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eSTREAM: Operations Modeling in the Mono Basin

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*e*STREAM: Model Details

Q: What does it do?

Inputs: Runoff from Lee Vining and Rush Creek, stream flow requirements, facility configurations and capacities, transition export rules.

Outputs: Daily flow at all creeks, Grant Lake Reservoir storage, Mono Basin export, Mono Lake elevation, plus monthly and annual summaries.

Q: How does it do it?

Calculates allowed and desirable diversions and releases to creeks to meet LADWP Mono Basin Amended License requirements, Grant Lake reservoir storage, and exports by using a water balance equation. Also, calculates the monthly Mono Lake level by using runoff, precipitation, and Mono Lake surface area as an input into regression equations.

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*e*STREAM: Past and Current Uses

Q: How does LADWP use the modeled outputs?

- eSTREAM is the only State Water Resource Control Board (SWRCB) recognized model used for development of the Mono Basin Operations Plan and each year's Annual Operation Plan for LADWP's Mono Basin Amended Water Rights Licenses.
- eStream used during:
  - Facilitated process (2010-13) involving LADWP, CDFW, Mono Lake Committee, and Cal Trout to determine the effect of changes to facilities and stream flows on Mono Lake levels and exports.
  - Grant Lake Spillway Modification assessment for EIR (2020-21).
  - Assessment of collaborative Mono Lake level modeling (2024-25) on diversion scenarios.

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*e*STREAM Development

Q: *e*STREAM: How was it developed?

- Developed by Watercourse Engineering starting in 2010 and continuously updated through today.
- Every aspect (runoff inputs, evaporation and loss consideration, Mono Lake level calculation, facility capacities, etc) was discussed, tested, and assessed in a collaboration during a facilitated process with LADWP, CDFW, Mono Lake Committee, and Cal Trout.

Q: How does it perform outside its calibration period?

- Calibration for hydrology uses the 1971-2020 historical period. As new hydrology becomes available and relevant to future conditions, it can be incorporated into eSTREAM.
- The Mono Lake level regression equations utilized in eSTREAM were calibrated within the elevation range of 6,372 - 6,385 ft. However, the equations can be recalibrated as lake level rises and new information is available.

*e*STREAM: Strengths and Limitations

Strengths

- Daily water balance model tailored for LADWP's Mono Basin operation planning.
- Useful planning tool for a wide range of scenarios that is flexible, adaptable, and well documented. The flexibility allows incorporation of changes to stream flow requirements, spillway modification, hydrology/meteorology, and transition rules.
- Developed with extensive stakeholder involvement (including CDFW, Mono Lake Committee, and Cal Trout) and used in the recent collaborative modeling effort in 2024 as well as other activities in the basin.
- Expert peer reviewed.
- Continuous development, support, and application (since 2010 and into the future).

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*e*STREAM: Strengths and Limitations (continued)

Q: What are the Limitations?

- As with any model, performance may vary outside of calibrated ranges. As lake levels rises, the regression equations for Mono Lake levels may lose accuracy.

Prospective Future Mono Lake Level

Q: What does your model project for Mono Lake level within the next 30 to 40 years?

- Lake level is driven by hydrology, not exports. The future of Mono Lake levels are more dependent on precipitation, evaporation, and runoff than any other factors. For comparison, evaporation from Mono Lake each year is approximately 160,000 acre-feet while maximum exports are only 16,000 acre-feet.

Prospective Future Mono Lake Level (continued)

Q: What does your model project for Mono Lake level within the next 30 to 40 years (continued)?

- Modeling suggests a high likelihood that the lake will rise, approaching or surpassing the transition elevation of 6,391 ft. in 30 to 40 years.
- Collaborative modeling done in 2024 with CDFW, Mono Lake Committee, and Cal Trout showed that, on average:
  - It would take 22 to 26 years until Mono Lake reaches 6,391 ft.
  - Without exports, it would take 22 years to reach the transition level of 6,391 ft.
  - Under the conditions of the Amended Licenses, it would take 26 years to reach the transition level of 6,391 ft.

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eSTREAM Comparison to UCLA Model

Q: How does eSTREAM compare to the UCLA MLM?

Important considerations for models, especially policy guidance models:

- Need for open, transparent, collaborative model development and application process.
- Value of external, expert peer review.
- Need for comprehensive documentation.
- Commitment to continuous support for model application, refinement, updates, documentation.

<u>eSTREAM</u>

- SWRCB recognized model for management of Amended Licenses by LADWP.
- Relies on historic hydrologic data specific to Mono Lake and Mono Basin.
- Daily model for LADWP Mono Basin operations with monthly regression equations for Mono Lake level.
- Flexibility of inputs to allow for changing conditions.
- Developed through an extensive collaborative process with stakeholders and peer reviewed.

<u>UCLA MLM</u>

- Annual model using historical and projected hydroclimate data (developed at a Statewide scale) to predict future Mono Lake level.
- Highly technical and scientifically novel modeling effort. Not developed through a facilitated process or expert peer reviewed. Requires additional time to complete a thorough review.

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