Is Climate Change Pushing our Rare Draba's off the Top of the San Juan Mountains?

San Juan Whitlow Grass, G3S3

DRABA GRAMINEA

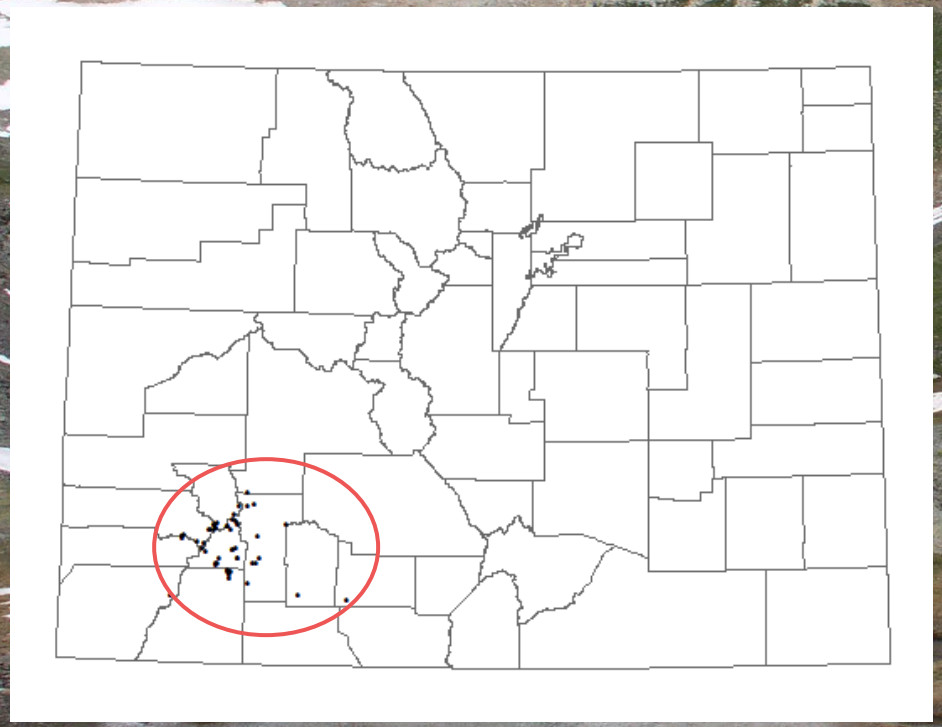
ENDEMIC TO THE SAN JUAN ALPINE REGION

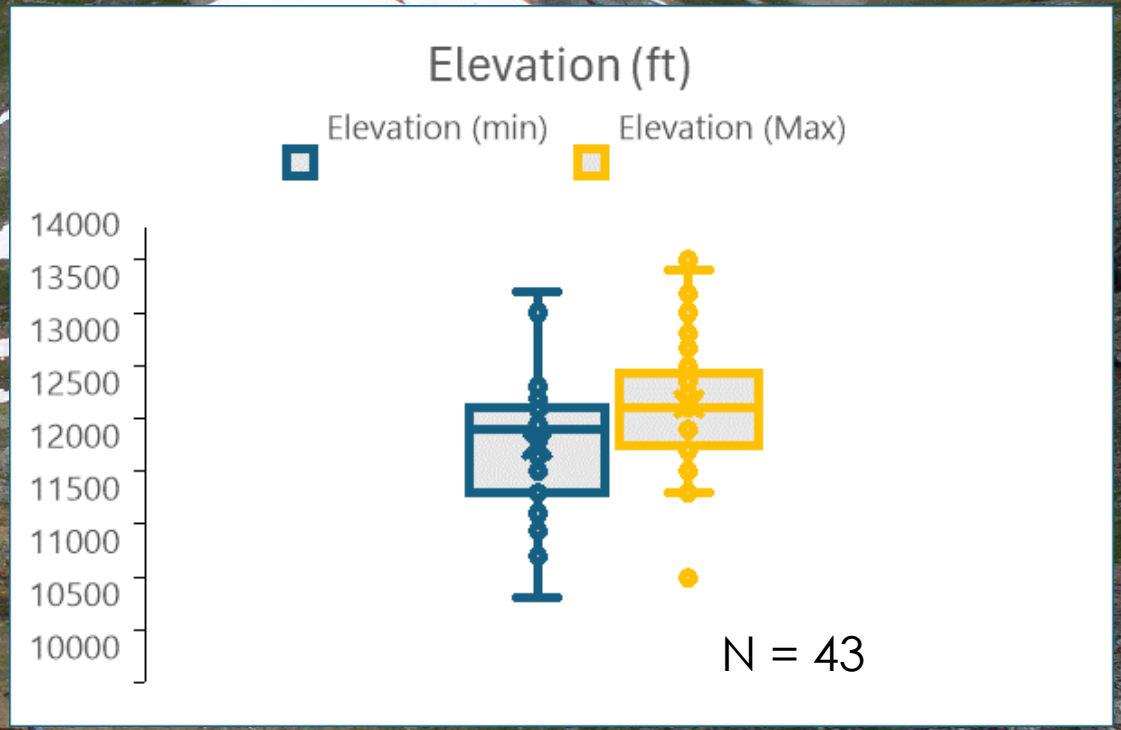
Renee Rondeau, Peggy Lyon, Becca Harris, Georgia Doyle

