

# **Appendix C**

## **Comments on Ocean Conditions and Flows from the draft 2004 NMFS FCRPS Biological Opinion**

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### Overview

The draft hydro measures are generally the same as in the 1995, 1998, and 2000 NMFS Biological Opinions. NMFS continues to insist on flat flow targets instead of moving toward a natural peaking-normative river operation. Advanced weather/climate and hydro forecasting tools for decision-making are still lacking in the draft.

### Specific Comments

#### Appendix "D": Ocean Conditions

No attempt is made to factor in the effects of the Pacific Decadal Oscillation (PDO), which gauges the abundance of salmon populations as a function of multivariate ocean conditions and long-term climate regimes (Mantua, 2000). NMFS should collaborate with researchers at the Climate Impacts Group to conduct more research into understanding the driving mechanics of the PDO. Better understanding of the PDO may lead to predictive models, which could give policy makers a better idea on the duration of current "good" ocean conditions, when to expect the next down-turn, and how terrestrial mitigation efforts can be adjusted and improved upon.

The draft assumes "good ocean conditions" without offering the science to back up such a claim. Figure 1 shows monthly values of the PDO (1976 through August 2004). The last full positive phase, when Columbia River salmon fares poorly, occurred from 1977 to 1998. Recent oceanographic research (Peterson and Schwing, 2003; Chavez et. al., 2003) strongly suggests that a new oceanic regime, favorable to Columbia River salmon, occurred in the summer of 1998, which suggests a reversal of the PDO to a negative phase. However, in August 2002, PDO values became positive again. Based on the last 100 years of PDO values, such excursions may last 2-4 years. So, for now, ocean conditions have temporarily turned less favorable for Columbia River salmon. As there is no predictive mechanism for the PDO, it is impossible to tell what trend the PDO may take in the future. So, assuming "good ocean conditions" is a poor assumption at this point in time.

#### Appendix "D": Flows

Table 1 shows monthly and seasonal flow values for the Reference Operation and NMFS' Proposed Action (PA), as modeled in Hydro-Sim (BPA). Comparison flows are given for the 2000 Biological Opinion, as modeled in GENESYS by NPCC staff (J. Fazio, pers. comm., 2004) and CRITFC's preferred alternative, a natural peaking-normative river operation that utilizes altered flood control rule curves (Martin, 2004), as modeled in GENESYS (CRITFC).

<b>FLOWS</b>		Apr1-15	Apr16-30	May	June	Spring (4/03- 6/20)	July	August	Summer (6/21- 8/31)
(kcfs)	Project								
Ref. Op.	Lower	69	90	105	105	96	51	33	51
NMFS PA	Granite	75	89	105	101	96	49	32	50
2000 BiOp		78	90	107	100	97	54	37	52
CRITFC		82	94	113	103	102	50	39	53
(4/10- 6/30)									
Ref. Op.	Priest	124	155	155	197	168			
NMFS PA	Rapids	101	124	169	185	162			
2000 BiOp		112	139	185	180	169			
CRITFC		111	141	179	225	184			
(4/10- 6/30) (7/01- 8/31)									
Ref. Op.	McNary	200	247	259	303	269	246	199	222
NMFS PA		186	216	272	287	261	211	159	185
2000 BiOp		200	231	290	282	286	203	174	189
CRITFC		199	237	291	330	289	212	168	190
			Oct.	Nov.	Dec.	Jan.	Feb.	March	Winter (11/01- 3/31)
Ref. Op.	Bonneville		113	132	137	150	149	168	147
NMFS PA			115	134	160	198	174	165	166
2000 BiOp			122	122	153	185	171	172	161
CRITFC			116	117	143	161	166	173	152

Table 1. Modeled flow studies, using Hydro-Sim (BPA) and GENESYS (CRITFC), 1929-1978.

