WATER BOARD MINUTES

February 24, 2020

Service Center Conference Room
1100 S. Sherman Street
Longmont, CO 80501

REGULAR MEETING

The February 24, 2020 meeting of the Longmont Water Board was called to order by Chair Todd Williams at 3:00 pm at the Service Center Water Conference Room.

1. ROLL CALL

Board Members Present: Todd Williams, John Caldwell, Kathy Peterson, Roger Lange, and Renee Davis

City Staff Members Present: Ken Huson, Wes Lowrie, Nelson Tipton, Kevin Boden, Maureen Wallace, and Heather McIntyre. Jason Elkins arrived at 3:01 pm.

Council Liaison Present: Marcia Martin

Public in Attendance: Gaythia Weis arrived at 3:03 pm.

2. DETERMINATION OF A QUORUM

There was a quorum present with five board members in attendance.

3. APPROVAL OF PREVIOUS MONTH'S MINUTES

Chair Williams asked if there were any questions or comments on the January 27, 2020 meeting minutes. **A motion was made by Board member Caldwell to approve Water Board's January 27, 2020 minutes, seconded by Board member Peterson. The motion passed 5-0.**

4. WATER STATUS REPORT

Staff member Tipton gave the current water status report. The flow of the St. Vrain at the Lyons gage at 8 am today was 20.3 cfs, with an historical average of 15 cfs for this date.

Ralph Price Reservoir at Button Rock Preserve is currently at an elevation of 6,387 feet, equaling 13, 440 acre-feet in storage, down approximately 2,760 acre-feet from full. Currently there are 20 cfs being released from Ralph Price Reservoir.

Union Reservoir is at an elevation of 23.58 feet, equaling 9,686 acre-feet in storage, down approximately 3,100 acre-feet from full. Currently there are 5 cfs being released from Union Reservoir.

The call on the St. Vrain Creek is Union Reservoir, Admin #19271 with a priority date of 10/6/1902, and the call on the Main Stem of the South Platte River is Burlington Ditch, Admin #22,239, with a priority date of 11/21/1910. There is currently no call affecting District 5.

Local storage at the end of January 2020 was approximately 71% of average. The snowpack was presented in detail later in the meeting.

5. PUBLIC INVITED TO BE HEARD AND SPECIAL PRESENTATIONS

Gaythia Weis brought an article from the *Science* magazine to share with the Board about the Colorado River flow (attached). She stated that the article was a research piece that was recently released. Chair Williams said he had an article on the same topic that he was prepared to discuss with the Board at today's meeting.

6. AGENDA REVISIONS AND SUBMISSION OF DOCUMENTS

Staff member Ken Huson submitted a current state legislation bill, HB 20-1164, for discussion during Item 9B – Legislative Update on the agenda.

7. DEVELOPMENT ACTIVITY

A. Sugar Mill Annexation

Sugar Mill Annexation is a 17.440-acre parcel south of Great Western Drive and west of East County Line Road. There were no historical water rights appurtenant to this annexation; there was a deficit of 52.320 acre-feet. Water Board approved a recommendation that Sugar Mill Annexation is presently in compliance with the Raw Water Requirement Policy at time of annexation and will be at time of final plat approval with satisfaction of the 52.320 acre-foot deficit.

The motion was made by Board member Caldwell to approve and was seconded by Board member Peterson. The motion passed 5-0.

B. The Highlands Subdivision Final Plat

The Highlands Subdivision Final Plat is a 52.890-acre parcel north of State Highway 119 and West of Weld County Road 1. All historic water rights were transferred to the City at the time of annexation, with a deficit of 37.122 acre-feet. Water Board approved a recommendation that The Highlands Subdivision Final Plat would be in compliance with the Raw Water Requirement Policy upon satisfaction of the 37.122 acre-foot deficit at time of final plat approval.

The motion was made by Board member Davis to approve and was seconded by Board member Caldwell. The motion passed 5-0.

