State of Washington
Department of Fish and Wildlife
Southwest Washington Regional Office
2108 Grand Blvd., Vancouver, WA 98661

Northwest Power Planning Council
Attention: Kendra Phillips
Response to ISRP
851 S.W. Sixth Ave., Suite 1100
Portland, OR 97204

March 15, 2002

RE: Project number 31020 Monitor Coweeman River Salmonid Populations.

Dear Northwest Power Planning Council:

Enclosed is WDFW response to comments by the ISRP reviewer(s) of our FY2003 proposal submitted to BPA: Monitor Coweeman River Salmonid Populations, project ID 31020. If these responses are not detailed enough, I would be happy to provide additional information on any of our responses.

Sincerely,

Daniel Rawding

RE: Project number 31020: Monitor Coweeman River Salmonid Populations
Sponsor: Washington Department of Fish and Wildlife (WDFW)
Province: Lower Columbia
Subbasin: Cowlitz
FY03 Request: $277,962
5YR Estimate: $1,009,366
Short Description: determine freshwater productivity and marine survival of wild tule fall chinook and wild winter steelhead to develop risk assessments and recovery actions for these ESA listed populations
Response Needed? Yes
ISRP Preliminary Recommendation and Comments:
A response is needed. The sponsors propose to install traps to obtain a more accurate estimate of the abundance of adult fall chinook and steelhead, and production of smolts. This goal seems worthwhile because the Coweeman stock of fall Chinook is used as an index stock for developing harvest rates for Lower Columbia ESU fall Chinook salmon. The stock is managed for natural production and has very few hatchery fish noted; the stock of Tule fall chinook in the Coweeman River is apparently genetically distinct from other Tule chinook. If this is truly a natural population of fall chinook, it is one of only two in the lower Columbia River (Lewis River is the other). Justifications for the program seem appropriate, and there are excellent multi-species returns for a small system. This proposal could become one of the better assessment programs in the lower Columbia.

Steelhead
ISRP Comment: "It is unclear how adult steelhead will be monitored. The sponsors mention, in passing, something about a temporary weir. The genetic aspects of the proposal are particularly perplexing, and the methods for distinguishing naturally spawning hatchery fish from "wild" fish are unclear."

WDFW Response: The initial focus of the proposal was fall chinook salmon for the reasons the ISRP noted in the comments listed above. However, since other salmonids populations in the Coweeman River are either listed or proposed for listing under the Endangered Species Act (ESA) and outmigrate within the fall chinook outmigrant period (February through July), a multi-species monitoring program was proposed. We intend to estimate the fall chinook escapement using a mark-recapture methods by installing a temporary weir (resistance board) to tag adults and jacks, and conduct carcasses surveys to recover tagged and untagged salmon. As shown in the February presentation WDFW believes the probability for an accurate escapement estimate is high because we have demonstrated this approach worked well on the Elochoman River fall chinook, and historic flow analysis on the Coweeman River indicated that over the course of fall chinook entry discharge will not likely flood the trap for any extended period of time.

Steelhead entry occurs from late February through May, and this period coincides with much higher flows. The certainty of effectively operating the weir is lower in February and improves in March and April. On page 10 in our proposal we detail the mark-recapture approach we tend to use for steelhead. We intend to operate the same weir we used for fall chinook to tag adult steelhead. Since steelhead are iteroparus, we can recapture the kelts at the weir after they complete spawning and outmigrate to the ocean.

I agree that the genetic aspects of the steelhead proposal are perplexing and I will try to explain them in more detail. WDFW has historically managed wild and hatchery steelhead separately in the Coweeman River. Hatchery steelhead enter the river from November to February with peak spawning in January. High turbid water makes accurate redd counts during the hatchery spawning time (January-February) impossible. Wild steelhead enter the Coweeman River from December through May with a peak spawning in late April through the first week in May. Water conditions are lower and less turbid from late March through May and WDFW annually estimates wild steelhead escapement in the Coweeman River during this time period using redd surveys.

The 1998 NMFS Biological Opinion on hatchery artificial propagation in the Columbia River Basin suggest that there may be benefits to wild steelhead populations if a local hatchery broodstock is used. The benefits potential include decreased genetic risk because the local hatchery broodstock has the same genetic structure as the wild fish because wild fish are the source of the broodstock. Another potential benefit is that if wild steelhead escapement is below carrying capacity, then local hatchery broodstock which escapes and spawns in the wild may contribute to recovery. Based on these NMFS recommendations many local citizens are requesting WDFW to switch to local hatchery broodstocks.

