



**Conservation, Fisheries and Wetlands and the Benefits of Flood Irrigation in Wyoming**

**CSG West Colorado River Forum**

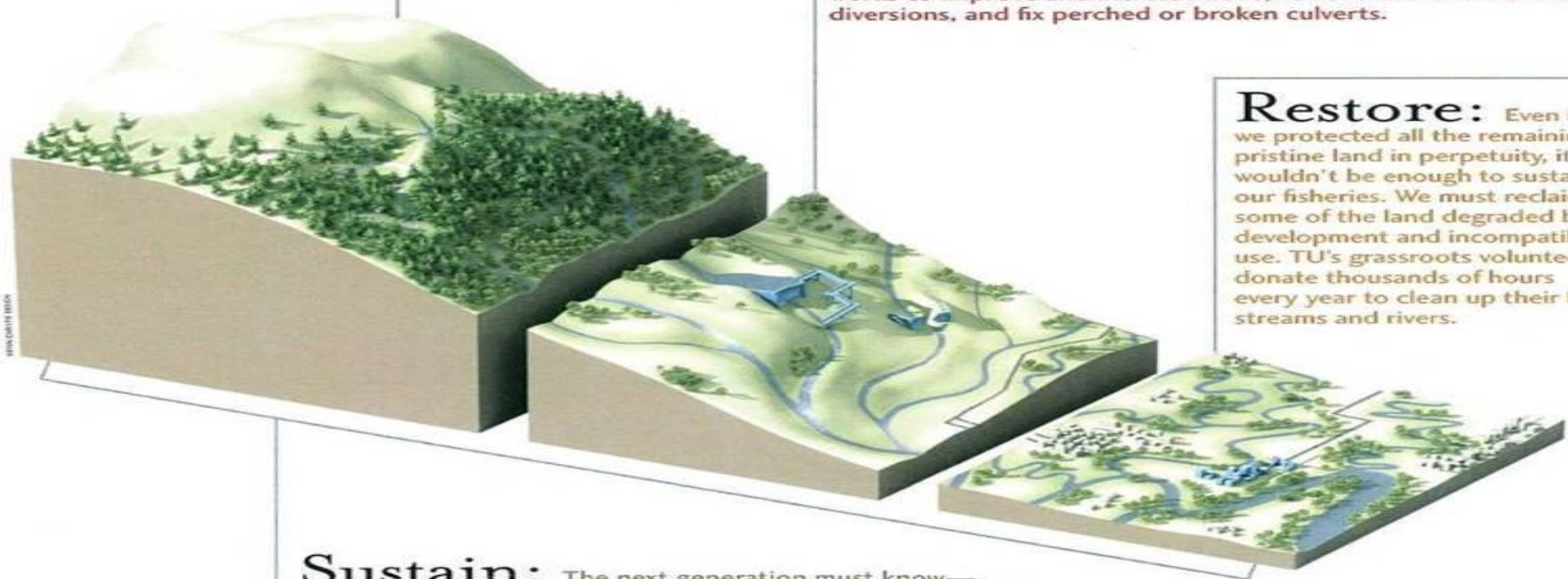
Cory Toye  
Wyoming Water and Habitat Director

**Protect:** Intact wilderness areas, pristine headwater streams and other undeveloped backcountry are quite literally the last refuges for many native trout and salmon. TU advocates for responsible use and continued protection of these last, best places.

**Reconnect:** Fish must be able to migrate away from floods, fires, drought and other disturbances. TU works to improve and increase flows, remove obsolete dams and diversions, and fix perched or broken culverts.

**Restore:** Even if we protected all the remaining pristine land in perpetuity, it wouldn't be enough to sustain our fisheries. We must reclaim some of the land degraded by development and incompatible use. TU's grassroots volunteers donate thousands of hours every year to clean up their local streams and rivers.

**Sustain:** The next generation must know—and care—about TU's work for it to endure. Through youth education and other outreach efforts, TU works to create a new generation of stewards for our coldwater rivers.

