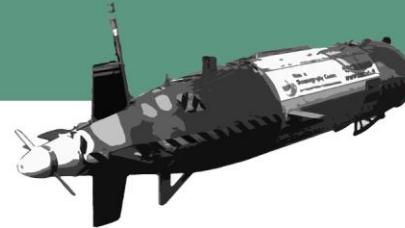
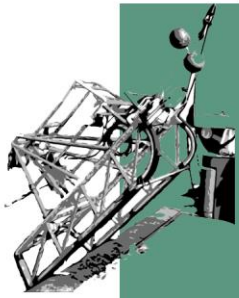


THE BIG PICTURE II

Benthic Imagery Workshop 2021



TheBigPicture@jncc.gov.uk

What do we use seabed Imagery for?

The standardisation and development of benthic imagery purposes

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Committee

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The problem

1. Seabed imagery is collected every day in UK
 - Survey target/s and design;
 - Sampling platform;
 - Data processing and analysis;
 - Product/s.
2. Some of this is archived (e.g. MEDIN) and can be shared with others



The problem

3. Appropriate use of shared data requires knowledge of **why** data were collected, **where** they were collected from, **how** it happened and **what** was done to them
 - Standards!
4. The '**why, where, how and what**' are not known for majority of seabed imagery in the UK

The problem

5. Consequences:

- All imagery data cannot be shared;
- Additional survey effort needed across UK;
- Additional analysis effort needed across UK;
- Potential for poorer quality of imagery data without standards.



Overarching guidelines and purposes for imagery

12 Identify and define range of main purposes for using benthic imagery

13 Identify standard requirements for grouped main purposes (CORE PURPOSES) and create standard table and decision tree flowchart

14 Guidance for entire imagery analysis work flow (design, analysis, randomisation, annotation, statistics), including decision tree flowchart

05 Explore imagery cost models for standard development, research, training and data dissemination

15 Develop guidance on determining appropriate sampling units from imagery data sets, including aggregation criteria (e.g. randomness) to meet minimum sample size recommendations for different purposes and targets

17 Develop minimum data standards for imagery core purposes

11 Create a machine learning and annotation user 'group' for the UK

16 Alignment of imagery acquisition parameters with minimum sample size recommendations and sample selection criteria for each core purpose

18 Develop minimum requirements for acquisition that meets the needs of each common purpose, to include assurance that minimum sample sizes are attained for each purpose

19 Develop minimum standards for data quality and apply to in-house and contracted analyses, including time and budget estimates in contract specifications

55 Define data format specifications necessary for machine learning algorithms to work, as well as export formats for biologists to use (e.g. csv files)

an working group fil-
ing and collaboration
site

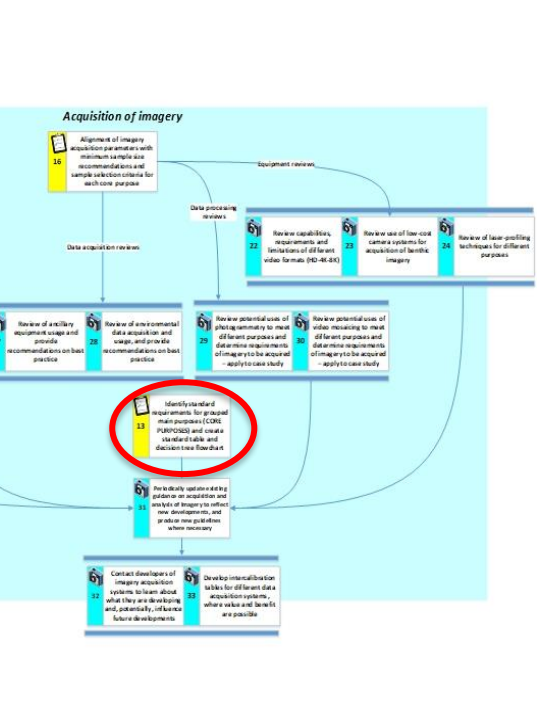
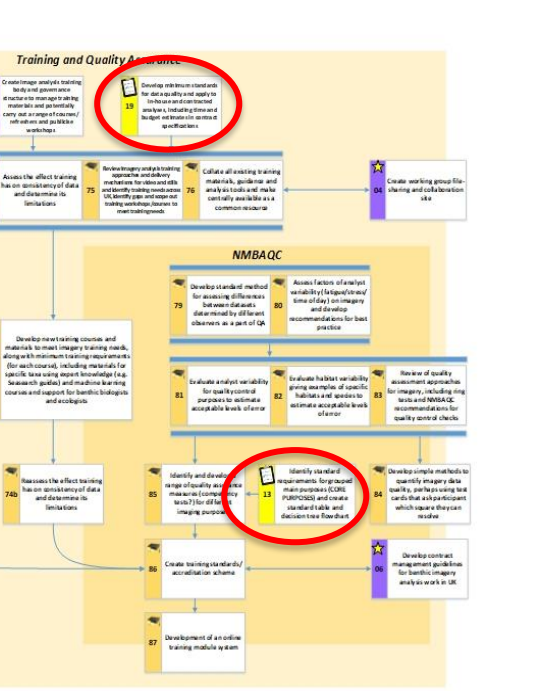
Review of quality
assessment approaches
imagery, including ring
barn and MMSAC
recommendations for
early remote checks

develop simple methods to
quantify imagery data
quality, perhaps using tool
that a participant
which require the same
review

Develop contract
management guidelines
for benthic imagery
analysis work in UK

of low cost
tools for
all benthic
imagery

Review of laser-guiding
techniques for different
purposes



Task no.	Task name and description	Priority	Suggested deliverable/s
12	<p>Identify and define range of main purposes for using benthic imagery</p> <p>Send questionnaire out to Big Picture Group to determine uses/purposes of benthic imagery, how it is acquired, why it used, how it is processed and what products are produced.</p>	H	Defined range of standard purposes for using benthic imagery
13	<p>Identify standard requirements for grouped main purposes (CORE PURPOSES) and create standard table and decision tree flowchart</p> <p>Purposes grouped by similarity to represent core purposes - imagery products/outputs must form the basis of each core purpose. Core purposes structured into hierarchy of minimum standard for all imagery, general level (mapping) and then specific level (monitoring). Decision-tree flowchart produced to help users identify their purposes. Cost of implementing each purpose must be considered. Core purposes will be used to develop basic minimum standards for data outputs and working practices in future.</p>	H	Core purposes for using benthic imagery and minimum requirements for each purpose Decision-tree flowchart to identify user purposes

