An Introduction to the Mid-Atlantic Humpback Whale Catalog (MAHWC): A Workshop Report

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Submitted to:
Naval Facilities Engineering Command Atlantic under Contract No. N62470-15-D-8006, Task Order 27, issued to HDR, Inc.

Suggestion Citation:

Mallette, S., Urian, K., Fujioka, E., Mathias, N., Barco, S. 2017. *An Introduction to the Mid-Atlantic Humpback Whale Catalog (MAHWC): A Workshop Report.* Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia, under Contract No. N62470-15-8006, Task Order 27, issued to HDR Inc., Virginia Beach, Virginia. 31 August 2017.

This project is funded, in part, by U.S. Fleet Forces Command and managed by Naval Facilities Engineering Command Atlantic as part of the U.S. Navy's marine species monitoring program. Matching contributions were provided by the Virginia Aquarium & Marine Science Center Foundation, Inc. and collaborating organizations.

Acknowledgements:

This project is funded, in part, by U.S. Fleet Forces Command and managed by Naval Facilities Engineering Command Atlantic (NAVFAC Atlantic) as part of the U.S. Navy's marine species monitoring program. We would like to thank Joel Bell at NAVFAC Atlantic for his support of this important project. We thank HDR, Inc. for use of the meeting room and specifically Craig Beardslee for technical support. Support for this project and for Virginia Aquarium Foundation humpback whale research from 2011-2017 was provided by the Kellam Family Foundation and Batten Collaborative Research Fund.

This report is a summation of a stakeholder workshop held in Virginia Beach, VA on June 27-28, 2017. See Appendix 2 for a full list of workshop participants to whom we are grateful for their contributions:

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Acronyms and Abbreviations

AW	Allied Whale
AHWC	Antarctic Humpback Whale Catalog
CCS	Center for Coastal Studies
CDOC	California Dolphin Online Catalog
DPS	Distinct Population Segment
GA DNR	Georgia Department of Natural Resources
GOM	Gulf of Maine
GoMDIS	Gulf of Mexico Dolphin Identification System,
HDR	HDR, Inc.
MABDC	Mid-Atlantic Bottlenose Dolphin Catalog
MAHWC	Mid-Atlantic Humpback Whale (Photo-ID) Catalog
MMPA	Marine Mammal Protection Act
NAHWC	North Atlantic Humpback Whale Catalog
NAVFAC LANT	Naval Facilities Engineering Command, Atlantic
NCMM	North Carolina Maritime Museum
NMFS	National Marine Fisheries Service
OBIS-SEAMAP	Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations
Photo-id	photographic identification
PIPIN	Pacific Islands Photo-Identification Network
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpback Whales
UNCW	University of North Carolina Wilmington
U.S.	United States
VAQF	Virginia Aquarium & Marine Science Center Foundation, Inc.
FFWCC	Florida Fish and Wildlife Conservation Commission

Introduction

The United States (U.S.) mid-Atlantic coast provides an important foraging habitat and migratory corridor for a diverse assemblage of marine mammals. Evidence of seasonal use, foraging, and site fidelity from mark-recapture efforts suggest the mid-Atlantic provides important seasonal habitat for humpback whales (*Megaptera novaeangliae*) (Swingle et al. 1993, Barco et al. 2002, Mallette et al. 2016). Humpback whales are the most common mysticete in the nearshore waters off the coast of Virginia Beach, VA (Mallette et al. 2016). Barco et al. (2002) suggested that some individual humpback whales overwinter in the mid-Atlantic and that this region may serve as a supplemental feeding ground.

Naval Station Norfolk is the world's largest Naval Station with a high concentration of military vessel traffic and training exercises occurring in the near and offshore waters of Virginia. The Navy has expressed an interest in the identity, residency, site fidelity of, and habitat use by humpback whales sighted in the mid-Atlantic region through the funding of tagging and biopsy efforts (Aschettino et al. 2017) and aerial surveys (Mallette et al. 2017).

The Virginia Aquarium has been tasked with developing a formal mid-Atlantic humpback catalog hosted by the OBIS-SEAMAP online platform (Halpin et al. 2009) to inform the Navy of the site fidelity and habitat use of humpbacks sighted in Navy training areas. Establishing a centralized, collaborative humpback whale photo-id catalog for the mid-Atlantic and southeast regions supports informed management and benefits researchers, managers, and educators interested in the conservation of this species.

The timeline for implementation of this system is anticipated to be three years. This report summarizes the progress in year one of MAHWC development and the outcomes of the Stakeholder Workshop held in June 2017.

The objectives of this project are to:

- Create a regional catalog of high quality humpback whale identification images and sighting data in collaboration with contributors from the mid-Atlantic region.
- Develop a searchable online photo-id catalog for humpback whales sighted outside traditional feeding and breeding areas off the U.S, mid-Atlantic states to inform the Navy of the site fidelity and habitat use of humpbacks sighted in Navy training areas.
- Produce a collaborative report/manuscript on humpback whale sighting, residency and site fidelity in the U.S. mid-Atlantic with collaborators and contributors as co-authors.
- Explore feasibility of integrating other images (aerial survey and stranded animal) into the catalog to enhance sighting contributions collected from additional platforms and to build a robust collection of individually identified humpback whales.

Background

In 2016, VAQF received funding from the U.S. Navy for a projected three-year project to develop a mid-Atlantic and Southeast Humpback Whale Photo-id catalog hosted by Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP). The deliverable for this project will be a consolidated online collection of sighting data and photo-id images from multiple sources that can be used to better inform the Navy of humpback whale residency and habitat use in military training areas. Development of a central catalog will facilitate the sharing of data across the mid-Atlantic and streamline submissions to the NAHWC and GOM catalogs. The establishment of the OBIS-SEAMAP based MAHWC will provide a formal mechanism to foster collaboration and will serve as an efficient tool to investigate questions related to humpback whale movement, seasonal habitat use, residency and site fidelity. VAQF's initial role in the project has been to work with contractors Kim Urian and Ei Fujioka to develop web-interface/database design for the MAHWC and create a platform for stakeholders to contribute to the OBIS-SEAMAP based MAHWC. Additionally, VAQF is working with stakeholders to draft protocols for data access, and Sarah Mallette, the MAHWC curator, will collate and process images and associated sighting data and curate the photo-id repository which will be accessible to collaborators through an online web flow for matching between sites.

Other Collaborative Catalogs

Existing examples of web-based photo-id catalogs, e.g. Mid-Atlantic Bottlenose Dolphin Catalog (MABDC); Gulf of Mexico Dolphin Identification System (GoMDIS), serve as models for the Mid-Atlantic Humpback Whale Catalog. Each of these labor intensive projects had catalog-specific challenges which required data sharing agreements specific to the stakeholders' explicit objectives and needs. Each of these examples also highlighted the importance of developing catalog-specific protocols to mitigate challenges among contributors of proprietary data. Fostering stakeholder consensus for data sharing and usage is essential to resolve concerns, and maintain and encourage support of contributors.

The MAHWC is being modeled after the Mid-Atlantic Bottlenose Dolphin Catalog (MABDC) originally developed to assist NMFS in answering questions about the movement patterns and stock structure of coastal bottlenose dolphins. The MABDC hosted a stakeholder workshop in 1996 to gain input from researchers throughout the mid-Atlantic and southeast. The development of the centralized catalog was sponsored by National Marine Fisheries Service and was aimed at streamlining bottlenose dolphin photo-id efforts and fostering collaboration among researchers in the region. The MABDC built off of the standards developed for the North Atlantic Right Whale and North Atlantic Humpback Whale Catalogs. The role of the curator, Kim Urian, was to provide QA/QC, evaluate images for distinctiveness and quality, assign attributes to dorsal fins that could be used to more efficiently find matches, facilitate and confirm matches, and maintain the database of contributor data. The MABDC fulfilled its original purpose and is now an online tool for bottlenose dolphin researchers from NJ to FL. Similar to the MABDC, one of the final products of the current MAHWC project will be an online searchable database hosted by OBIS-SEAMAP that is consistently curated by experienced humpback whale photo-id researchers.

