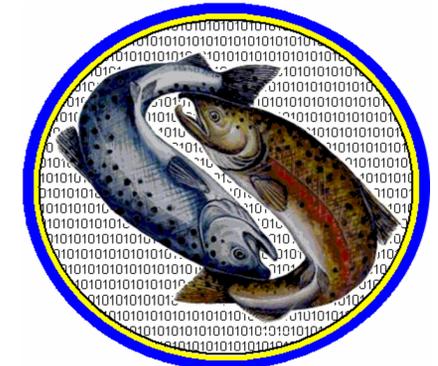




Electronic Collection of Aerial Survey Data

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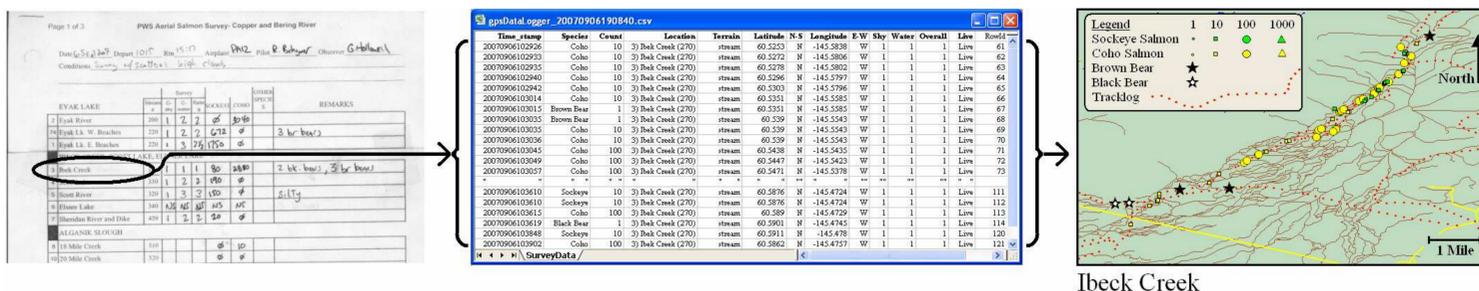
Abstract: Aerial surveying of streams in the Copper River drainage has been used to assess sockeye salmon spawning escapements since 1948. Historically, observations were recorded in-flight using pencil and paper. Recent advances in GIS technology and handheld computer hardware have provided biologists with the opportunity to record this data in-flight and pair aerial observations with accurate geographic coordinates. While software is currently available that can accomplish this, (ArcPad, CyberTracker, etc) these applications are written primarily for collecting generic field data and rely heavily on visual cues to change fields and record observations. This application, gpsDataLogger, was written specifically for use while conducting aerial surveys and addresses these shortfalls. It allows the observer to document observations with minimal visual contact with the computer. This allows for a more productive use of flying time as the observer focuses entirely on the stream being flown and significantly minimizes the possibility of untimely motion sickness. This application was written using the Superwaba java development environment. The application and source code are available at <http://sourceforge.net/projects/gps-datalogger/>.



Application Structure: The application consists of four tabbed screens. During surveys the "Data Capture" screen is selected. Species and location fields can be browsed with minimal visual reference using the center hardware buttons on the device. Counts are made in increments of 1, 10, 100, or 1,000 using the four smaller hardware buttons. Additionally the center-most button can be configured by the user to set either the species, location or live/dead field to a predetermined string for a single count event. This allows for quick configuring of the device to document bears, fly fishers etc. in groups of fish that are being actively counted. The stored data table can be browsed on the device and individual records selected for editing, copying or deletion using the "Table" and "Data Edit" screens. Location and species fields are stored in user editable lookup tables. This allows adding additional species or locations in the field as needed. It also allows this application to be configured for purposes other than salmon surveys and locations other than Prince William Sound.

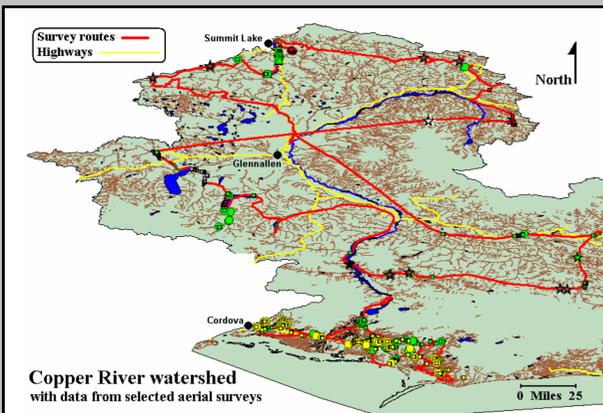


Introduction: Aerial surveys of sockeye and coho salmon are conducted from a Piper Super Cruiser weekly from June into the fall season. In any given survey, up to 80 streams and lakes systems may be surveyed for sockeye, coho and Chinook salmon. Many of these systems are extensive and can take 20-40 minutes to survey. With **traditional aerial survey** data collection the observer mentally keeps a count of the numbers of fish and other wildlife that are observed in the index stream being flown and then records a single number for each species observed, (see below left). With **electronic aerial survey** data collection the observer records observations as they are made for each system. This is done using a handheld computer that is receiving GPS input and running the application "gpsDataLogger". Data is later downloaded as a table, (below center) for inclusion in a larger georeferenced dataset.



With traditional paper based methods only a single number for each species is recorded. Using electronic collection linked to GPS coordinates, a robust spatial data model can be created such as that for Ibeck Creek shown above on the right.

Methods: The application gpsDataLogger was written using Superwaba which is a Java-like open source development platform and virtual machine (VM). The SuperWaba VM has been optimized specifically for use on PDAs and Smart phones whereas other VMs such as Sun Personal Java, IBM J9, and Insignia Jeode have a broader focus that includes more limited devices. Most other small device VMs, are in compliance with Sun Microsystems CDC and CLDC ("Connected Device Configuration" and "Connection Limited Device Configuration") specifications and do not allow straightforward VM access to host hardware resources such as Bluetooth devices, barcode scanners, PIT tag readers etc. Superwaba was selected as the VM for this project because it allows direct and standardized access to serial port data by the application. Additionally, the Superwaba toolset supports creation of portable databases on the device that can be handled using SQL commands. The application was written using the Eclipse workbench with the Superwaba API and Sun Microsystems 1.50 SDK installed.



Results and conclusions: This application was used successfully on all Commercial Fisheries aerial surveys of the Copper River drainage from Summit Lake to tidewater during 2007. Whereas previously only a single count was generated for each species and each system, with gpsDataLogger each spawning system had multiple counts made with associated geospatial references. As a result of this application the produced dataset is of significantly greater depth and is useful for a greater range of purposes.

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