Task no.	Task name and description	Priority	Suggested deliverable/s
17	<p>Develop minimum data standards for imagery core purposes</p> <p>Consider the most appropriate levels that an analysis needs to reach for each purpose. Could use MEDIN data ingestion standards to develop standards for each core purpose (this would make all data collected under each purpose compliant with MEDIN). However, data standards must be cost effective and sustainable to be implemented so task will need to consider this aspect too.</p>	H	Imagery data output standards for standard purposes
19	<p>Develop minimum standards for data quality and apply to in-house and contracted analyses, including time and budget estimates in contract specifications</p> <p>Task involves developing data quality standards that can be quickly applied to raw imagery data sets to ensure they are fit for purpose, i.e. they are fit for annotation, further analysis and data storage later on.</p>	M	Data quality standards for in-house and contractual analyses

Benthic imagery purposes

1. **The aim** of this project is to develop guidance on the minimum requirements for a range of different **uses of benthic imagery** in the United Kingdom
2. This guidance aims to underpin the development of future imagery standards



Consultation with Big Picture Group



Consultation with BPG

Two phases:

1. Questionnaire

- 28 mixed structure questions
- 100 individuals from across 39 organisations

Questionnaire

Purposes (20):
e.g. scientific research, MPA
monitoring, training, PR,
licensing, advice on
operations

Sampling
equipment?

Imagery
resolution?

Training?

Frequency
of
collection?

What are
your costs?

Target features?
What do you
record?

Sampling
designs?

Do you use any
standards?
Which ones?

Do you share
you data
afterwards?

What do you
count? How
do you count
it?

What software
do you use?

Do you have any
Quality
Assurance?

What products
are generated?



Consultation with BPG

Two phases:

1. Questionnaire

- 28 mixed structure questions
- 100 individuals from across 39 organisations

2. Follow up one-to-one interviews

- 26 x 1 hour interviews conducted

Analysis of responses from Big Picture Group



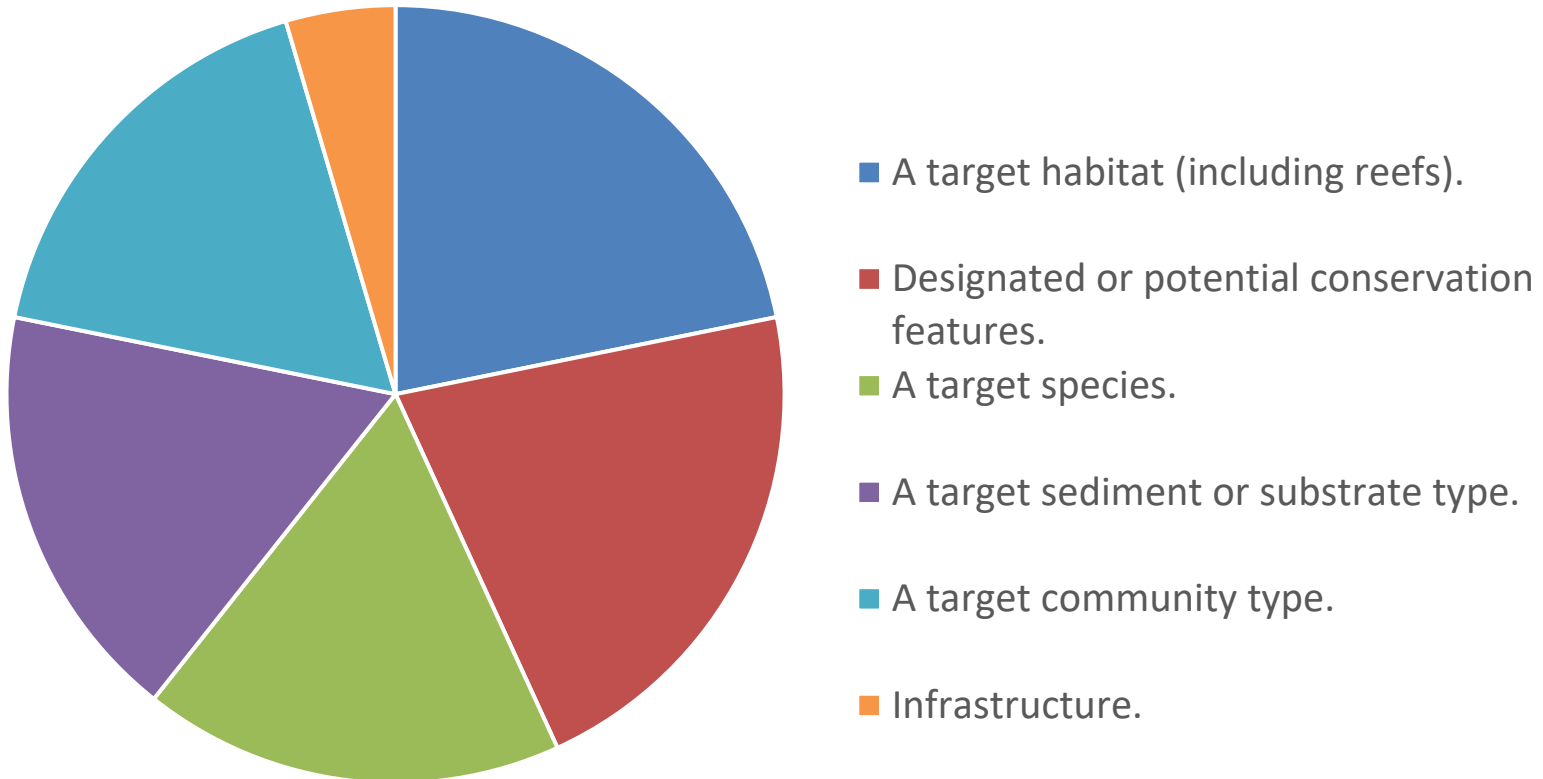
Analysis of responses from BPG

- Questionnaire recorded 110 responses from 38 individuals
- Raw results - Purposes:

Mapping of seabed, habitats and species	30
Mapping conservation features	29
Testing novel technologies and techniques	24
Detection of trends in conservation features (for status assessment)	24
Assessment of fishing impacts	20
Public engagement, education and outreach	19
Environmental Impact Assessment	15
Identifying and characterising new species	14
For training purposes	14
Detecting trends or changes	14

