

Predictive Water Management Modeling: Results from 2018

Henry's Fork Watershed Council, October 9, 2018



Outline

- Water supply in 2018
- Water use and management in 2018
- Predicted vs. observed hydrographs
- Predictions from May 8 HFWC presentation:
how did they hold up?
- Conclusions

Key climate features of water-year 2018:

- Temperature was “only” 1°F above average for year, thanks to cool periods in February-March, late June, and late August.
- SWE peaked April 18 at 117% of mean but melted rapidly in May.
- Precipitation was 111% of average on June 24 but only 102% at end of water year.

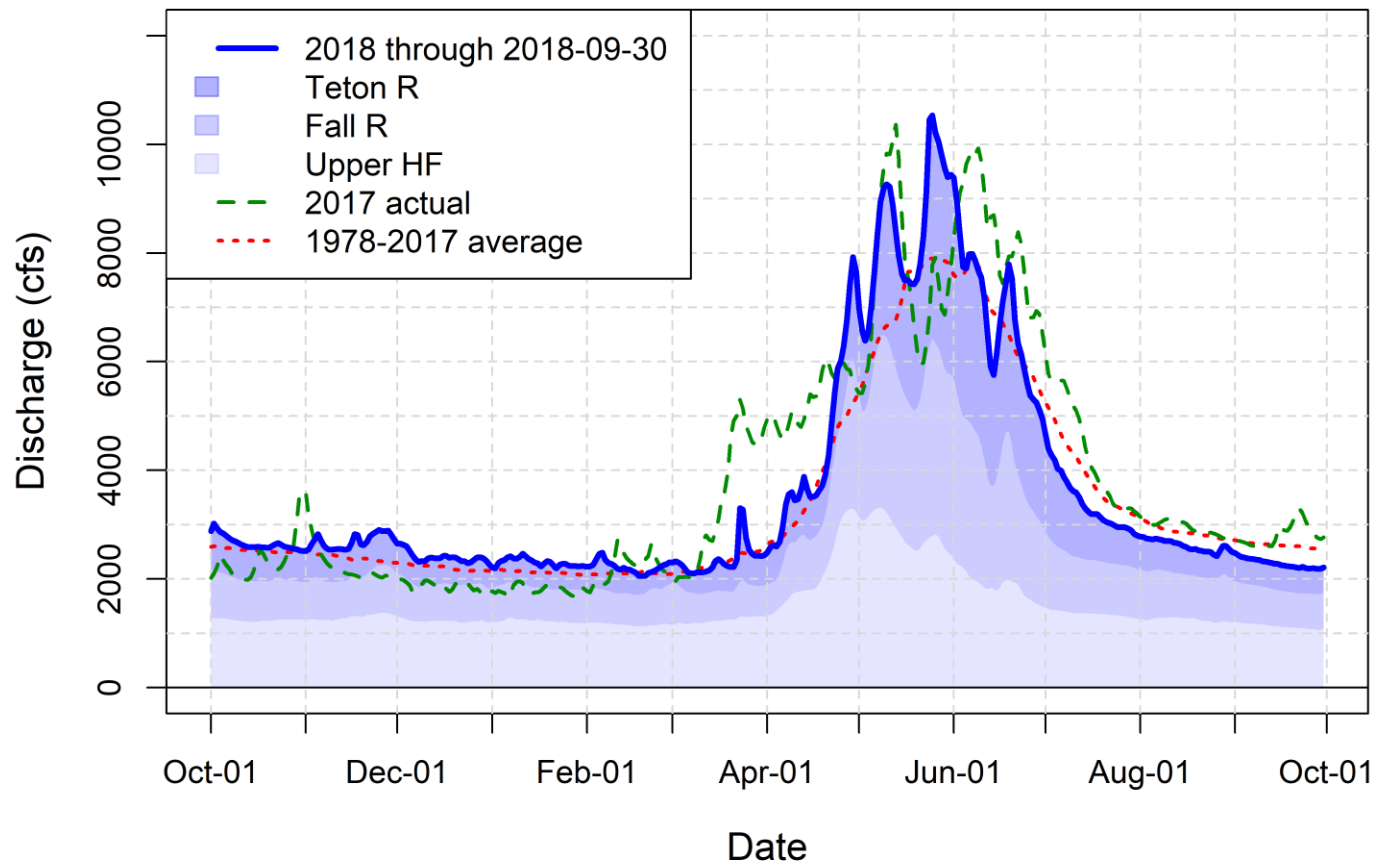
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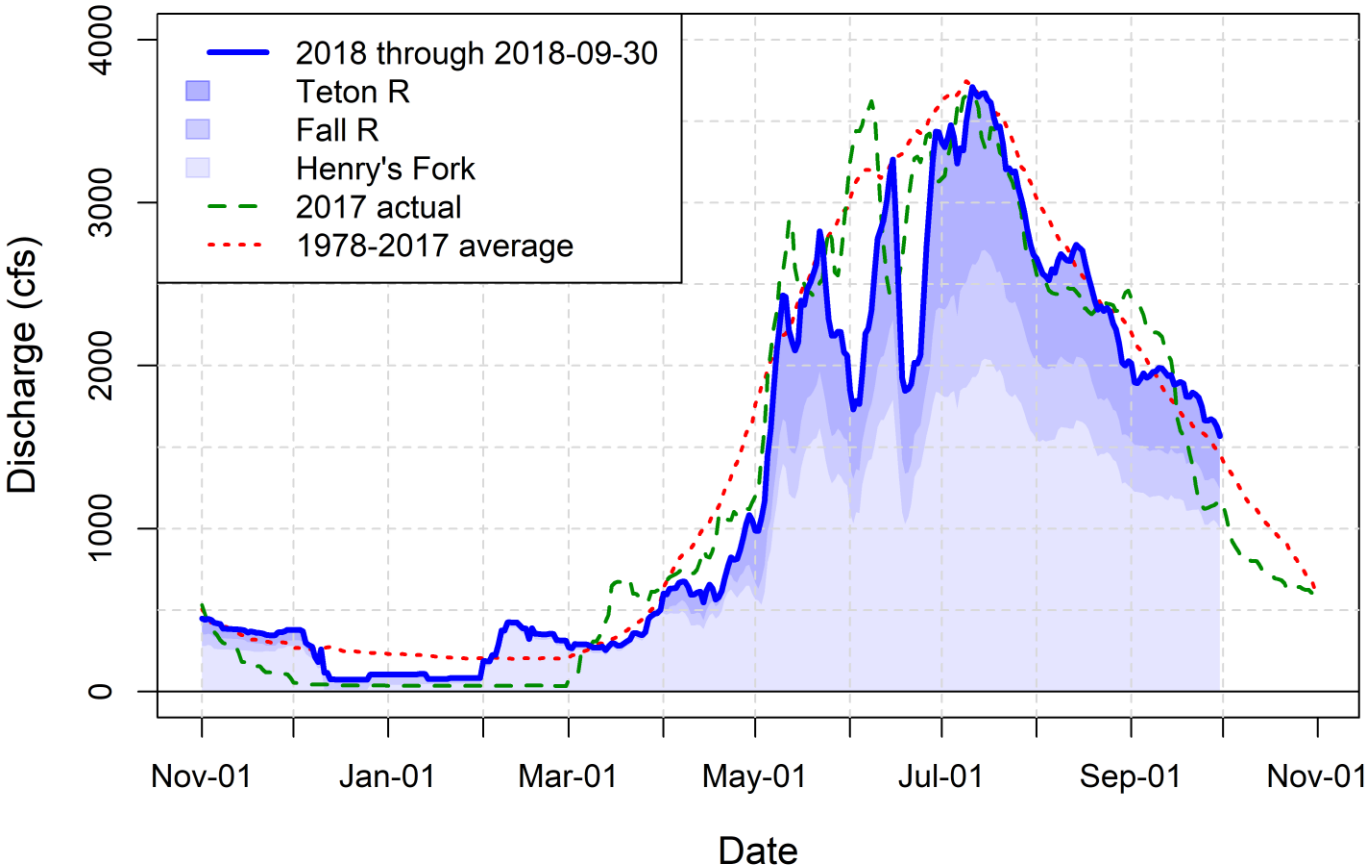
Henry’s Fork Water-supply Summary, Water-year 2018

