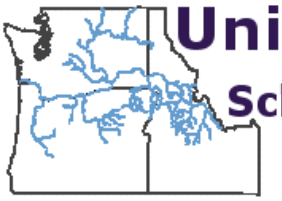
Salmon Insider

Columbia Basin Research Newsletter

Summer 2004



University of Washington
School of Aquatic & Fishery Sciences
Columbia Basin Research

Columbia Basin Research (CBR) is a scientific research group at the University of Washington, School of Aquatic & Fishery Sciences. We investigate salmon biology and survival in the Columbia and Snake river basins. We provide user-friendly data analysis and modeling tools, and maintain DART, an interactive secondary database, for the fisheries community and the general public.

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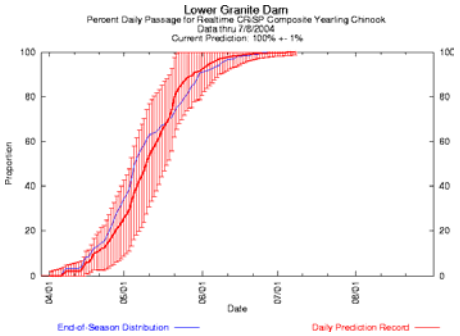
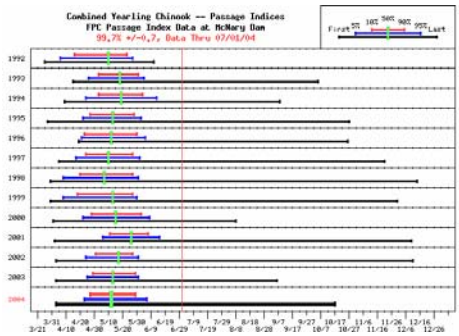
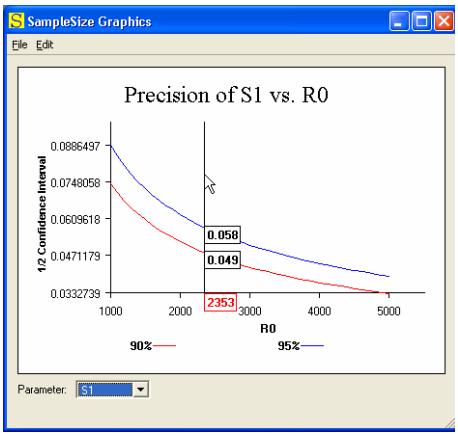




Program SampleSize



javaDART

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Post-Season Evaluation of 2004 Smolt Run-Timing Forecasts – Snake and Lower Columbia Yearling Chinook

Since 1994, Program RealTime has provided, online to the fisheries community and the public, predictions of passage percentages and forecasts of smolt run-timing to the dams on the Snake and Columbia Rivers. With the 2004 Snake River yearling chinook smolt outmigration near completion, we have an opportunity to look back and evaluate the performance of Program RealTime during the season with the benefit of hindsight.

To measure the accuracy of predictions, we compare the observed data with the expected values based on predictions for each day of the run using the mean absolute deviance (MAD). To calculate the MAD for a given run at a given site, we sum the absolute differences between observed percentile and predicted percentile for each day of the run and then take the mean. We can also represent this graphically by plotting the predicted values and the observed values, overlaid on the same graph (Figures 1, 2, and 3).

Lower Granite, John Day, and Bonneville dams were chosen to be representative of the Snake River outmigration. The predictions were made using PIT-tag data from the Pacific State Marine Fisheries Commission (PSMFC) at Lower Granite and passage index data from the Fish Passage Center (FPC) at John Day and Bonneville dams. The values of MAD for predictions made at each dam were 3.40% at Lower Granite Dam, 2.61% and 2.90% at John Day and Bonneville dams, respectively. The interpretation in the case of Lower Granite Dam, for instance, is that on a daily basis, Program RealTime differed from the observed values by an average of 3.4% daily. The program was even more accurate at the John Day and Bonneville dams.

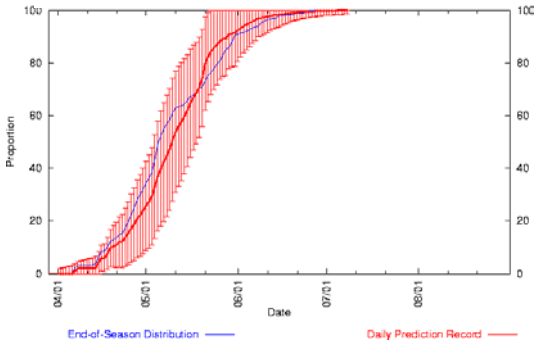


Figure 1. Prediction of 2004 yearling chinook smolt outmigration at Lower Granite Dam based on PIT-tag data: MAD = 3.40%.