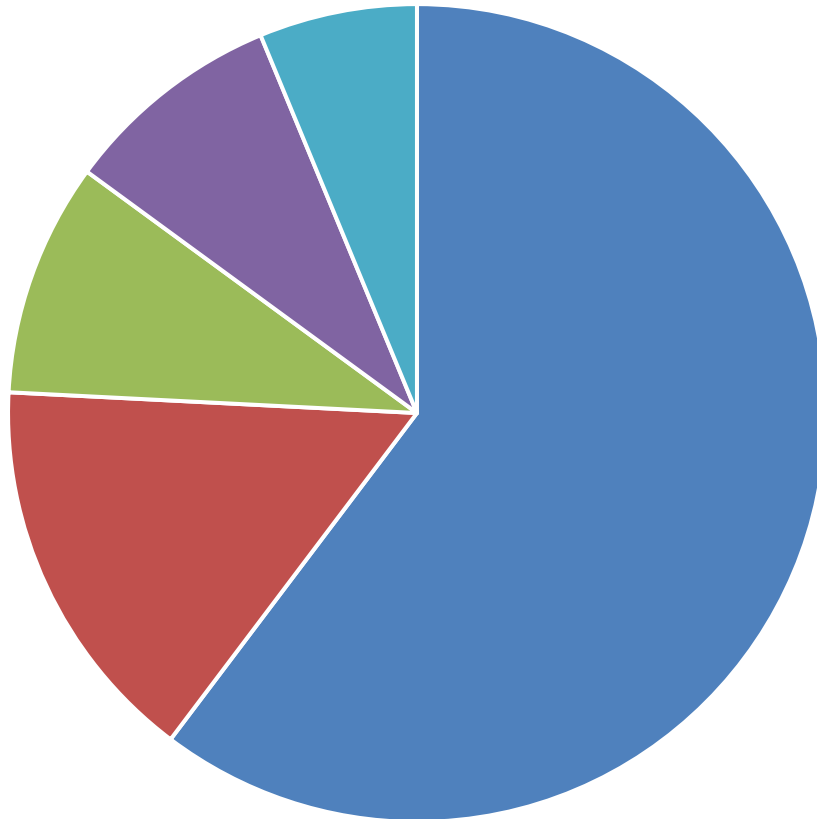
Analysis of responses from BPG

- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Target features:



Analysis of responses from BPG

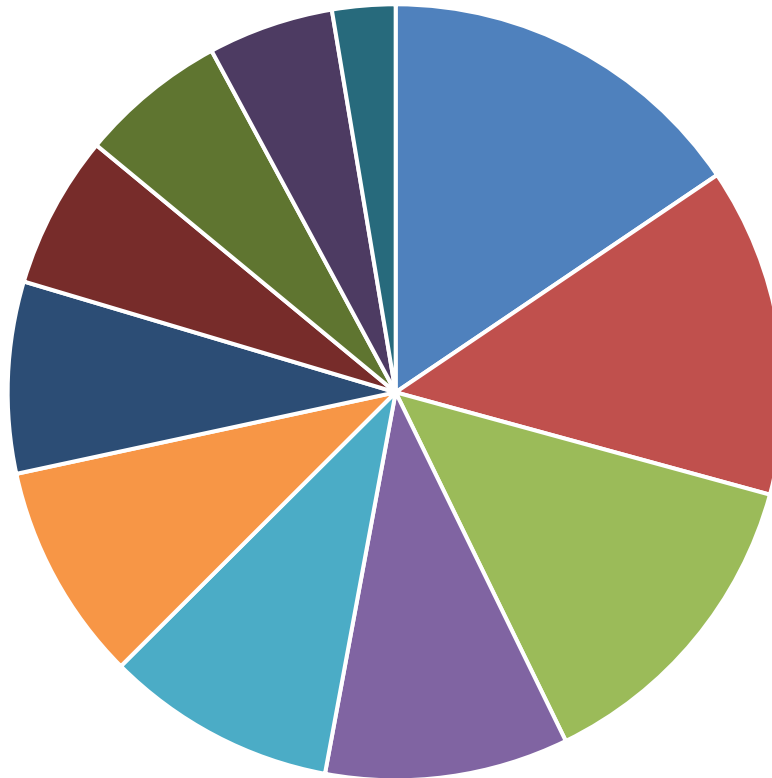
- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Frequency:



- One-off dependent on research or client demands
- Repeated monitoring/survey as and when client requests it
- Regular monitoring – once a year
- Regular monitoring – at least twice a year
- As and when it comes up but generally at least once a year

Analysis of responses from BPG

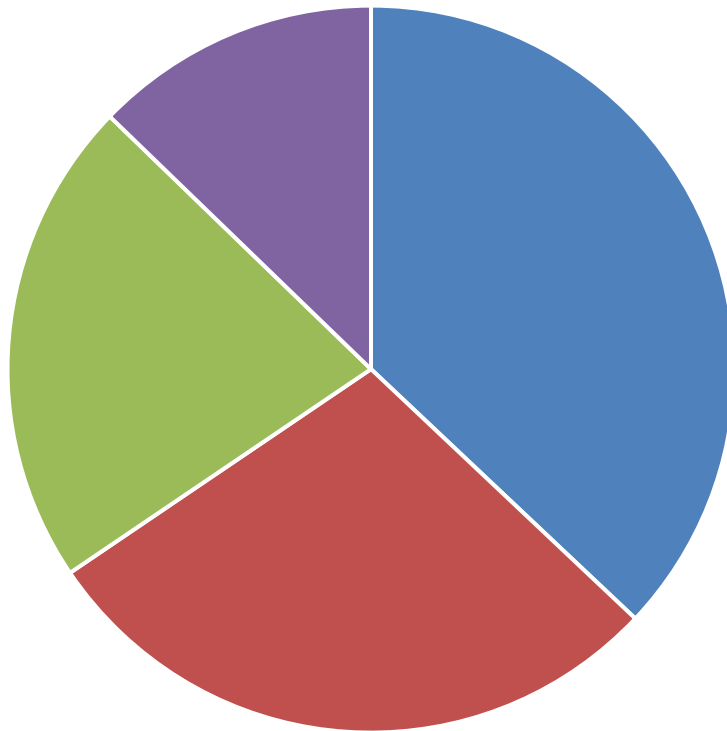
- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Sampling apparatus:



