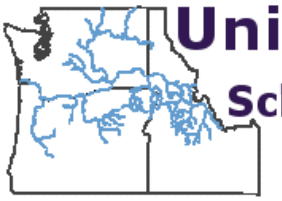
Salmon Insider

Columbia Basin Research Newsletter

Summer 2007

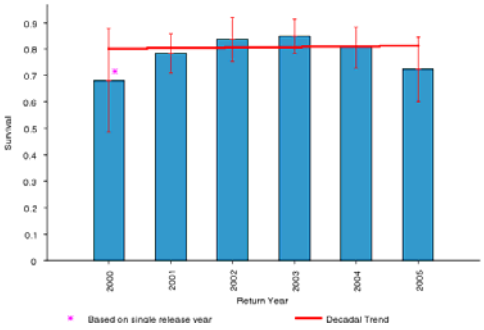


University of Washington
School of Aquatic & Fishery Sciences
Columbia Basin Research

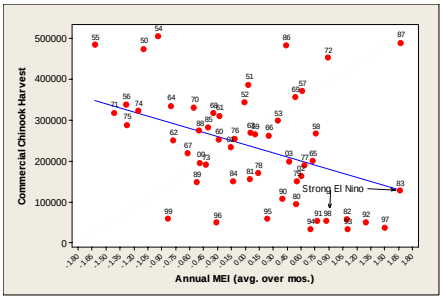
Columbia Basin Research (CBR) is a scientific research group at the University of Washington, School of Aquatic & Fishery Sciences. We investigate salmon biology and survival in the Columbia and Snake river basins. We provide user-friendly data analysis and modeling tools, and maintain DART, an interactive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

Inside . . .

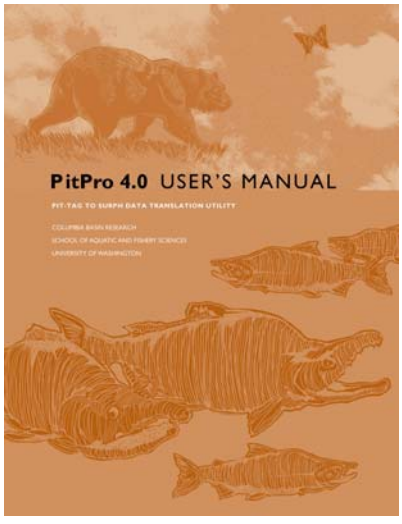
ROSTER Results

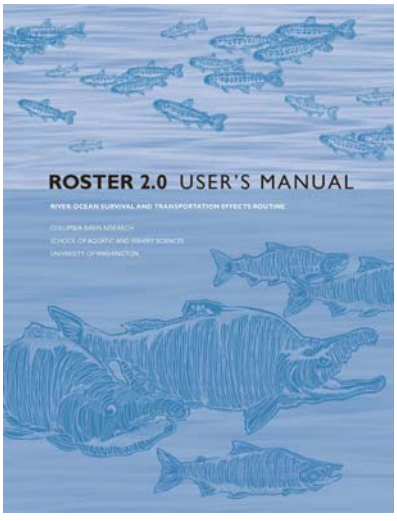


Ocean Indices



Updated User's Manuals





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Status & Trends: ROSTER Results

We've added a new interactive ROSTER Results webpage to the CBR Status & Trends website; it features analysis results from Program ROSTER (River-Ocean Survival and Transportation Effects Routine). Program ROSTER, introduced in 2005, models the life cycle of Pacific salmonid stocks from juvenile migration to adult returns in the Columbia/Snake River Basin based on PIT-tag data.

The ROSTER Results webpage allows users to assess current and historical salmonid PIT-tag data from the Columbia/Snake River Basin by performance measure, species, locations, or hydroelectric projects. Users can query such measures as smolt survival, adult survival by release or return year, smolt-to-adult ratio (SAR), transport-inriver ratio (T/I), ocean survival, or differential mortality (D). The stocks include spring and summer Chinook salmon and summer steelhead from the Clearwater River Hatchery and the Snake River Basin hatcheries.

