MEMO

State of Idaho
Department of Water Resources
322 E Front Street, P.O. Box 83720, Boise, Idaho 83720-0098
Phone: (208) 287-4800 Fax: (208) 287-6700

Date:	28/03/2019
To:	Mat Weaver
From:	Allan Wylie AW
cc:	Shelley Keen, Sean Vincent
Subject:	Review of ESPA transfers between 2012 and 2018

Mat

The Water Allocations Bureau identified 426 transfers between 1/1/2012 and 8/31/2018 involving pumping from the Eastern Snake Plain Aquifer (ESPA). "TO" and "FROM" wells were assigned a model row and column and average annual consumptive use determined by location. Figure 1 shows the locations for the TO cells and FROM cells. Figure 2 shows the net cumulative use rate (AF/yr) for all model cells involved in the transfers. The spreadsheet containing the ESPA transfers was sent to the Hydrology Section to analyze using version 2.1 of the ESPAM (IDWR, 2013).

All pumping within the Upper Snake River Basin is assumed to have an impact on the ESPA. Because ESPAM2.1 ignores all impacts outside the active model grid, any TO or FROM wells that were outside the active portion of the model grid were moved to the nearest active model cell. This affected the representation of 21 of the transfers.

The spreadsheet was checked to make sure that the sum of all TO wells for each transfer was less than or equal to the sum of all FROM wells per IDWR transfer policy (Peppersack, 2009), and transfers where the average transfer distance was greater than 3.0 miles were checked to make sure that the row and column numbers assigned to the TO and FROM wells were correct.

Transfer #81590 is a change in beneficial use from irrigation to mitigation, which is not a typical transfer. Therefore, the consumptive use for the FROM and TO wells for this transfer were set to zero (0.0) during the modeling analysis.

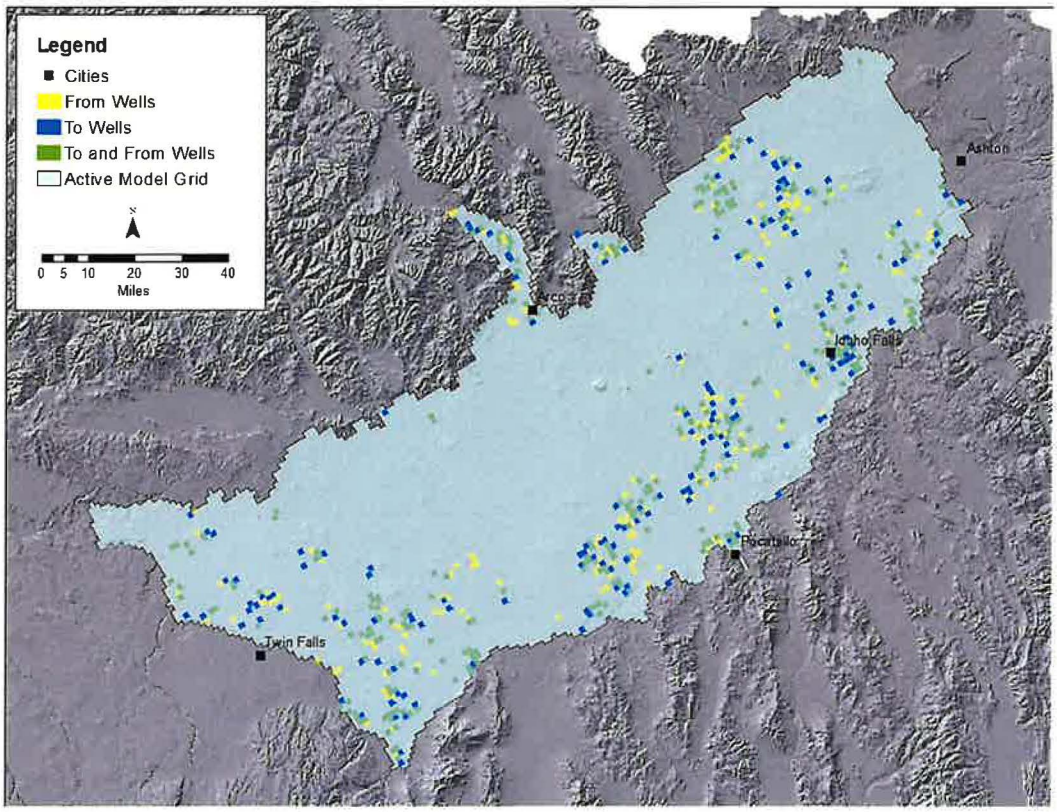

Figure 1. TO and FROM cells in transfers between 2012 and 2018.