Basin	Water-year 2018 as a percent of 1978-2017 average			Streamflow rank over 1978-2018
	Snow water equivalent	Precipitation	Streamflow	
Upper Henry’s	111%	97%	94%	24 th out of 41 yrs.
Fall River	121%	103%	113%	10 th out of 41 yrs.
Teton River	120%	102%	114%	12 th out of 41 yrs.
Watershed total	117%	102%	105%	15th out of 41 yrs.

Henry's Fork Total Natural Flow (Water Supply)



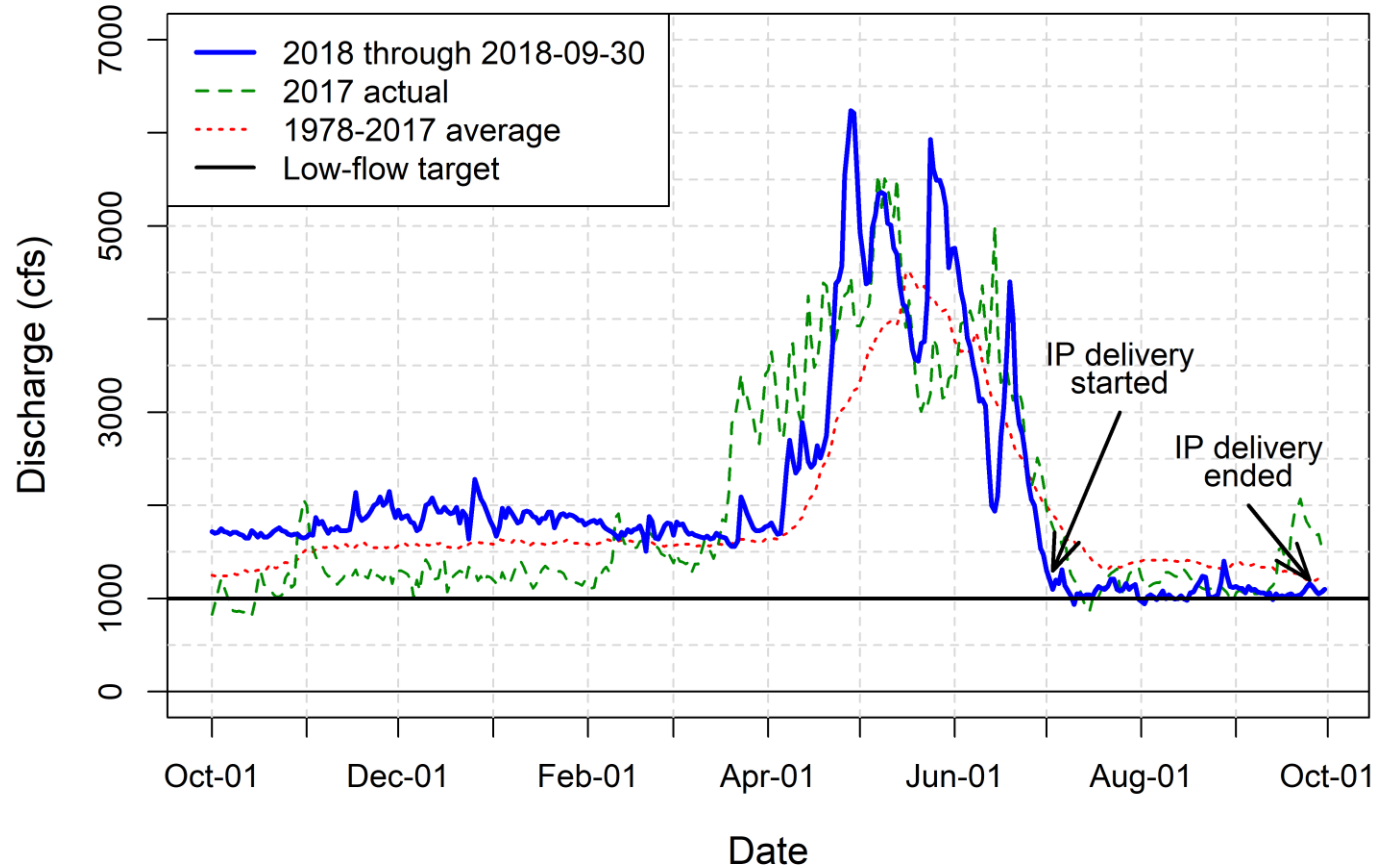
Henry's Fork Watershed Total Diversion



Diversion:

- Low during early season
- Near average July-September
- Total through Sept: 81% of average