- Diver operated camera
- Remotely Operated Vehicle (ROVs) – general / inspection class
- Drop down camera – off-bottom towed system – towed body not intentional contact with seafloor
- Drop down camera – hand deployed system
- Drop down camera – bottom towed system – sledge in physical contact with seafloor
- Remotely Operated Vehicle (ROVs) – micro / mini / eyeball class
- Remotely Operated Vehicle (ROVs) – light work / heavy work class
- Drop down camera with freshwater lens apparatus – off-bottom towed system – towed body not in intentional contact with seafloor
- Autonomous Underwater Vehicles (AUVs) – survey class

Analysis of responses from BPG

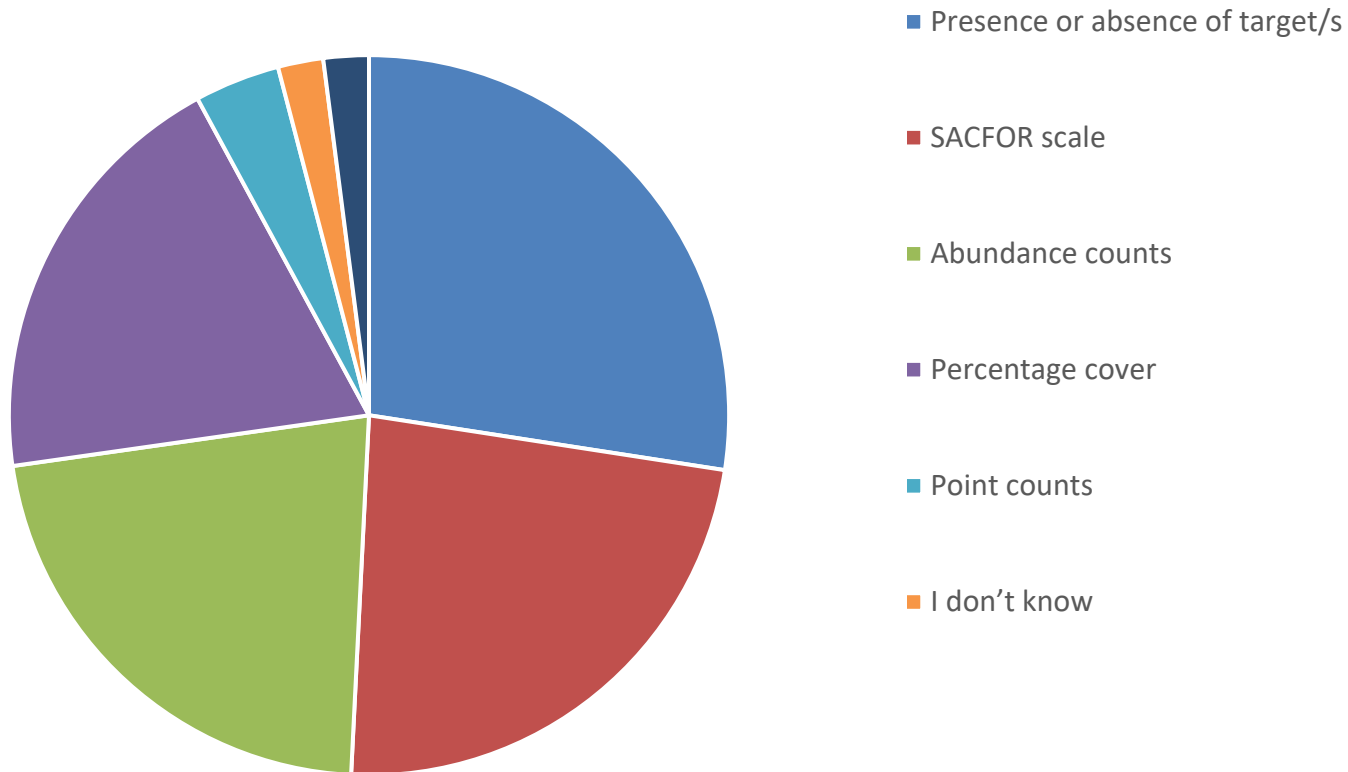
- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Sampling design:



- Targeted imagery collection at locations known to contain the target, e.g. species/habitat/structure
- Haphazard/random sampling across area but stratified in some way
- There is no standard approach for this
- Target imagery collection at locations historically sampled (e.g. monitoring stations)

