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DEPT. OF NATURAL RESOURCES

Nebraska Department of Natural Resources Preliminary Republican River Basin Forecast for 2022

November 15, 2021

Nebraska Department of Natural Resources

Preliminary Forecast and Accounting

Topic Outline

- Final 2020 Accounting
- Preliminary 2021 Accounting
- Early Dry-year Forecast (2022)
- Compact Call Year Evaluation Flow Chart
- Forecasted NRD Projections for 2022

Final 2016-2020 Accounting

Hardy Balances, Table 3C	LRNRD	MRNRD	URNRD
2016	8,700	9,700	5,200
2017	3,900	14,700	17,300
2018	500	-1,900	2,900
2019	40,300	47,000	65,800
2020	14,800	28,500	26,300
2016-2020	81,800	117,500	141,000
Remaining Compact Compliance Volume (RCCV)	-3,280	-3,680	-480

*Units are acre-feet unless otherwise noted.

**Values throughout accounting and forecast presentation rounded to nearest 100. Sum of subtotals may not equal totals due to rounding.

Final 2019-2020 Accounting

Guide Rock Balances, Table 5C	LRNRD	MRNRD	URNRD
2019	25,800	31,000	43,200
2020	10,900	24,300	20,500
2019-2020	36,700	55,300	63,700
Remaining Compact Compliance Volume (RCCV)	-3,280	-3,680	-480

Preliminary 2021 Accounting

Year	Item	Information Source
Provisional Data for T=0 (Current Year or Immediate Past Irrigation Season)	Pumping	Prior year pumping
	Surface Water Use	Estimated from preliminary data and previous years values
	Streamflow	Available provisional records – end-of-year estimated
	Evaporation	Prior year records and provisional data

Preliminary 2021 Accounting – Guide Rock

Guide Rock Balances, Table 5C	LRNRD	MRNRD	URNRD
2020 (final)	10,900	24,300	20,500
2021 (projected)	3,000	8,800	9,600
2020-2021	14,000	33,100	30,100
Remaining Compact Compliance Volume (RCCV)	-2,460	-2,760	-360

Preliminary 2021 Accounting: Hardy with Management Actions

Hardy Balances, Table 3C	LRNRD	MRNRD	URNRD
2017-2020 (final)	59,500	88,200	112,300
2021 (projected)	3,900	9,400	10,400
2017-2021	63,400	97,600	122,700
Remaining Compact Compliance Volume (RCCV)	-2,460	-2,760	-360

Early Dry-Year Forecast (2022)

Dry-Year Forecast

Year	Item	Information Source
Forecast Year T+1 (Coming Irrigation Season)	Groundwater Consumptive Use and Imported Water Supply Credit	Average Values for T=0 and T-1
	Surface Water Consumptive Use	Colorado: Average of T-1 and T-2 use Kansas: $+(0.1858 \times \text{HCLcontent}) + 9,575$ Nebraska: $-(4 \times 10^{-7}) \times (\text{NE lake volume})^2 + 0.52 \times \text{NElakeVolume} - 42,000$
	Streamflow	$(5\text{-year average of state line flows}) \times 0.41 + 0.23 \times \text{HCLcontent} - 27,450$

Compliance Balances

Year	Guide Rock Balance (AF)
T=0 (2021, projected)	21,400
T=+1 (2022, early forecast)	900
2-Year Forecast Balance	22,300

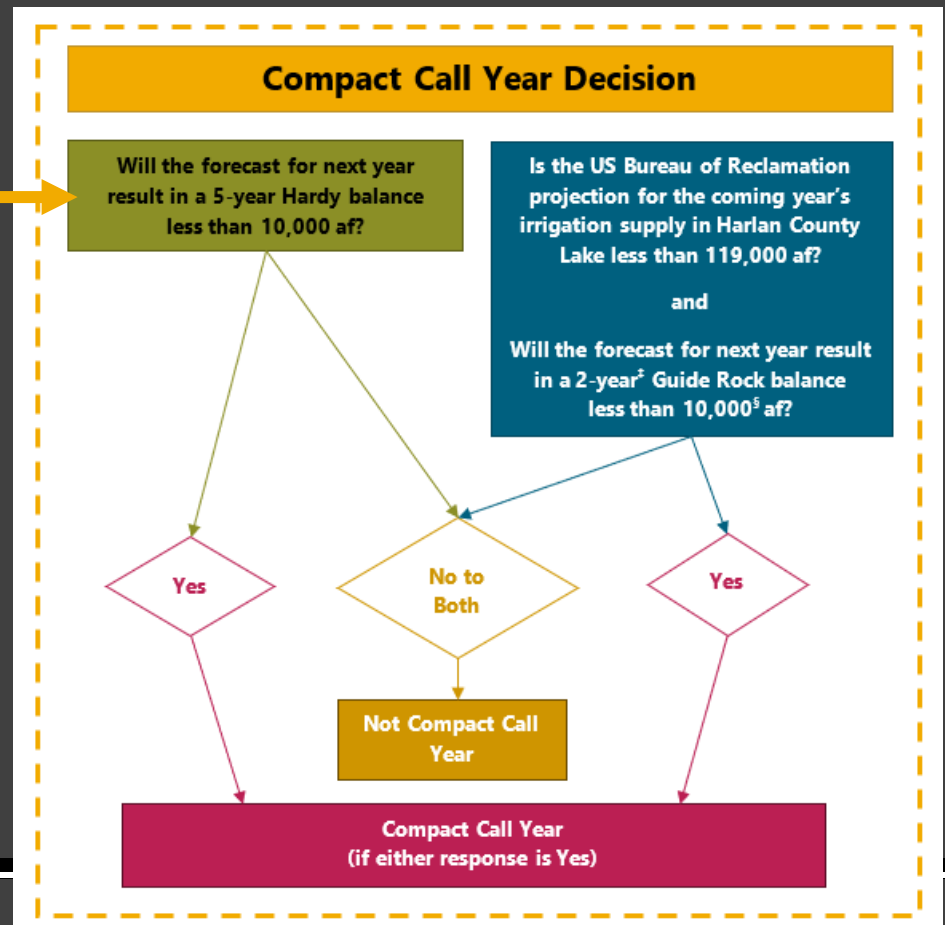
Year	Hardy Balance (AF)
T=-3 to 0 (2018-2021, projected)	259,200
T=+1 (2022, early forecast)	11,200
5-Year Forecast Balance	261,400

Compact Call Year Evaluation: Checklist A. Water Short Year Test

Will the forecast for next year result in a 5-year Hardy balance less than 10,000 AF?

Year	Hardy Balance (AF)
5-Year Forecast Balance	261,400

No.



Compact Call Year Evaluation:

