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DEPT. OF NATURAL RESOURCES

# Nebraska Department of Natural Resources Preliminary Republican River Basin Forecast for 2021

**November 9, 2020**

*Nebraska Department of Natural Resources*

# Preliminary Forecast and Accounting

# Topic Outline

- Final 2019 Accounting
- Preliminary 2020 Accounting
- Early Dry-year Forecast (2021)
- Compact Call Year Evaluation Flow Chart
- Forecasted NRD Projections for 2021

# Final 2015-2019 Accounting

Hardy Balances, Table 3C	LRNRD	MRNRD	URNRD
2015	-2,200	4,600	14,100
2016	11,300	7,500	4,900
2017	7,300	12,000	16,600
2018	0	1,500	0
2019	39,800	47,200	65,900
<b>2015-2019</b>	<b>56,200</b>	<b>72,800</b>	<b>101,500</b>
<b>Remaining Compact Compliance Volume (RCCV)</b>	<b>-4,100</b>	<b>-4,600</b>	<b>-600</b>

\*Units are acre-feet unless otherwise noted.

\*\*All values rounded to nearest 100. Sum of subtotals may not equal totals due to rounding.

Distribution percentages were adjusted in 2017, 2018, 2019 for relative increase from NY Baseline Depletion Percentages for distribution of a positive balance

# Final 2018-2019 Accounting

Guide Rock Balances, Table 5C	LRNRD	MRNRD	URNRD
2018	-3,600	-3,500	-6,500
2019	25,000	31,500	43,500
<b>2018-2019</b>	<b>21,400</b>	<b>28,000</b>	<b>37,000</b>
<b>Remaining Compact Compliance Volume (RCCV)</b>	<b>-4,100</b>	<b>-4,600</b>	<b>-600</b>

Distribution percentages were adjusted in 2019 for relative increase from WSY Baseline Depletion Percentages for distribution of a positive balance

# Preliminary 2020 Accounting

Year	Item	Information Source
<b>Provisional Data for T=0 (Current Year or Immediate Past Irrigation Season)</b>	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 2020 Accounting – Guide Rock

<b>Guide Rock Balances, Table 5C</b>	<b>LRNRD</b>	<b>MRNRD</b>	<b>URNRD</b>
2019 (final)	25,000	31,500	43,500
2020 (projected)	10,400	15,900	18,800
<b>2019-2020</b>	<b>35,400</b>	<b>47,400</b>	<b>62,300</b>
<b>Remaining Compact Compliance Volume (RCCV)</b>	<b>-3,280</b>	<b>-3,680</b>	<b>-480</b>

# Preliminary 2020 Accounting: Hardy with Management Actions

<b>Hardy Balances, Table 3C</b>	<b>LRNRD</b>	<b>MRNRD</b>	<b>URNRD</b>
2016-2019 (final)	58,400	68,200	87,400
2020 (projected)	13,700	19,900	24,000
<b>2016-2020</b>	<b>72,100</b>	<b>88,100</b>	<b>111,400</b>
<b>Remaining Compact Compliance Volume (RCCV)</b>	<b>-3,280</b>	<b>-3,680</b>	<b>-480</b>

Distribution percentages were adjusted in 2017, 2018, 2019 for relative increase from NY Baseline Depletion Percentages for distribution of a positive balance



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# Early Dry-Year Forecast (2021)

# 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

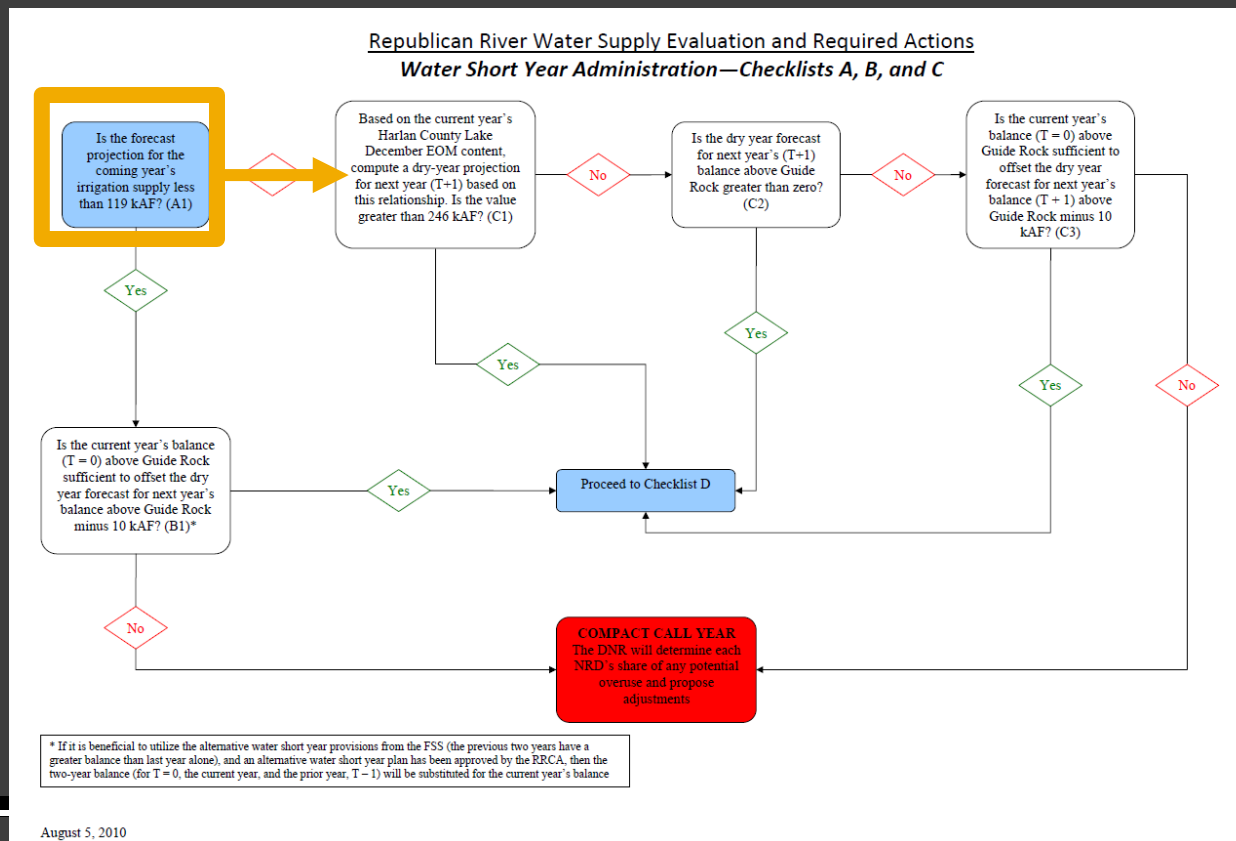
Year	Guide Rock Balance (AF)
T=0 (2020, projected)	45,100
T=+1 (2021, early forecast)	-6,200
2-Year Forecast Balance	38,900

Year	Hardy Balance (AF)
T=-3 to 0 (2017-2020, projected)	248,000
T=+1 (2021, early forecast)	3,200
5-Year Forecast Balance	251,200

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

Is the forecast projection for the coming year's irrigation supply less than 119 kAF?

No.  
Proceed to Checklist C.



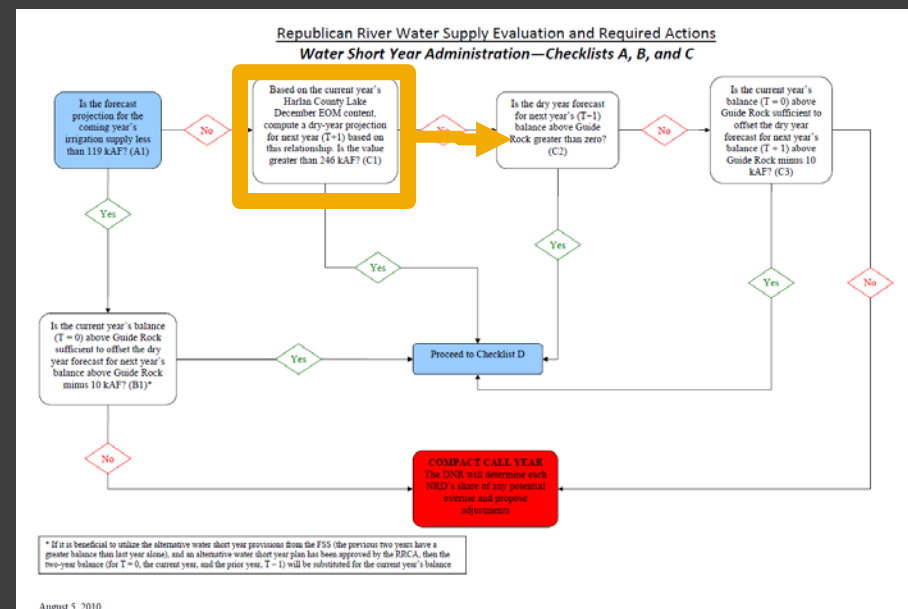
# Compact Call Year Evaluation: Checklist C.

