleinwort Charitable Trust.

The aims of the workshop were to collectively identify:

- 1. Key indicator species and environmental metrics for assessing UK kelp habitat condition and Sussex kelp recovery.**
- 2. The most effective methods for monitoring UK kelp ecosystems.**
- 3. The most effective methods for data sharing and ongoing communication between kelp projects in the UK.**

A pre-workshop survey (p9) gathered views on points 1 and 2 ahead of the workshop and results fed back to participants in the workshop.

Attendees then shared their knowledge and experience to address the above three points, through interactive exercises and break out groups.

Key outcomes

- General agreement was reached on the species and environmental metrics that should be prioritised and key considerations as part of any UK kelp monitoring programme:
 - Five priority species agreed: *Laminaria digitata*, *Laminaria hyperborea*, *Sacchorina latissima*, *Sacchoriza polyschides* and *Laminaria ochroleuca*.
 - Priority environmental metrics ranked in order of importance: Temperature > Turbidity > Light > Pollutants > Substrate > Nutrients > Disease and fouling > pH > Grazers > Invasive Species > Water Motion > Salinity.
 - Focus on **environmental factors over which we have some control** and that can inform improved management of pressures on kelp and marine ecosystems.
 - Importance of **local contexts and the need for flexibility** to incorporate diversions from the ‘national norm’ to focus on locally important species and environmental variables.
 - Importance of **identifying the purpose of monitoring and research at the outset** - whether to understand the ‘natural’ environmental tolerances, or to research the effect of environmental pressures on kelp growth and recovery.
- **No overall preferred monitoring methods were agreed**, as the most appropriate methods are wholly dependent on the purpose of a particular kelp monitoring or research programme.
- Participants identified several **areas for further collaborative action and knowledge exchange** if future funding/resources became available.

Update since April 2025

Since the workshop, the **Environment Agency** has progressed several workstreams relating to kelp extent and condition monitoring and ecosystem services research including:

- Reports commissioned through the marine Natural Capital and Ecosystem Assessment (mNCEA) have now been published, improving our understanding of some key ecosystem services provided by kelp habitats in the UK, available to [download here](#):
 - Inshore kelp bioremediation capacity
 - Nitrogen and carbon uptake in England's kelp forests
 - Kelp aquaculture ecosystem services
 - Biodiversity enhancement benefits of kelp forests
 - Kelp essential fish habitat evidence
- Further research has been undertaken through Defra's Marine and Fisheries Research and Development programme, including studies investigating **kelp habitat wave attenuation benefits** and building on **ecosystem services research associated with seaweed and shellfish aquaculture**.
- Data collected through the Environment Agency's National Kelp Monitoring Programme during 2024-2025 and 2025-2026, including **single-beam echosounder and dropdown video surveys** have been used to refine the **Scottish Association for Marine Science (SAMS) Kelp Species Distribution Model**, improving predictive maps of kelp presence which can be used to estimate the extent of kelp habitats around the UK, as well as in the immediate locality of survey sites.
- As part of the **Marine Restoration Potential + Enhancement (MaRePo+)** project a [Kelp Restoration Handbook](#) has been published.

Future work in 2026-2028

Funding for a further two years to support the Environment Agency's Kelp Monitoring Programme has been secured under the NCEA programme to:

- Continue single-beam echosounder and dropdown video surveys to inform the modelled asset inventory
- Complete baseline information for sentinel sites proposed for ongoing monitoring
- Explore innovative supplementary survey and analytical methods
- Further develop and refine SAMS Kelp Species Distribution Models.

The Kelp Forest Alliance is also expanding its outreach to support and connect kelp restoration practitioners globally, including:

- [Knowledge Hub](#)
- [Community Platform](#)
- [Kelp Restoration Database](#).



Workshop agenda

Session 1: Key indicators for kelp habitat condition and recovery		Session 2: Ecosystem-scale monitoring		Session 3: Co-ordination and collaboration	
Q: Which species and environmental metrics should be monitored to track kelp habitat condition, recovery, ecosystem service benefits and barriers to kelp recovery?		Q: What are the most effective methods for monitoring UK kelp ecosystems?		Q: What mechanisms can be used/developed to increase collaboration, share data and maintain communication/knowledge exchange for UK kelp projects and research?	
9.30am	Introductions – Sam Fanshawe, Blue Marine Foundation / SKRP	11.00am	Individual Exercise: Mapping Sussex/UK current kelp research, monitoring & projects	2.00pm	Natural Capital and Ecosystem Assessment programme – Erin Lawes, EA
9.40am	Overview – Professor Pippa Moore, University of Newcastle	11.30am	Sussex Kelp Recovery Project research programme – Dr Chris Yesson, ZSL/SKRP	2.15pm	Group Exercise: Priorities and methods for future coordination Discuss: • Examples of effective and low maintenance project/research networks. • Preferences for communication and knowledge exchange methods between UK kelp projects. • How we can improve data sharing between different research bodies/projects. • What innovations might enable more efficient data collection and analysis.
9.50am	Pre-workshop survey results and introduction to group exercise – Sam Fanshawe	11.40am	Innovative monitoring techniques – Dr Ray Ward, Queen Mary University of London/SKRP		
10.00am	Group Exercise: Identifying key species, metrics and ecosystem service benefits. 1. Review the pre-workshop survey results and agree a group ranking for: a. the priority species to monitor b. the priority environmental metrics to monitor 2. Discuss the added value of monitoring certain indicators/metrics.	11.45am	Group Exercise: Priority monitoring methods for standardised framework • Review the list of monitoring methods provided. • Discuss their uses, pros and cons. • Agree a cost assessment of High/Medium/Low based on range of factors	2.45pm	Plenary feedback and discussion
10.30am	Plenary feedback and discussion	12.30pm	Plenary feedback and discussion	3.15pm	Sum up and close
		1.00pm	Lunch		



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Session 1:

Key indicators for kelp habitat condition and recovery

Q: Which species and environmental metrics should be monitored to track kelp habitat condition, recovery, ecosystem service benefits of kelp, and the barriers to kelp recovery?



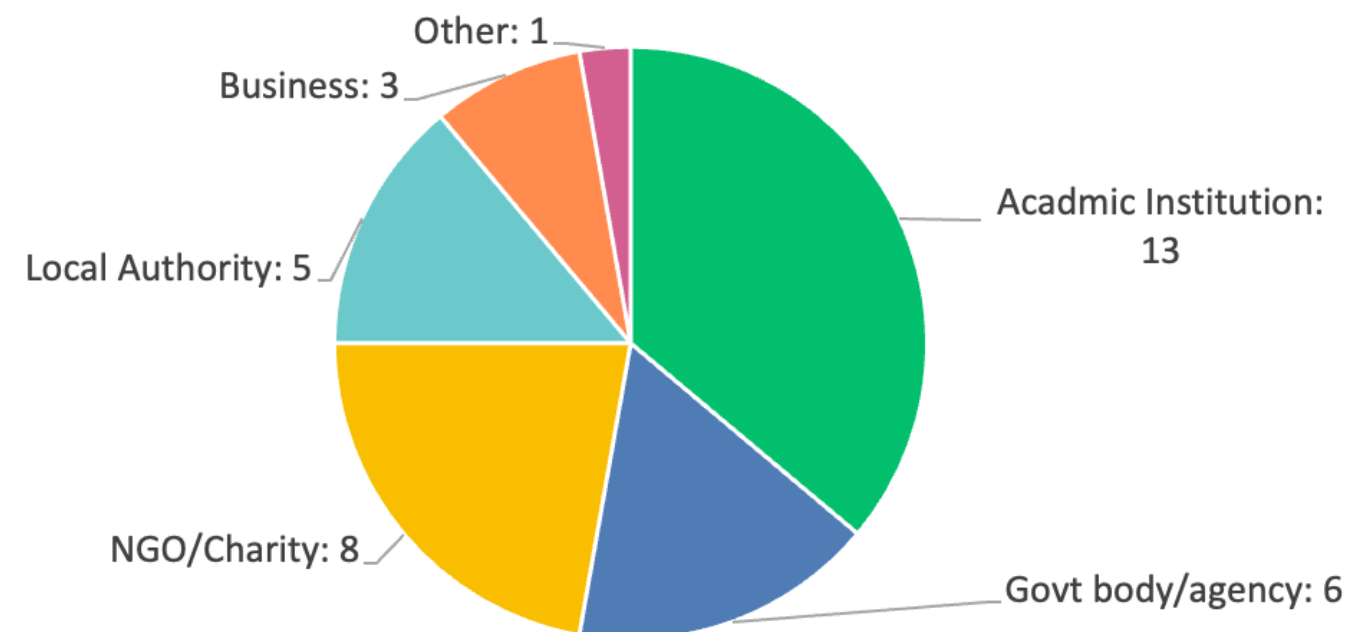
Review of survey results

A pre-workshop survey collected information from attendees to identify the key species and environmental metrics that should be monitored to track kelp habitat condition, recovery and the barriers to recovery, and the ecosystem service benefits of kelp

Q1: Tell us about yourself.

36 workshop attendees completed the survey

Responders' organisations

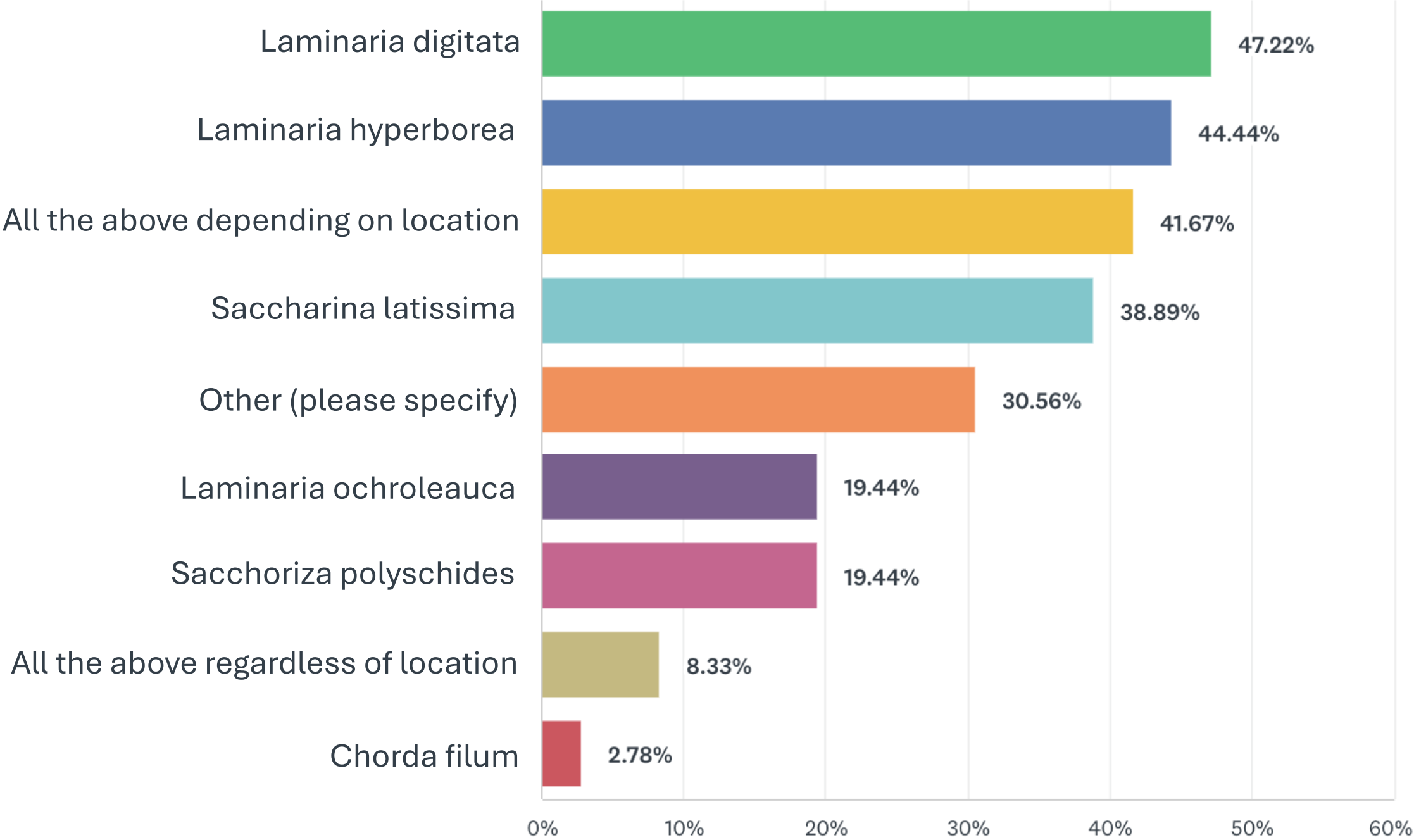


Attendee areas of expertise/research

- Benthic ecology
- Coastal geomorphology, longshore sediment transport and sedimentology
- FCERM Nature Based Solutions
- Fisheries management / Conservation / Marine ecology
- Fisheries / seagrass / maerl
- Former Head of Defra Marine Environment Science Unit
- Hydrographic Surveying/ backscatter analysis
- Inshore fisheries
- Invasives and crustaceans
- Kelp and marine conservation
- Kelp ecology, restoration and cultivation
- Kelp forest ecology and climate change impacts
- Life Sciences
- Local knowledge of Sussex kelp
- Marine algae floristics and ecology
- Marine biodiversity monitoring
- Marine conservation policy; general marine ecology
- Marine Conservation, Benthic Ecology, Seagrass Restoration
- Marine Ecology
- Marine ecology, fisheries, monitoring, sustainable management and restoration
- Marine historical ecology/social-ecological systems/environmental history/past ecosystem dynamics/shifting baselines
- Marine Sedimentary Analysis
- Nature Inclusive Design - Coastal Management
- No area of expertise - here to learn and share NEs work on MNG so far.
- Seaweed aquaculture / role of kelp beds towards organic carbon stocks in sediments
- Seaweeds in a time of rapid environmental change: biodiversity, taxonomy, systematics, genomics, biogeography, conservation, seaweed aquaculture, citizen science, structural colour
- Shellfish
- SKRP network and partnership
- Stable isotopes, geochemistry, pollution
- Terrestrial Land policy and practice with an interest on how that interacts on coastal and marine nature recovery.

Q2: Which **species** do you think are the most important to be monitored in order to increase our understanding of kelp ecosystems in the UK?

[Select the species that are most likely to recolonise an area in the UK, where that area is recovering from kelp habitat decline or is at risk of decline due to human and natural pressures.]