Where Is It Found?

The Alpine

San Juan Mountains





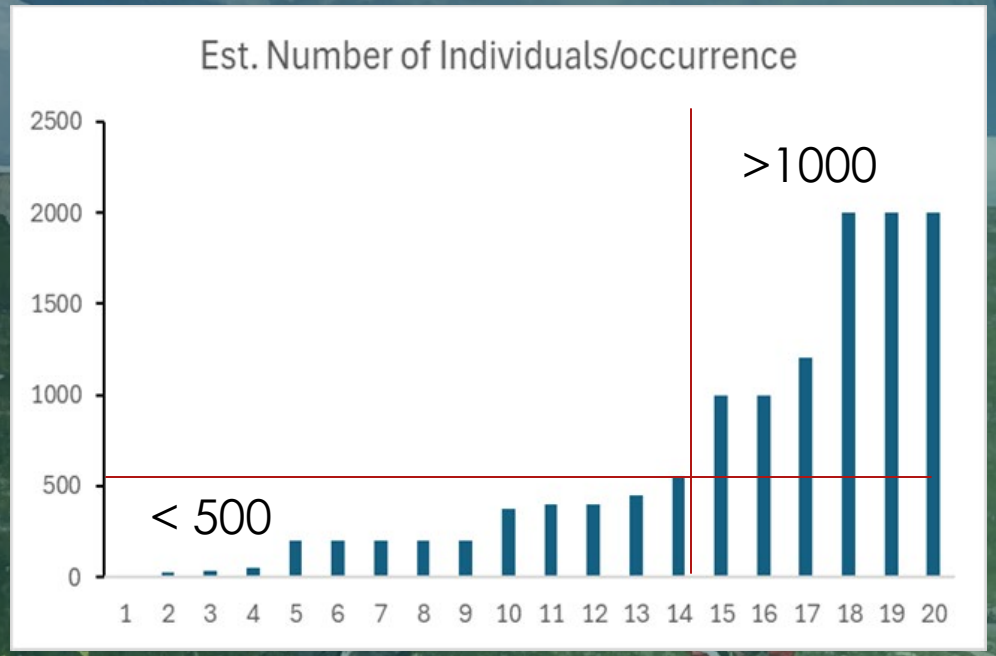
Average = 12,500 ft;
Min = 10,800
Max = 14,000
Most plants are between 11,800-12,900

20% of the occurrences were documented by Peggy

Following in Peggy Lyon's footsteps is not that easy!

Most of Peggy's records are now considered historical (>20 years since it was updated)