C. Mountain Brook Subdivision Filing No. 1 Final Plat

Mountain Brook Subdivision Filing No. 1 Final Plat is a 38.050-acre parcel south of Rodgers Road and west of North 95th Street (Hover Street). All historic water rights were transferred to the City at the time of annexation, with a 12.563 acre-foot deficit. Water Board approved a recommendation that Mountain Brook Subdivision Filing No. 1 Final Plat would be in compliance with the Raw Water Requirement Policy at time of annexation and upon satisfaction of the 12.563 acre-foot deficit.

The motion was made by Board member Lange to approve and was seconded by Board member Peterson. The motion passed 5-0.

D. Mountain Brook Subdivision Filing No. 2 Final Plat

Mountain Brook Subdivision Filing No. 2 Final Plat is a 28.130-acre parcel south of Rodgers Road and west of North 95th Street (Hover Street). All historic water rights were transferred to the City at the time of annexation, with a 9.930 acre-foot deficit. Water Board approved a recommendation that Mountain Brook Subdivision Filing No. 2 Final Plat would be in compliance with the Raw Water Requirement Policy at time of annexation and upon satisfaction of the 9.930 acre-foot deficit.

The motion was made by Board member Peterson to approve and was seconded by Board member Lange. The motion passed 5-0.

E. Riverset Annexation

Riverset Annexation is a 7.240-acre parcel north of Rodgers Road and east of Sunset Street. There were no historic water rights appurtenant to the annexation; there was a deficit of 21.720 acre-feet. Water Board approved a recommendation that Riverset Annexation would be in compliance with the Raw Water Requirement Policy at time of annexation and upon satisfaction of the 21.720 acre-foot deficit.

The motion was made by Board member Caldwell to approve and was seconded by Board member Davis. The motion passed 5-0.

F. West Grange Filing No. 3 Final Plat

West Grange Filing No. 3 Final Plat is a 29.220-acre parcel south of Nelson Road and east of North 75th Street. All historic water rights were transferred to the City at the time of annexation, with a 50.989 acre-foot deficit. Water Board approved a recommendation that West Grange Filing No. 3 Final Plat would be in compliance with the Raw Water Requirement Policy at time of annexation and upon satisfaction of the 50.989 acre-foot deficit.

The motion was made by Board member Lange to approve and was seconded by Board member Caldwell. The motion passed 5-0.

8. GENERAL BUSINESS

A. City of Longmont and ECCV, ACWWA, and United Water Short Term Water Supply Exchange Agreement

Staff member Tipton reviewed with the Board a short-term water supply exchange agreement that the City has been part of with other governmental agencies and special districts for the last several years. This one-year intergovernmental agreement is with East Cherry Creek Sanitation District (ECCV), Arapahoe County Water and Wastewater Authority (ACWWA), and United Water and Sanitation District (United), and needs to be renewed to continue.

The basis of the Exchange Agreement is a water-for-water exchange, up to 600 acre-feet. ECCV and ACWWA will use a portion of their decreed fully consumable water rights to meet all or a portion of Longmont's Union Reservoir Change Decree Case No. 87CW22, Bijou Ditch Loss Obligations in July and August. Longmont will use a portion of its decreed fully consumable water rights, up to 600 acre-feet, to meet a portion of ECCV/ACWWA Winter Return Flow Obligations, November through March. This benefits all participants in helping to meet the water rights demands in those periods.

After further discussion with the Board, **a motion was made by Board member Peterson to recommend that City Council approve the Short-Term Water Supply Exchange Agreement with ECCV, ACWWA, and United Water; the motion was seconded by Board member Caldwell. Motion passed 5-0.**

9. ITEMS FROM STAFF

A. Monthly Water Supply Update

Staff member Wes Lowrie provided snowpack information as of February 1, 2020, to the Board. We are still trending in an above average direction overall. Snowpack in the South Platte River Basin was at 119%. Precipitation in January was at 79%, bringing the year-to-date average to 99%. Reservoir storage at the end of December was 111%, which is higher than last year's 104%. As of February 19, the South Platte River Basin was reporting at 127% and the Upper Colorado River was at 114%. Projections for the season are continuing the trend toward an average/above average snowpack year.