Q2: Responses to 'Other'

I have selected all due to the following. All kelp spp need to be monitored to enhance our overall knowledge of kelp systems and their responses in the UK e.g., spp that show increased risk to (absolute temperature) warming such as **S. latissima**.

However, those that are more likely to recolonise areas are warmer tolerant species such as **L. ochroleuca** and **S. polyschides**, which are establishing in the south west.

Also other habitat forming macro algae such as **Ascophyllum nodosum** or **Halidrys siliquosa**

I haven't put **Chorda** but would be interesting. I would add **Undaria pinnatifida** and **Sargassum muticum**.

It is still location dependant - I would have selected "All the above depending on location" if **Chorda filum** wasn't on the list, as it isn't a kelp species.

However, it might be valuable to monitor **Chorda filum** too if you think it plays a role in succession and are interested in what areas that are recovered towards kelp habitat look like (i.e. allow you to identify best areas for recovery of kelp species)

Ecosystem indicators + geomorphology

Non natives?

The exception being **Corda filum**

I cant answer the above, but consider **Mussel** expansion and overall diversity and abundance of species to be vital aspects to monitor

Undaria pinnatifida

Prior to restoration, the original driver of loss needs to be addressed / mitigated, otherwise efforts will be wasted. Conservation/ management of existing kelp habitats will be more cost effective than restoration.

Q2: Responses to 'Other' continued

Some evidence of declines in **Saccharina latissima** in south west UK – consider also monitoring **Alaria esculenta** which is likely to be declining (both are cold adapted 'climate losers').

Due to likelihood of declines in the near future, these two species could be the most suitable candidates for restoration.

They are also both already cultivated in Ireland, so protocols are relatively established. To survive conditions of ocean warming, resilient strain selection / thermal priming should be considered as part of restoration efforts.

Monitoring / understanding on Kelp habitats in the UK lags behind many other regions globally, a lack of fundamental ecological knowledge hinders targeted development of restoration strategy in the UK.

See Smale et al EA report (Marine Natural Capital and Ecosystem Assessment, 2025) for discussion / recommended of monitoring 'sentinel sites' in areas of rapid change, where several kelp species co-occur.

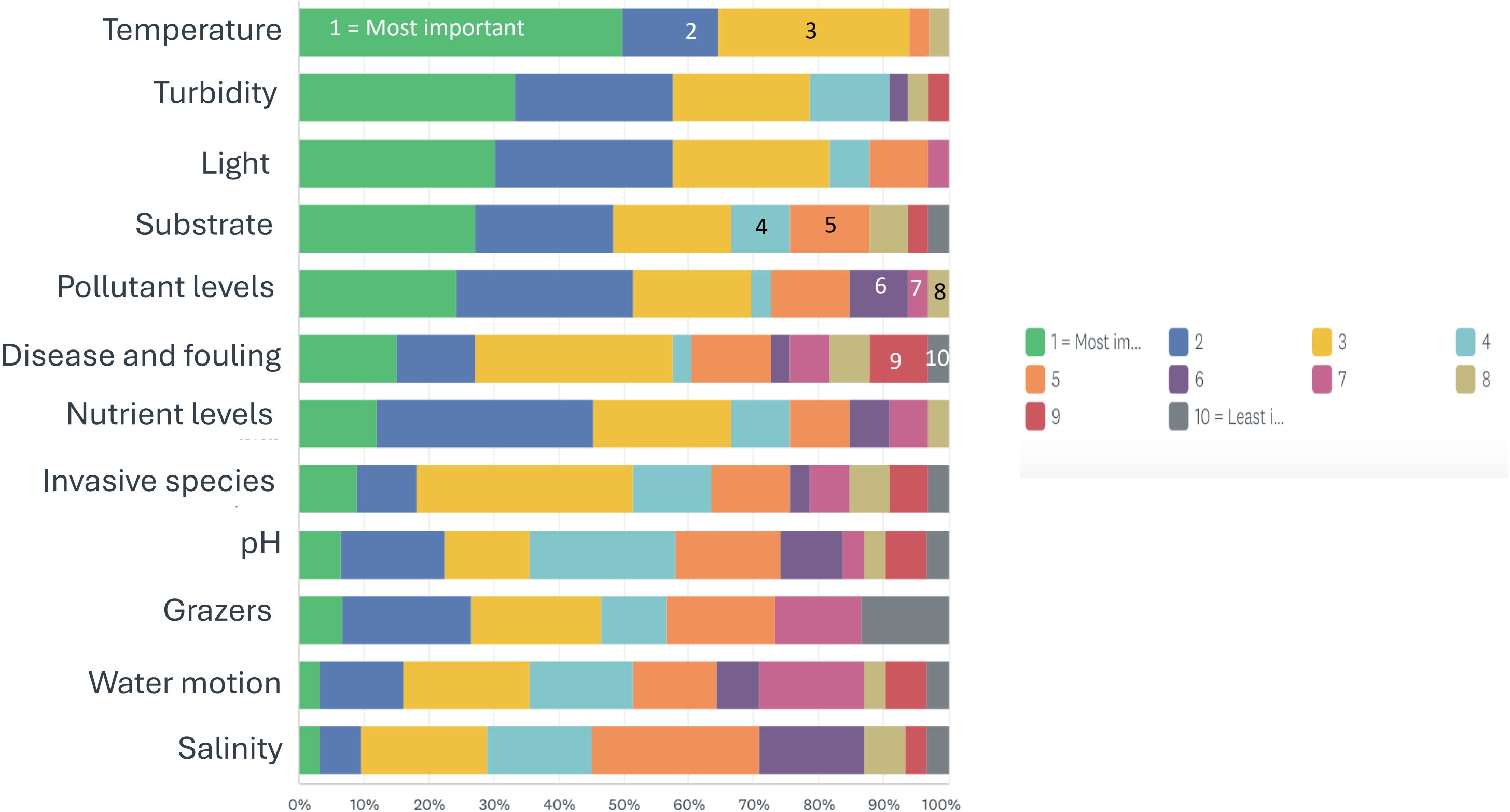
Laminaria hyperborea is the 'most important' for delivery of ecosystem service (particularly habitat provisioning), and is the most extensively distributed species in the UK, hence is worthy of monitoring attention.

Both **Laminaria ochroleuca** and **Sacchoriza polyschides** are 'climate winners' which are expanding in South West UK, and could have ecosystem level impacts if they were to displace **L. hyperborea** (reduced availability of habitat due difference in stipe communities; shorter lifespan ~ 9 months for **Sacchoriza**).

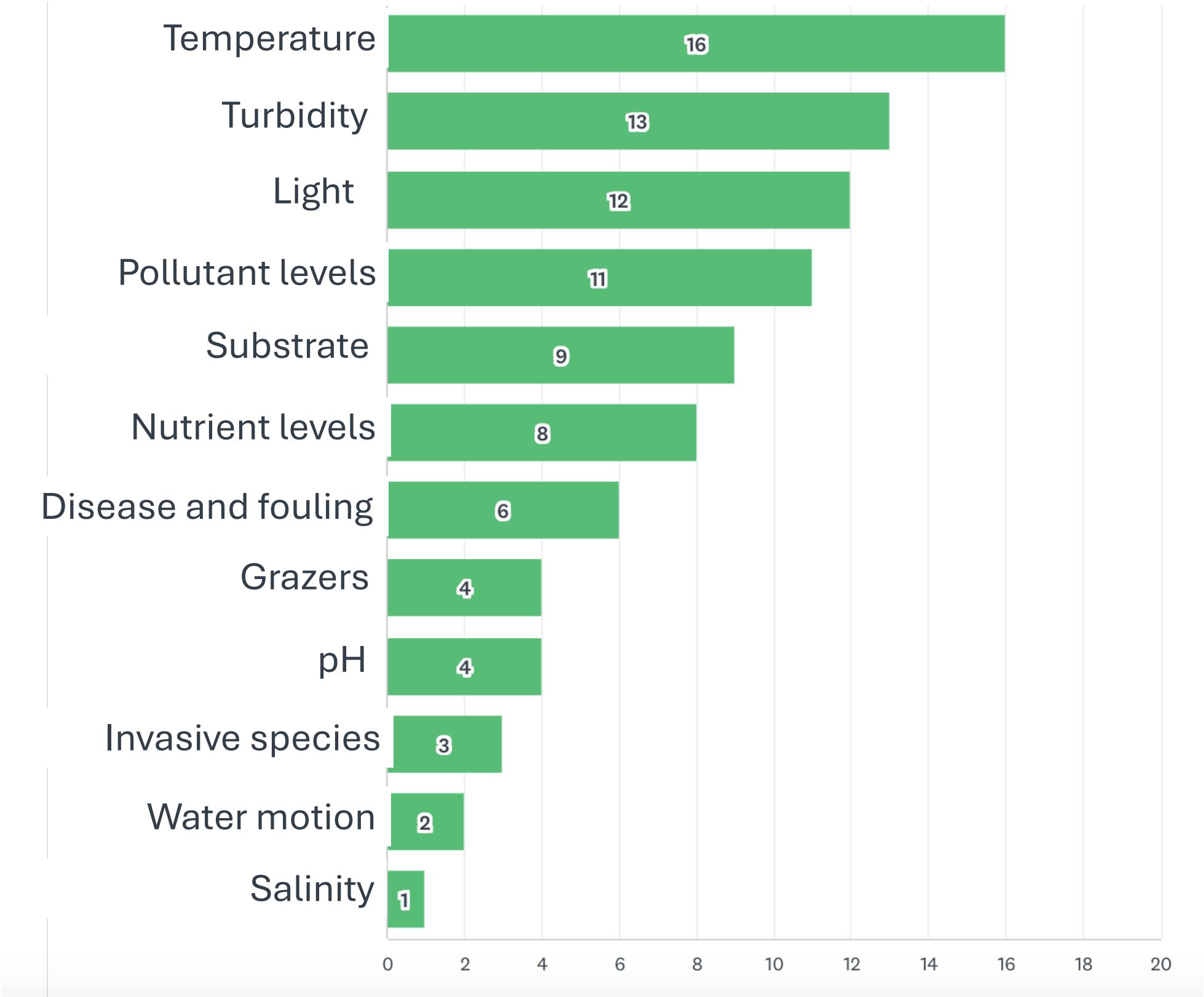
S. polyschides is an opportunistic, 'weedy' species which readily colonised gaps in the kelp canopy following disturbance, so is likely to recolonise naturally provided source populations exist near by.

L. ochroleuca has spread to NW Ireland with no known connecting populations between there and Lundy Island/Pembrokeshire, although this may reflect a lack of evidence rather than true absence of connecting populations.

Q3: Which **environmental metrics** are the most important to be monitored in order to increase our understanding of the environmental limits and tolerances for kelp settlement and growth in the UK? *Rank the following in order of importance from 1 (most important) to 10 (least important)*



Q3 Continued: 1st and 2nd choices combined and reordered

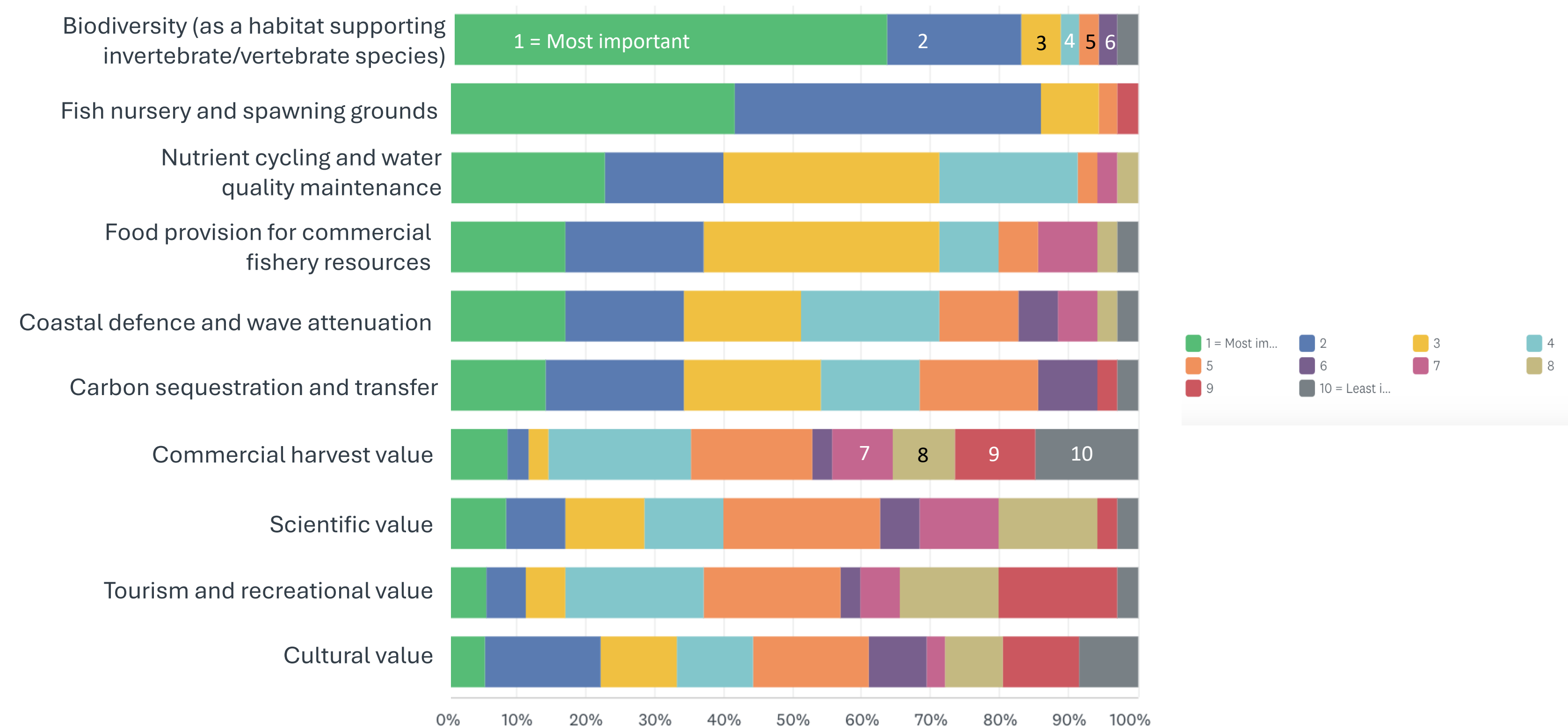


Comments:

- **Maximum depth penetration**
- **Fishing – Commercial**
- I am interested in the **pathways of kelp detritus** as contribution to the organic carbon stocks in marine sediments - this links with the potential of carbon sequestration in marine sediments. Any information on how far detritus disperse around the kelp beds (detritus type, size etc.), presence and quantity of kelp detritus/carbon in sediments (eg via eDNA) would be incredibly useful and would help linking donor (kelp beds) with receiver (sedimentation/burial) sites.
- **Substrate** - I qualify the importance of this variable with reference to the **resuspension of sediment** and the **subsequent transportation** (obviously a cross-over with **turbidity** here) but the monitoring of the **pollutants** being potentially reintegrated into kelp's ecosystem via the localised sediment sink, as opposed to the rock substrate that the kelp itself grows on.
- There are lots of overlaps to consider here.
- **Climate change** is a key driver of ecological change, inc kelp. **Availability of hard substrate** mapping at sufficient resolution is currently a limiting modeling of kelp distribution (e.g. Mike Burrows at SAMs). **Water motion** i.e. hydrology / current regime will dictate availability of propagules to recolonize following local losses - spores generally only travel 100's of m, although mature / reproductive 'drift plants' could travel much further. **Water clarity (light/turbidity)** is limiting to all kelp species. Other: **sedimentation** - was this not a driver linked to loss in Sussex, as a result of benthic trawling?!