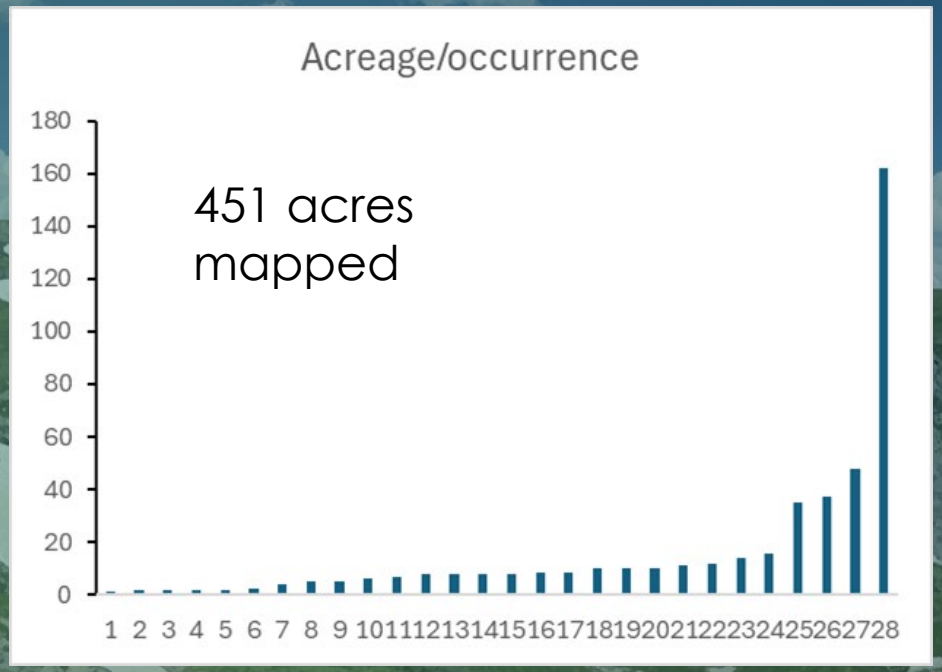
Estimated No. of Individuals/occurrence



20 occurrences estimated population size.
Total = 12,500 individuals

30% had 1,000-2000 individuals
70% had fewer than 500 individuals

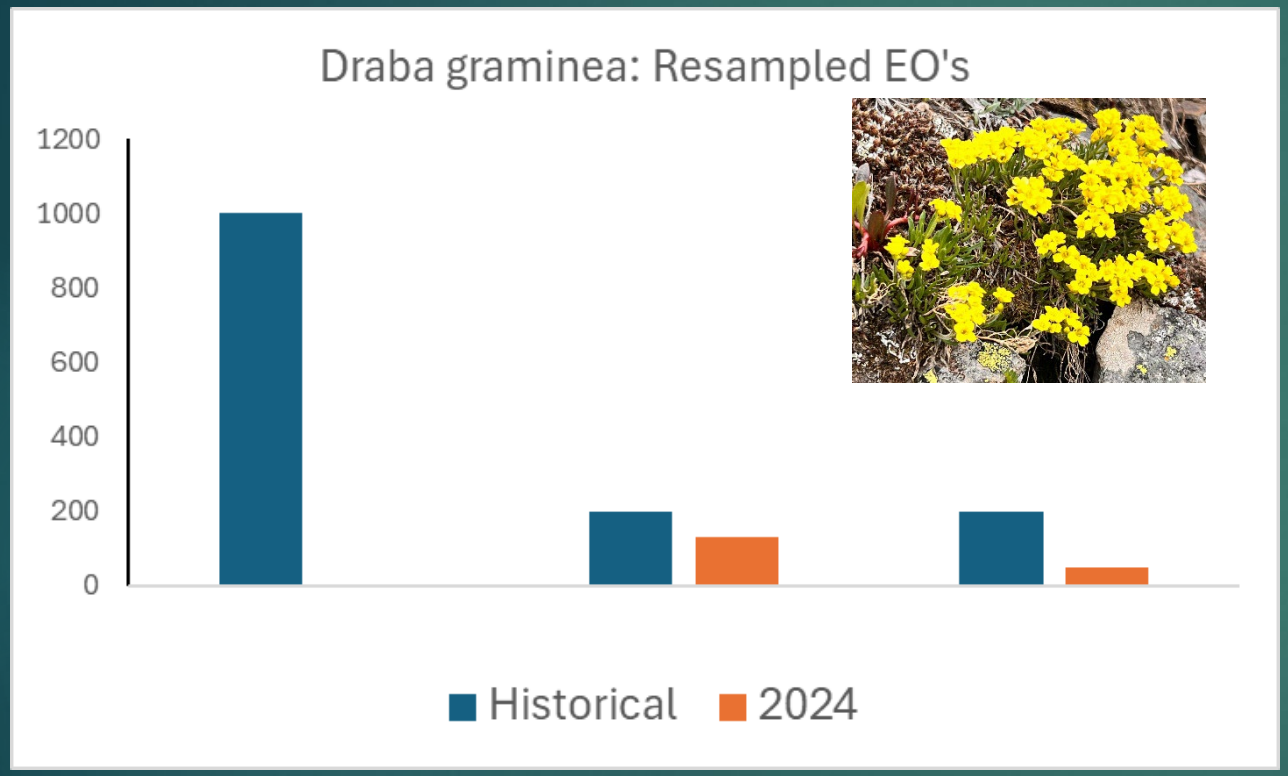
Average Size (acres)/occurrence



Most occurrences are under 15 acres in size

Nearly 50% of all the records (43) are either historical or extant

Some evidence that Drgr may have declined



In 2024, we updated 7 historical EO's; of these, only 3 had population estimates, totaling 1400 individuals. In 2024 we counted 183 individuals