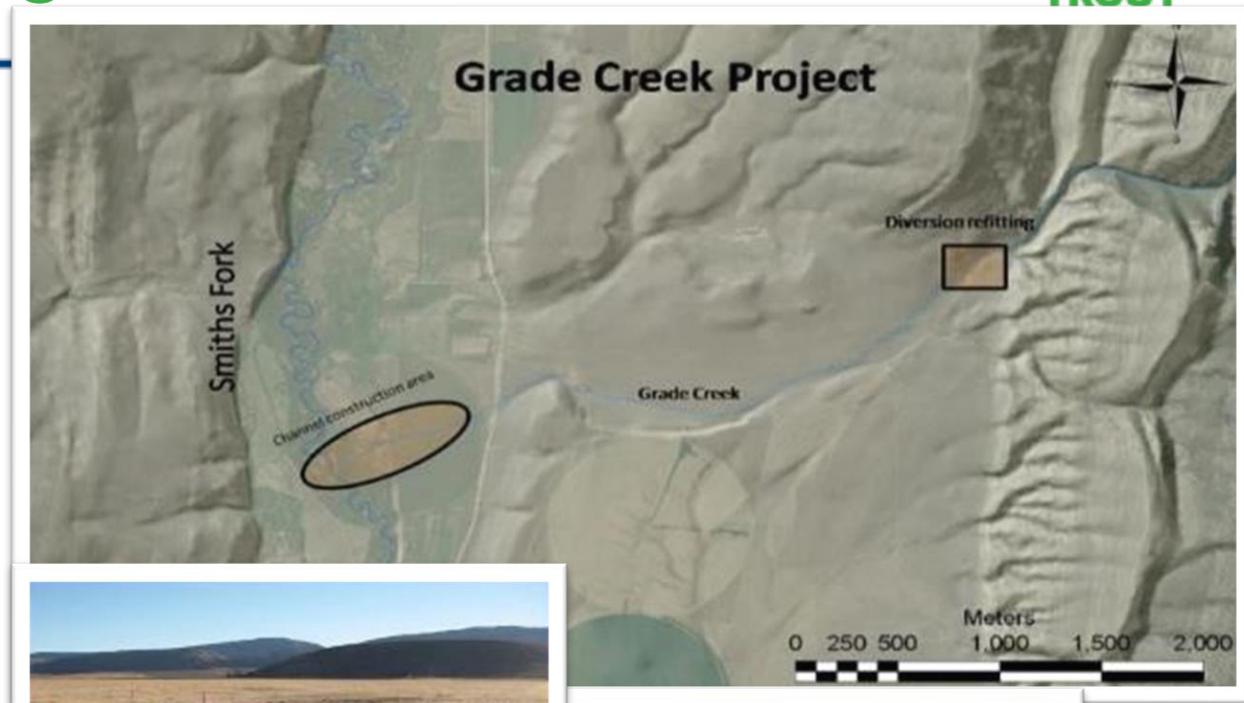


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# The TU business plan in Wyoming



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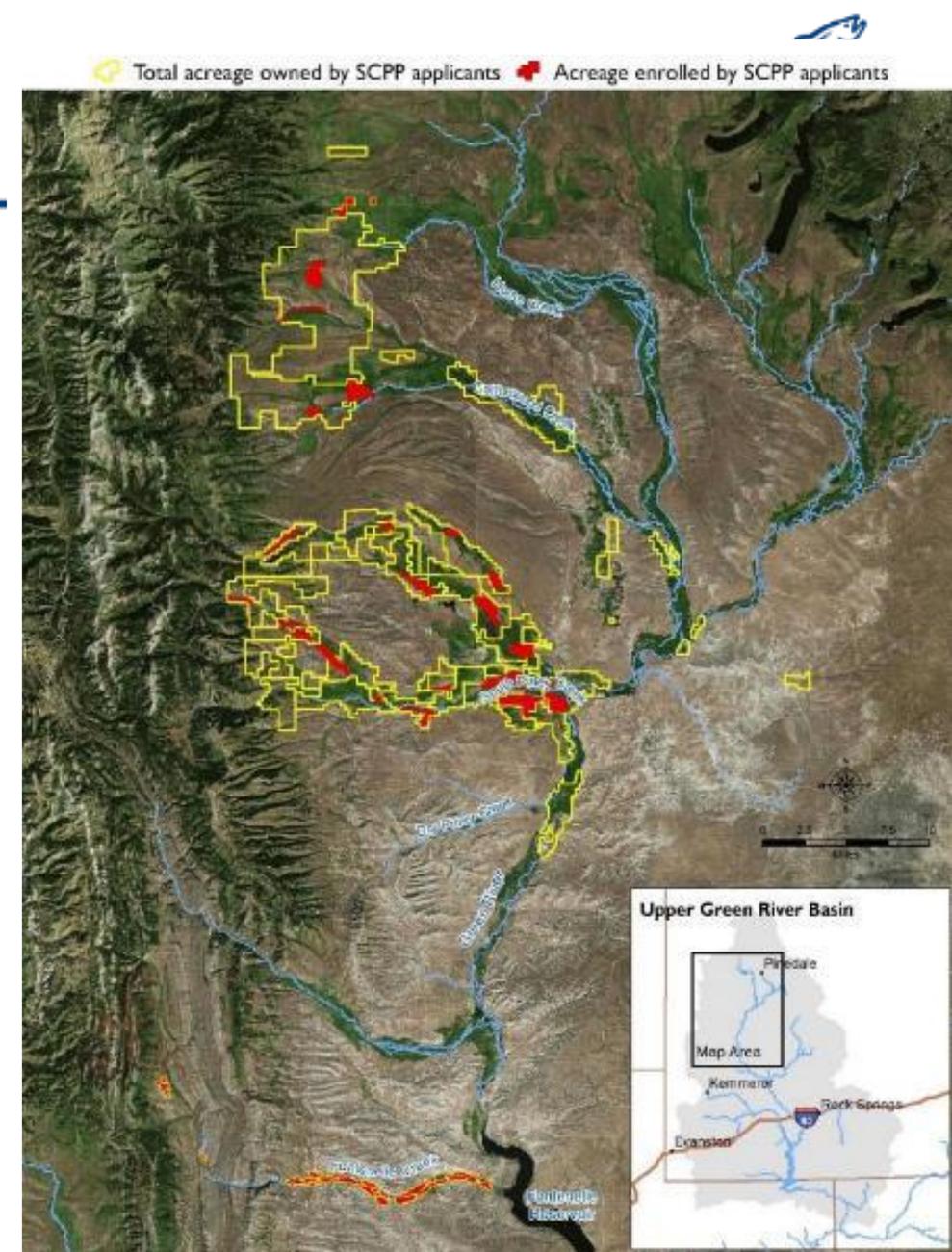