The MABDC was created as a portal through OBIS-SEAMAP by Ei Fujioka (Duke). The OBIS-SEAMAP is a web-based biogeographic database of multi-platform survey data for marine megafauna and a thematic node of the Ocean Biogeograpahic Information System (OBIS) managed by the Intergovernmental Oceanographic Commission (IOC) of UNESCO. It provides tools for mapping and visualizing species sighting data on a global scale. Currently, OBIS-SEAMAP hosts multiple other photo-id catalogs (e.g., MABDC, GoMDIS) and provides a user-friendly interface that provides efficient tools for comparing collections. By uploading the information into an online database, the workflow between contributors became more interactive and efficient due to the ability to share and identify matches on their own, and across the region. The platform also serves as a means for archiving collections and is especially powerful when used with wide-ranging species. This web-based tool helps streamline research efforts, facilitate collaboration and inform management. The MAHWC will also be hosted by OBIS-SEAMAP and modeled after the development of the MABDC.

Stakeholder Workshop

The MAHWC Stakeholder Workshop was held on June 28 & 29, 2017 (see agenda in Appendix 1) at HDR Engineer Inc. offices, 249 Central Park Avenue, Virginia Beach, VA 23462. Representatives from ten different organizations participated (see list of participants in acknowledgements & Appendix 2), either in person or via teleconference/web meeting. These groups included NAVFAC-LANT, VAQF, HDR, Inc., Duke University, VAQ Whale Watch, Rudee Tours, Allied Whale, Center for Coastal Studies, Whale and Dolphin Conservation, and Wildlife Conservation Society.

The goals of this workshop were to:

(1) provide a venue to discuss developing and contributing to a collaborative online catalog
(2) finalize the protocols for data access
(3) define minimum metadata required for submissions to MAHWC
(4) establish work flow for rolling up data from MAHWC to the NAHWC and CCS catalogs
(5) explore what data established catalogs (NAHWC/GOM) are willing to contribute

Workshop Outcomes

Contributor Goals of the Collaborative Catalog

Stakeholders agreed that the MAHWC hosted on OBIS-SEAMAP will provide a streamlined and formal mechanism to catalog and exchange humpback whale photo-id information. Workshop participants were supportive of contributions to the MAHWC and also excited for the more efficient online process of matching whales within and outside the region. A mechanism to efficiently share information about specific whales in concurrent Navy funded projects will yield a more comprehensive understanding of humpback whale presence and help address specific questions of occurrence in Navy training areas in the

mid-Atlantic and southeast regions. Additionally, the whale watch stakeholders were enthusiastic about the potential for quicker turnaround of data for education and outreach purposes on their vessels. Stakeholders expressed that the MAHWC on the web-based platform could allow for a more comprehensive view of anthropogenic threats and interactions with the whales in this region and will support informed management decisions. Humpback whale researchers curating the northern catalogs were interested in better characterizing the range of individuals along the U.S. East Coast and gaining more information about younger whales that appear to be utilizing the mid-Atlantic coast. Additionally, there is interest in better understanding habitat use and recruitment to non-traditional areas.

Data Access

Existing terms of use, consent forms for inclusion of images and associated sighting data, and protocols for data access were discussed for five collaborative, web-based catalogs, including: (a) Structure of Populations, Levels of Abundance, and Status of Humpback Whales (SPLASH), (b) Gulf of Mexico Dolphin Identification System (GoMDIS), (c) North Atlantic Right Whale Catalog, (d) mid-Atlantic Bottlenose Dolphin Catalog (MABDC), and (e) Antarctic Humpback Whale Catalog (AHWC; Allen et al. 2011). Each had favorable aspects that stakeholders expressed interest in including in the MAHWC, the specifics of which are discussed in the relevant sections below.

Terms of Use

OBIS-SEAMAP has a separate Terms of Use Agreement from the MAHWC and other databases it hosts (see Appendix 3). Here we are discussing Terms of Use specifically for the MAHWC, regardless of hosting platform. The Terms of Use for the North Atlantic Right Whale Catalog explicitly states “It is illegal to approach right whales within 500 yards in U.S. waters without a scientific research permit. Images on this web site that were obtained within U.S. waters were collected under research permits granted by the National Marine Fisheries Service”. Stakeholders expressed concern over ensuring submitted data were obtained responsibly, and participants felt that it was important to explicitly address responsible conduct for contributors to the MAHWC, similar to the NARW or PIPIN Terms of Use. Participants in the stakeholder workshop agreed that submission guidelines which state that “no data would be included in the catalog that resulted from unauthorized harassment of protected species,” would be appropriate to cover the needs of the MAHWC. In addition, specifying that the images submitted to the catalog were taken under permit or when abiding by Responsible Whale Watch Guidelines should be included.

The terms of use for the Antarctic Humpback Whale Catalog (AHWC), indicates the user agrees to, “not hold AHWC liable for errors in the data. While we have made every effort to ensure the quality of the database, we cannot guarantee the accuracy of the data”. The North Atlantic Right Whale Catalog includes a disclaimer in their data sharing agreement about the lack of peer review for management documents, and a similar disclaimer was suggested to be included for the MAHWC. See Appendix 4 for a Terms of Use statement that includes the recommendations of the stakeholders.

Consent form

Stakeholders agreed that, similar to the MABDC, all contributors to the MAHWC will be required to submit a consent form with their respective submissions that ensures any information contributed to the MAHWC cannot be used without their written approval. This consent form also indicates that the contributor agrees to allow the submitted images, and their respective data, to be entered into the MAHWC. After being processed by the curator the dataset would be uploaded to the OBIS-SEAMAP website for matching purposes only. The consent form explicitly states that the contributor retains ownership of the images and data they submit, and that any images and data submitted, by default, will be subject to the terms of the MAHWC protocols for data access, unless waived by the contributor. The stakeholders indicated an option to make the data publically available through OBIS-SEAMAP should be added to the consent form, including explicit verbiage verifying that the contributor has the authority to share those data. The GoMDIS consent form uses specific language to remove data if a contributor no longer wants to collaborate, and that the curator reserves the right to suspend a contributor and remove his/her submissions if established protocols are ignored. Stakeholders indicated this verbiage could also be added to the consent form for the MAHWC. The consent form can be found in Appendix 5.

Protocols for data access

The final product of this project will be a report designed to be a multi-authored manuscript for publication. Following the Navy-funded developmental component of this project, the catalog will continue to be supported by stakeholders and future data sharing will take place among contributors as per the data sharing agreement. Stakeholders expressed the need for establishing standardized protocols for data access beyond the scope of the Navy support for the development of the MAHWC. Some stakeholders suggested there should be separate data sharing agreements for the short-term Navy funded project and the continuation of the longer-term photo-ID project, and that these could be in the form of (a) an agreement for sharing images and associated data for the Navy funded MAHWC project, and (b) a data access protocol for sharing data beyond the scope of the Navy funded project, similar to how data access was established for the MABDC.