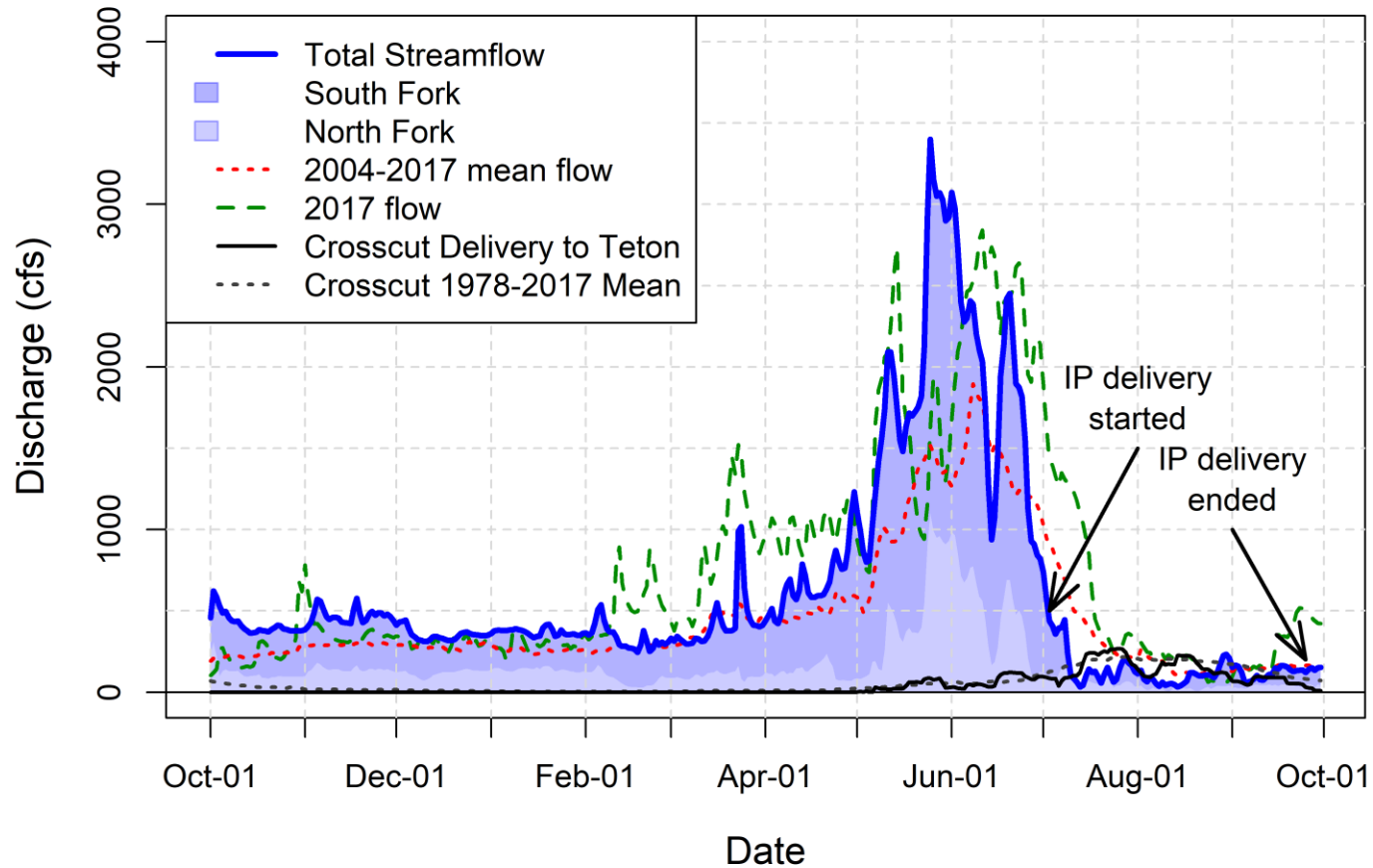
Henry's Fork at St. Anthony



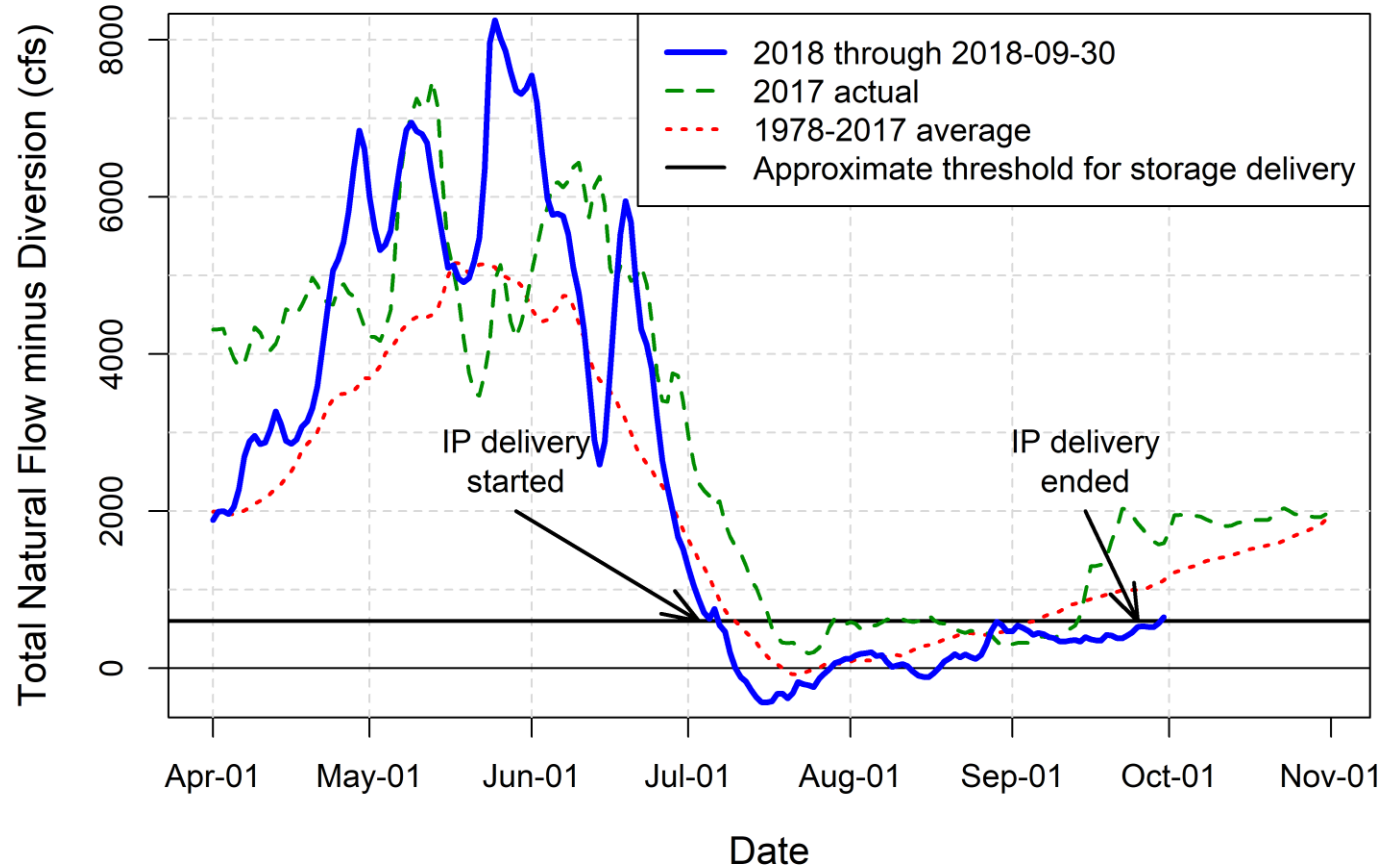
Irrigation-season
target: 1,000 cfs

- Below 1,100 cfs
July 3 – Sept 30
- Average: 1,081 cfs
- Fell below 1,000
cfs on 10 days
- Average over those
days: 980 cfs

Teton River Forks Downstream of Diversions



Henry's Fork Watershed-total Supply and Demand



Summary of Physical Storage-water Delivery: Duration

Indicator	Start	End
St. Anthony flow $\leq$ 1100 cfs	July 3	Sept 30
Crosscut delivery needed on Teton	July 10	Sept 14
