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DEPT. OF NATURAL RESOURCES

Nebraska Department of Natural Resources Preliminary Republican River Basin Forecast for 2020

November 13, 2019

Nebraska Department of Natural Resources

Preliminary Forecast and Accounting

Topic Outline

- Forecast 2019 Projection
- Preliminary 2019 Accounting Results
- Early Dry-year Forecast (2020)
- Compact Call Year Evaluation Flow Chart
- Forecasted NRD Projections for 2020
- Kansas Compliance Water Request Update

Final 2014-2018 Accounting

Hardy Balances, Table 3C	LRNRD	MRNRD	URNRD
2014	18,900	13,000	6,200
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
2014-2018	35,300	38,500	41,800
Remaining Compact Compliance Volume (RCCV)	-4,100	-4,600	-600

*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 and 2018 for relative increase from NY Baseline Depletion Percentages for distribution of a positive balance

Final 2017-2018 Accounting

Guide Rock Balances, Table 5C	LRNRD	MRNRD	URNRD
2017	5,700	9,900	13,700
2018	-3,600	-3,500	-6,500
2017-2018	2,100	6,400	7,200
Remaining Compact Compliance Volume (RCCV)	-4,100	-4,600	-600

Distribution percentages were adjusted in 2017 for relative increase from WSY Baseline Depletion Percentages for distribution of a positive balance

Preliminary 2019 Accounting

Year	Item	Information Source
Provisional Data for T=0 (Current Year or Immediate Past Irrigation Season)	Pumping	2018 Pumping
	Surface Water Use	Estimated from preliminary data and previous years values
	Streamflow	Available provisional records – end-of-year estimated
	Evaporation	2018 records and provisional data

Preliminary 2019 Accounting – Guide Rock

Preliminary 2019 Accounting: Hardy with Management Actions

Hardy Balances, Table 3C	LRNRD	MRNRD	URNRD
2015-2018 (final)	16,400	25,500	35,600
2019 (projected)	35,700	45,400	61,600
2015-2019	52,000	70,900	97,200
Remaining Compact Compliance Volume (RCCV)	-4,100	-4,600	-600

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

Early Dry-Year Forecast (2020)

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

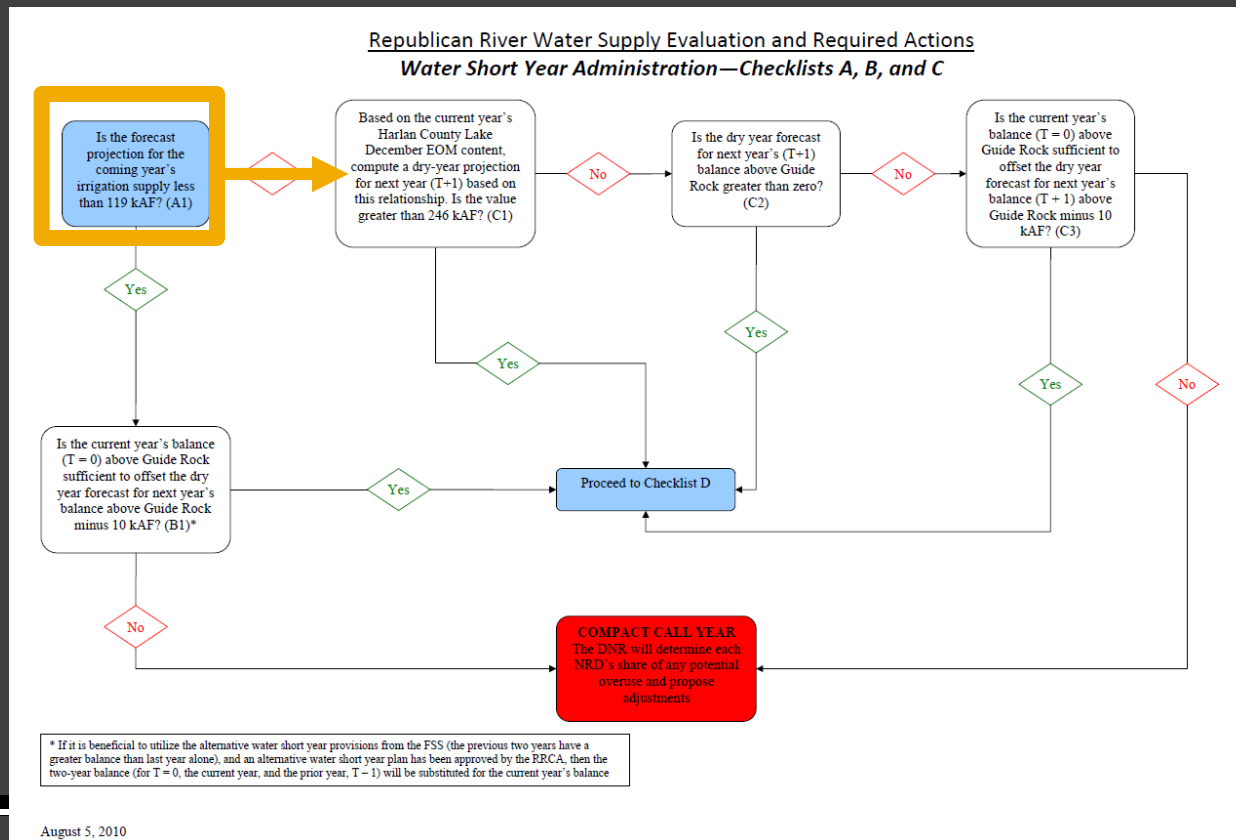
Year	Guide Rock Balance (AF)
T=0 (2019, projected)	tbd
T=+1 (2020, early forecast)	-10,800
2-Year Forecast Balance	tbd

Year	Hardy Balance (AF)
T=-3 to 0 (2016-2019, projected)	203,600
T=+1 (2020, early forecast)	-1,900
5-Year Forecast Balance	201,600

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.



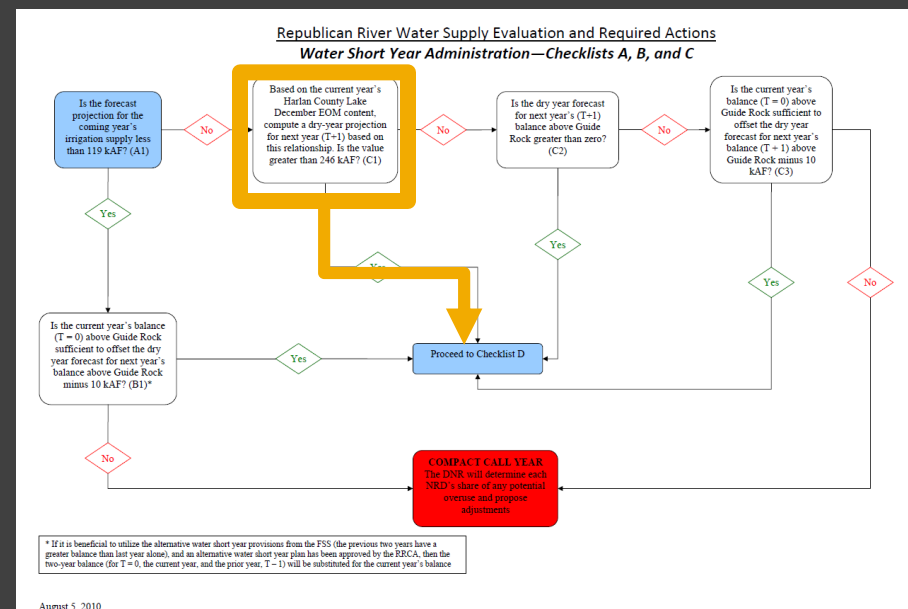
Compact Call Year Evaluation: Checklist C.