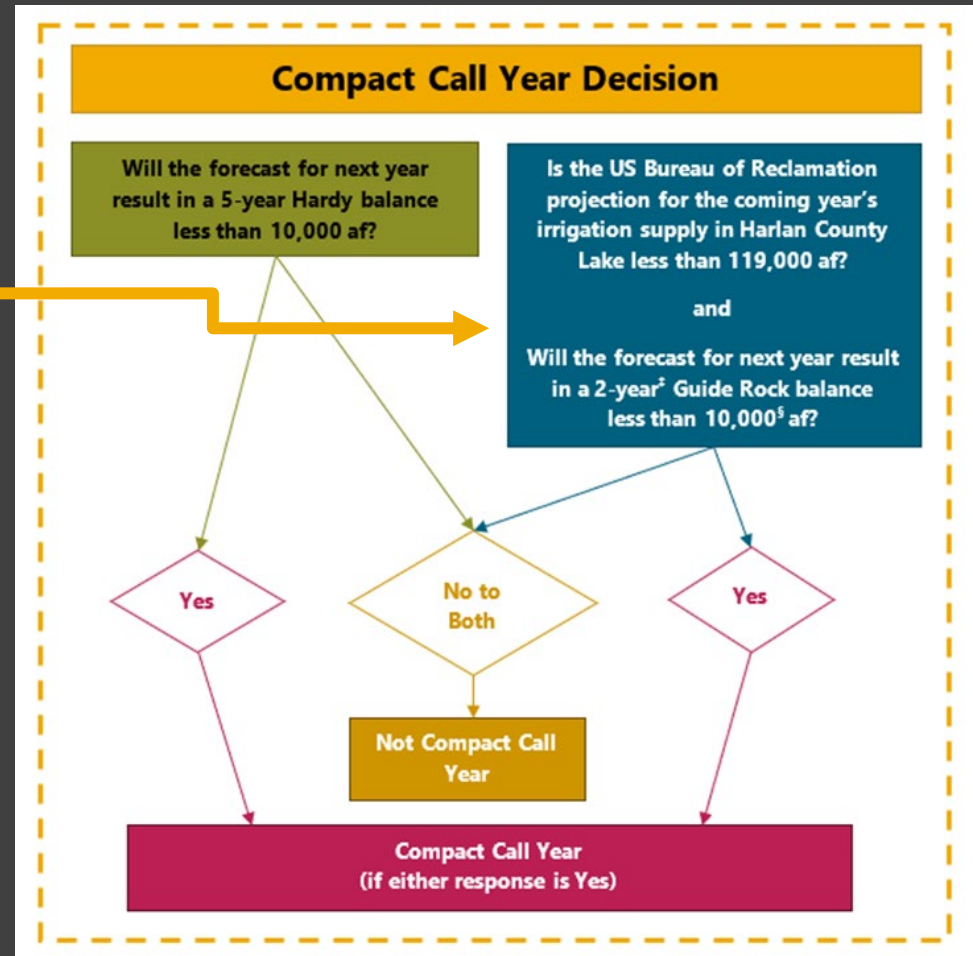
Is the US Bureau of Reclamation projection for the coming year's irrigation supply in Harlan County Lake less than 119,000 AF?

AND

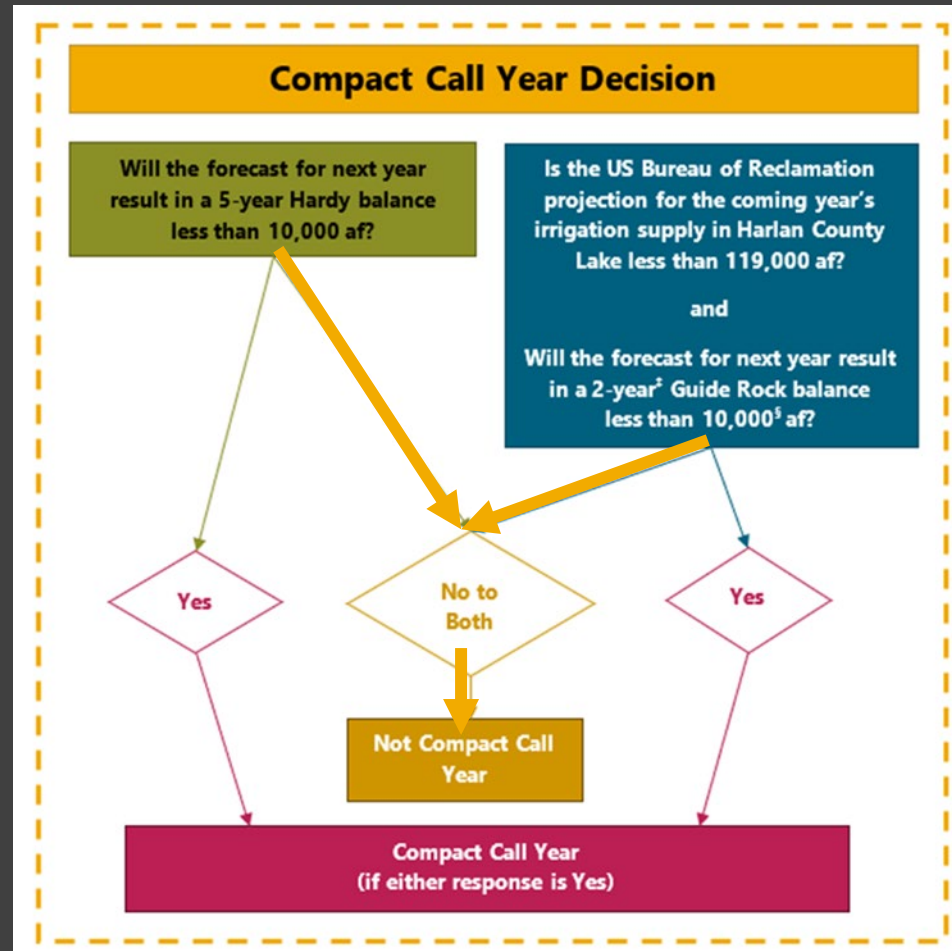
Will the forecast for next year result in a 2-year[†] Guide Rock balance less than 10,000 AF?

No to both.

Year	Guide Rock Balance (AF)
2-Year Forecast Balance	4,100



Compact Call Year Evaluation: Not a Compact Call Year



NRD-Specific Forecast Balances

NRD Annual Guide Rock Balance Forecast for Upcoming Year (2022)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	24.5%	31.1%	44.4%	100.0%
Allowable Groundwater Depletions	41,400	52,900	75,500	170,100
Projected Groundwater Depletions	43,600	49,100	76,500	169,200
2022 Forecast Balance (no action)	-1,900	3,800	-1,000	900
2021, projected	3,000	8,800	9,600	21,400
2-Year Forecast Balance	1,100	12,600	8,600	22,300
RCCV	-1,640	-1,840	-240	-3,720

NRD Annual Hardy Balance Forecast for Upcoming Year (2022)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	25.3%	30.8%	43.9%	100.0%
Allowable Groundwater Depletions	46,100	56,100	80,000	182,200
Projected Groundwater Depletions	45,400	49,100	76,500	171,000
2022 Forecast Balance (no action)	700	7,000	3,400	11,200
2018-2021, projected	59,500	83,000	105,500	248,000
5-Year Forecast Balance	60,300	90,000	108,900	259,200
RCCV	-1,640	-1,840	-240	-3,720

Summary

- Based on the preliminary forecast, the IMP checklist indicates that 2022 will **NOT** be a **Compact Call Year**.
- Preliminary approximate 2021 accounting balances:
 - Guide Rock: **+21,400 ac-ft**
 - Hardy: **+23,800 ac-ft**
- Preliminary dry-year forecast balance for 2022 currently approximated at **900 ac-ft** at Guide Rock and **+11,200 ac-ft** at Hardy
- RCCV on January 1, 2022, will be **-3,720 acre-feet**

Next Steps

- The Department will complete its final forecast prior to January 1, 2022
- Expectation for frequency of accounting updates in 2022?

