Water Allocation and Challenges Facing Alfalfa and Pasture in Northern California

2024 Alfalfa & Forage Symposium

Adv. in Irrigation and Water Mgt. Workshop

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Irrigation Water Curtailments

- Order Imposing Water Right Curtailment
  - Scott and Shasta Rivers Watersheds
- State Water Board adopted an emergency regulation establishing minimum flows in the region
  - Last started on February 1, 2024 (1year)
- Minimum flows measured at the United States Geological Survey Gages

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2024 Order in Scott Valley

- Flows at the Fort Jones gage started to decrease on May 17, 2024
- Flows dropped below the minimum flow on July 21, 2024
- Based on higher temperatures, no snowpack, and no precipitation forecasted, flows were anticipated to remain below minimum required
- Two Orders
  1. Order Imposing Water Right Curtailment and requiring reporting for surface water rights (July 23, 2024)
  2. Order imposing water right curtailment and requiring reporting for groundwater rights (July 24, 2024)
- Order Requirements:
  - Curtailment certification form (15 calendar days after order issuance)
    - Exception for evacuees and possibility of extension

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Allowances for Continued Limited Diversion

- **Non-consumptive Diversion**: if the diversion does not use up water or change the time the water is available for others
  - run-of-river hydropower
- **Minimum Human Health and Safety Diversion**: if diversion is the only water source
  - Drinking, cooking, washing or meeting the state's infrastructure needs (firefighting)
- **Minimum Livestock Watering Diversion**

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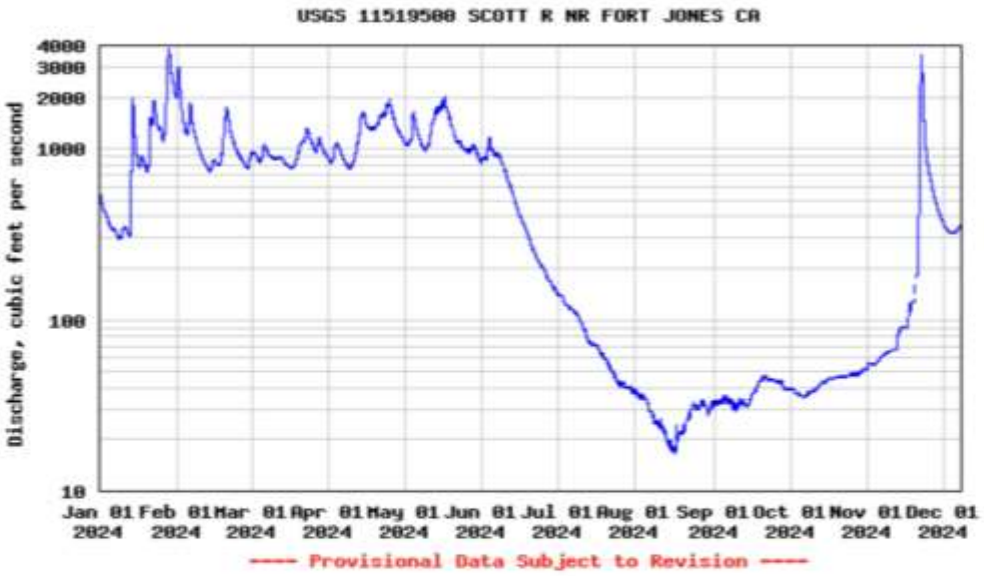
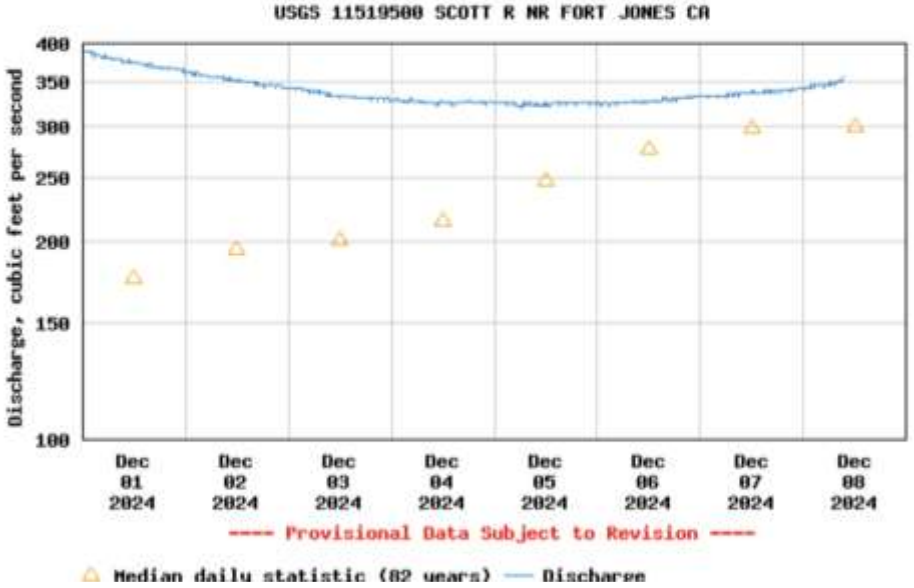
Minimum Flow and Current Status