## Early Warning System for WSY Compliance

C1. When HCL declines from one year to the next, the December EOM content is about 80% of what it was last year. A December EOM of 246 kAF provides a high level of confidence that the coming year (T+1) will not be a WSY. Based on the current year's (T=0) HCL December EOM content, compute a dry-year projection for next year (T+1) based on this relationship. Is the value greater than 246 kAF?

No. Advance to next question.

We are projecting the HCL December EOM 2020 content to be 275,000 AF.



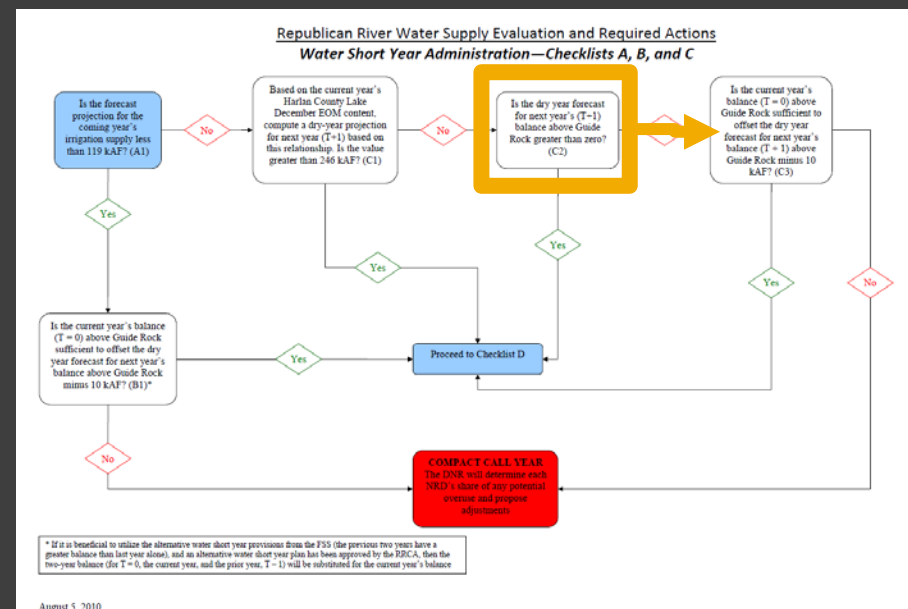
# Compact Call Year Evaluation: Checklist C.

## Early Warning System for WSY Compliance

C2. Is the dry year forecast for next year's (T +1) balance upstream of Guide Rock greater than zero?

No. Advance to next question.

Year	Guide Rock Balance (AF)
T=+1 (2021, early forecast)	-6,200

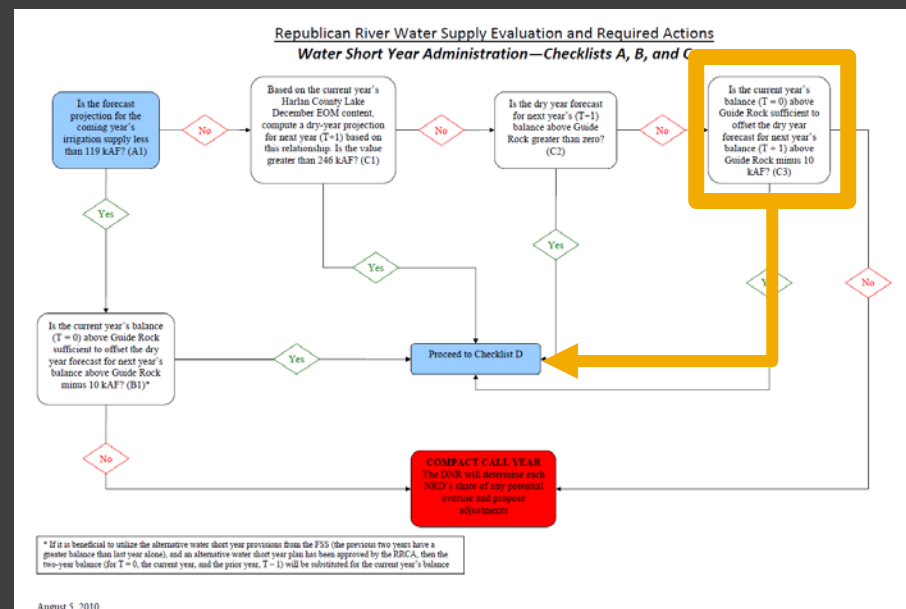


# Compact Call Year Evaluation: Checklist C. Early Warning System for WSY Compliance

C3. Is the current year's balance (T=0) upstream of Guide Rock sufficient to offset the dry year forecast for the next year's balance (T+1) upstream of Guide Rock minus 10kAF?

Yes. Proceed to Checklist D.

Year	Guide Rock Balance (AF)
T=0 (2020, projected)	45,100
T=+1 (2021, early forecast)	-6,200
2-Year Forecast Balance	38,900

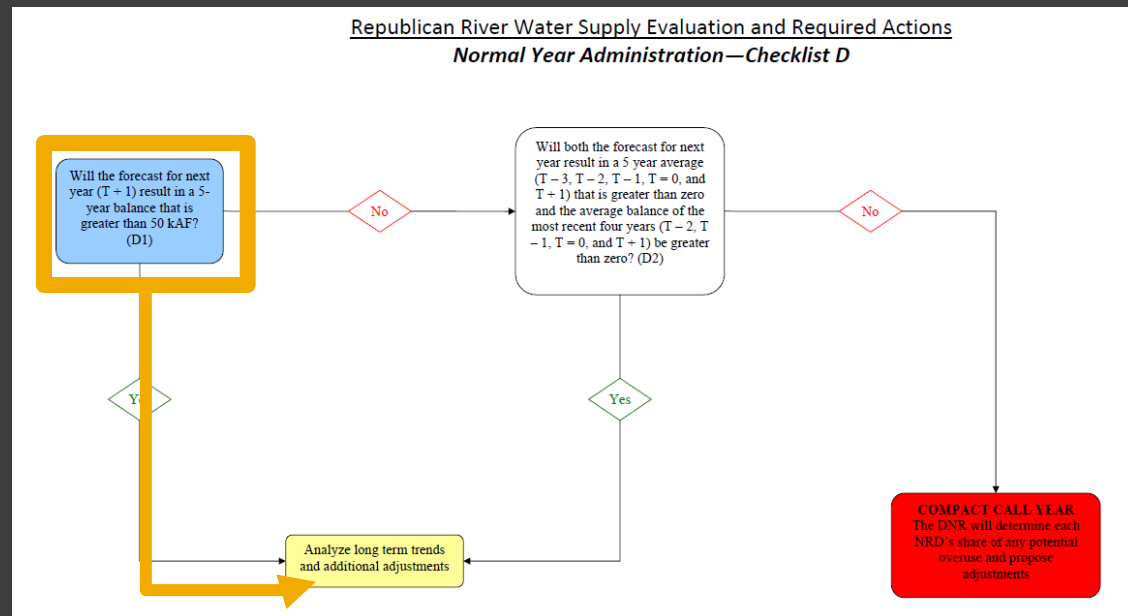


# Compact Call Year Evaluation: Checklist D. Normal Year Administration

D1. Will the forecast for next year (T+1) result in a 5-year balance at Hardy that is greater than 50 kAF?