Augmentation Impacts

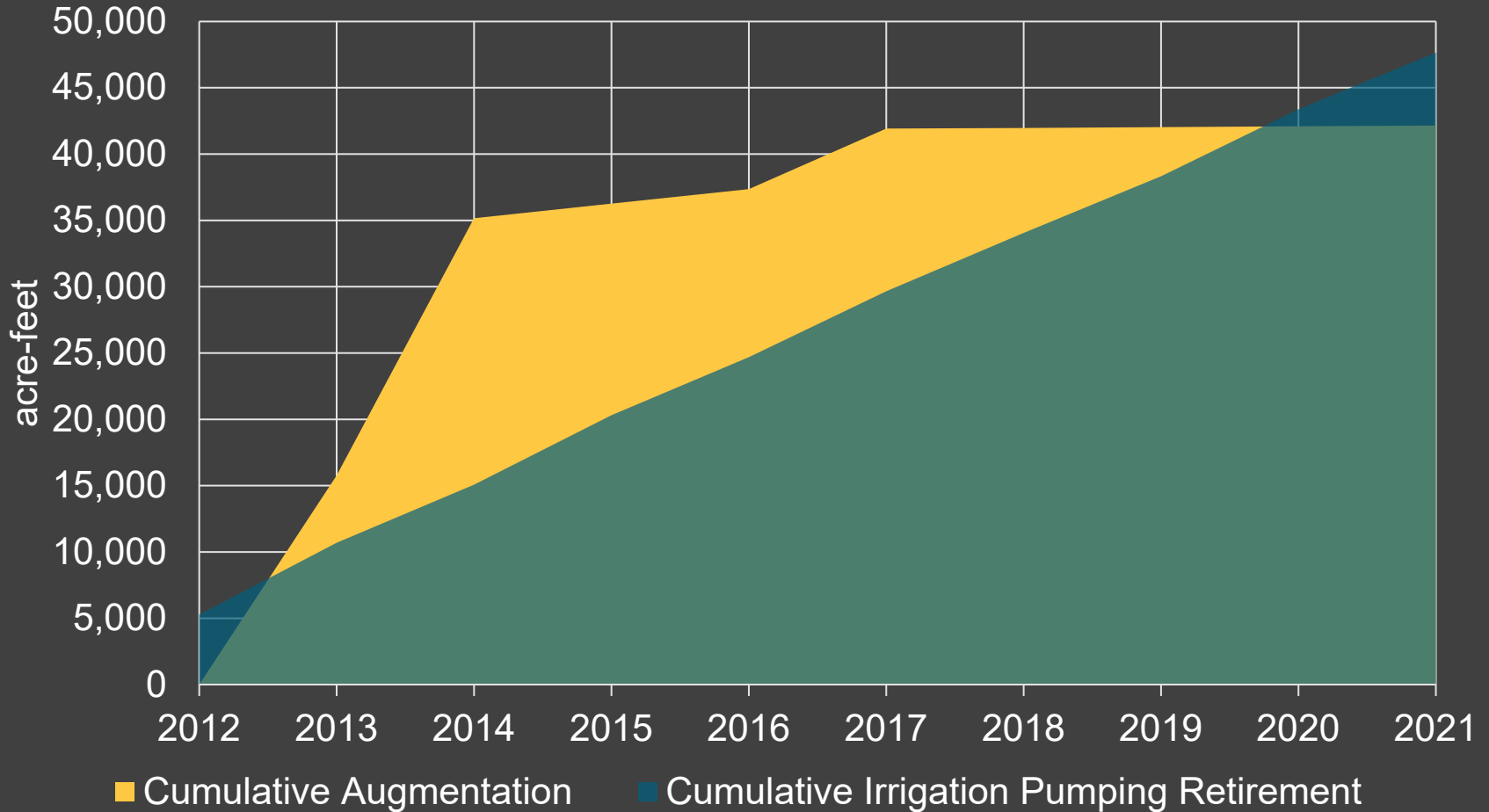
Augmentation Impacts – IMP

Our IMPs state:

“...NeDNR will annually evaluate whether offsets are necessary to mitigate new net depletions resulting from augmentation pumping or other management actions.”

