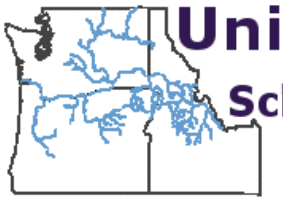
Salmon Insider

Columbia Basin Research Newsletter

Winter 2005



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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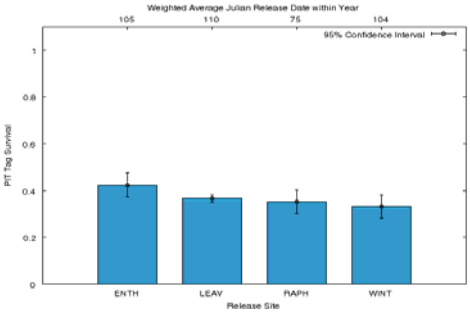
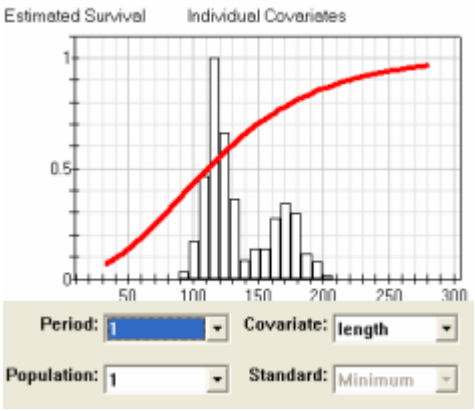
2004 Survival Trends for Hatchery Spring Chinook Salmon



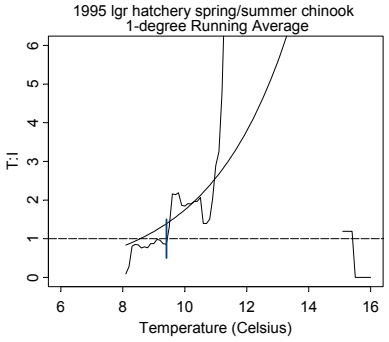
Correcting Window Counts for Re-ascensions

Site	Unique Fish	Total Ascents	Proportion Unique	Fallback Rate	SE
BO1	1447	1467	0.9864	0.0136	0.0030
BO2	641	647	0.9907	0.0093	0.0038
BO3	1408	1442	0.9764	0.0236	0.0040
Pooled:	3496	3556	0.9831	0.0169	0.0041

Program SURPH



Transportation Study Results Indicate Predictors for Success



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2004 Survival Trends for Hatchery Spring Chinook Salmon

The PIT-tag survival results for the 2004 spring chinook salmon outmigration are now posted on DART. Survival for hatchery releases from Entiat, Leavenworth, Winthrop, and Rapid River are illustrated in Fig. 1.

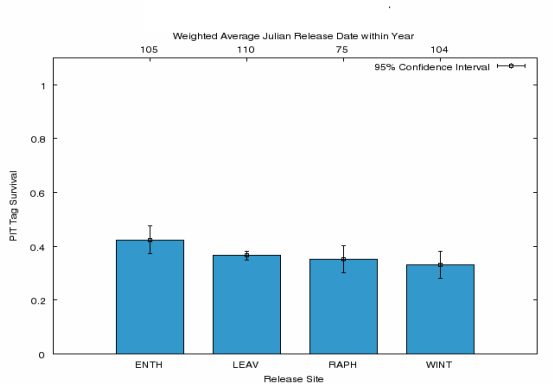

Figure 1. Hatchery chinook salmon survival from release to John Day Dam, 2004.

In addition to spring chinook salmon, the website results include analysis of 22 other stocks from 11 hatcheries and traps since 1992. Decadal means and trends are recent features on the survival bar charts that can be used to help assess recovery status. Annual trends for Entiat hatchery, 1993-2004, are illustrated in Fig. 2.