A comparison with the Proposed Action to the 2000 Biological Opinion is far more meaningful. Spring flows decrease by 1-2 kcfs in the lower Snake, drop by 11-16 kcfs in the Hanford Reach (although increase by 5 kcfs in June), and decline 15-18 kcfs in the lower Columbia (although increase by 5 kcfs in June). Summer flows decrease by 5 kcfs in the lower Snake (net seasonal drop of 2 kcfs), and increase by 8 kcfs then drop 15 kcfs in the lower Columbia (net seasonal drop of 4 kcfs). Winter flows increase by 3-13 kcfs, which would enhance lower Columbia chum and Chinook populations at the expense of spring/summer salmon stocks.

#### Appendix “D” Attachment #1: Flows

The use of a three-point flow average is inadequate. The technique to replicate the same runoff volume during any year within 1994-2003 using past water years is sound, but fails on an important consideration—ocean conditions.

There is no mention of how the study flows selected by NMFS relates to ENSO (inter-annual) and PDO (decadal) conditions. A better approach would be to run an ensemble hydro model that

can produce dozens of time-series traces of differing flow volumes that would better capture the variability of in-season flows and then match that result with ENSO and PDO conditions. The University of Washington's Climate Impacts Group is capable of running such historical flow simulations.

#### Appendix "E": In-Stream Flows

There is no quantification of past or present in-stream tributary flows. Since flow is a strong determinant factor in habitat quality- how can one make a proper assessment?

#### Other Comments on the Hydro-System:

There is no mention of moving the FCRPS to a natural peaking-normative system. The river continues to be run in piece-meal instead of a holistic basin-wide ecosystem approach to recovery. Many technical staff advocate a holistic ecosystem approach to managing water and salmon resources in the Columbia (Transboundary Conference, 2002). NMFS continues to insist on flat flow targets instead of moving toward a natural peaking-normative river operation (Bunn and Arthington 2002) that would benefit salmon (Williams et.al., 1996).

No mention is given to modified flood control operations, which will make more water available for spring migrants. NMFS needs to push the Federal Action Agencies into acting upon better flood control operations to the betterment of the juvenile salmon.

Updated GENESYS hydro studies conducted by CRITFC staff (Martin, 2004) shows that a refill date of May 31<sup>st</sup>, instead of the June 30<sup>th</sup> target proposed by NMFS, would ensure better refill probability and as a mitigation tool to counter the effects of global warming. For example, if reservoir refill occurred in May 31<sup>st</sup>, 2000, instead of June 30<sup>th</sup>, 2000, Grand Coulee and Dworshak reservoirs would have refilled completely, instead of missing full pool by 10 feet and 2 feet, respectively. The spring freshet peaked in mid-April and the COE continued flood control drafts of Grand Coulee through mid-May. Earlier freshet peaks will become dominant as global warming warms winter and spring temperatures and reduces snow-packs.

Modified flood control rule curves, combined with earlier refill, could reclaim 1.3 MaF from the Snake River and 6.7 MaF from the Columbia River without significantly increasing flood risk to Vancouver and Portland (Figures 2, 3). Current flood control operations wastes 8 MaF annually that could be used for anadromous fish passage. NMFS should push the COE into ceasing the overly conservative flood control operations in low-to-medium runoff years.

Current operations manage the Columbia at The Dalles to 350 kcfs each spring, or 100 less than bank full conditions or 200 kcfs less than flood flow conditions at Vancouver. An independent academic and/or engineering review should be conducted on the feasibility and the consequences of altering flood control operations to achieve an intelligent productive use of spring water.

Federal water managers often fail to meet flow targets (Tables 2, 3), partly due to current flood control operations, but also due to relying on Water Supply Forecast (WSF) information so early in the season, then engaging in hydro operations (e.g., power flows) that deplete system storage

that is needed for spring flows. If the WSF volumes decline, then Federal operators are very unlikely to replenish that water in the reservoirs for spring salmon flows. Research by CRITFC shows how trending analysis can add a corrective value to the WSFs and save water in medium-low and low water year classes (Martin, 2002). Knowledge of these trends could keep more winter/early-spring water in the reservoirs in low and/or drought-prone *El Nino* water years.