cfs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Scott River	200	200	200	150	150	125-90	50	30	33	40	60	150
Shasta River	125	125	125-105	70	50	50	50	50	50-75	105	125	125

Scott River Canyon – Credits State Water Resources Control Board

Discharge, cubic feet per second
Most recent instantaneous value: 356 12-08-2024 09:30 PST





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2024 Water Summary

- Flow in Scott River is influenced by according to the State Water Board
  - Precipitation
  - Snow melt
  - Surface and groundwater demand

- Since early May, no recordable precipitation and no significant snow cover in the Scott River watershed
  - July 22, flow reached 46.1 cfs (minimum flow req. for July is 50 cfs)
- Record Maximum Temperatures July 5-7
- July 3: Shelly Fire started and had grown to 15,232 acres with only 3% containment on July 15
  - 1 week break of the curtailment, but order stated those not affected by the fire to reduce diversion

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2024 Water Summary

- May 2024 had the highest average groundwater level in the last 4 years
  - DWR attributes this conditions to many factors, including:
    - Average and slightly above average precipitation (rain and snow) in 2023
    - 2023 and 2024 curtailments
    - Water use reductions associated with **local cooperative solutions (LCS)**

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Local Collaborative Solutions

- Binding agreement with coordinating entity with primary responsibility to verify the implementation of the LCS
- In 2024, proposals were due in April and were implemented during the entire irrigation season
  - Proposal describes metering in place for groundwater well extractions
    - Record daily extractions and report monthly to the State Water Board
    - Requirements may be waived for wells that irrigate less than 30 acres

Three types of groundwater LCSs

1. Best Management Practice LCS: may be approved if following actions are followed

- Use of low-energy precision application (LEPA) system on all irrigated acreage
- No irrigation on center pivot corners
- Use of Soi Moisture Sensors for proper irrigation management and records available for inspection
- Cessation of irrigation of 90% of irrigated acreage by Aug. 31 if snowpack is low (Scott Valley) or dry or very dry water year determined in Shasta

Three types of groundwater LCSs

2. Graduated Overlying Groundwater Diversion Cessation Schedule

- This can be approved if proved that irrigation is reduced compared to standard practices on the property (compared to unregulated years)
- Two options for decreasing percentage throughout the irrigation season
  - 15% by Jul. 15, 50% by Aug. 15, and 90% by Aug. 31
  - 20% by Jul. 20, 50% by Aug. 20, and 95% by September 5

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Three types of groundwater LCSs

3. Percent-reduction in Groundwater Pumping LCS

- Scott River watershed: net reduction of 30% (April 1- October 31)
- Shasta River watershed: net reduction of 15% (March 1 – November 1)