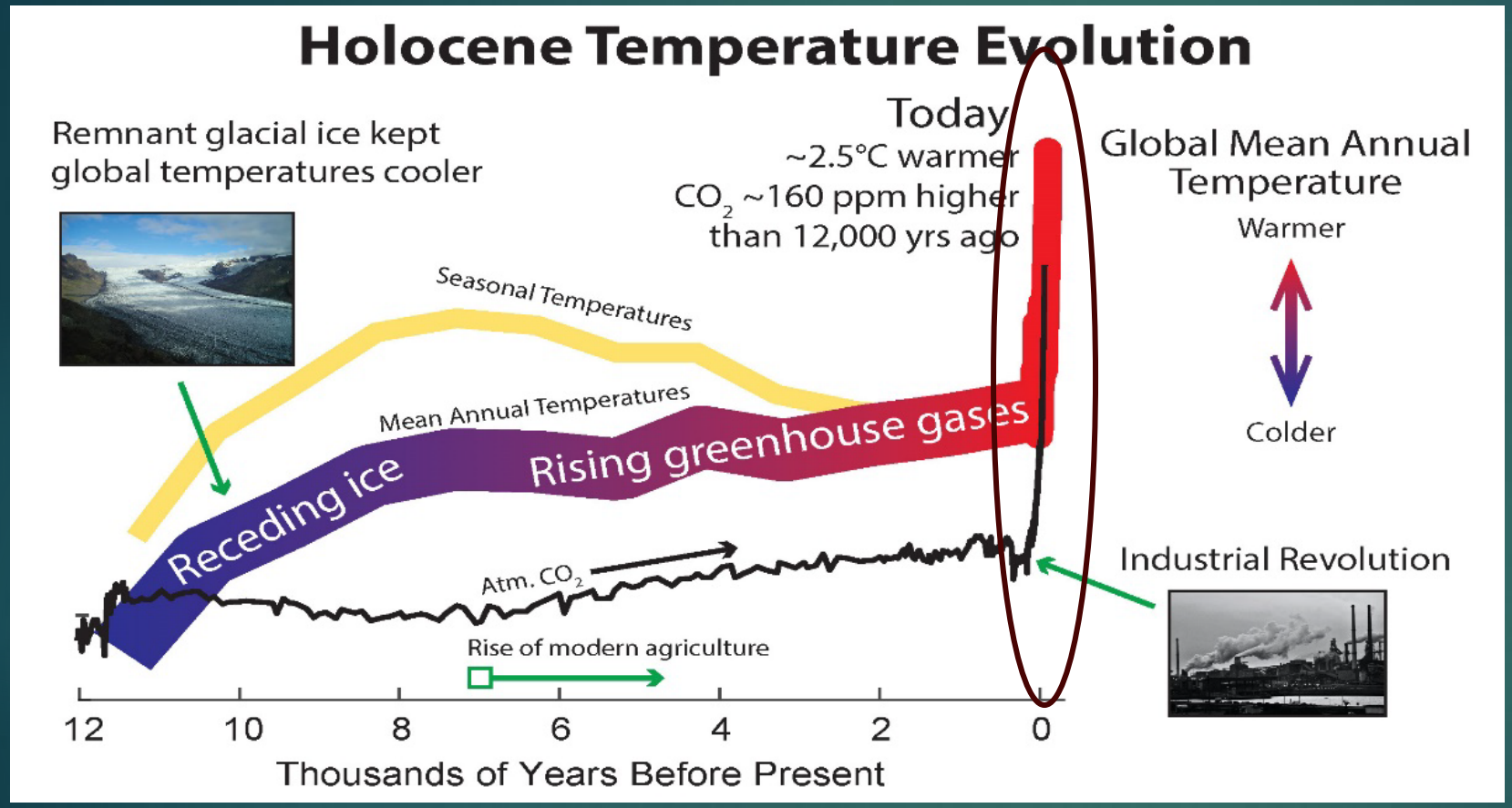
In 2024, all 7 eo's totaled 997 individuals

In addition to a potential loss of individuals, we also noted that most of the plants in 2024 were very small (total area/plant < the size of a quarter coin); while Peggy often commented that they were the size of her hand in the late 90's.

