Republican River Basin-Wide Plan First Annual Meeting

February 20, 2020

Cambridge Community Building

UPPER REPUBLICAN NRD

Middle Republican Natural Resources District

Lower Republican Natural Resources District

Tri Basin Natural Resources District

NEBRASKA DEPT. OF NATURAL RESOURCES

Welcome and Introductions

- Nebraska Open Meetings Act requirements
- Review agenda and meeting objectives
- Introductions

Welcome and Introductions

Nebraska Open Meetings Act

- Location of:
  - Open Meetings Act
  - Sign-in-Sheets
- Where meeting was noticed:
  - Benkelman Post and News Chronicle
  - Franklin County Chronicle
  - Frontier Enterprise
  - Harlan County Journal
  - Hayes Center Times Republican
  - Hitchcock County News
  - Holdrege Daily Citizen
  - Imperial Republican
  - McCook Gazette
  - Red Cloud Chief
  - Superior Express
  - The Valley Voice
  - Wauneta Breeze
  - Grant Courthouse, City Building, & NRCS Office
  - *rrbwp.nebraska.gov*
  - *dnr.nebraska.gov*
  - *lrnrd.org*
  - *mrnrd.org*
  - *tribasinnrd.org*

Welcome and Introductions

Meeting Agenda

First Annual Meeting
Republican River Basin-Wide Plan

Cambridge Community Building
722 Patterson St., Cambridge, NE
February 20, 2020
1:00 p.m. Central Time

Agenda

1. Welcome and introductions
    a. Nebraska Open Meetings Act requirements
    b. Review agenda and meeting objectives
    c. Introductions
2. Plan implementation progress
    a. Annual Report: Plan Implementation Progress 2014-2018
        i. Progress toward goals and objectives of the plan
            1. Management activities
            2. Measurable Hydrologic Objectives (MHOs)
        ii. Water supplies and uses in the basin
        iii. Methodology for the analysis of MHO B
        iv. Methodology for the analysis of MHO C
    b. Feasibility and potential impacts of planned projects
3. Collaboration
    a. Existing and potential new water conservation programs
    b. Information sharing about water user management practice improvements
        i. Future opportunities to encourage and support water users to share information about management practice improvements
    c. HUC 12 watershed project (Water for Food)
    d. Weed management
4. Conflicts Resulting from Implementation of the Plan, if any
    a. None submitted for consideration
5. Public comment

Why an Annual Meeting?

Goal 2. Maximize Nebraska's efficient and beneficial consumptive use of its portion of the water supply, increase certainty for long-range planning of water supplies to reduce the need for regulatory actions, and increase collaborative efforts among water management entities and stakeholders across the Basin

Objective 2.3. Provide opportunities for collaboration among the Basin's water users

Action Item 2.3.1. Hold an annual public meeting to discuss Plan implementation and exchange information about the Basin

Introductions

Plan Implementation Progress

- Annual Report: Plan Implementation Progress, 2014–2018
- Feasibility and potential impacts of planned projects

First Annual Report for the Republican River Basin-Wide Plan
Data and Progress Updates, 2014–2018

Submitted at the First Annual Meeting

February 20, 2020

Annual Report

- Introduction
- Progress toward goals, objectives and action items
- Water supplies and uses in the basin
- Appendices (MHO B & C Methodology)

