

Project Number 98163 O Statistical Review

Progress Report For Statistical Work Conducted With Apex Investigators, FY98.

Since October 1997, WEST has continued development of methods for estimation of mean biomass density of forage fish in discrete units of Prince William Sound in cooperation with APEX Principal Investigators: Ken Coyle, Lew Halderson, and Thomas Shirley. This work has included development of statistical and computational methods for estimating the mean of auto-correlated data over an irregular polygonal region, along with software to implement those methods. Hydro-acoustic surveys typically result in samples containing very large numbers of observations which has prohibited implementation of traditional geostatistical methods due to computational bottle necks. The statistical methods have been developed for estimation of mean forage fish biomass density from hydro-acoustic surveys in which observations are from non randomly selected sites. Although the methods were developed specifically for estimating forage fish density, the methods are also appropriate for estimation and mapping of other spatially distributed parameters such as plankton and other invertebrate densities, as well as spatial distributions of sea bird activity.

Software implementation has included work with Ken Coyle and Chirk Chu to modify GEOMAT[®] a geostatistical package for analysis and display of spatially correlated data. The software includes a graphical user interface and is based on computational routines from MATLAB[®] scientific computation and visualization software. Additional work in the upcoming months is anticipated to include publication of the statistical and computational methods, further modifications of the GEOMAT[®] user interface to include additional analysis options, and development of additional analysis techniques which incorporate relationships between biomass density and other covariates such as distance from shore, depth and other data available as coverages from GIS systems.

Results of the statistical methodology developed in cooperation with Ken Coyle will be submitted for publication in the open literature and submitted for presentation at the 1999 EVOS workshop to be held in March 1999. John Kern and Ken Coyle will be the authors on this paper.

In addition to the above larger scale statistical research and applications in the Fish Population Sampling project, we have interacted with the Principal Investigators in the following projects in design and analysis of APEX studies: Seabird/Forage Fish Interactions, Fish Diet Overlap, Kittiwake Foraging and Reproduction, Guillemot Foraging and Reproduction, Barren Islands Study, and Marbled Murrelets.