THE CONTINUOUS PLANKTON RECORDER (CPR) SURVEY OF THE PLANKTON OF THE NORTH ATLANTIC

The project investigators will comply with the data management and dissemination policies described in the NSF Award and Administration Guide (AAG, Chapter VI.D.4) and the NSF Division of Ocean Sciences Sample and Data Policy.

Continuous Plankton Recorder (CPR) Tows will be conducted on established Routes in the NW Atlantic from 2022 to 2027. Each route is covered by commercial shipping (Ships Of Opportunity), coordinated by the MBA (CPR operations) reducing carbon emissions. Tows will continue to operate monthly and will collect plankton samples to produce spatio-temporal abundance data for a large number of plankton taxa. Data concerning tow position, dates, and times will be recorded on paper log forms by the towing ships crew and later quality controlled and entered into the CPR database. CPR Survey is investigating the use of Automatic Identification Systems (AIS) data to improve sample position accuracy. Plankton samples will be captured on silk cassettes within each CPR unit, then sent to the MBA at Plymouth in the UK and analysed and archived. Analysis of all samples will be completed within one year of collection and the results incorporated into the CPR database after quality control checks.

Samples are cut from an unspooling roll of silk which captures the plankton within the CPR sampler device. Each sample corresponds to plankton caught over a distance of approximately 10 nautical miles. Data is semi-quantitative abundance (counts via microscopy) of large plankton (eye count) and small plankton (by microscope traverse), plus the plankton colour index (a measure of chlorophyll). Every other sample is analysed microscopically. Data specific to this project will be collected on the CPR Z route leading from Iceland to the US East coast, via standard CPR methodology. Sampling will be monthly for five years, with a nominal 700 samples per year to be analysed. In addition, the archive of all data sampled by the CPR since 1958 will be available.

Data will be made available as comma separated values in ascii text. Every sample will include PCI and counts of all taxa identified, with date, time, latitude, longitude, and details of the ship which carried out the sampling, plus additional analyst comments as metadata. The MBA hosts the UK node of OBIS, and as such is aligned with the global standards and publication methods that fit with OBIS/GBIF. The CPR leads the zooplankton component of the Northeast Atlantic Marine Biological Analytical Quality Control Committee (NMBAQC) scheme. The Laboratory manager, Senior Analyst, and a team represented by members of each group (Analysis, Research, Operations and data) are responsible for survey QA/QC, following current NMBAQCC guidelines. Tow procedures are documented and standardised across all routes with standard maintenance routines. Laboratory techniques have been documented and standardised for many years, and ongoing training is provided. Checks of analysed samples are included in the procedure and carried out frequently;

unusual results are checked by a different staff member. Each sample entry is entered by two members of staff, who cross check against paper records. Data are further examined by other members of staff before publication to the database takes place. Finally, data extracted from the database are checked against previous versions. The CPR data are stored in a Microsoft SQL server database, an industrial standard robust database system. This runs in a dedicated VMWare virtual machine. All servers run the Veeam backup software with daily replicates and offsite backups to an external data centre.

Data will be shared between project participants via access to a shared network drive Backups of the database itself are performed monthly and transaction logs allow point-in-time recovery for the last month. Total file size for CPR data extracts is not expected to exceed 500Mb.

A full current CPR data extract including up-to-date Z route data and metadata will be available to US researchers at each of the 5 annual working group meetings planned for this project. Access information will be provided to the Biological and Chemical Oceanography Data Management Office (BCO-DMO) in a .CSV file and metadata will be provided using the BCO-DMO Dataset Metadata submission form. The project investigators will work with BCO-DMO data managers to make project data available online in compliance with the NSF OCE Sample and Data Policy. Data, samples, and other information collected under this project will be available to all US researchers once submitted to the public repositories. Data produced by this project may be of interest to oceanographers and scientists and also to policy makers and resource managers concerned with North Atlantic ecosystems and fisheries. We will adhere to and promote the standards, policies, and provisions for data and metadata submission, access, re-use, distribution, and ownership as prescribed by the BCO-DMO Terms of Use (http://www.bco-dmo.org/terms-use).

The CPR Survey will supply NW Atlantic data to BCO-DMO following procedures from the Global Biodiversity Information Facility Integrated Publishing Toolkit (GBIF IPT). Paper records of the original log sheet (together with any amendments annotated on the original document); original hand written PCI scores; and plankton identification counts (i.e. the analysts sample results notebook) are all kept in an archive, where possible in fireproof cabinets. Physical samples in formalin are themselves archived in an off-site MBA secure store. Currently and in future, access to data extracted from the CPR database is available to collaborators on request.

David Johns is head of survey and responsible for overall integrity and accessibility of data, and ensuring compliance with the data management plan. Lawrence Sheppard is responsible for supplying data to other project participants as required throughout the lifetime of the project. BCO-DMO will be responsible for forwarding these data and metadata to the appropriate national archive.