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AUV Review and AUV Review Continuation companion paper

In the spirit of advancement and continual improvement the IMOS Office has initiated a series of internal and external reviews of elements of our program. Through this process an External Review of the Autonomous Underwater Vehicle (AUV) Facility was conducted. The IMOS Governing Board subsequently requested some additional work be conducted by the IMOS Office based on several of the external review recommendations. This additional work forms the AUV Review Continuation described below. This document provides a summary and IMOS response to these reviews.

AUV Review

The Independent External Review of the Integrated Marine Observing System Autonomous Underwater Vehicle Facility (AUV Review) evaluated the stakeholder and end-user needs for sustained benthic observing in Australia and explored mechanisms for delivery of an efficient and effective program. The review consisted of two components:

- Consultation to determine current and future need for sustained benthic observations by researchers, industry, end-users and stakeholders.
- Review of benthic observing technologies and programs in Australia to inform an optimised approach to sustained benthic monitoring in IMOS.

The AUV Review resulted in ten recommendations (pp 4-9 of the AUV Review) which were presented to the IMOS Governing Board. The recommendations ranged from additional work to be completed by the IMOS Office to items worth noting and suggestions for forward planning and operations. Some of the recommendations included:

- R2. IMOS office engage marine management agencies in Victoria, NSW, and the Australian Government in 2021 to establish their demand for observations provided by the AUV Facility
- R5. IMOS note that AUVs compete with several other remote observing technologies, including light inspection class ROVs, offering more cost-effective benthic imaging in depths under 50 m
- R6. IMOS note that the least contested niche space for AUV observations is between 50 and 200 m
- R7. IMOS consider options to expedite automated classification of benthic imagery

The Board discussed and considered all External Review recommendations and tasked the IMOS Office with undertaking further work based on the recommendations (including clarifying user demand) to help the Board reach conclusions about future directions and funding allocations.

AUV Review Continuation

The aim of the Review Continuation was to assess the end-user demand for IMOS AUV deployments (i.e., the need for imagery collection) and the end-user value of IMOS increasing investment in image processing for the purposes of marine management. This work was informed by recommendations outlined in the External Review. Assessment of marine management need was conducted via interviews and desktop analyses across the three main components of the Facility: AUV Vehicle Operations, Benthic Imagery, and Image Annotations.

The Review Continuation concluded that although some jurisdictions are currently designing and developing monitoring and management frameworks, most jurisdictions indicate some level of benthic imagery need for either monitoring or research purposes. The depths of the areas requiring monitoring vary greatly between the States and the Commonwealth, however States typically require observing in <50m depth. Currently shallow observations (<50m) are mostly being achieved by that jurisdiction's own capability. The main stakeholders in the proposed niche of 50-200m are Commonwealth agencies (Parks Australia and potentially the Great Barrier Reef Marine Park Authority), which narrows the niche of the IMOS program.

The Review Continuation revealed uploading of images into Squidle+ remains a barrier for some marine managers. This needs to be addressed to ensure annotations can be collated for use by other marine managers and researchers, as well as for the building of machine-learning algorithms. There is strong desire in the stakeholder and end user community to have access to automated image analysis, but most felt that this is not a feasible option currently for a range of reasons. Therefore, image processing and automated analysis are still topics of concern within the community.

In undertaking the Review Continuation several of the External Review recommendations have now been completed. The IMOS Governing Board discussed and considered the Review Continuation in the context of the original External Review. It was concluded that further targeted conversations with stakeholders and funders are required to refine the use case and determine the expected level of need for IMOS AUV capability into the future. This work will be conducted by the IMOS Office in the second half of 2021.