Supply-demand $<$ 600 cfs	July 7	Sept 30
Island Park drafted	July 3	Sept 25
Grassy + HL + IP drafted	July 3	Sept 26

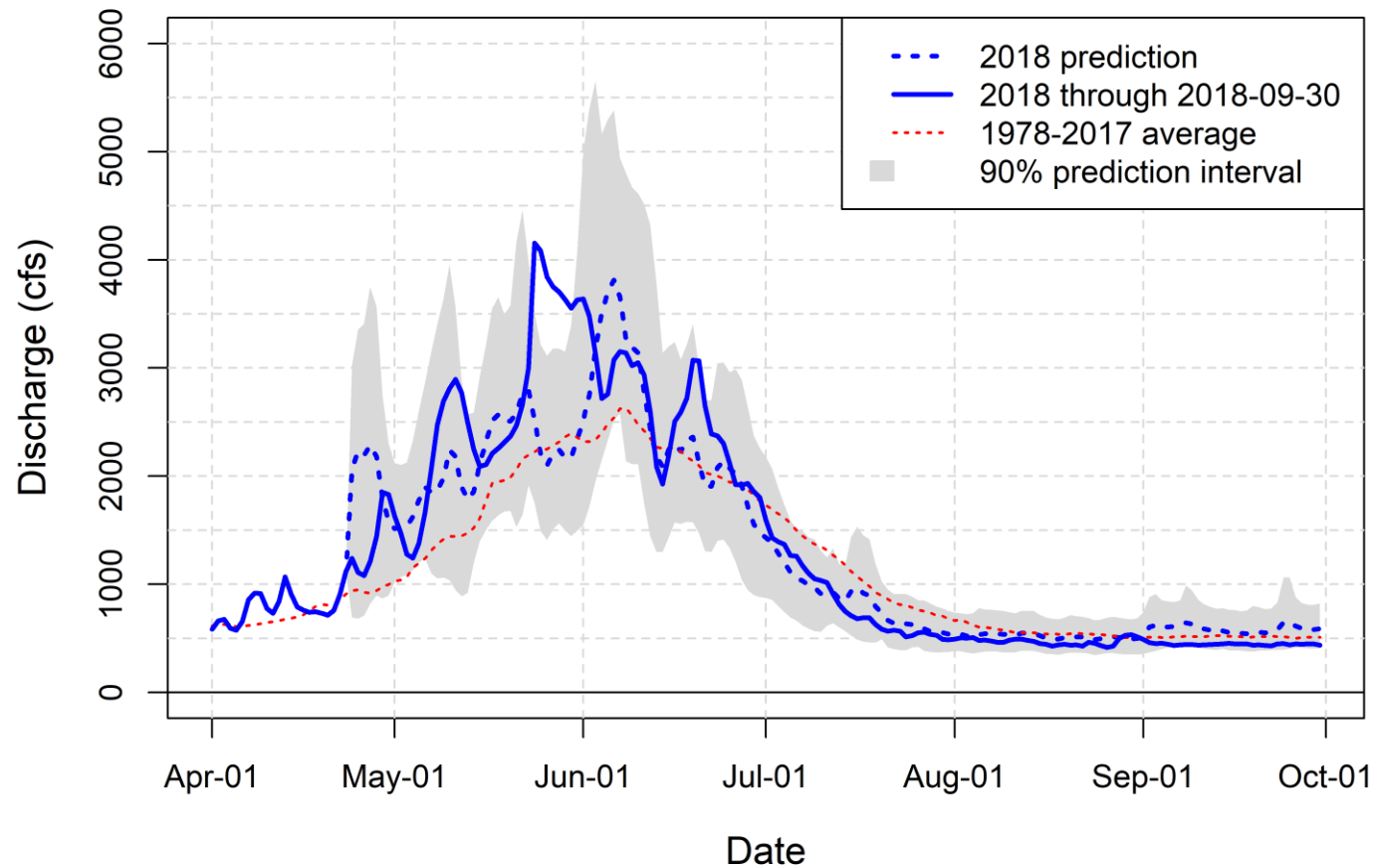
Summary of Physical Storage-water Delivery: Volume

Reservoir	Capacity (ac-ft)	Sep 30 content (ac-ft)	Net draft (ac-ft)	Sep 30 content (% capacity)	Mean Sep 30 content (% cap.)
Grassy Lake	15,180	11,768	3,412	77.5%	73.0%
Henrys Lake	90,000	78,115	11,885	86.8%	85.4%
Island Park	135,205	98,509	36,696	72.9%	43.6%
TOTAL	240,385	188,392	41,293	78.4%	61.2%