An example Agreement for Data Sharing for a specific photo-ID project between HDR, Inc. and Duke University can be found in Appendix 6. The stakeholders indicated a similar agreement should be considered for the current project as it reflects the objectives of the project and ensures the data is retained by the original contributor. The data access protocol developed for the MAHWC is based on the MABDC data access protocol, which divides terms for data access into three categories:1) data access for publication, 2) data access for management purposes (e.g. access to data by state/federal protected species manager and/or by organizations seeking to comment on federal and/or state actions), and 3) data for education and outreach e.g. images and/or numbers of matches to be used on whale watch vessels and/or for formal or informal educational programs; Appendix 7). Stakeholders agreed that the MAHWC should also include these three levels of data access with some modifications to the MABDC agreement based upon the needs of the MAHWC stakeholders.

Each level of access would require submission of a short proposal, which would include the following:

- outline of the proposed project/application of data
- type of request (publication, management, education/outreach)
- anticipated data requirements and products of the work
- estimated time frame for completion of the study

Similar to the MABDC, the relevant contributors and the curator will review proposals to ensure no conflicts exist with the conditions for data access. Review of proposals for access to data for publication would, in part, be to reduce duplication of research efforts, propose appropriate analyses, and identify potential coauthors and/or appropriate acknowledgement. Upon agreement of authorship by the applicant, the data will be released.

Data Sharing

AW and CCS are willing to share data for any whales matched to the NAHWC and GOM catalog once a data sharing agreement for the Navy funded project and data access protocols established at the Stakeholder Workshop are finalized. AW indicated that some contributors to the NAHWC provide blanket waivers for sharing data, while others request sighting data should not be released without prior written consent. AW will collate a list of contributors and contact information for the primary investigators (and a supplementary investigator if one is established) who submitted images that have matched to the MAHWC, to specifically discuss data sharing. We will be working with HDR to develop a draft request for data from the MAHWC for their NAVFAC-LANT project (Aschettino et al. 2017).

In regards to the workflow for rolling up data from the MAHWC to the NAHWC and CCS catalogs, AW would like a batch submission of animals annually, whereas CCS does not need a submission of images, rather only access to the MAHWC for comparisons to the GOM catalog. The group agreed that CCS could have a collaborator login account which would allow access to view the catalog throughout the season. Access for matching MAHWC contributions to larger regional catalogs will not require specific data access requests, rather is granted with collaborator login credentials.

The most requested data by the contributors to other organizations are complete sighting histories (e.g. sighting dates and specific locations), although these may not include the latitude and longitude for historic data where GPS position was not used. Inclusion of location data was of interest to stakeholders, to examine residency times and distribution patterns which might foster the development of additional research questions and support development of proposals under the established categories of data access. Vetting multiple sightings of an individual by a single contributor will not be the catalog curator's responsibility, although there are QA/QC steps during processing and integrating into the online database. Therefore, if a proposal to share sighting histories is accepted by the respective contributor(s), these groups will be encouraged to work together to validate multiple sightings of individuals.

When requesting data from MAHWC to be used for publication, the group decided that approval would be determined by the contributor(s) and facilitated by the curator. If an agreement cannot be reached, a steering committee, including representatives from Allied Whale and Center for Coastal Studies (CCS) will offer mediation and guidance. The North Atlantic Right Whale Consortium identifies the time frame of the study should not exceed two years, which was acceptable to the workshop participants. CCS suggested that a requirement explicitly state that contributors of data must be allowed to review any manuscript(s) before publication to ensure proper use of data and inclusion of this requirement in the terms of data access was agreed to by the group.

Stakeholders reiterated the importance of including a disclaimer in the data access protocols, especially as it pertains to data access for management, that raw data will not be displayed in publicly available management reports. Further, the MAHWC should explicitly be cited when management requests result in published information.

Though access for education/outreach requests would result in a similar proposal process as management requests, some stakeholders felt it is one of the most controversial types of data request. Concern was expressed over the feeling of ownership over the individual animals and their life histories which has occurred in the northeast. This can become a problem if protocols for data access are not explicitly stated, understood or adhered to. CCS has a separate public outreach catalog that can be downloaded for use on whale watch boats to preempt any misuse of data and proliferation through social media. It was suggested to include very specific and well-structured language to cover this issue in the data sharing agreement and help direct citizens to the proper reporting channels.

Best Practices

Workflow

The design of the MAHWC platform will be the same as the MABDC (Appendix 8). There are three applications, (a) a customized Microsoft Access Database that the curator uses to organize images for ID (e.g. fluke and dorsal fin images) and link associated whale information, (b) a web-based platform that allows the curator and contributors to circulate and verify potential matches, and (c) an online interface for contributors to filter images and visualize sighting histories for comparison across sites.

Each contributor is required to agree to the Terms of Use for the MAHWC to contribute to and gain access to the OBIS-SEAMAP based catalog. The contributor will be able to download a template for submitting images and data. The contributor must submit the Consent Form for inclusion of data in the MAHWC (*i.e.* for matching purposes only) with their submission. Data cannot be accessed publically unless a contributor specifically chooses this option within the Terms of Use of the OBIS-SEAMAP. Each contributor will be assigned login credentials to view and compare potential matches.

The workshop participants agreed that minimum metadata are required for all submissions to the MAHWC to ensure that the MAHWC is a high quality scientific resource and effective tool for generating research questions and informing management. Validated coordinates and verified dates were preferred by the group. It was agreed that all sighting dates recorded in the MAHWC should have an image to confirm the identification of that whale. In addition, the group agreed that confirmation of a unique whale by more than one person within the contributing organization will be required.

There will also be an option to indicate that supplementary data/samples exist (such as biopsy and tagging results) without sharing the detailed results in the MAHWC. Stakeholders felt this option would increase the power of the MAHWC as a tool and foster collaboration among organizations without compromising on-going research projects. Stakeholders could discuss offline and independently about the specifics of the supplementary data and/or submit a proposal for data access per the established protocols. Each contributor defines the level of data that can be viewed in the web-based platform. Although sighting data may be viewed by other contributors, they will be unable to download it unless the contributor owning the data agreed on a public release of the data through OBIS-SEAMAP. Any inquires or proposals for use of the data must follow the protocols established for the different levels of data access.

The initial curator for the OBIS-SEAMAP based MAHWC, Sarah Mallette (VAQ), will work with Kim Urian (Duke) to develop systematic protocols for curator responsibilities based upon the similarities in the workflow with the MABDC. The curator will review data/image submissions and complete a QA/QC protocol, (e.g. organizing images and data in the database, scoring images for photo quality, assigning feature codes to dorsal fin and flukes, excluding images without sufficient metadata) and provide the submissions to the developer of OBIS-SEAMAP (EI Fujioka-Duke University). Mallette will work with CCS and AW to validate scoring images for feature codes and assure standardization among the groups. Eventually these protocols will be incorporated into a training manual for future curatorial duties for the MAHWC.

Photo-quality

Workshop participants discussed quality control considerations for data submissions and confirming matches within the MAHWC. Specific photo quality criteria (Friday et al. 2008; Jones 2017) from existing catalogs were discussed, and Lindsey Jones (AW) presented the updated guidelines developed for scoring images for the NAHWC (Appendix 9). The group was in support of using these image quality scoring guidelines to systematically grade image quality for the MAHWC. The photo quality rating ranges from 1 (highest quality) to 4 (extremely poor quality, corresponding to the 3- category presented by Friday et al., 2008). For humpback whales, distinctiveness has been shown to be difficult to code independently of photo quality (Friday et al. 2008). Analyses performed on images in the NAHWC to detect positive matches based on images coded for photo-quality and fluke distinctiveness revealed the effect of distinctiveness was small compared to that of photo quality (Friday et al. 2008). Unless the stakeholder group suggests distinctiveness codes are important features of the MAHWC, flukes will not be coded for distinctiveness, only for quality.