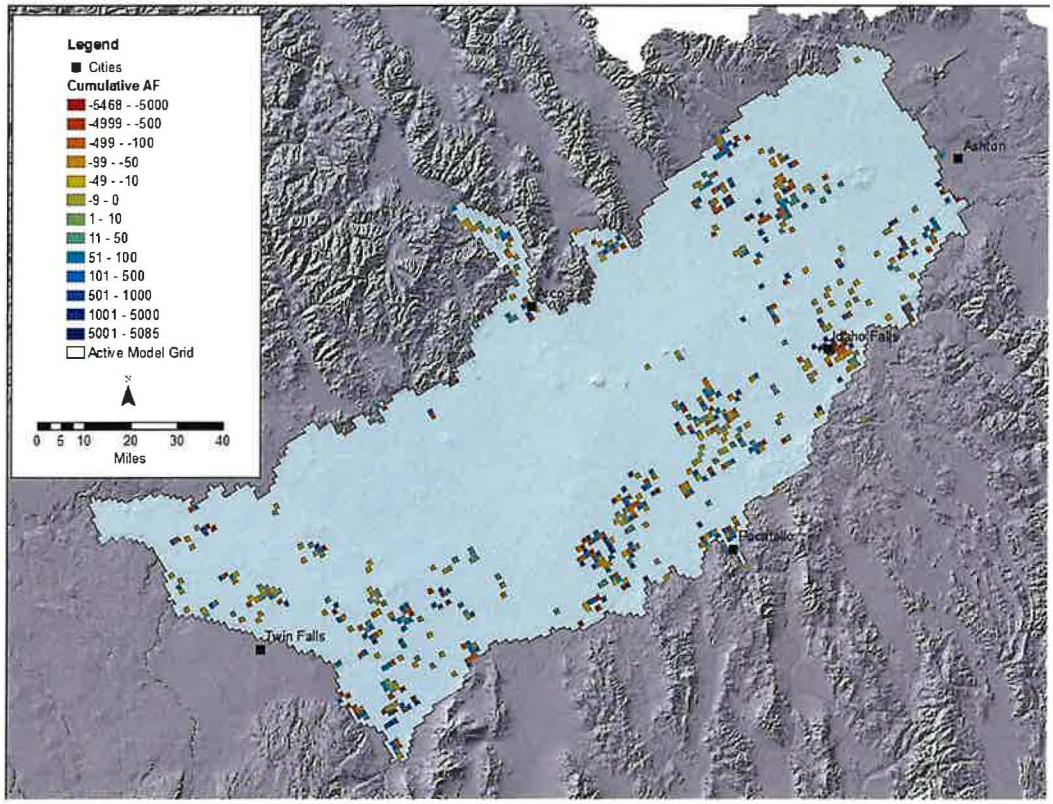

Figure 2. Cumulative annual pumping rate (AF/yr) for all cells involved in transfers between 2012 and 2018. Negative (-) = TO well, positive (+) = FROM well.

Most transfers move small amounts of water short distances. About half relocate 100 AF/yr (0.14 cfs) or less. About 75% move five miles or less. Figure 3 is a histogram showing the pumping rate for all transfers and Figure 4 is a histogram showing the average distance for each transfer.