Evidence of decline also occurred in D. *streptobrachia*

Evidence that the alpine environment, especially in the San Juans, is warming and drying out

Holocene: the last 12,000

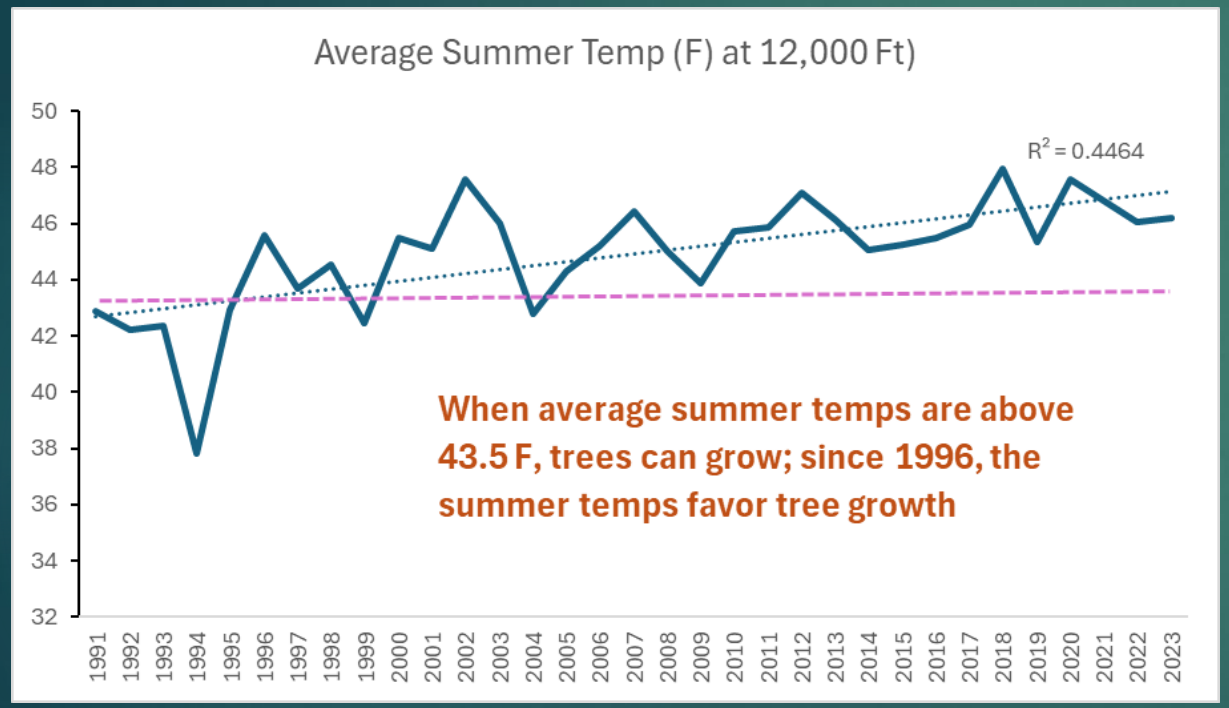


Bova, S., Rosenthal, Y., Liu, Z. *et al.* Seasonal origin of the thermal maxima at the Holocene and the last interglacial. *Nature* **589**, 548–553 (2021).

The last glacial ice began to melt around 12,000 yrs ago. Global mean annual temperature is 2.5C warmer today than 12,000 yrs ago

Hotter and Drier!

Red Mountain Snotel temp data was adjusted for 12,000 ft



Paulsen and Korner 2014: A climate-based model to predict potential tree line position around the globe