- The Wyoming State Engineers Office (SEO) approached TU in 2015 to participate in the SCPP by soliciting the program to partners in the Upper Green.
- SEO offered technical assistance for completing applications, in particular, estimating consumptive use (CU) for each water conservation activity.
- Success of the early rounds of SCPP were due to relationships from previous TU project partnerships.
- Successful applicants helped recruit more members.
- Opportunity to participate in policy and temporary projects to explore impacts of flood irrigation on wetlands, fisheries and flows.

# Wyoming SCPP 2018

- 28 applications submitted by TU
- 28 applications approved
- 16,944.97 acres
- 16,714.88 AF conserved
- \$150.00/AF
- Total Cost: \$2,168,832.00
  
- Four tributaries with 95-100% participation
  - Participating landowners represent over 60,000 acres land
  - Limited application to ~600 acres/landowner
  - Tributary model for shepherding
  
- TU acting as 3<sup>rd</sup> party to administer agreement and funding



# Lessons Learned

- Landowner demand
- Scale is available through collaboration
- Voluntary, temporary, non regulatory
- Shepherding is a group effort
- Certainty for buyers and sellers is critical
- The market for conserved water in the upper basin is evolving
- “Residual Soil Moisture” and its impact on estimating CCU and accounting
- Ecological and hydrology impacts are site specific.
  - Return flows
  - Wetlands
  - Streamflow





RESOLUTION  
of the  
UPPER COLORADO RIVER COMMISSION  
June 20, 2018

Regarding the Emergency Upper Basin Drought Contingency Plan  
Demand Management

WHEREAS, on December 10, 2014 the Upper Colorado River Commission adopted a Resolution Regarding Development of an Emergency Upper Basin Contingency Plan (UB DCP) in response to the drought in the Colorado River Basin in 2000 and currently in its nineteenth year;

WHEREAS, the UB DCP consists of three primary elements, generally follows: 1) continue and expand weather modification programs in the Upper Basin; 2) develop and finalize a plan for drought operations of the Colorado River Project Act initial units; and 3) explore the feasibility of developing and implementing voluntary, and compensated demand management program(s) within the Upper Basin;

WHEREAS, the purposes of a demand management program are to reduce consumptive uses, if and when needed, to protect against impacts from Lake Powell reservoir operations, and to help assure full compliance with the Colorado River Compact and the right to exercise any existing Upper Basin water rights in the future;

WHEREAS, to inform its investigation of demand management, the Commission committed to support pilot programs such as those called for in the 2013-2014 System Conservation Agreement. The Commission has supported the Colorado River System Conservation Pilot Program in the Upper Basin;

WHEREAS, the primary objective of the Pilot was to assess the feasibility of conservation as a future means of increasing storage at Lake Powell, while investigating some of the administrative and operational considerations of performing demand management activities in each of the Upper Basin Divisions;

WHEREAS, after four years of facilitating the Pilot, the Commission's February 2018 report, that many Upper Basin water users have shown a willingness to participate in demand management activities;