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, 2020) will not be a WSY. Based on the current year's (T=0, 2019) HCL December EOM content, compute a dry-year projection for next year (T+1, 2020) based on this relationship. Is the value greater than 246 kAF?

Yes. Proceed to Checklist D.

We are projecting the HCL December EOM 2019 content to not be less than 314,111 AF.

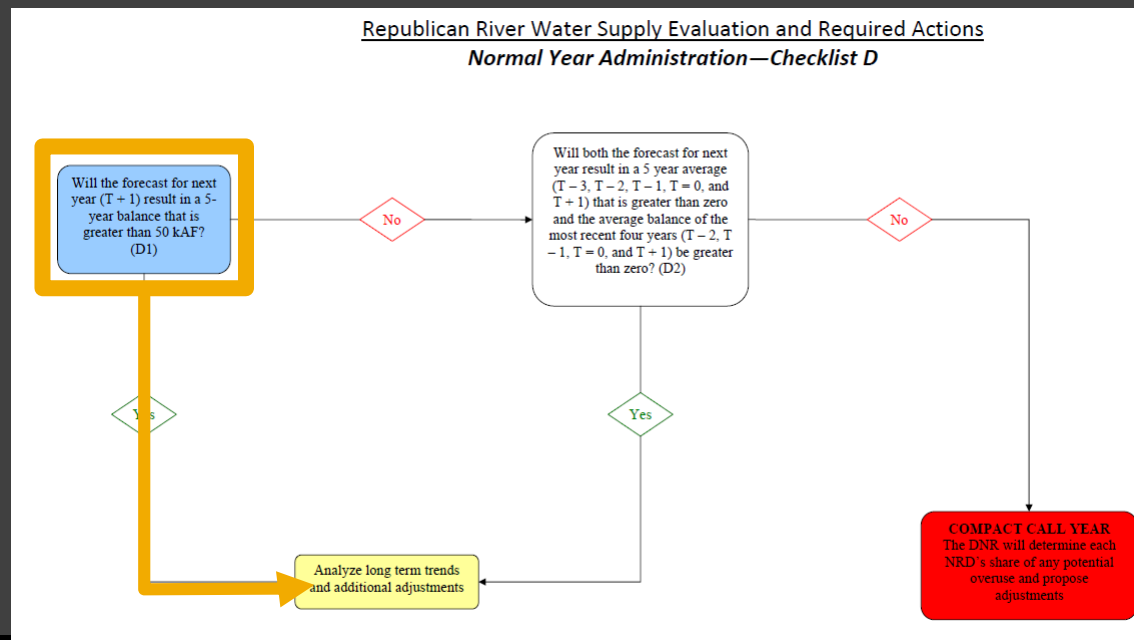


Compact Call Year Evaluation: Checklist D. Normal Year Administration

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 (2016-2019, projected)	203,600
T=+1 (2020, early forecast)	-1,900
5-Year Forecast Balance	201,600



NRD-Specific Forecast Balances

NRD Annual Guide Rock Balance Forecast for Upcoming Year (2020)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	24.5%	31.1%	44.4%	100.0%
Allowable Groundwater Depletions	46,200	58,600	83,700	188,500
Projected Groundwater Depletions	48,400	63,500	87,400	199,300
2020 Forecast Balance (no action)	-2,200	-4,900	-3,700	-10,800
RCCV	-3,280	-3,680	-480	-7,440

NRD Annual Hardy Balance Forecast for Upcoming Year (2020)

	LRNRD	MRNRD	URNRD	Total
Allowable Depletion Distribution Percentage from IMPs	25.3%	30.8%	43.9%	100.0%
Allowable Groundwater Depletions	50,500	61,500	87,700	199,800
Projected Groundwater Depletions	50,800	63,500	87,400	201,700
2020 Forecast Balance (no action)	-300	-2,000	300	-1,900
2016-2019, projected	54,200	66,300	83,000	203,600
5-Year Forecast Balance	54,000	64,300	83,300	201,600
RCCV	-3,280	-3,680	-480	-7,440

Summary

- Based on the preliminary forecast, the IMP checklist indicates that 2020 will **NOT** be a **Compact Call Year**.
- Preliminary approximate 2019 accounting balances:
 - Guide Rock: **TBD ac-ft** (pending Flood Flow provision work)
 - Hardy: **+142,600 ac-ft**
- Preliminary dry-year forecast balance for 2020 currently approximated at **-10,800 ac-ft** at Guide Rock and **-1,900 ac-ft** at Hardy
- Kansas did not request any water for delivery by June 1, 2020
- RCCV on January 1, 2020, is projected to be **-7,440 acre-feet**

Next Steps

- The Department will complete its final forecast prior to January 1, 2020
- Expectation for frequency of accounting updates in 2020
- Working with EC to revise Flood Flow provisions towards finalizing 2019 accounting