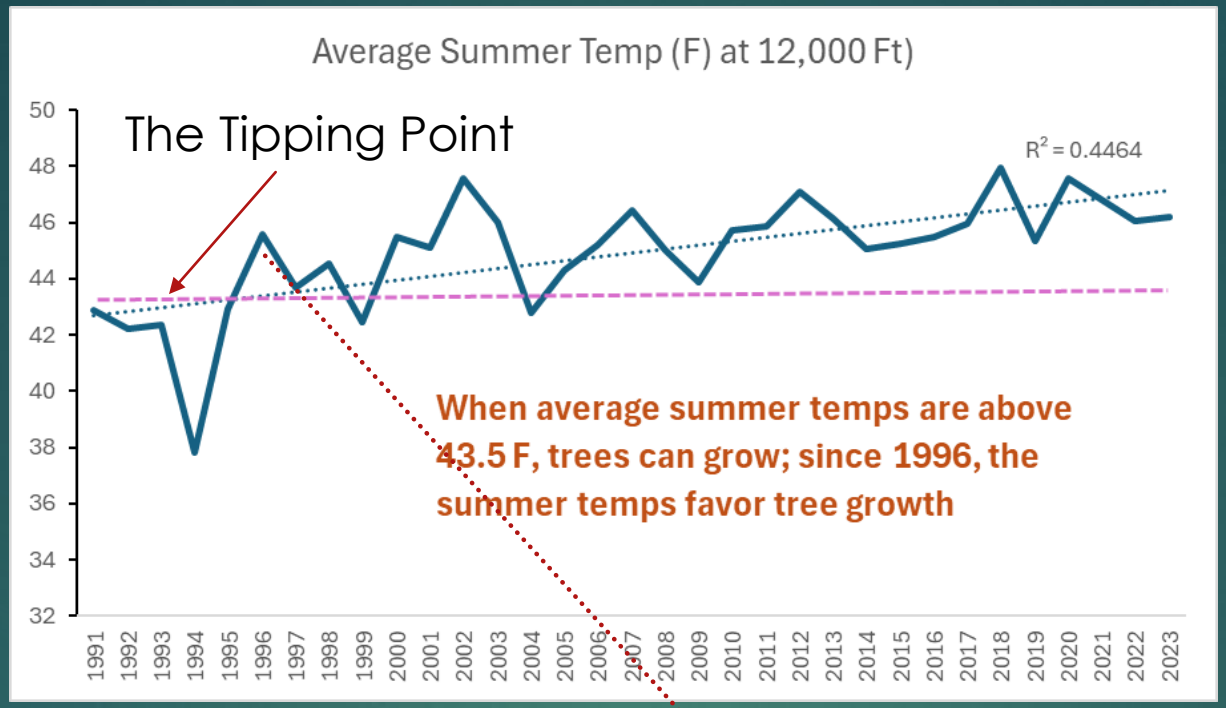
Krummholz at 12,000 ft, just starting to bolt in 2012

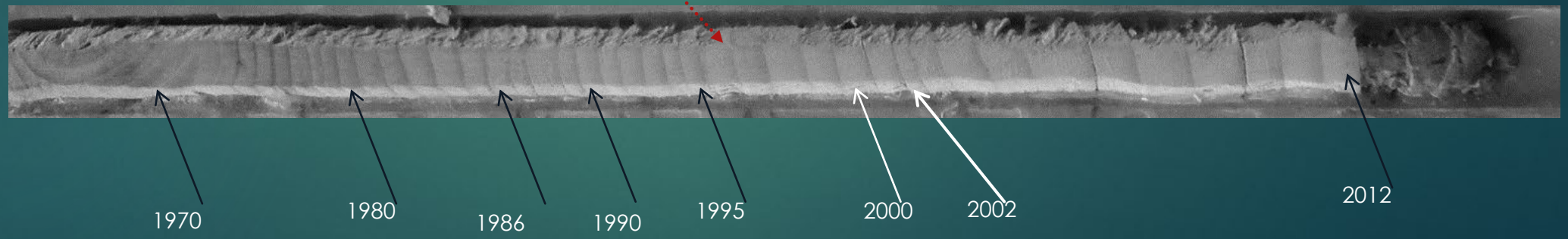
The combination of summer temps rising plus dust on snow events = 4-5 week earlier snowmelt and a faster snowmelt

Tree 11 was at 11,930 feet and was 2.8m tall and 18.1 cm diameter.

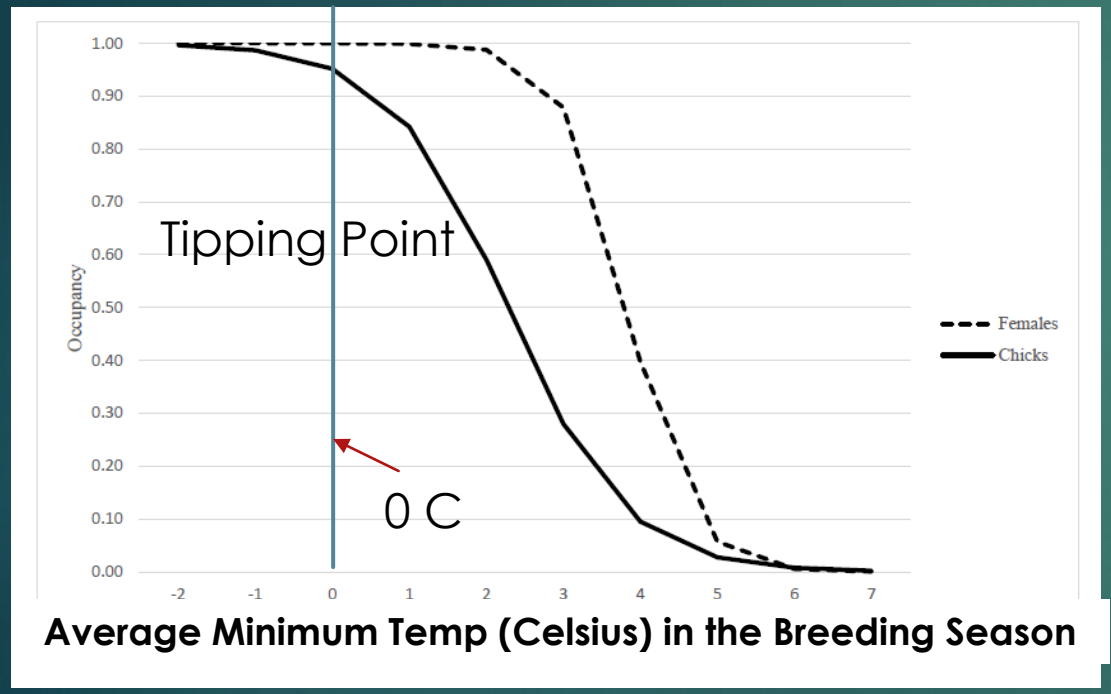
Starting in 1996, tree growth increased compared to previous years. This increase correlates with an increase in warmer and longer growing season.