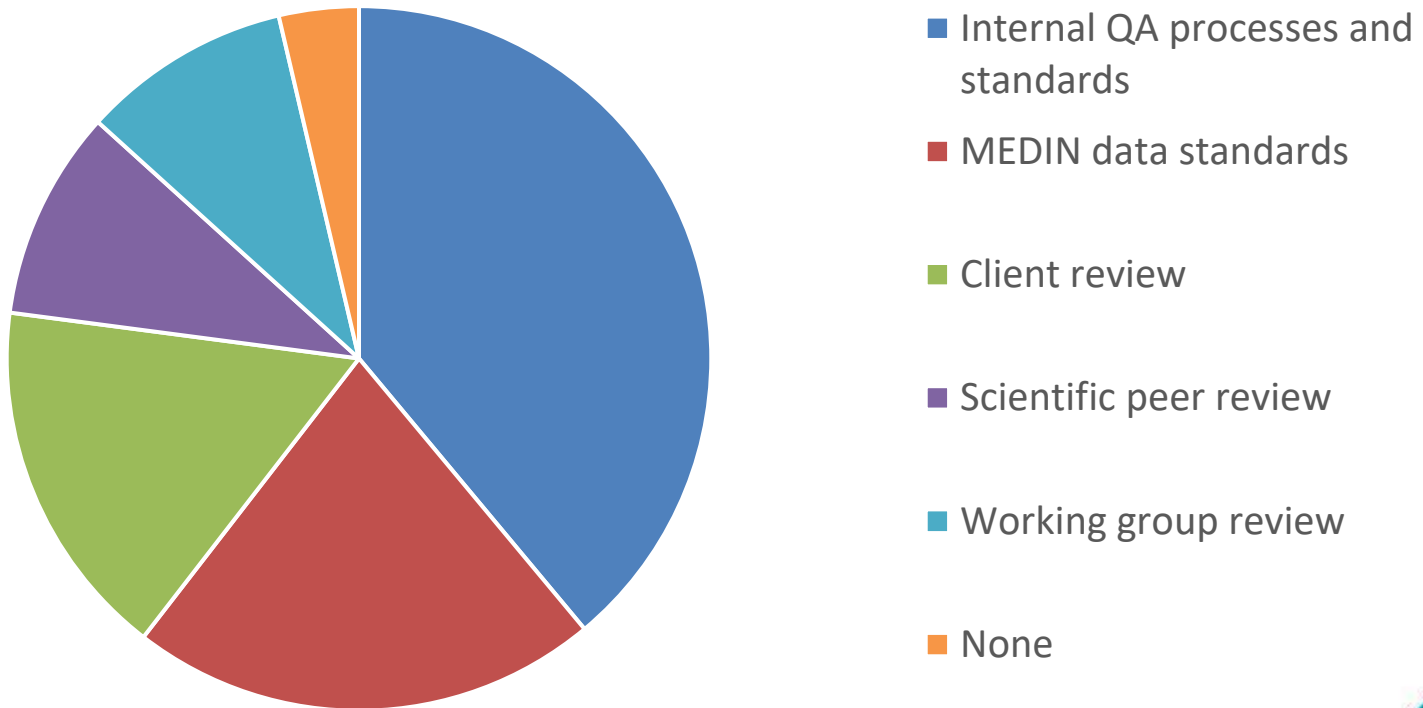
Analysis of responses from BPG

- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Quantification method:



Analysis of responses from BPG

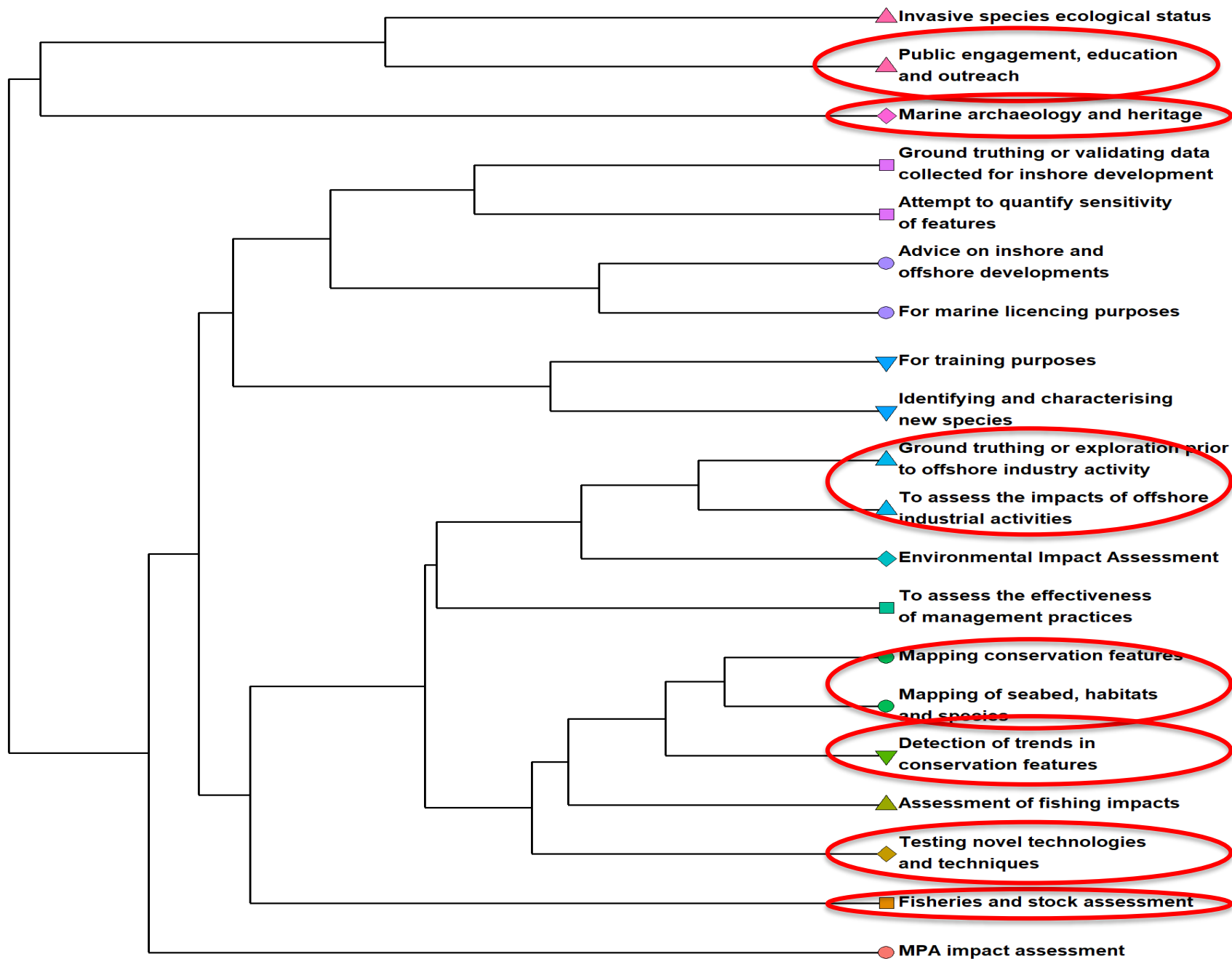
- Questionnaire recorded 110 responses from 38 individuals
- Raw results – Output standards:



Analysis of responses from BPG

- Questionnaire recorded 110 responses from 38 individuals
- Raw results:
 - Lumped, summarised, ranked, separated, re-categorised...even non-parametric multi-metric testing applied (bray-curtis similarity matrices)