Yes. Analyze long term trends and additional adjustments in accordance to IMP Section (VIII.B.2.e) Monitoring and Studies. Monitoring. Additional adjustments related to long-term trends

Year	Hardy Balance (AF)
T=-3 to 0 (2017-2020, projected)	248,000
T=+1 (2021, early forecast)	3,200
5-Year Forecast Balance	251,200





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# NRD-Specific Forecast Balances

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# NRD Annual Guide Rock Balance Forecast for Upcoming Year (2021)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	24.5%	31.1%	44.4%	100.0%
Allowable Groundwater Depletions	44,400	56,400	80,600	181,400
Projected Groundwater Depletions	45,800	57,100	84,800	187,800
<b>2021 Forecast Balance (no action)</b>	<b>-1,400</b>	<b>-700</b>	<b>-4,200</b>	<b>-6,200</b>
2020, projected	10,400	15,900	18,800	45,100
<b>2-Year Forecast Balance</b>	<b>9,000</b>	<b>15,200</b>	<b>14,600</b>	<b>38,900</b>
<b>RCCV</b>	<b>-2,460</b>	<b>-2,760</b>	<b>-360</b>	<b>-5,580</b>

# NRD Annual Hardy Balance Forecast for Upcoming Year (2021)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	25.3%	30.8%	43.9%	100.0%
Allowable Groundwater Depletions	48,800	59,400	84,600	192,800
Projected Groundwater Depletions	47,800	57,100	84,800	189,600
<b>2021 Forecast Balance (no action)</b>	<b>1,000</b>	<b>2,200</b>	<b>-100</b>	<b>3,200</b>
2017-2020, projected	60,800	80,600	106,600	248,000
<b>5-Year Forecast Balance</b>	<b>61,800</b>	<b>82,900</b>	<b>106,400</b>	<b>251,200</b>
<b>RCCV</b>	<b>-2,460</b>	<b>-2,760</b>	<b>-360</b>	<b>-5,580</b>

# Summary

- Based on the preliminary forecast, the IMP checklist indicates that 2021 will **NOT** be a **Compact Call Year**.
- Preliminary approximate 2020 accounting balances:
  - Guide Rock: **+45,100 ac-ft**
  - Hardy: **+57,600 ac-ft**
- Preliminary dry-year forecast balance for 2021 currently approximated at **-6,200 ac-ft** at Guide Rock and **+3,200 ac-ft** at Hardy
- RCCV on January 1, 2021, will be **-5,580 acre-feet**

## Next Steps

- The Department will complete its final forecast prior to January 1, 2021
- Expectation for frequency of accounting updates in 2021?

# Augmentation Impacts

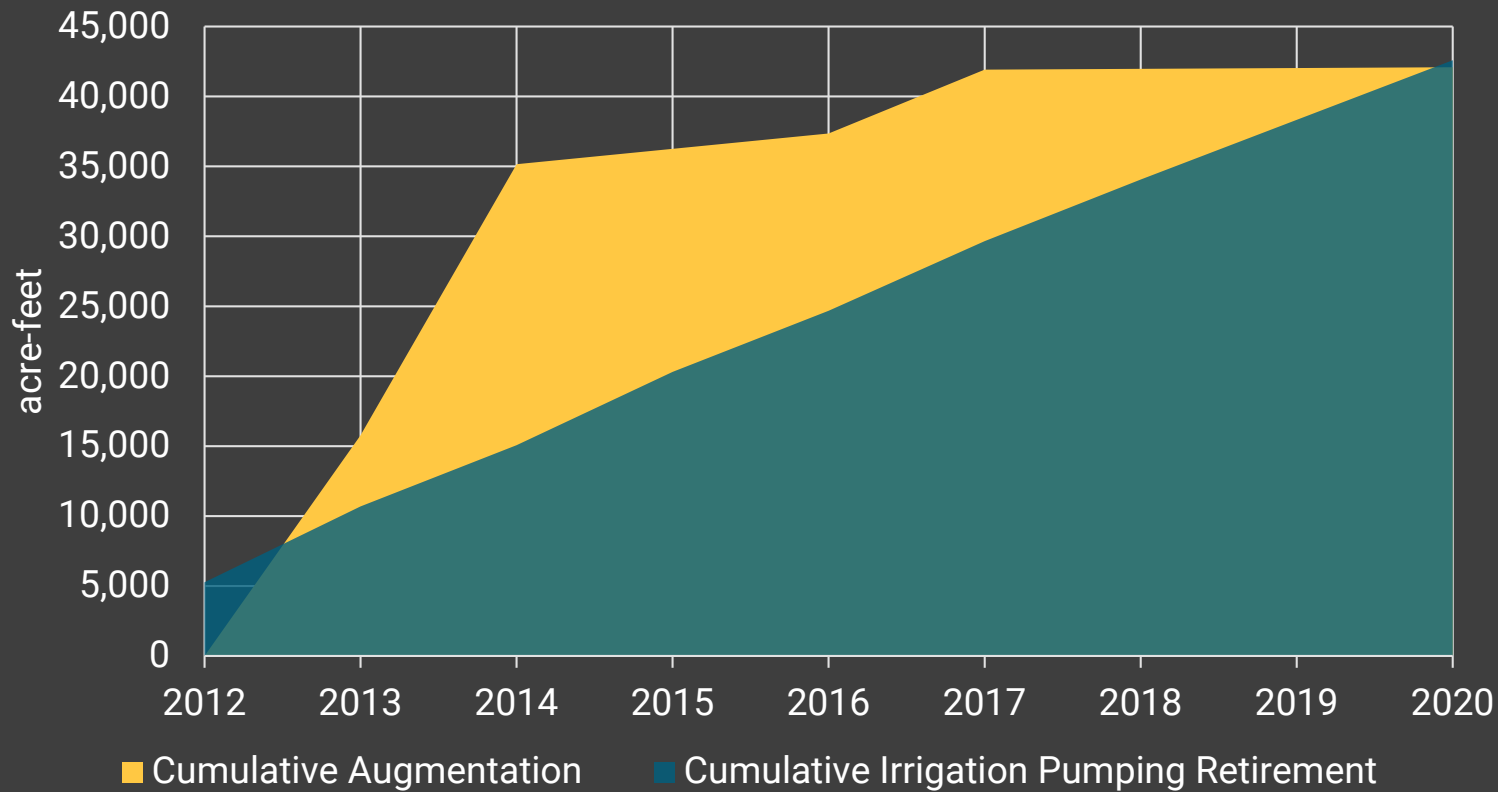
# Augmentation Impacts – IMP

Our IMPs state:

“...all new net depletions to streamflow that result from augmentation pumping (as calculated by the RRCA ground water model) will be mitigated to ensure protection of existing surface water appropriations.”