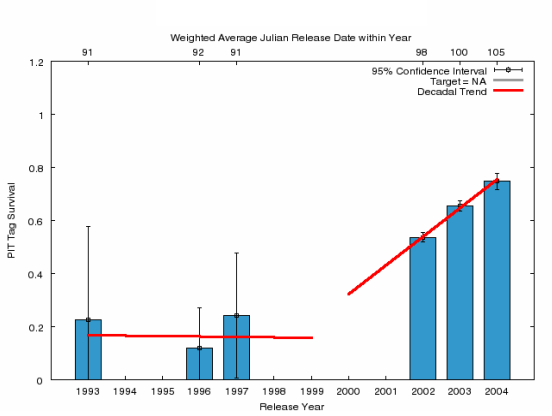

Figure 2. Decadal trends from Entiat hatchery to McNary Dam, 1993-2004.

The 2004 summer and fall chinook salmon outmigration PIT-tag results will be posted to the website during winter 2005.

For more information: http://www.cbr.washington.edu/pitSurv/.

Fallback – Correcting Adult Window Counts for Re-ascensions

A new feature available through the DART website is information on daily and seasonal adult fallback rates at Bonneville Dam. Using adult PIT-tag detections, the fraction of the daily adult ascents by new fish is calculated. This adjustment factor can be used with daily passage counts to more accurately estimate adult escapement. Figure 3 summarizes the seasonal PIT-tag results for spring chinook salmon at Bonneville Dam in 2004.

The algorithm for determining fallback is based on radiotelemetry research at the Columbia dams performed by Brian Burke, Northwest Fisheries Science Center, NOAA, 2003-2004.

Site	Unique Fish	Total Ascents	Proportion Unique	Fallback Rate	SE
BO1	1447	1467	0.9864	0.0136	0.0030
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Figure 3. Fallback for 2004 spring chinook salmon at Bonneville Dam.

The proportion of unique fish is expressed as the ratio of number of unique PIT-tagged fish passing over the ladder(s) divided by the total number of estimated ascents. The fallback rate is the complement to the proportion of unique fish ascending. For more information, see http://www.cbr.washington.edu/fallback/.

Modeling Individual Covariates with the SURPH Program

SURPH (**Sur**vival with **P**roportional **H**azards) is a tool for modeling survival-related parameters as a function of covariate data from release-recapture studies. The covariate data can be either (1) "group"-based factors, i.e., environmental factors that pertain to an entire population or (2) "individual"-based factors that pertain to each individual.

Figure 4 shows the individual covariate design dialog for a study with the recorded body length as an individual-based covariate. In this example, the survival of individual fish is modeled with a common period-specific length parameter.

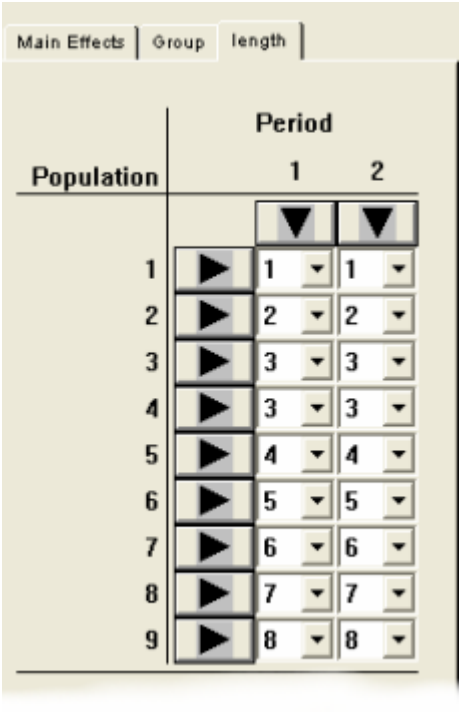

Figure 4. Dialog for individual covariate "length."

SURPH provides diagnostic tools for analyzing the resulting models. Figure 5 shows the modeled survival as a function of body length (in red), with the corresponding nonparametric survival curve superimposed (in black). Figure 6 shows the same modeled survival function with a histogram of the actual length distribution superimposed on it.