Matching

Proposed identifiers (or feature codes) that would be most useful for categorizing and filtering images to increase the likelihood of finding matches quickly were discussed and refined. These ranged from the basic variations in the ventral fluke pattern and/or in the shape, size and scarring of the dorsal fin (Katona and Whitehead 1981) to supplementary feature codes such as the level of prominence of the hump and knuckles. AW and CCS both curate much larger catalogs than the size of the expected MAHWC. AW began with many categories but found that over time, they only used basic fluke pigmentation types and subtypes. CCS also uses a similar approach categorizing the broader dorsal fin shape and ventral fluke pigmentation categories. From their experience, they recommended scoring fluke and dorsal fin feature codes as these were the most efficient ways of finding matches, while a few supplementary identifiers should be considered (*e.g.* categories of injury). The group discussed concern for how an injury was classified (*i.e.* entanglement, vessel strike), because of the potential for misclassification and the implications for management. Participants also felt that it was important to assign feature codes on an image by image basis, rather than to an individual whale because not every image will necessarily reveal a specific feature on an individual.

Similar to the MABDC, if a potential match is made it will initiate a workflow among the relevant contributors and curator (Appendix 10). The online matching tool will allow viewers with a login to display two catalogs simultaneously for comparison and will provide basic image processing tools (e.g. overlaying images, flipping and rotating images). Once a potential match is made, a notification will be sent to the curator and the other contributor(s) for review and can then be verified or rejected. Complete consensus among the three parties must be reached in order for a match to be confirmed. If one party does not agree, offline exchange of supplementary images may occur to assist in confirmation rejection of a match. Specific images used to validate a match, should be uploaded to the online MAHWC. The timeline for contributors to confirm or reject a match will be no more than two weeks. If the two week period is exceeded the curator will follow up with the contributors and urge their timely review of the match(es).

Summary

The workshop provided a venue to discuss specific considerations for the development of the OBIS-SEAMAP based MAHWC. Examples of existing web based photo-id catalogs and their terms of use were presented. The MAHWC collaboration will be modeled after the structure and workflow of the established MABDC. Contributors will submit images and sighting data to the curator who will process and score images for photo quality, and assign feature codes for filtering matches to each image. The curator will work with CCS and AW to standardize coding images. The processed data will be submitted to the developer (EI Fujioka-Duke University) who will update the online catalog hosted on the OBIS-SEAMAP website for the MAHWC. Contributors will be able to search for matches through the online catalog, and potential matches circulated for the contributors to verify.

Existing photo-id data sharing agreements were reviewed and stakeholders identified what should be included in the final MAHWC data submission package. Specific verbiage for the data access protocols,

the consent form, and terms of use were agreed upon and collated for final review by the stakeholders (see appendices). Development of draft proposals for the Navy funded and future projects was recommended to test the final data access protocols. AW and CCS are willing to share data for any whales matched to the NAHWC and GOM catalog under the conditions established in the final data sharing agreement. CCS will be granted collaborator status to compare images throughout the year to the GOM catalog. AW will continue to annually receive submissions from the MAHWC to be matched to the NAHWC. This workshop provided the opportunity for stakeholders to discuss the workflow of contributing to the collaborative online catalog and address data sharing concerns. Stakeholders were very supportive of the work completed thus far and for the continued development of the MAHWC.

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Appendix 1. Meeting Agenda

Workshop Agenda

Stakeholder Workshop for the Mid-Atlantic Humpback Whale Catalog
Wednesday and Thursday, June 28-29, 2017
HDR Engineer Inc.
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462

Workshop Information:

Audio Conference Line:

Phone number: 1-866-583-7984;
Conference code: 9599613

Videoconferencing Info:

Please note link for videoconferencing is different each day.
Audio call-in is the same.

First GoToMeeting? Try a test session: https://care.citrixonline.com/g2m/getready

June 28, 2017: MAHWC Stakeholder Workshop

Wed, Jun 28, 2017 9:00 AM - 5:00 PM EDT

Please join my meeting from your computer, tablet or smartphone.
https://global.gotomeeting.com/join/477963573

June 29, 2017: MAHWC Stakeholder Workshop

Thu, Jun 29, 2017 9:00 AM - 5:00 PM EDT

Please join my meeting from your computer, tablet or smartphone.
https://global.gotomeeting.com/join/629906613

Appendix 1. Meeting Agenda Continued.

Wednesday June 28, 2017

9:00-9:30 Introduction

- Welcome, housekeeping
- Introductions
- Rapporteur
- Agenda review and schedule

9:30-10:15 MAHWC background and workshop goals

- VAQ (SGB/SDM)
- HDR (JA)

10:15-12:00 Demonstrations

- MABDC and OBIS-SEAMAP (KU)

15 min break

- MAHWC and OBIS-SEAMAP (EF)
- Examples of collaborative catalog agreements, terms of use and submission consent forms (KU & EF)

12:00-13:00 Lunch (Many options near meeting location)

13:00-1400 Discussions – Stakeholder input (stakeholders)

- Contributors' goals/desired outcomes for collaborative catalog
- Research and management priorities for Mid-Atlantic
- Methods used for photo-analysis
  - Scoring features for ID and photo-quality
  - Verifying matches

14:00 – 15:30 Discussions -- MAHWC specific considerations

- Data requests/sharing protocols (SGB/KU)
  - Navy funded project
  - Future projects - MAHWC collaborators and/or outside agencies
- Contributor needs
  - Consent form and terms of agreement for sharing of images and data via MAHWC

15:30 – 15:45 Break

15:45 – 16:45 Discuss guidelines for data contribution MAHWC

- Workflow for image and data submission (KU/EI):
  - Proposed curator role (SDM/SGB)
  - Feature codes used for scoring (SDM/NM/AW/CCS)

Appendix 1. Meeting Agenda Continued.

- Determine standards/best practices for MAHWC (KU)
  - Image and sighting data accession guidelines
    - image vs. animal specific data
    - photo quality guidelines (Lindsey Jones-AW)
  - Timeline on contributors confirming/rejecting matches
  - Inactive contributor
- Considerations for rolling up data/images to NAHWC and GOM catalogs (AW/CCS/EF)
  - Standardized submission template
  - Image file naming – do not change after submission
  - Minimum data to include in submission
  - Best of images from MAHWC– multiple contributors/sightings but only best of submitted?

16:45-17:00 Wrap-up

Thursday June 29, 2017

Update Agenda based upon Wed (6/28) Meeting

09:00 – 10:30 Recap of previous day

- Feedback
- Discussions
  - Schedule of catalog updates for on-going projects
  - Types of supplemental data and how to incorporate for those who want to contribute (tag data, biopsy sampling and genetic data, etc.) (EF)

10:30 - 10:45 Break

10:45 – 12:30 Discussions: Next steps in project development

- Future needs/considerations/meetings
- Advancement and improvements of the PhotoID App
- Unmined data/missing data- areas not surveyed
- Consideration of NMFS letter of authorization or permit and citizen science
- Collaboration with stranding networks to share and compare images of stranded humpback whales
- Technical considerations for computer assisted matching (e.g. Wildbook)
  - Formal partnership?