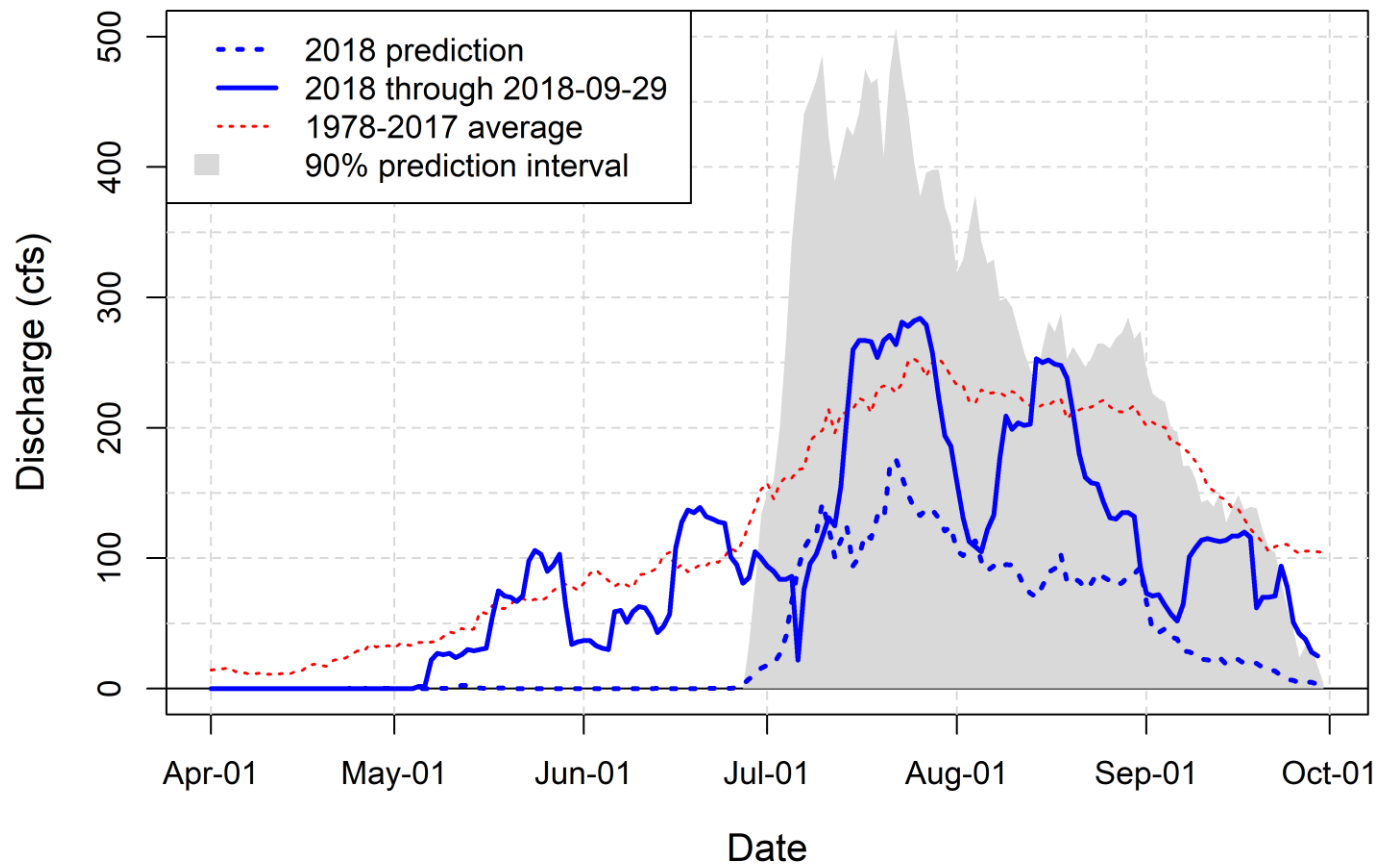
Observed versus Model-predicted hydrographs

- Teton River above Crosscut Canal
- Crosscut Canal delivery to Teton River
- HF at St. Anthony
- Outflow from Island Park Reservoir
- Inflow to Island Park Reservoir
- Island Park Reservoir volume
- Island Park Reservoir volume vs. St. Anthony flow target

