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## Identification approaches used for benthic imagery

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#### First Stage: Context





#### ID of what?



#### Which approaches?

## Taxonomic

## Morphological

## Combined



## **ID requirements**

- Accurate
- Precise
- Image qualityappropriate



**ØJNC** 

- Generally important
- Crucial for comparisons

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#### Second Stage: BP IDA PWG





# <u>Big Picture</u> <u>Identification Approaches</u> used for benthic imagery <u>Project Working Group</u>



## **Formation of group**

#### **Big Picture Group – November 2020 Workshop**

- BPG members attended workshop on 26 November 2020 to discuss Project Working Groups (PWG) to carry forward tasks from the Benthic Imagery Action Plan of the UK
- Key information captured for most PWGs (e.g. ideas for aims, objectives, tasks, issues and funding sources)



According to November 2020 Workshop...

 The main issue is around identifying the most appropriate/maximum level of taxonomic resolution and best classification scheme for the specific question(s) you're asking.



According to November 2020 Workshop...

- The work of the group could potentially be split into two overlapping sections:
- 1. Use of imagery to make formal taxonomic identifications/standard open nomenclature signs
- 2. Use of imagery to make morphological identifications e.g. CATAMI



#### According to November 2020 Workshop...

• Key tasks are 43 and links to 37 and 40.

Action Plan Task WG comments	
<ul> <li>Recommend minimum requirements for taxonomic and morphological identification to meet different benthic imagery purposes</li> <li>and the current budget, equipment capabilities and comparing communities/assemblages over time. Higher levels of taxonomic resolution are often needed to detect meaningful change over time. But functional groups of tax can also be appropriate, not just species level ID.</li> <li>Needs to be a balance between answering the question robustly, cost, what i really needed in terms of ID for your purpose, and how can this be standardised?</li> <li>There are a range of options: OTU, CATAMI, other morphological approaches. Can we standardise, or if not, can we at least link across the classification systems?</li> </ul>	nd xt e f is

#### According to November 2020 Workshop...

• Key tasks are 43 and links to 37 and 40.

	Action Plan Task	WG comments
37	Develop Epifauna Identification Protocol (EIP) to improve consistency of taxonomic nomenclature	A LOT of the work hinges on the scope and delivery of this product. The EIP could be linked objectively and automatically to the purpose, along with guidance on how to identify the correct taxonomic resolution for a particular purpose. This is already being discussed in the EIP group.
40	Carry out pilot test to explore combined use of morphology- based classification system (e.g. CATAMI) and Epifauna Identification Protocol (EIP)	Expand on this to include a comparison of ID approaches and how this impacts conservation outcomes for benthic MPA monitoring, possibly using a dataset from Jaime Davies. Run different approaches to ID through statistical analyses to determine how this impacts the ability to detect change in community composition or particular taxa. JNCC/Cefas already have some datasets that have been analysed in multiple ways that could be used. NRW (Mark Burton) has existing datasets that could feed into such a comparative study. Shallow subtidal sponge timeseries dataset exists using both Bell's morphological approach and diver ID'd in-situ taxonomy. This could be an ideal dataset for a comparison study. It could also support a study investigating how conditions and image quality affects suitable level of taxonomic resolution.



#### According to November 2020 Workshop...

	Action Plan Task	WG comments
34	Review taxonomic identification approaches for benthic imagery	There are a range of options: deep sea OTUs, CATAMI, other morphological approaches e.g. for sponges. Can we standardise, or if not, can we at least link across the classification systems with correlations?
35	Develop guidance on minimum sizes of organisms that should be counted, e.g. 10mm in 1m2	<ul> <li>JH - needs defining as an explicit task related to a repeatable, objective and robust assessment of the quality of the image (e.g. NMBAQC guidance categories) and the EIP. Could be an automated approach to considering ground cover, FoV, light quality etc.</li> <li>BB – what we really mean by 'size' of an organism is pixel resolution. Need to consider pixel resolution, physical size of the organism and whether you're then applying a size-based categorisation of organisms such as 'mega-benthos'</li> </ul>

## **Group roles**

#### **Breakout group participants from:**

- NatureScot
- Natural Resources Wales
- Natural England
- Gardline Ltd
- Galathea
- University of Plymouth

- Seastar Survey Ltd
- Envision Ltd
- NOC
- Cefas
- JNCC



## **Group roles**

#### According to November 2020 Workshop...

- Joey O'Connor (JNCC) is PWG lead
- NE & NRW able to collaborate
- NOC Tammy Horton is doing work currently linking to the EIP deliverable.





## **PWG Scoping Meeting**

 PWG members participated in scoping meeting 12 February 2021

 Considered formation and remit of group



#### Discussion

- -What are you already doing in this area?
- -What do you want to do over the next year?
- -How to do (and fund) this work?
- -How much time can you contribute to the group over the next while
- -Group name



# What are you already doing in this area?

- 'Big Picture' work (e.g. QAF, EIP, other PWGs)
- Contracted analyses (e.g. from MPA monitoring surveys)
- Developing OTUs (deep and shallow), Smarter ID framework
- -Online annotation
  - Including development of MPA label trees which include CATAMI based morphological classification with embedded taxonomy



# What do you want to do over the next year?

- -Further develop EIP and QAF
- Produce flowchart combining purposes and image quality to recommend maximum level of taxonomic resolution for ID
- Develop ID system that works for shallow and deep habitats
- Develop standardised workflow processes
- Improving quality/consistency of contract requirements



# What do you want to do over the next year?

- –Assist Imagery data flows and Data archives and catalogues PWGs to mobilise existing imagery data
- -Ensure work across closely related PWGs such as ID and enumeration is well aligned
- -Document emerging imagery methods used within MPA



What do you want to do over the next year?

- -Develop UK specific system based on CATAMI (if no-one else will)
- -Collate a list of contactable 'imagery experts' (e.g. EIP miniworkshops participants) to share with the wider community



#### **Group focus**

"Build on EIP work due to be completed in March 2021 to produce guidance on the use of imagery to make formal taxonomic identifications and morphological identifications (e.g. CATAMI, but not CATAMI)"



#### How to do (and fund) this work?

- JNCC actively seeking funding for this work
- Level of input/work we can do on this next year dependent on how this goes
- If funding is secured will work with PWG members to determine how best to use resources to target highest priority tasks
   Funding route ideas welcome!



# How much time can you contribute to the group?

- PWG members contributions will depend on their availability at a given time
- All members will receive regular updates on PWG progress and from APCC meetings and will have the opportunity to input to and review PWG outputs.



#### **Ties to other BP PWGs**

- Quality Assurance Framework
- Al approaches
- Work-flow guidance
- Deep sea imagery training
- Imagery annotation software
- Imagery data flows and Data archives and catalogues
- Enumeration approaches



#### **Ties to other BP PWGs**

#### **Enumeration approaches**

- Produce a set of guidance/flow chart on the use of different approaches and how this ties in with data collection purposes, acquisition equipment, ID method, image quality. This could focus on the delivery of guidance/flow chart and undertake further analysis looking at image quality, to help answer some of the outstanding questions around that, particularly for the inshore agencies.
- It needs to be able to bolt onto the deliverable around the most suitable ID approach from the group of tasks under the ID working group, but not necessarily be dependent on its delivery.
- Work needs to link with imagery workflow and assessing data quality so that by the time we get to enumeration we are working with a suitable quality of imagery data.









#### Third stage: next stages





#### Third stage: next stages

- Formalise plan
- Secure funding/resource
- Finalise PWG membership

#### Will YOU get on board?





## Questions?