Annual Report

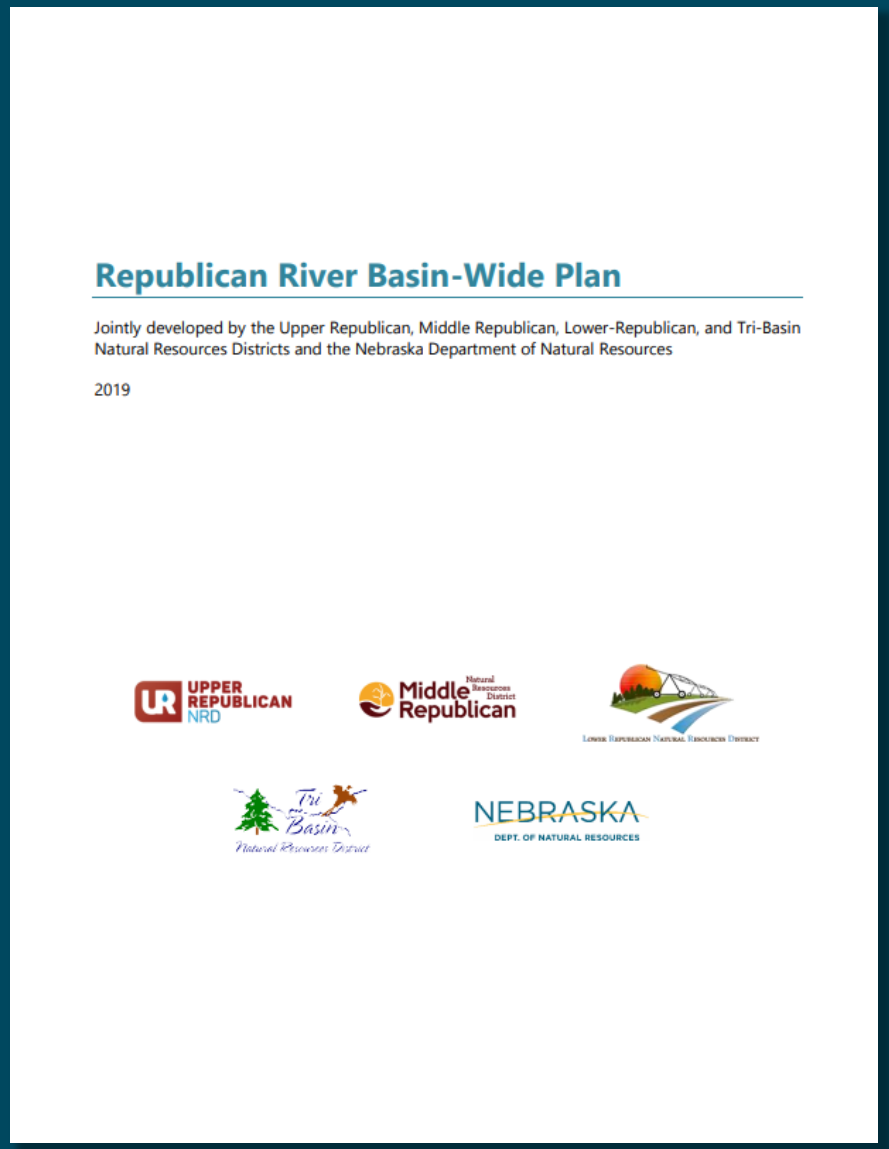
Introduction

Carol Flaute, Nebraska Department of Natural Resources (NeDNR)

Annual Report Introduction

Republican River Basin-Wide Plan

- Required by LB 1098 (2014)
- Purpose
  - To collaboratively manage hydrologically connected water resources in the Republican River Basin
- Jointly developed
  - By NeDNR and Republican Basin NRDs
  - With Stakeholder Advisory Committee
- 25 year time-frame
  - March 1, 2019, to April 17, 2044



