

**Southeast Sustainable Salmon Fund  
Final Report for Approved Projects**

- Project Number: 45226
- Project Title: AYK satellite-derived environmental database
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- Duration of Project: May 1, 2003 to May 1, 2004
- Abstract: This project will produce a novel oceanographic data base of the Eastern Bering Sea spanning the years 1987 – present. Imagery from multiple satellite sensors will be used to characterize the regions sea surface temperature, suspended sediment and plankton patterns at 1km spatial resolution on daily, weekly and monthly frequencies. Specialized algorithms will be applied to AVHRR visible data to bridge the important ocean color data gap existing between 1987 and late 1997 when no dedicated ocean color sensor was available. The time series will be analyzed for pattern changes, anomalies and trends, and these data will be correlated to salmon abundance measurements, on both basin wide and water shed-specific spatial scales
- Approach: 1) To compile a satellite image-based environmental database of the eastern Bering Sea spring-fall season spanning 1987 to 2003 (16 years) including daily (when possible), weekly and monthly SST fields at 1km spatial resolution, and weekly and monthly chlorophyll concentrations at 1km. Additionally, regional variability, anomalies and other relevant statistics will be computed. This entire database will be made available to all interested persons on CD-ROM with its own integrated viewing and analysis software, and/or through a future AYK-SSI data web site
- 2) Obtain salmon catch, return and other abundance records for the AYK watersheds and utilize the above data series to perform initial analyses of spatial environmental variability and salmon abundance.
- Results/Findings: Although the remotely sensed marine environmental variables studied in this project helped confirm that no single marine environmental variable can be pegged as the causative factor in the decline of salmon populations,

at the same time they offer witness to an overarching change to the EBS marine system. As to whether or not long term SST and post 1996 SST/plankton changes to the marine ecosystem are contributors to the decline of salmon populations, the OI team suggests the answer is yes. The long term increase in SSTs dating back to the early 1980s; the high intra-annual variability in monthly SST for northern and coastal regions; and the significant 2000-2003 rise in SSTs combined with a post 1996 disturbance in the phytoplankton community structure (and thus the food chain) help substantiate the hypotheses put forth by Kruse (1998) that long potentially stressful conditions during the marine phase of the salmon lifecycle may be contributing to the vulnerability of already burdened fish stocks.

Evaluation:

The data contained in this set can continue to be used to analyze the marine environment in relation to other variables such as climate change, changes to the freshwater habitat, food chain variability, etc. In accordance with the AYK's interim priorities the database will serve as a resource for managers, researchers and the fishing community to turn to when questions arise about the 1987-2003 marine conditions. This is not only true for salmon research and management, but also in the study of the entire EBS ecosystem.

Project Products:

Satellite Image-Based Environmental Database - The AYK-SSI Satellite-Derived Multivariate Database is organized as a six-disc set delivered with this report and separately to known AYK-SSI stakeholders. This report will also be included in the reports section of the database. Each disc is equipped with an auto run initiation file, which automatically opens up the index.html document in users default web browser when the CD is inserted. From there one can navigate to the "Products" page and follow the data viewing instructions. If this initiation file fails to open up the index.html file, the most convenient way to access the data from the CD's is to use a web browser and navigate to the top level of the CD-ROM and open up the index.html file. All data on each of the CD's are stored in a compressed self-extracting files, under the data directory. Each disc contains a "Metadata" folder, which contains FGDC compliant metadata for each of the product set's in HTML and a .txt format.

Key Words:

AVHRR, Bering Sea, chlorophyll-a, coccolithophore, MODIS, plankton, salmon, satellite image, SeaWiFS, sea surface temperature, SST, turbidity

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