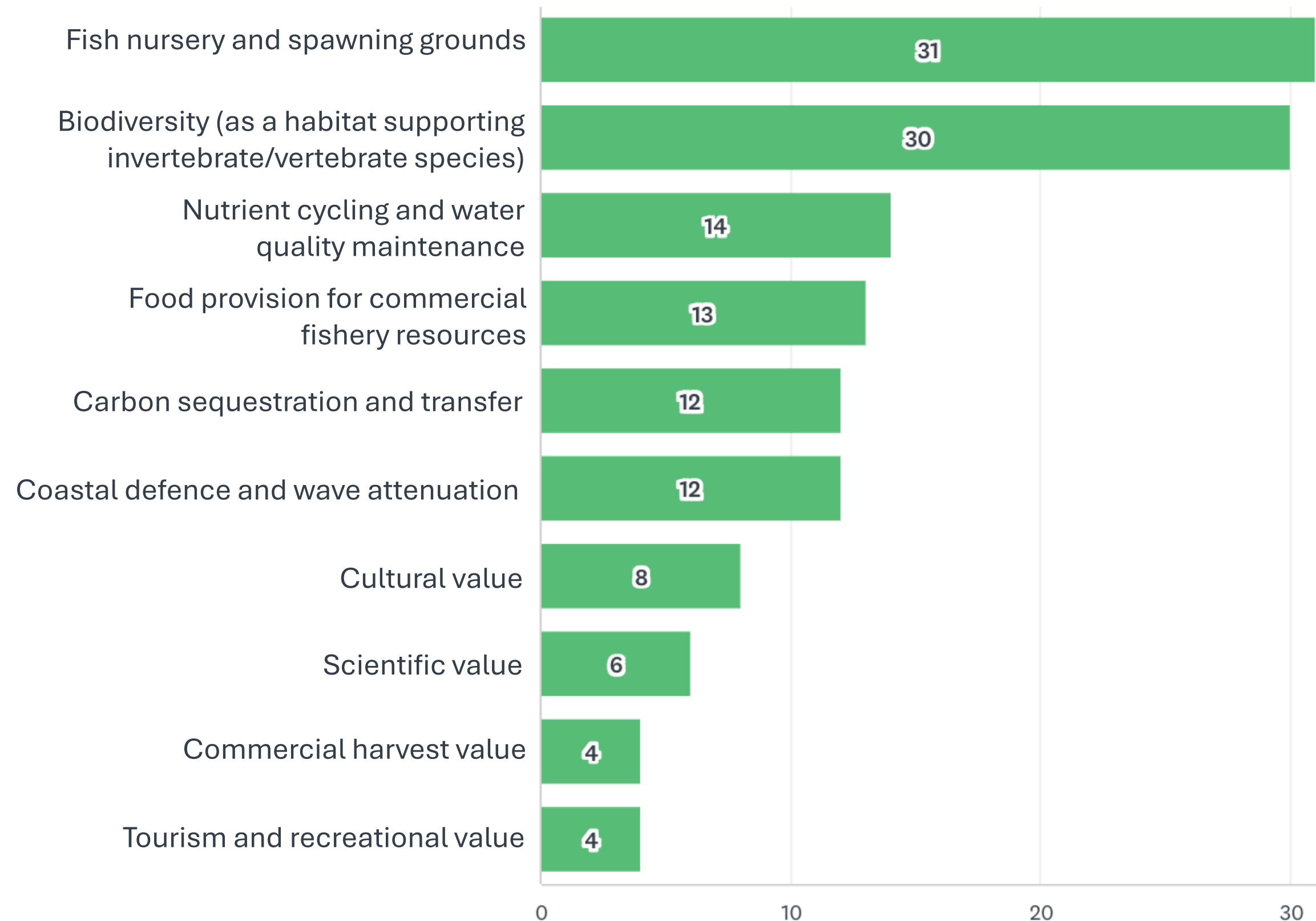
Q4: What are the **key ecosystem and regulating services** that need to be researched in order to assess the total ecosystem service value of different kelp species?

For example, to answer the question ‘kelp species x is important because of the services it provides for.....’.



Q4: What are the **key ecosystem and regulating services** that need to be researched to assess the total ecosystem service value of different kelp species?

1st and 2nd choices combined and reordered



- Comments:
- **Engagement with commercial fisheries. Role of Sussex IFCA in management.** Legal framework
 - **Provision of services to restoration of other habitats....**its value in a seascape setting
 - **Carbon sequestration rates of Kelp species** varies so dramatically and the absolute value of storage are related to its capacity to be undisturbed, preferably in a deep sea system - so whilst it is of paramount importance, the measurement of such is still in debate.
 - I have marked associations with **commercial fisheries** and **habitat provision specifically as nursery/spawning** as high, as these areas of research are very limited. The same for **carbon sequestration**, we don't know enough yet. **Commercial harvest** is increasing in the UK, however, answers here will depend on perspectives and expertise. We know kelps are of **ecological, social and cultural value**, but we always need more data!



Group Exercise 1:

Identifying key species, indicators and metrics

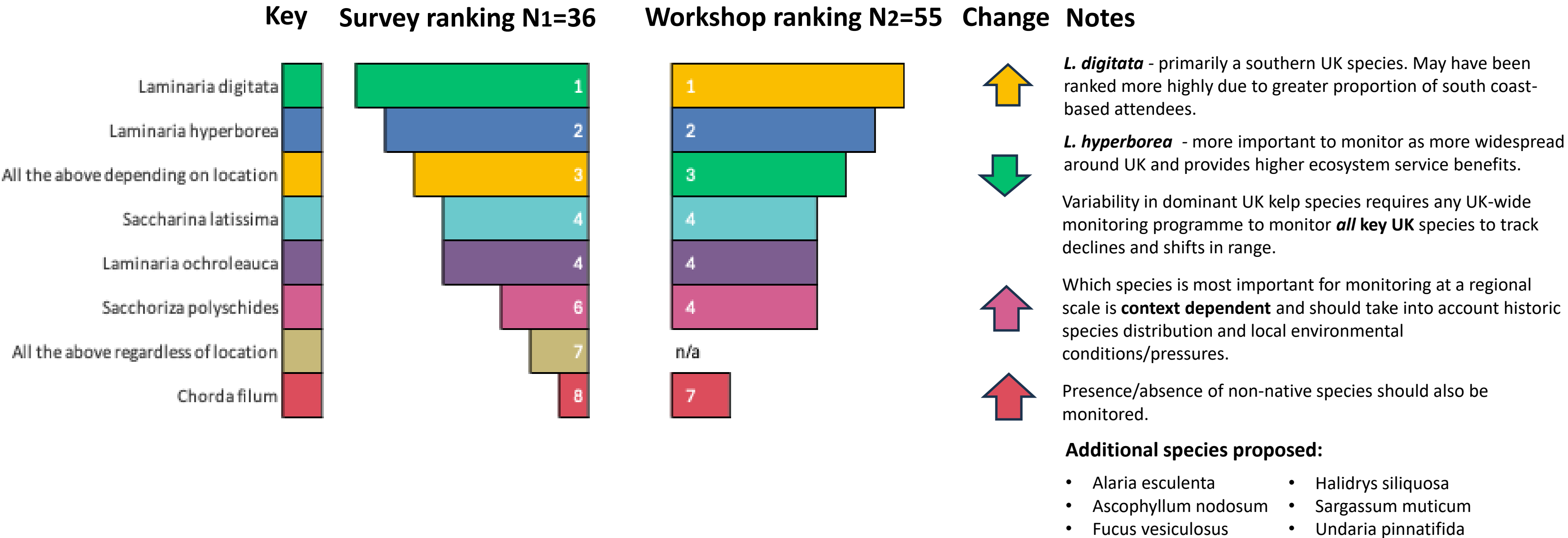
Q: Which species and environmental metrics should be monitored to track kelp habitat condition, recovery, ecosystem service benefits of kelp, and the barriers to kelp recovery?

Group exercise: Identifying key species, indicators and metrics

Participants reviewed the pre-workshop survey results on the ranking of priority species and metrics to monitor and discussed variations to this to arrive at a Group agreed ranking.

A: Priority species to monitor:

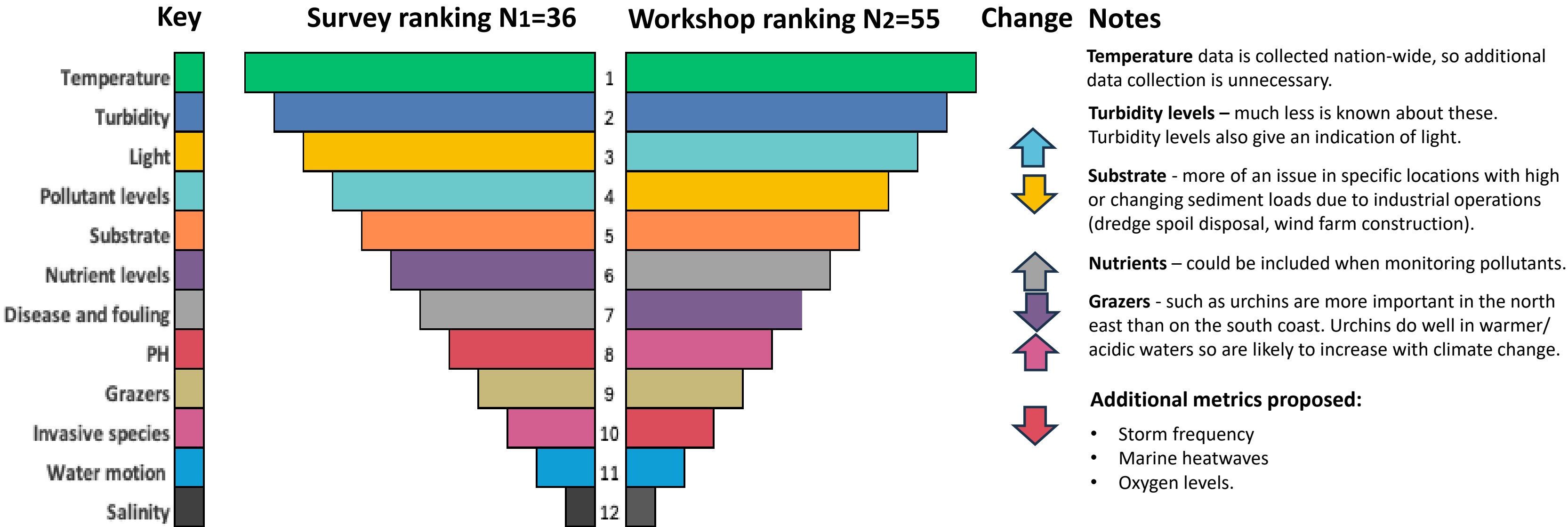
Which species are the most important to be monitored to increase our understanding of kelp ecosystems in the UK?



Group exercise: Identifying key species, indicators and metrics

Participants reviewed the pre-workshop survey results on the ranking of priority species and metrics to monitor and discussed variations to this to arrive at a Group agreed ranking.

B: Priority environmental metrics to monitor: Which environmental metrics are most important to be monitored to increase our understanding of the environmental limits and tolerances for UK kelp settlement and growth?



Key outcomes

Q: Which species and environmental metrics should be monitored to track kelp habitat condition, recovery, ecosystem benefits of kelp and the barriers to kelp recovery?

- **General agreement was reached on the species and environmental metrics** that should be prioritised in a UK kelp monitoring programme:
 - Five priority species were ranked in terms of importance: *Laminaria digitata*, *Laminaria hyperborea*, *Sacchorina latissimi*, *Sacchoriza polyschides* and *Laminaria ochroleuca*.
 - Priority environmental metrics were ranked in order of importance: Temperature > Turbidity > Light > Pollutants > Substrate > Nutrients > Disease and fouling > pH > Grazers > Invasive Species > Water Motion > Salinity.
 - Agreed that focus should be on **environmental factors over which we have some control** and that can inform improved management of pressures on kelp and marine ecosystems.
 - Agreed on the importance of **local contexts and the need for flexibility** to incorporate diversions from the 'national norm' to focus on locally important species and environmental variables.
 - Agreed on the importance of **identifying the purpose of monitoring and research at the outset** - whether to understand the 'natural' environmental tolerances, or to research the effect of environmental pressures on kelp growth and recovery and whether to assess density, extent and or diversity.



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Session 2:

Ecosystem scale monitoring

Q: What are the most effective methods for monitoring UK kelp ecosystems?