12:30-1:45 Lunch (Many options near meeting location)

1:45-3:00 Wrap up

- Sources of future funding/long-term curation
- Address any remaining items

Appendix 2. Stakeholder Workshop Meeting Participants

Mid Atlantic Humpback Whale Stakeholder Workshop Participants		
List of Attendees	**Institution**	**Address**
Joel Bell	Naval Facilities Engineering Command Atlantic	6506 Hampton Blvd, Norfolk, VA 23508
Jessica Aschettino	HDR, Inc.	1209 Independence Blvd. Suite 108, Virginia Beach, VA 23455
Amy Engelhaupt	HDR, Inc.	1209 Independence Blvd. Suite 108, Virginia Beach, VA 23455
Sue Barco	Virginia Aquarium & Marine Science Center Foundation	717 General Booth Blvd, Virginia Beach, VA 23451
Sarah Mallette	Virginia Aquarium & Marine Science Center Foundation	717 General Booth Blvd, Virginia Beach, VA 23451
Noelle Mathies	Virginia Aquarium & Marine Science Center Foundation	717 General Booth Blvd, Virginia Beach, VA 23451
Alexis Rabon	Virginia Aquarium & Marine Science Whale Watch	717 General Booth Blvd, Virginia Beach, VA 23451
Kristin Rayfield	Rudee Tours	200 Winston Salem Ave, Virginia Beach, VA 23451
Monica Pepe	Whale & Dolphin Conservation	7 Nelson St, Plymouth, MA 02360
Regina Asmutis-Silvia	Whale & Dolphin Conservation	7 Nelson St, Plymouth, MA 02360
Kim Urian	Mid-Atlantic Bottlenose Dolphin Catalog	408 Straits Rd, Gloucester, NC 28528
Ei Fujioka	Duke University	2138 Campus Dr, Durham, NC 27708

Remote:	**Institution**	**Address**
Judy Allen	Allied Whale	105 Eden St, Bar Harbor, ME 04609
Peter Stevick	Allied Whale	105 Eden St, Bar Harbor, ME 04609
Tom Fernald	Allied Whale	105 Eden St, Bar Harbor, ME 04609
Lindsey Jones	Allied Whale	105 Eden St, Bar Harbor, ME 04609
Jooke Robbins	Center for Coastal Studies	5 Holway Ave, Provincetown, MA 02657
Howard Rosenbaum	Wildlife Conservation Society	2300 Southern Blvd, Bronx, NY 10460
Maia Murphy	Wildlife Conservation Society	2300 Southern Blvd, Bronx, NY 10460

Appendix 3. OBIS_SEAMP Terms of Use

http://seamap.env.duke.edu/about/termsofuse:
OBIS-SEAMAP Terms of Use
This Terms of Use was updated on January 5th, 2016. If you are familiar with the previous Terms of Use, please read the new one carefully.
By accepting this document, the user agrees to the following when using OBIS-SEAMAP data in any publication, product, or commercial application:

1. For datasets under CC0 sharing policy, data are free to use without permission or restrictions. Proper credit/citations for individual datasets and OBIS-SEAMAP are appreciated (see below for more details),

2. For datasets under the CC-BY or CC-BY-NC sharing policy, permission is not required from the data provider(s) for use. Proper credit/citations for individual datasets and OBIS-SEAMAP are required (see below for more details),

3. For datasets under the "permission required" sharing policy, it is required that users contact and get permission from the original data provider(s) for the use of individual observation records from the datasets registered in the OBIS-SEAMAP database. Proper credit/citations for individual datasets and OBIS-SEAMAP are required (see below for more details),

4. Gridded summary data that OBIS-SEAMAP has generated are under CC-BY sharing policy and permission is not required from the original data provider(s) for use. Proper credit/citation for OBIS-SEAMAP is required (see below for more details),

5. The citation of any publication, report, or product that made use of the data or tools provided by OBIS-SEAMAP will be forwarded to the OBIS-SEAMAP Technical Team (seamap-contact@duke.edu) for inclusion in our list of references,

6. OBIS-SEAMAP and the original data providers are not liable for errors in the data. While we have made every effort to ensure the quality of the database, we cannot guarantee the accuracy of these datasets,

7. The burden for determining fitness for use of the downloaded data for any analyses lies entirely with users. OBIS-SEAMAP or the original data providers do not support outcomes of your analyses that used the data downloaded from OBIS-SEAMAP,

8. Be encouraged to consider inclusion of the accompanying transect (effort) dataset(s) if available into the methodology of your analyses, and

9. Not to redistribute the data you downloaded from OBIS-SEAMAP through any media without consent from OBIS-SEAMAP and the original data providers unless the datasets are explicitly shown under the CC0 sharing policy.

Details on the proper credit/citations:
Except for data under CC0 sharing policy, proper credit/citations for all individual datasets are required, even when multiple datasets are used together. The citation section in the metadata of individual Dataset Page(s) should be used as the proper credit/citations. For your convenience, the zipped file for download data includes datasets_and_citations.csv that lists all the datasets, their citations and links to online metadata (notes: datasets_and_citations.csv has only one row for the dataset when users downloaded data with "Dataset on Dataset Page" option. For other options, the csv file lists all the datasets that provided data users downloaded)

Appendix 4. Draft MAHWC Terms of Use

Mid-Atlantic and Southeast Humpback Whale Photo-id Catalog (MAHWC)

Terms of Use

It is illegal to approach within 100 yards of a humpback whale, to place your vessel in the path of oncoming humpback whales causing them to surface within 100 yards of your vessel, or to disrupt the normal behavior or prior activity of a whale in U.S. waters without a scientific research permit. Vessels must be operated at a slow, safe speed when near a humpback whale.

Images on this site were collected under research permits granted by the National Marine Fisheries Service or under Responsible Whale Watch Guidelines (http://www.nmfs.noaa.gov/pr/viewing.htm). The Mid Atlantic Humpback Whale Catalog represents a collaborative effort made possible by the dedication and joint effort of many organizations and individuals. The data and images in the catalog are the property of the individual contributors. To request the use of data or images from the catalog please contact the Mid Atlantic Humpback Whale Photo-id Catalog curator through Virginia Aquarium & Marine Science Center at smallett@virginiaaquarium.com.

By accessing the mid-Atlantic and Southeast Humpback Whale Catalog (MAHWC) the user agrees to the following:

1. Not to use data contained in the mid-Atlantic Humpback Whale Catalogue (MAHWC) in any publication, product, or commercial application without prior written consent of the original data contributor.

2. To cite both the data contributor and the mid-Atlantic Humpback Whale Catalogue (MAHWC) appropriately after approval of use is obtained.

3. Not to hold the mid-Atlantic Humpback Whale Catalogue (MAHWC) liable for errors in the data. While we have made every effort to ensure the quality of the database, we cannot guarantee the accuracy of the data.

***Terms of Use for the MAHWC are based on those developed for the North Atlantic Right Whale Catalog and the Antarctic Humpback Whale Catalog*

Appendix 5. Consent Form.

Consent form for inclusion of images in the mid-Atlantic and Southeast Humpback Whale Photo-ID Catalog (MAHWC)

Contributor Information:

Name: _____

Affiliation/Project: _____

Address: _____

Archive location: _____

Email address: _____ Website address: _____

Phone number: (_____)_____

Date of submission: _____

Images were collected under a Federal/state protected species authorization permit? **Yes** or **No**

If **Yes**, please provide permit # and type (ESA or GA) and primary individual(s) authorized under this permit _____

If **No**, do you certify, to the best of your ability, that submissions included here were collected under Responsible Whale Watch Guidelines? **Yes** or **No**

Data sharing through OBIS-SEAMAP:

Any images and data submitted by default will be subject to the terms of the MAHWC protocols for data access, unless waived by the contributor of that data. If you are interested in making your data publically available through OBIS-SEAMAP please review the OBIS-SEAMAP terms of use (Appendix 3).