<b>Spring Target Flows</b>	LWG		MCN		PRD	
	4-10/6-20 Target	(kcf) Observed	4-20/6-30 Target	(kcf) Observed	4-10/6-30 Target	(kcf) Observed
1995	96.3	100.9	249.2	253.0	135	
1996	100	138.3	258	357.1	135	
1997	100	162.5	260	454.8	135	
1998	90.3	115.6	220	287.8	135	153.9
1999	100	117.0	260	303.6	135	169.6
2000	97	85.1	246.4	243.4	135	158.1
	4-03/6-20 Target	Observed	4-10/6-30 Target	Observed	4-10/6-30 Target	Observed
2001	85	47.5	220	123.9	135	76.7
2002	97	83.4	246	269.3	135	180.6
2003	89.1	90.0	220	231.4	135	141.4
2004	85	70.1	220	203.2	135	126.7
Hits:	6 of 10 yrs.		7 of 10 yrs.		5 of 7 yrs.	

Table 2. FCRPS Biological Opinion Spring Target Flows and Observed Flows, 1995-2004.

<b>Summer Target Flows</b>	LWG		MCN	
	6-21/8-31 Target	(kcf) Observed	7-01/8-31 Target	(kcf) Observed
1995	51.3	55.3	200	165.0
1996	52.5	52.7	200	214.5
1997	55	66.3	200	236.5
1998	50.6	53.2	200	169.7
1999	54.3	56.0	200	228.2
2000	51.3	33.7	200	153.6
2001	50	25.4	200	90.9
2002	51.3	41.0	200	189.1
2003	50.5	32.3	200	135.5
2004	50	33.2	200	133.7
Hits:	5 of 10 yrs.		3 of 10 yrs.	

Table 3. FCRPS Biological Opinion Summer Target Flows and Observed Flows, 1995-2004.

The probability of meeting flow objectives appears to have declined, as outlined in the draft. Tables 4a, 4b shows the probability of meeting or exceeding target flows under the scenarios modeled in Hydro-Sim or GENESYS. It should be noted that the CRITFC alternative drafts less water out of Dworshak in July, on average, compared with the Biological Opinion and reserves more water into August and September, which is consistent with the NPT-ID Plan.

Probability	Apr16-30	May	June
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<b>of Meeting</b>	<b>Lr Grn</b>	<b>McNary</b>	<b>Lr Grn</b>	<b>McNary</b>	<b>Lr Grn</b>	<b>McNary</b>
Target Flow	85	220	85	220	85	220
Ref. Oper.	42%	64%	48%	56%	70%	66%
NMFS PA	44%	46%	60%	60%	68%	60%
2000 BiOp	54%	50%	72%	84%	68%	74%
CRITFC	58%	56%	80%	82%	70%	84%

Table 4a. Achieving FCRPS Biological Opinion Spring Target Flows (average of 1929-1978).

<b>Probability of Meeting</b>	<b>July</b>		<b>Aug1-15</b>		<b>Aug16-31</b>	
	<b>Lr Grn</b>	<b>McNary</b>	<b>Lr Grn</b>	<b>McNary</b>	<b>Lr Grn</b>	<b>McNary</b>
Target Flow	50	200	50	200	50	200
Ref. Oper.	42%	100%	0%	70%	0%	70%
NMFS PA	40%	60%	0%	8%	0%	8%
2000 BiOp	70%	52%	0%	40%	0%	12%
CRITFC	38%	54%	10%	28%	2%	4%

Table 4b. Achieving FCRPS Biological Opinion Summer Target Flows (average of 1929-1978).