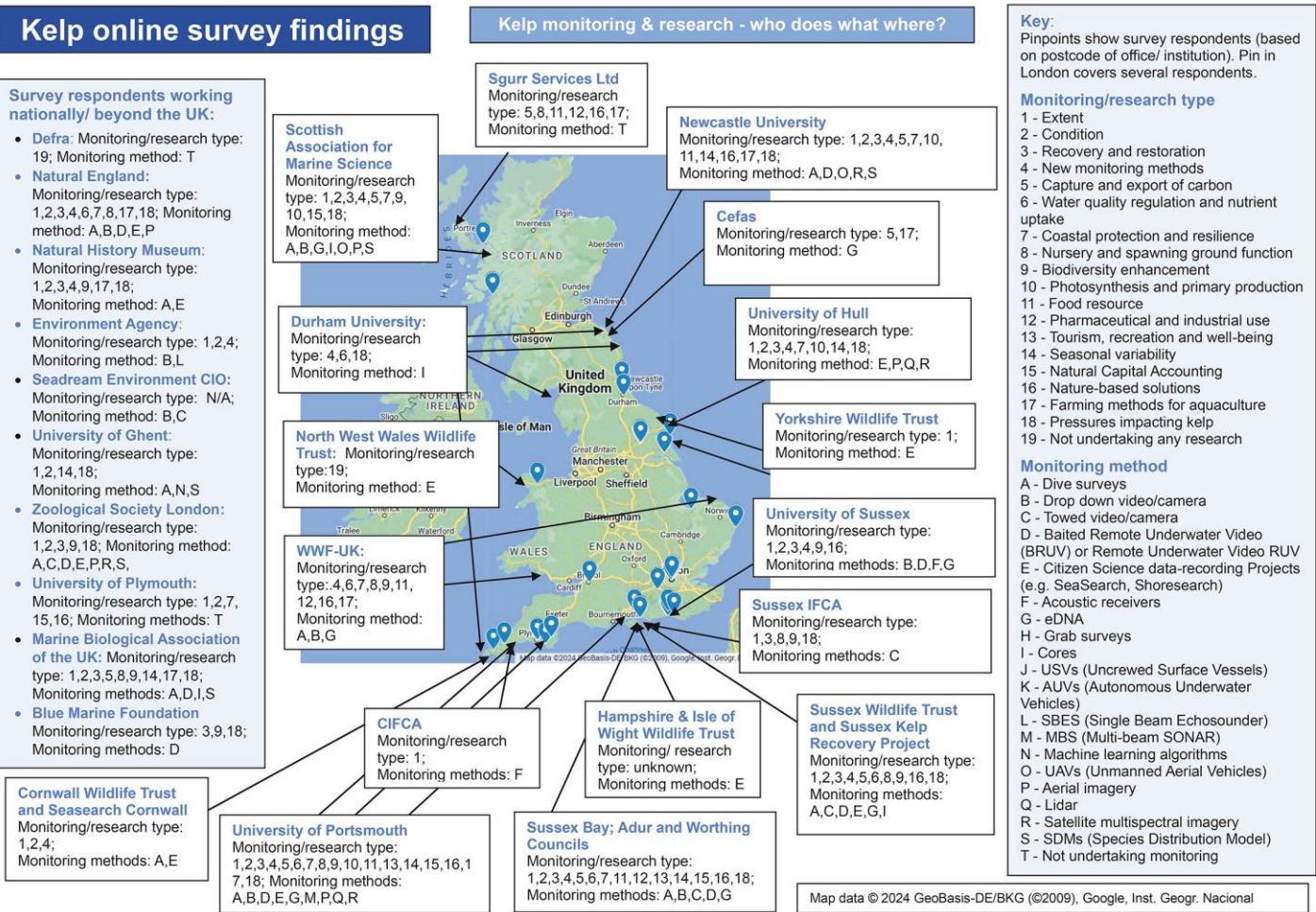
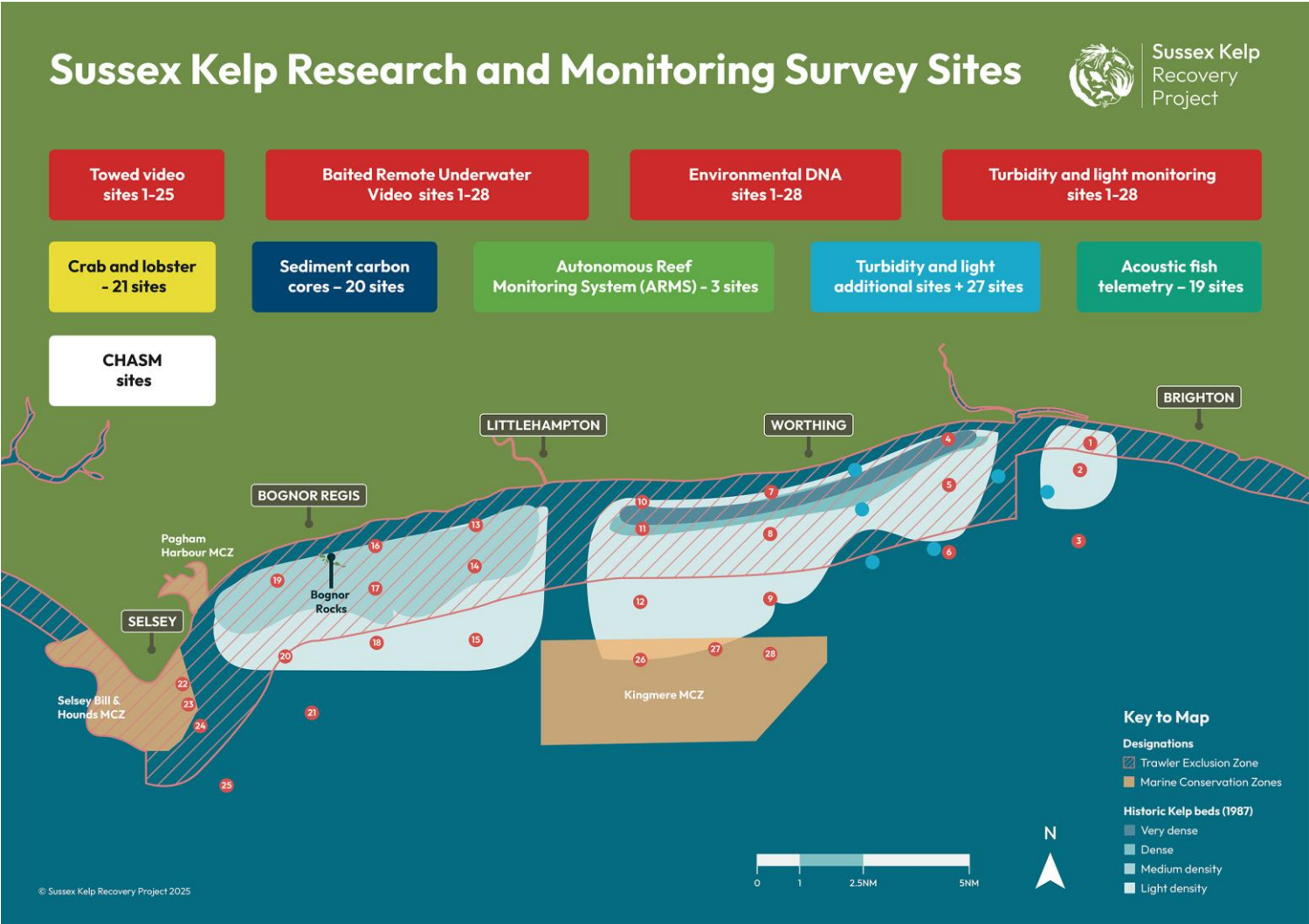
Individual Exercise:

Mapping current kelp research and monitoring

Using Post-it notes participants added any kelp monitoring, research and projects to the pre-prepared maps of currently known kelp research and monitoring in the UK and Sussex.

UK / Sussex Kelp Monitoring and Research – Who, what & where

Pre-prepared maps for interactive exercise



Towed video sites 1-25

Baited Remote Underwater Video sites 1-28

Environmental DNA sites 1-28

Turbidity and light monitoring sites 1-28

Crab and lobster - 21 sites

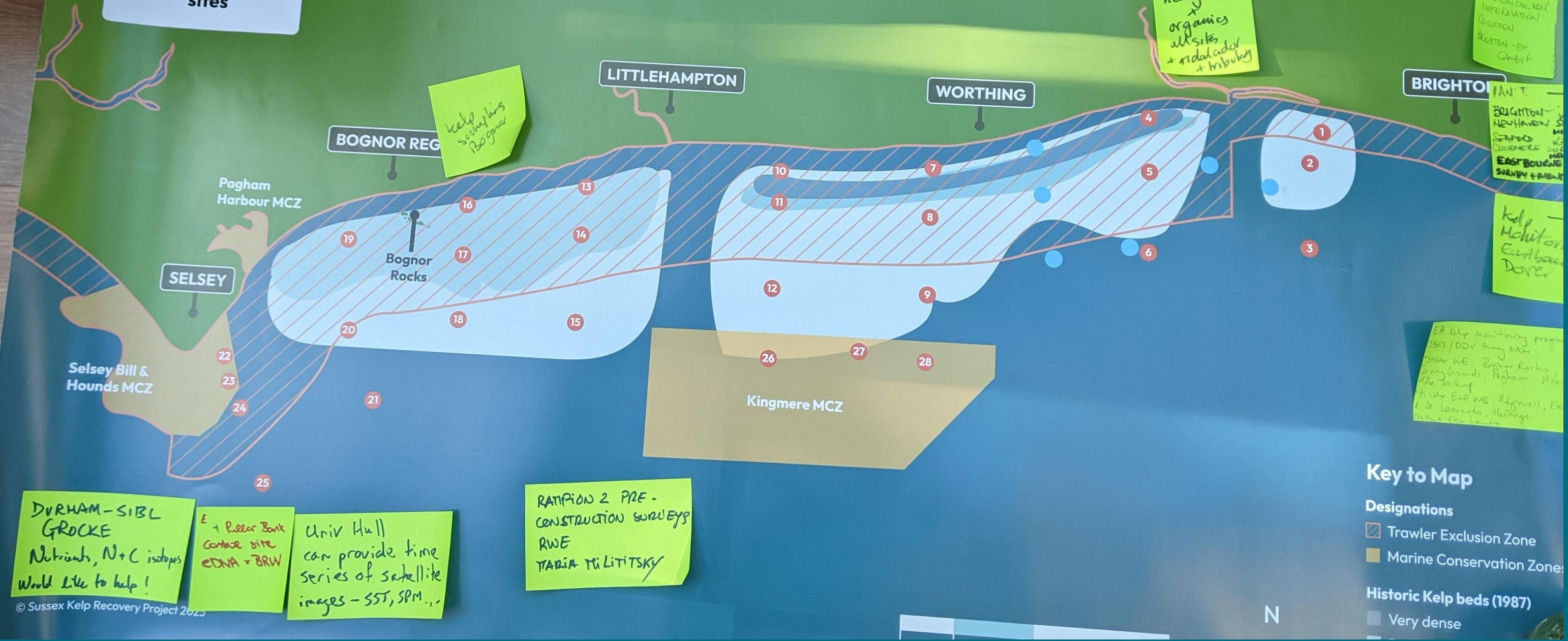
Sediment carbon cores - 20 sites

Autonomous Reef Monitoring System (ARMS) - 3 sites

Turbidity and light additional sites + 27 sites

Acoustic fish telemetry - 19 sites

CHASM sites



BRUV's before management confined
→ BASELINE

heavy metals + organics all sites + tidal adobe + tributary

HISTORICAL INFORMATION LOCATION BRIGHTON → GARDEN

BRIGHTON NEWHAVEN SEAFOOD CRUISE SURVEY EASTBOURNE SURVEY + MCZ

Kelp Monitoring Eastbourne Dover

EA kelp monitoring program SSES/DDV survey sites: Sussex WG: Bognor Rocks, Bognor Regis, Pagham, Littlehampton, Worthing, Brighton, Eastbourne, Dover. Sussex EA WG: Haldon, Eastbourne, Hastings, Brighton, Dover. Sussex EA WG: Haldon, Eastbourne, Hastings, Brighton, Dover.

help sampling Bognor

DURHAM-SIBL GROCKE Nutrients, N+C isotopes Would like to help!

E + Poller Bank Centre site EDNA = BRUV

Univ Hull can provide time series of satellite images - SST, SPM, ...

RATIPION 2 PRE-CONSTRUCTION SURVEYS RWE TATIANA TILITITSKY

Key to Map
Designations
Trawler Exclusion Zone
Marine Conservation Zone
Historic Kelp beds (1987)
Very dense

Individual exercise output: Sussex kelp research, monitoring & projects

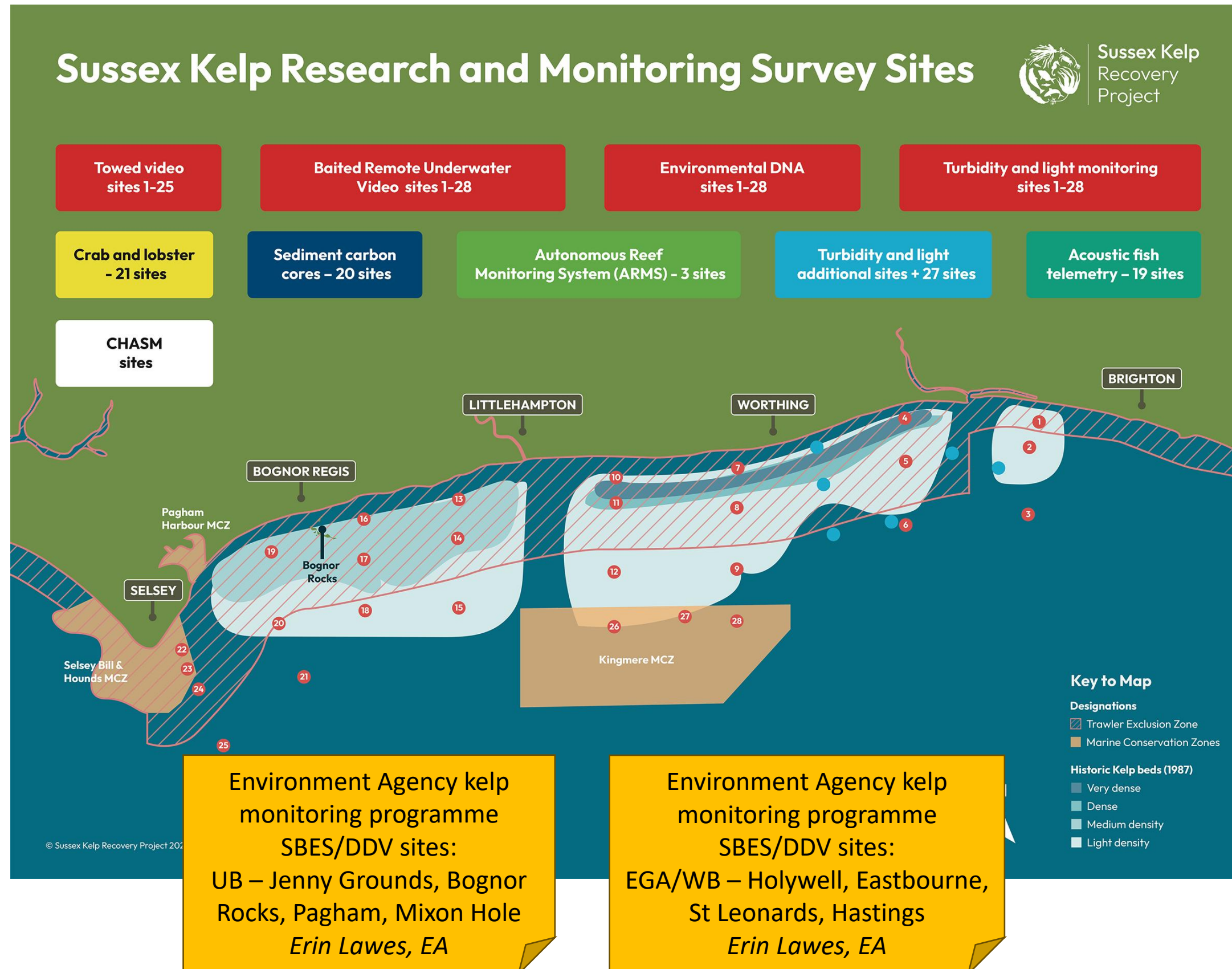
Nutrients,
Nitrogen &
Carbon isotopes
*Durham University,
Darren Grocke*