L1 Purpose	Scientific research						MPA monitoring							Invasive species			Advice on operati
L2 Purpose	Identifying and characterising new species	Mapping of seabed, habitats and species	Assessment of fishing impacts	Marine archaeology and heritage	Fisheries and stock assessment	Mapping conservation features	Detection of trends in conservation features (for status assessment)	Other		Public engagement, education and outreach	For training purposes	For marine licencing purposes	Ecological status	To assess the impacts of offshore industrial activities	To assess the effectiveness of management practices	Environmental Imp. Assessment	
"Other" Purpose							Attempt to quantify sensitivity of features	Impact Assessment									
Percentage Total	36.84%	78.95%	52.63%	15.79%	13.16%	76.32%	63.16%	26.32%	1	50.00%	36.84%	23.68%	21.05%	28.95%	34.21%	39.4	
Number Main	2	22	5		2	21	13	1	1	3		2	2	5	3		
Percentage Main	5.26%	57.89%	13.16%	2.63%	5.26%	55.26%	34.21%	5.26%	7.89%	2.63%	5.26%	5.26%	5.26%	13.16%	7.89%	18.4	
Percentage P1	2.63%	33.47%	2.63%	2.63%	2.63%	10.53%	18.42%	0.00%	0.00%	0.00%	0.00%	5.26%	0.00%	5.26%	0.00%	0.0	
Percentage P2	0.00%	10.53%	7.89%	0.00%	2.63%	26.32%	10.53%	2.63%	0.00%	2.63%	0.00%	0.00%	0.00%	5.26%	2.63%	10.5	
Percentage P3	2.63%	7.89%	2.63%	0.00%	0.00%	18.42%	5.26%	2.63%	2.63%	5.26%	2.63%	0.00%	5.26%	2.63%	5.26%	7.8	
Target Feature	A target species	0%	59%	40%	0%	100%	90%	77%	100%	100%	67%	100%	50%	100%	40%	100%	8
	A target habitat	50%	100%	100%	100%	100%	100%	100%	100%	100%	67%	100%	50%	100%	100%	100%	8
	A target sediment	50%	64%	100%	100%	100%	71%	85%	100%	100%	33%	50%	50%	40%	100%	100%	7
	A target community	50%	73%	60%	0%	50%	86%	85%	100%	0%	33%	100%	100%	50%	20%	100%	7
	Designated or Infrastructure	0%	82%	100%	0%	0%	90%	100%	100%	67%	0%	100%	100%	50%	80%	100%	8
	Cultural heritage	0%	14%	20%	0%	0%	10%	8%	0%	0%	0%	50%	50%	60%	0%	5	
	Anthropogenic	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	20%	0%	0%	5
	Varies	0%	5%	0%	0%	0%	5%	0%	0%	0%	0%	50%	0%	0%	0%	0%	5
Primary End User	Government	50%	77%	100%	100%	100%	95%	100%	100%	100%	33%	0%	100%	60%	67%	2	
	Private organisations	0%	18%	0%	0%	0%	14%	8%	0%	0%	0%	50%	0%	80%	0%	7	
	Public organisations	0%	32%	0%	100%	0%	33%	48%	0%	0%	33%	0%	50%	0%	33%	2	
	NGOs	0%	36%	0%	100%	0%	12%	15%	0%	0%	33%	0%	50%	0%	50%	2	
	Academia (schools)	50%	68%	40%	100%	0%	43%	23%	0%	0%	0%	100%	50%	0%	33%	5	
	Open access	0%	9%	0%	0%	0%	0%	0%	0%	0%	33%	0%	0%	0%	0%	0	
MPAs?	Don't know	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%	0%	
	No	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	50%	0%	20%	0%	0%	
	Yes	100%	100%	100%	100%	50%	100%	100%	100%	100%	100%	50%	100%	60%	100%	8	
Frequency	Ad hoc dependent	100%	68%	60%	100%	0%	67%	48%	100%	100%	33%	100%	100%	60%	67%	10	
	Regular monitoring	0%	23%	20%	0%	100%	29%	48%	0%	0%	67%	0%	0%	0%	33%	0	
	Regular monitoring	0%	5%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	20%	0%	0	
	When budget allows	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0	
Equipment	Diver operated	0%	36%	60%	100%	0%	38%	54%	0%	100%	100%	0%	50%	100%	20%	33%	1
	Remotely Operated	0%	18%	40%	100%	0%	14%	8%	0%	0%	0%	100%	50%	0%	40%	33%	1
	Remotely Operated	100%	27%	40%	100%	0%	19%	8%	0%	0%	100%	50%	0%	100%	33%	2	
	Remotely Operated	100%	32%	20%	0%	0%	14%	8%	0%	0%	100%	0%	0%	40%	33%	1	
	Hybrid remotely Operated	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	1
	Autonomous Underwater Vehicle	50%	23%	0%	100%	0%	16%	0%	0%	0%	0%	0%	0%	0%	60%	0	
	Drone (e.g. UAV)	0%	27%	0%	100%	0%	19%	8%	0%	0%	0%	0%	0%	40%	0%	0	
	Remote sensing	0%	14%	20%	0%	0%	14%	0%	0%	0%	0%	0%	0%	0%	20%	0%	5
	Surveyor-operated	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0
	Drop down camera	0%	27%	60%	100%	0%	29%	31%	100%	0%	0%	50%	0%	40%	0%	2	
	Drop down camera	0%	32%	60%	0%	100%	38%	48%	100%	0%	0%	0%	0%	20%	33%	2	
	Drop down camera	0%	60%	60%	0%	0%	52%	38%	100%	0%	0%	100%	50%	60%	33%	5	
	Drop down camera	0%	45%	35%	0%	0%	35%	0%	0%	0%	0%	50%	0%	60%	0%	0	