# Augmentation Impacts – Model Inputs

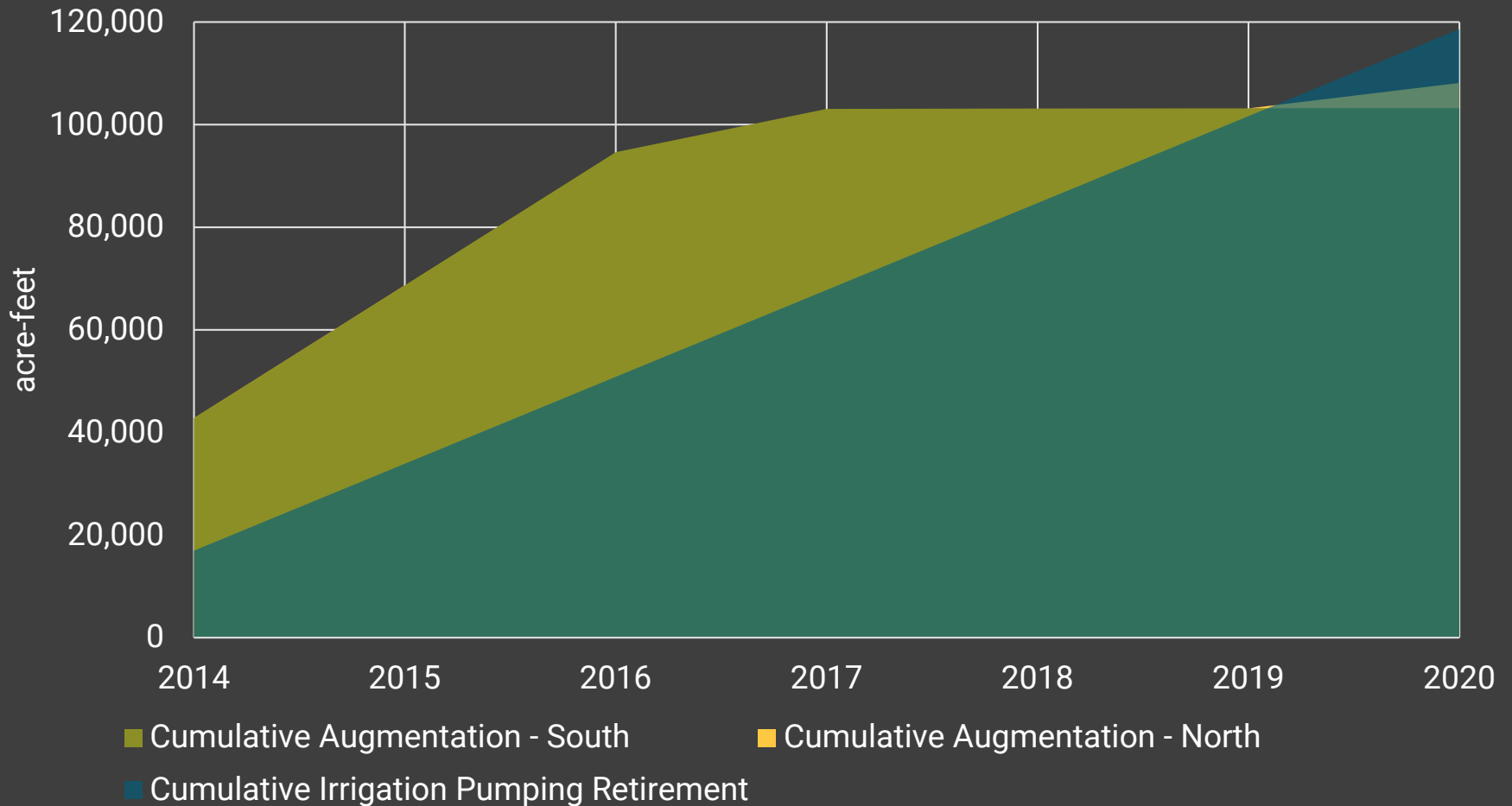
Rock Creek





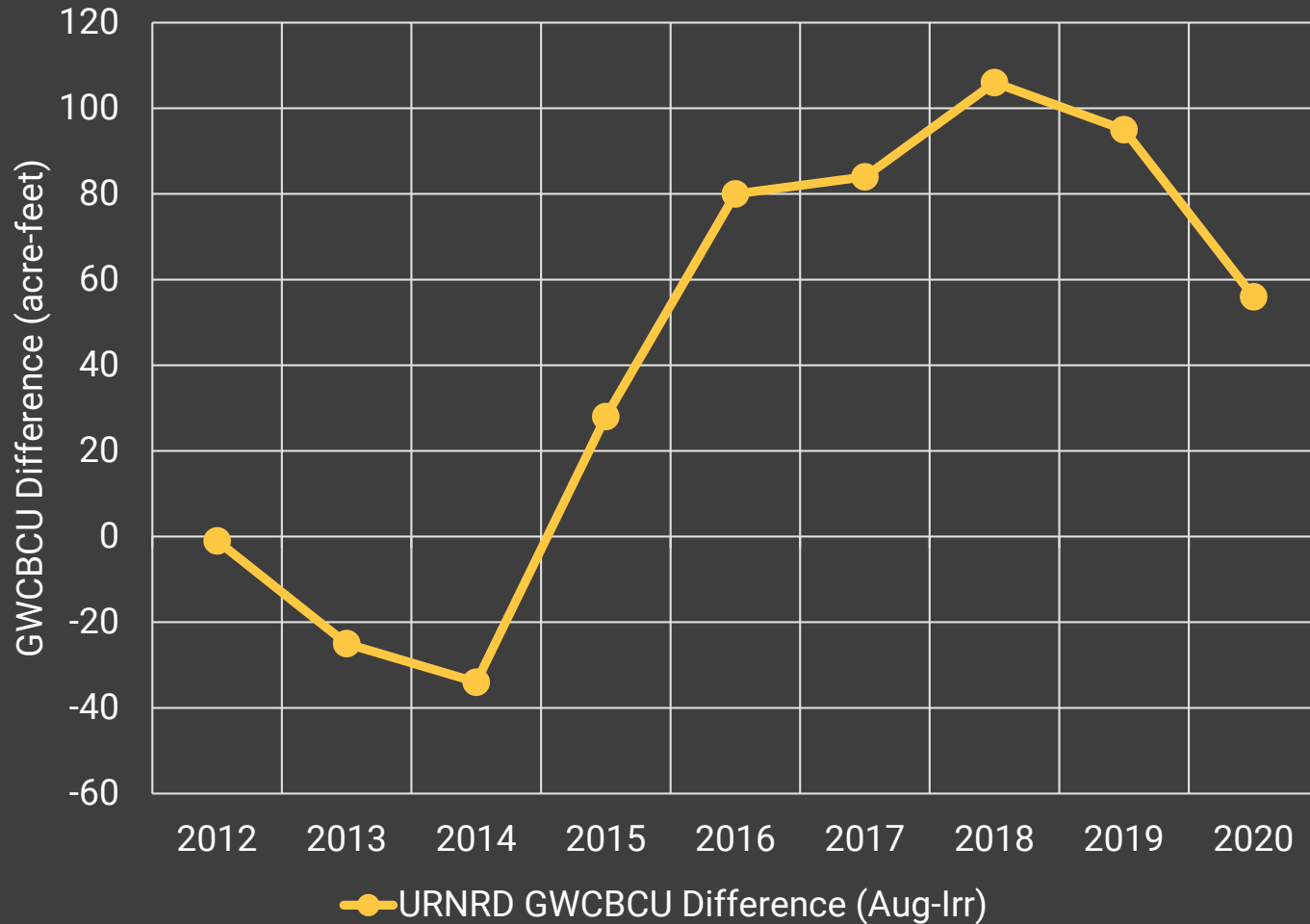
# Augmentation Impacts – Model Inputs

N-CORPE



