MEMORANDUM

TO: Jim Scott
FROM: Bob Hayman
DATE: August 27, 2001
SUBJECT: Skagit Recovery Goals

At our meeting on August 1, we agreed to recommend using the May 25, 2001 EDT outputs as the best estimates of productivity and capacity of Skagit adult chinook under PFC conditions. This is because our analyses now indicate that the EDT Current adult parameters are very close to those estimated for recent years, and the EDT Historic production levels, at long-term average marine survival rates, are not out of line with historic estimates derived from the NMFS status review. Comparisons between EDT estimates and observed adult recruitment values are given below.

A key factor in our agreement is the observed summer/fall adult recruitment numbers. In my previous comparisons between EDT and adult recruitment (memo of August 29, 2000; email attachment sent February 2, 2001), I used, as the Skagit summer/fall chinook recruitments, the values listed in the second PFMC Overfishing Report. For some years, these numbers, which were derived from the CTC chinook model, differed significantly from your CWT-derived recruitment estimates, which I had used to develop the Skagit chinook management objectives in Comprehensive Chinook. We agreed that the CWT-derived numbers are likely to be more accurate estimates of Skagit summer/fall chinook recruitment than the CTC model numbers.

When we use the CWT-derived summer/fall recruitment estimates, there is much closer agreement between the recently-observed recruitments, and EDT's estimate of Current productivity and capacity under recent (low) marine survival (Fig. 1).

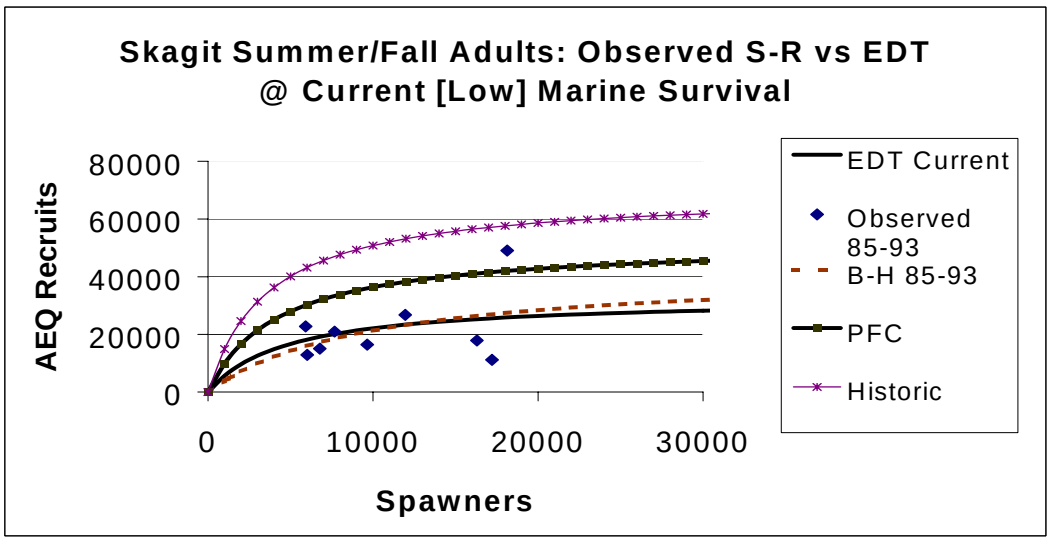

Figure 1. The May 25, 2001 EDT estimates of current, PFC, and historic productivity and capacity of Skagit summer/fall chinook under current (low) marine survival, compared to BY 1985-93 observations.

The close agreement between the EDT projection of Current production and the Beverton-Holt line through the BY 1985-93 observations, gives some credence to using EDT to project PFC and Historic levels. At least, more credence than if there wasn't this close agreement. Figure 1 also shows that, under current marine survival rates, pristine (Historic) habitat conditions would be expected to produce about double the current level of production, and PFC habitat conditions would increase production by about 50%. While this indicates significant degradation of habitat used by Skagit summer/fall chinook, it is nowhere near as severe as that which was estimated for some other Puget Sound runs, such as Stillaguamish summer/falls.

And how realistic are the adult production levels projected under PFC and Historic habitat conditions? Figure 2 (which is the same as Figure 1, except I've added observations back to BY 1952[1]) indicates that those levels are well within the range of observed production. Relative to earlier observed levels, PFC habitat conditions under current (low) marine survival rates would be expected to result in production levels similar to those of the early 1980's; restoring habitat to Historic (pristine) conditions, under current marine survival rates would be expected to result in production levels similar to those of the 1970's (Fig. 2).