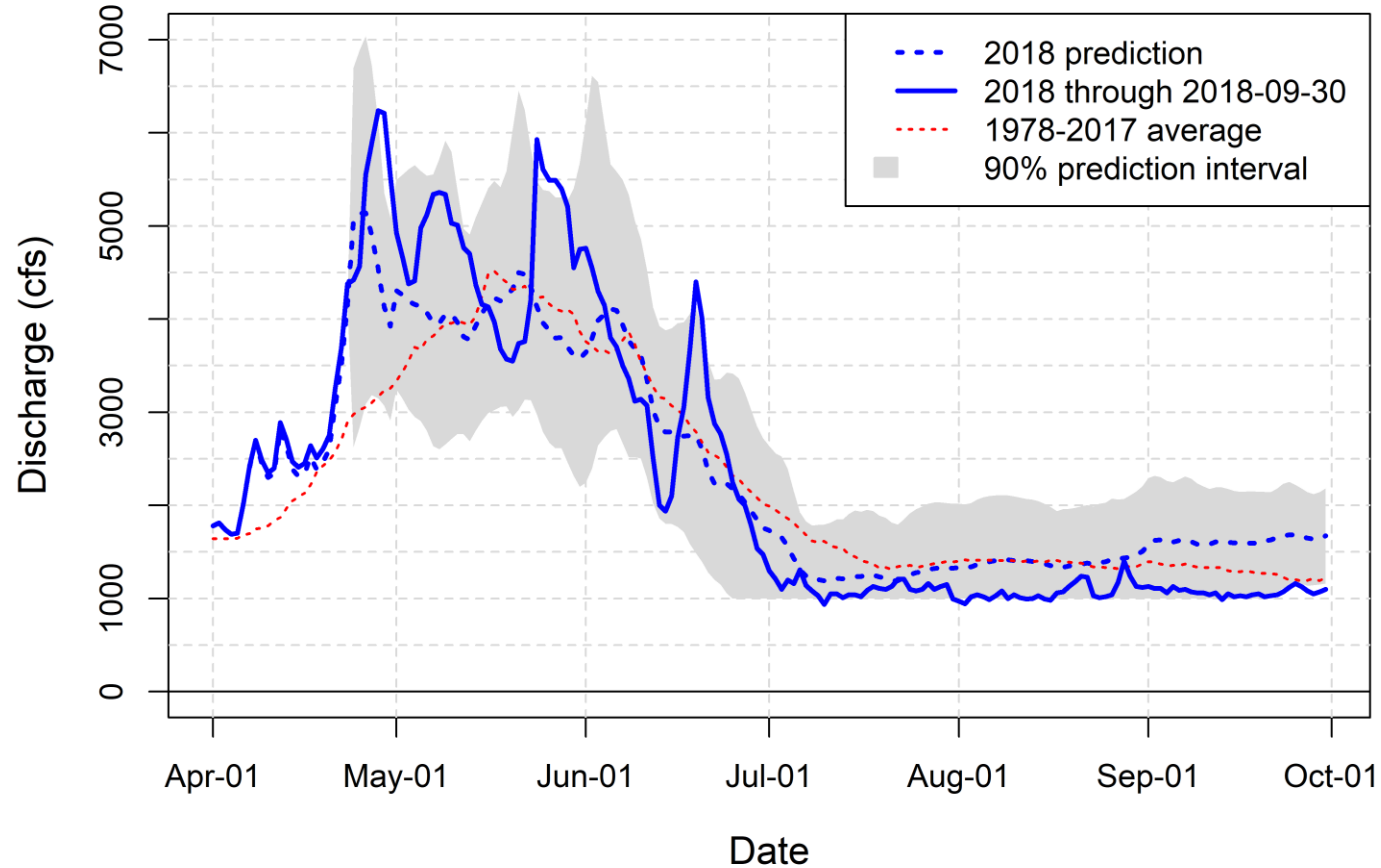
Teton River above Crosscut Canal



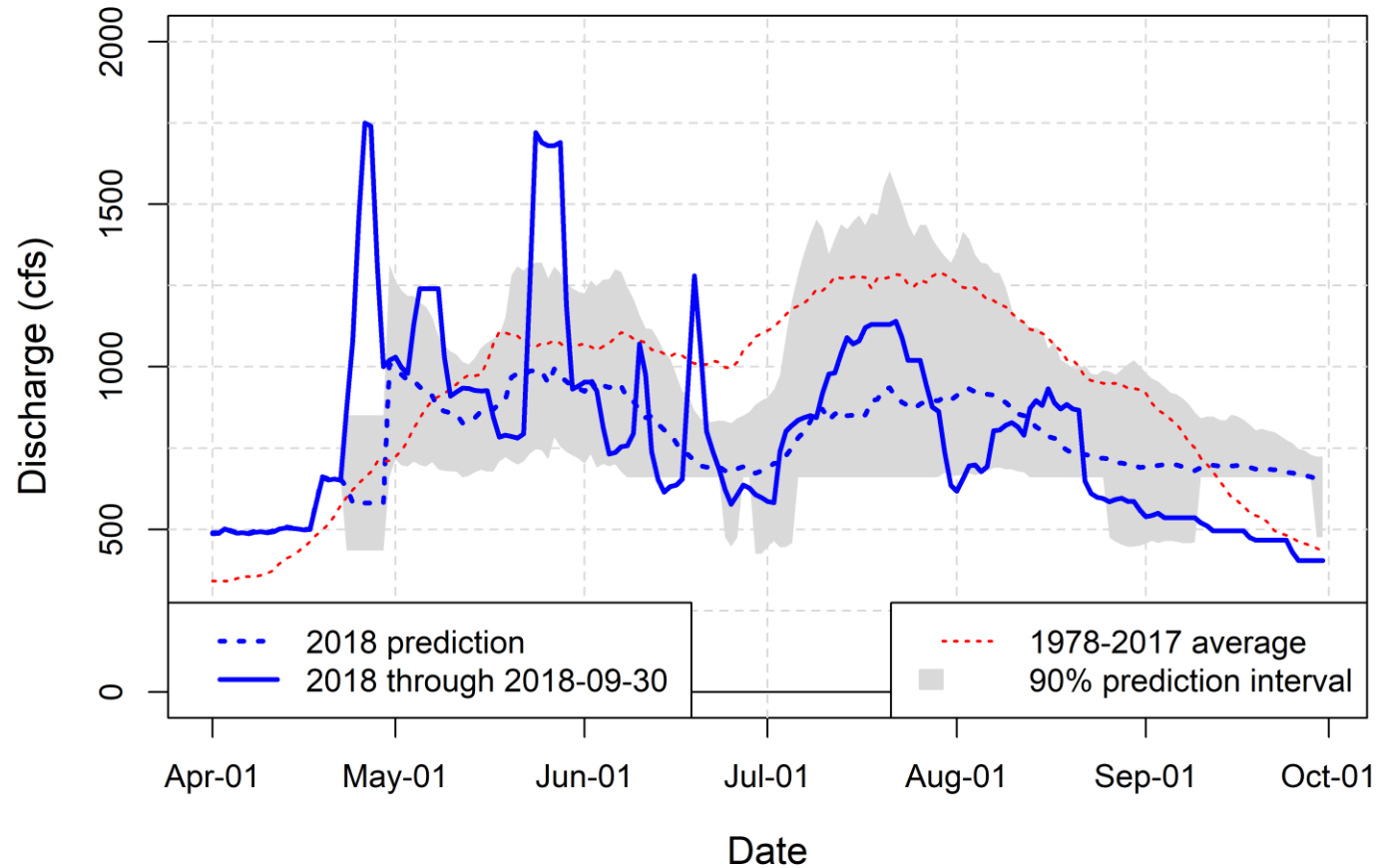
Crosscut Diversion to Teton River



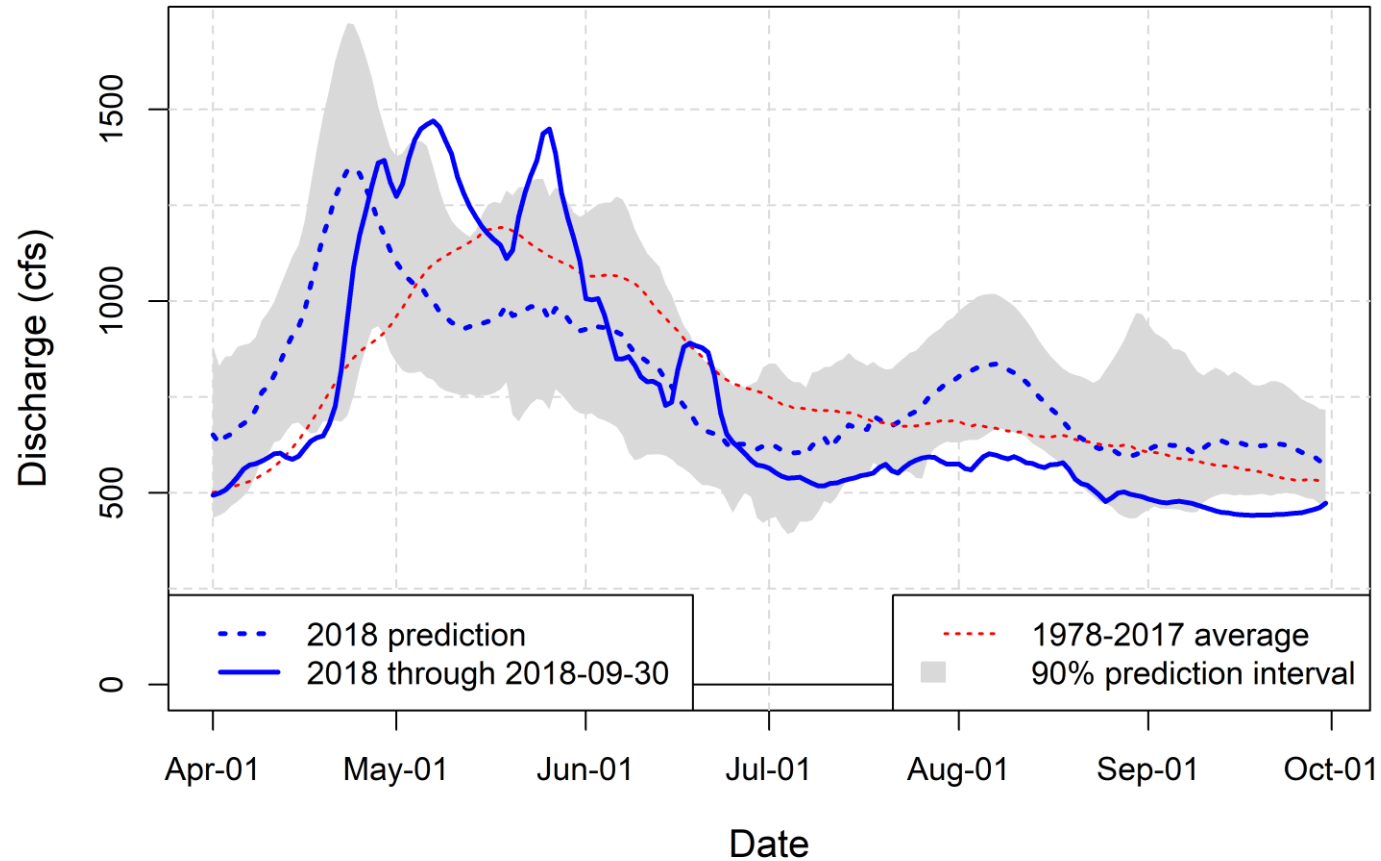
Henry's Fork at St. Anthony



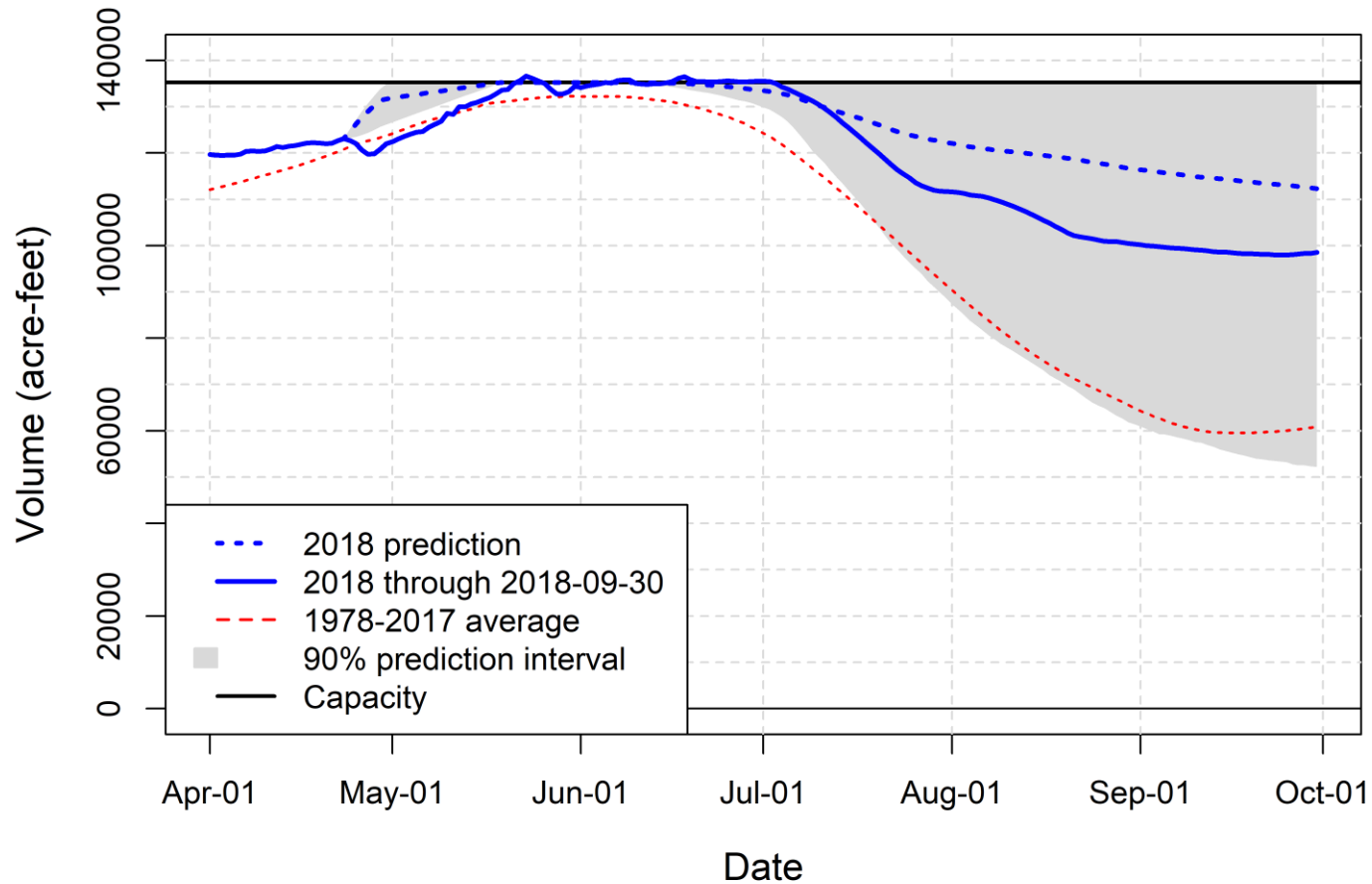
Outflow from Island Park Reservoir



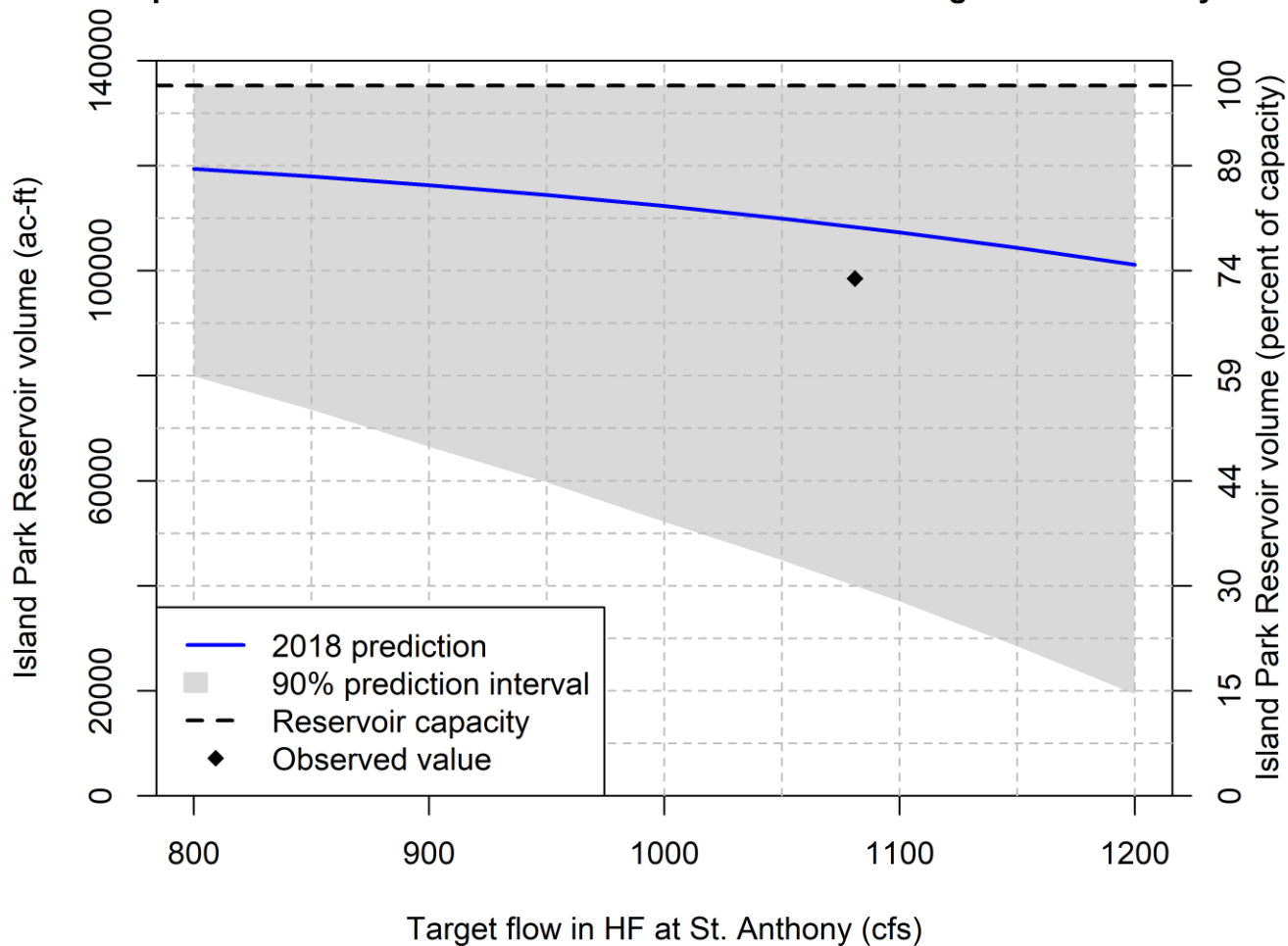
Net Inflow to Island Park Reservoir



Island Park Reservoir Volume



Sept. 30 IP Reservoir Volume vs. Summer-time Flow Target at St. Anthony



Summary and Conclusions (actual slide from May 8)

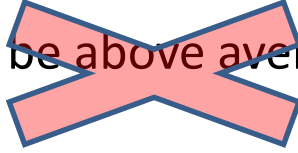
- Cool, wet period from mid-February to mid-April turned “OK” water supply into solidly above-average supply without high runoff prior to mid-April.
- Warm weather over past 10 days has melted a lot of snow, but current SWE is still above average.

Dry summer turned “solidly above-average supply” back to “OK.”

