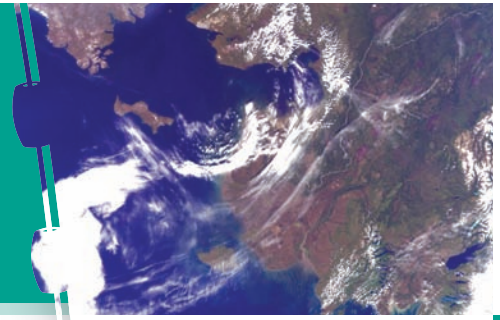




## AYK SUSTAINABLE SALMON INITIATIVE

### *Project Synopsis*

#### BERING SEA-MARINE



(Ocean Imaging Corporation)

BERING SEA

## PROJECT 306

### PRINCIPAL INVESTIGATOR

Jan Svejkovsky  
*Ocean Imaging  
Corporation*

### RESEARCH PERIOD

May 2003 -  
May 2004

### BUDGET

\$76,293.00

## ARCTIC-YUKON-KUSKOKWIM SATELLITE-DERIVED ENVIRONMENTAL DATABASE

### SATELLITES, SALMON, AND A CHANGING SEA

Alaska salmon constitute a critical food and revenue source for the people of the Arctic-Yukon-Kuskokwim region. These salmon have exhibited high variability for more than a decade, creating numerous hardships for the local communities. The exact causes of the declines are not known. Also, the northern Bering Sea is a more difficult region in which to conduct research than the more heavily studied southeastern area.

### OUR OBJECTIVES

Establish a clear data baseline characterizing variability in oceanic sea surface temperature (SST), ice melt, sediment runoff, and plankton blooms spanning 16 years.

Compare this information to salmon catch, return, and other abundance records over this period to better understand the influence of these factors on AYK salmon abundance.

### HOW WE DID IT

We used satellite imagery of the eastern Bering Sea spring-fall season spanning 1987 to 2003 including daily (when possible), weekly and monthly SST, and weekly and monthly chlorophyll concentrations, both at 1km resolution. We used the Advanced Very High Resolution Radiometer (AVHRR) to determine chlorophyll concentrations during the 1988-1997 period, which was previously a gap in this data record. We analyzed the

### RESEARCH FRAMEWORKS:

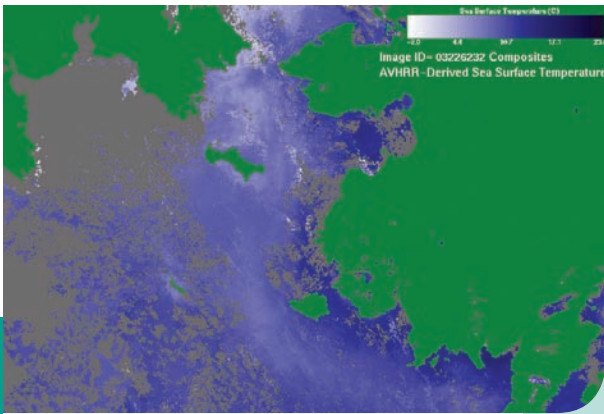
SALMON LIFE CYCLE -  
PRIORITY #1;

SYNTHESIS &  
PREDICTION -  
PRIORITY #10

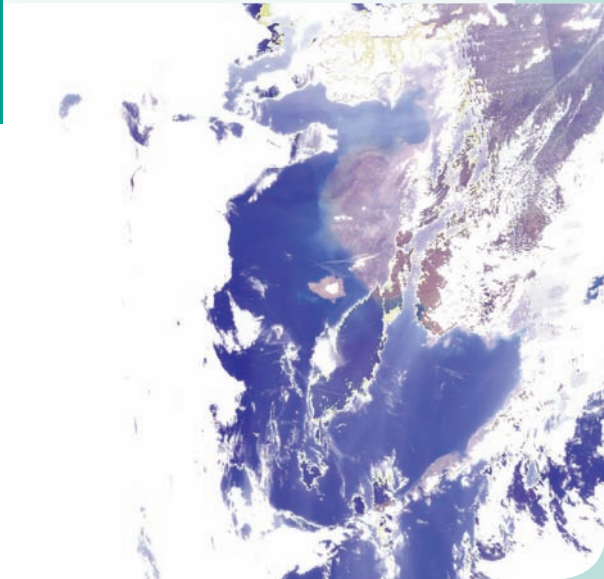
### SNAPSHOT

Satellite images were used to collect information about the northern Bering Sea ecosystem over a 16-year period. This data was compared to salmon abundance information in the region.

The correlations found provide some insight into the causes of ongoing salmon population declines and suggest directions for further research.



AVHRR Sea Surface Temperature Composites.  
(Ocean Imaging Corporation)



MODIS Simulated True Color RGB image from AYK SSI Satellite-Derived Multivariate Database. (Ocean Imaging Corporation)

***AYK SSI Mission:** To collaboratively develop and implement a comprehensive research plan to understand the causes of the declines and recoveries of AYK salmon.*

### **ARCTIC-YUKON-KUSKOKWIM SUSTAINABLE SALMON INITIATIVE**

BERING SEA FISHERMEN'S ASSOCIATION  
110 W. 15TH AVENUE  
ANCHORAGE, AK 99501  
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satellite data series for the whole region, as well as individual watersheds within northern Norton Sound and the Yukon and Kuskokwim rivers, and made comparisons to seasonal salmon abundance records.

### **WHAT WE DISCOVERED**

Our analysis suggested that long-term SST and plankton changes after 1996 are contributors to the decline of salmon populations. However, no single marine environmental variable can be pegged as the causative factor. Our data illustrate the long term increase in SSTs dating back to the early 1980s; high variability in monthly SSTs; and the significant 2000–2003 rise in SSTs combined with a disturbance in the phytoplankton community structure. This suggests that long-term conditions during the marine phase of the salmon life cycle increases the vulnerability of the stock.

### **PRODUCTS AND OUTREACH**

Our satellite image-based database is available on a CD-ROM set and was delivered to the AYK SSI. Workshops were held in communities within our study areas to inform residents about our project and the use of the database. Peer-reviewed articles were published using our data.

### **WHAT'S NEXT?**

Due to the limited, one-year time frame of the study, we were able to complete only a preliminary comparison of the satellite data with salmon abundance records. Because we found correlations, however, we recommend further research and analysis in this area. Our database can continue to be used to analyze the effects of other variables such as climate change, changes to the freshwater habitat, and food chain variability. It will continue to serve as a resource for fisheries managers, researchers and the fishing community when questions arise about 1987–2003 marine conditions.