Data Management Plan

Research has become both increasingly data-intensive and collaborative, and there are many benefits to sharing data. All data generated for this project will be provided to the community in an easily used format, and will adhere to the Division of Ocean Sciences Data and Sample Policy. Data will be archived and/or links to data repositories will be made available within the 2-year timeframe as stipulated. Data will be submitted directly to BCO-DMO.

A. Data generation activities: This proposal will generate multiple forms of data including experimental results for physiological and behavioral studies on the larvae of multiple species of interest (e.g., tuna crab *Pleuroncodes planipes*; CA market squid, *Doryteuthis opalescens;* and white sea bass, *Atractoscion nobilis*), hydrographic data (T, pH, O_2, pressure, PAR) and hydrographic data and analyses from CalCOFI and the characterization of the critical luminoxyscape boundary over time. This proposed research program will generate the following types of data:

(1) Physiological oxygen metrics for changes in visual function (V_{90}, V_{50}, V_{min}) found in electrophysiology experiments for all three species. Critical metabolic limits (P_{crit}) calculated for each species.

(2) Video data from all physiology experiments will be stored in raw and processed formats.

(3) Video and still photographic data from behavioral phototaxis experiments with different oxygen concentration exposures will be generated and stored in raw and processed formats.

(4) Oceanographic data (temperature, depth, PAR, dissolved oxygen) from daytime hydrographic collections at nearshore stations acquired from CalCOFI cruises between 1984 and present time. These will all be georeferenced typically in .csv or .txt formats.

(5) Post-processing oceanographic data will be generated (e.g. calculated pH, downwelling irradiance at specific wavelengths). These will be combined with other hydrographic data and be georeferenced typically in .csv or .txt formats.

(6) Calculation of the lower boundary depth of the critical luminoxyscape and the resulting changes over time.

B. Results and data from physiological and behavioral experiments: Physiological oxygen metrics for vision will be determined in electrophysiology experiments and metabolic thresholds will be determined from respirometry trials. These thresholds will be defined at different light and oxygen concentrations and made available. Additional data products from physiology experiments include physiological traces of responses to light stimuli under different oxygen conditions. Metrics of response timing, amplitude, decay structure, and shape can be analyzed to determine additional visual effects. Video and/or still photographs will be taken during all electrophysiology and behavioral (phototaxis) experiments. Processed videos will be combined with experimental oxygen and light data imposed in each frame.

C. Results and data from critical luminoxyscape characterization: Additional processing of hydrographic data will generate pH and ecologically relevant downwelling irradiance. The pH will be calculated from existing hydrographic data (dissolved oxygen, temperature, etc.) using carbonate chemistry equations from Alin et al. (2012). Downwelling plane irradiance (E_{PAR}) will be converted to irradiance at the wavelengths of physiological relevance (e.g. E_{528}) using Hydrolight HE5.4 Software (radiative transfer model) and reported with other hydrographic parameters. Estimations or measurements of inherent or apparent optical properties (AOPs and IOPs) as well as other calculations used will also be made available. Resulting data will include the lower boundary depth of the critical luminoxyscape over different stations, seasons, interannually, and over long-term decadal oxygen decline for each target study species. Where possible, video representations will be created and archived to show changes over multiple time scales.

D. Protocols: Any new protocols developed during this program will be deposited at the Protocols.io

database (https://www.protocols.io/).

E. Data Quality: Data QA/QC will follow specific plans for each type of data generated. Individuals from all electrophysiology experiments and behavioral studies will be saved for the duration of the project.