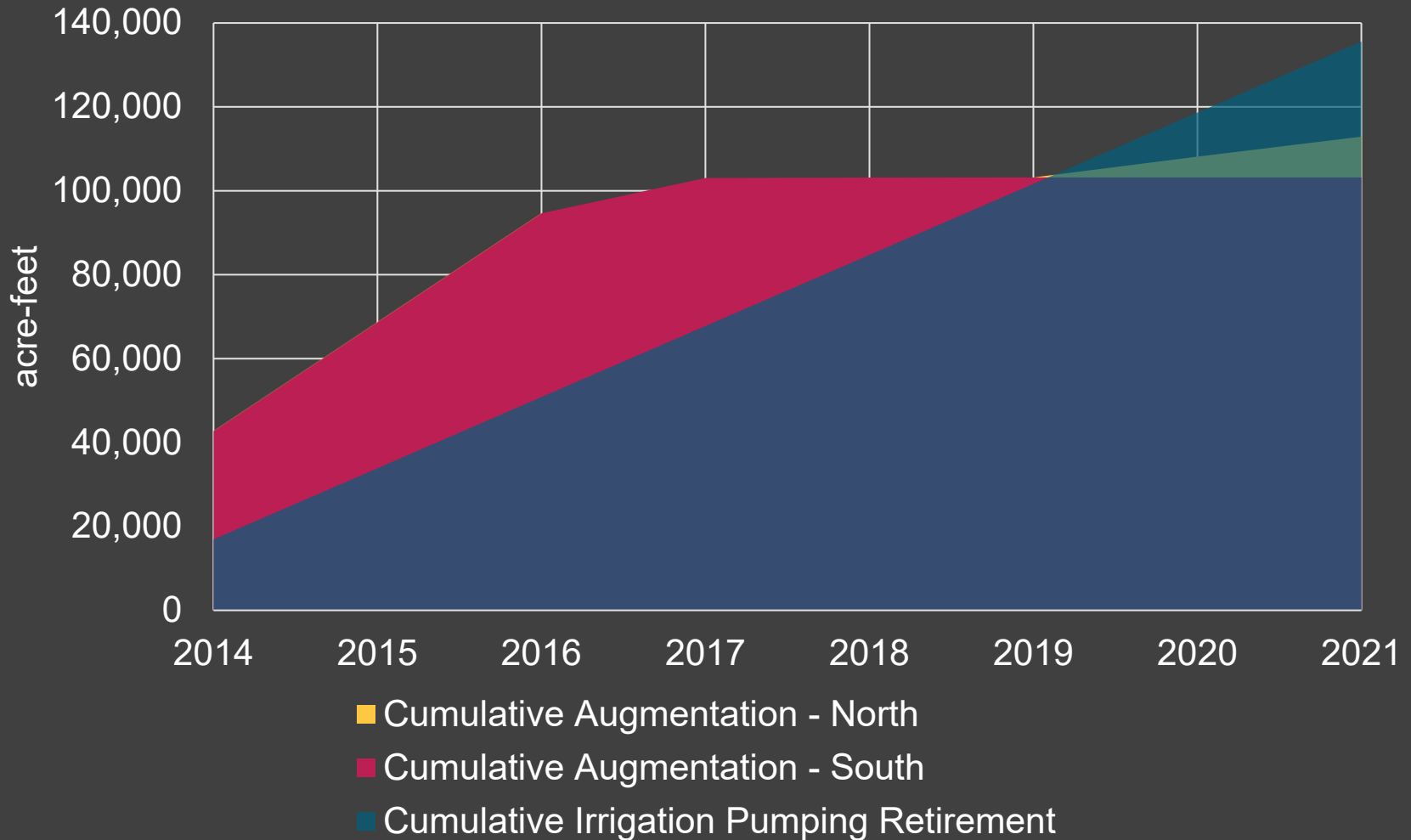
Augmentation Impacts – Model Inputs

Rock Creek



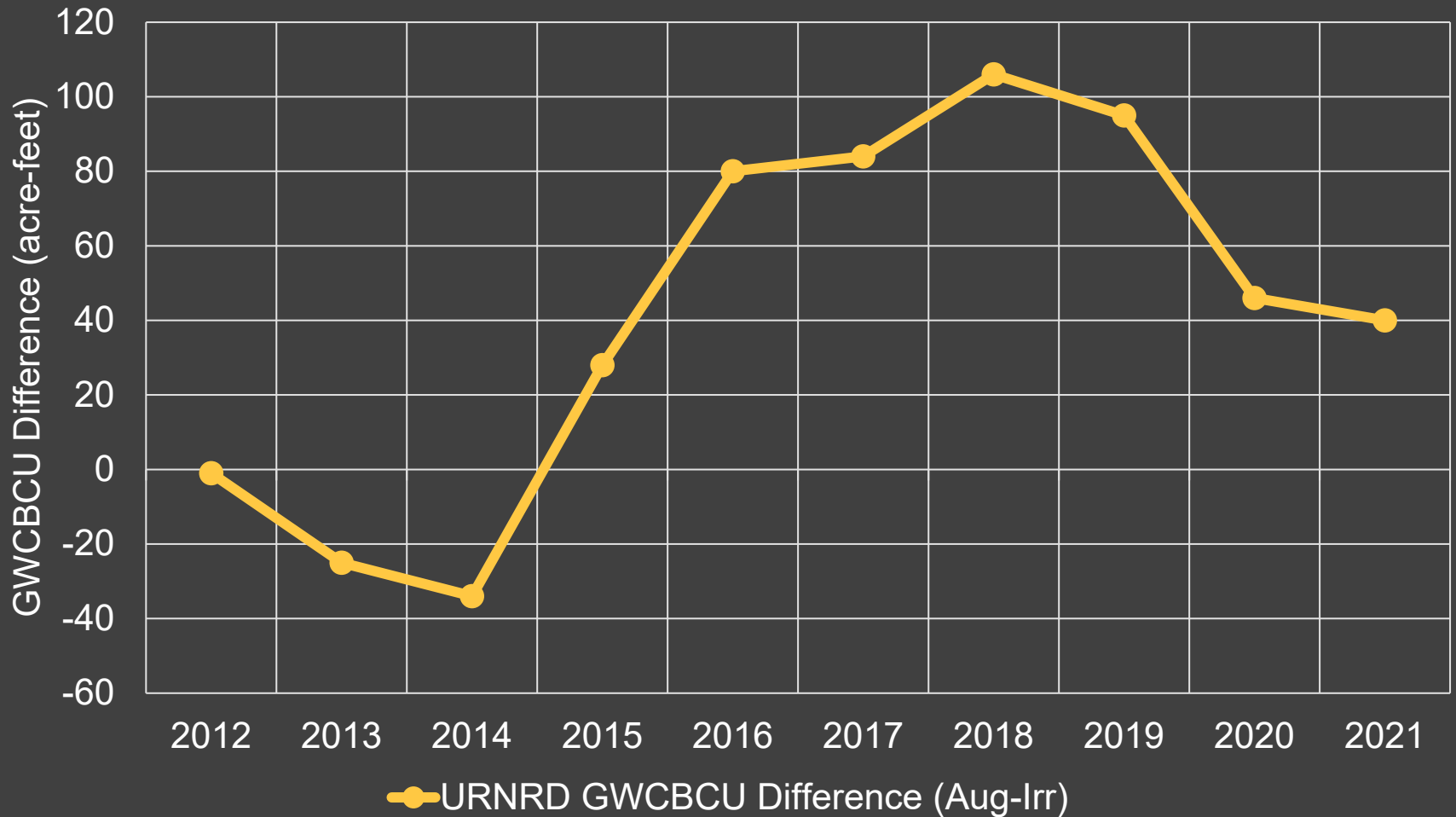
Augmentation Impacts – Model Inputs

N-CORPE



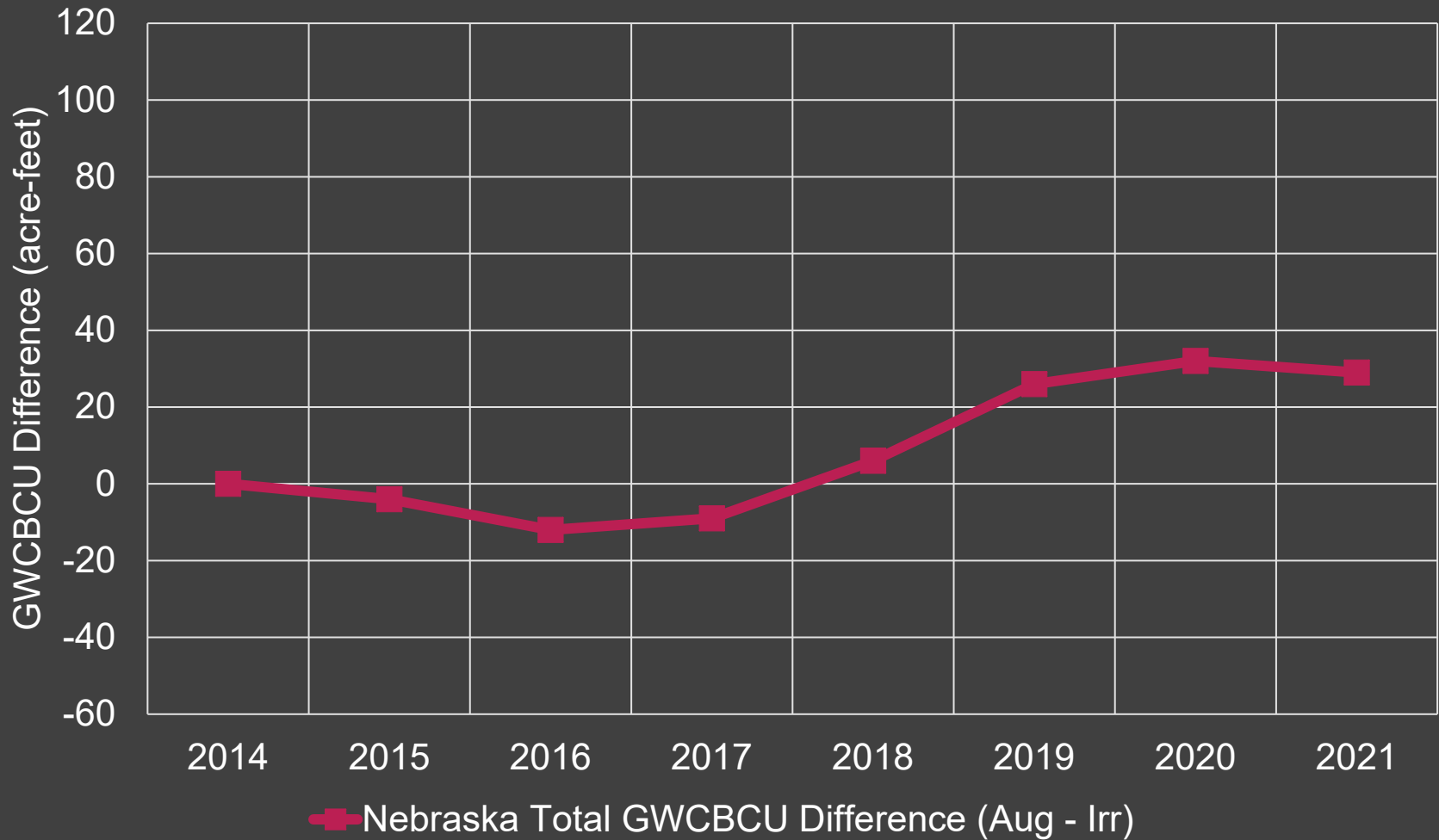
Augmentation Impacts – Oct. 2021 run

Rock Creek Impacts



