DATA MANAGEMENT PLAN

The procedures outlined below represent our plans for collection, processing, archiving and distributing data. These procedures adhere to and are guided by the requirements of the EAR data policy as described at *http://www.nsf.gov/geo/ear/2010EAR_data_policy_9_28_10.pdf*. Data management for the proposed SEES project will be supported by the 3 LTER sites, which conform to the LTER-wide Data Access Policy. The data for the project will be hosted by the VCR LTER; specific policies and procedures regarding data management are outlined in the document: VCR/LTER Information Management Policy.

Collection and Processing of Data

Existing LTER data, hosted by the individual LTER websites, will leverage the proposed research. These data sets include: long-term data on suspended sediment concentrations, long-term sea-level rise records, salt marsh topography (LIDAR), watershed land use / land cover, aerial photographs and wetland surface elevation (surface elevation tables, SET). In addition, data from existing "marsh organ" experiments that assess marsh plant productivity as a function of elevation will be made available to the proposed project. Existing models developed or implemented through LTER research will be used and further refined in the proposed research. These include: the Delft3D and FVCOM hydrodynamic models for determining spatial variation in suspended sediment concentrations and fluxes, and the marsh "point" models (ensemble, MEM) for determining threshold sea-level rise rates for marsh survival.

New field data will be collected for the proposed work: 1) To obtain more temporally resolved and consistent estimates of SSC, we will make time-series observations of SSC, currents and waves at representative locations in each study domain where we will also be collecting sediment cores (see below). The field observations will be made over several spring-neap tidal cycles at several times of the year (nominally summer and winter) near the marsh-creek or marsh-bay interface. Collection and processing of samples will be done by technical staff at each LTER site. Wiberg will extend these site-based SSC measurements to annual averages and interannual variability using historical records of winds in each location, any other available measurements of flow and SSC, and hydrodynamic models that have already been developed for each site (Delft3D or FVCOM). 2) Marsh organ experimental data relating plant production to elevation for *Spartina patens* at PIE and *Spartina alterniflora* at GCE. Morris will set up the experiments, collect and process the data. These experiments will complement the existing data at the other study sites, and will be used to modify the MEM point model. 3) Measurements of sediment accretion rates and elevation chronologies in 48 sediment cores, 16 at each LTER site. The samples will processed in the labs of Alexander and Giblin, and the data will be used to parameterize the empirical model of spatial evolution of wetlands.

Social science data used in the meta-regression model of marsh economic value will be gathered primarily from the published literature, but may also come from other readily-available secondary data sources, such as GIS data layers on land use/cover in the area studied. Data for socio-ecological vulnerability maps (used to inform focus group and charrettes) will include secondary data such as GIS data layers, US Census data, and existing LTER data described above. Focus group and charrette data will include recordings and transcripts of focus group sessions. Focus group participants will be recruited from the general public. Non-expert participants will be recruited using random sampling methods including random digit dial recruiting and recruitment scripts posted on widely accessible public media, with screening criteria to ensure representation both spatially and across demographic groups. Participants in the charrettes will be local and state policy-makers and leaders of stakeholder groups. Expert participants will be identified using key informants, iterative referrals, and partner networks. All collection and retention protocols for human subjects data (focus groups and charrettes) will be reviewed and approved by the Clark University Institutional Review Board (IRB) prior to any research activity under the proposed project. Full informed consent will be obtained for all human subjects data. Co-PI Johnston is a

standing member of the Clark University IRB and is familiar with requirements for human subjects data; he will oversee all compliance issues for these data.

Analysis

New and existing data will be used as input to the available models (Delft3D, FVCOM, marsh point model). Wiberg will be responsible for using the hydrodynamic models already implemented at each site (Delft-3D or FVCOM) to help extend measured SSC time series to annual time scales using existing site-based, long-term wind and tide data. Kirwan and his post-doc are responsible for applying the marsh point model and the spatial model, and Morris is responsible for modifying the point model with new data from the marsh organs.

Historical analysis of aerial photographs and historical charts from each site from the 1930s through the present will be used to delineate the characteristics of wetlands and changes over time. Alexander will be responsible for georeferencing and analyzing charts and imagery using ESRI ARCGIS 10, which contains analysis tools to evaluate specific metrics of wetland change (listed in Table 3 of the proposal). AMBUR, a shoreline analysis tool, will be used to assess tidal channel metrics and shoreline change. All GIS datasets will be accompanied by FGDC-compliant metadata.

Results of prior economic valuation studies of salt marshes will be analyzed using a meta-regression model (MRM) by Johnston. The MRM results will produce transferrable and generalizable cost-benefit functions applicable to any US salt marsh, and for our 3 sites, will be grounded directly in the biophysical results produced by this project. "Out-of-sample" forecast accuracy will be validated using iterative, "leave-one-out" convergent validity tests. Sensitivity analysis will be conducted using alternative definitions of the dependent variable (e.g., value per acre, value per person per acre) and alternative data subsets. Focus group and charrette data will be analyzed using qualitative (taxonomic or ethnographic) methods to generate mental models characterizing how participants categorize and understand marshes, marsh vulnerability and feasible adaptation options across different LTER sites.

Documentation

Documentation for our approaches will be published along with our results in scientific journals. In addition, the project website hosted by the VCR LTER website will contain information on the research goals, activities and findings. Morris has an interactive web-based training module that includes an introduction to one of the point models that is part of the ensemble point model used in the proposed project (http://jellyfish.geol.sc.edu/model/marsh/mem.asp). Social science data will be documented and retained following relevant guidelines from the American Economic Association (http://www.aeaweb.org/aer/data.php) and National Center for Geographic Information and Analysis (http://www.ncgia.ucsb.edu/).

Data availability

By two years after the end of the project – in order to allow us time to generate primary publications in the open scientific literature – higher order data will be made available electronically through the PI's web sites which are maintained by their institutions. We will also make these data available through the Virginia Coast Reserve LTER data system (http://www1.vcrlter.virginia.edu/home1/dataCatalog) which links to the Knowledge Network for Biocomplexity (http://knb.ecoinformatics.org). During the period when we are actively publishing our results, we intend to share data with colleagues upon request.

Publication of data subsets

Our major findings will be presented in open-access peer-reviewed publications in journals with a high impact such as *Journal of Geophysical Research, Geophysical Research Letters, Limnology and Oceanography,* and *Nature*. Many journals allow substantial data to be published in Web Appendices. To

the extent this is feasible, we will take advantage of this means to make major results available to the scientific community.