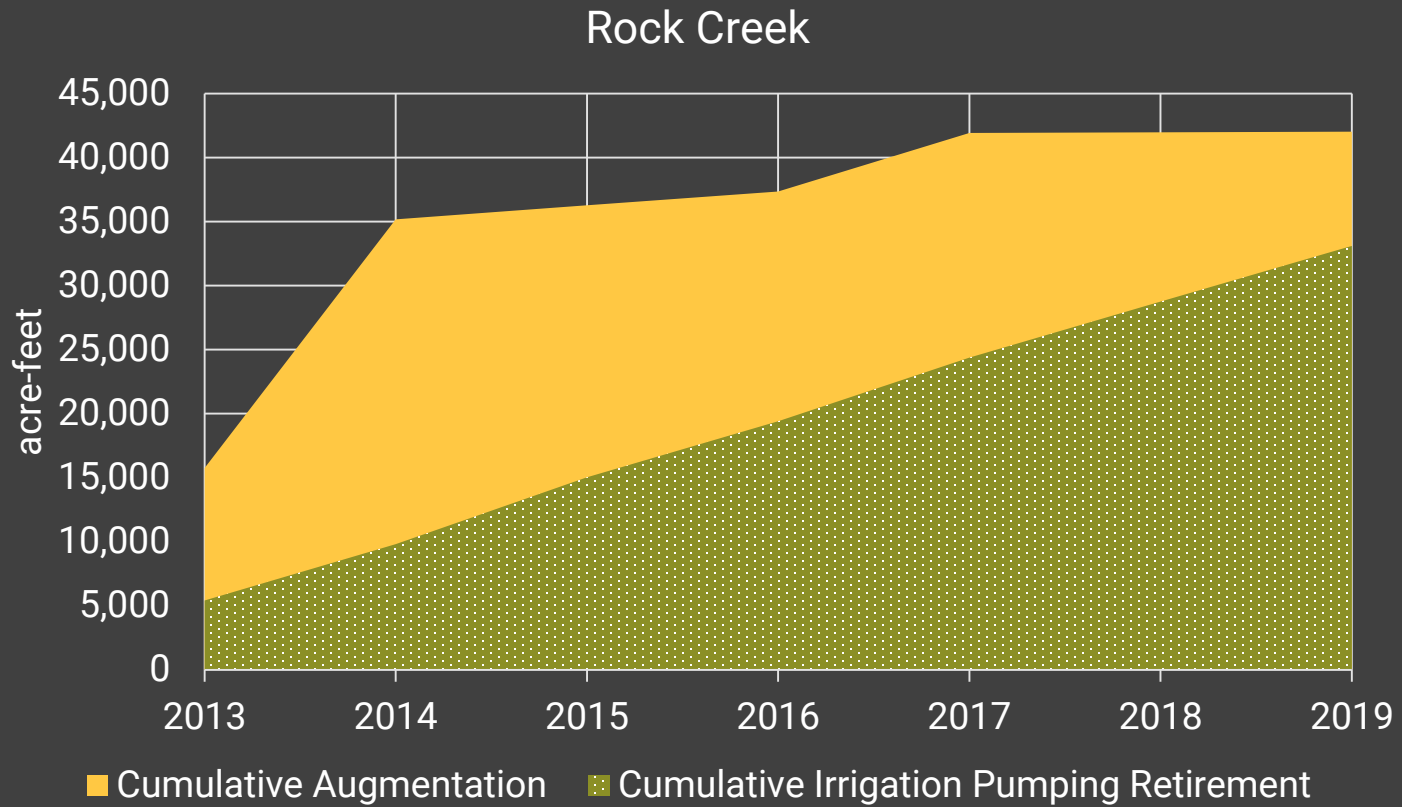
Augmentation Impacts

Augmentation Impacts – IMP

Our IMPs state:

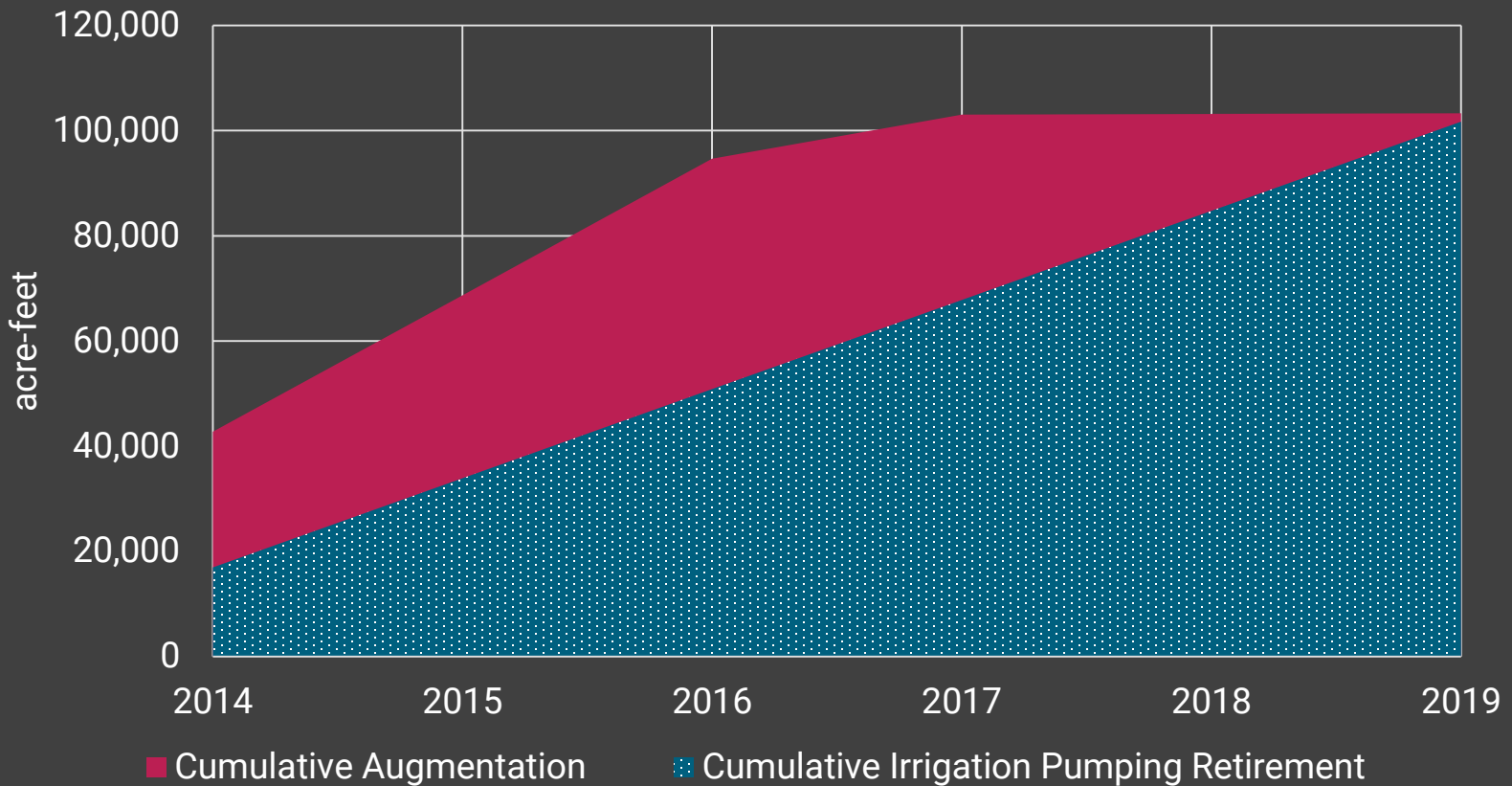
“...all new net depletions to streamflow that result from augmentation pumping (as calculated by the RRCA ground water model) will be mitigated to ensure protection of existing surface water appropriations.”