B. Monthly Legislative Report

Staff member Huson updated the Board on two legislative bills in the 2020 Colorado Legislative Session. HB-1097, a bill regarding interconnected systems, died in the House Agriculture Committee and was postponed indefinitely. SB 20-153, a bill to set up a water fee for water projects, was postponed indefinitely in the Senate Agriculture Committee. Longmont opposed this bill.

He also explained HB 20-1164, which was submitted at the beginning of the meeting. This bill proposes exemptions for housing authorities from tap fees and development fees imposed by water conservancy districts. Discussion among the Board members ensued.

A motion was made by Board member Caldwell to recommend that the City of Longmont oppose HB 20-1164; the motion was seconded by Board member Davis. Motion passed 5-0.

C. Windy Gap Firming Project Update

Staff member Huson reported that the legal group is working to figure out the best way to construct an allotment contract and an operations contract, whether to bring them together or separate. The committees are continuing their work on what needs to be included in those contracts. Staff member Huson hopes they can finish those and bring them to the Water Board for discussion in the next couple of months.

There is nothing new to report on the federal lawsuit as we are still waiting on the new judge to look at the case. Concerning the state water rights case, negotiations with the two main objectors continue and still have a little ways to go.

The contractors are continuing to pull together their project proposals for equipment needs and various other items and are working with a technical team to do so.

10. ITEMS FROM BOARD

A. Review of Major Project Listing

A review of major project listing was provided in the agenda packet.

Additionally, Staff member Lowrie stated that he is hopeful the Board will get an update from other PWNR staff at next month's meeting on Union Reservoir and Button Rock efforts. Water Resources' Annual Report will also be brought to the Board at their next meeting.

11. INFORMATIONAL ITEMS AND WATER BOARD CORRESPONDENCE

Chair Williams referenced the article he brought to the meeting regarding the Colorado River. To summarize, he stated that the article discussed that with increased temperatures we would see a decrease in snowpack and water supply due to heating. The article estimated that for every Celsius-degree increase there would be a nine percent decrease in available flow and supply.

He added that the City of Fort Collins conducted a climate change analysis to project how it might impact their raw water system, including their C-BT yields. He shared that his impression from reviewing that analysis, also something the article alluded to, was that there is much uncertainty on how climate change would affect precipitation. The report discussed in the article indicated there would likely be more variability in precipitation, but not necessarily less. He

stated that it could have impacts on the Windy Gap Firming Project, but suggested that storage could become even more important in wet years to prepare for the drier years.

Chair Williams invited Ms. Weis to comment since it was related to the article she brought to the Board. She stated that the article she brought in for the Board additionally discussed how higher levels of evaporation and transpiration due to higher temperatures would also affect the flow yields. The article reported that this would negatively affect the Colorado River, and therefore, water rights in the future. Chair Williams added that the current rules outlined in the Colorado River Agreement would expire in 2026 and negotiations for new rules would begin over the next couple of years. He suggested that many variables, including these, would be part of the discussion for setting the new guidelines for water use along the Colorado River after the 2026 expiration of the current guidelines.

12. ITEMS TENTATIVELY SCHEDULED FOR FUTURE BOARD MEETINGS

The next cash-in-lieu review is scheduled for the March 2020 meeting.

Staff member Huson notified the Board of the NCWCD Spring Water Users meeting that would be held on Tuesday, April 7, 2020, in Greeley. Any Board members wanting to attend could contact Heather McIntyre to register.

He also mentioned that the City's Climate Action Task Force (CATF) is currently focusing on renewals, transportation, and energy use; as such, they have not yet launched their water committee. He stated that staff would email the Board with the Council packet information for the March 3, 2020 meeting, which would include the monthly Climate Action report to Council. Councilmember Martin added that the CATF committees were supposed to submit at least one drafted recommendation by mid-February to the full task force, and the renewables committee she was part of had several they were going to submit.