Please provide information on the level of your sharing preference:

- o I certify that I am the official representative (e.g. have the authority to make decisions of how all data included in submission is shared) of all data within this submission. **Yes** or **No**

Do you have permission to decide whether these data are made publically available through OBIS-SEAMAMP? Please circle, **Yes** or **No**

1) I only want my data to be viewable by collaborators/contributors with log-in access to the MAHWC and under the terms of use established in the data sharing agreement **Yes** or **No**
2) I am interested in making my data publically available through OBIS-SEAMAP. **Yes** or **No**

Appendix 5. Consent Form Continued.

Consent form for inclusion of images in the mid-Atlantic and Southeast Humpback Whale Photo-ID Catalog (MAHWC)

I, _____, agree to allow the submitted images and their respective data to be entered into the mid-Atlantic photographic-identification repository/catalog known as the MAHWC. Once processed by the Curator, I understand the images/data will be uploaded to the OBIS-SEAMAP Photo-ID Application website by the Curator for further circulation and verification amongst other MAHWC collaborators for photographic identification purposes. These images will not be used for purposes other than initial matching without the written consent of their contributor. I understand this agreement also applies to future submissions and updates. **All contributing organizations maintain ownership of their submitted images and the accompanying data**. Should any of the above contributor information change, I shall notify the Curator. I also understand that should my organization no longer wish to collaborate, our images and data will be removed from the MAHWC database and OBIS-SEAMAP if desired. The Curator also reserves the right to suspend a collaborating person/group/organization and remove their submitted images/data from the MAHWC and OBIS-SEAMAP database should the established protocols knowingly be ignored.

_____ _____

Signature of contributor Date

_____

Printed name of contributor

***This consent form for the MAHWC is based on those developed for the GoMDIS and MABDC Photo-ID Catalogs*

Appendix 6. Example Data Sharing Agreement

Agreement between HDR EOC and Duke University for Sharing of Photographic Data and Associated Sighting Information

In an effort to further our knowledge and understanding of the multiple species of cetaceans that occur in the U.S. Navy's Atlantic Fleet Training & Testing (AFTT) study area, researchers from Duke University and HDR will agree to collaborate and share photo-identification images and associated sighting information with one another as part of Navy-funded project deliverables. While each institution/organization will maintain ownership of their photos and sighting information, the objective of the sharing agreement is to allow the data to be processed as quickly and efficiently as possible while compiling the information in a larger photo database. Compiling of images in this manner will allow comparisons with existing catalogs (e.g. those catalogs already established by Duke University and HDR) as well as comparisons with catalogs from other regions (assuming both parties are in agreement to do so). Duke University will continue to maintain the pilot whale and beaked whale catalogs, compiling images from multiple regions within the AFTT. HDR will continue to maintain the large whale catalogs (including baleen and sperm whales), also compiling images from multiple regions. Per previous agreements, humpback whale photos will also be shared with Provincetown Center for Coastal Studies (PCCS) and Allied Whale, both of whom maintain larger, regional catalogs for the species. Fin whale photos will also be shared with PCCS. Photos of North Atlantic right whales (NARW) will be shared with the New England Aquarium, who curates the NARW catalog. Photos of other species, e.g. bottlenose dolphins, Atlantic spotted dolphins, striped dolphins, short-beaked common dolphins, and other odontocete species encountered may be compiled by either group, or a third party entity (such as a graduate student) subject to agreement from both Duke University and HDR. Neither Duke University nor HDR will share photos and associated data with any third party not listed above, without communication and consent of the other.

Each group should inform the other prior to using compiled photo and data information for reporting, presentations, or publication. For each use of aforementioned examples, authorship should be established beforehand. In some instances co-authorship may be appropriate, whereas other instances only acknowledgements may be warranted.

All data collected during Navy-funded projects remains subject to the terms and conditions within the Data Use Agreement.

_____	_____
Name (HDR Representative)	Name (Duke Representative)
_____	_____
Signature (HDR Representative)	Signature (Duke Representative)
_____	_____
Date	Date

Appendix 7. Protocol for Data Access

The Mid-Atlantic and Southeast Humpback Whale Photo-identification Catalog

This protocol for data requests, to the MAHWC, is based on the Protocol for Data Access for the Mid-Atlantic Bottlenose Dolphin Catalog, 2009 and North Atlantic Right Whale Consortium Data, 2002.

Protocol for Data Access

Categories of data access

There are three categories of data access: the first is a request for data for research that will lead to a peer-reviewed publication ("Data for Publication"). The second type is a request for data that will be used solely for management purposes ("Data for Management"), and the third category is for data requests specifically for education and outreach purposes ("Data for Education"); the second and third request types would not result in publication of data or analysis of data acquired from the MAHWC. Each type of request has a separate access protocol. Proposals for all three types of data access should be submitted to the MAHWC curator (Sarah Mallette; smallett@virginiaaquarium.com), to circulate to the relevant contributors.

Appendix 7. Protocol for Data Access Continued

I. Data for Publication

a) Protocol for data access

To ensure that research being planned or currently conducted by contributors is not compromised or unnecessarily duplicated, and that proper authorship or acknowledgment of all data contributors occurs, any request for data must be submitted to the MAHWC in the form of a brief proposal (e-mail is preferred). The proposal need not be lengthy, but it should at a minimum contain the following:

- Name of the requesting institution(s) and of the Principal Investigator;
- Outline of the proposed work, including questions being addressed or hypotheses tested;
- Anticipated data requirements;
- Anticipated products of the work (e.g. scientific paper, student thesis, EA/EIS);
- Estimated time frame to completion of the study, length of study not to exceed 2 years. A report summarizing the work will be due 6 months following the project end date. It is understood that peer-reviewed and thesis publications may require a longer time frame and so a progress report indicating the outcome of the study may be filed while awaiting publication).

Proposals for scientific analyses and publication will be reviewed by the relevant contributors and the curator within three weeks of submission. Their review will: ensure that duplication of effort is minimized; propose appropriate analyses; and identify potential co-authors. Recommendations for authorship will be sent to the applicant; in some cases, the reviewers may suggest that, instead of authorship, acknowledgement of the MAHWC and/or certain institutions/persons be included in any published document. Once authorship has been agreed upon by the applicant, contributors and curator, the data will be released. The applicant will then be provided with the requested data, with the method (e-mail, CD, FTP) determined by the size of the requested information file.

The curator and the reviewers will treat proposals as confidential and ideas or hypotheses that they may contain will be not be shared with third parties. The only exception to this confidentiality may occur if the reviewers wish to obtain confidential peer review of the proposed work in order to judge its feasibility or merit; this would only be done with prior approval of the applicant.

The MAHWC encourages multi-investigator proposals where interests of several investigators may overlap. Conflicts over the use of the data will be mediated by MAHWC contributors and curator in as timely a fashion as possible.

Grounds for rejection of a proposal will include: a lack of qualification; lack of necessary resources; an assessment that the scope of the project is unreasonably large or not feasible within the proposed time frame; unwillingness of the applicant(s) to acknowledge or offer authorship to major data contributors; proposed methods that do not adequately address a meaningful question or hypothesis, or a determination that the proposed work is already underway by the original contributors or by someone else.

Appendix 7. Protocol for Data Access Continued

I. Data for Publication

b) Conditions for data access

Provision of any data will be subject to the conditions given below, to which the applicant must agree within his/her proposal. These conditions are designed to eliminate misunderstanding and to protect the applicant, the data contributors and their organizations, and the curator.