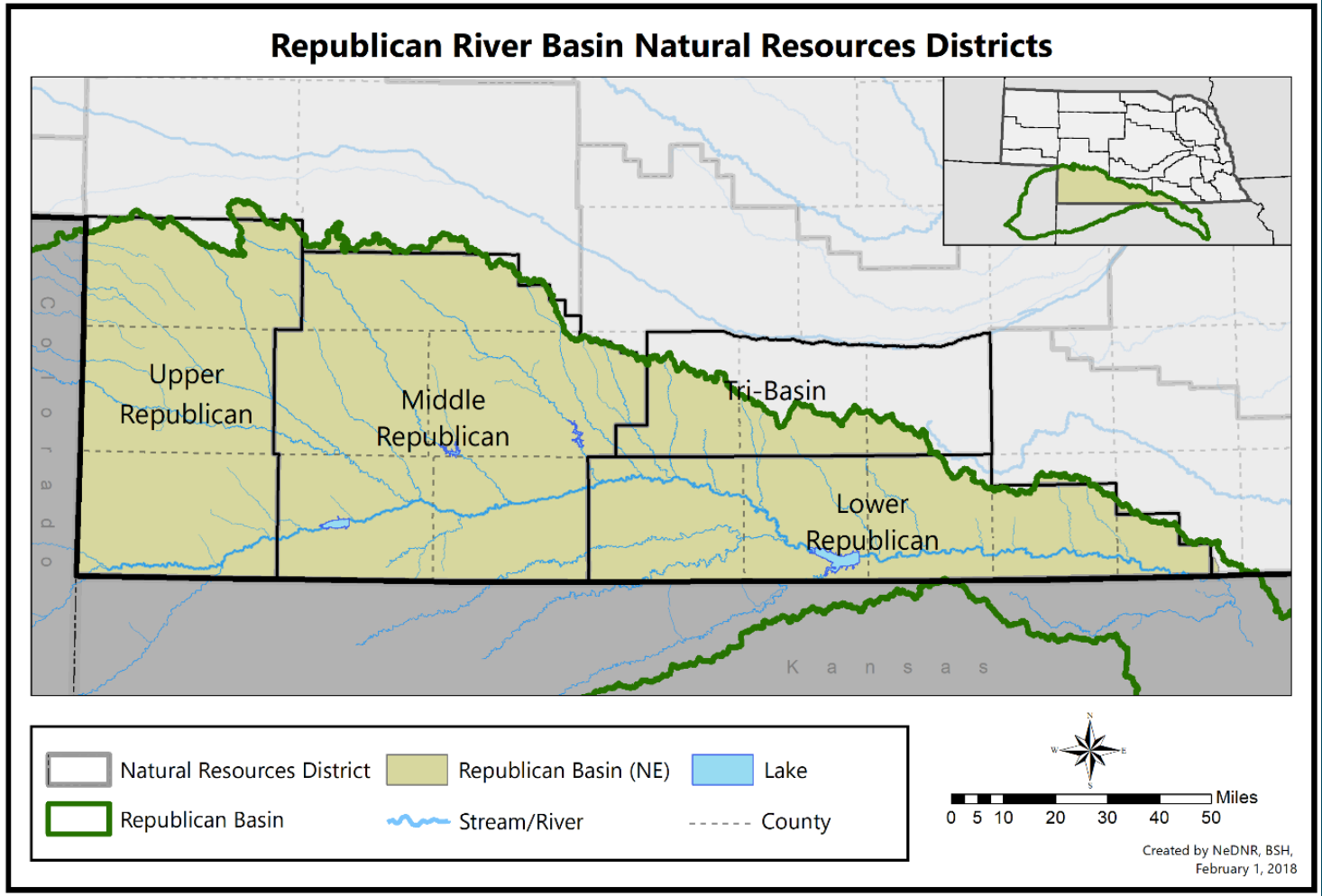
Republican River Basin-Wide Plan

Jointly developed by the Upper Republican, Middle Republican, Lower-Republican, and Tri-Basin Natural Resources Districts and the Nebraska Department of Natural Resources

2019

Annual Report

Republican River Basin-Wide Plan



Vision Statement for the Plan
"Waters responsibly used and the Republican River Basin is economically vibrant"

Mission Statement for the Plan
"To sustain a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the Republican River Basin can be achieved and maintained for both the near term and long term."

Annual Report Introduction

Why a Report?

Goal 3. Positive public relations, including information sharing, within and outside the Basin

Objective 3.2. Improve information sharing with water users who are reliant on the Basin's water supplies

Action Item 3.2.1. Share data and information related to the Republican River Compact with the public in an easily accessible, user-friendly format

Action Item 3.2.2. Annually prepare and exchange reports containing data and information about water supplies and uses in the Basin, and make these reports publically accessible

- Data & information about water supplies & uses
- Management activities
- Progress toward goals and objectives

Annual Report Introduction

Scope & Timeframe of Annual Reports

Future

- Plan to move meetings to fall, beginning with 2nd Annual Meeting in fall 2020
- Report Scope
  - Data & plan progress for **previous calendar year**
- Example
  - 2nd Annual Report will be published in fall 2020 and will cover 2019

Current

- 1st Annual Meeting (February 2020)
- 1st Annual Report Scope
  - Data & plan development process for **2014–2018**
- Why 2014–2018?
  - The first 5 years since passage of LB 1098 (2014)

Annual Report

Progress toward Goals, Objectives, and Action Items

- Management Activities
- Measurable Hydrologic Objectives (MHOs)

