# Response to Comments of Federal and BPA Summer Spill Analysis

Offset Action 1 A – **Northern Pikeminnow Management Program Heavy-Up**

**Technical**

**<u>Confounding Factors affecting exploitation rates</u>**

1. Confidence bounds are too large on exploitation rate estimates that they preclude making comparisons among years.

**Response:**

- This is an artifact of the limited sampling (i.e., mark/recapture) conducted by ODFW under the NPMP biological evaluation. Hankin and Richards (2001) also noted the limitations associated with the magnitude of existing marking efforts. It may be appropriate to increase tagging efforts to enable more precise estimation of annual exploitation rates as a component of proposed revised Heavy-up.
- The exploitation rate in 2001 is still much higher than preceding and subsequent years. Uncertainty in exploitation estimates does not rule out that the higher exploitation observed in 2001 was not a random variation.
- Uncertainty inherent in all statistical inference
- Complete analysis of tag loss recommended by ISAB (Hankin 2001)
- Devote more efforts to analysis of the resulting catch/effort/exploitation rate (Component of proposed revised Heavy-up)

2. The increase in catch and exploitation in 2001 is at least partially explained by the low river flows. ODFW regression (p. 10 of Joint Technical Staff) shows a strong correlation between seasonal exploitation rate and the independent variable mean stage at Bonneville Dam (ft.)

**Response:**

- Two years' data points ('97 and '01, N=9) strongly influence the strength of the correlation between the variables in the regression in Figure 1. Eliminate them and the correlation goes away ($r^2$ .75 v. $r^2$ .06).
- 2001 was a NPMP heavy-up year on top of being a near record low flow (its why we implemented it in the first place), so for that year those variables are confounded by colinearity.
- The exploitation rate data set used in figure 1 only go back to 1995. The strength of the correlation disappears when you add in data points back to 1991 ($r^2$.75 v. $r^2$ .1). If you excluded 1991 and 1992 altogether, the strength of the correlation still decreases significantly ($r^2$ .75 v. $r^2$ .19). We agree, that flow conditions within year may have an

affect on catch, but not nearly the strength as presented by ODFW and other commenters in their spill offset comments.
- 1995 was also a year that contained an increased incentive program (1st year of sliding reward scale, Regional Derbies/ $5,000 tagged fish) and resulted with an above average exploitation rate.
- Incentive programs definitely influence fishery effort and resultant catch, which are positively correlated. After all, the NPMP is largely based on effort associated with the monetary incentive of the sport-rewards.

Therefore, incentives influence catch and resultant exploitation rates positively. Flows alone do not adequately explain the relationship between seasonal flow conditions and exploitation rates observed in the NPMP. While changes may not be discernable based on current sampling efforts, increased exploitation results in reduced predation unless there is some form of compensation. Increased sampling effort could be pursued to if increased statistical precision is deemed a necessity.

**Longer-term trends in seasonal exploitation rates and catch.**

1. Catch in the NPMP is not a reliable predictor of exploitation rate (Fig. 2 Joint agency comments)

**Response:**

- Catch and exploitation rate are strongly correlated using either the limited data set presented ('95-'03 – $r^2$ .77) or the full data set ('91-'03 – $r^2$.67). Figure 2 in the joint agency comments is simply incorrect (the data point for 2001 erroneously corresponds to an equivalent catch of approximately 140 thousand NPM, when the catch for that year was 239 thousand NPM.
- In years where no mark-recapture data was available (1991) and limited reservoir data (e.g., no below Bonneville Dam in 1992), program evaluators (ODFW) estimated exploitation rates using total reservoir NPM catch and reservoir population estimates from indices.
- Our Revised Heavy-up proposal will be more aggressive to ensure that substantial increases in catch are realized. This will increase the likelihood that increases in exploitation rate will be significantly measurable/detectable in specific reservoirs through increases in catch and effort. This may be enhanced through more rigorous mark/recapture efforts in the ongoing biological evaluations.

2. There is no apparent relationship between exploitation rates before and after July 10; exploitation rates were always less than that before July 10. The seasonal change was similar to that in many other years.