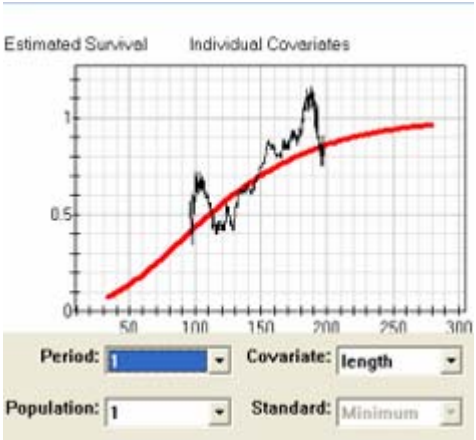

Figure 5. Survival as a function of "length" with nonparametric estimate.

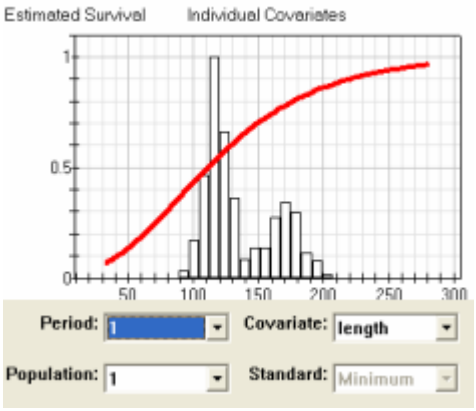

Figure 6. Survival as function of "length" with histogram of data

SURPH allows the user to test one model against another using a Likelihood Ratio Test (LRT) or the Akaike Information Criterion (AIC). In a future issue of *Salmon Insider*, using SURPH with group-based covariates will be discussed. For a copy of SURPH, along with a user manual, see: http://www.cbr.washington.edu/paramEst/SURPH.

When Is It Best to Transport Smolts

A recent study on transportation prepared for the Army Corps of Engineers by CBR staff with the Battelle Pacific Northwest Laboratories (Anderson et al. 2004) suggests that water temperature at Lower Granite Dam is the best predictor of when transportation will outperform in-river passage (T:I > 1) in the spring. Day of year provided similar predictions, but was less reliable across years. Flow was not a good predictor of when the T:I ratio will exceed 1. An example of the relationship between transportation temperature and the T:I ratio is shown in Figure 7.

Reference

Anderson , J.J., R. A. Hinrichsen, C. Van Holmes, and K. D. Ham. 2004. Historical analysis of PIT tag data for transportation of fish at Lower Granite, Little Goose, Lower Monumental and McNary dams. Prepared for U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, Washington.

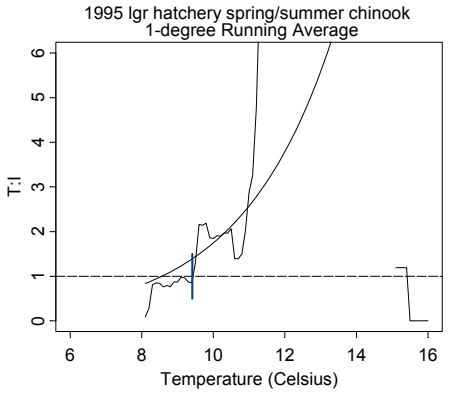

Figure 7. SAR and T:I vs. temperature for 1995 hatchery spring/summer chinook salmon released at Lower Granite Dam.

What's Next in 2005

Watch our website and future issues of this newsletter for new developments and products in 2005. The following are a few highlights for 2005.

ROSTER

The development of Program ROSTER (River and Ocean Survival and Transportation Effect Routine) that focuses on analysis of juvenile and adult PIT-tag life-cycle information.

BiOp Compliance

Compilation and review of the FCRPS (Federal Columbia River Power System) Biological Opinion performance measures on Columbia River DART (Data Access in Real Time). Temperature, flow, dissolved gas percentage, smolt survival, and adult escapement data are compiled, along with state-of-the-art tools to interpret trends.

Fallback Statistics

Adult PIT-tag fallback statistics will be extended to all FCRPS projects.

Radio-tag Data

New statistical software to analyze the complex historical detections of radio-tagged up-migrating salmon.