



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Bill Tweit, WDFW

*Michele DeHart*

FROM: Michele DeHart

DATE: July 13<sup>th</sup>, 2005

RE: Projected Flow Impact of Montana SOR for Libby and Hungry Horse

In response to your request, the Fish Passage Center has estimated the potential Columbia River flow impacts if SOR 2005 MT-1 Final V2 were implemented. To estimate this impact, the most recent flow projections were utilized, which contained projected inflows, outflows, and reservoir elevations for both Libby and Hungry Horse from July 11<sup>th</sup> through September 30<sup>th</sup>, 2005. *The flow projections also assumed BiOp drafts at both Hungry Horse and Libby by the end of August.*

The following outlines the method used to estimate July 11<sup>th</sup> through September 30<sup>th</sup> average outflows under the Montana SOR. From the flow projections, the average inflow to Hungry Horse and Libby from July 11<sup>th</sup> to September 30<sup>th</sup> was calculated to be 0.9 Kcfs and 7.5 Kcfs, respectfully. The storage available between the projected elevations on July 11<sup>th</sup> (HGH: 3558.3 feet, Libby 2458.2 feet) and the 20-foot draft elevations (HGH: 3540 feet, Libby 2439 feet) were calculated using the reservoir storage tables for each Libby and Hungry Horse. The amount of storage between the July 11<sup>th</sup> projected elevation and the 20-foot draft elevation (HGH: 3558.3-3540 feet = 438.8 Kaf, Libby 2458.2-2439 feet = 854.5 Kaf) at each project was converted to a draft flow over the period from July 11<sup>th</sup> to September 30<sup>th</sup> (82 days). The draft flow represented the average daily flow over the period from July 11<sup>th</sup> to September 30<sup>th</sup> that could be expected only from the drafting of Hungry Horse and Libby to BiOp elevations by the end of September (HGH: 2.7 Kcfs, LIB: 5.3 Kcfs). To estimate the average outflows from July 11<sup>th</sup> to September 30<sup>th</sup> for each Libby and Hungry Horse that would result from the Montana SOR, the daily average inflows were simply added to the calculated draft flows at each project. The resulting estimated outflows over the July 11<sup>th</sup> to September 30<sup>th</sup> period was 12.7 Kcfs at Libby and 3.6 Kcfs at Hungry Horse. Considering all operations downstream of these projects to be identical to those assumed in projections, these flows would be the target below Libby and Hungry Horse under the Montana SOR from July 11<sup>th</sup> to September 30<sup>th</sup>.

The second stage of this analysis dealt with comparing Columbia River flows from the projected BiOp operation with estimated flows from the Montana SOR operation. Monthly projected BiOp outflows were averaged at Hungry Horse and Libby, again these flows represented BiOp operations as drafts were to 20-feet by the end of August. The following table summarizes the differences in the projected BiOp flows and the Montana SOR over July, August and September at both Hungry Horse and Libby.

	<b>Projected BiOp Average Flows (Kcfs)</b>	<b>Estimated Flows With MT SOR (Kcfs)</b>	<b>Difference Projected BiOp – MT SOR (Kcfs)</b>
Hungry Horse July 11-31	5.2	3.6	1.6
Hungry Horse August 1-31	5.2	3.6	1.6
Hungry Horse September 1-30	2.0	3.6	-1.6
Libby July 11-31	18.5	12.7	5.8
Libby August 1-31	16.8	12.7	4.1
Libby September 1-30	7.5	12.7	-5.2

\*Reflects BIOP 20-foot end of August drafts

Using the above table, the combined (Libby and Hungry) flow impacts of the Montana SOR (relative to the BiOp) were computed to be a 7.3 Kcfs decrease in flows in July, a 5.6 Kcfs decrease in flows in August, and a 6.8 Kcfs increase in flows in September. The following table displays projected BiOp flows at McNary over July, August and September along with the estimated flows at McNary under the Montana SOR.

	<b>McNary Average Flows under Projected BiOp Operation (Kcfs)</b>	<b>Estimated McNary Average Flows With MT SOR (Kcfs)</b>	<b>Difference Projected BiOp – MT SOR (Kcfs)</b>
July 11-31	173.8	166.5	7.3
August 1-31	145.5	139.9	5.6
September 1-30	106.7	113.5	-6.8

**Conclusions:**

- The implementation of the Montana SOR is estimated to decrease flows in the Columbia River by an average of 7.3 Kcfs in July, 5.6 Kcfs average in August and increase flow in September by an average of 6.8 Kcfs, relative to the BiOp operation.
- The combined estimated volume loss in water in the Columbia River over July and August (BiOp summer flow period) is approximately 648 Kaf.
- According to the latest flow projections the end of August BiOp elevation will be reached at Libby by providing an average outflow of 17.5 Kcfs between July 11<sup>th</sup>

and August 31<sup>st</sup>, this discharge is within the 13-18 Kcfs range identified as suitable.