WHEREAS, the Commission recognizes that additional administrative, technical, operational, economic and legal considerations must also be investigated to fully inform the feasibility and usefulness of developing a demand management program in the Upper Basin;

WHEREAS, the Commission believes that any viable demand management program requires the ability to accumulate and store conserved water over multiple years. However, no means for accounting, measuring, conveying or storing water have currently been established. As such, any water that is currently conserved is subject to use by downstream water users or release from existing system storage prior to being needed in response to emergency drought conditions, thereby defeating the intended purposes of any demand management;

BE IT FURTHER RESOLVED that the Commission commits to:

- i. Work with interested parties to adapt the existing Pilot, or develop new pilots, to investigate outstanding considerations related to demand management;
- ii. Work with interested entities to explore other possible mechanisms or opportunities to investigate outstanding considerations related to demand management; and
- iii. Support intrastate efforts to explore demand management mechanisms and considerations within each of the Upper Division States.

- Objectives:

- Improve accuracy of Conserved Consumptive Use (CCU) estimations through direct measurements of water budgets at the field level.
- Assess and cross-verify existing models for estimating Consumptive Use (CU).
- Determine ecological impacts that demand management projects may have on field composition and production, local groundwater levels, return flow, and wetlands.
- Develop a tool to enable landowners and other practitioners to assess potential ecological impacts and dollar values of CCU associated with non-diverted water under various field conditions (i.e. pivot versus flood irrigated, bench versus bottomland, sandy versus loamy soils).
- Monitor recovery on fields after 2 consecutive years of fallow.

Field intensive, full water balance study of **6 irrigated fields (275 acres) in the Upper Green River basin** across a range of elevations, vegetation types, and irrigation practices.

**2022**

Quantify  
Consumptive  
Use under  
“normal”  
conditions

**2023-2024**

Quantify  
changes in  
Consumptive  
Use under fallow  
conditions

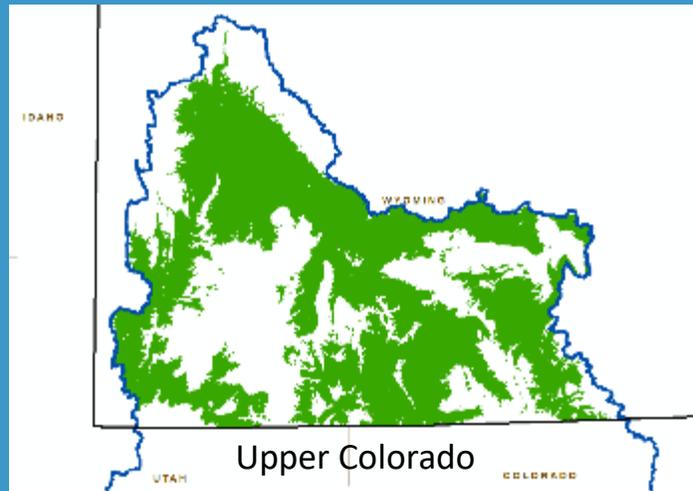
Document  
changes in  
vegetation  
characteristics  
due to fallowing



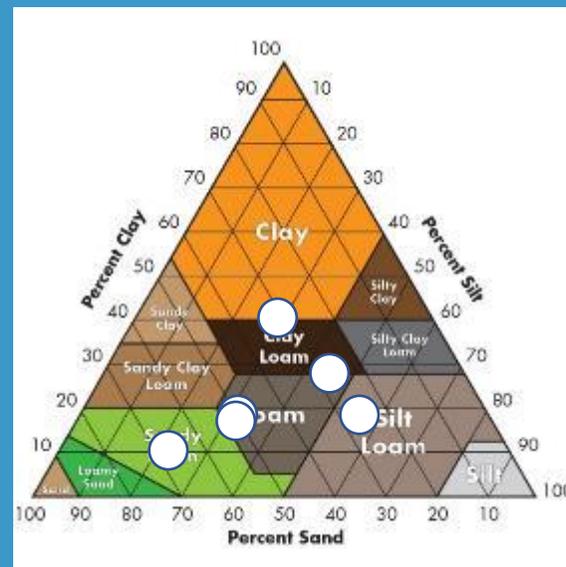
Field intensive, full water balance study of **6 irrigated fields in the Upper Green River basin** across a range of elevations, vegetation types, and irrigation practices.