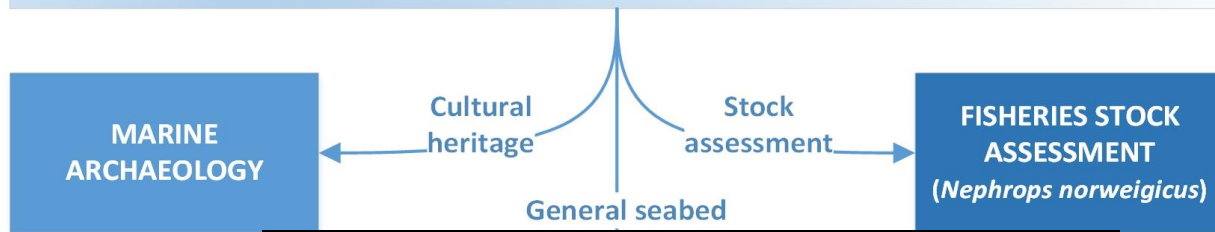


Purpose	Marine Archaeology and Heritage	Fisheries Stock Assessment	Identification, Training and Public Outreach	Research and/or Development of Novel Technology	Full Seabed Characterisation - Human Activities	Full Seabed Characterisation - Habitat
Summary	Imagery collected to identify and assess marine cultural heritage. Specific targets but varied approaches to acquisition. Does not use quantitative approaches in analysis. Industry specific standards, metadata limited.	Imagery collected to assess fisheries stocks. Specific targets and approaches to acquisition. Uses quantitative approaches in analysis. Industry specific standards, metadata rich.	Imagery collected as outreach material, for species identification, or for training purposes. Varied targets and approaches to acquisition. Does not use quantitative approaches in analysis. Limited or no standards, metadata rich.	Imagery collected while testing new acquisition techniques or technologies. Targets biological and abiotic features. Varied approaches to acquisition. Uses quantitative approaches in analysis. Limited standards, metadata rich.	Imagery collected for operational use, which targets infrastructure as well as biological and abiotic features. Varied approaches to acquisition. Uses quantitative approaches in analysis. Standards and metadata rich.	Imagery collected for use in habitat characterisation, e.g. mapping, assessment of trends, assessment of impacts. Targets biological and abiotic features. Uses quantitative approaches in analysis. Data standards and metadata rich. Limited acquisition standards.
Includes		- Nephrops stock monitoring and assessment	- Public engagement - Ecological status of invasive species - Training (human seafarers) - Identifying and characterising new species		- Marine licensing - Advice on inshore and offshore developments - Ground truthing or exploration prior to offshore industry activity	- Mapping conservation features - Mapping of trends, habitats and species - Detection of trends in conservation features - Assessing the effectiveness of management practices - Environmental Impact Assessment (including assessment of fishing impacts, offshore industrial impacts, impact assessment in MPAs) - Ground truthing, anecdotal information or data for inshore developments
Targeted features	Cultural heritage assets	Biological Abiotic	Biological Abiotic Designated or potential conservation features Infrastructure	Biological Abiotic Designated or potential conservation features	Biological Abiotic Designated or potential conservation features Infrastructure	Biological Abiotic Designated or potential conservation features
Acquisition details	Stills and videos collected along a transect by diver or remote sensing methods (e.g. hand deployed drop camera, ROV, AUV, drone). No standard approach to sampling design.	Usually videos collected along a transect by towed drop camera, using a stratified sampling design.	Can be stills and videos collected using a range of approaches (e.g. diver, drop camera, ROV, AUV). Sampling design and methods vary.	Can be stills and videos collected using a range of approaches (e.g. diver, drop camera, ROV, AUV). Sampling designs tend to be stratified but no standard approach for sampling methods.	Can be stills and videos collected along a transect using a range of approaches (e.g. diver, drop camera, ROV, AUV). Stratified sampling designs.	Can be stills and videos collected along a transect using a range of approaches (e.g. diver, drop camera, ROV, AUV). Stratified sampling designs.
Acquisition and analysis standards (ESSENTIAL)	Industry specific standards	ICES guidelines and procedures Internal procedures	No standards	Internal procedures	NMBAGC Internal procedures	NMBAGC Internal procedures
Additional acquisition and analysis standards (OPTIONAL depending on project)		NMBAGC	NMBAGC	NMBAGC	JNCC NEA OSPAR DNV ICES CEFAS	
Identified features (ESSENTIAL)	Cultural heritage assets	Taxa subset (target taxa for project) Habitats Substrata	Feature recorded for identification, training or public outreach purposes MUST be clearly identified in imagery. Could be: All biological taxa/substrata Taxa morphologies/substrata Habitats Substrata Artificial structures/objects Litter Anthropogenic activity	Taxa subset (target taxa for project; Apix ID) Taxa morphologies for subset (all identifiable taxa) Habitats Substrata	Taxa subset (target taxa for project; Apix ID) Taxa morphologies for subset (all identifiable taxa) Habitats Substrata Artificial structures/objects Anthropogenic activity Litter	Biological taxa (all identifiable taxa; Apix ID) Taxa morphologies (all identifiable taxa) Habitats Substrata Designated or potential conservation features
Additional identified features (OPTIONAL depending on project)	Taxa subset (target taxa for project) Taxa morphologies for subset (all identifiable taxa) Habitats Substrata Artificial structures/objects Anthropogenic activity Litter	Biological taxa (all identifiable taxa; Apix ID) Taxa morphologies (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter		Biological taxa (all identifiable taxa; Apix ID) Taxa morphologies (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter	Biological taxa (all identifiable taxa; Apix ID) Taxa morphologies (all identifiable taxa) Designated or potential conservation features	Artificial structures/objects Anthropogenic activity Litter
Quantification methods (ESSENTIAL)	Presence/absence	Abundance	Presence/absence	Presence/absence	Abundance Percent cover	Abundance Percent cover
Alternative quantification methods (OPTIONAL depending on project)	Presence/absence of additional taxa	Presence/absence of additional taxa	SACFOR	Abundance Percent cover Point counts and frequency cells (being explored)	Point counts and frequency cells (being explored) SACFOR	Point counts and frequency cells (being explored) SACFOR

- **Six core purposes** with **ESSENTIAL** and **OPTIONAL** recommended standards for:
 - Acquisition of imagery
 - Features identified and method of quantification
 - Additional data collected
 - Data management and output QA for imagery

Question 1:

What is the general focus of your benthic imagery work?



Question 2:

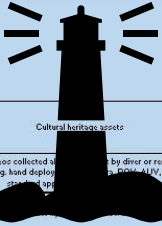
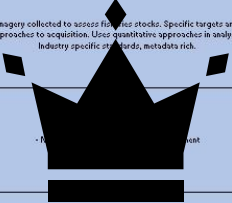
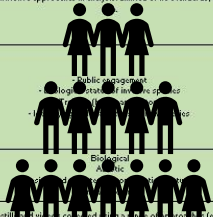
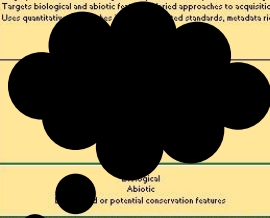
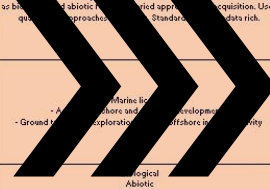

How do you quantify?



Question 4:

Does your imagery target evidence of impacts of marine infrastructure or check the condition of the infrastructure?