Kelp sampling
Bognor

Pullar Bank site –
eDNA and BRUVs

Rampion 2 pre-
construction
surveys
*RWE Maria
Milititsky*

Time series of
satellite images –
SST / SPM
University of Hull



Heavy metals and
organics – all sites +
tidal Adur and
tributary

Kelp survey mapping:
Brighton – Newhaven,
Seaford – Cuckmere
Ian Tittley

Kelp survey mapping
+ monitoring
Eastbourne - Dover
Ian Tittley

Historical kelp
information
Brighton - Camber

Beachy Head East
MCZ – BRUV
baseline surveys

Environment Agency kelp
monitoring programme
SBES/DDV sites:
UB – Jenny Grounds, Bognor
Rocks, Pagham, Mixon Hole
Erin Lawes, EA

Environment Agency kelp
monitoring programme
SBES/DDV sites:
EGA/WB – Holywell, Eastbourne,
St Leonards, Hastings
Erin Lawes, EA



Group Exercise 2:

Monitoring methods

Q: What are the most effective methods for monitoring UK kelp ecosystems?

Group exercise: Prioritise monitoring methods for a standardised framework

In six groups, attendees discussed and reviewed monitoring methods in rotation, scoring them against points 1, 2 and 3 below.

Monitoring methods

Biodiversity methods		Substrate surveys	Habitat mapping	Water quality	Aerial monitoring
• Dive surveys (quadrats/transects) • Drop down video/camera • Towed video • Baited Remote Underwater Video (BRUV)	• Acoustic receivers • Water Column eDNA • ARMS	• Grab surveys • Substrate coring • Substrate eDNA	• Single Beam Echosounder • Multi-beam SONAR • Lidar • Side scan SONAR	• SONDEs • Secchi • Sediment traps	• Unmanned Aerial Vehicles (UAVs) • Aerial imagery • Satellite multispectral imagery

1

2

3

Their uses for measuring different metrics (Biotic metrics)
• Disease • Fisheries benefits • Grazers/herbivore levels • Kelp biomass • Kelp density • Kelp extent / % cover • Species abundance - invertebrate/vertebrate • Species diversity - invertebrate/vertebrate • Species assemblages

Their Pros and Cons
<i>Considering factors such as:</i> • Weather dependency • Expertise level required • Data reliability and accuracy • Value in informing management measures

Cost assessment: H/M/L
<i>Considering factors such as:</i> • Material/Equipment/Boat costs • Labour cost • Frequency required • Data analysis requirements

Group Exercise Results: Monitoring methods – Biodiversity monitoring

		Uses	Pros	Cons	Cost
Biodiversity methods	Dive surveys	• Ground truthing • Sessile & mobile species abundance & diversity • Species assemblages • Substrate type • Kelp density/biomass measurements /tissue samples • Fisheries management • Finer scale data • Direct observation and sampling	✓ Best way to collect samples ✓ Divers create flexibility to deploy and retrieve equipment ✓ High resolution data and details ✓ Education benefits ✓ Community involvement	✗ Weather dependent ✗ Visibility dependent ✗ Time limited to dive time ✗ Difficult to standardise and quality assure data ✗ Prone to diver subjectivity ✗ Disturbance of biodiversity ✗ Labour intensive and expensive ✗ Health & safety risks and liabilities ✗ Limited/small geographic scale	Medium to High ££-£££ • Medium to High depending on location and scale
	Drop down video/camera	• Ground truthing/exploratory surveys • Species abundance/diversity • Species assemblages • Substrate type • Grazers • Disease	✓ Easy to use ✓ Good quantitative data ✓ Standardised data ✓ Sensors can be added ✓ Polecam – EA – Transect through canopy to see all areas of kelp forest	✗ Weather dependent ✗ Visibility dependent ✗ Kelp occludes view ✗ Sensitivity to turbidity ✗ Time consuming processing and analysis (without AI) ✗ Limited/small geographic scale	High – Medium £££ - ££ • High equipment costs • Low ongoing boat & research time
	Towed video	• Ground truthing • All biotic factors except disease • Substrate type	✓ Relatively good spatial coverage ✓ Good if towed above kelp canopy ✓ Good for picking up envtl change eg appearance of urchin barrens ✓ Visually engaging	✗ Kelp occludes view ✗ Limited to certain habitats – not good over rocky terrain ✗ Limited/small geographic scale ✗ High data storage use	High – Medium £££ - ££ • Initial high equipment outlay
	BRUVs	• Ground truthing • Species abundance/diversity/size • Species assemblages • Substrate type and structure • Nursery habitats	✓ Good for commercially valuable predatory fish species ✓ Relative species abundance ✓ Visually engaging	✗ Weather dependent ✗ Visibility dependent ✗ Kelp occludes view ✗ Biased to predatory species (bait) ✗ High data storage use	Low to Medium £ - ££ • Relatively low cost after initial equipment cost

Group Exercise Results: Monitoring methods – Biodiversity (continued)

		Uses	Pros	Cons	Cost
Biodiversity methods	Acoustic monitoring	• Detect presence/absence of species • Detect noise inputs/effects • Assess biodiversity recovery • Long term acoustic baseline data (soniferous species and noise) • Assess habitat condition • Identify/detect bioindicators • Habitat use, species movement and behaviour • Detects health (cloudier = healthier)	✓ Can detect commercial species ✓ Identifies protected versus non-protected species ✓ Connection to underwater world ✓ Soundscapes aid public engagement	✗ Weather dependent ✗ Logistics – e.g. battery life ✗ Location dependent to avoid boat noise interference ✗ Acoustic tags are invasive to fauna ✗ Requires specialists/experts ✗ Maintenance of equipment ✗ Shallow water use only ✗ Only for sound omitting sources	Medium ££ • Low cost equipment • Expertise is expensive • Ongoing cost and maintenance
	eDNA sampling	• Detect presence/absence of species • Species assemblages • Grazers • Not good for measuring abundance	✓ Very sensitive ✓ Easy to collect data (could be done by Citizen Science) ✓ Not time sensitive – can freeze and analyse later	✗ Weather dependent ✗ False positives ✗ Emerging tech – not yet 100% reliable ✗ Need a standardised method	Medium ££ • Low cost for collection • Lab analysis is expensive • Cost effective if using boat for other surveys
	ARMs	• Biodiversity assessment of benthic and sediment communities ✓ Assessment of small scale benthic diversity – not feasible with other methods ✓ Diverse use – from microbes to macrofauna and flora	✓ Not overly-complex ✓ High diversity of data collected	✗ Weather dependent ✗ Difficult to deploy - has to stick to the seabed ✗ Difficult to recover ✗ Time consuming ✗ Difficult to find ✗ Small area ✗ Single point of data ✗ Post-collection analysis is a lot of work ✗ Requires dive team to set up	Medium ££ • Analysis is highest cost • Low cost option for basic ARMs package • Boat costs • Dive time and equipment

Group Exercise Results: Monitoring methods - Substrate

		Uses	Pros	Cons	Cost
Substrate surveys	Grabs	• Infaunal species abundance/diversity • Species assemblages • Substrate type • Carbon uptake/release • Nutrients • Pollutants	✓ Reliability ✓ Can study different areas of kelp e.g. holdfast / stype / fronds ✓ Easy (but some equipment is heavy) ✓ Suitable for most weather conditions	✗ Requires permissions ✗ Potentially destructive /extractive ✗ Heavy unwieldy equipment ✗ Not suitable for kelp forests – only soft sediments ✗ Large boat with winch needed ✗ Time consuming ✗ Not suitable for studies of a wider area (must combine with sonar)	Low – Medium £ - ££ • Analysis and boat hire are main costs
	Substrate coring	• Substrate type • Carbon and sediment dating • Pollutants over time • Changes in species over time • Redox conditions • Sediment infall	✓ Geochronology very good ✓ Amount of ‘good’ data ✓ Data on historic trends ✓ Benthic change/communities	✗ Not suitable for kelp forests or rocky reefs ✗ Soft sediment only ✗ Limited coverage (point data) ✗ Labour intensive ✗ Depth restricts who can take samples ✗ Divers with expertise required	Low – Medium £ - ££
	Substrate eDNA	• Carbon dating • Carbon contribution • Pollutants • Can be an addition to cores/surveys • Biodiversity	✓ Easy to add to other surveys	✗ Not suitable for kelp forests or rocky reefs ✗ Unconsolidated substrates only ✗ Requirement to reference material	High £££ • High level of expertise and therefore cost for analysis

Group Exercise Results: Monitoring methods – Habitat mapping

		Uses	Pros	Cons	Cost
Habitat mapping	Single beam Echosounder	• Bathymetry • Biomass height and volume • Extent • 3D view • Shallow water use	✓ Most boats have one ✓ Can be transferred between boats ✓ Fixed ✓ Better for shallow waters 5-30m ✓ Good quality images	- X Weather dependent - X High cost of fieldwork - X Requires ground truthing - X Calibration required - X Data blindspots – under the boat - X Turbidity, salinity & weather impacts data/image quality - X Needs interpolation - X Training required - X High expertise level - X Small area	Low £ • Compared to Multibeam
	Multi-beam SONAR	• Bathymetry • Substrate mapping • Bio height and volume • Biomass and extent • Fisheries benefit • Better for deeper waters	✓ High quality ✓ High accuracy ✓ High/large coverage ✓ Mobile ✓ No blindspots as usually towed behind vessel	- X Weather dependent - X High cost of fieldwork - X Requires ground truthing - X Calibration required - X Training required	High £££
	LiDAR	• Bathymetry (40m) • Low depth to 40m • Bio height and volume • Sedimentation	✓ Large swath ✓ Cover large areas very quickly	- X Weather dependent - X High cost of fieldwork - X Requires ground truthing - X Calibration required - X 40m max depth - X High expertise level required - X Not eye-safe (rarely used in the UK)	High £££ • Expertise cost • Expensive for the resolution scale
	Side scan SONAR	• Bathymetry • Species • Extent	✓ Large scale ✓ Development of AI for analysis ✓ Suitable for shallower water	- X Weather dependent - X High cost of fieldwork - X Requires ground truthing - X Calibration required - X Slow data collection - X High expertise level	Medium ££

Group Exercise Results: Monitoring methods – Water quality

		Uses	Pros	Cons	Cost
Water quality	SONDEs	• Light • Turbidity • Water quality • Temperature • Dissolved oxygen • Organic matter (Chlorophyll) • Ammonia	✓ Flexibility ✓ Can lower into kelp bed ✓ Continuous data ✓ 'Aqua read' conductivity	✗ Biofouling ✗ Need multiple SONDEs in an array ✗ Single data point ✗ High maintenance ✗ Calibration required ✗ Limitations on data storage ✗ Requires high level of Quality Assurance ✗ High expertise required	Medium - High ££ - £££
	Secchi	• Light • Turbidity	✓ Simple/easy/minimal effort ✓ Easy to collect data (could be done by Citizen Science) ✓ Long time series ✓ General trends detectable	✗ Less accurate below 0.5m ✗ Vulnerable to algal blooms ✗ Weather dependent ✗ Equipment is not standardised ✗ Researcher subjectivity	Low £
	Sediment traps	• Productivity • Sedimentation rate/type • Carbon burial • Biological community	✓ Simple/easy/minimal effort ✓ Historical/seasonal (layers of sediment determine time scale) ✓ Can leave traps over long periods	✗ Analysis is time consuming and requires expertise ✗ Very localised data ✗ Equipment is not standardised ✗ Loss of gear	Medium ££ • Fieldwork is low cost but analysis is high cost
	Bottle sampling	• Nutrient and pollution collection	✓ Simple/minimal effort ✓ Accessible	✗ Water contamination	Low £

Group Exercise Results: Monitoring methods – Aerial

		Uses	Pros	Cons	Cost
Aerial Monitoring	UAVs (Unmanned Aerial Vehicle)/ Drones	• Mapping • Turbidity • Activity monitoring • Fishing/shipping vessel movements • Kelp density and extent • Disease • Water motion • Primary productivity	✓ Highest resolution method ✓ Rapid ✓ AI analysis ✓ Large/medium spatial scales ✓ High/low shore limits	- X Calibrating (impact of YAW) - X Visibility limitations - X Weather dependent - X Intensive training - X Time consuming processing and analysis (without AI) - X Licensing and access - X Personal privacy (nearshore) limitations	High £££
	Aerial Imagery	• Mapping • Turbidity • Snapshot of human pressures (landslips, constructions, fishing, boating) • Habitat level monitoring • Indicator of suitable habitat • National Network of Regional Coastal Monitoring Programmes (NNRCMP) – 6 year monitoring programme does not identify kelp	✓ High resolution ✓ Rapid ✓ AI analysis ✓ Large spatial scales ✓ Historical data (as a baseline)	- X Limited availability to take pictures - X Ground truthing required - X Visibility limitations - X Lower resolution	High £££ • Airplane hire
	Satellite multisectoral imagery	• Turbidity • Fishing/shipping vessel movements • Temperature • Acidity/pH	✓ High resolution (1.5m -100m) ✓ Free* ✓ Large spatial scales	- X Variable return rate - X Visibility limitations/cloud cover - X Lower resolution - X Too much data – no filters	Low £ • Free (Sentinel 1 & 2) • *Free for academics but cost for corporate & government • Higher cost for high res

Key outcomes

Q: What are the most effective methods for monitoring kelp ecosystems?