13. ADJOURN

There being no further business to come before Water Board, Chair Williams adjourned the meeting at 3:57 pm.

The next regular meeting of the Longmont Water Board will be held on March 16, 2020, at 3:00 pm at the Service Center, 1100 South Sherman Street, Longmont, CO 80501.

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Todd Williams, Water Board Chair **Date**

_____ _____

Heather McIntyre, Recording Secretary **Date**

Attachment 1

Science

REPORTS

Cite as: P. C. D. Milly, K. A. Dunne, *Science* 10.1126/science.aay9187 (2020).

Colorado River flow dwindles as warming-driven loss of reflective snow energizes evaporation

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The sensitivity of river discharge to climate-system warming is highly uncertain and governing processes are poorly understood, impeding climate-change adaptation. A prominent exemplar is the Colorado River, where meteorological drought and warming have been shrinking a water resource that supports more than USD 1 trillion per year of economic activity. Monte-Carlo simulation with a radiation-aware hydrologic model resolves the longstanding, wide disparity in sensitivity estimates and reveals the controlling physical processes. We estimate that annual-mean discharge has been decreasing by 9.3% per °C of warming due to increased evapotranspiration, mainly driven by snow loss and consequent decrease of reflection of solar radiation. Projected precipitation increases likely will not suffice to counter fully the robust, thermodynamically induced drying. Increasing risk of severe water shortages is expected.

The Upper Colorado River Basin (UCRB) supplies water to ~40 million people and supports ~16 million jobs (*1*). Atmospheric warming and recent precipitation deficits heighten concern about the future (*2*–*6*), but the response of river discharge to warming remains highly uncertain. An implicit assumption in the UCRB hydroclimatic change literature is that two climatic mean variables—precipitation and temperature—determine runoff (hence, river discharge) response, following constant sensitivities α (% discharge change per % precipitation change) and β (% discharge change per °C warming). Empirical regression analyses imply large (–13 to –15% $°C^{-1}$) values of β (*4*, *6*–*8*), inconsistent with estimates in the range –2 to –9% $°C^{-1}$ obtained from perturbation of temperature inputs (the "delta" method) to hydrologic-model simulations (*2*, *9*, *10*) and from theory (*11*); for α, regression and delta estimates are in much better agreement (*10*). The discrepancy in β, which is seen for rivers around the globe (*11*), translates into great uncertainty in magnitude of future impacts on human livelihood, economic activity and ecosystem health. The situation is exacerbated by limited process understanding in the presence of hydroclimatic non-stationarity (*12*). Indeed, the empiricism inherent in the regression approach and even in the estimation of energy-driven evaporative demand in the hydrologic models (*13*) leaves open to question the use of such methods for extrapolation of past observations to the future under anthropogenic climate change. Accordingly, we give special attention here to surface net radiation—the ultimate driver of evapotranspiration—and to its modulation by snow-affected surface albedo (*14*), rather than relying on temperature measurements as a surrogate for energy availability. We find a strong influence of snow-affected albedo on radiation balance in the UCRB (Fig. 1) (*15*), necessitating its consideration in process-based estimation of β.

Herein we address the following questions in turn by use of a monthly water-balance model grounded in a suite of observations: Does the model reproduce the historical regression-based β? What is the model's delta-based β, and why does it differ from the regression-based value? Can the two values be reconciled? What physical processes control β? How sensitive is our β estimate to the assumptions in our analysis? How much did warming contribute to the historical hydrological drying in the UCRB? What future changes in UCRB discharge can be expected?