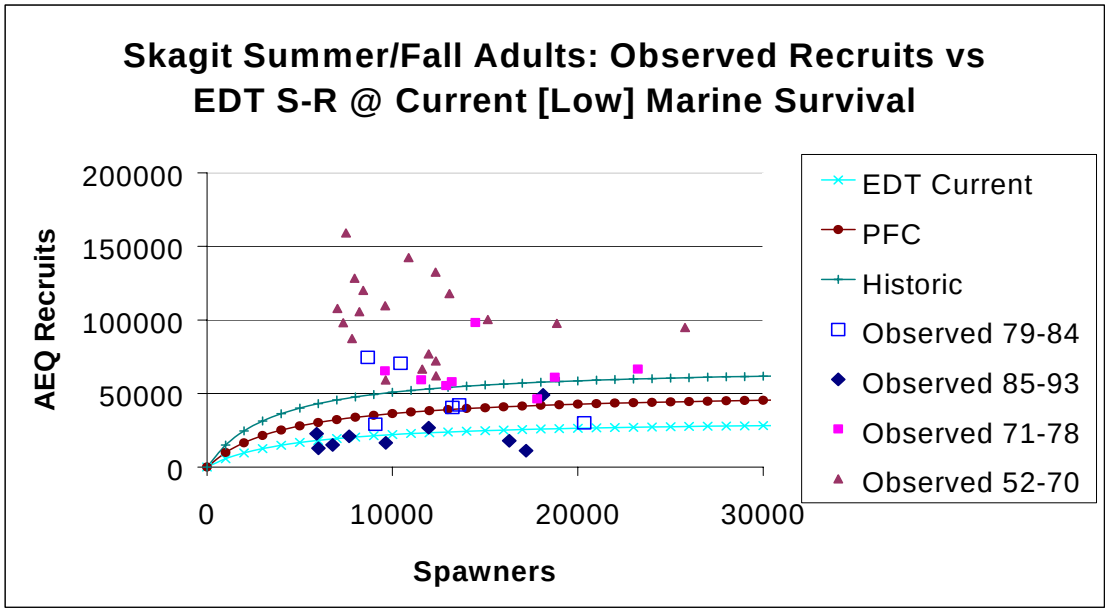

Figure 2. Spawner-recruit observations for Skagit summer/fall chinook from BY 1952-1993, compared to EDT projections of production under current (low) marine survival rates.

Marine survival rates, however, were higher in those earlier years. Since it is our intention to adjust our PFC targets to account for natural and uncontrollable changes in marine survival rates, we should compare the observed production levels to the levels

[1] The 1952-1970 recruitment calculations assumed a constant marine exploitation rate, and are more suspect than the later CWT-derived recruitment estimates.

projected by EDT using the higher marine survival rates that existed in those earlier years.

In this case, if we assume that marine survival rates are closer to those that existed during the 1970's (i.e., higher), restoring habitat to PFC conditions would be expected to result in production levels similar to those observed during the 1950's and 1960's (Fig. 3). Restoring habitat to pristine (Historic) conditions would be expected to result in production levels greater than most observations from the 1950's and 1960's. And, if we assume 1970's (higher) marine survival rates and no change in habitat conditions (i.e., Current conditions), expected production would, not surprisingly, be similar to that of the 1970's (Fig. 3).