No overall preferred monitoring methods were agreed, as the most appropriate methods are wholly dependent on the purpose of monitoring or research.

The Kelp Forest Alliance produced a **Guidebook to Kelp Forest Ecosystem Monitoring** published in 2024 which provides a detailed assessment of many of the methods discussed in the workshop:

[Kelp Forest Ecosystem Monitoring - Kelp Forest Alliance](#)





**Sussex Kelp
Recovery
Project**

Session 3: Co-ordination and collaboration

Q: What mechanisms can be used/developed to increase collaboration, share data and maintain communication/knowledge exchange for UK kelp projects and research?



Group Exercise 3:

Priorities and methods for future co-ordination

Q: What mechanisms can be used/developed to increase collaboration, share data and maintain communication and knowledge exchange for UK kelp projects and research?

Group exercise results: Priorities and methods for future co-ordination

Examples of effective networks	Suggestions for communication and knowledge exchange
➤ Community groups (<i>Facebook page/WhatsApp group, social media</i>) ➤ Research networks - Oyster and seagrass examples (<i>Quarterly online meetings, updates on research. Requires a chair, admin capacity and funding</i>) ➤ Oceans Past Committee (<i>International, meets online monthly, updates, collaborations + newsletters (three people - roles, chair, treasurer)</i>) ➤ British Phycological Society ➤ ReMeMaRe (particularly MARMAM Info Page) ➤ Marine mammals mailing lists ➤ Blue Carbon Forum ➤ Ocean and Coastal Futures (<i>Mailing lists/jobs/events/news updates</i>) ➤ Young Coastal Scientists Engineers (<i>Fortnightly meetings - discounts on papers – link is to 2026 conference in Nottingham</i>) ➤ Hydrographic Society (<i>one email per month</i>) ➤ OCTO (Open Communications for the Ocean): MPA Help and EBM Help networks (<i>Hosted webinars, e-news letters, question forum</i>)	➤ Use existing networks such as British Phycological Society ➤ Online meetings ➤ Monthly newsletters / meeting with themes ➤ In person meetings and events (<i>e.g. annual or biennial 2-day conferences or an annual fieldtrip. In person events are beneficial for networking and relationship building, but have a higher cost, and are not low maintenance.</i>) ➤ Alternate between in person and online conferences/meetings ➤ Website/hubs (<i>e.g. South Downs National Park Community Hub. A UK version of the Kelp Forest Alliance Knowledge Hub</i>) ➤ WhatsApp groups (<i>Can grow too big/hectic - moderators required</i>) ➤ Microsoft Teams channel ➤ Accessible platforms for researchers/NGOs/Industry/Fishers ➤ A guidebook to monitor kelp with a decision tree ➤ Annual report on kelp data and research ➤ Videos ➤ Forums - summarise an issue and get comments from peers

Group exercise results: Priorities and methods for future co-ordination

Data sharing methods	Innovation for efficient data collection and analysis
➤ Data sharing within the group ➤ Increasing collaboration - sharing of equipment - enable partnerships ➤ Maintain the EA map - what's everyone doing where? ➤ Opensource access of data, a Kelp Information Hub (like the Kelp Forest Alliance Knowledge Hub) ➤ Data sharing/method sharing for consistency - through open access publications. (Note: limitations due to data being owned by researchers and kept offline until publication) ➤ Events for sharing methodology tips and ideas, resolving issues and funding solutions ➤ Signposting existing datasets and contacts ➤ SharePoint ➤ Social media signposting ➤ ResearchGate profile/group ➤ Creating a repository (with caveat that it requires continued maintenance and coordination) ➤ Podcast with researchers	➤ AI – can bring together different datasets/historic datasets, or video analysis (as done for BRUVs) ➤ Innovation - new system for analysing data - pinpoint hotspot areas of kelp - assessing methods you use make more efficient data collection ➤ Directory of calculations and their work - as a website - search using keywords e.g. eDNA ➤ National water sports/paddleboarding events - taking water samples, log manually/app/data ➤ Who are we monitoring data for? management? – What’s most important? Where will kelp protection + decline - Decision making tool/framework - equipment log ➤ Citizen Science: Efficient data collection using fishermen/paddleboarders etc. ➤ Citizen Science apps for young people (though expensive to develop apps) ➤ Engaging communities: How to set up a citizen science programme, how it works/how to encourage participation/recruitment ➤ Standardisation in collection and curation

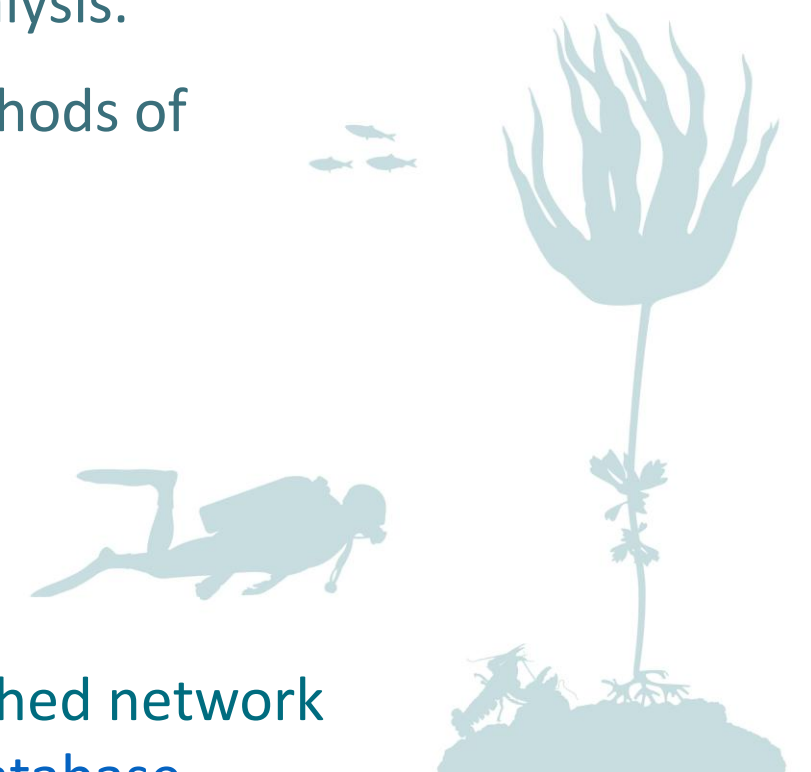
Key outcomes

Q: What mechanisms can be used/developed to increase collaboration, share data and maintain communication/knowledge exchange for UK kelp projects and research?

Participants identified a number of areas for further **collaborative action and ongoing communication** if future funding and resources became available:

- Exploring a **decision-making tool** to help define factors to be monitored depending on the question to be addressed.
- **Standardisation of data collection and monitoring protocols** to facilitate data sharing and analysis.
- Ongoing **knowledge exchange** among kelp researchers and policy makers with preferred methods of communication including:
 - *Annual / biennial meeting*, alternating between online and in person
 - *Directory of contacts*, research areas, equipment available for loan
 - *Informal chat forum* for exchange of experience.

Joining the **Kelp Forest Alliance** was suggested as an immediate way to connect with an established network of kelp researchers through their [Knowledge Hub](#), [Community Platform](#) and [Kelp Restoration Database](#).





Sussex Kelp
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Presentations from the day

SKRP research programme Dr Chris Yesson, ZSL

Innovative techniques for marine/coastal ecosystem monitoring

Dr Ray Ward, Queen Mary University London

Natural Capital and Ecosystem Assessment programme

Erin Lawes, Environment Agency



SKRP research programme

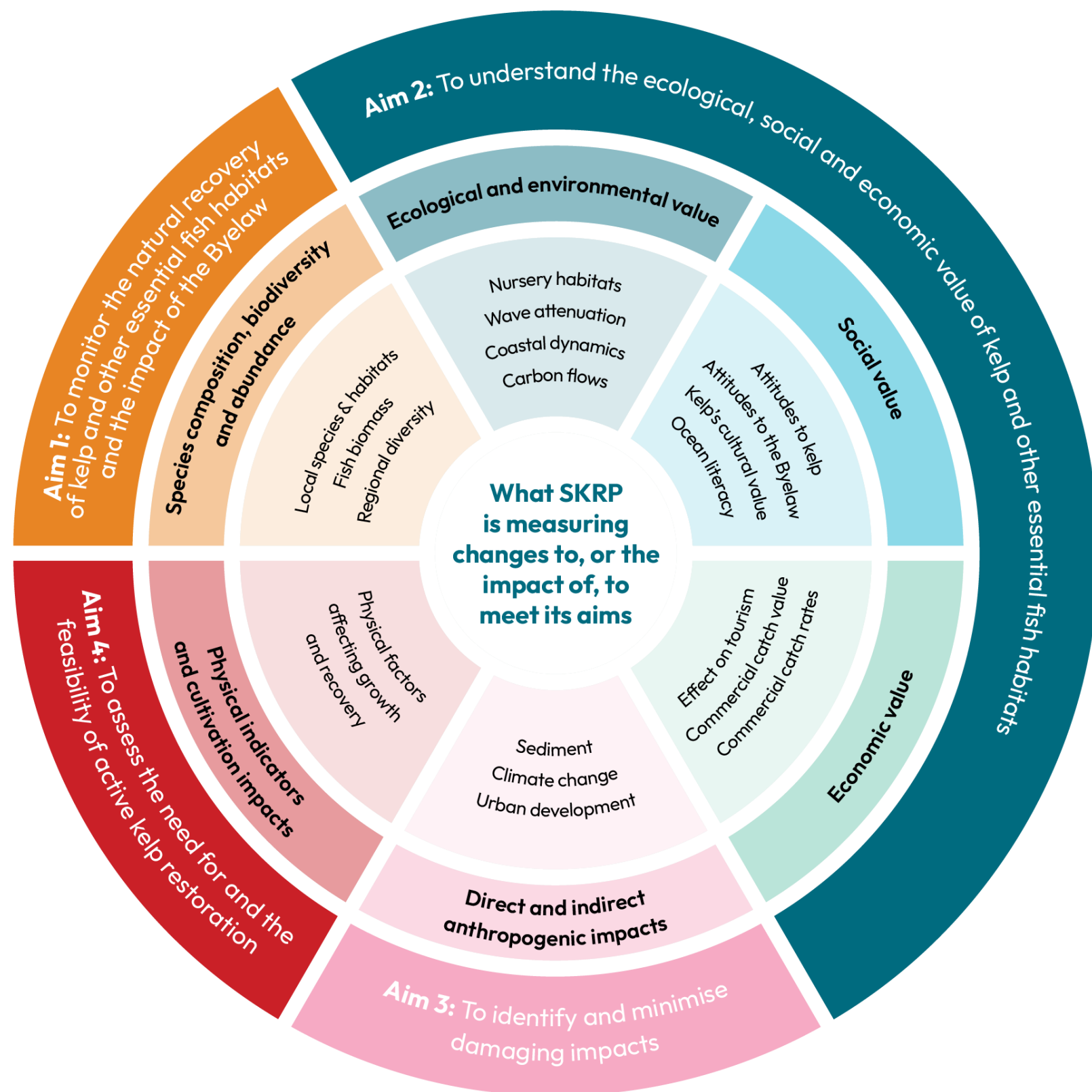
Dr Chris Yesson

SKRP Research lead

Zoological Society of London



Sussex Kelp Recovery Project



Objective of the Sussex Kelp Recovery Project (SKRP) Research Working Group:
To establish, maintain and publish a programme of research which monitors the natural recovery of kelp and other essential fish habitats in Sussex, and the impact of the Sussex IFCA Nearshore Trawling Byelaw.

Aim 1: How are kelp and other essential fish habitats recovering naturally?

- Method: Quantify and measure ecological impact/change resulting from the byelaw

Aim 2: How do we quantify the role and value of kelp and other essential fish habitats?

- Method: Assess the impact of the byelaw on local economies (fisheries, seafood supply chain), recreation (e.g. sea angling and diving), tourism.
- Method: Assess the impact of the byelaw on wider community well-being, values and engagement.

Aim 3: How can we improve the recovery chances of kelp and other essential fish habitats?

- Method: Identify the factors that may limit or optimise kelp recovery and seek to minimise limiting factors

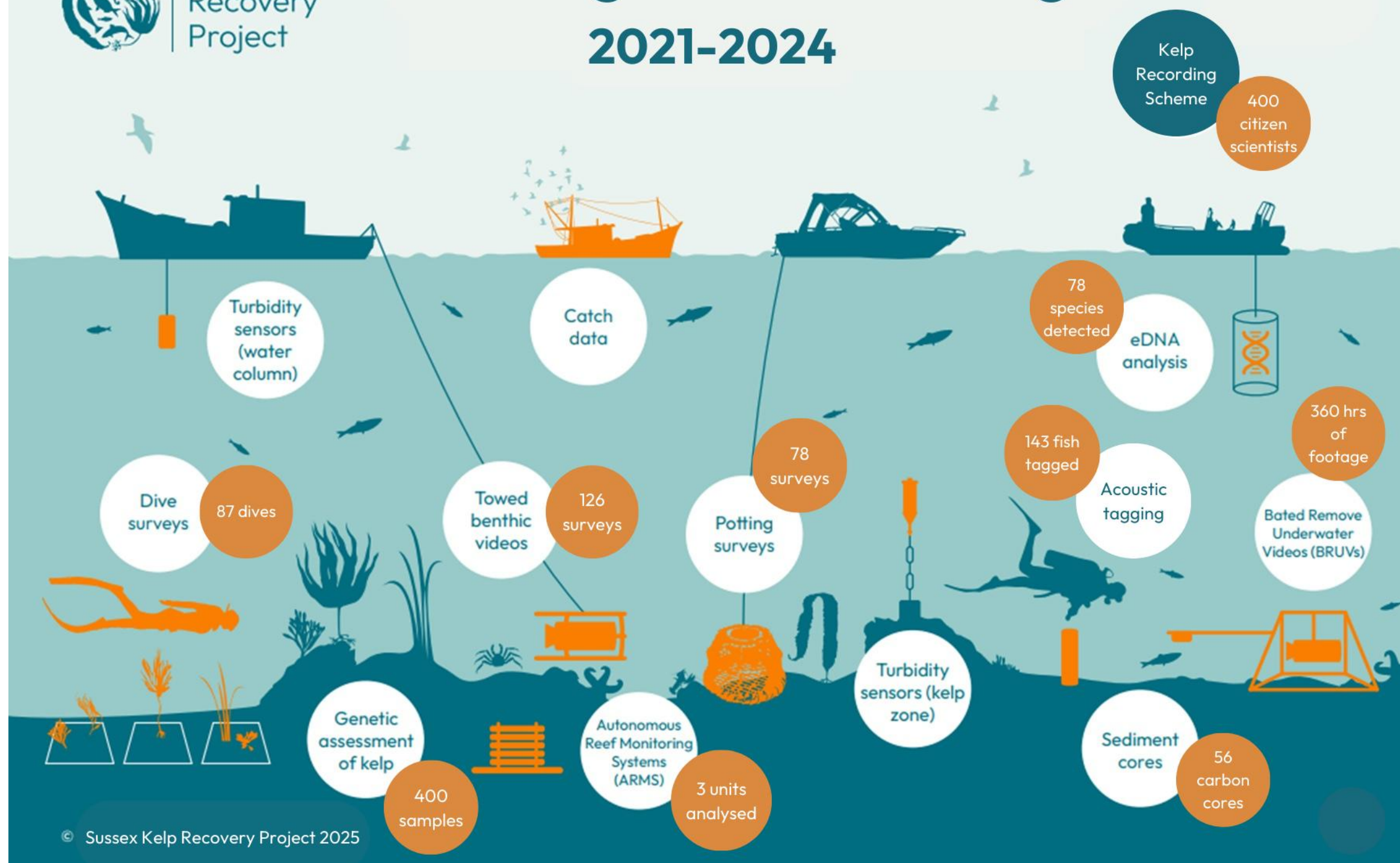
Aim 4: What is the need for, and the feasibility of, active kelp restoration?