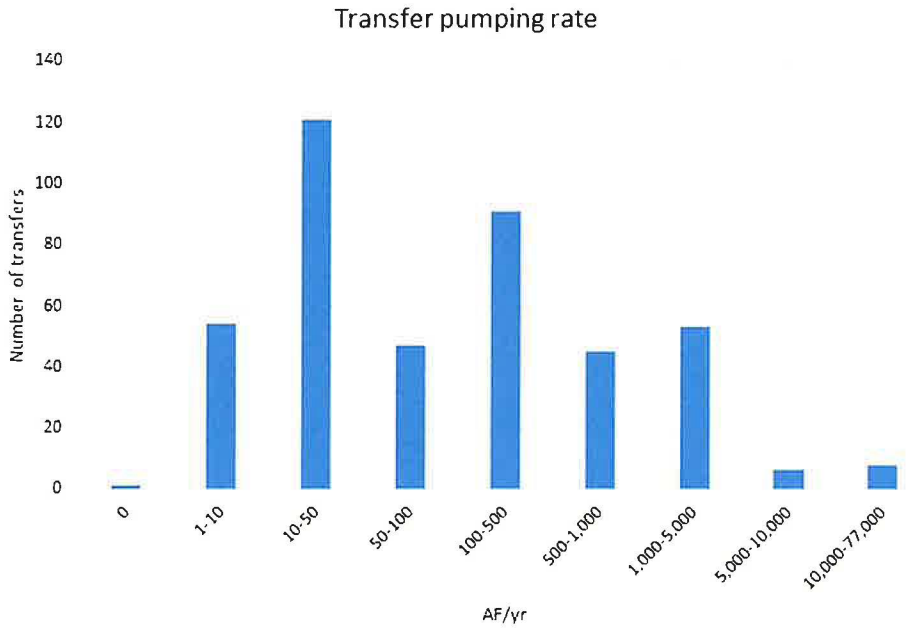

Figure 1. Transfer pumping rate for transfers between 2012 and 2018.

Figure 2. Average transfer distance for transfers between 2012 and 2018.

The transfers were formatted into a MODFLOW well file and run in the steady state superposition version of ESPAM2.1 (IDWR, 2013). Because MODFLOW is an aquifer

flow model, it is aquifer-centric; all recharge to the aquifer is positive (+) and all depletions to the aquifer are negative (-) (Harbaugh and others, 2000). The FROM wells are simulated as inputs (cessation of pumping is a positive impact) and the TO wells are simulated as a depletion. The FROM wells total about 412,728 AF of positive impact to the aquifer and the TO wells total about 412,210 AF of depletion to the aquifer. This indicates that the transfers do not inadvertently result in a net increase in aquifer depletions.

The impact of the 2012 through 2018 transfers on the river reaches used in the Transfer Tool (Figure 5) were extracted from the model output. Table 1 shows the steady state impact for the transfers on the reaches. ESPAM2.1 indicates that the transfers resulted in increased gains for the Ashton-Rexburg and near Blackfoot-Neeley reaches. The Heise-Shelley, Shelley-near Blackfoot, Neeley-Minidoka, Kimberly-King Hill reaches have reduced gains as a result of the transfers. The maximum annual gain is to the near Blackfoot-Neeley reach at about 850 AF/yr and the maximum annual loss is to the Neeley-Minidoka reach at about 300 AF/yr.