Augmentation Impacts – Model Inputs

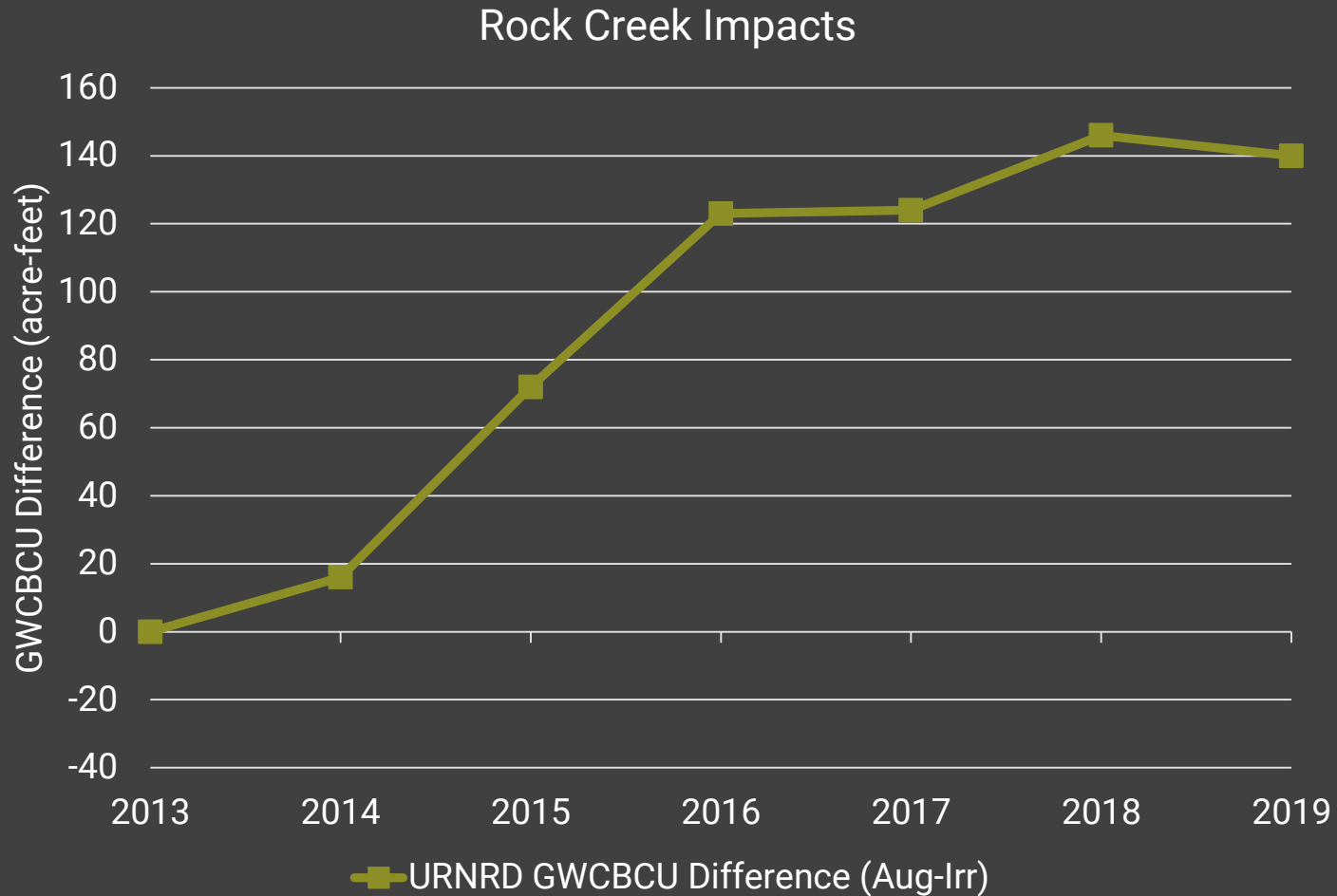


Augmentation Impacts – Model Inputs

NCORPE

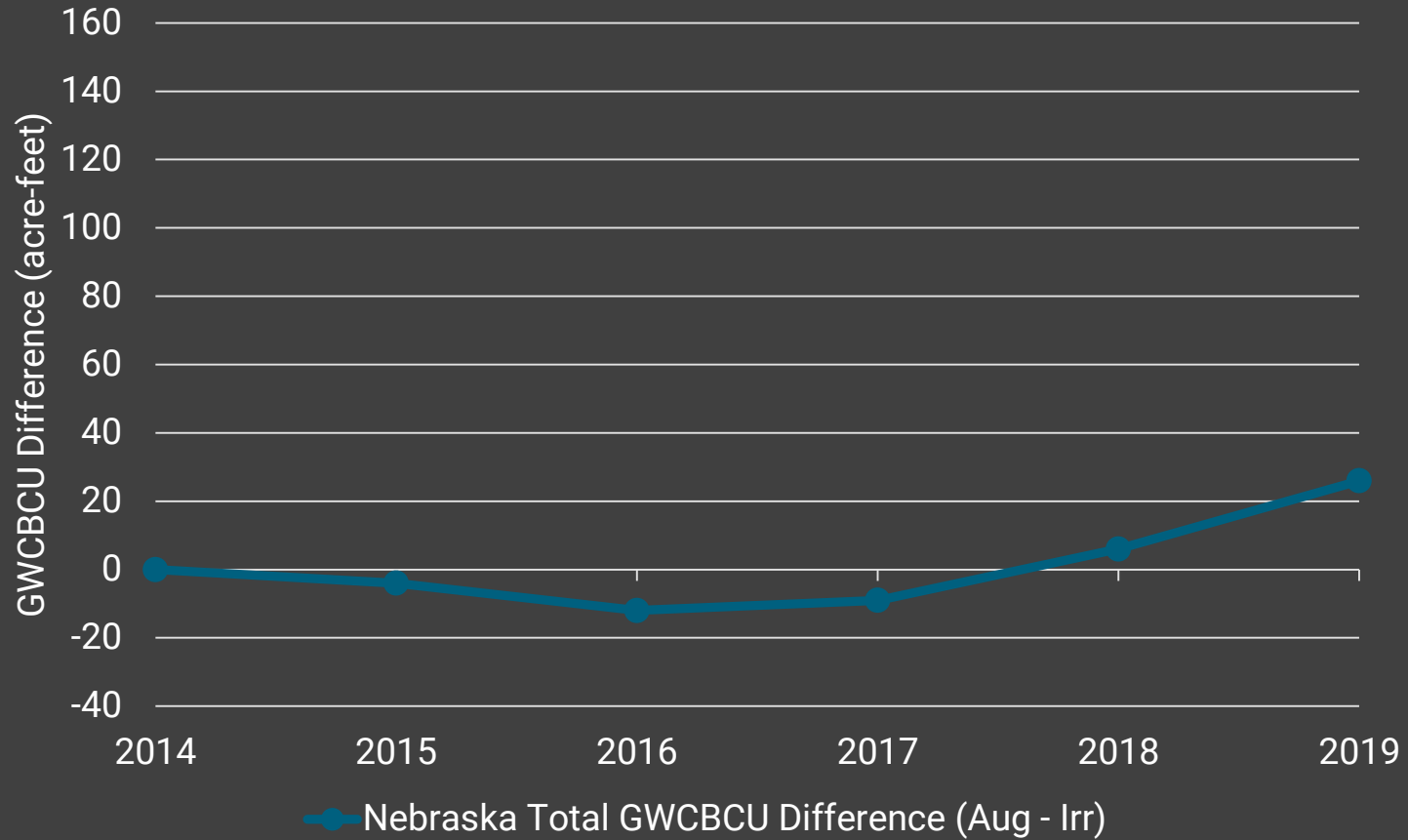


Augmentation Impacts – Oct. 2019 run