In addition to the snow-water equivalent (SWE), albedo and radiation measurements used to develop the relations in Fig. 1, we used observations of precipitation and temperature (Fig. 2 and Fig. 3, A and B), as well as discharge (Fig. 3G), to constrain a hydrologic simulation model (*15*), in order to elucidate the processes controlling sensitivity and to reconcile divergent published sensitivity estimates. The model has a monthly time step and divides the 290,000-km^2 UCRB into 960 subareas in order to capture the strong heterogeneity induced by rugged (2,700-m relief) topography (Fig. 2C). Rain-snow partitioning depends on temperature. Evaporative potential is set to the rate of non-water-stressed evapotranspiration under conditions of minimal advection (*16*). Fifteen model parameters are estimated by maximizing goodness of fit to observed discharge (*15*). Goodness of fit is measured with respect to mean, linear trend, regression-based sensitivities α and β, and Nash-Sutcliffe coefficient of efficiency. (Including a correction that accounts for temporary subsurface storage of runoff before entering the river (*11*), which has previously been neglected, and using an October-September

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ACKNOWLEDGMENTS

This study was facilitated by the Geophysical Fluid Dynamics Laboratory of the National Oceanic and Atmospheric Administration and by the several data providers cited in the Supplementary Materials. The authors gratefully acknowledge colleague reviews by Randal Koster and Thomas Delworth. **Funding:** The authors are supported by the U.S. Geological Survey. **Author contributions:** PCDM was responsible for conceptualization and overall direction of the work and wrote the original draft. PCDM and KAD carried out computations. KAD performed data curation and reviewed the original draft. **Competing interests:** Authors declare no competing interests. **Data and materials availability:** No original data collection was performed. The results of this study are reproducible and extensible by use of the cited data sources and other information in the Supplementary Materials.

SUPPLEMENTARY MATERIALS

science.sciencemag.org/cgi/content/full/science.aay9187/DC1
Materials and Methods
Supplementary Text
Fig. S1
Tables S1 to S5
References (*25–32*)
Data S1 to S3

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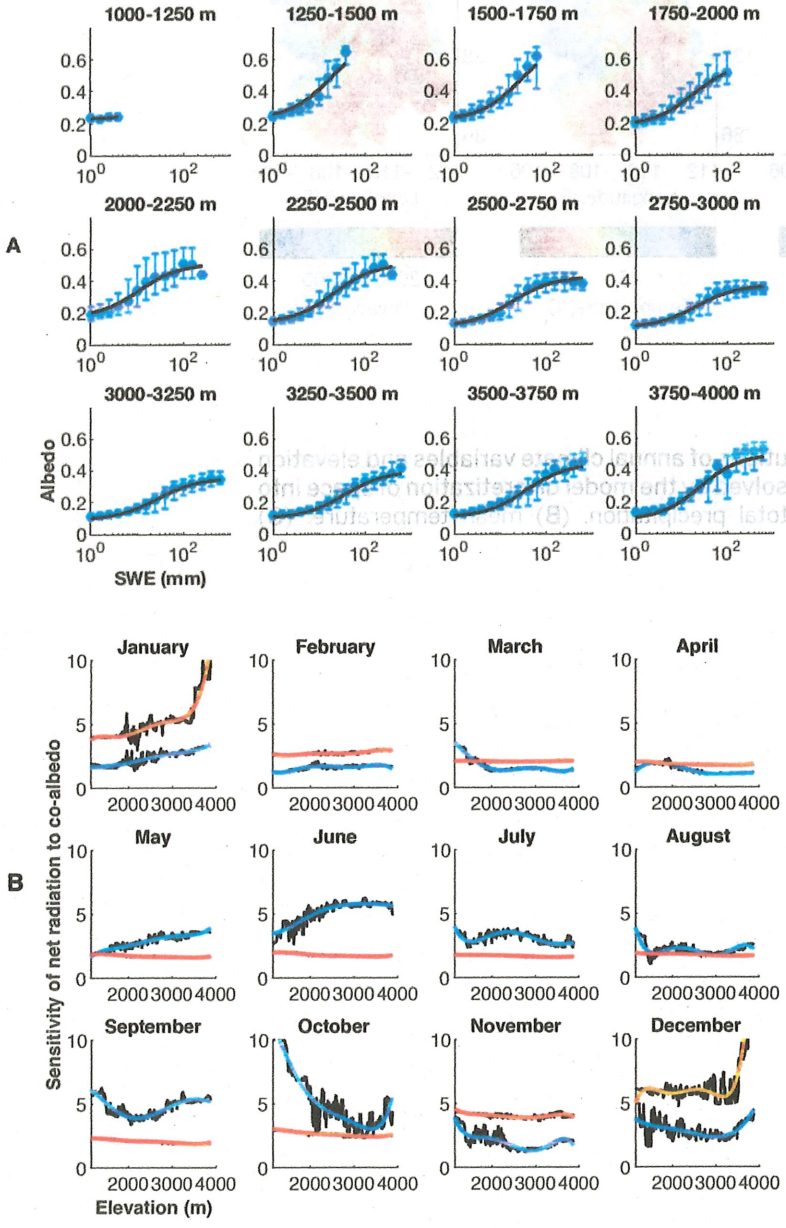