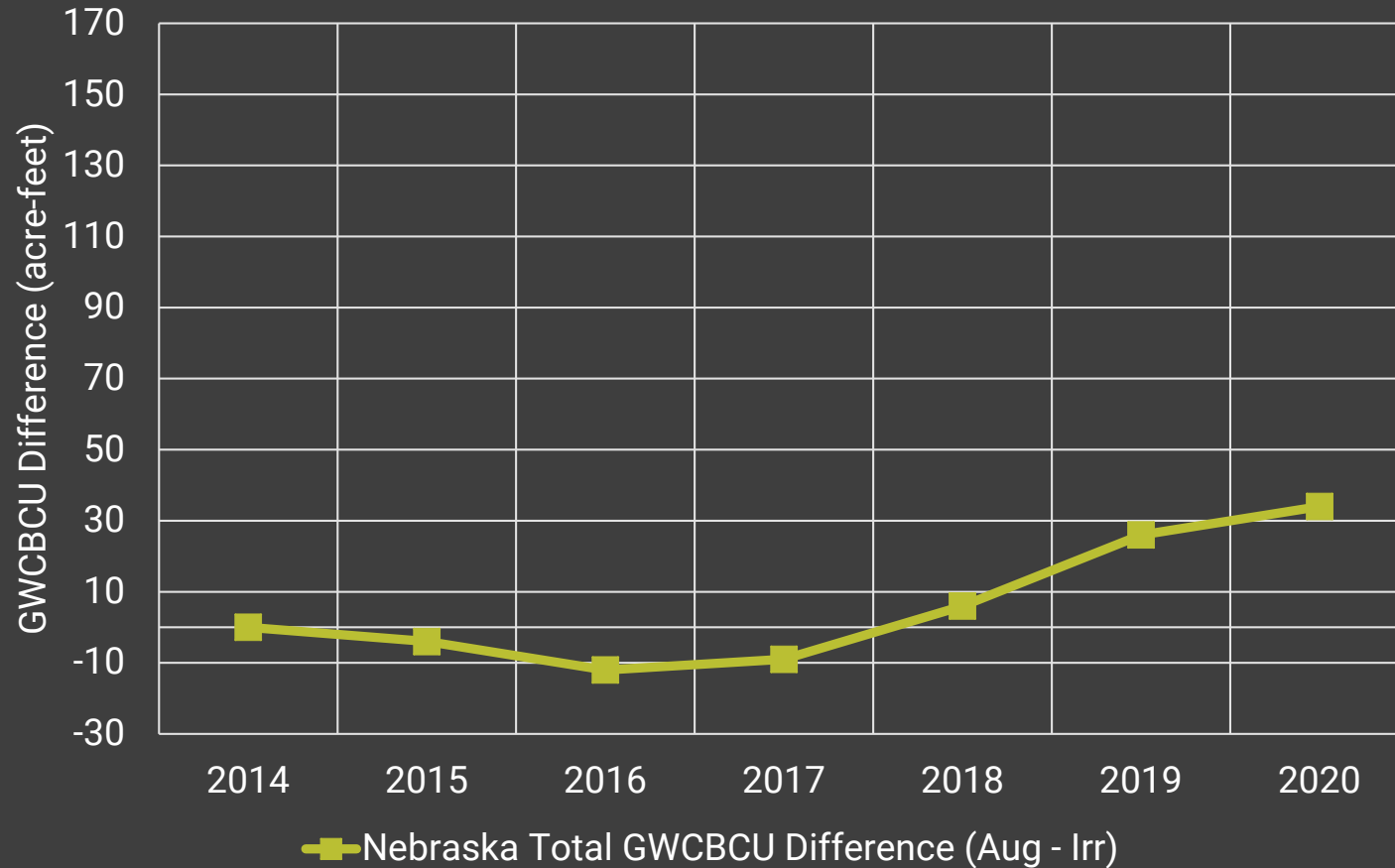
# Augmentation Impacts – Oct. 2020 run

Rock Creek

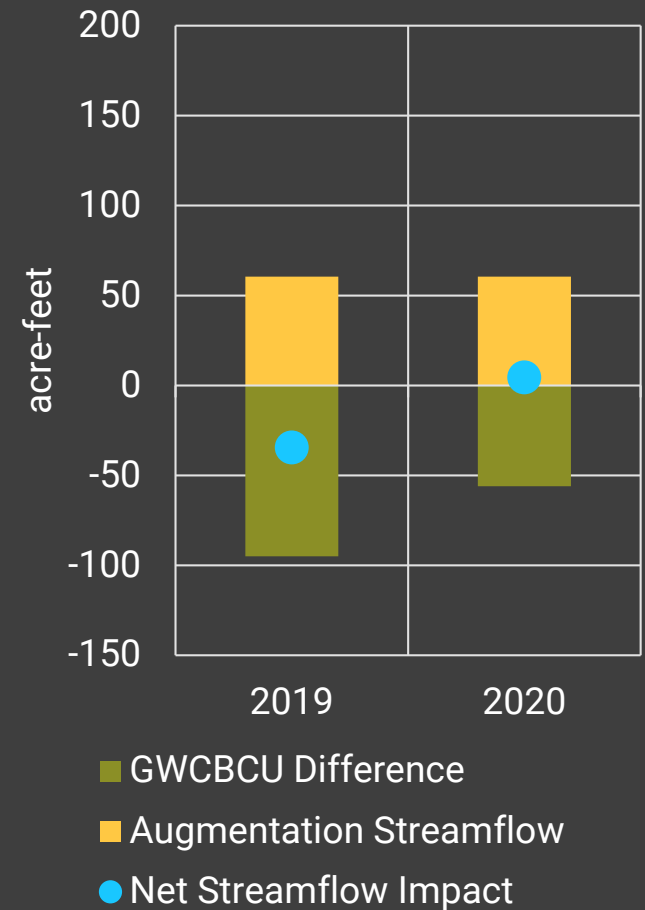
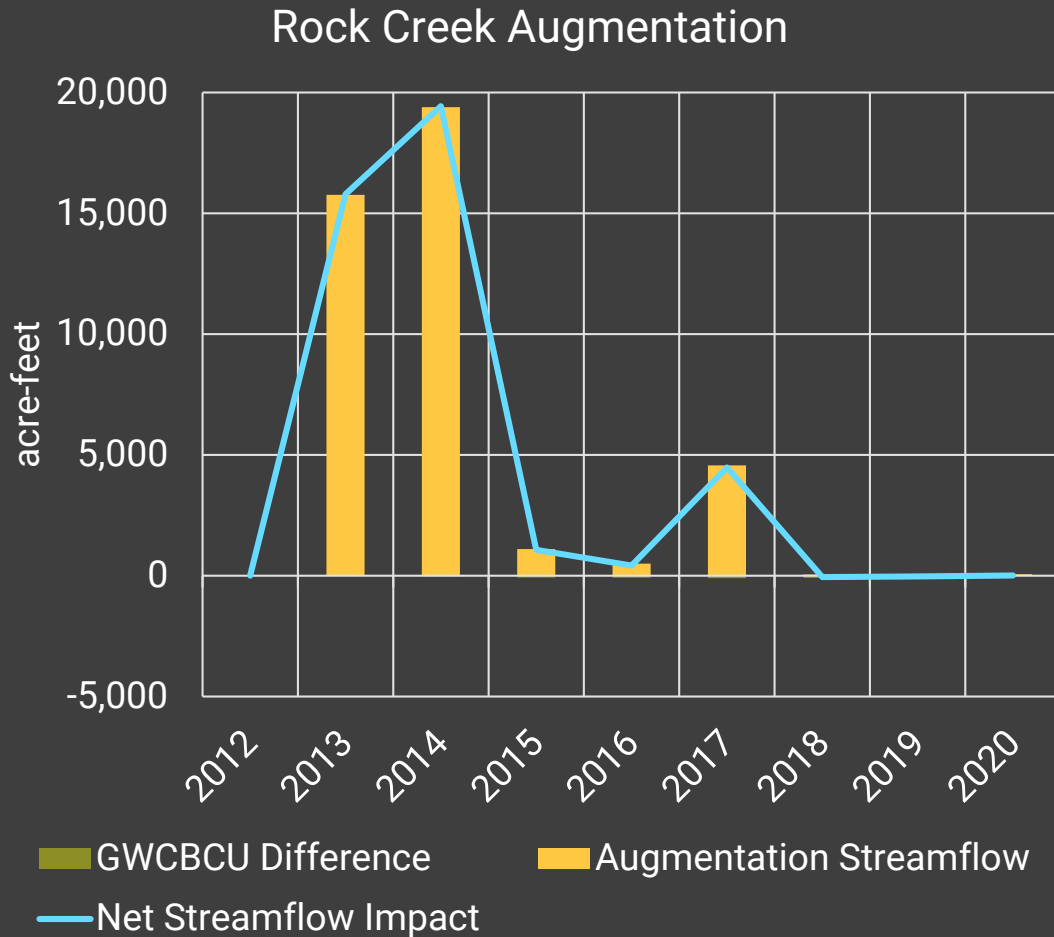