A linear trend in temperature is occurring.



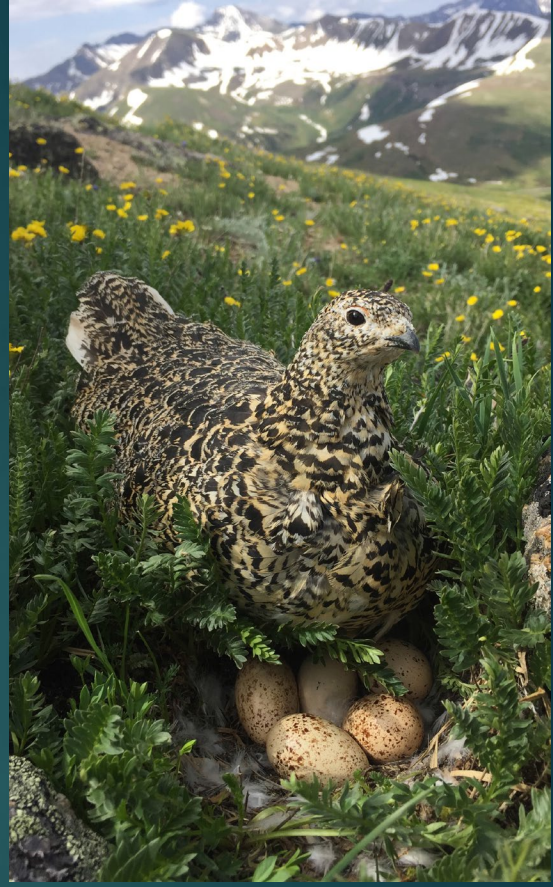


Ptarmigan Occupancy Decreased as Average Minimum Temperature Increased



From Seglund (2024). Technical Report on Ptarmigan

- "The area of most concern was the southern population where chick occupancy and chicks/hen declined dramatically in the **San Juan Mountains**".
- "Loss of persistent snowfields caused by higher temperatures could have resulted in chicks and hens traveling greater distances to find cold microclimates and mesic vegetation potentially exposing them to increased predation rates".



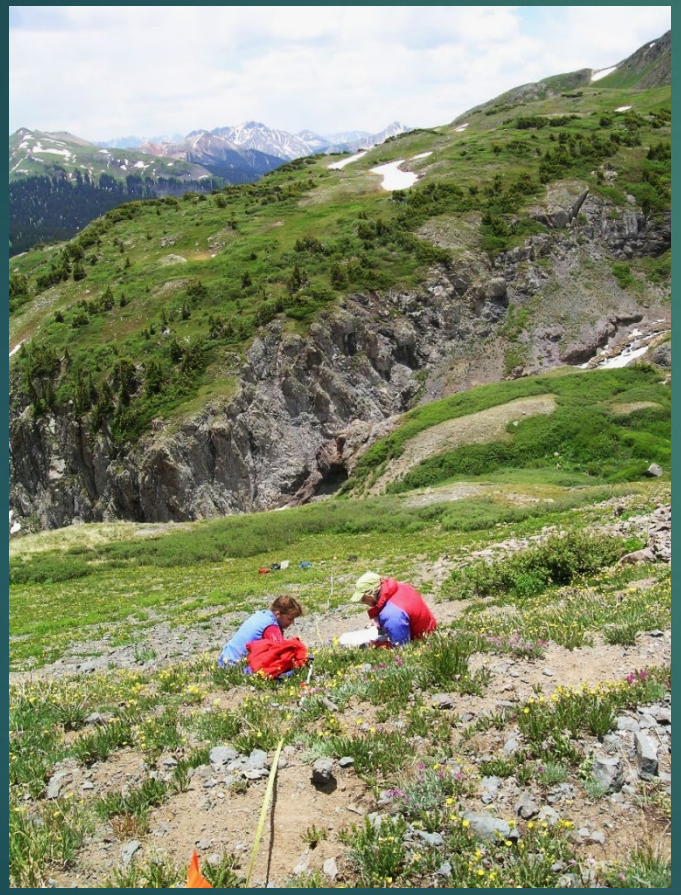
Photographic Evidence of a Changing Alpine Environment