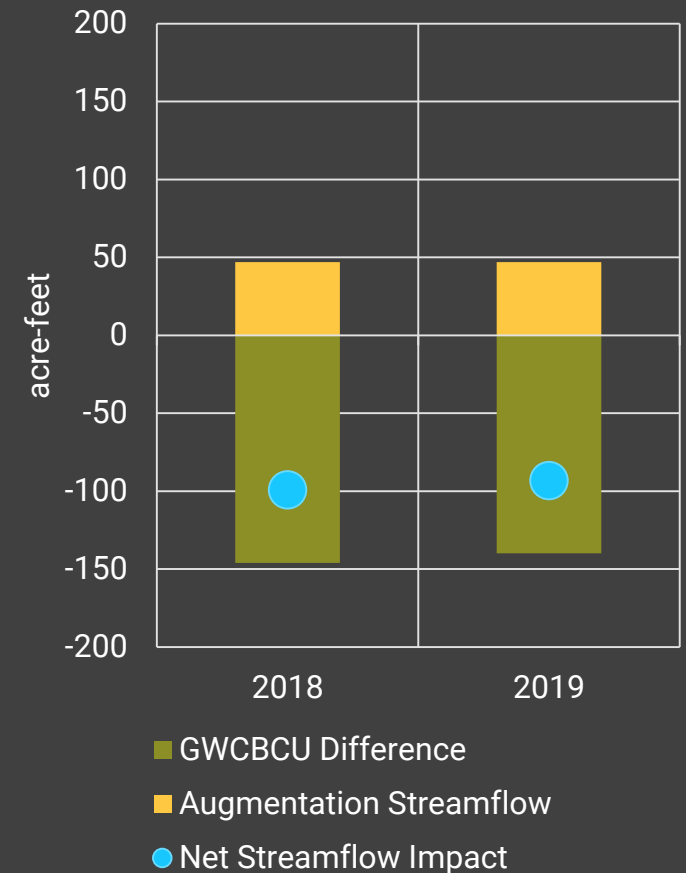
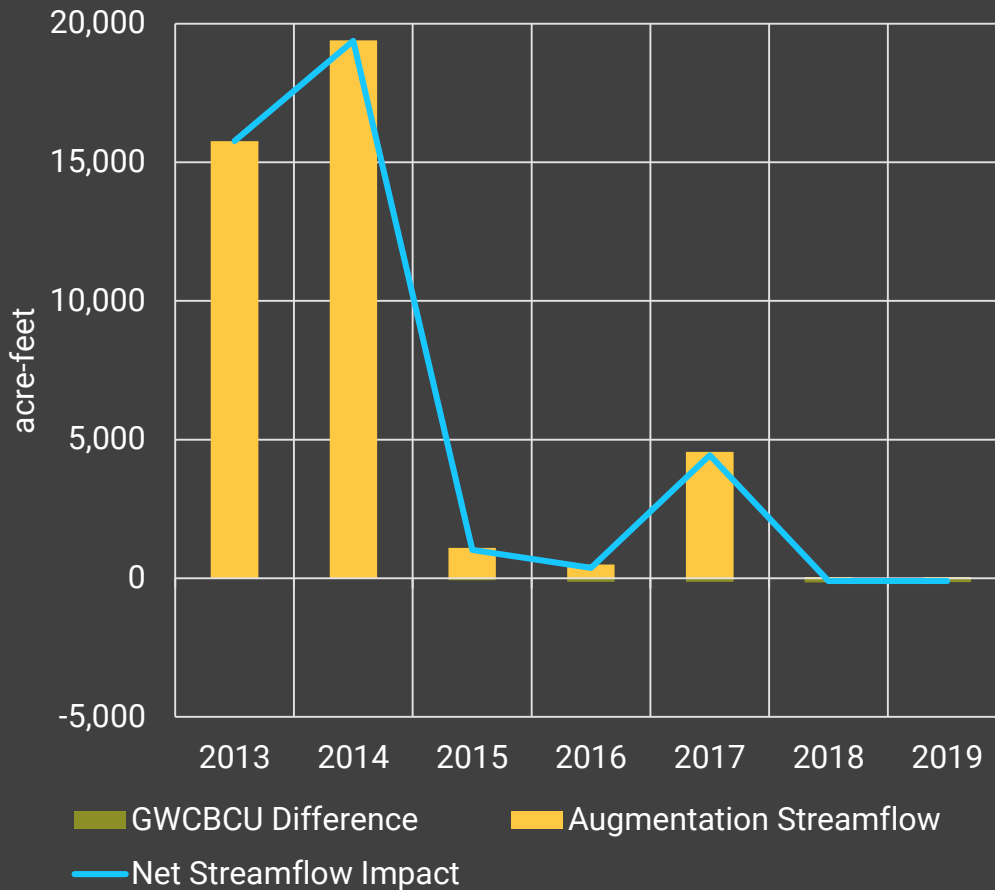


Augmentation Impacts – Oct. 2019 run

NCORPE

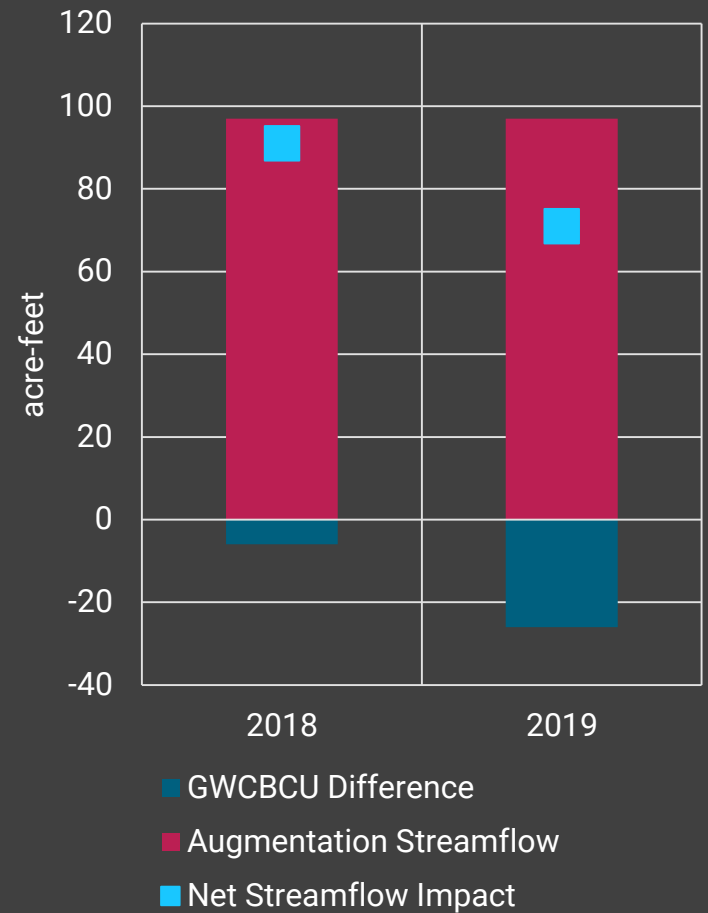
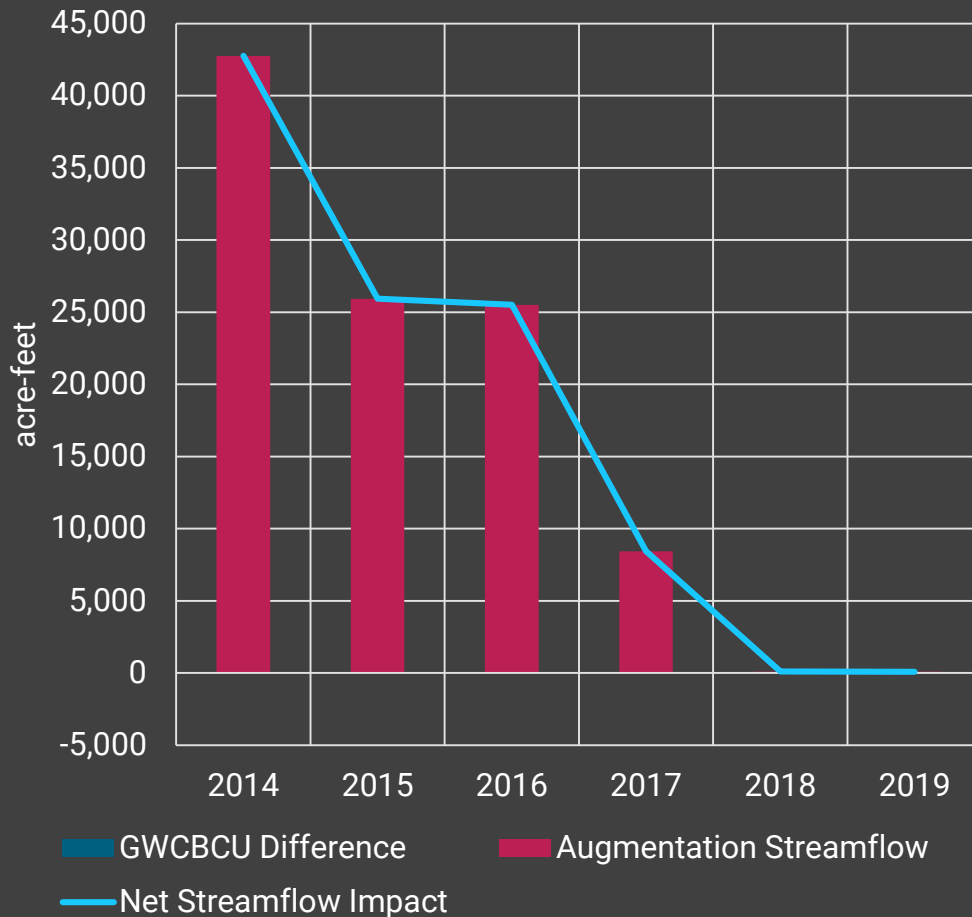


