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.

Inside . . .

2004 Survival Trends for Hatchery Spring Chinook Salmon

Correcting Window Counts for Re-ascensions

<table>
<thead>
<tr>
<th>Site</th>
<th>Unique Fish</th>
<th>Total Ascents</th>
<th>Proportion Unique</th>
<th>Fallback Rate</th>
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Program SURPH

Transportation Study Results Indicate Predictors for Success

1995 lgr hatchery spring/summer chinook 1-degree Running Average

Estimated Survival Individual Covariates

Period: | Covariate: length
Population: | Standard: Minimum

Temperature (Celsius)
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.

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.

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.

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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 (Survival with Proportional Hazards) 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.

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.

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


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.