## Range of Elevations

6745-7810ft



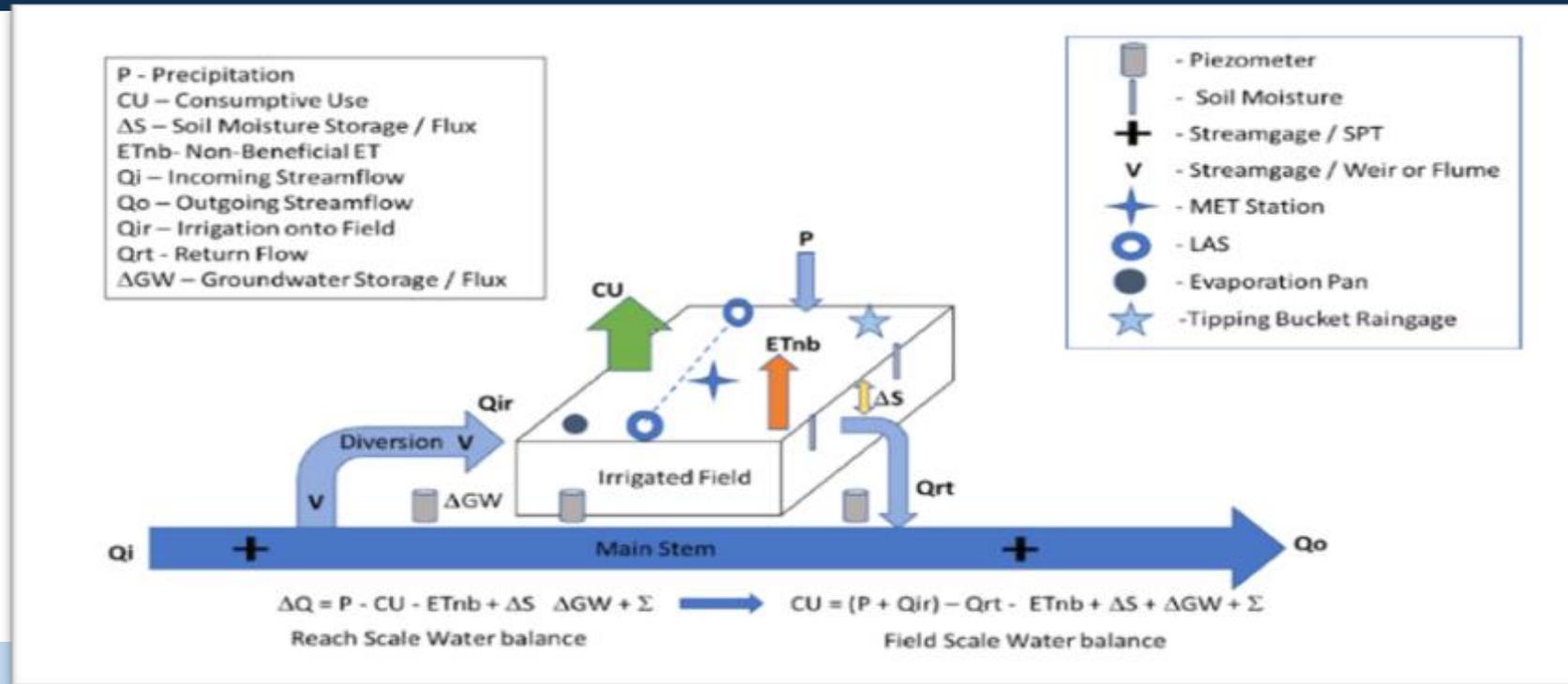
## Range of Soils



## Range of practices

1 Pivot  
1 Sideroll  
4 Flood Irrigated  
  
3 unhayed  
3 hayed

$$ET_{\text{beneficial}} = P + Q_{\text{irrigation}} - Q_{\text{returns}} - ET_{\text{non-beneficial}} + \Delta S + \Delta G + \varepsilon$$