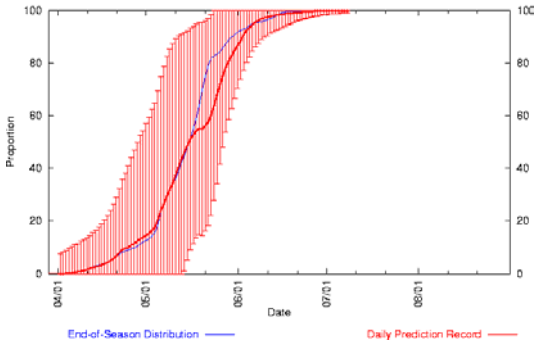


Figure 2. Prediction of 2004 yearling chinook smolt outmigration at John Day Dam based on passage index data: MAD = 2.61%.

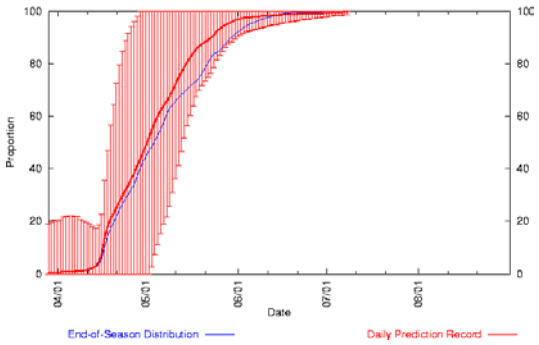


Figure 3. Prediction of 2004 yearling chinook smolt outmigration at Bonneville Dam based on passage index data: MAD = 2.90%.

Historically, 2004 was an average year in terms of run-timing (Figure 4). The 5th, 50th, and 95th percentiles of passage at McNary Dam, based on passage index data, from the FPC were reached on 4/23, 5/12, and 6/6, respectively as compared to the mean of 4/20, 5/14, and 6/4. The middle 80% duration this year was 33 days compared with a historical mean of 33.5 days.

For more information, see http://www.cbr.washington.edu/crisprt/.

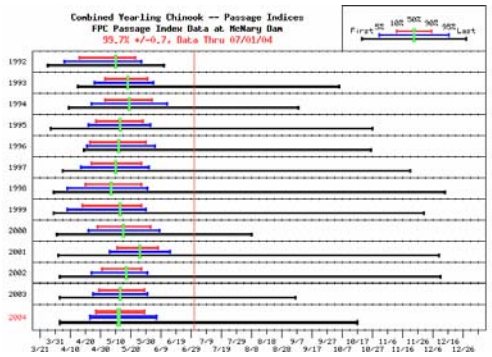


Figure 4. Yearling chinook run-timing based on passage index data at McNary Dam, 1992-2004.

Introducing Program *SampleSize*

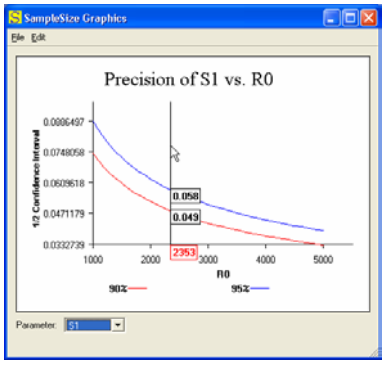
In designing a tagging study for wildlife or fisheries management, a study planner needs to keep the costs and impact to the population at a minimum by tagging no more individuals then necessary, yet tagging enough individuals to achieve a desired level of precision for the survival-related parameters. The *SampleSize* program was developed to achieve this goal. The current version (1.3) allows sample size calculations for the following four types of studies.

1. **Single release-recapture** with tagged individuals released at the initial release occasion with possible staggered entry of additional tagged individuals at the subsequent recapture events;
2. **Paired release-recapture** with a pair of initial releases allowing for the estimation of survival between the initial release events;
3. **Transport-inriver ratio** used to assess the effects on survival of transporting juvenile salmon;
4. **Balloon-tagging** for estimating the effect of a treatment (such as passage through dam turbines) on survival.