- These reductions should be based on a comparison to a baseline irrigation season (2020, 2021, 2022, or 2023)
- Irrigation 'cap’
  - Alfalfa 33 inches per year, grain 14 inches, and 30 inches for pasture

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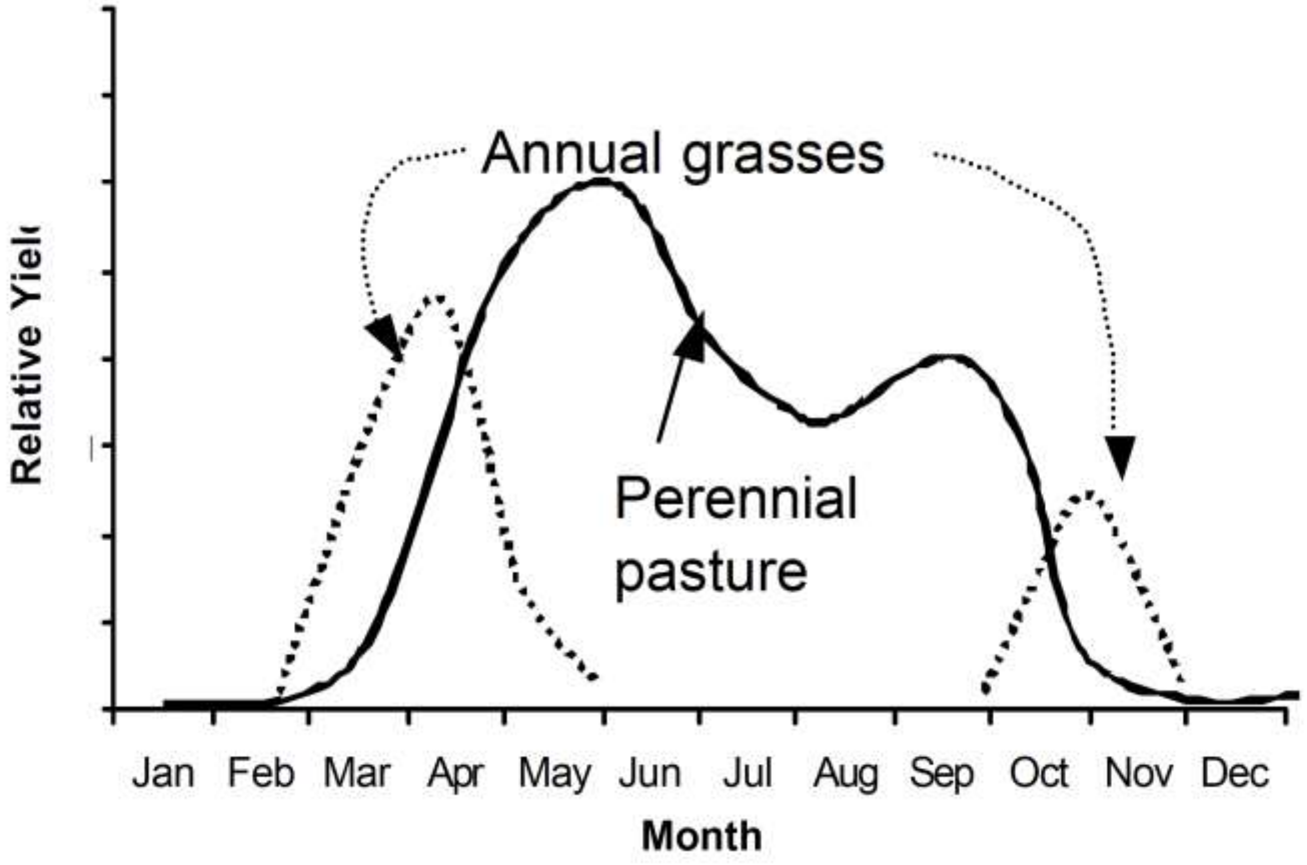
Mostly successful

- Growers have been collaborating and are part of the solution
- Despite the challenges, progress has been made to guarantee a long-lasting agriculture in Siskiyou County while preserving natural resources
- We strive to provide tools for growers and mitigate the economic and environmental impact
  - Forage production with limited water?