Tipping Buckets

Flumes and Gauging Stations

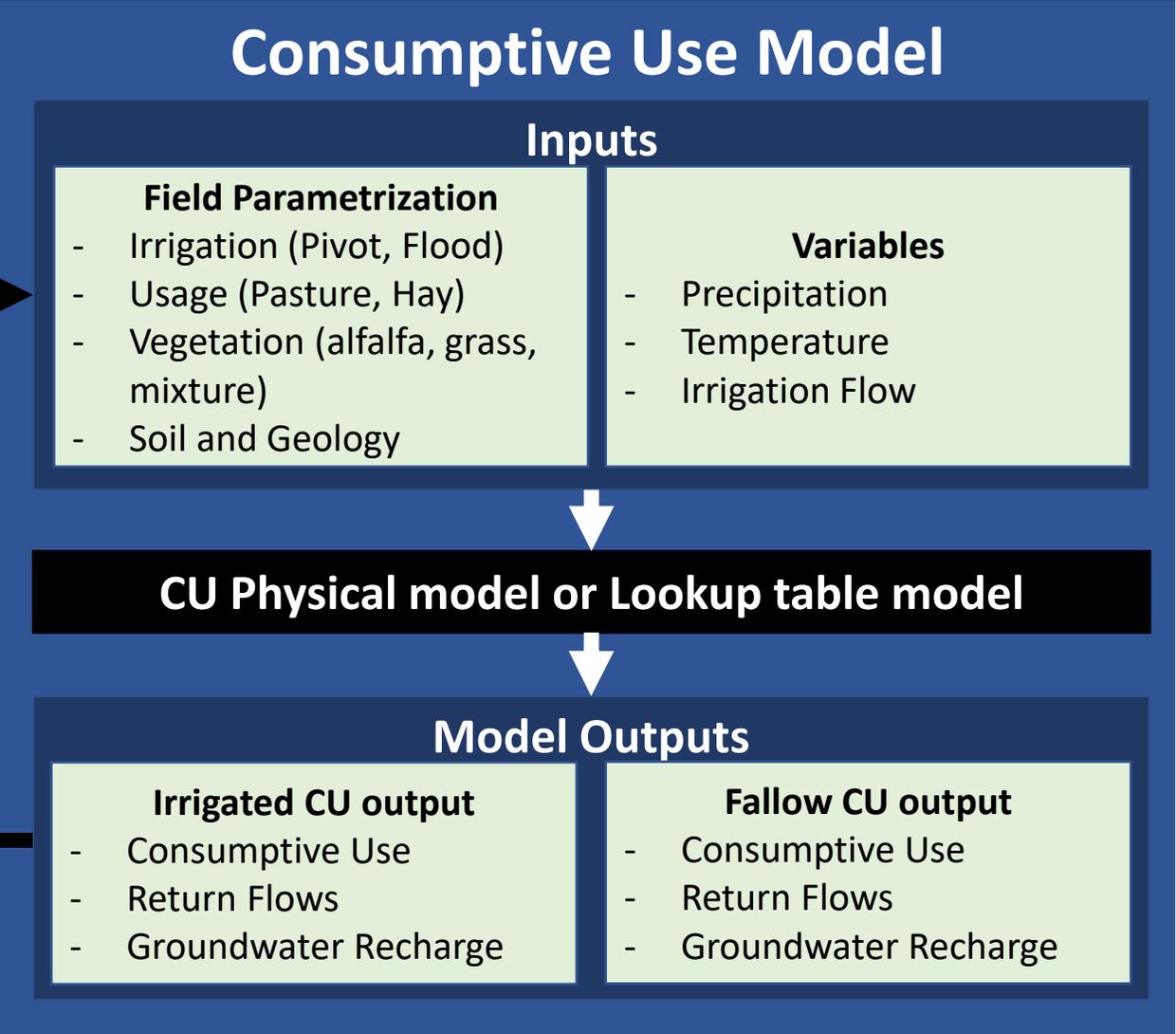
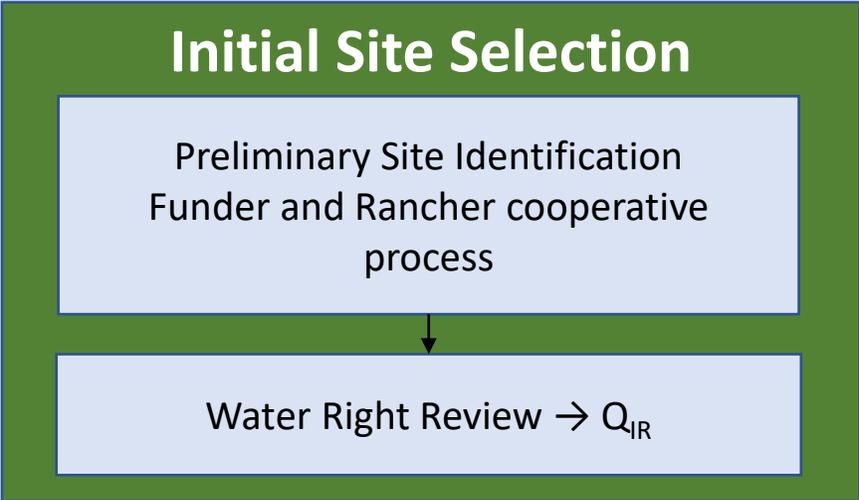
Scintillometers  
Weather Stations  
Evaporation Pans