For example, to investigate the Ocean Survival performance measure, users can select release area, species, runs, and with or without jacks (Fig. 1). For Clearwater River spring Chinook salmon, for example, users can select further for trend statistics (decadal mean, decadal trend, or smoothed trend) and, if selected, for smoothing levels (1 to 5) (Fig. 2). In addition to the graph, a data link is produced—"meta"--which, when selected, provides point estimates and 95% confidence intervals by year, as well as detailed information on data collection, preparation, and analyses. Comments note that the subject salmon are non-transported fish from Bonneville to Bonneville and provide a citation for the statistical theory: Buchanan & Skalski, "A migratory life-cycle release-recapture model for salmonid PIT-tag investigations," in press, *Journal of Agricultural, Biological, and Environmental Statistics*.

Ocean Survival:

Release Area	Species	Run	Rearing Type	With Jacks	Tagged
No Filter	No Filter	No Filter	No Filter	No Filter	No Filter
Clearwater River	Chinook	Spring	Hatchery	No	NA
Clearwater River	Chinook	Spring	Hatchery	Yes	NA
Snake River	Chinook	Spring	Hatchery	Yes	NA
Snake River	Chinook	Spring	Hatchery	No	NA
Snake River Basin	Steelhead	Summer	Hatchery	No	NA
Snake River Basin	Chinook	Spring	Hatchery	No	NA
Snake River Basin	Chinook	Summer	Hatchery	No	NA
Snake River Basin	Chinook	Summer	Hatchery	Yes	NA
Snake River Basin	Steelhead	Summer	Hatchery	Yes	NA
Snake River Basin	Chinook	Spring	Hatchery	Yes	NA

Fig. 1. Menu selections for performance measure Ocean Survival.

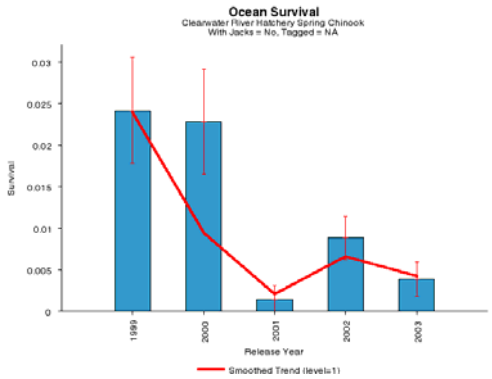

Fig. 2. Ocean survival for Clearwater Spring Chinook salmon without jacks with a smoothed trend.

For more information, see the ROSTER Results webpage (http://www.cbr.washington.edu/trends/roster.php). In addition, ROSTER Results are available from the Status & Trends Overview webpage. Program ROSTER was featured in the Salmon Insider, Summer 2006 and Autumn 2005.

Status & Trends: Ocean Indices Webpage Added and Updated

To facilitate the increasing focus on ocean effects on salmonid survival, we've developed the Ocean Indices webpage. It brings together in one location all CBR ocean-related data. Ocean resources included are large-scale climate indices accessible via links to other sites, as well as regional and local series of data maintained and updated by CBR. Three recently added data series are: the Multivariate ENSO Index (MEI), a Biological Spring Transition Date, and a Biological Fall Transition Date.

The following ocean data series are provided: Pacific Northwest Index (PNI) updated and maintained by CBR, three Spring Transition Date series (OSCURS model, E. Logerwell at NOAA, and W. Peterson at NOAA) and three Fall Transition Dates (OSCURS model, CBR, and W. Peterson at NOAA). In addition, links are provided to the Pacific Ocean Coastal Upwelling Index (CUI) courtesy of the NMFS Pacific Fisheries Environmental Lab (PFEL), Air/Ocean Data from NOAA moored buoys, the Pacific Decadal Oscillation (PDO) (University of Washington), and the Multivariate ENSO Index (MEI) from NOAA, Physical Sciences Division, Earth System Research Lab.

The MEI is a leading indicator for the El Niño/Southern Oscillation (ENSO) phenomenon. Negative values of the MEI represent the cold ENSO phase (La Niña), while positive MEI values represent the warm ENSO phase (El Niño). El Niño events are often accompanied by declines in adult salmon returns (Fig. 3). The MEI is calculated as the first unrotated Principal Component (PC) of six observed variables over the tropical Pacific Ocean (Wolter and Timlin 1993).