Near Red Mountain Pass at 12,000 ft

2004

2014

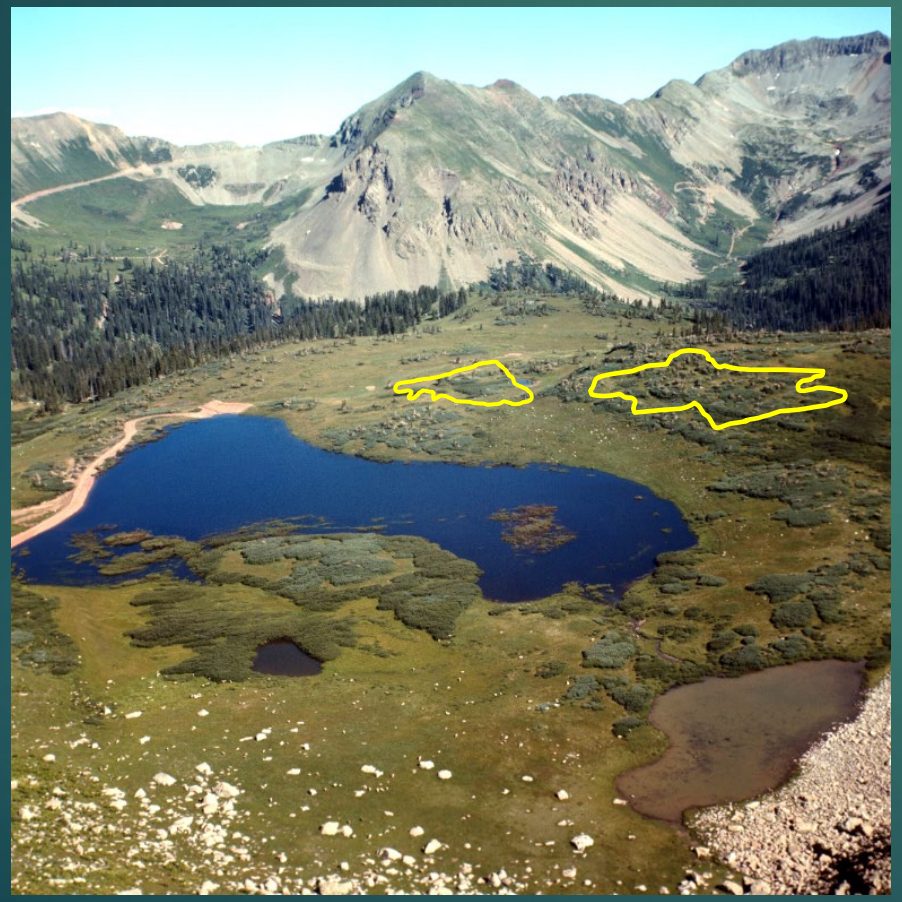
Senator Beck Basin



July 7, 2004

July 19, 2021

Taylor Lake, La Plata Mountains: 1972 and 2016. Krummholz bolted



Suggested Next Steps

- Revisit ALL of the occurrences over the next 4 years
- Ideally, find 2-3 locations that could be monitored annually
  - Determine how long an individual can live
  - Record no. of individuals every year
  - Record no. of flowers/fruits/plant
  - Record size of plant (width and length)
  - Set up a "census" type monitoring design to determine if there is a trend
  - Ideally, we would do this at 3 distinct sites, e.g., Imogene Pass, Mineral Basin, and Senator Beck Basin
- Locate new occurrences and always provide a count of individuals and flowering/fruiting/vegetative counts

Thanks to GOCO and Ouray County for their support on this project

It is projects like this that will allow us to discover many important natural history stories and potential changes within Colorado's biodiversity