Soil Moisture Probes

Shallow Groundwater Wells

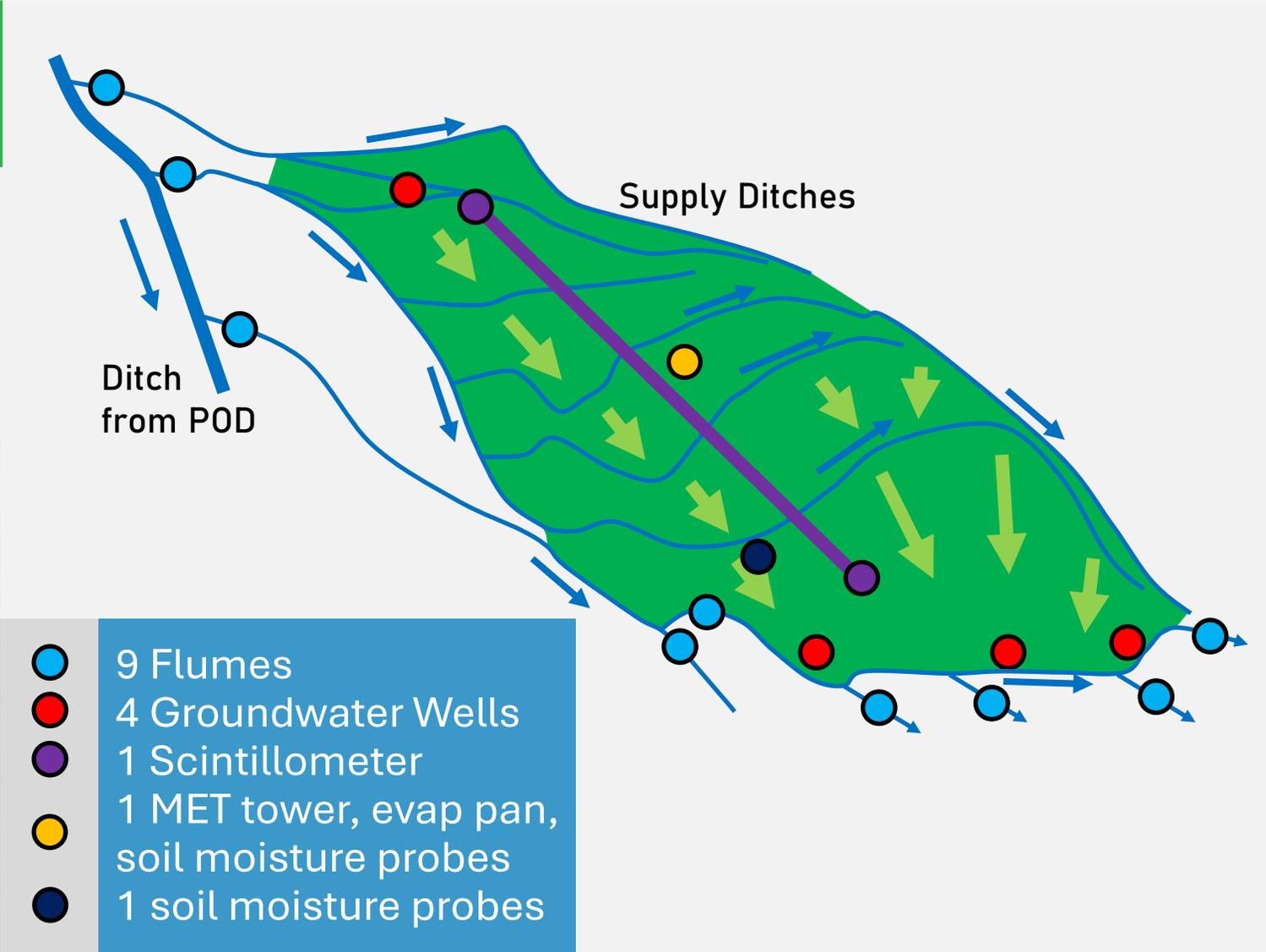
# Data to model : helping ranchers and decision makers assess viability of demand management options.

