From: Carl Walters [mailto:c.walters@fisheries.ubc.ca]
Sent: September-15-11 7:13 AM
To: 'David Marmorek'
Subject: a few more comments about sockeye dynamics

Dave,

I was just looking at the Peterman/Dorner Cohen report to get some parameter estimates for another analysis, and I noticed the comments you had highlighted on p 33-34 about weak density dependence and contribution of density effects to the productivity decline. I think those comments are really quite misleading. The figure below shows trends in total recruits/total spawners (rather than arithmetic average of recruits/spawners across stocks; total weights the R/S contributions of larger stocks more heavily in calculating the overall trend), as observed and as predicted by the Ricker and Larkin models when fitted to the whole data series with assumed stationarity in parameters; the models obviously do explain most of the trend as being due to density effects, and imply possible overescapement by the Alaskan definition (fishing at lower than MSY rates). When the data are fitted using only brood years before 1990 (second figure below), the Ricker model fails to predict the decline but the Larkin model predicts most of it, i.e. the Larkin model has much better out-of-sample performance than the Ricker!

Further, when I compare the historical overall exploitation rate to the exploitation rates for MSY by stock, estimated as time varying using an MA-3 filter rather than Kalman filter to track productivity changes (Kalman filter underestimates decline for cases where there has been strong, persistent decline), it is obvious that if the Larkin model is correct that the harvest policy has been far more conservative in recent years than would be "optimal" (for MSY) for most stocks (third figure below). This reflects three policy responses: (1) experimental harvest reductions for stock rebuilding (minor effect); (2) response to concerns about Cultus stock being SARA listed (major effect); and (3) concerns about early migration and likely prespawning mortality of late run fish (major effect).

Hope this helps in the questioning. You are welcome to use the figures in your talk if needed.
Carl