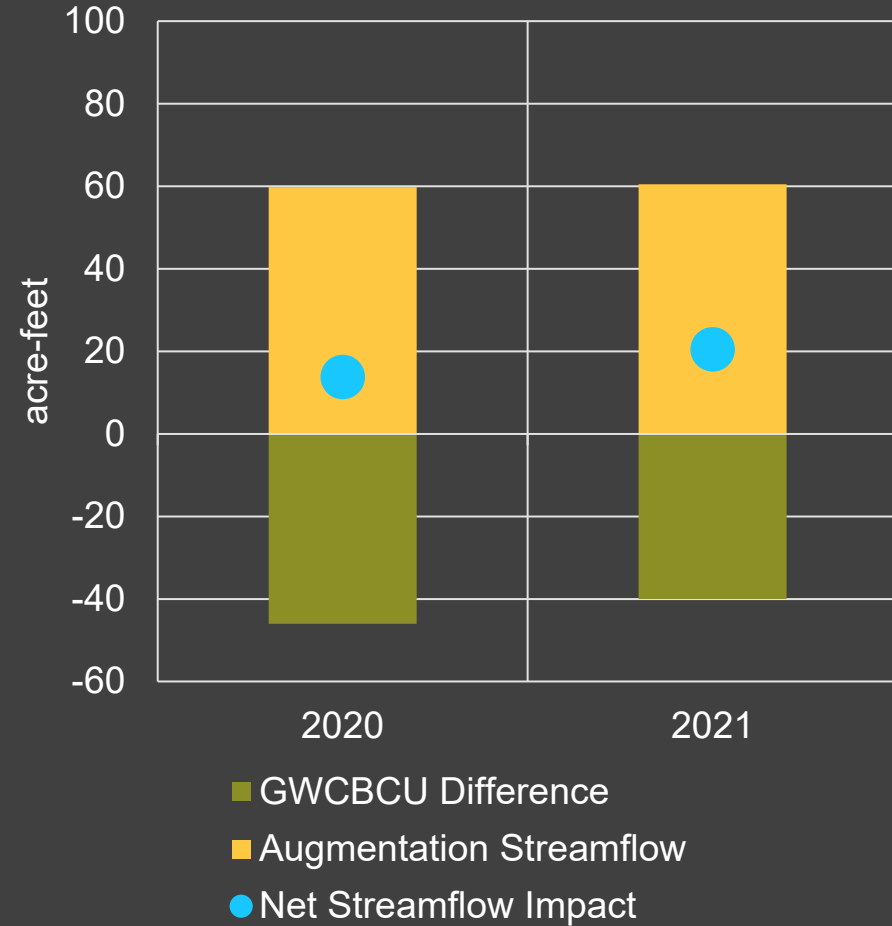
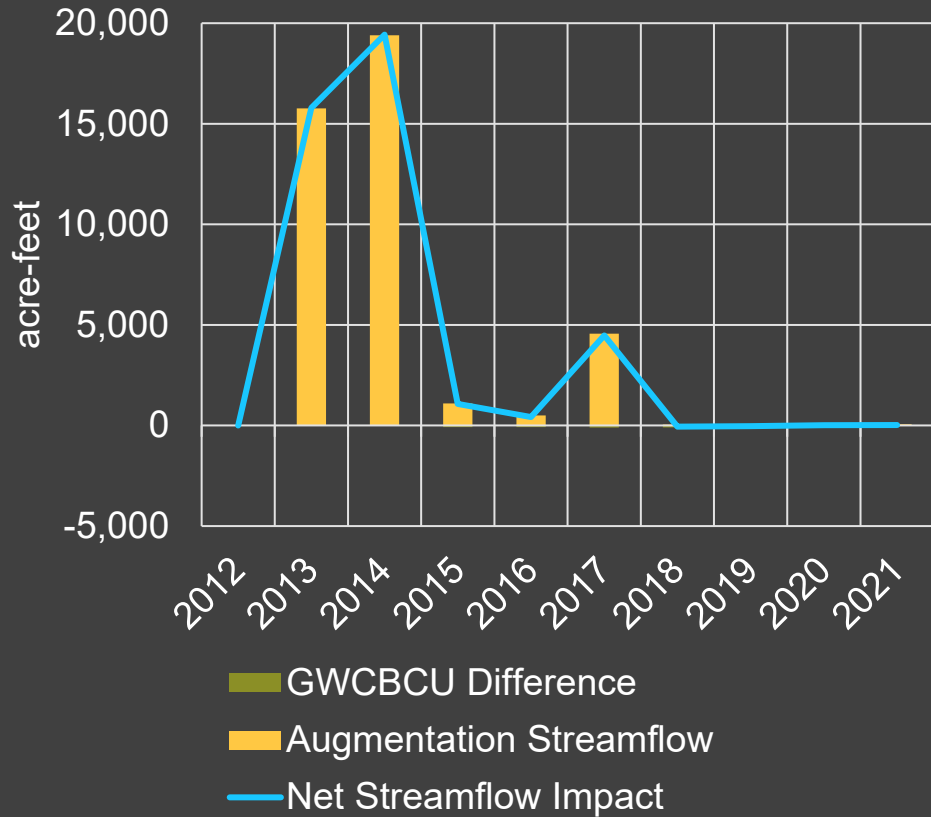
Augmentation Impacts – Oct. 2021 run

N-CORPE



Augmentation Net Streamflow Impacts – Rock Creek

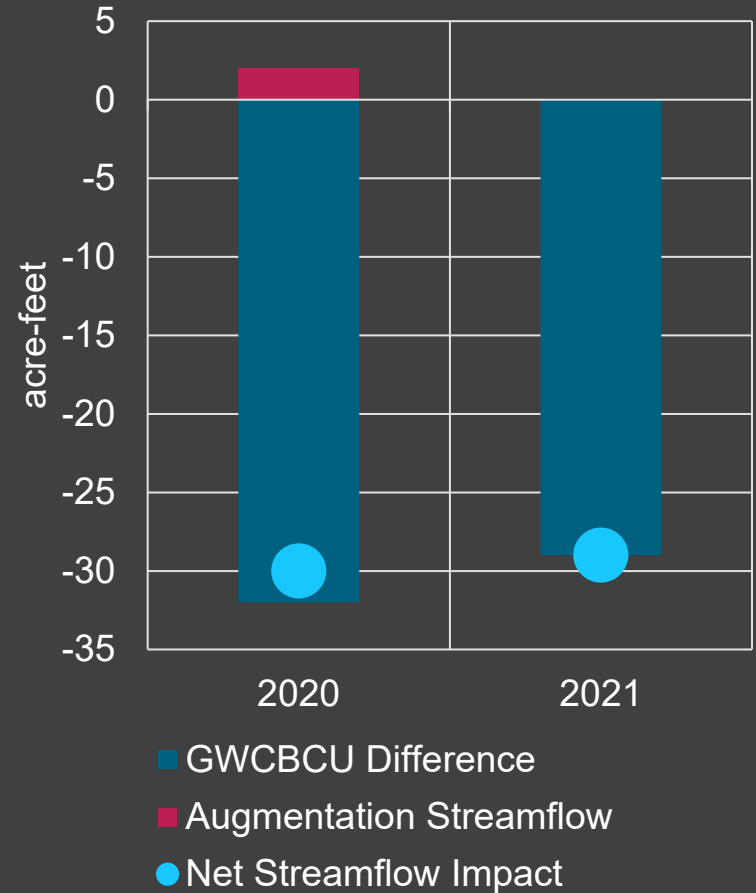
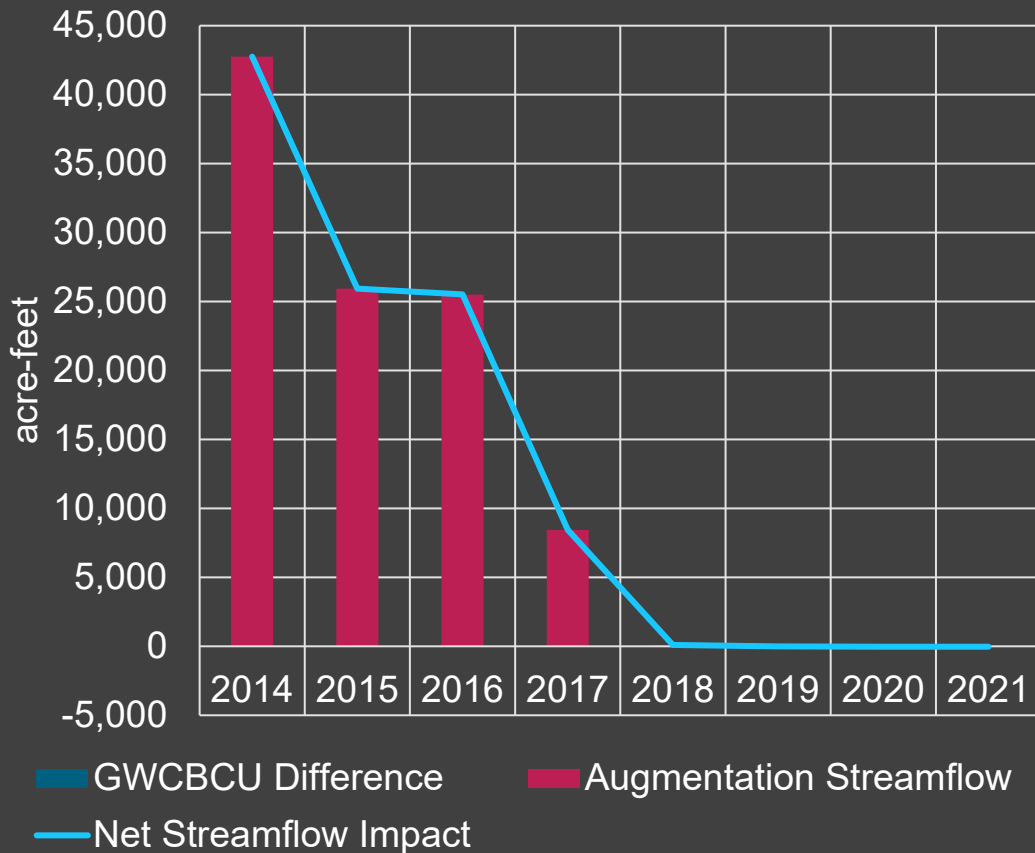
Rock Creek Augmentation Net Impacts to Streamflow