## Demand Management Toolkit

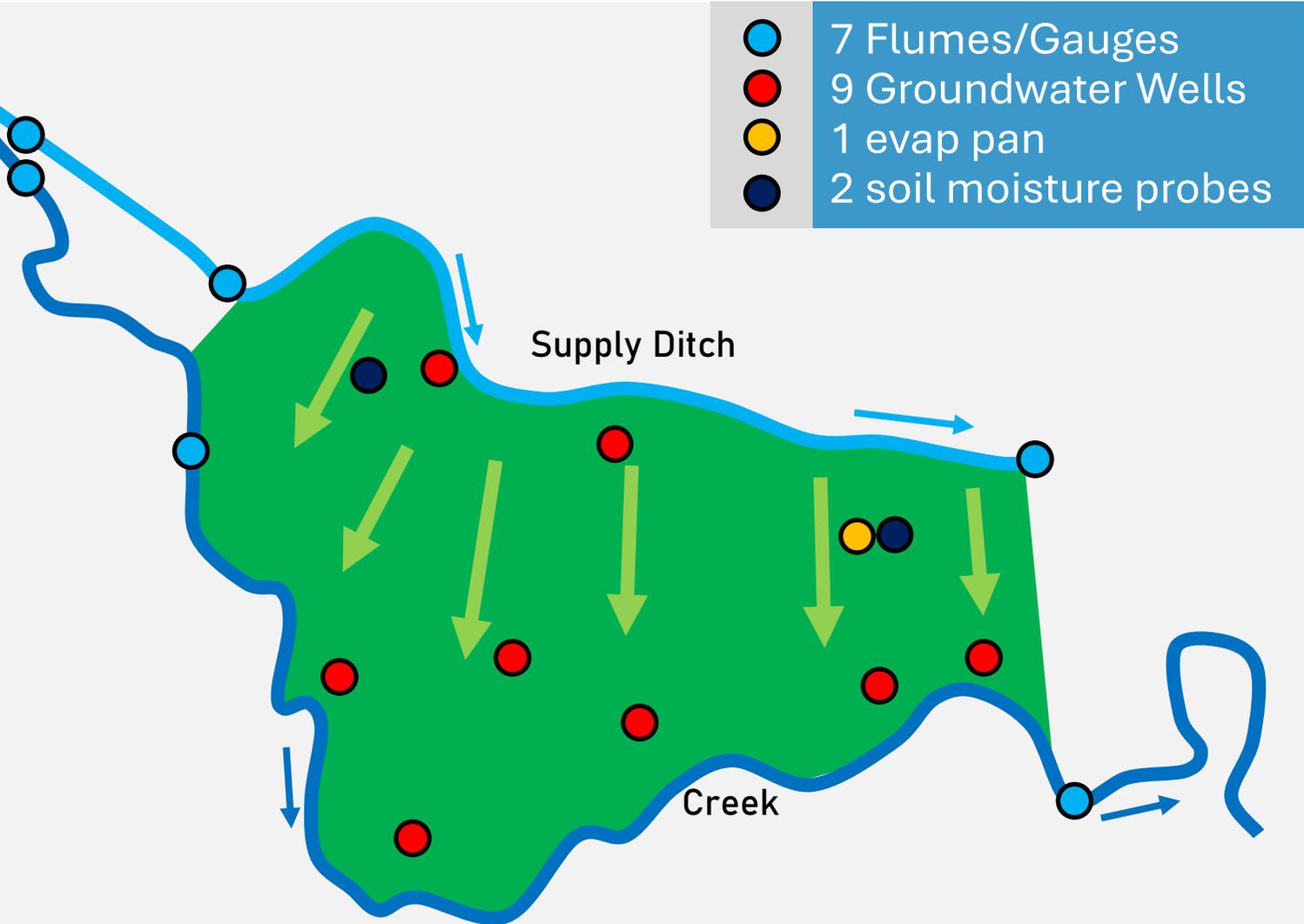


# Example field 1: 70 Acres of irrigated meadow overlaying colluvium, cattle and horse grazing, 1919-1940 priorities

Flood Irrigated, timothy grass dominated meadow



# Example field 2: 26 Acres of irrigated pasture on a south facing gravel bench, yearling cattle grazing, 1885-1886 priorities



Flood Irrigated, native grass mix bench.



# 2021-2025 Demonstration Projects



- Next Steps:

- Finalize 1<sup>st</sup> year fallow activities and reporting
- 2024: 2<sup>nd</sup> year fallow activities and reporting
- 2025: monitor and reporting for field recovery under “normal” use
- Continue to refine the tool to enable landowners and other practitioners to assess potential ecological impacts and dollar values of CCU associated with non-diverted water.
- Use SCPP 2024 (if available) to continue site specific data needs including:
  - conveyance losses (1 cfs/70 vs free river vs 2nds)
  - Shepherding through collaboration rather than regulation
  - Accuracy of OpenET, eeMETRIC, etc
  - Landowner demand
  - Identify project opportunities for efficiencies and long term CCU infrastructure upgrades

# Questions?



# Wyoming SCPP 2023



- TU assisted 12 water right holders with SCPP applications
- ~7518 acres
- ~8530 AF conserved
- Average AF/ACRE in Upper Green: 1.13
- \$575.00/AF
- Full Season Fallow