For Dworshak, there is no mention of the Nez Perce Tribe-Idaho Plan for Dworshak (IDWR, 2000). The Plan, now adopted by the Idaho Legislature and a part of the Snake River Basin Adjudication court process, advocates draft limits of 1535 feet by August 31<sup>st</sup> and 1520 feet by September 30<sup>th</sup>, so that 200 KaF of storage can be used in September for late sub-yearling migrants from the Clearwater, over-wintering smolts, and returning adult Chinook and steelheads. Lower Snake pool elevations should be kept at Minimum Operating Pool during the time in September when Dworshak flow augmentation water is still being released, in order to provide maximum benefits to late migrating Clearwater sub-yearling salmon.

The BOR proposes to use 130 KaF of Banks Lake water for summer flow augmentation. The Tribes want to see 250 KaF (short term) and 500 KaF (long term) from Banks Lake.

The lower Columbia flow gauging point should be moved away from McNary and back to The Dalles, for (1) historical significance, (2) longer-term water record (126 years) versus McNary (50 years), and (3) any flood control studies need to use The Dalles as the only reference point, as The Dalles indexes flood potential at Vancouver. It is logical to use the same reference point during real-time in-season operations.

The draft fails to mention advanced weather and climate predictive tools to help decision makers: NOAA's long-range probabilistic climate forecasts, multivariate ENSO (El Nino Southern Oscillation) index, NOAA's ENSO Risk Model, Pacific Decadal Oscillation research, sea-surface temperature departure analysis, and new models from the European Centre for Medium-Range Weather Forecasts.

The Climate Impacts Group (CIG, 2004) offers an increasing suite of new products to help Pacific Northwest water and salmon managers. Such products are not being used by managers, despite repeated calls for such usage. Nichols (1999) suggests that policy-makers and resources

managers are unable, or unwilling, to utilize weather and climate forecasts in the decision-making process.

The COE needs to look beyond using a SOI diagnostic tool as the only managing guide to Libby autumn operations (i.e., pre-season December 31 draft). A comprehensive package of climate diagnostic tools (see above) is needed to better manage Libby, and for all of the COE's reservoirs, instead of continued reliance on outdated science because it is "comfortable."

## References:

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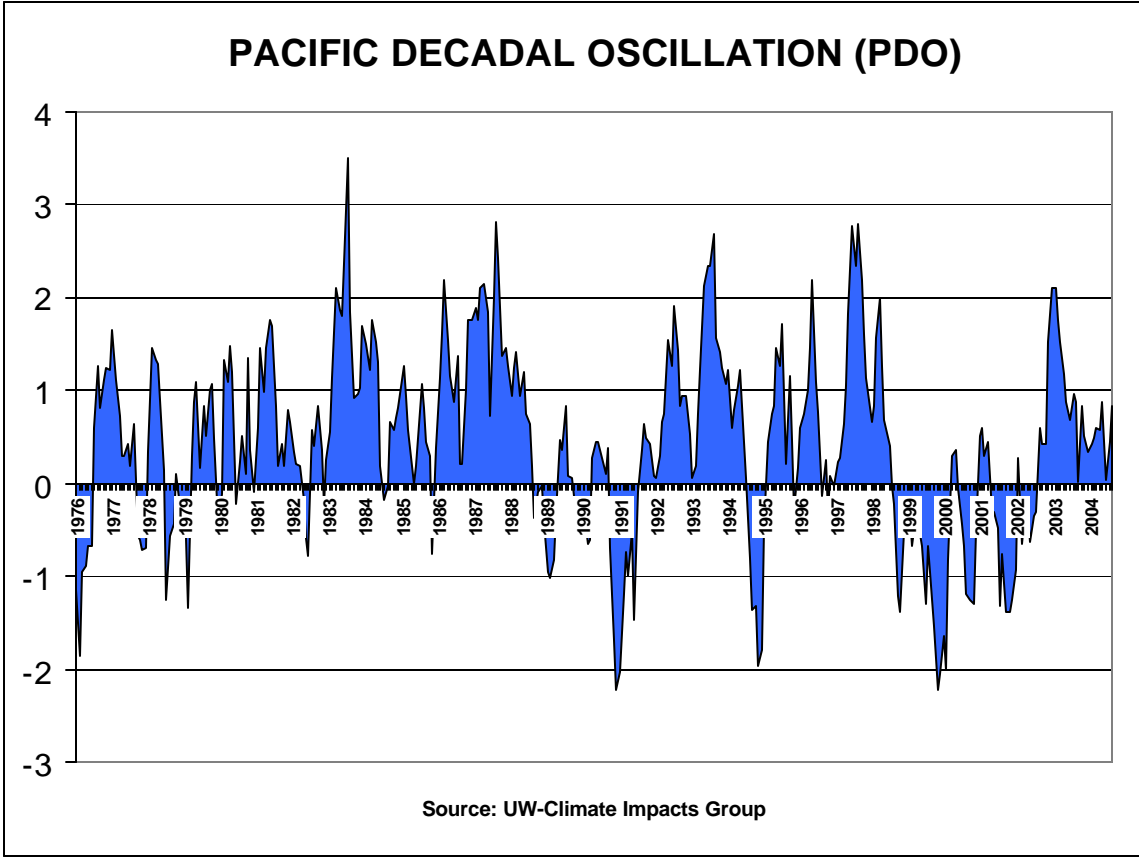