Augmentation Net Streamflow Impacts – Rock Creek



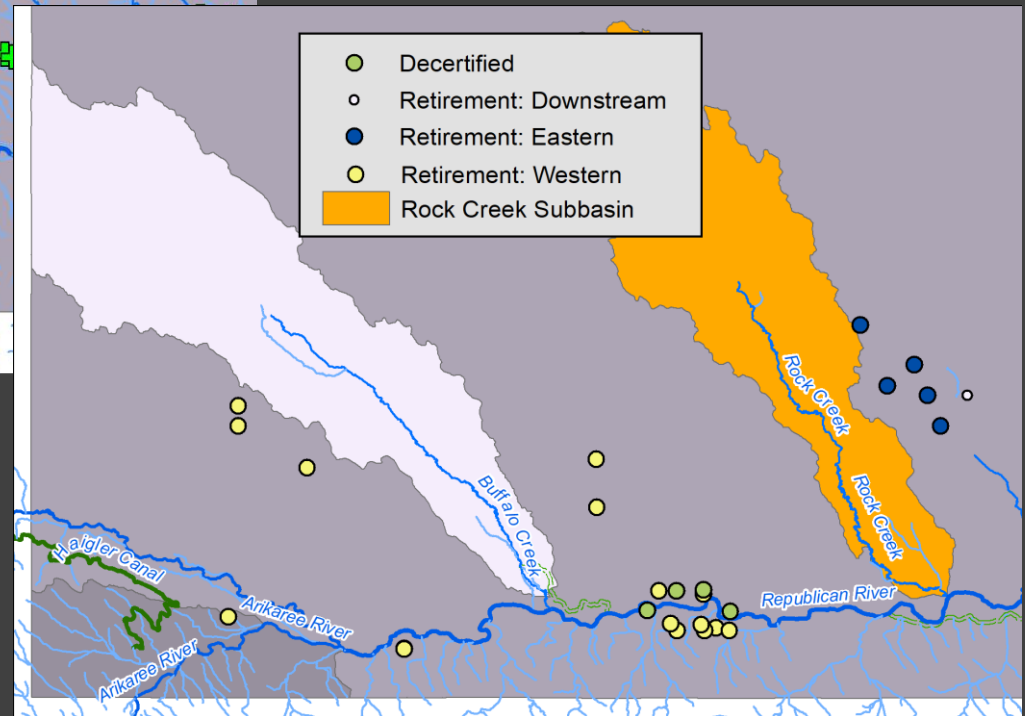
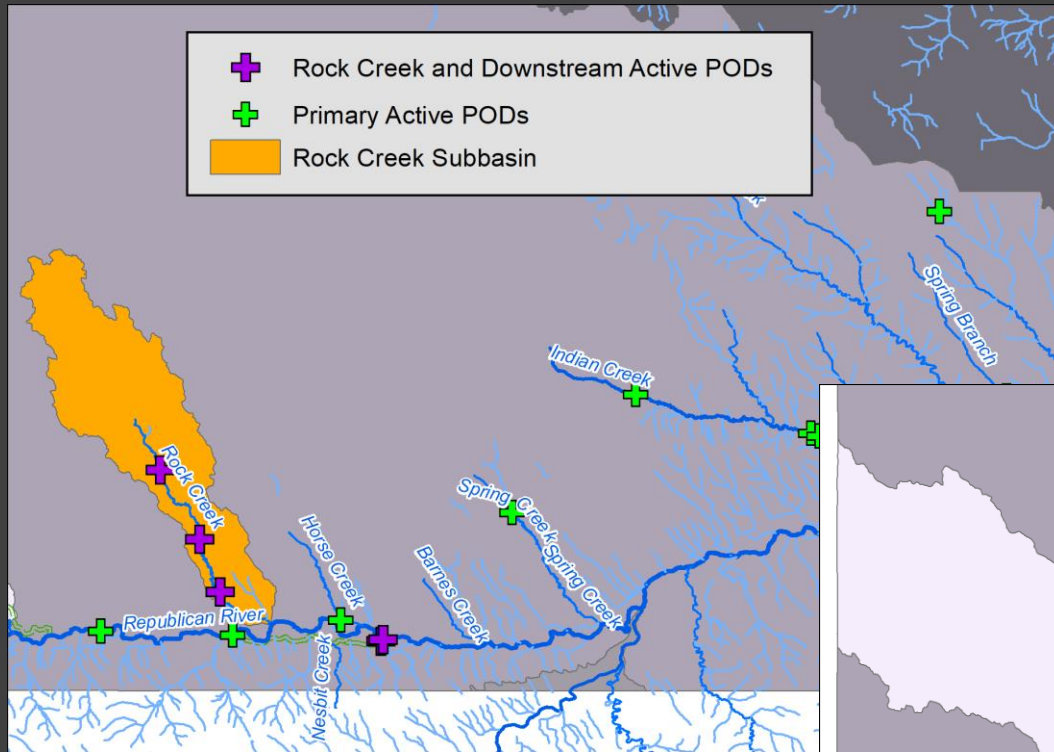
*Augmentation streamflow assumed to occur in same year as pumped; 2019 pumping repeated from 2018