*Augmentation streamflow assumed to occur in same year as pumped; 2021 pumping repeated from 2019

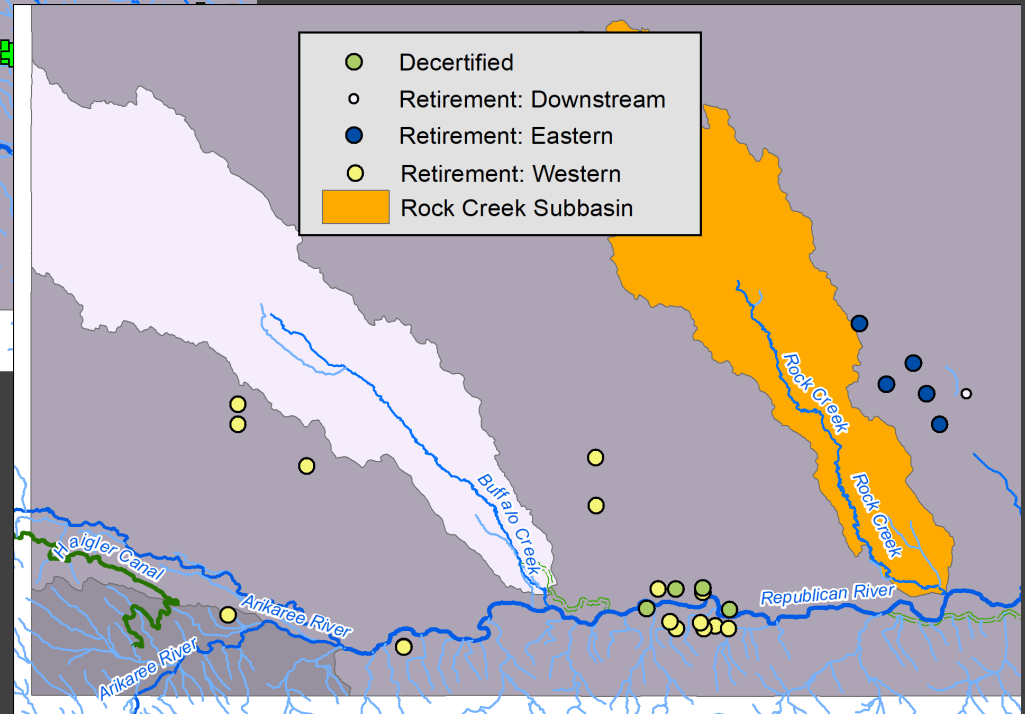
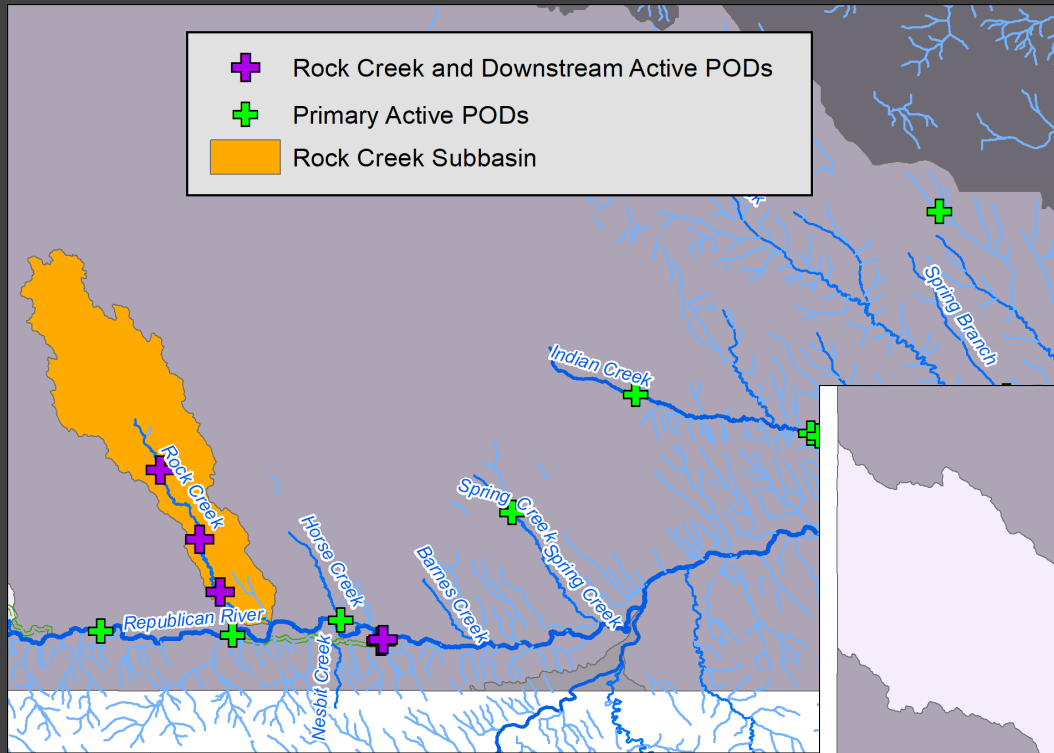
Augmentation Net Streamflow Impacts – N-CORPE

N-CORPE



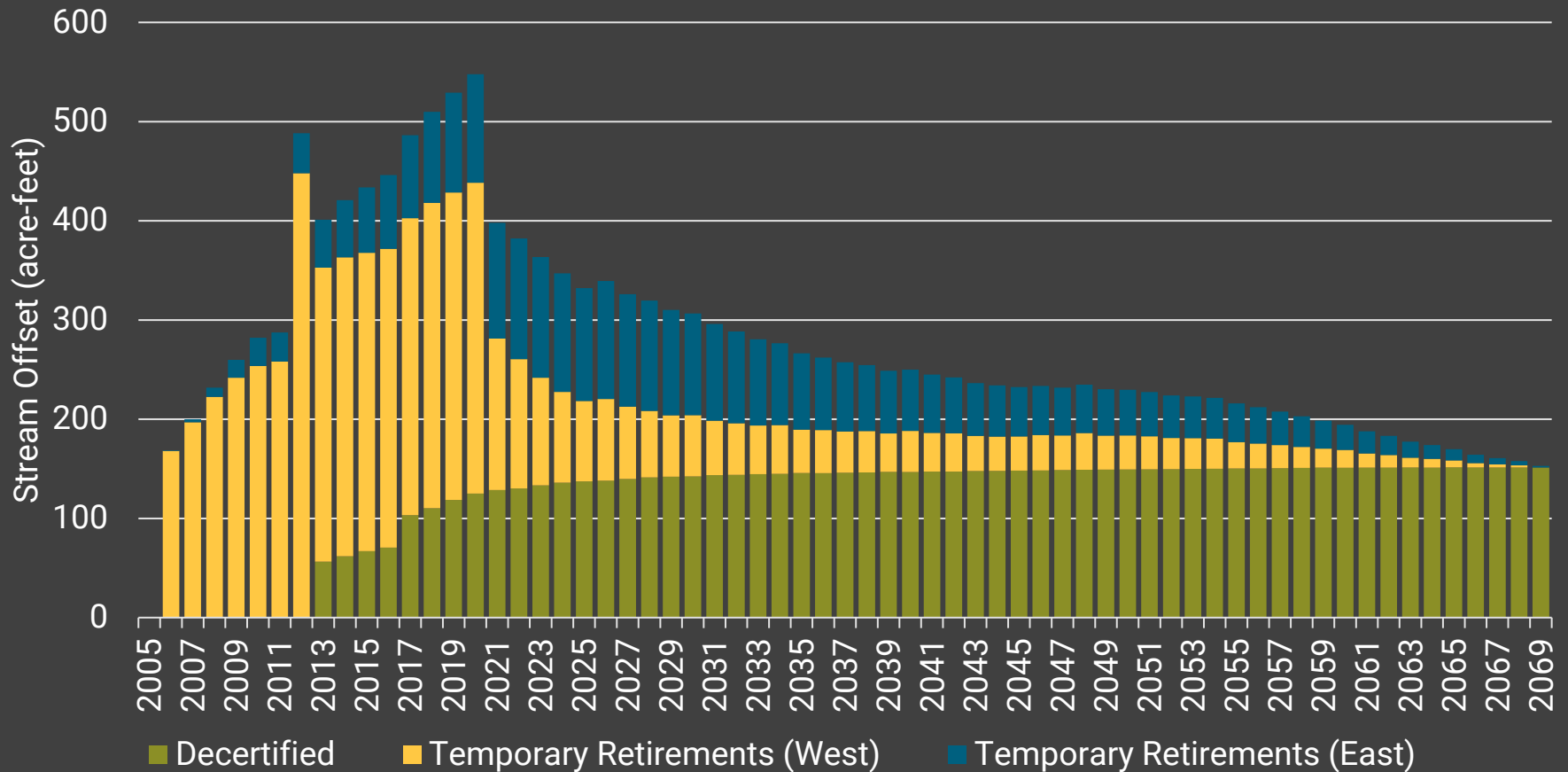
*Augmentation streamflow assumed to occur in same year as pumped; 2021 pumping estimated from year-to-date records and NCORPE AOP

