

## DATA MANAGEMENT PLAN

### **Expected Data and Products of Research**

The proposed work will generate 1) quantitative data from laboratory and mesocosm experiments on the effects of environmental stressors (biotic and abiotic) on the type, frequency and effects of cloning events, 2) photomicrographs of cloning embryos and larvae, 3) photomicrographs from the visualization of the fluorochromes used to determine juvenile survival and growth rate, and 4) short instructional videos demonstrating the techniques used in the laboratory.

1) Morphometric data (measures of egg size, juvenile size, and juvenile growth), survival data and mesocosm data will be entered onto excel (.xls) spreadsheets, analyzed using SPSS (.sav) and graphed using Prism (.pzf) and Excel software; 2) Images will be saved as .jpg or .tif files; 3) protocols visualization and cloning induction techniques will be written up as .doc files; 4) short instructional videos will be saved in .mov format.

The PI and students in the Allen lab have worked together using shared databases for years. At the start of each experiment they jointly create the template data sheets and data protocols and all research students are trained in the use of the spreadsheets and the proper protocols for saving and backup. To facilitate this training in data management protocols, there are weekly lab meetings of the research group throughout the academic year and even more often (usually daily) in the summer.

### **Data collection and storage**

During the course of the proposed work, the PI and his students will generate valuable data on the induction and effects of cloning on echinoderm larvae and juveniles. Based on prior data collection efforts and analyses, we expect that data stored on our excel spreadsheets and analyzed using SPSS and Prism software will use less than 1 GB of storage space. We expect stored image data to take less than 1 TB of space (about 500-750 GB).

All data will be digitized and stored electronically in four secure locations: 1) the hard drive of the PI's primary laboratory computers 2) the hard drive of the PI's primary office laptop device 3) an external hard drive stored in the PI's laboratory and 4) on remote servers (ACStore provided to all faculty at the College of William and Mary). At the College of William and Mary faculty are provided with 100 GB of storage space and are able to request more as needed. The servers are institutionally secured via firewall and ID/password access. The data collected for this research can be stored in this way for a minimum of 10 years, or longer as needed.

### **Data dissemination**

The data collected during the course of the proposed work will be disseminated in a variety of ways. First, the PI and his students will attend the annual meeting of the Society of Integrative and Comparative Biology, the annual Benthic Ecology meeting and the annual meeting of Sigma Xi. In addition to meeting presentations, the PI is generally invited to present 1-2 departmental seminars per year, at which the results of this research

will be updated. Most importantly, the PI and his students will submit their research results for publication to top tier peer-reviewed journals with a priority for publishing in journals that provide open access. PDF reprints of any articles that are not open access will be available on the PI's website and will also be available upon request directly from the PI. All raw data will be available upon request in electronic format (as .xls files for numerical data and as .tiff or .jpg files for photomicrographs) from the PI. All published data will be accessible to the public in its raw form through public digital repositories such as Dryad (<http://datadryad.org/>). In addition, and to comply with the data policy of the Division of Ocean Sciences (NSF 17-037), the PI will establish a project page through the Biological and Chemical Oceanography Data Management Office (<https://www.bco-dmo.org>). All data and metadata generated from this project will be deposited to this location within two years of the completion of data collection. If data are made accessible to the public through other repositories (e.g. Dryad) then the metadata and links to the alternative repositories will be added to the BCO-DMO project page.

One additional way the results of this research will be disseminated is through the laboratory website of the PI. Beyond the release of raw data and PDFs of publications as described above, the PI will also post laboratory protocols on his faculty website for use by colleagues and students. The dissemination of these techniques will allow rapid transmission of methods to other laboratories. Short instructional videos demonstrating the techniques used in the laboratory will also be posted on free file sharing sites already in use by the PI (You Tube, Vimeo etc.) and linked to on the PIs' homepage. The use of video file sharing will facilitate the transmission of techniques to students, collaborators, other laboratories and to interested members of the public.

We anticipate no restrictions on the data generated from the research funded by this grant, but we will require attribution by users of our videos or datasets.