Siskiyou County Dryland small grain trial

- Problem: Forage for grazing is not available in Siskiyou County for many months
- Forage-production system that prolongs the grazing season so growers could save money on hay
- Steve Orlofff early work showed great potential for growing winter cereal for prolonging grazing season in the Intermountain Region
  - Evaluated potential for grazing in the fall, spring and one hay harvest in the summer

Growth Pattern of irrigated pasture and annual grass



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Siskiyou County Dryland small grain trial

- Steve was very successful
  - Triticale (Trical 102) produced the highest among the varieties tested
    - 0.5 tons/A dry matter yield in fall
    - 2.5 tons/A in spring
    - 4 tons/A of hay
- Key points Steve's research
  - Fall yields were highly dependent on planting date
    - Early planting, higher yields
    - Quality x Quantity tradeoff
      - Triticale: harvested at early heading to flower provided best compromise between yield and quality for beef cows
  - His trials showed that winter annual grasses can provide high quality grazable forage cheaper than hay feeding

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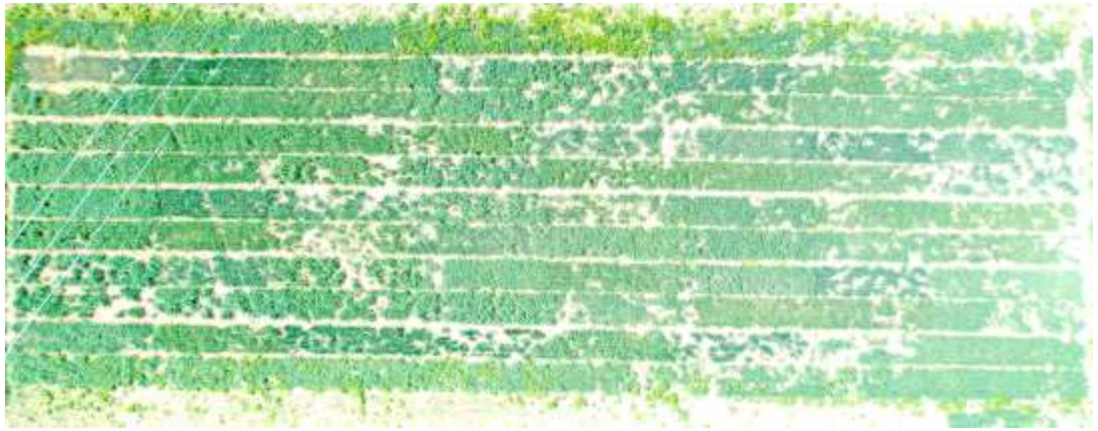
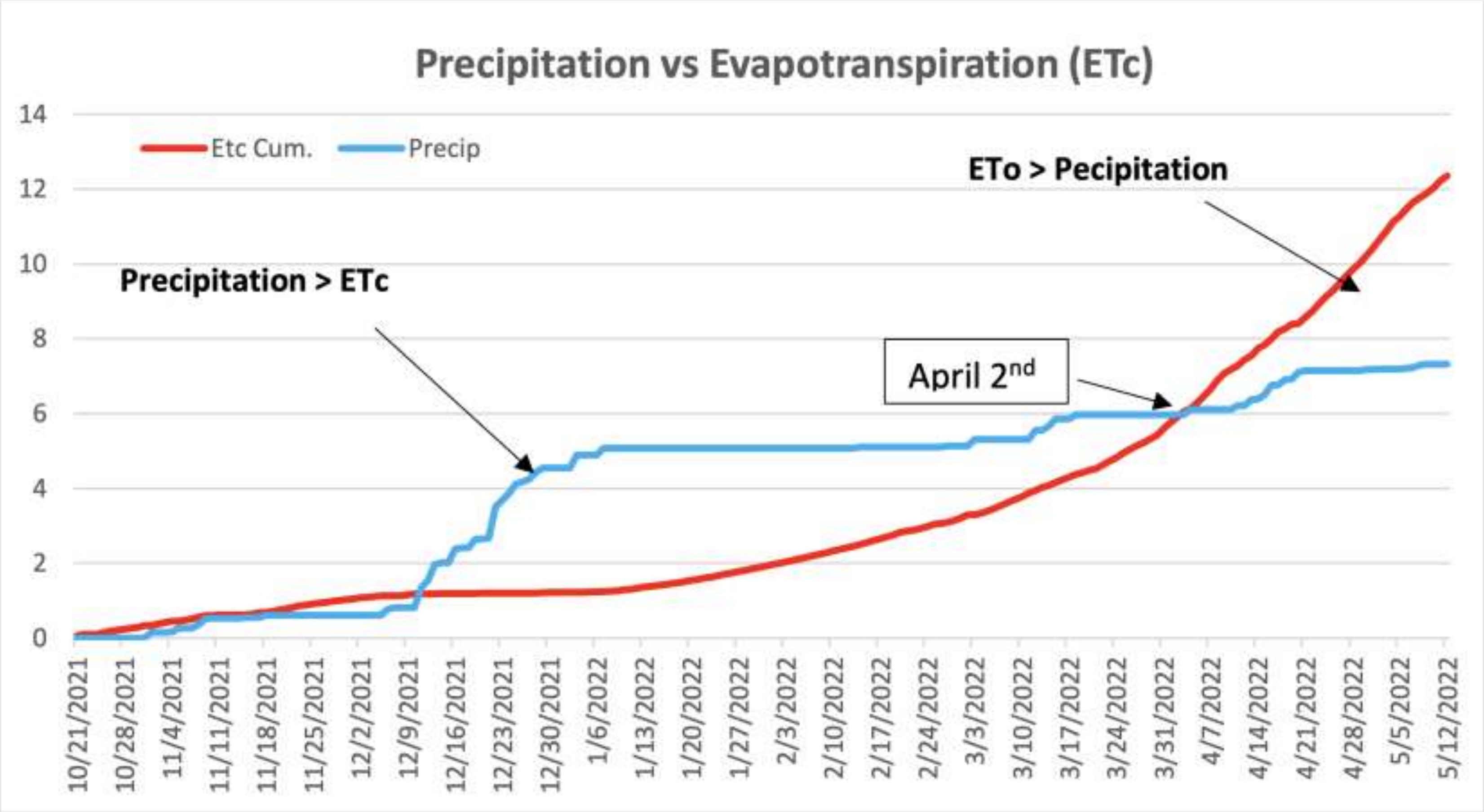
Siskiyou County Dryland small grain trial

- My goal was to investigate what yields we could get with no irrigation at all
  - Very variable depending on each year’s weather
- Planted on October 21, 2021
- 14 varieties of triticale, wheat , and barley assessed regarding forage yield



Water Stress Timeline



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Yields

		ton/A						
Variety		Fresh Weight	Dry matter (90% DM)					
14401	Triticale	15.2	3.0	A				
Thor	Triticale	13.2	2.6	A	B			
Legend	Triticale	12.2	2.4	A	B	C		
TriMark099	Triticale	11.9	2.4		B	C		
Surge	Triticale	11.8	2.4		B	C		
Merlin Max	Triticale	11.6	2.3		B	C	D	
Forerunner	Triticale	11.0	2.2		B	C	D	E
UC3185	Triticale	10.5	2.1		B	C	D	E
Yamhill	Wheat	10.1	2.0		B	C	D	E
Alvena	Wheat	9.1	1.8			C	D	E
Mandala	Wheat	9.1	1.8			C	D	E
Patron + Eureka	Wheat + Barley	8.5	1.7				D	E
Patron	Wheat	8.3	1.7				D	E
Brundage	Wheat	8.2	1.6					E
Mean		10.8	2.2					