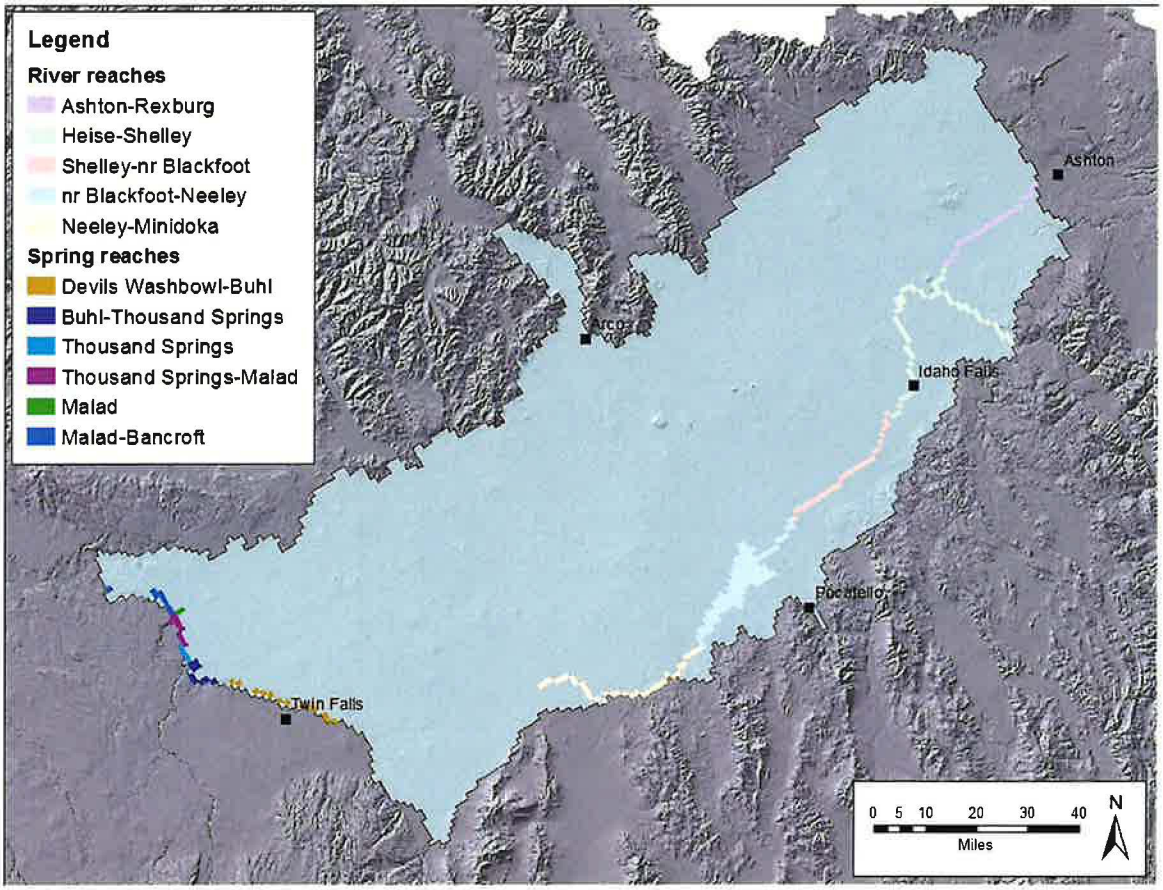

Figure 3. River and spring reaches.

Table 1. Impact of all ESPA 2012-2018 transfers by reach.

Reach	Transfer Impact		Average Reach Gain		% change in reach gain
	(AF/yr)	(cfs)	(AF/yr)	(cfs)	
Ashton-Rexburg	174	0.24	-40,100	-55	0.43%
Heise-Shelley	-51	-0.07	-535,500	-739	-0.01%
Shelley-Near Blackfoot	-74	-0.10	-466,800	-644	-0.02%
Subtotal above nr Blackfoot	49	0.07	-1,042,400	-1,439	0.00%
Near Blackfoot-Neeley	848	1.17	1,598,200	2,206	0.05%
Neeley-Minidoka	-308	-0.43	77,600	107	-0.40%
Subtotal nr Blackfoot-Minidoka	539	0.74	1,675,800	2,313	0.03%
Devil's Washbowl -Buhl	-51	-0.07	1,121,400	1,548	0.00%
Buhl-Thousand Springs	-47	-0.06			
Thousand Springs	-4	-0.01			
Thousand Springs-Malad	0	0.00			
Malad	26	0.04			
Malad-Bancroft	4	0.01			
Subtotal Kimberly-King Hill	-70	-0.10	4,088,500	5,644	0.00%
Total	518	0.71	4,721,900	6,518	0.01%

References

Harbaugh, A.W., E.R. Banta, M.C., Hill, and M.G., McDonald, 2000, MODFLOW-2000, the U.S. Geological Survey modular ground-water model-user guide to modularization concepts and the ground-water flow process. USGS Open-File Report 00-92. Available at: https://pubs.er.usgs.gov/publication/ofr200092

Idaho Department of Water Resources, 2013, Enhanced Snake Plain Aquifer Model Version 2.1: Final Report. Available at: https://idwr.idaho.gov/files/projects/espam/browse/ESPAM_2_Final_Report/ESPAM21FinalReport.pdf

Peppersack, J., 2009, Transfer Processing Policies & Procedures. Available at: https://idwr.idaho.gov/files/water-rights/transfer-process-24-transfer-processing-policies-and-procedures.pdf