- Method: Continually assess the available methods for active restoration, examining whether, how and when such methods could be helpful and practical for SKRP.



Sussex Kelp
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Ecological Monitoring 2021-2024



Innovative techniques for marine/coastal ecosystem monitoring

Ray Ward

Reader Environmental Sciences

eDNA

Positives:

- Non-Invasive Sampling (disruption)
- Detecting Rare or Elusive Species (particularly those difficult to detect using traditional methods (e.g. cryptics))
- Large-Scale Surveys (can be deployed across large areas, efficient)
- Cost-Effective (considering the potential savings from early detection and management of invasive species)
- Identifying Invasive Species:
- Monitoring Aquatic Ecosystems biodiversity change

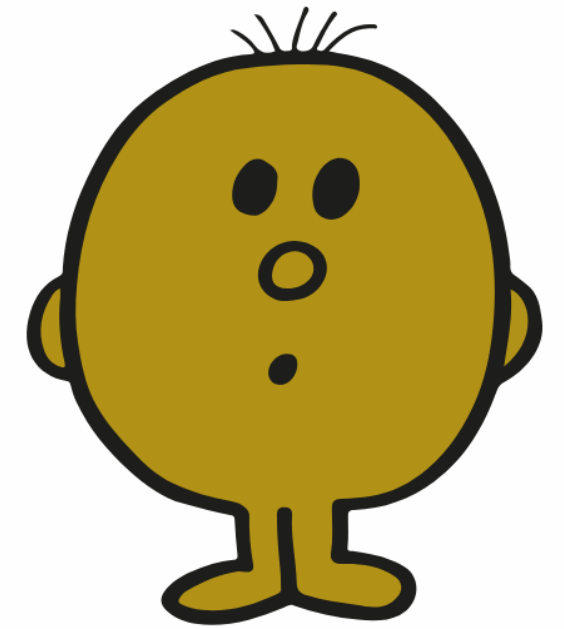
eDNA

Negatives:

- False Positives and Negatives
- DNA Degradation and Dilution: reducing detection rates.
- Primer Bias preferential detection of certain species over others.
- Data Interpretation (issues around quality of reference databases)
- Limited Information on Abundance and Activity
- Challenges in Soil and Sediment due to persistence (hard to determine in sediment disturbed area if recent or historical)
- Wastewater Contamination (can contain eDNA from various species leading to false positives in biodiversity assessments)

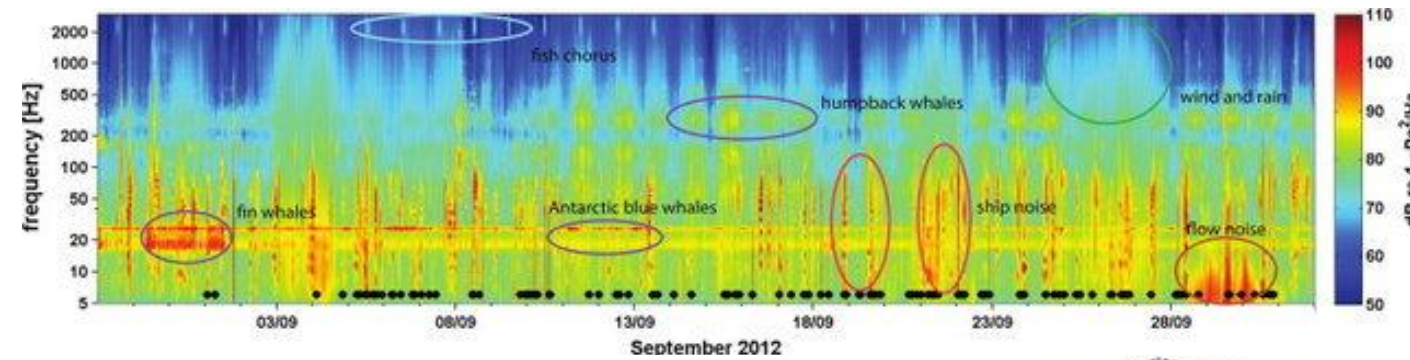
Eco-acoustics and soundscape analysis

- Provides a huge amount of data at very little cost (big positive and negative)
- Hugely complex to evaluate
- Only some species will be picked up
- Novel AI (MM, CNN, VLM) can reduce complexity

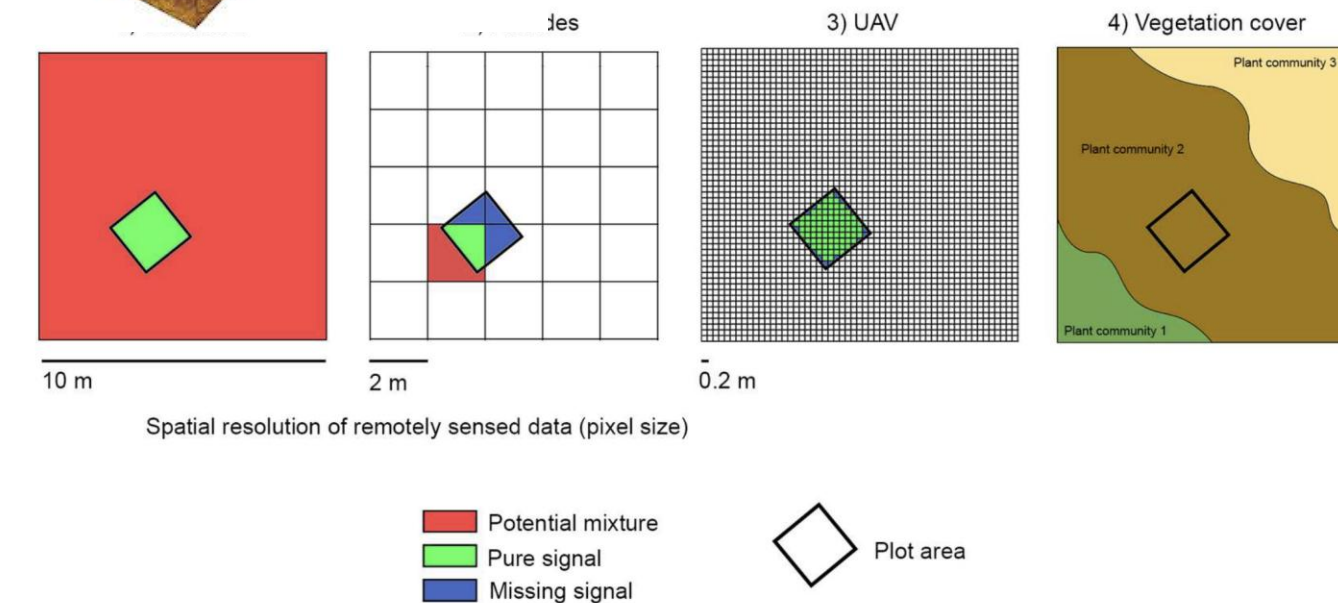
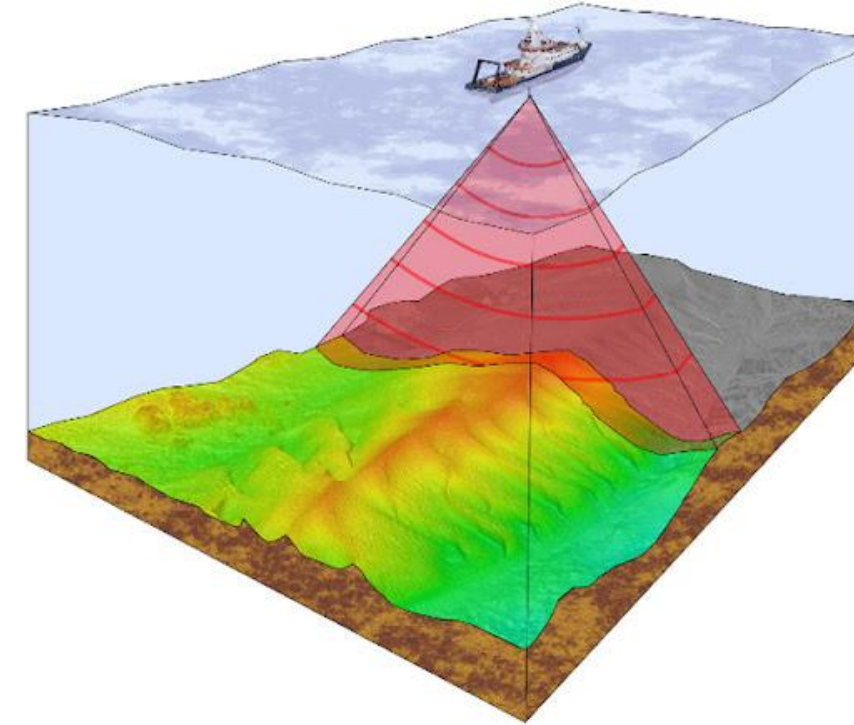


- Scale dependent offsets from platforms (UAV/ROV-Plane/Boat-Satellites)
- Passive vs active (MBES, Bathymetry, Sidescan, SRTM, SENTINEL1 vs Worldview, Planet, SENTINEL2, Landsat)
- Issues in water (sunlint, light attenuation, penetrability)
- AI/ML classifiers (RF, KNN, CNN, with OBIA/PBIA) plus OA platforms GEE

Summary



- Wide range of new methods available!
- Wide range of freely available data!
- Increasing number of studies in this area, but check the small print



Natural Capital and Ecosystem Assessment programme

Erin Lawes
Environment Agency



Nationwide online survey & workshop - Aims



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Aims of national online kelp research and monitoring survey and workshop :

- Raise awareness of, and inform, the EA's kelp programme
- Help develop and facilitate collaborations
- Collate and share information on kelp monitoring and research work being conducted – methods, costs, data sources, kelp sites/losses knowledge, partners

Survey respondents:

43 individual responses
representing 35
organisations

Multiple responses from
several organisations
Some individuals responded
on behalf of 2 organisations

Responses from national
level and local level
stakeholders
Some international
responses

Universities, IFCA's, projects,
local authorities, museums,
wildlife trusts, government
agencies, NGOs,
companies, associations

Nationwide online survey & workshop - output



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Kelp online survey findings

Survey respondents working nationally/ beyond the UK:

- **Defra:** Monitoring/research type: 19; Monitoring method: T
- **Natural England:** Monitoring/research type: 1,2,3,4,6,7,8,17,18; Monitoring method: A,B,D,E,P
- **Natural History Museum:** Monitoring/research type: 1,2,3,4,9,17,18; Monitoring method: A,E
- **Environment Agency:** Monitoring/research type: 1,2,4; Monitoring method: B,L
- **Seadream Environment CIO:** Monitoring/research type: N/A; Monitoring method: B,C
- **University of Ghent:** Monitoring/research type: 1,2,14,18; Monitoring method: A,N,S
- **Zoological Society London:** Monitoring/research type: 1,2,3,9,18; Monitoring method: A,C,D,E,P,R,S
- **University of Plymouth:** Monitoring/research type: 1,2,7,15,16; Monitoring methods: T
- **Marine Biological Association of the UK:** Monitoring/research type: 1,2,3,5,8,9,14,17,18; Monitoring methods: A,D,I,S
- **Blue Marine Foundation:** Monitoring/research type: 3,9,18; Monitoring methods: D