# Augmentation Impacts – Oct. 2020 run

N-CORPE



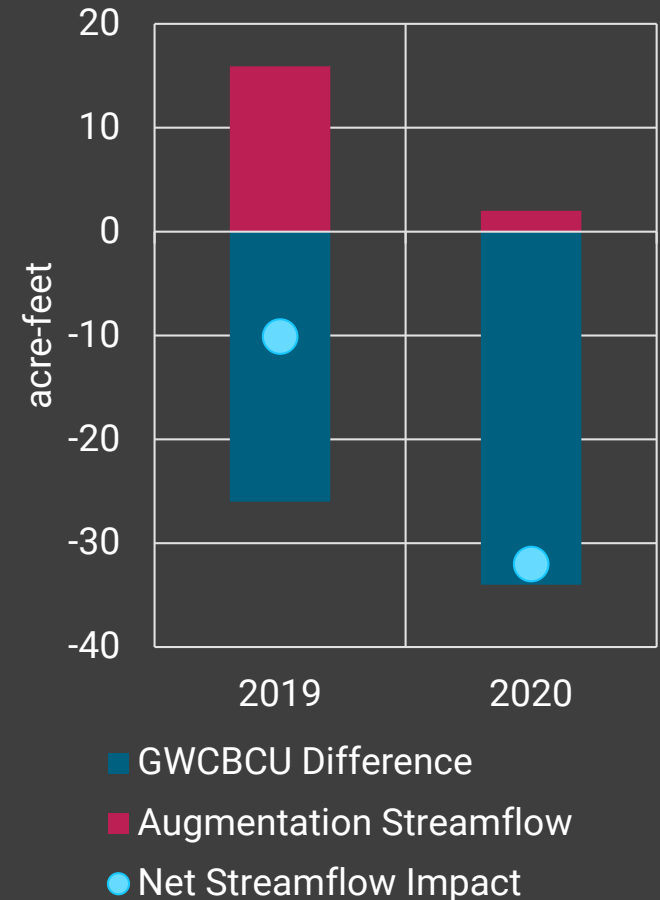
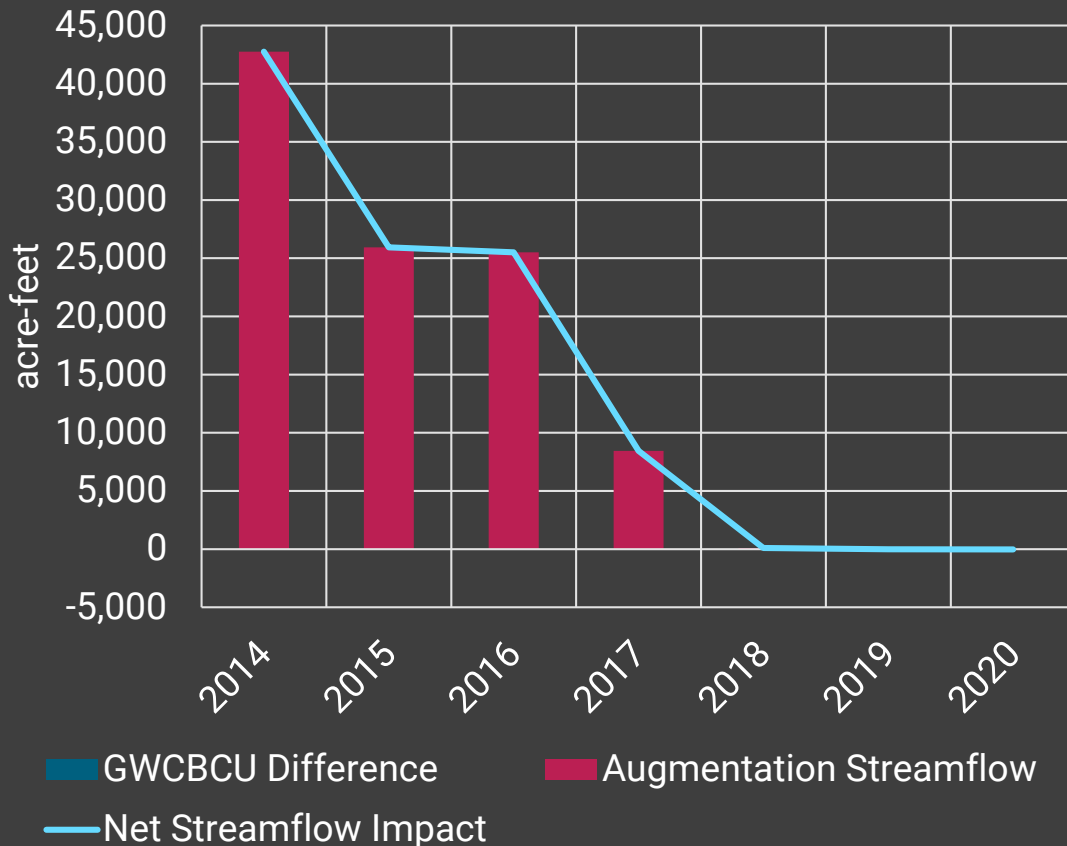
# Augmentation Net Streamflow Impacts – Rock Creek



\*Augmentation streamflow assumed to occur in same year as pumped; 2020 pumping repeated from 2019

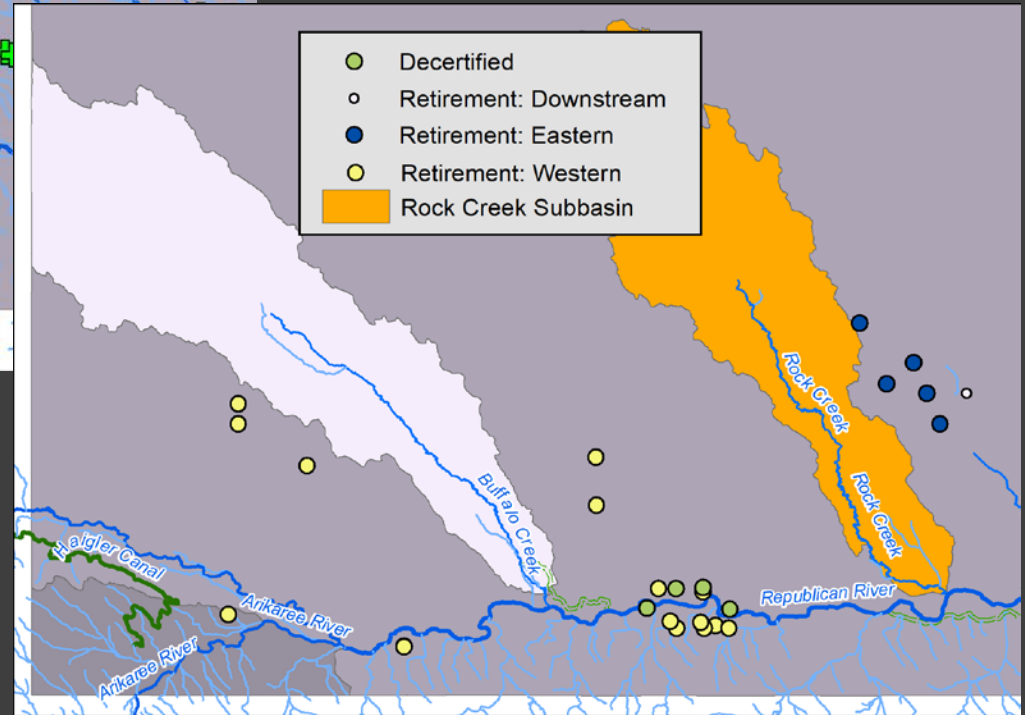
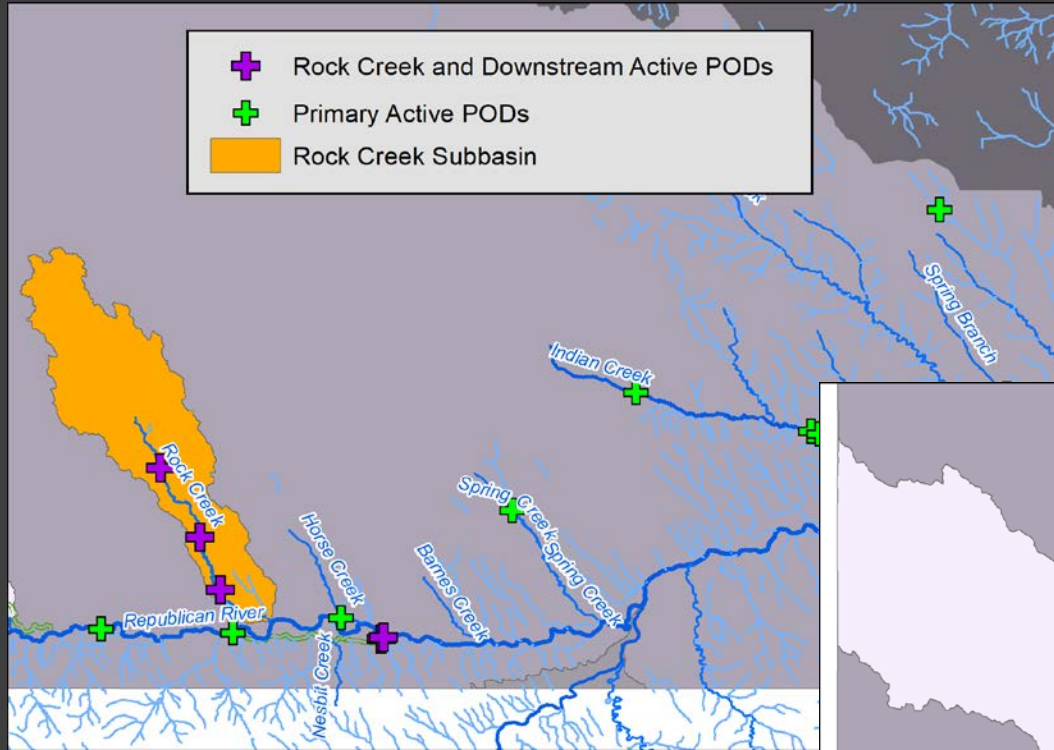
# Augmentation Net Streamflow Impacts – NCORPE

