

Errata to the April 2026 course report

Predictive Forecasting of Lake Mead and Lake Powell Water Levels Using Upstream SNOTEL Anomalies and Deep Learning

ISYE 6740 Computational Data Analysis Spring 2026

Georgia Institute of Technology

The submitted PDF is `Alina_Karaulanova_Report.pdf`. This page documents post-submission corrections. Every metric below is read directly from `baseline_ablation_results.csv`, the pipeline’s raw output, not retyped by hand.

Corrections (August 2026)

1. **Target leakage.** Future `target_*d` columns were included in X , inflating Lake Powell 90-day R^2 to approximately 0.98. Retracted. The leak is also visible in the submitted report’s own diagnostics: the SHAP plot (Figure 7, page 11) shows `target_30d` as the dominant feature by a wide margin, an independent symptom of the same error.
2. **Evaluation pipeline.** Three fixes applied together: restore current elevation at t as a predictor; train on elevation change $\Delta = L_{t+h} - L_t$; plot and evaluate at valid date $t + h$.
3. **Baselines.** Added persistence, drift (30-day trend extrapolation), and seasonal naive references.
4. **Test period extended.** The corrected pipeline was re-run on data through the first week of August 2026: 583 daily rows for both Lake Powell and Lake Mead, both ending 6 August. A trailing row is dropped whenever the source has not yet posted that day’s reading, so the split always ends on the last genuinely observed value rather than a forward-filled one. The April report evaluated 483 test rows (January 2025 to April 2026); the tables below use the longer test set, so the two are not comparable row for row.
5. **Reproducibility inputs.** Chronological split: train through 2022-12-31, validation 2023–2024, test 2025 onward. 107 engineered features from 21 SNOTEL stations across six Upper Colorado sub-basins (elevation-weighted aggregation), with lags of 7/14/30/45/60/90 days, rolling means/stds at 7/30/90 days, 7/30-day differences, autoregressive elevation lags, and cyclical calendar encoding. Full detail in `README.md` and `model_utils.py`.
6. **Federal benchmark superseded.** Section 5.3 cites the April 2026 24-Month Study projection of 3,483 ft for the end of water year 2026 on 3.87 maf of unregulated inflow. The July 2026 study projects 3,516 ft on a *lower* inflow forecast of 3.50 maf. A worse water year produced a higher projected elevation, because of the 17 April release cut and the Flaming Gorge transfer. This illustrates the report’s own argument about operational effects.

Corrected test results (all baselines, RMSE ft)

RMSE, not R^2 , is the metric reported throughout this document. R^2 is scaled by the variance of whatever window it is computed on; extending the test period (Correction 4) changes that variance independently of model quality, which makes R^2 an unstable basis for comparing the April and August results. RMSE does not have this problem. For reference, the corrected 90-day Powell R^2 is 0.83, against the retracted 0.98 (Correction 1).

Reservoir	Horizon	Persistence	Drift	Seasonal naive	XGBoost (all)
Lake Powell	30 d	3.51	2.80	4.50	1.31
Lake Powell	60 d	6.32	6.45	8.52	3.38
Lake Powell	90 d	8.57	10.03	11.60	5.27
Lake Mead	30 d	3.43	2.16	1.74	1.46
Lake Mead	60 d	6.50	5.65	3.16	3.46
Lake Mead	90 d	8.98	10.13	4.34	5.39

XGBoost beats the strongest naive baseline in four of six cases: Powell at every horizon, Mead only at 30 days. At Powell the closest reference is drift or persistence; at Mead it is the seasonal rule, which wins at 60 and 90 days.

Feature ablation (test RMSE, ft)

Reservoir	Feature set	30 d	60 d	90 d
Lake Powell	AR lags/diffs only	2.45	5.87	8.49
Lake Powell	SNOTEL + calendar only	1.66	2.75	4.02
Lake Powell	All (107 features)	1.31	3.38	5.27
Lake Mead	AR lags/diffs only	2.01	4.56	7.78
Lake Mead	SNOTEL + calendar only	2.20	4.37	3.92
Lake Mead	All (107 features)	1.46	3.46	5.39

Validation selects the full feature set in every cell (val-split RMSE, not shown, is lowest for “all” in all six reservoir/horizon pairs). On the drought test period, SNOTEL + calendar alone beats the full model at Powell 60 and 90 days, and at Mead 90 days only. SNOTEL-only also beats the strongest baseline in four of six cases: the same cells as the full model except at Mead, where SNOTEL-only wins at 90 days rather than 30.

Known defects in the submitted PDF

Figure 2 (page 5) renders with an empty second panel, an artifact of the plotting code rather than a data problem; the upper panel is the intended figure. Typographical errors remain at Section 3.3 (“considered,this”) and Section 5.2 (“In contarst”).