Figure 1. Monthly values of the Pacific Decadal Oscillation (Mantua, 2000).

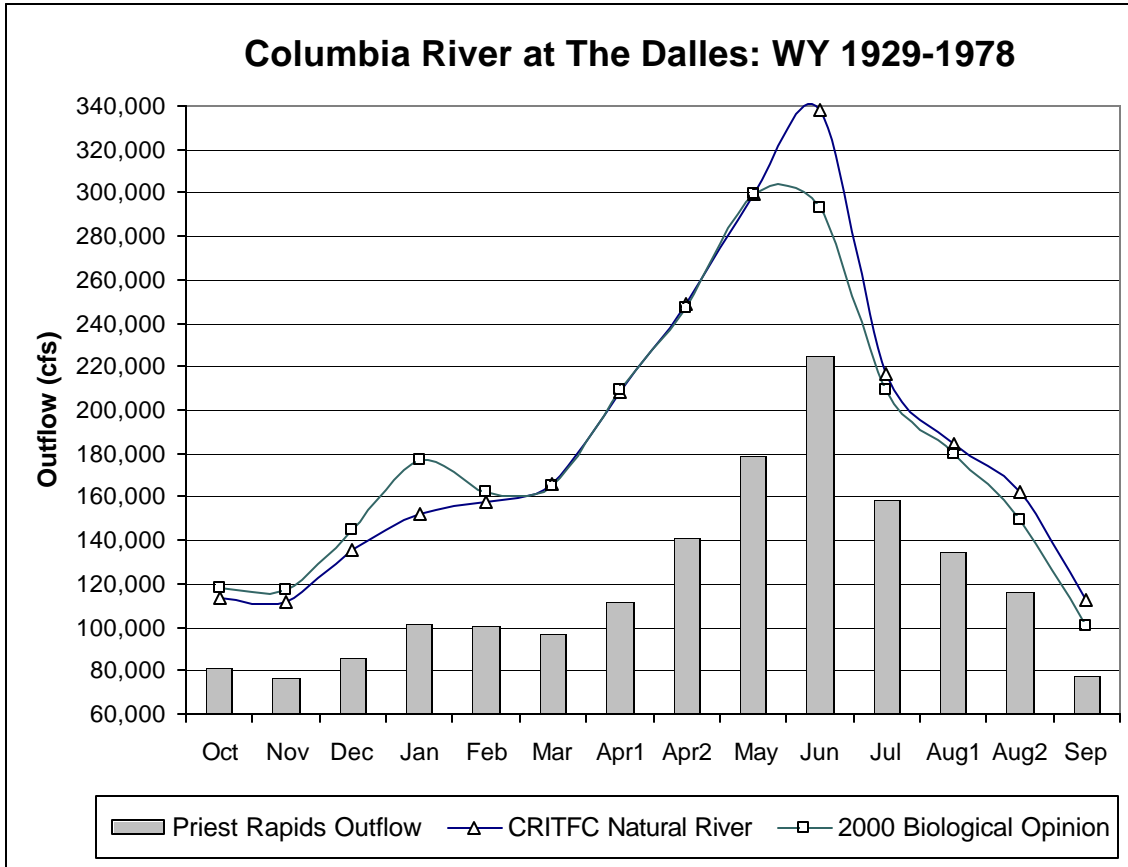


Figure 2. Monthly flow values at The Dalles, as