Augmentation Impacts – Rock Creek Offsets



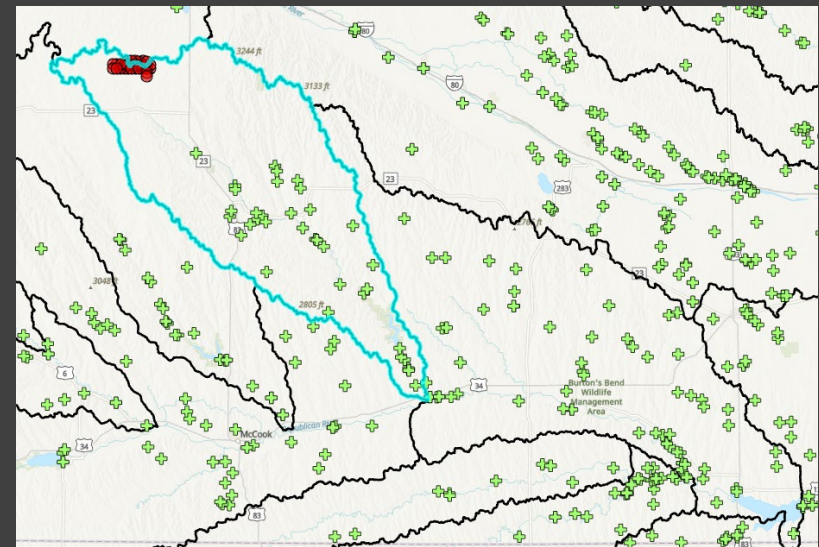
Augmentation Impacts – Rock Creek Offsets

Annual Offset from Decertified and Retired Historical Uses Affecting and Upstream of the Rock Creek and Republican River Confluence



N-CORPE Offsets Discussion

- Net depletions are to Medicine Creek
- Consideration of users impacted by depletions
- NRD management action to consider



Hydrologically Balanced Assessment

For the IMP for the Republican Basin
Portion of Tri-Basin NRD

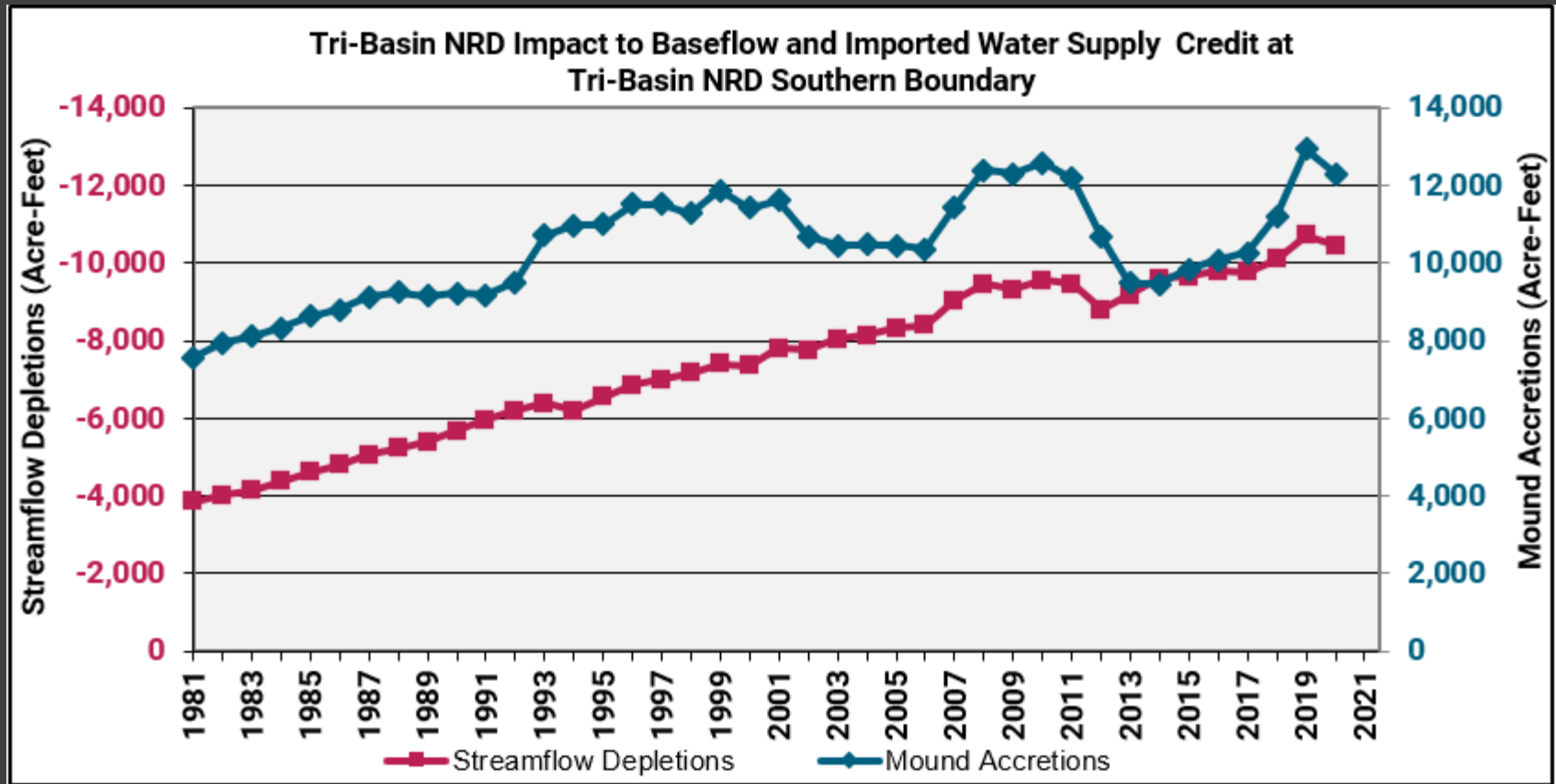
Goal A, Objective 1

“Revise existing NRD integrated water management rules and regulations, to the extent necessary, to insure **that the NRD will incrementally achieve and sustain a hydrologically “balanced” condition** so that, in combination with imported water contributions from the Platte basin, streamflow augmentation and other management actions, Tri-Basin NRD water users will not cause a net depletion to streamflow.....**Under a hydrologically balanced condition in the context of this plan, baseflow impacts and the mound credit will be equal.**”