Augmentation Net Streamflow Impacts – NCORPE



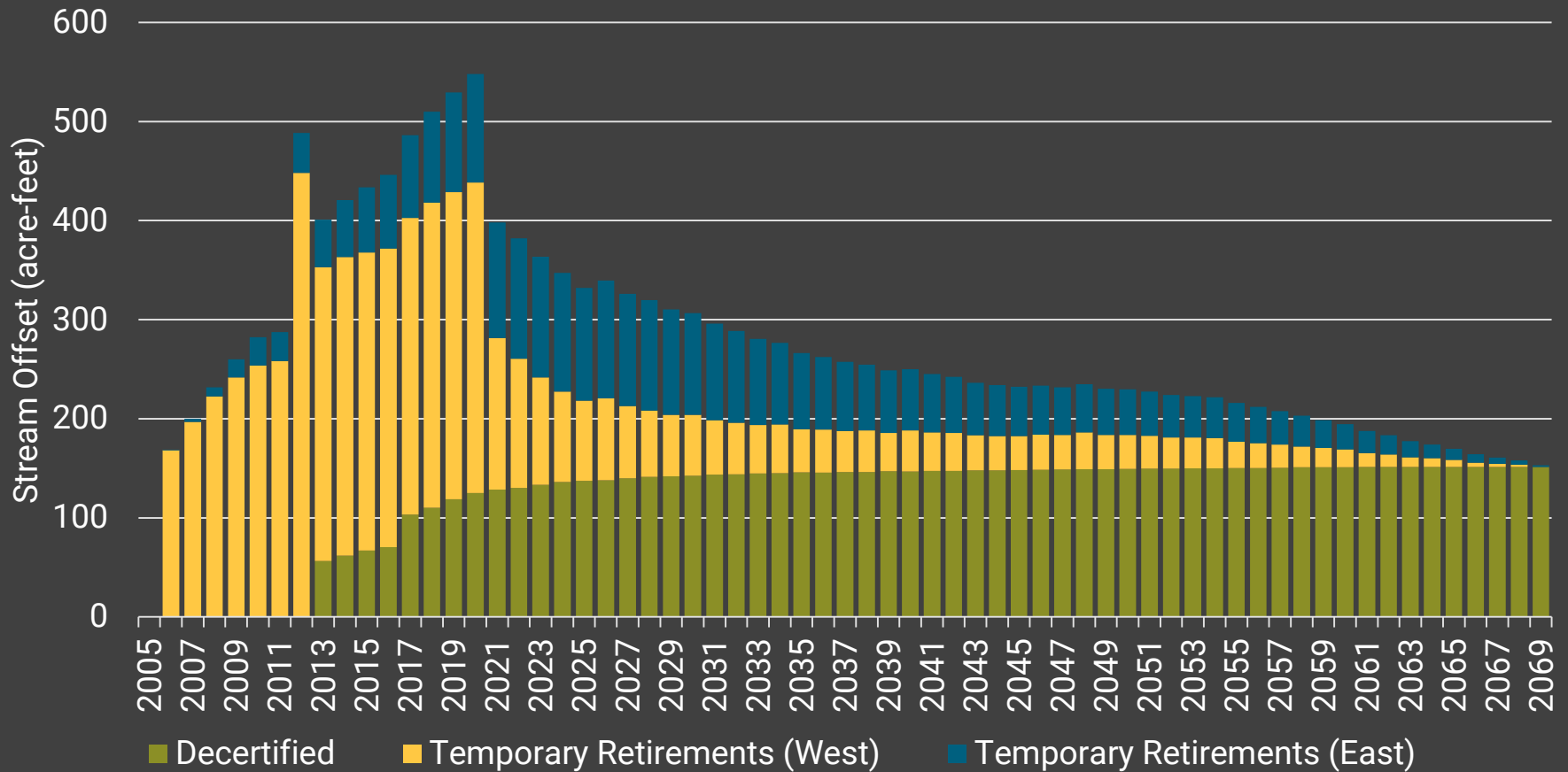
*Augmentation streamflow assumed to occur in same year as pumped; 2019 pumping repeated from 2018

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

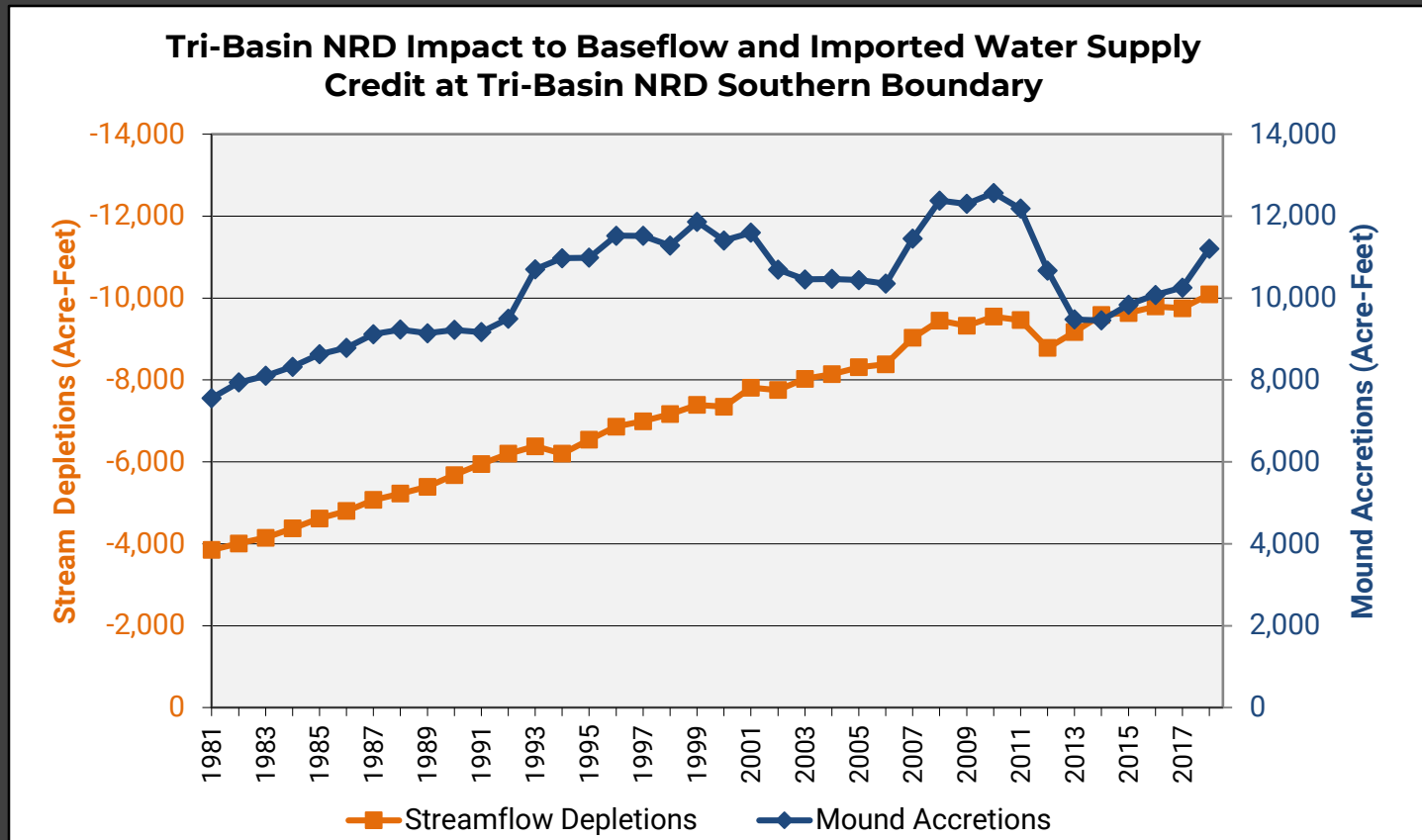
Goal A, Objective 1

“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.**”