Figure 1. Trends in overall productivity (total recruits for 10 largest stocks divided by total spawners for those stocks), compared to Ricker and Larkin model fitted values.
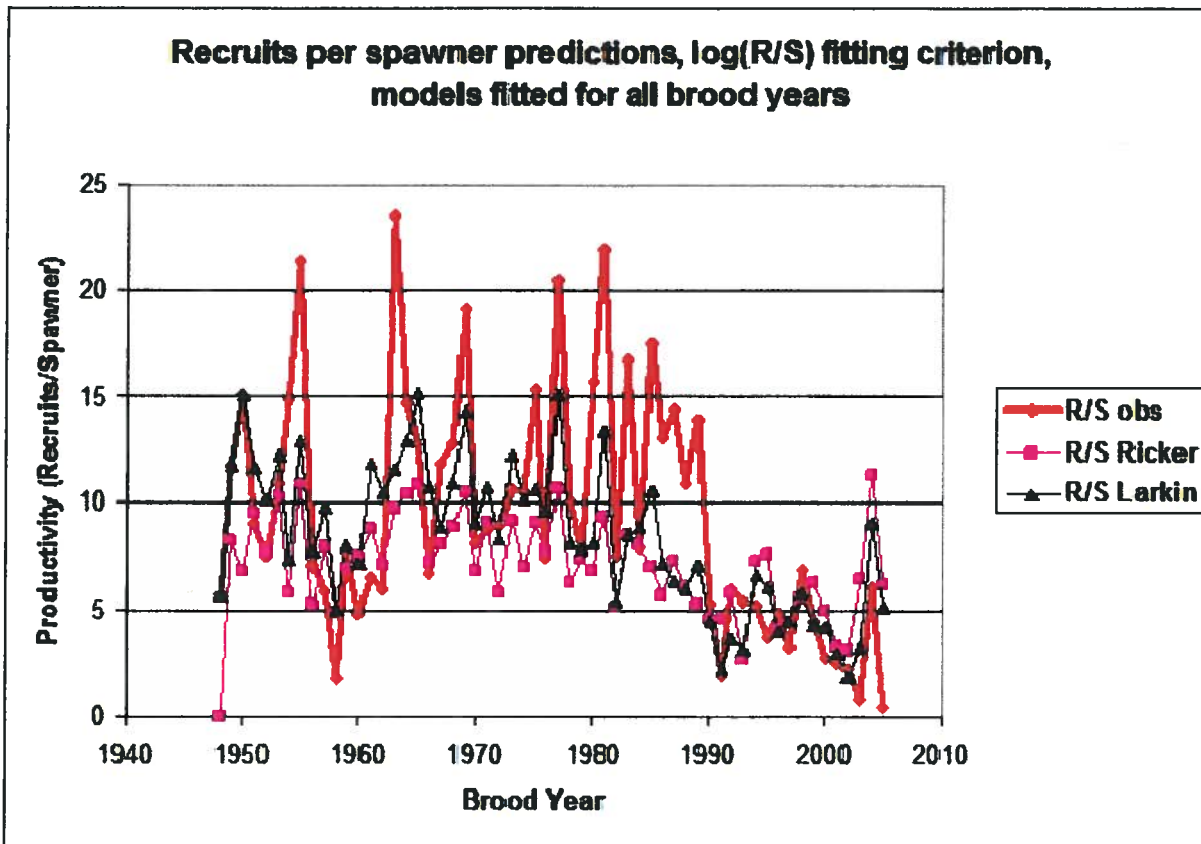
Figure 2. Trends in overall productivity as above, but compared to predictions after 1990 from model fits to earlier data.
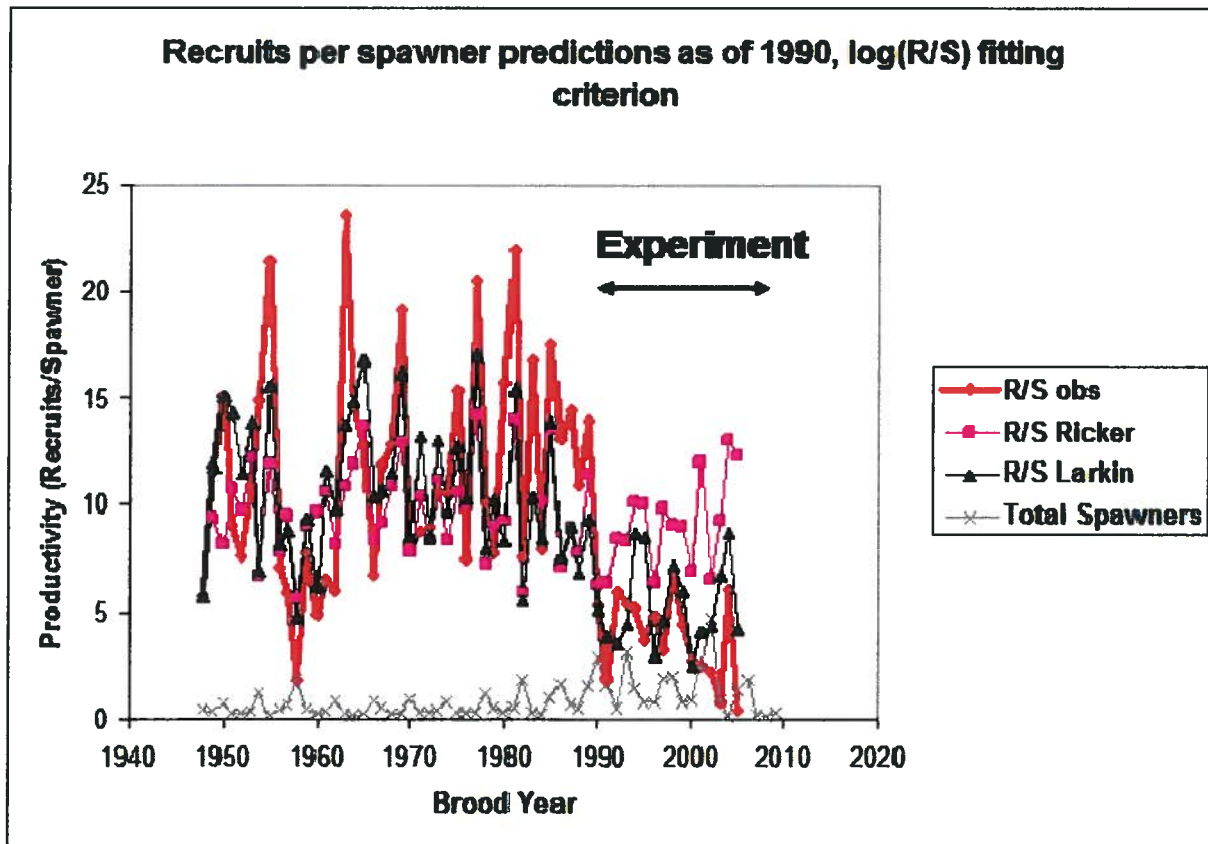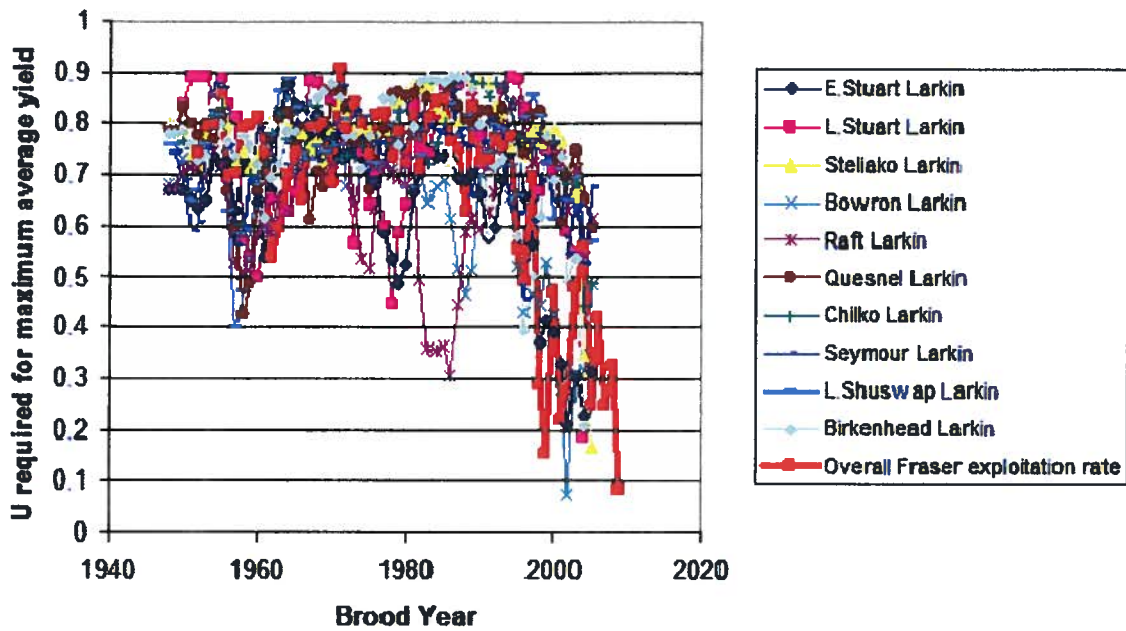

Figure 3. Trends in MSY exploitation rates compared to historical overall exploitation rate, estimated using the Larkin vs Ricker models

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Trends in MSY exploitation rate, Larkin model

Trend in MSY Exploitation Rate, Ricker model