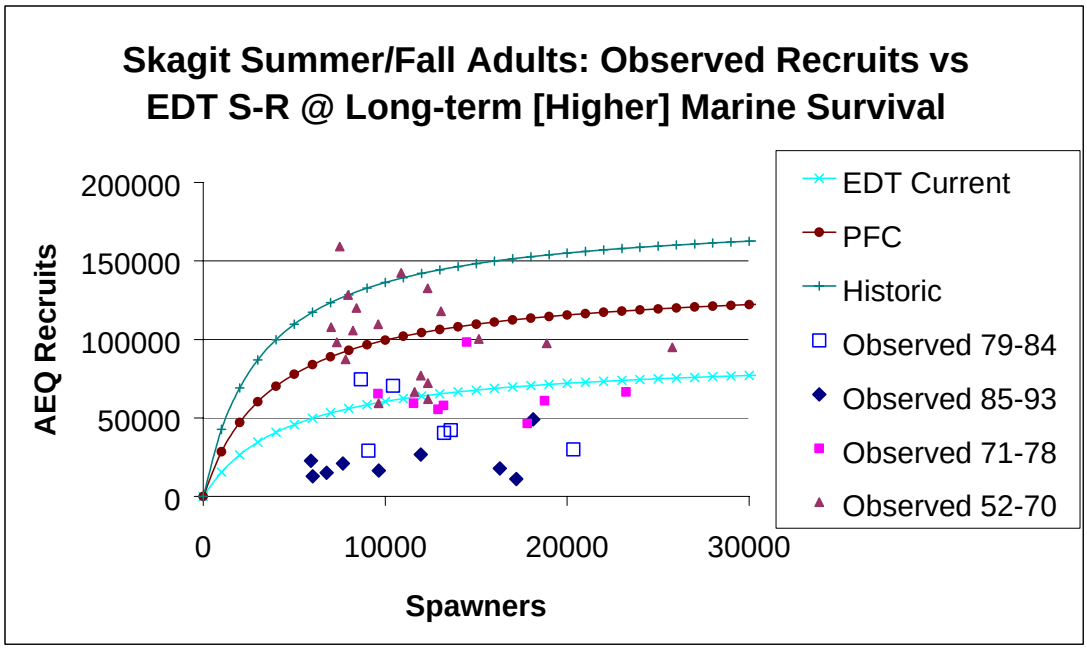

Figure 3. Spawner-recruit observations for Skagit summer/fall chinook from BY 1952-1993, compared to EDT projections of production under long-term average (higher) marine survival rates.

At this higher marine survival rate, the PFC recruitment at MSY would be about 115,000. This is a similar magnitude to the mean recruitment I calculated for BY 1952-1970 (102,000). While this doesn't necessarily mean that 1952-1970 conditions were close to PFC, it does indicate that the EDT projection of PFC is not beyond the range of anything ever observed.

We also discussed the reasonableness of the EDT estimate of Historic production levels. If we assume that the estimate of historical production of Puget Sound chinook listed in the NMFS status review (690,000) is reasonably accurate, and that Skagit chinook constituted about one-third of the Puget Sound production (that came from EDT, but it's also the relative volume of water the Skagit contributes to Puget Sound), then historical production of Skagit chinook would have been about 230,000. Under the assumption that the long-term marine survival rate was what existed in historical times,

EDT estimated the carrying capacity of adult Skagit summer/fall chinook at about 180,000, and Skagit spring chinook capacity was about 16,000. This gives a historical Skagit chinook capacity of about 200,000 adults. Given all the uncertainties, this is not out of line with the number derived from the NMFS status review. This doesn't necessarily mean that it is a reasonable number, but it does provide more comfort than if the two estimates had been grossly different.

For Skagit spring chinook, the EDT estimate of production under PFC is not greatly different from the EDT estimate for Current conditions. MSY recruitment at PFC, under current (low) marine survival, is 3600, compared to 2600 under Current habitat conditions (Fig. 4). EDT may somewhat underestimate Current productivity and capacity for spring chinook (all but one of the 1985-93 points lie on or above the EDT Current line shown in Fig. 4), but, because spring chinook spawning habitat is relatively non-degraded, the small difference between Current and PFC production levels may accurately reflect the degree of restoration possible for spring chinook. At any rate, because most of the habitat restoration actions needed for spring chinook would occur in degraded areas where summer/falls also rear, actions intended to restore these degraded areas for summer/falls should also improve spring production. So I'm not going to worry too much about trying to get our PFC production estimates for spring chinook within a gnat's ass of the "true" values possible under PFC.