2023 Perennial Grass Deficit Trial

- Collaboration with Grace Woodmansee (UCCE Siskiyou) and Charlie Brummer UC Davis)
- Same idea, different crops
  - Increase water use efficiency
    - More crop, less irrigation
- Identify most productive and persistent grass variety under deficit irrigation
  - Irrigation only for the year of establishment
    - Start with a decent stand

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2023 Perennial Grass Deficit Trial

- Planted on September 26, 2022
- Initially two sites
  - Grenada (Shasta Valley): No irrigation at all
  - Etna (Scott Valley): partial irrigation (maximum 70% crop demand due to Local Cooperative Solution (LCS)
- 5’ x 21’ plots
- Harvest: first completed in year 2 of the trial (summer 2024)

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Variety selection

- Warm and cool season perennial grass
  - Total of 21 varieties/species
- Wheatgrass is king in production under water scarcity
  - However, quality not great
- Evaluate performance of orchardgrass and fescue
  - Highly desirable for hay and grazing

Establishment Year – Fall 2022

- **Grenada:** No irrigation
  - Very dry, no crop germination
  - Declared failure
- **Etna:** Irrigation during establishment year
  - 8 irrigation cycles in 2023, wheel lines
  - 19.5” of irrigation (2022 + 2023)
- 2024: No irrigation applied
  - Dryland trial after establishment
  - What will survive?

Dry matter yield

Variety Name	Species	-	-	-	DM Yield (ton/A)
Jose	Tall Wheatgrass	A			3.10
Tuscany II	Tall Fescue	A	B		3.06
Atlas II	Tall Fescue	A	B	C	2.91
Kora	Tall Fescue	A	B	C	2.71
Goliath	Tall Fescue	A	B	C	2.39
Extend	Orchardgrass	A	B	C	2.34
Persist	Orchardgrass	A	B	C	2.20
Teton II	Tall Fescue	A	B	C	2.19
Alpine II	Orchardgrass	A	B	C	2.19
FSG 402TF	Tall Fescue	A	B	C	2.05
Fawn	Tall Fescue	A	B	C	2.01
Barelite	Tall Fescue	A	B	C	1.97
Macbeth	Meadow Bromegrass	A	B	C	1.90
Hymark	Tall Fescue	A	B	C	1.81
Mammoth	Orchardgrass	A	B	C	1.80
Berber	Orchardgrass	A	B	C	1.75
Icon	Orchardgrass	A	B	C	1.56
Rushmore II	Orchardgrass	A	B	C	1.45
Profit	Orchardgrass		B	C	1.40
Quickdraw HSG	Orchardgrass			C	1.38
Baridana	Orchardgrass			C	1.31

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Specie Comparison

- Fescue produced more biomass than Orchardgrass

Specie	DM Yield	
Fescue	2.3	A
Orchardgrass	1.7	B

- Among the other species:

Specie	DM Yield	
Wheatgrass	3.1	A
Hardinggrass	2.0	A B
Bromegrass	1.9	A B
Canarygrass	1.6	B

Discussion: Planting dates

- Spring: can be successful if irrigation available
  - Warmer temperatures accelerate germination and crop development
  - Insufficient water can be particularly detrimental to perennial grasses
- Fall
  - Benefits from winter precipitation and lower ET
  - More time for root development, critical for withstanding spring and summer heat
- Situations with limited water: prioritize establishment year

Hay production and stand longevity

- Significant variation on dry matter yields
- The total irrigation water applied was enough to establish the crop
- Yield and persistence will depend on specie and cool-season precipitation
- Limited water: use it early in the year
  - Cool season grass tend to be more productive in the spring
- Next Steps:
  - Will keep it as dryland trial and assess persistence and yields in the following years

Thank you

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