As part of a process to evaluate proposals to change to local hatchery broodstocks, WDFW has identified that we will not be able to estimate wild steelhead escapement using redd surveys if local hatchery broodstocks are used. This will occur because local hatchery broodstocks will inherit entry and spawning time from their parents (wild fish). Therefore, in a situation when wild steelhead and local hatchery broodstock are spawning in the same river, we will not be able to assign the redd to hatchery or wild origin because spawning times of these two groups are identical.

The focus of the adult steelhead escapement element is to test the ability estimate wild steelhead escapement using the weir for mark-recapture estimates. Moving to this type of an escapement methodology allows us to estimate escapement based on handling of fish not redds. If we can accurately estimate wild steelhead in the Coweeman River over a period of years (different flow conditions), then we should be able to accurately assess escapement local hatchery broodstocks as well. This information would allow WDFW to consider changing hatchery steelhead broodstock as suggested by NMFS.

Spawner-Recruit Analysis

ISRP Comment: "The sponsors propose to develop a stock-recruitment relationship by measuring smolt production over a ten-year period and estimating recruits from the smolt production data using marine survival estimates. The sponsors need to justify why a reliable stock-recruitment relationship can be developed with this method using only ten data points, especially given variability in marine survival. How will the age structure of the recruits be estimated from the smolt production data?"

WDFW Response: WDFW has proposed to develop two separate Spawner-Recruit (SR) relationships. The first is a freshwater relationship based on adult spawners and juvenile outmigrant estimates and the second is a based on adult spawners and adult equivalent recruits. I had planned to discuss this in more detail at the presentation but my alpha, beta, and delta were replace with eyeglasses, scissors, and a block. The ISRP is aware of the potential problems with SR models and I will attempt to discuss how we would use the data to develop SR models. Hilborn and Walters (1992) discuss common problems with SR data and analysis including measurement error for spawners and recruits, time-series bias, and non-staionarity including age structure and lack of contrast.

Freshwater Productivity

We propose to use the Ricker model in the form

$$R_{(juveniles)} = \alpha S\, e^{-\beta S} \qquad (1)$$

where S is the number of adult fall chinook spawners, R is the total number of juvenile recruits, and α is the density independent productivity. This equation does not consider marine survival and without this component the relationship should be less variable. NRC (1996) referencing work by Elliot indicated that freshwater productivity for brown trout provided a reliable fit to a Ricker curve possibly with as few as ten data points. However it was noted that these data were from a stable spawning environment. The reviewers are correct defaulting to the position that it is not probable that in ten years (ten data points) we will get enough contrast (> 8 fold range in escapement) in chinook escapements and the freshwater environment is stable. As the reviewers are aware, in order to meet biologically justified escapement objectives the data needs to be analyzed measurement error, time-series bias, and stationarity in addition to the number of data points and the contrast of the data. Scale samples will be collected from a portion of the juvenile salmonids that are trapped to estimate age structure. This age structure will be used to assign the juvenile salmonids estimates to the corresponding brood year.

Ocean Productivity

As mentioned above development of a SR curve is dependent on a number of factors. For adults salmon we hope to reduce the variability in the SR relationship by adding a marine survival parameter to the standard Ricker model:

$$R = \alpha S\, e^{-\beta S} * (M)^{\delta} \qquad (2)$$

The addition of this term is reduce the number of years of data used to develop a biologically justifiable relationship. However, as with the freshwater productivity it is not possible to predict how many years of monitoring are needed because there are a number of factors beyond our control. The freshwater productivity relationship is likely to be developed before the ocean productivity because it will take up to six year for adults to return and in freshwater we are only influence by the riverine environment and in the ocean we are influenced by the riverine and ocean environments.

Budget

ISRP Comment: "In the budget, why would Planning and Design costs remain inflated for each of 5 years?"

WDFW Response: The planning and design phase was constant through out the time period on the project for two major reasons. The first is that the river is a dynamic environment and suitable trap sites may not be constant. Therefore if trap sites changed yearly, we may need to relocate traps and redesign site-specific traps. The second reason was that as new information would become available after each season, and adaptive management strategy provides for new data to be incorporated in the study design. One might argue the appropriate place for this is in the evaluation but it was included here.