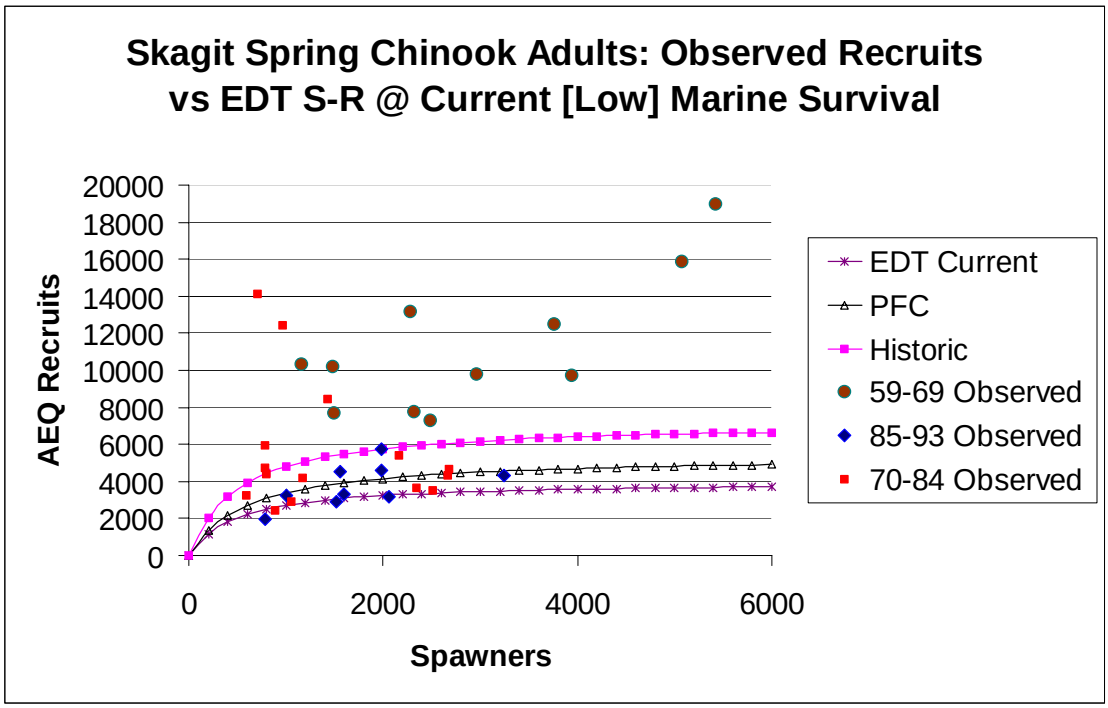

Figure 4. Spawner-recruit observations for Skagit spring chinook from BY 1959-1993, compared to EDT projections of production under current (low) marine survival rates.

At the long-term average (higher) marine survival rates, PFC conditions for spring chinook habitat would be expected to produce abundances similar to the levels of the

1960's (Fig. 5). Historic conditions would restore chinook recruitment to levels similar to the highest previously observed.

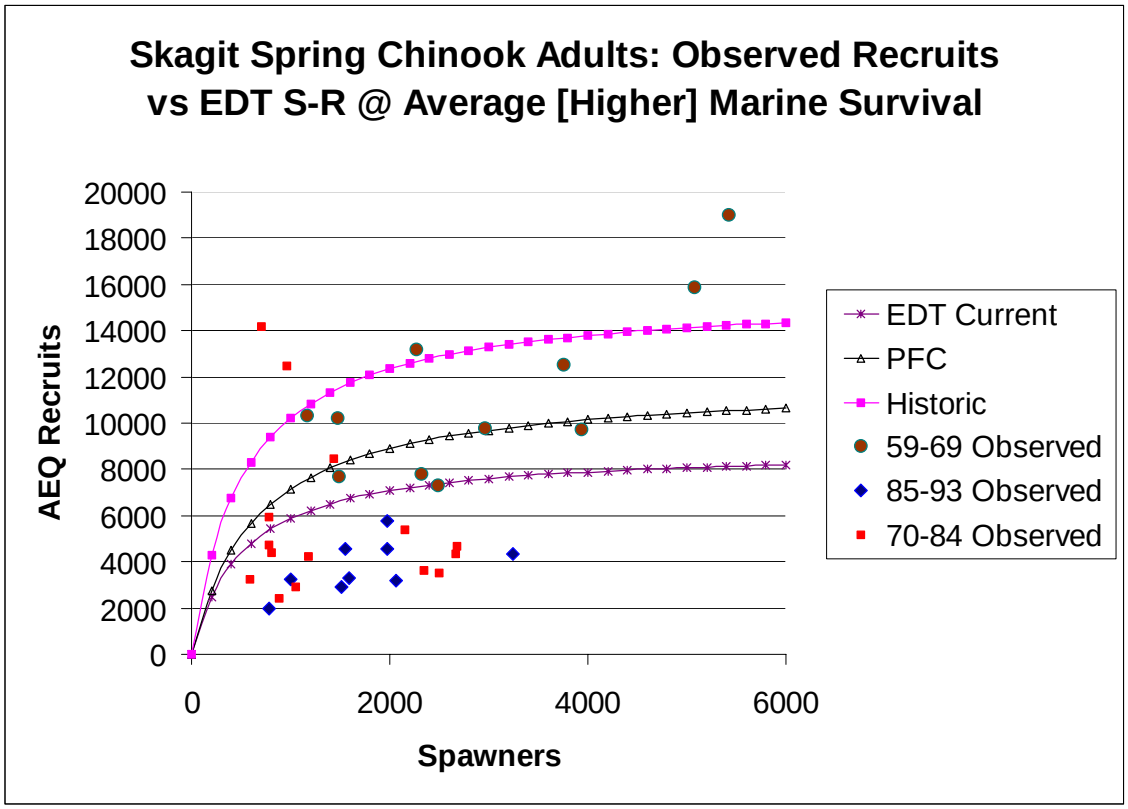

Figure 5. Spawner-recruit observations for Skagit spring chinook from BY 1959-1993, compared to EDT projections of production under long-term average (higher) marine survival rates.

Regarding PFC estimates for juveniles, we agreed to hold off that discussion to another time. My preference is to wait until we get the juvenile data for this year, because, due to last year's high spawning escapement and mild winter flows, outmigration data from this year may give us a lot of information about juvenile capacities.

cc: COOKS