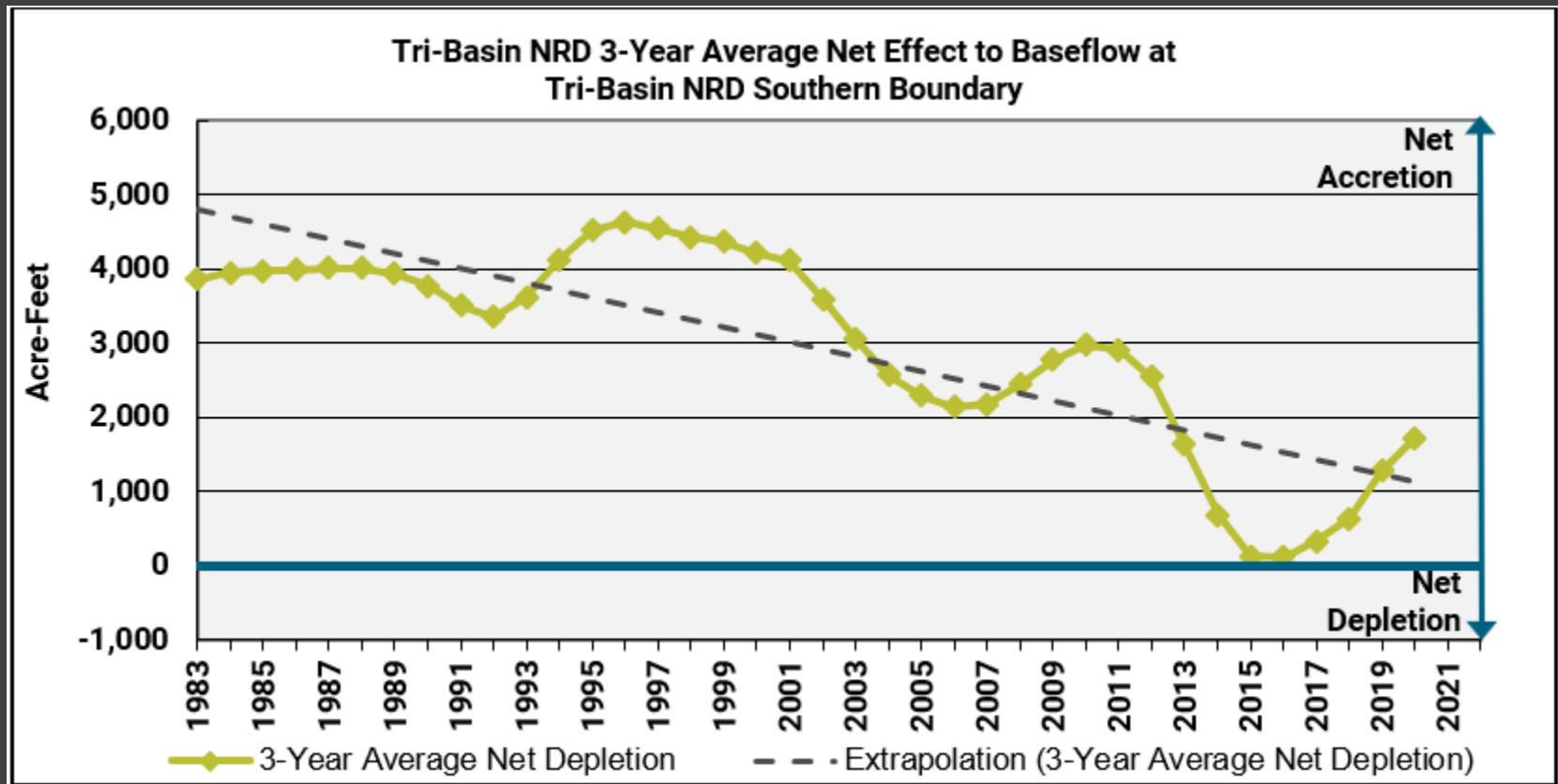
Assessment

“Goal A Objective 1 of this IMP is to establish a hydrologically ‘balanced’ condition in which Tri-Basin NRD water users will **not cause a net depletion to streamflow of the Republican basin when evaluated on a three-year rolling average basis**.”

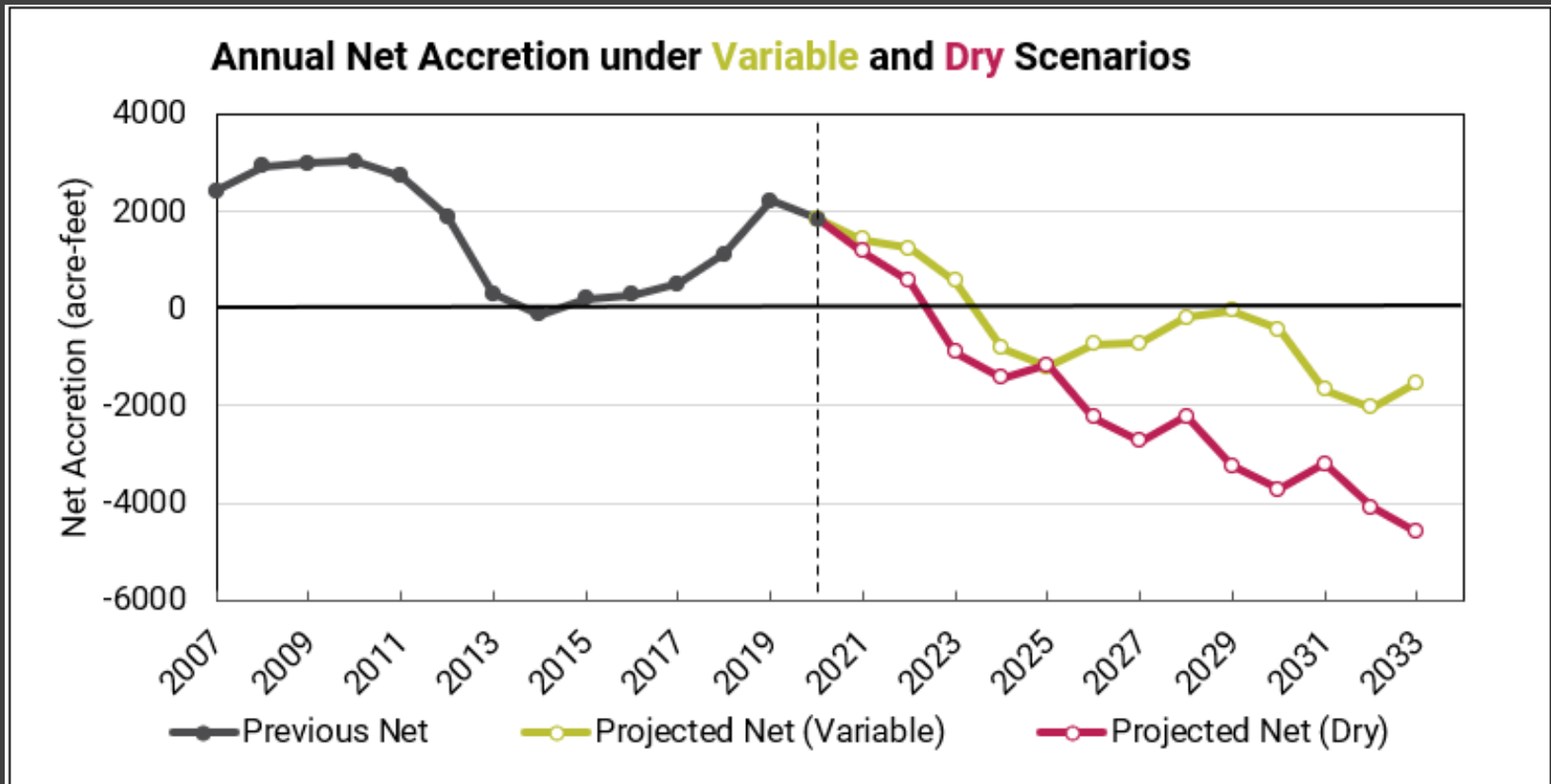
Modeled Depletions and Accretions, 1981 – 2020



Hydrologically Balanced Assessment



Projected Net Accretion



IMP Updates

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