Fig. 1. Observed relations among monthly snow-water equivalent (SWE), surface albedo, and surface net radiation in the UCRB. (A) Dependence of surface albedo on SWE (logarithmic scale) for each of 12 elevation ranges. 1st, 2nd, and 3rd quartiles of binned data are shown. Curves are least-squares fits to the unbinned data and are used in the model. (B) Inferred dimensionless sensitivity $\frac{\overline{C}}{R_n}\frac{dR_n}{dC}$ of net radiation, R_n, to co-albedo (one minus albedo), C, as function of mean elevation of 960 subareas by month of year. Blue curves are fitted to smoothed (30-point moving median; black) data from empirical regression estimates. Red curves are analogous fits for theoretical case where a change in absorbed solar radiation causes no radiative feedbacks. Fits to regressions are used in the model, except that fits to no-feedback data are used in a sensitivity experiment.

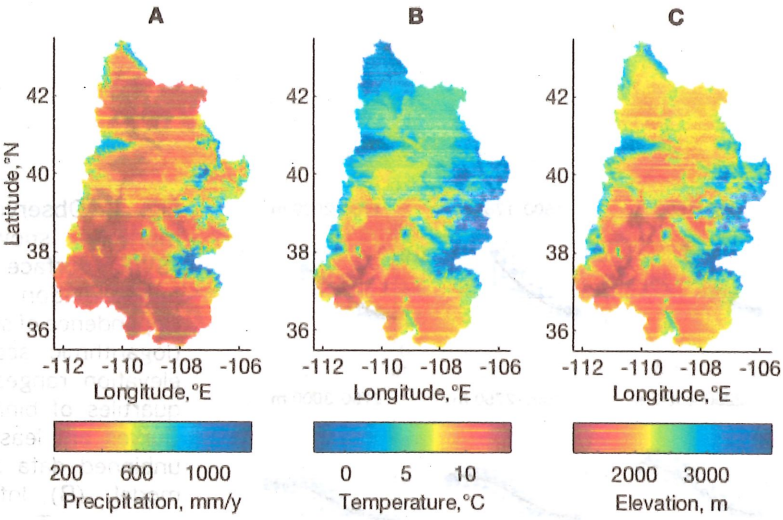

Fig. 2. Spatial distributions of annual climate variables and elevation over the UCRB, as resolved by the model discretization of space into 960 subareas. (A) total precipitation. (B) mean temperature. (C) elevation.

