

Opportunities and Costs for Agricultural Water Optimization

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Extension
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Why This Matters

- Agriculture is central to the economy, culture, and environmental health of the Great Salt Lake (GSL) Basin. Farming supports billions in annual economic activity and shapes most of the watershed's land and water use, but long-term declines in lake levels and increasing water scarcity mean Utah must strategically balance agricultural productivity with sustaining the Great Salt Lake, which is an ecosystem essential for wildlife, recreation, air quality, and climate resilience.
- This report, a component of the Utah Division of Water Resources GSL Basin Integrated Plan analyzed recent agricultural water use (2019–2023) and evaluated feasible, voluntary paths to reduce agricultural water depletion by 10%, while maintaining strong agricultural communities.
- This planning work does not make recommendations, change water rights, or assess legal implementation. Instead, it provides the strongest data to date on where and how agricultural water optimization may be achieved and what it may cost.

Key Findings

1. Agricultural Water Use in the Basin

- The GSL basin covers areas of Utah, Idaho, Wyoming, and Nevada.
- Agricultural depletion for the entire GSL basin ranged from 1.0–1.7 million acre-feet (AF) annually during 2019–2023 with an average of 1.32M AF Basin-wide and 830k AF in the Utah portion.
- About two-thirds of total depletion occurs in Utah portion of basin.
- Agricultural diversions ranged from 2.1M–3.1M AF, varying by crop, irrigation method, and water availability.



2. Options to Reduce Depletion by ~10%

The BIP evaluated 21 options within four categories of voluntary strategies to reduce depletion by 10% within the entire basin (132k AF) and the Utah portion (83k AF):



Irrigation Upgrades

- Low-Elevation Sprinklers = Up to 2% reduction
- Subsurface Drip Irrigation = Up to 10% reduction



Crop Substitution

- Alfalfa to Winter small grains = Up to 10% reduction
- Alfalfa to Corn = Up to 2% reduction



Water Leasing

- Three of six split-season leasing options could reach up to 10% reduction but require broad participation.



On-Farm Conveyance Improvements

- Ditch piping and similar projects = ~4,500 AF reduction (0.3%)

A 10% depletion reduction is achievable through a combination of multiple strategies implemented across large areas

3. Economic Findings

Two economic approaches were used:

- (1) minimum payments farmers would need to participate, and
- (2) input-output modeling of regional economic effects.

*Both approaches assume farms are kept whole financially. Actual impacts may be lower as people adapt and innovate

Most Cost-Effective Overall Approach

Balanced Mix Strategy that combines leasing + irrigation upgrades + targeted crop substitution (total of \$30M/year to reach 10% reduction) compared to \$31M-\$75M for single-strategy approaches.

Lowest-Cost Options ●

- LESA sprinklers on existing pivots – \$148/AF
- Wheel-line to Pivot conversions – \$176-\$209/AF
- Split- or full-season leasing of alfalfa – \$236/AF
- Alfalfa to winter wheat – \$276/AF

Moderate-Cost Options ●

- Delayed irrigation start – \$340-\$493/AF
- Alfalfa to corn or spring wheat – \$340-\$493/AF

Highest-Cost Options ●

- Wheel-line or Pivot to SDI – \$509-\$667/AF
- Surface irrigation to pressurized systems – \$1,014-\$22,094/AF



Although crop substitution may help achieve depletion reductions, having adequate demand in the market for corn, wheat, or other crops is critical to the viability of this option

4. Land Use Change Will Also Reduce Agricultural Depletion

- Independent BIP analysis shows that projected conversion of Utah farmland to municipal/industrial uses may reduce net depletion by 20k – 30k AF annually by 2050, about 2-4% of current Utah agricultural depletion in the Basin.

Overall Takeaways

- Agriculture is critical to the Basin's economy and the health of the GSL.
- 10% depletion reduction is achievable with voluntary, incentive-based programs, and widespread participation.
- Leasing, targeted irrigation upgrades, and crop substitution are the most cost-effective strategies.
- A balanced, flexible approach with multiple strategies offers the greatest long-term value with the least impact to agriculture and the regional economy.
- Land use change may contribute significantly to reduced agricultural depletion over the coming decades, but negative implications on food security, open space, and associated environmental benefits will need to be evaluated.
- The results are not prescriptive, and other options beyond the 21 evaluated in this report should be considered.
- The newly developed economic tool will allow for other combinations of options to be evaluated.