These six variables are sea-level pressure, zonal and meridional components of the surface wind, sea surface temperature, surface air temperature, and total cloudiness fraction of the sky. The MEI is computed for each of twelve sliding bi-monthly seasons (Dec/Jan, Jan/Feb, . . ., Nov/Dec). The index is updated on a monthly basis by NOAA.

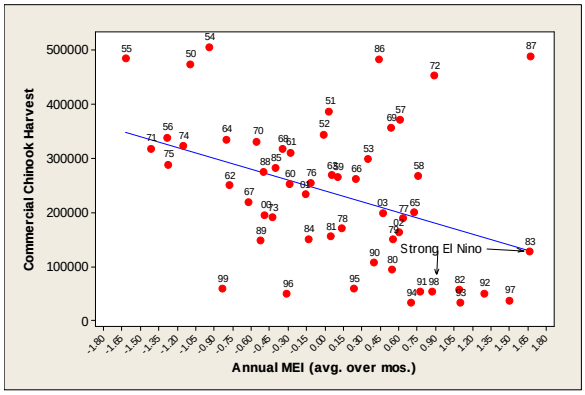

Fig. 3. Annual multivariate El Niño/Southern Oscillation (ENSO) index correlated with commercial Chinook salmon harvest.

The Biological Spring transition is the date by which the zooplankton community composition has changed from a winter assemblage to a summer assemblage. The summer community is dominated by higher biomass, boreal or coldwater species of copepods rich in lipids and fatty esters. Shifts in zooplankton community structure are driven by seasonal changes in coastal circulation patterns (Peterson and Keister 2003). Summer upwelling brings cold water high in nutrients into nearshore areas of the coasts of Washington and Oregon, setting the stage for increased secondary production and improved salmon feeding conditions.

Status & Trends: Ocean Indices Site Added and Updated (cont.)

The Biological Fall Transition day is the date by which the zooplankton community composition has shifted from a summer assemblage to a winter assemblage, and marks the end of the high biomass zooplankton season. The difference in the fall and spring biological transition dates provides an estimate of the duration of the upwelling season, which may be useful in describing trends in Columbia River Chinook salmon harvests.

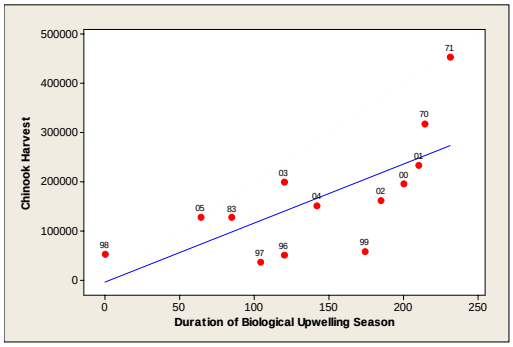

Fig. 4. Columbia River mainstem commercial Chinook salmon harvest (CBR Status &Trends/Harvest) vs. duration of biological upwelling season (lag 1), R^2 = 0.475.

The spring and fall biological transition data were developed by Dr. William Peterson of the Newport Research Center Northwest Fisheries Science Center. Columbia Basin Research wishes to thank the individuals and agencies whose time and effort have made possible the CBR Ocean Indices webpage.

For more information, see the Ocean Indices webpage.

References

Peterson, W. T., and J. E. Keister. 2003. Interannual variability in copepod community composition at a coastal station in the northern California current: A multivariate approach. *Deep-Sea Res.* 50:2499-2517.

Wolter, K., and M. S. Timlin, 1993. Monitoring ENSO in COADS with a seasonally adjusted principal component index. Proceedings of the 17th Climate Diagnostics Workshop, Norman, OK, NOAA/N MC/CAC, NSSL, Oklahoma Clim. Survey, CIMMS and the School of Meteor., Univ. of Oklahoma, 52-57.

PitPro and ROSTER User's Manuals Updated

We've updated the user's manuals for two of our software programs available online at our website. The PitPro Manual is in its fourth generation. Program PitPro processes PTAGIS data into capture histories. The ROSTER Manual is in its second generation; ROSTER models the life cycle of Pacific salmonid stocks in the Columbia/Snake river basin. Hard copies can be requested from web@cbr.washington.edu. For more information, refer to the PitPro (PitTag Processor) and ROSTER (River-Ocean Survival and Transportation Effects Routine) webpages.