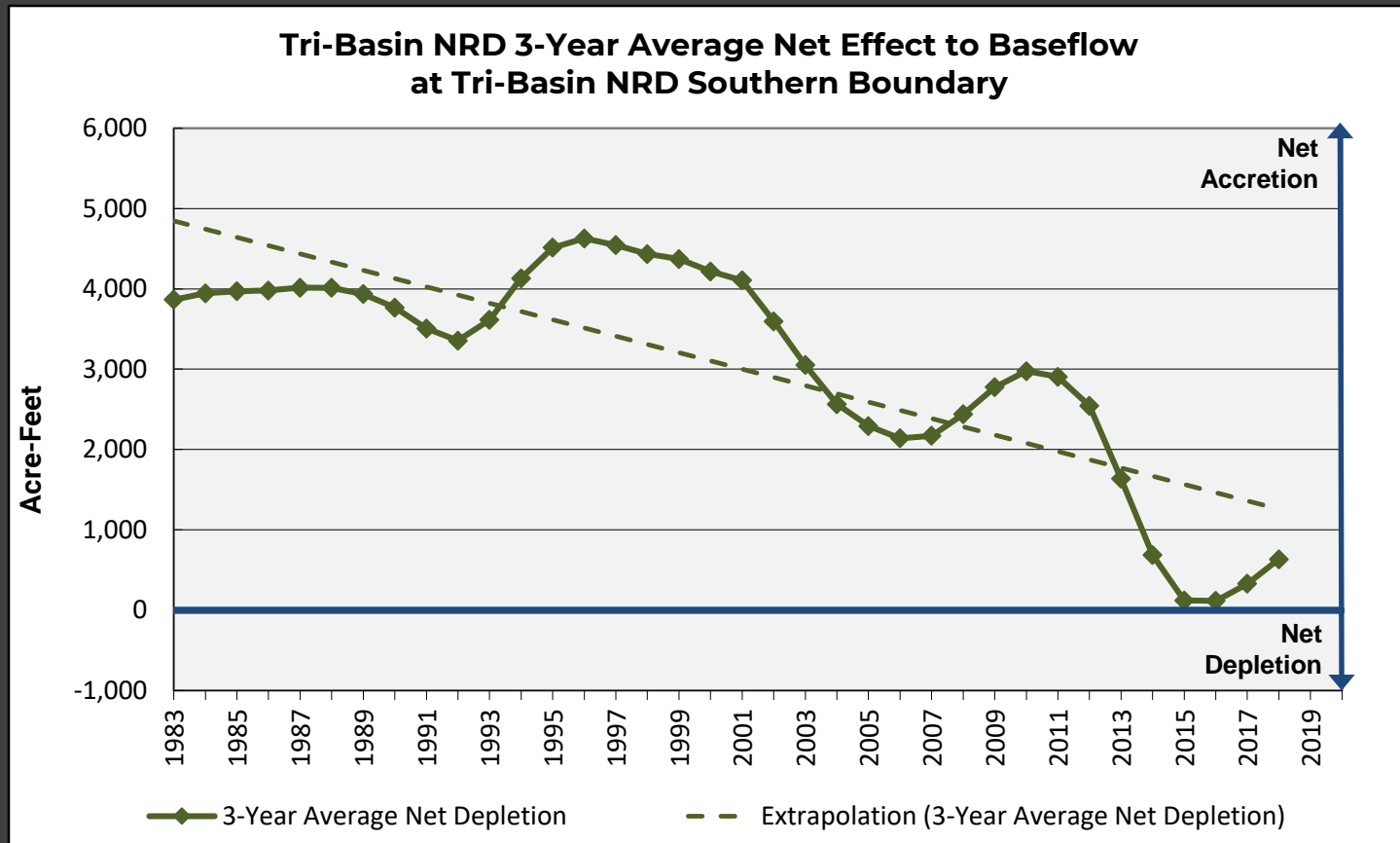
Assessment

“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**.”

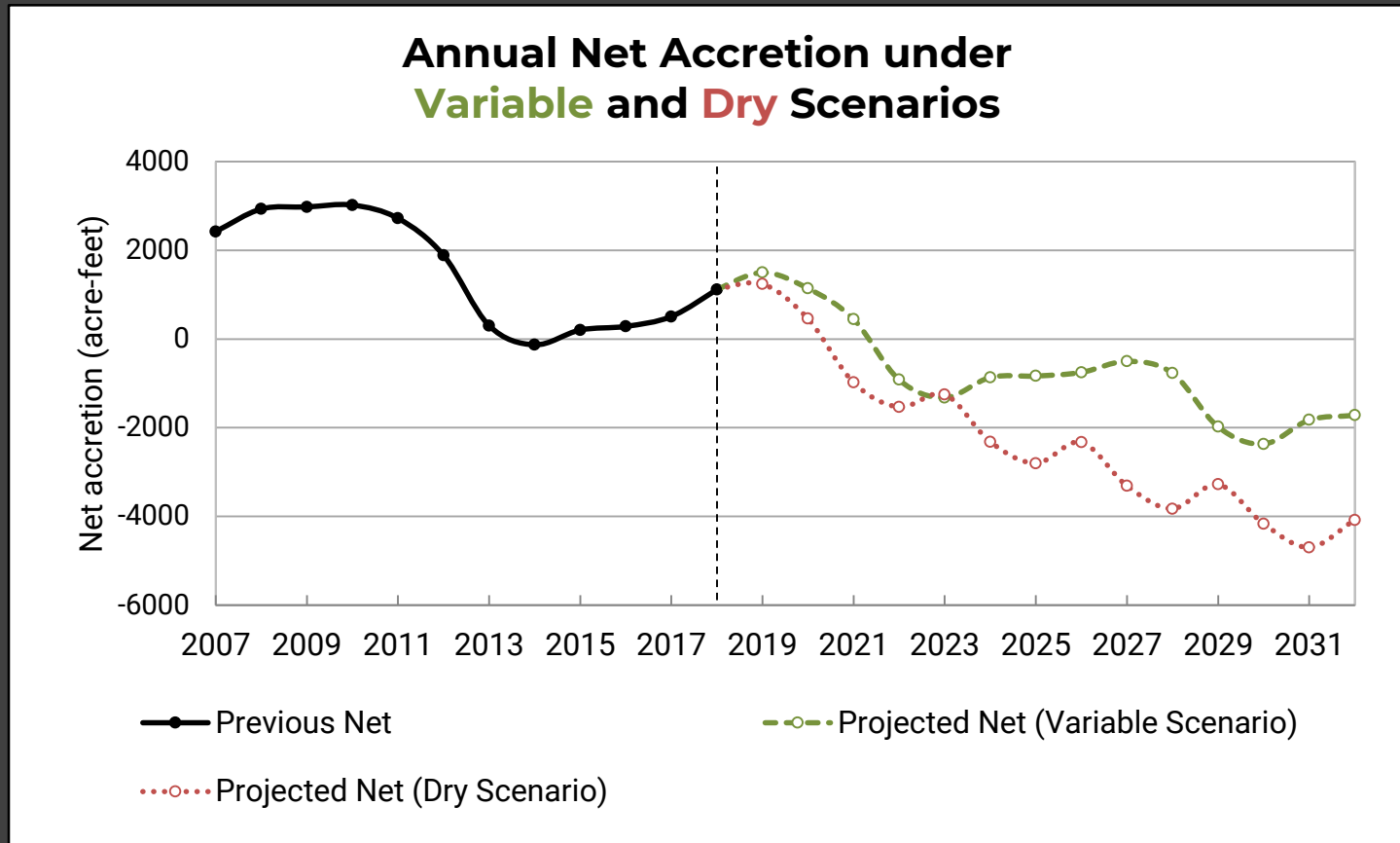
Modeled Depletions and Accretions, 1981 – 2018



Hydrologically Balanced Assessment



Projected Net Accretion (3-Year Rolling Average)



IMP Updates

Timing of future Meetings and
Correspondence

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