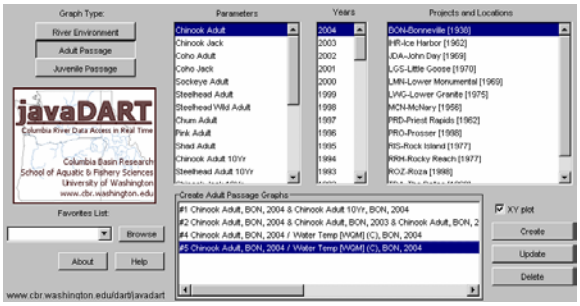
A user of Program *SampleSize* can simply enter single values for all release parameters, and *SampleSize* will produce a report listing the anticipated half-widths for both a 90% and a 95% confidence interval (CI) for all parameters. Or the user can enter a range of values for one parameter, and *SampleSize* will produce a graph similar to the one shown below.

In the figure below, the user has entered a range for the release sizes between 1000 and 5000; hence, the release size is shown on the X axis with the selected parameter on the Y axis. The red line plots the anticipated half-width of a 90% confidence for the selected parameter, and the blue line plots the half-width of a 95% CI. The user can drag a vertical line along the graph to get specific values for a specific release size. In this case, a release size of 2353 is anticipated to produce a 90% CI of ±0.049, while a 95% CI is anticipated with ±0.058. The precision of other model parameters can be viewed via the drop-down selection box in the lower left.

The *SampleSize* program, along with a user manual, can be obtained at: http://www.cbr.washington.edu/paramEst/SampleSize.



javaDART: Java-Based Columbia River DART Graphics Tool

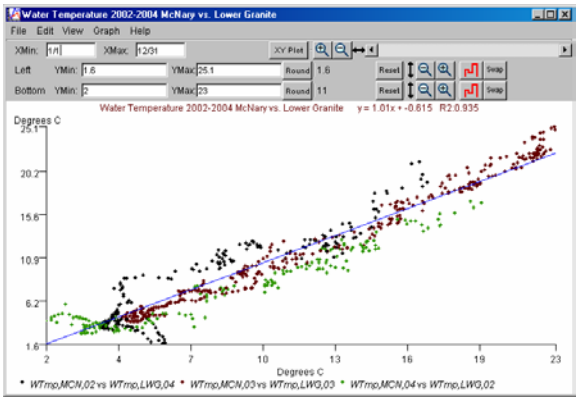


javaDART applet GUI

javaDART 2.0 is a new Columbia River DART database access tool based on the java programming language. It runs within a webpage as an applet giving users greater flexibility to extract and analyze data from DART in both graphical and text-based formats. javaDART 2.0 replaces the prototype tool javaDART, which needed to be downloaded and installed on the users computer.

javaDART provides access to the River Environment, Adult Passage, and Juvenile Passage data sets in the Columbia River DART database. Plotting multiple data types in a single graph is possible with javaDART, which supports up to four separate Y axes. Graphs can be configured with axis scaling options including zoom in and zoom out capabilities for each axis as well as a round axis function that uses an adaptive rounding algorithm to create readable axis value labels. Graphs may be saved or exported to number of popular formats or copied to the system clipboard. With the text data interface, users can specify which columns to be copied or saved to disk. The text view handles both Julian dates and a standard date format.

javaDART data analysis functions include parameter versus parameter (XY) plots and linear regressions on data series pairs. Regression lines and statistics are displayed on the graphs. Data filtering algorithms are a powerful data analysis feature of javaDART that can identify and remove erroneous data that sometimes occur in data queries. The user can easily control the amount of filtering using a redesigned filtering interface with slider controls. In addition, javaDART offers data accumulation; histogram options by weeks, months, or years; and plotting multiple years consecutively or as individual years.



XY plot with linear regression

Online help is available from anywhere in the program, as well as tool tips for a context-sensitive guide to javaDART buttons and features. The comprehensive help system has been designed to cover all of javaDART's capabilities. Step-by-step tutorials are included in the help system to introduce users to many of the features and capabilities of javaDART.

The user interface for javaDART was redesigned as part of an University of Washington Computer Science and Engineering Senior Project in User Interface Design. javaDART is designed to maximize the effectiveness of Human Computer Interaction. The interface provides an intuitive and user-friendly approach to database access and data analysis. User tasks have been simplified by shortening the number of steps to complete them. Users of DART and javaDART are encouraged to participate in a survey to help in the development of the project.

For more information and to run the applet, see http://www.cbr.washington.edu/dart/javadart/.