Purpose	Marine Archaeology and Heritage	Fisheries Stock Assessment	Identification, Training and Public Outreach	Research and/or Development of Novel Technology	Full Seabed Characterisation - Human Activities	Full Seabed Characterisation - Habitat
Summary	Imagery collected to identify and assess marine cultural heritage. Specific targets but varied approaches to acquisition. Does not use quantitative approaches in analysis. Industry specific standards, metadata limited.	Imagery collected to assess fisheries stocks. Specific targets and approaches to acquisition. Uses quantitative approaches in analysis. Industry specific standards, metadata rich.	Imagery collected as outreach material, for species identification, or for training purposes. Varied targets and approaches to acquisition. Does not use quantitative approaches in analysis. Limited or no standards, metadata	Imagery collected while testing new acquisition techniques or technologies. Targets biological and abiotic features using varied approaches to acquisition. Uses quantitative approaches in analysis. Limited or no standards, metadata rich.	Imagery collected for operational purposes, which may include infrastructure as well as biological and abiotic features. Varied approaches to acquisition. Uses quantitative approaches in analysis. Limited or no standards, metadata rich.	Imagery collected for use in habitat characterisation, e.g. mapping, assessment of trends, assessment of impacts. Targets biological and abiotic features. Uses quantitative approaches in analysis. Data standards and metadata rich. Limited acquisition standards.
Includes						
Targeted features	Cultural heritage assets	Biological Abiotic	Biological Abiotic	Biological Abiotic Designated or potential conservation features	Biological Abiotic Designated or potential conservation features Infrastructure	Biological Abiotic Designated or potential conservation features
Acquisition details	Stills and videos collected using a range of approaches (e.g. diver, remote sensing, drop camera, ROV, AUV, drone). No standard approach for sampling methods.	Usually video collected along a transect using a range of approaches (e.g. diver, drop camera, ROV, AUV, drone). Stratified sampling designs.	Can be stills and videos collected using a range of approaches (e.g. diver, drop camera, ROV, AUV, drone). Sampling designs tend to be stratified but no standard approach for sampling methods.	Can be stills and videos collected using a range of approaches (e.g. diver, drop camera, ROV, AUV, drone). Sampling designs tend to be stratified but no standard approach for sampling methods.	Can be stills and videos collected along a transect using a range of approaches (e.g. diver, drop camera, ROV, AUV, drone). Stratified sampling designs.	Can be stills and videos collected along a transect using a range of approaches (e.g. diver, drop camera, ROV, AUV, drone). Stratified sampling designs.
Acquisition and analysis standards (ESSENTIAL)			No standards	Internal procedures	NMBAGC Internal procedures	NMBAGC Internal procedures
Additional acquisition and analysis standards (OPTIONAL depending on project)					JNCC NEA OSPAR EU ICES	
Identified features (ESSENTIAL)	Cultural heritage assets	Taxa subset (for stock assessment) Taxa morphotypes (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter	Feature recorded for identification, training or public outreach purposes. All features recorded in imagery.	Taxa subset (for stock assessment) Taxa morphotypes (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter	Taxa subset (for stock assessment) Taxa morphotypes (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter	Biological taxa (all identifiable taxa, Apix ID) Taxa morphotypes (all identifiable taxa) Habitats Substrata Designated or potential conservation features
Additional identified features (OPTIONAL depending on project)				Biological taxa (all identifiable taxa, Apix ID) Taxa morphotypes (all identifiable taxa) Designated or potential conservation features Artificial structures/objects Anthropogenic activity Litter	Biological taxa (all identifiable taxa, Apix ID) Taxa morphotypes (all identifiable taxa) Designated or potential conservation features	Artificial structures/objects Anthropogenic activity Litter
Quantification methods (ESSENTIAL)	Presence/absence	Abundance	Presence/absence	Presence/absence	Abundance Percent cover	Abundance Percent cover
Alternative quantification methods (OPTIONAL depending on project)	Presence/absence of additional taxa	Presence/absence of additional taxa	SACFOR	Abundance Percent cover Point counts and frequency calls (being explored)	Point counts and frequency calls (being explored) SACFOR	Point counts and frequency calls (being explored) SACFOR

- Reviews carried out by Big Picture Group members and Marine Monitoring Group
- Focus now on 'Full seabed characterisation'
 - Many new combinations for essential and recommended criteria

Feature		Habitat/Species	
Purpose	Feature verification	Habitat mapping	Habitat/Species monitoring
Summary	<p>Imagery collected for use in verification of feature existence in particular area. Targets biological and abiotic features. Data standards and metadata rich. Limited acquisition standards, as only few replicates required to verify feature.</p>	<p>Imagery collected for use in habitat mapping. Targets biological and abiotic features. Data standards and metadata rich. Limited acquisition standards.</p>	<p>Imagery collected for use in habitat characterisation particularly assessment of trends & assessment of impacts. Targets biological and abiotic features. Uses quantitative approaches in analysis. Data standards and metadata rich. Limited acquisition standards.</p>
Includes	<ul style="list-style-type: none"> - Ground truthing anecdotal information or data from multiple sources - Support marine licensing 	<ul style="list-style-type: none"> - Mapping conservation features - Mapping of seabed, habitats and species - Ground truthing anecdotal information or data for inshore developments - Support marine licensing 	<ul style="list-style-type: none"> - Detection of trends in conservation features (community extent, distribution, composition) - Assessing the effectiveness of management practices - Environmental Impact Assessment (including assessment of fishing impacts, offshore industrial impacts, impact assessment in MPAs) - Ground truthing anecdotal information or data for inshore developments - Support marine licensing

Key messages



Key messages

High priority tasks from Benthic Imagery Action Plan targeted

- To identify main purposes and develop standards for benthic imagery use

Members of BPG consulted about purposes of benthic imagery use

- Showed a wide range of uses of benthic imagery for many purposes in the group

Analysis and refinement of BPG imagery uses narrowed down to three standards:

1. Habitat verification
2. Habitat mapping
3. Habitat/species monitoring

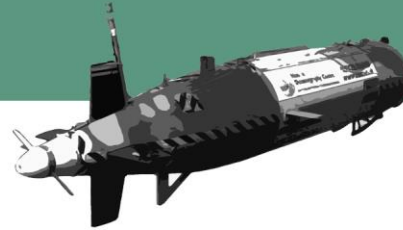
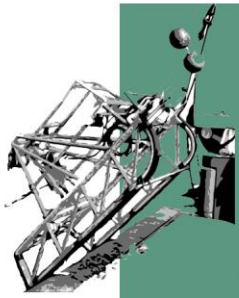
Many more standards possible and can be developed by BPG for other purposes if necessary

- Can be inserted into Quality Assurance Framework for benthic imagery



THE BIG PICTURE II

Benthic Imagery Workshop 2021



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