- For a reasonable period of time (generally that of the estimated time frame of the applicant's proposed study), the MAHWC will not provide similar data to others for the same or similar scientific purposes described in the applicant's proposal, without first obtaining the applicant's written permission.
- The applicant will use the requested materials only for those purposes set forth in his/her proposal. Requests for significant departures from the scope of the proposal must be submitted in writing to the MAHWC contributors and curator for approval.
- The applicant will not share the requested materials with any third party without first obtaining written permission from the MAHWC contributors and curator.
- The applicant agrees to complete the work in the time frame given, although requests for reasonable extensions of this time frame will be considered.
- The applicant agrees to publish the results in a refereed journal in a timely manner. A draft of the manuscript must be submitted to the MAHWC contributors and curator prior to submission to the journal. It is encouraged to submit manuscript to contributors earlier in manuscript development to ensure contributor data is interpreted accurately. Failure to supply a draft will preclude further data access.
- The applicant must cite the MAHWC, OBIS-SEAMAP and the relevant contributor when presenting any data provided by the MAHWC.
    - The appropriate citations will be provided to you with the requested data.

Appendix 7. Protocol for Data Access Continued

I. Data for Management

a) Protocol for data access

The MAHWC recognizes that access to current data will allow managers to improve management decisions regarding humpback whales in the western North Atlantic. Requests for data that will be used solely for management decisions should be submitted to the curator who will then circulate it to the appropriate contributor(s). The requests should include:

- Name of the requesting institution(s) and of the Principal Investigator;
- Anticipated management application (e.g. Stock Assessment Update);
- Anticipated data requirements;
- Anticipated products of the work;
- Estimated time frame for completion

If no conflicts are evident, the applicant will be provided with the requested data, with the method (email, CD, FTP) determined by the size of the requested information file.

b) Conditions for data access

- Applicants may use the data for other management related analyses on the condition that they inform the curator of additional projects. This process allows the MAHWC to establish links between the applicant and other managers and/or scientists interested in similar analyses. Also, by tracking the manner in which the data are used, the MAHWC can further illustrate the benefits of data sharing. Although persons other than the initial applicant may perform the additional analyses, it remains the responsibility of the initial applicant to inform the MAHWC of the additional work.

- If the analyses conducted for management needs result in publishable information, the applicant is required to submit an additional request for publication. If another individual has already applied for data to publish a similar analysis, the MAHWC will encourage a dialog among the parties, but publication rights will go to the applicant who first applied for data under the publication request process.

- Use of this data outside of public comments requires permission from original data contributors.

- Acknowledgement in the public comments statement as a condition for using those data. It is understood that raw data will not be displayed in publicly available management reports.

- A report summarizing the work will be due 6 months following the project end date.

- The applicant must cite the MAHWC, OBIS-SEAMAP and the relevant contributor when presenting any data provided by the MAHWC.
    - The appropriate citations will be provided to you with the requested data.

Appendix 7. Protocol for Data Access Continued

II. Data for Education

a) Protocol for data access

Many contributions to the MAHWC are from individuals and organizations involved in education and outreach programs. Access to information included in the MAHWC will allow educators to update the public and students on the biology and management decisions regarding humpback whales of the western North Atlantic. These data would be used to enhance the education and experience of students and teachers, and the general public. Requests for data that will be used solely for education and outreach purposes should be submitted to the curator who will then pass it to the appropriate contributor(s). The requests should include:

- Name of the requesting institution(s) and of the Principal Investigator;
- Anticipated education or outreach program (e.g. public presentations, displays);
- Anticipated data requirements;
- Anticipated products of the work;
- Estimated time frame for completion, when appropriate

If no conflicts are evident, the applicant will be provided with the requested data, with the method (email, CD, FTP) determined by the size of the requested information file.

b) Conditions for data access

- Applicants may use the data for other education programs on the condition that they inform the curator of additional projects. As stated above, by tracking the manner in which the data are used, the MAHWC can further illustrate the benefits of data sharing.

- If any analyses conducted for education or outreach purposes result in publishable information, the applicant is required to submit an additional request for publication. If another individual has already applied for data to publish a similar analysis, the MAHWC will encourage a dialog among the parties, but publication rights will go to the applicant who first applied for data under the publication request process.

- A report summarizing the work will be due 6 months following the project end date.

- Potential use of MAHWC data on any social media outlet must be clearly defined and outlined in the proposal. Any use of these data not outlined in the proposal will preclude access to any future data. If contributors and curator agree and access is granted each social media post containing MAHWC data or images must include explicit information on the proper reporting channels for sightings (e.g. to the MAHWC, NAHWC and GOM catalog curator's).

Appendix 7. Protocol for Data Access Continued

The Mid-Atlantic and Southeast Humpback Whale Photo-identification Catalog

This protocol for data requests to the MAHWC is based on the Protocol for Data Access for the Mid-Atlantic Bottlenose Dolphin Catalog, 2009 and North Atlantic Right Whale Consortium Data, 2002.

If you have any questions, please contact Sarah Mallette (*smallett@virginiaaquarium.com*). Proposals will be distributed to the appropriate contributors for review and/or to the curator of the data, as applicable.

All proposals must include the following agreement:

Protocol for Data Access

Agreement:

I have read and understand all of the conditions for data access and use listed in the "Mid-Atlantic Humpback Whale Catalog Conditions for Data Access" and agree to be bound by them.

Printed Name: _____ Date:____/____/_____

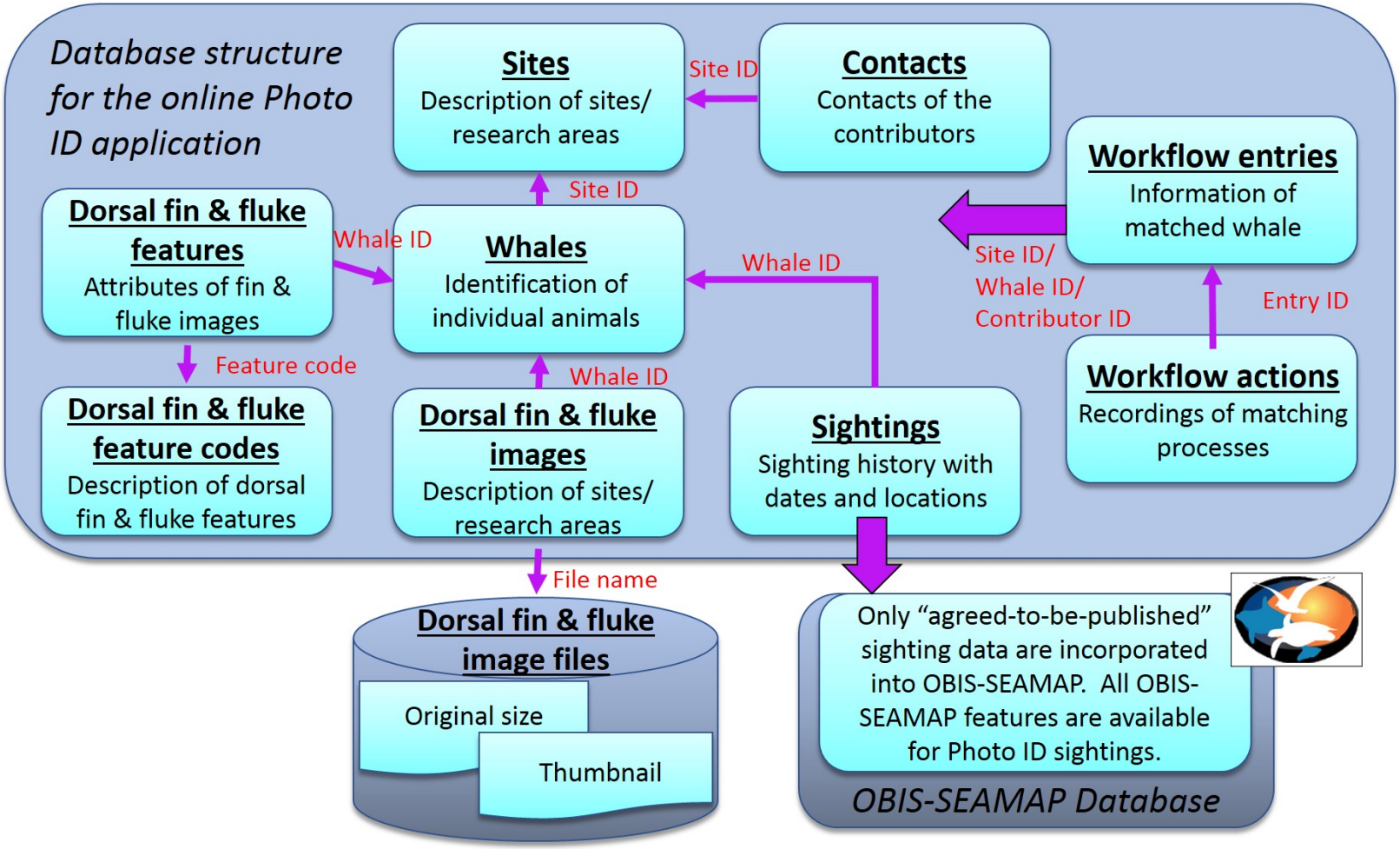
Organization:

_____

Date:____/____/_____

Signed Name: _____

Appendix 8. MAHWC Database Structure



***Database structure modified from the MABDC database structure*

Appendix 9. Fluke Photo Quality Guidelines

Fluke Photo Quality Guidelines

Based on Friday et al. 2008; Updated by Lindsey Jones: 5-15-2017

Quality code descriptions:

Based on image quality, NOT the distinctiveness of marks.

1 = High quality

A type 1 image is a clear photo with excellent contrast, clarity, completely in focus, and the fluke is at nearly a right angle to the camera. All marks and the trailing edge are visible. At least 80% of fluke is visible.

2 = Average quality

Image may be slightly out of focus, have reduced clarity, or reduced contrast. The majority of marks on the fluke and the trailing edge are visible. The angle of fluke in the image may be slightly off. At least 50% or more of the fluke is visible.

3 = Poor quality

Photo quality does not substantially compromise the ability to re-identify the individual whale. Image is blurry, has too much or too little contrast, is out of focus, at a poor angle, or less than 50% of fluke is visible. However, the majority of the fluke and/or the trailing edge are still visible.

4 = Extremely poor quality

Photo quality is poor enough to substantially obscure the information content of the fluke and compromise the ability to re-identify the individual. The image is blurry, has too much or too little contrast, is out of focus, is at a poor angle, the trailing edge is not visible, and/or less than 20% of fluke is visible. The majority of marks on the fluke are obscured.

Protocol:

- Score all images in catalog 1, 2, 3, or 4 and R, or L (if appropriate) on the photo information datasheet.
- Code 1, 2, and 3 images are suitable for analyses.
- Eliminate code 4, R, and L images from catalog for analyses.
- Both code 1 and 2 images are good images to match and the distinction between quality 1 and 2 does not matter in analyses, so substantial time should not be devoted to distinguishing between these two categories. The default is to assign a code 2 quality score to images where there is a question of whether it is a code 1 or 2 image. Quality 1 scores should be reserved for exemplary images that are clearly above the average in the catalog.

For Half flukes:

- Score quality from 1 to 4 using the same guidelines as above.
- Code images as R (right half only) or L (left half only) in a separate column.
- Half fluke images (coded R or L) should only be put into the corresponding ‘Other’ folder of the catalog (ex: T2other).

Fluke Photo Quality Guidelines

Based on Friday et al. 2008; Updated by Lindsey Jones: 5-15-2017

1	2	3	4
High quality Clear photo with excellent contrast, all marks and the trailing edge are visible The fluke is at nearly right angle to the camera At least 80% of fluke is visible	Average quality Image may be slightly blurry/out of focus or with slightly reduced contrast Majority of marks and the trailing edge are visible Angle of image may be slightly off 50% or more of fluke is visible	Poor quality Photo quality does not substantially compromise the ability to re-identify the individual Blurry, too much or too little contrast, out of focus, at a poor angle, OR less than 50% of fluke is visible Majority of marks and/or trailing edge are visible	Extremely poor quality Photo quality is poor enough to substantially obscure the information content and compromise the ability to re-identify the individual Blurry, too much or too little contrast, out of focus, at a poor angle, trailing edge not visible, AND/OR less than 20% of fluke is visible Majority of marks are obscured

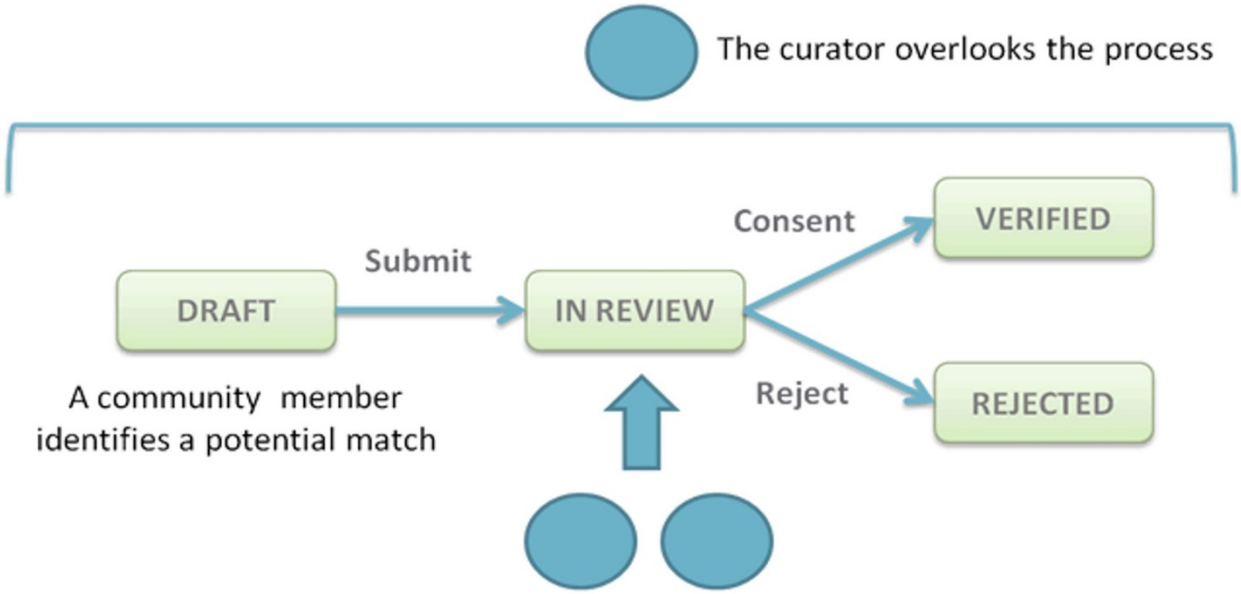



Half flukes

L	R
Only left side of fluke is visible	Only right side of fluke is visible


*** Image quality scoring was developed by Lindsey Jones (Updated: 05-15-2017) and based off of Friday et al. 2008 guidelines established for the NAHC and AHWC*

Appendix 10. MAHWC Matching Workflow



***Matching workflow adopted from the MABDC and modified to be used for the MAHWC*