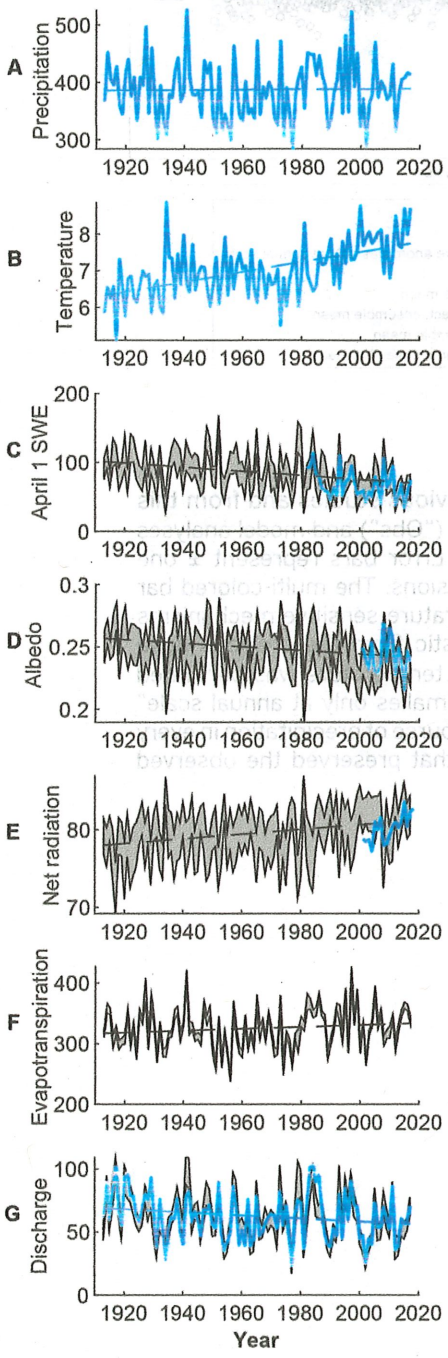

Fig. 3. Water-year time series of basin-mean, annual-mean (A) precipitation (mm y^{-1}), (B) temperature (°C), (C) April 1 SWE (mm), (D) surface albedo (-), (E) surface net radiation (W m^{-2}), (F) evapotranspiration (mm y^{-1}), and (G) discharge per unit area (mm y^{-1}). Blue curves represent estimates from observations, and grey bands represent ensemble range of model outputs. Least-squares linear fits also are shown.

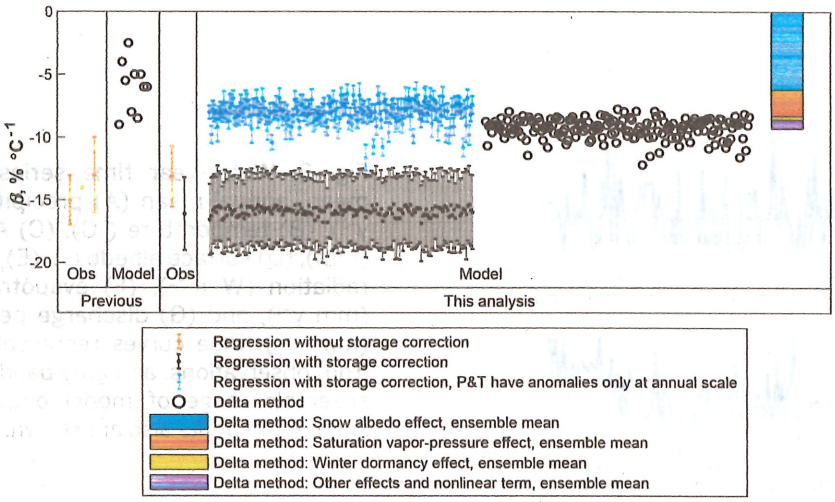

Fig. 4. Summary of estimates of β from previous studies and from this analysis. Left to right: previous observational ("Obs") and model analyses (*2*, *4*, *6–10*) and results from this analysis. Error bars represent ± one standard error of estimation from the regressions. The multi-colored bar shows the contribution of each of the temperature-sensitive mechanisms to the magnitude of β. Excluded as unrealistic from the previous delta analyses are cases in which maximum daily temperature was perturbed while minimum was not (*10*). "P&T have anomalies only at annual scale" refers to the computations in which monthly course of precipitation in every year was set to climatology times a factor that preserved the observed annual anomaly.