Improving Conveyance Efficiency

ENGINEERED OPTIONS

AGRICULTURAL OPTIMIZATION

2024 GREAT SALT LAKE POLICY SUMMARIES

The Great Salt Lake Strike Team analyzed ten policy options and created summaries for each. The strike team does not endorse individual policies but rather evaluated the most-discussed options to address Great Salt Lake.

Policy summaries fall into four categories:

- **Water Shepherding**
- **Economic Incentives**
- **Agriculture Optimization**
- **Engineered Options**

For more information on policy summaries, please scan the QR code above or visit: https://gardner.utah.edu/great-salt-lake-strike-team/policy-summaries/

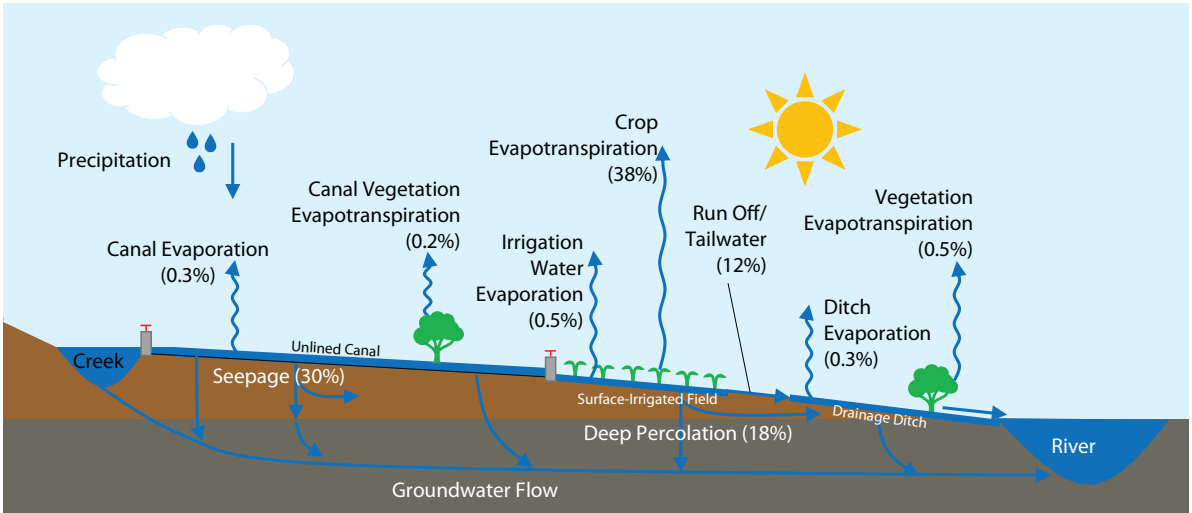
Improving water conveyance efficiencies is likely ineffective for securing Great Salt Lake water.

Could lining or piping canals reduce seepage and secure water for Great Salt Lake?

The water that seeps out of canals typically contributes to shallow groundwater. It can be intercepted by nearby groundwater pumps or flow into unlined canals or rivers. Because seepage is not a consumptive water use, improving conveyance efficiency can increase agricultural productivity and income but does not significantly reduce depleted water that could be available to Great Salt Lake through water right change applications.

A recent review of 230 global studies showed little evidence that improving conveyance efficiency reduces depletions.[1] In fact, when considering a watershed as a whole, conveyance efficiency (and other irrigation efficiency measures) have been shown to reduce flows to rivers and aquifers.[2] While seepage from unlined canals can range from 0-50% of the flow in the canal,[3] seepage varies significantly over time and throughout canal systems. Reduction of this seepage could further impair Great Salt Lake.

Figure 1: Water depletion in example irrigation system



The percentages next to each depletion pathway represent estimates of the fraction of the diversion flows to each pathway. In this scenario, seepage is 30%, deep percolation from field irrigation is 18%, and tailwater runoff is 12%, which can return flow to groundwater and nearby rivers. This water can be delivered to Great Salt Lake unless used by other downstream users.

Source: Adapted from Barker, B., Yost, M., Gale, J., & Nelson, M. (2023). Understanding irrigation water optimization [Fact sheet]. Utah State University.

Could covering canals to reduce evaporation secure water for Great Salt Lake?

Less than 1% of water in canals can be lost to evaporation off the canal surface or evapotranspiration via adjacent vegetation.[4] Recent studies focused on covering canals to limit evaporation have estimated a depletion reduction of 5-51 acre-ft per mile per year.[5] In the Great Salt Lake Basin, there are approximately 1,200 miles of open canals, and if every canal were covered, about 6,000 - 61,057 acre-ft of depleted water could be saved per irrigation season. This is water that could be made available to Great Salt Lake through water right change applications.

1. Pérez-Blanco, C. D., Hrast-Essenfelder, A., & Perry, C. (2020). Irrigation technology and water conservation: A review of the theory and evidence. Review of Environmental Economics and Policy.
2. Morrisett, C. N., Van Kirk, R. W., Bernier, L. O., Holt, A. L., Perel, C. B., & Null, S. E. (2023). The irrigation efficiency trap: rational farm-scale decisions can lead to poor hydrologic outcomes at the basin scale. Frontiers in Environmental Science, 11, 1.
3. Water Resources Plan - Utah State Water Plan, Utah Division of Water Resources, 2021
4. Barker, B., Yost, M., Gale, J., & Nelson, M. (2023). Understanding irrigation water optimization [Fact sheet]. Utah State University.
5. Serago, J. (2023). Memorandum on General inquiry into the consequences of covering open canals in the GSL basin. For Utah Division of Water Resources.