**Response:**

- Program administration observed a marked increase in the effort in 2001 and catch after the heavy-up.
- The before July 10 exploitation rate was very high in 2001 but less than 2000 and very similar to 2002 and 1999. The After July 10 exploitation rate in 2001 was the highest for all years presented by a large margin. The significance of this as random variation is not supported by the observations and program predictions before the heavy up.

**Variation inherent in all exploitation rate and predation estimates**

1. An increase of 1-2 percent is not substantial enough to realize any detectible reductions in predation as per Freisen and Ward 1999.

**Response:**

- This is an artifact of the limited sampling (i.e., mark/recapture) conducted by ODFW under the NPMP biological evaluation. Hankin and Richards (2001) also noted the limitations associated with the magnitude of existing marking efforts. It may be appropriate to increase tagging efforts to enable more precise estimation of annual exploitation rates as a component of proposed revised Heavy-up.
- Friesen and Ward 1999 indicate that a more recent subset (1994-1996 avg. 13.9%) of the combined 1991-1996 (avg. 12.1%) exploitation rate data show an increase in average exploitation rate; and the resulting conclusion that "further reductions in potential predation will be realized if exploitation is maintained at mean 1994-1996 levels." (p.413). The absolute difference in these two average exploitation rates is 1.8%, which is similar to the expected increase in exploitation rate resulting from the Revised Heavy-up.

Revised Heavy up seeks to significantly increase system wide and reservoir specific exploitation rate to more distinguishable levels and statistical significance.

**Affects of a Heavy-up on Human Behavior**

1. Pikeminnow incentive programs increase program fraud, therefore reducing the ability to assess actual affect of increased rewards on the NPM population.

**Response:**

- Fraudulently caught fish are an important concern in implementing and monitoring the NPMP. Since 2001, a concerted effort to document fraud and disqualify and remove fishers who do not comply with program rules has resulted in the disqualification of several anglers. WDFW indicates the frequency of angler fraud has decreased substantially since 2001 and the emphasis on enforcing program compliance rules including disqualification. (Eric Winther, Washington Department of Fish and Wildlife pers. communication)
- As stated previously in the Joint Technical Comments, program effectiveness is derived from the measurement of exploitation rates, not the number of NPM harvested. The measure of exploitation rate is an independent measurement of the proportion of tagged

fish turned into the program, which is independent of the variances associated with out of boundary NPM turned into the NPMP.

- One of the purposes of substantial rewards for tagged fish is to help ensure that increased effort is focused on fishing in waters open to the sport-reward fishery.
- NPMP program implementers will continue to aggressively monitor and enforce the rules of participation in the NPMP in all areas including Lower Granite Reservoir and below Bonneville Dam.

**Direct Effects of Discontinuing Spill on Predation**

Predation on juvenile salmonids by northern pikeminnow will likely increase in the absence of spill; this estimate could be as high as 1 million. This issue is addressed on the text of "Responses from BPA and USACE" posted 4/02/04.

**Sources:**

State, Federal and Tribal Fishery Agencies Joint Technical Staff letter to BPA dated February 20, 2004.

Raymond Beamesderfer, David Ward, and Anthony Nigro, 1996: *Evaluation of the Biological Basis for a Predator Control Program on Northern Squawfish (Ptychocheilus oregonensis) in the Columbia and Snake Rivers*, Volume 53, Number 12, pp 2898-2908.

Friesen, Tom and David Ward, 1999, *Management of Northern Pikeminnow and Implications for Juvenile Salmonid Survival in the Lower Columbia and Snake Rivers*, North American Journal of Fisheries Management 19:406-420.

Hanken, David, and Jack Richards, 2000, *The Northern Pikeminnow Management Program: An Independent Review of Program Justification, Performance, and Cost-Effectiveness*, 38pp.

Porter, Russell, et al., *Development of a System-wide Predator Control Program: Stepwise Implementation of a Predation Index, Predator Control Fisheries, and Evaluation Plan in the Columbia River Basin*, Annual Report 2000, 2001, 2002.

See also Excel files titled: Annual_catch_flow_etc 3-18-04.xls, Hanford-priest NPM redu 04-01-041.xls, below-MCN NPM reduction 04-01-042.xls, SNFAC pred ctrl with timing 03-17-044.xls, Annual_catch_flow_etc 03-18-04.xls