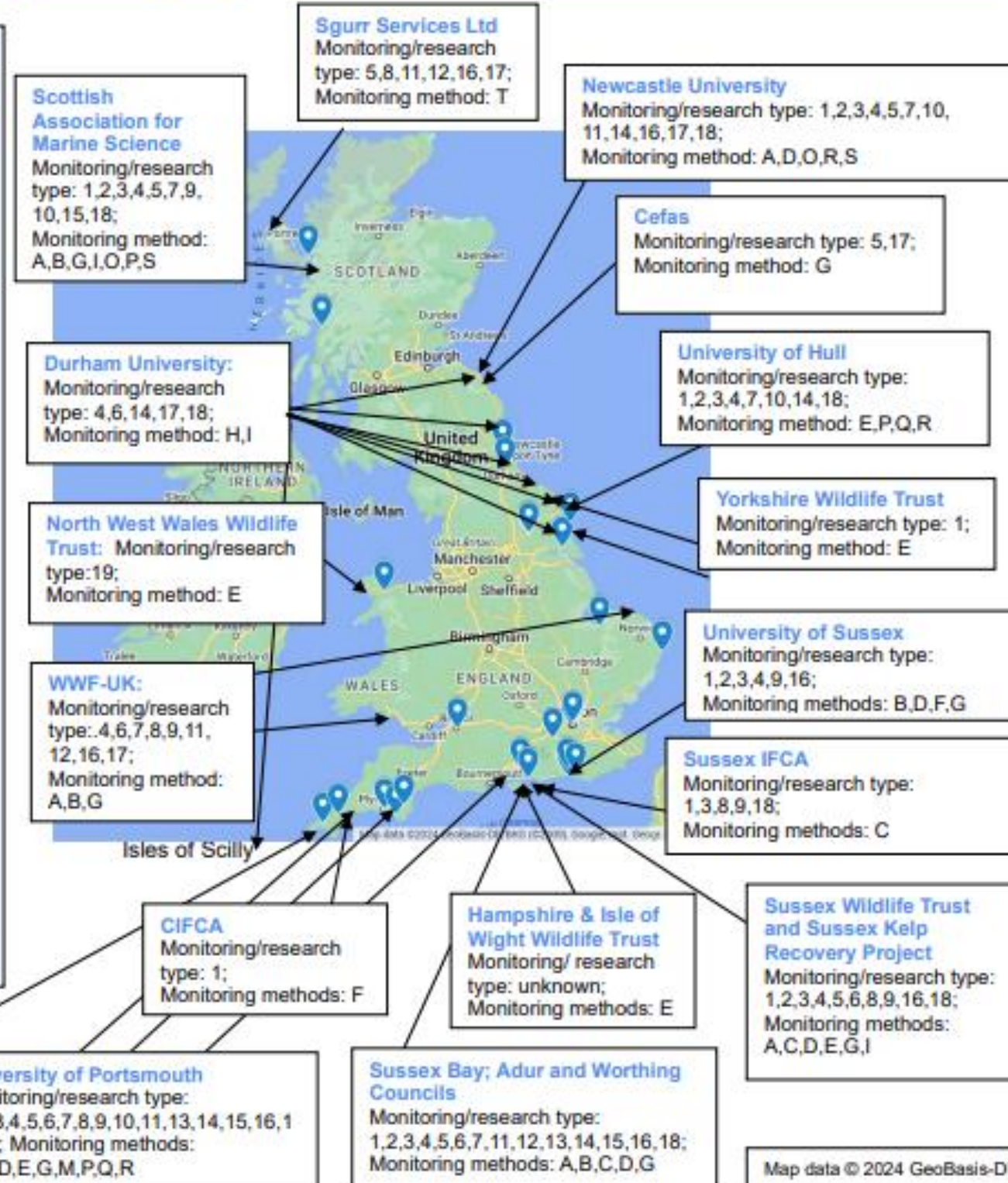
Cornwall Wildlife Trust and Seasearch Cornwall
Monitoring/research type: 1,2,4;
Monitoring methods: A,E

University of Portsmouth
Monitoring/research type: 1,2,3,4,5,6,7,8,9,10,11,13,14,15,16,17,18;
Monitoring methods: A,B,D,E,G,M,P,Q,R

Sussex Bay; Adur and Worthing Councils
Monitoring/research type: 1,2,3,4,5,6,7,11,12,13,14,15,16,18;
Monitoring methods: A,B,C,D,G

Map data © 2024 GeoBasis-DE/BKG (©2009), Google, Inst. Geogr. Nacional

Kelp monitoring & research - who does what where?



Key:

Pinpoints show survey respondents (based on postcode of office/ institution). Pin in London covers several respondents.

Monitoring/research type

- 1 - Extent
- 2 - Condition
- 3 - Recovery and restoration
- 4 - New monitoring methods
- 5 - Capture and export of carbon
- 6 - Water quality regulation and nutrient uptake
- 7 - Coastal protection and resilience
- 8 - Nursery and spawning ground function
- 9 - Biodiversity enhancement
- 10 - Photosynthesis and primary production
- 11 - Food resource
- 12 - Pharmaceutical and industrial use
- 13 - Tourism, recreation and well-being
- 14 - Seasonal variability
- 15 - Natural Capital Accounting
- 16 - Nature-based solutions
- 17 - Farming methods for aquaculture
- 18 - Pressures impacting kelp
- 19 - Not undertaking any research

Monitoring method

- A - Dive surveys
- B - Drop down video/camera
- C - Towed video/camera
- D - Baited Remote Underwater Video (BRUV) or Remote Underwater Video RUV
- E - Citizen Science data-recording Projects (e.g. SeaSearch, Shoresearch)
- F - Acoustic receivers
- G - eDNA
- H - Grab surveys
- I - Cores
- J - USVs (Uncrewed Surface Vessels)
- K - AUVs (Autonomous Underwater Vehicles)
- L - SBES (Single Beam Echosounder)
- M - MBS (Multi-beam SONAR)
- N - Machine learning algorithms
- O - UAVs (Unmanned Aerial Vehicles)
- P - Aerial imagery
- Q - Lidar
- R - Satellite multispectral imagery
- S - SDMs (Species Distribution Model)
- T - Not undertaking monitoring

WHO'S DOING WHAT WHERE?

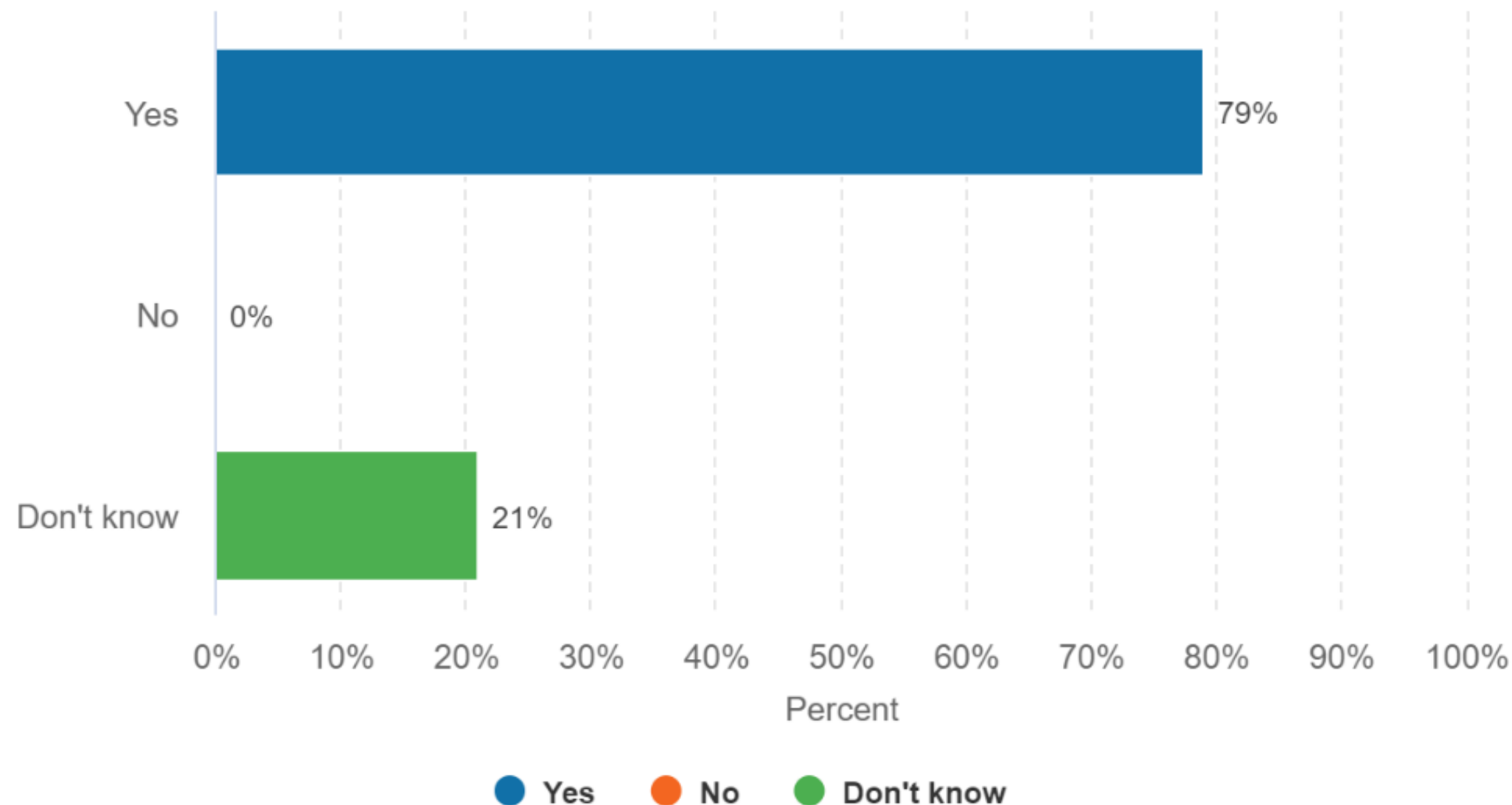
Respondents:

- 43 individual responses, representing 35 organisations

Most common monitoring / research activities:

- Extent (56%)
- Condition (44%)
- Recovery & restoration, new monitoring methods, pressures (37% each)

Do you feel there is the need for national coordination on our kelp monitoring and research work?



Survey findings on coordination:

79% of respondents felt there was a need for national coordination on kelp monitoring and research work



Sussex Kelp
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Appendix

Kelp Forest Alliance Monitoring kelp forest ecosystems guidebook
Workshop attendees

Appendix: Kelp Forest Alliance Monitoring - Kelp forest ecosystems guidebook

The purpose of this guidebook is to:

- Develop a standardized monitoring and reporting framework for kelp forest ecosystems around the world.
- Ensure the framework is applicable across sectors and user types.
- Encourage the adoption of such a framework.
- Describe the methods for monitoring kelp forest extent, condition, and benefit.
- Provide recommendations about the most cost-effective approaches currently available for monitoring and reporting.
- Identify areas of rapid development that may change how kelp forests are monitored in the future.
- Encourage the management, protection and restoration of kelp forests.

Table 3. Key parameters and monitoring frequency.

Parameter	Reason	Frequency (With intervention)	Frequency (Without intervention)
Area Extent	Understanding what size area you are monitoring.	• Before intervention • 2–4x/year in the first 2 years • 1x/year after 2 years	1–2x/year
Kelp Density	Understanding of the “health” of the kelp forest.	• Before intervention • At least 2x/year in the first 2 years • 1x/year after 2 years	1–2x/year
Biodiversity and Animal Density (Fish and Invertebrates)	Understanding of the species in a kelp forest as well as their productivity.	• Before intervention • 2–4x/year in the first 2 years • 1x/year after 2 years	1–2x/year
Water Temperature	A common stressor and cause of failure for restoration projects	• Before intervention • 2–4x/year in the first 2 years post intervention • 1x/year after 2 years	1–2x/year
Herbivore Population Size	A common stressor and cause of failure for restoration projects	• Before intervention • 2–4x/year in the first 2 years post intervention • 1x/year after 2 years	1–2x/year
Cost of Activity, Including People Employed in Conservation	An important factor to understand the resources required and the social benefits of restoration	• 1x/year	1–2x/year

Appendix: Workshop invitees / attendees

Organisation	Name		Organisation	Name		Organisation	Name
Adur & Worthing Council	Paul Brewer		JBA Consulting	Glenn Langler		Sussex IFCA	George Balchin
Algapelago	Kerr Jeferies		JBA Consulting	Jerome Curoy		Sussex Underwater	Paul Boniface
Arun District Council	Steve McAuliffe		Kent Field Club	Ian Tittley		Sussex Wildlife Trust	Nikki Oliver
Arun District Council	Charlotte Thwaites		Kings College London	Maud Borie		Sussex Wildlife Trust	Laura Brook
BHCC	Theresa Fowler		Kings College London	Aline da Silva Cerqueira		Sussex Wildlife Trust	Sarah Ward
Blue Marine Foundation	Francesco Marzano		Knepp Wildland Foundation	Gareth Williams		Sussex Wildlife Trust	George Short
Blue Marine Foundation	Barny Hobbs		Knepp Wildland Foundation	Jasmine Cacioppo		Sussex Wildlife Trust	Henri Brocklebank
Blue Marine Foundation	Gail Fordham		Marine Biological Association	Cat Wilding		Sussex Wildlife Trust	Chris Corrigan
Blue Marine Foundation	Sam Fanshawe		Natural England	Florence Aves		The Crown Estate	Edmund McManus
Blue Marine Foundation	Emily Bulled		Natural History Museum, London	Juliet Brodie		University College London	Cassandra Nanlal
Blue Marine Consultant	Simon Harding		Newcastle University	Pippa Moore		University of Brighton	Heidi Burgess
Cefas	Elisa Capuzzo		Newcastle University	Paddy Keith		University of Durham	Darren Grocke
Channel Coastal Observatory	Charlie Thompson		Newcastle University	Alex Wickenden		University of Exeter	Madison Bowden-Parry
Cornwall Wildlife Trust	Oscar Miller		North Wales Wildlife Trust	Dawn Thomas		University of Plymouth	Matilda Longstaff
Environment Agency	Erin Lawes		Queen Mary, University of London	Raymond Ward		University of Portsmouth	Joseph Sargent
Environment Agency	Keith McGruer		RSPB	Wez Smith		University of Portsmouth	Janet Nichol
Environment Agency	Lee Stevenson		RWE Offshore Wind	Maria Milititsky		University of Sussex	Alice Clark
Environment Agency	Fabian Bowes-Richley		Seasidemoocher	Sarah Wiltshire		University of Sussex	Marianne Glascott
Environment Agency	Charly Alexander		Seaweed Guy CIC	Toby Young		University of Sussex	Tim Cane
Environment Agency	Louise Parker		Seaweed Guy CIC	Matt Edbrooke		University of Sussex	Sue Baxter
Environment Agency	Karolina Skalska		Southern Water	Dan Ross		University of Sussex	Pratham Dhawan
Environment Agency	George Thomas McDonnel-Hood		Southern Water	Sean Ashworth		University of Sussex	Codey Ramona Sharp
Environment Agency	Milly Piggott		Surfers Against Sewage	Natalie De La Mare		University of Sussex	Aimee Lowles
Friends of Adur SSSI	Sarah Hunt		Sussex Bay	Lewis White		University of Sussex	Max Wilkins
Hampshire and Isle of Wight Wildlife Trust	Tim Ferrero		Sussex IFCA	Sol Lucas		University of Sussex	Geoffrey Porras
Hull Marine Lab, University of Hull	Rodney Forster		Sussex IFCA	Emily Denton-Smith		University of Sussex	James Manuli
Hull University	Harry Catherall		Sussex IFCA	Daniel Karparis		University of Sussex	Mika Peck
IFCA	Noel Atkins		Sussex IFCA	Rob Pearson		University of Sussex	Claude Annels
In Depth Photography	Martin Davies		Sussex IFCA	Paul Leonard		Zoological Society of London	Chris Yesson

On behalf of the Workshop organisers:



Thank you:

Funders: **Ernest Kleinwort Charitable Trust**

Facilitators: **Di and Rob Alcroft, Wayforward Brighton**

All participants