N-CORPE



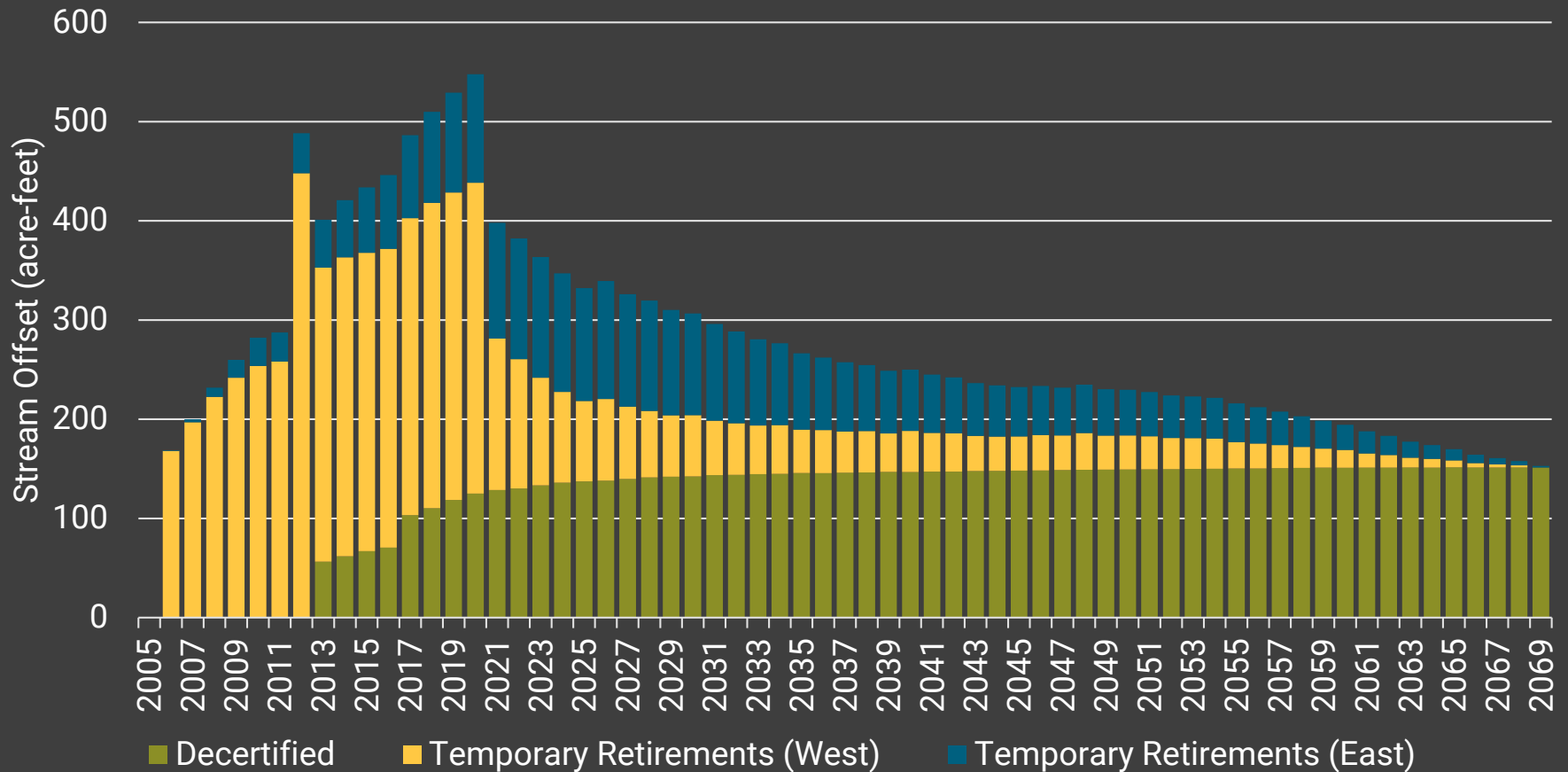
\*Augmentation streamflow assumed to occur in same year as pumped; 2020 pumping estimated from year-to-date records and discussion with N-CORPE

# 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



# Hydrologically Balanced Assessment

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



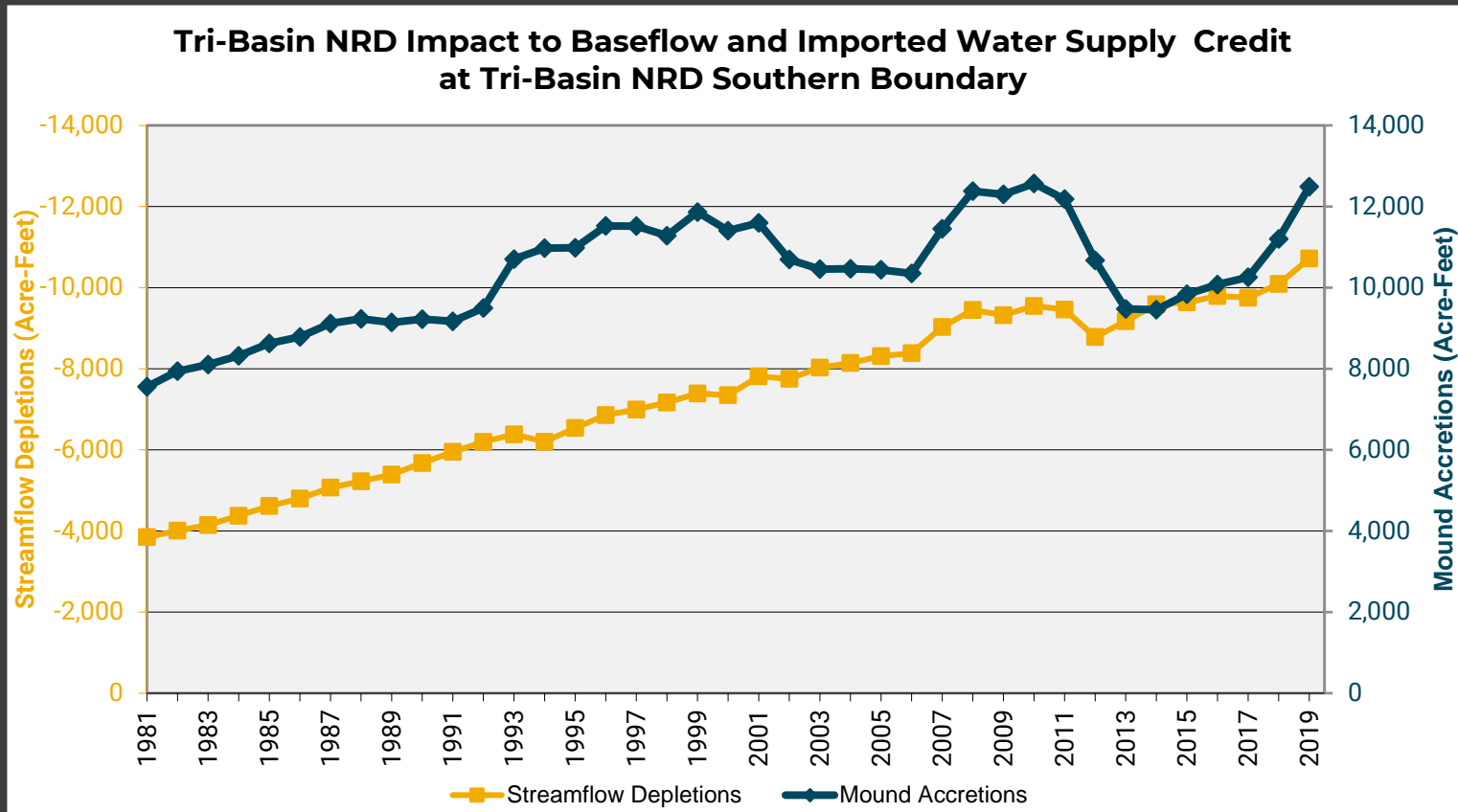
## Goal A, Objective 1

“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.**”