Warm weather dropped SWE below average a week after this observation.

Summary and Conclusions (actual slide from May 8)

- Natural flow is predicted to be above average through the summer.



Natural flow was ~85% of average for July, August, and September.

Summary and Conclusions (actual slide from May 8)

- Storage delivery is predicted to begin in late June.
- ✓ Storage delivery began on July 3.

Summary and Conclusions (actual slide from May 8)

- Maximum IP Reservoir outflow will be around 800-900 cfs, from early July through early August.
- ✓ Maximum IP Reservoir outflow occurred between early July and early mid-August, and averaged 895 cfs over that time period.
- ✓ One-day maximum was 1,140 cfs on July 22.

Summary and Conclusions (actual slide from May 8)

- IP Reservoir carryover is predicted to be 80-85% of capacity, depending on St. Anthony target.
- ~ Reservoir carryover was 73% of capacity.
- ✓ At actual St. Anthony flow of 1,081 cfs, observed carryover was only 7% below prediction.

Summary and Conclusions (actual slide from May 8)

- At last year's target of 1,000 cfs, IP winter flow is predicted to be 475 cfs, but with 90% probability will be between 250 cfs and 620 cfs.
- ✓ IP winter flow is currently predicted to be 350-400 cfs, at or above long-term average.

Summary and Conclusions

- IP Reservoir carryover was much higher than average in a water year that turned out to be pretty close to average.
- Setting St. Anthony target at 1,000 cfs was a good strategy.
- Implementation of 1,000-cfs target was very precise, within 10% tolerance.
- Observed hydrologic values were generally within 90% model-prediction intervals.
- Model performed well in predicting timing and average magnitude of storage delivery.
- Model performed well in predicting reservoir carryover.