modeled in GENESYS (Martin, 2004).

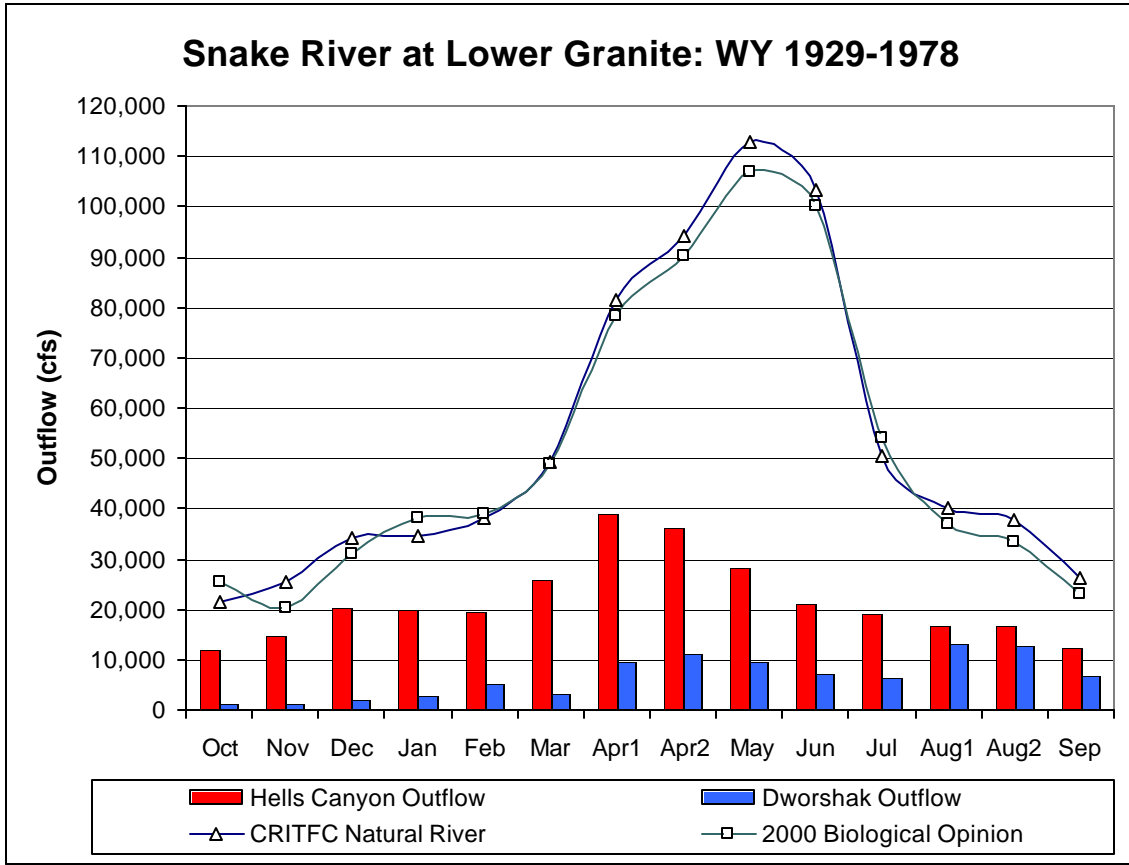


Figure 3. Monthly flow values at Lower Granite, as modeled in GENESYS (Martin, 2004).