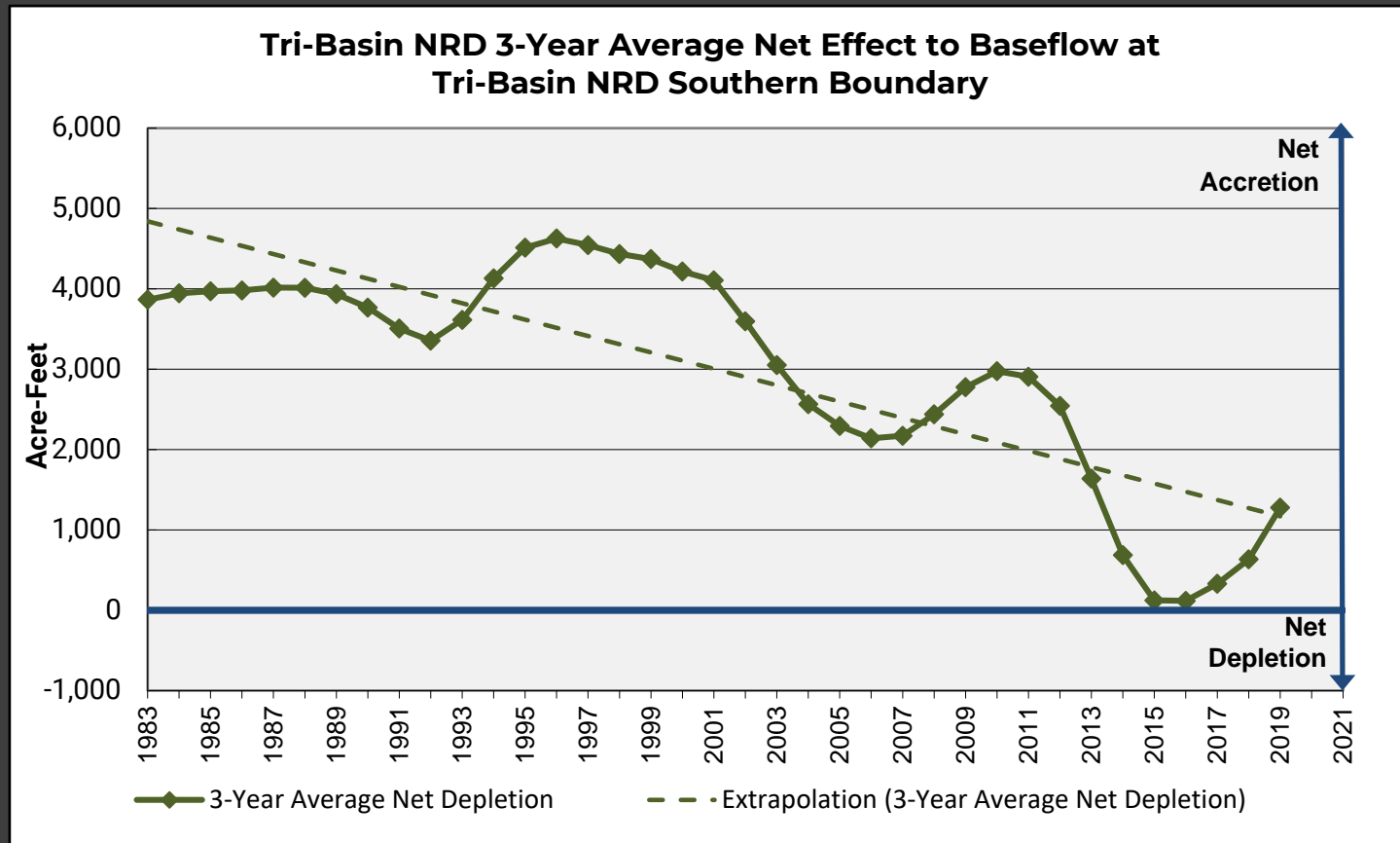
# Assessment

“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**.”

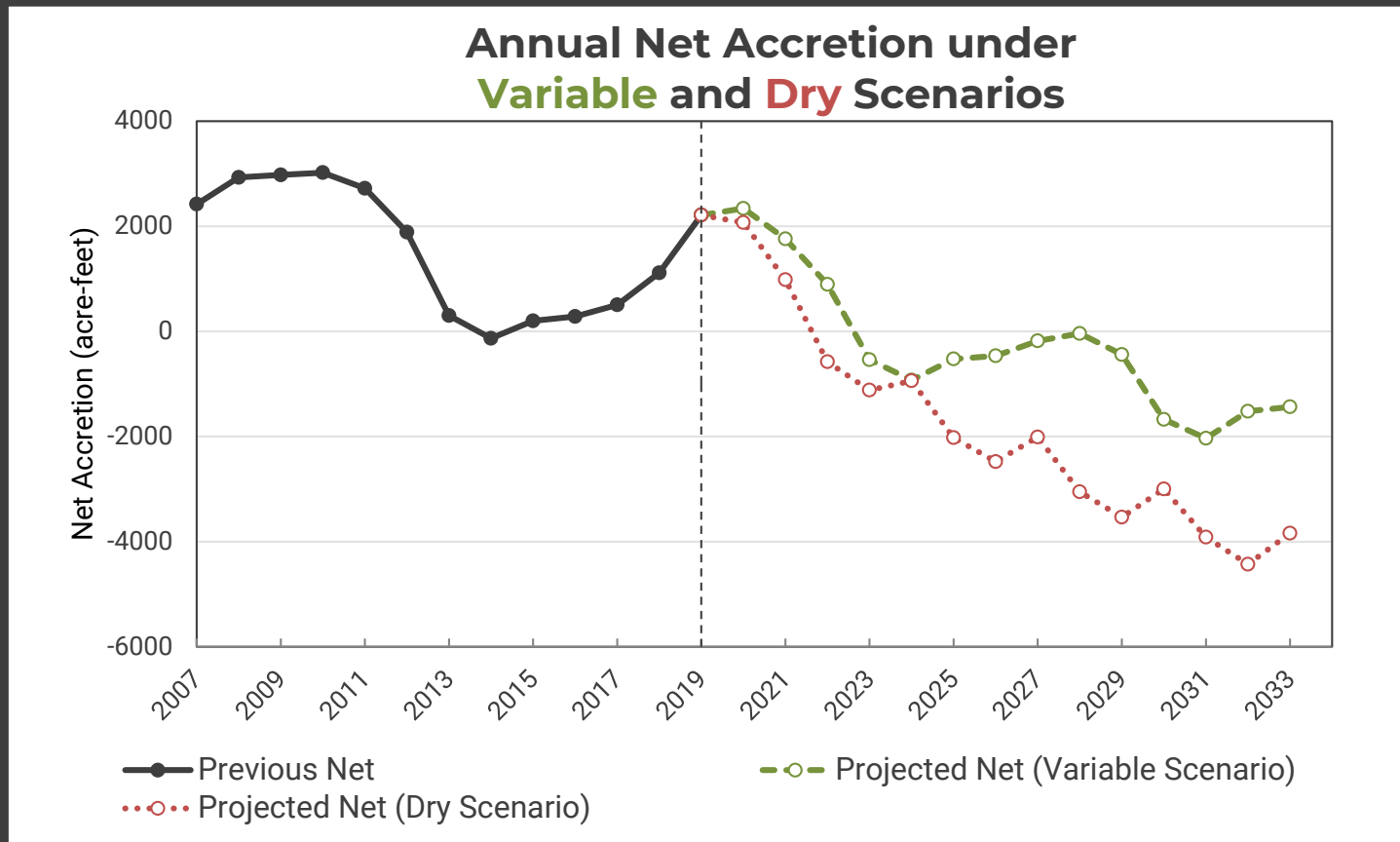
# Modeled Depletions and Accretions, 1981 – 2018



# Hydrologically Balanced Assessment



# Projected Net Accretion



# IMP Updates

Timing of future Meetings and  
Correspondence

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