Progress toward Goals, Objectives, and Action Items

Management Activities: Plan Development & Adoption

Progress toward Goals, Objectives, and Action Items

Management Activities: Plan Development & Adoption

April 2014
LB 1098

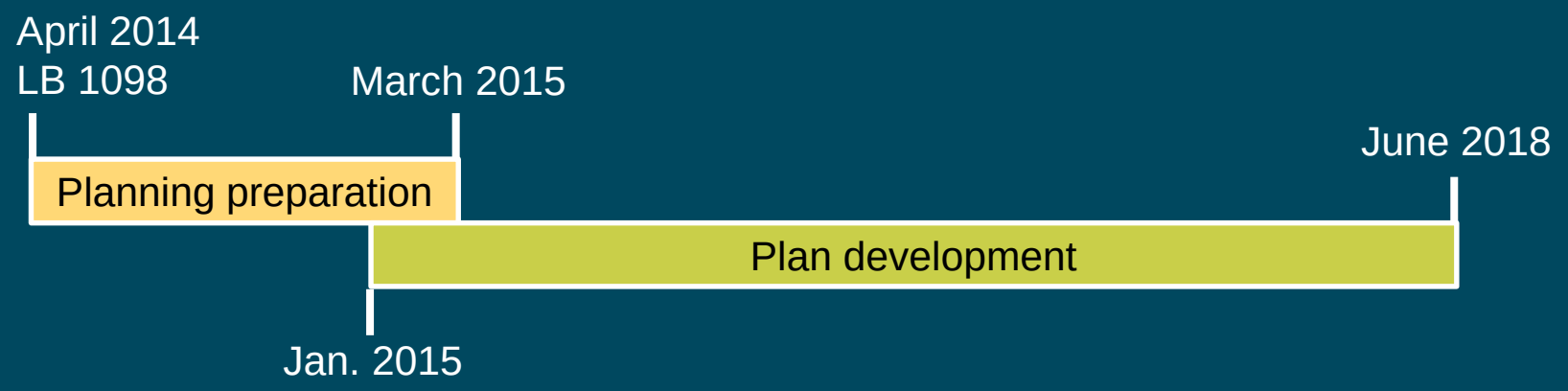
March 2015

Planning preparation

- Stakeholder Advisory Committee recruitment and compilation
- Consultant selection
- NeDNR and NRD coordination

Progress toward Goals, Objectives, and Action Items

Management Activities: Plan Development & Adoption



- 22 NeDNR/NRD Coordination meetings
- 15 Stakeholder Advisory Committee meetings

Progress toward Goals, Objectives, and Action Items

Management Activities: Plan Development & Adoption

- Stakeholder Advisory Committee final votes
- Public hearings and evaluation of testimony
- Agreement by NeDNR and NRDs on final plan, including goals, objectives, and action items

Progress toward Goals, Objectives, and Action Items

Republican River Basin-Wide Plan Goals

Goal 1. Maintain Nebraska's compliance with the Republican River Compact and applicable state laws

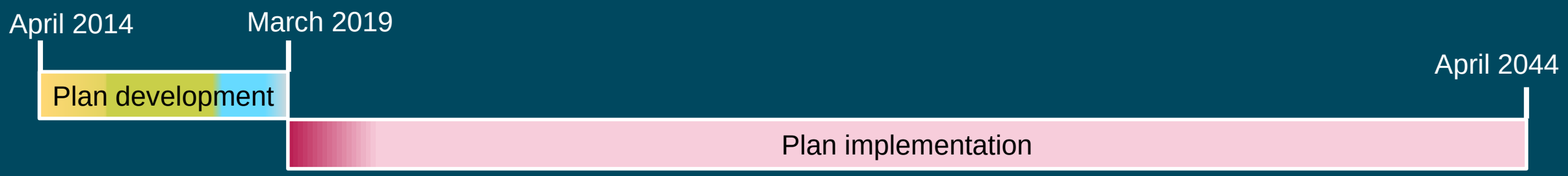
Goal 2. Maximize Nebraska's efficient and beneficial consumptive use of its portion of the water supply, increase certainty for long-range planning of water supplies to reduce the need for regulatory actions, and increase collaborative efforts among water management entities and stakeholders across the Basin

Goal 3. Positive public relations, including information sharing, within and outside the Basin

Goal 4. When possible, pursue projects that not only benefit water supplies and uses, but also create benefits for fish, wildlife, recreation, and conveyance within the Republican River Basin

Progress toward Goals, Objectives, and Action Items

Management Activities: Implementation In Progress



Progress toward Goals, Objectives, and Action Items

Management Activities: Implementation In Progress*

- Completed & ongoing:
  - IMP review & updates (including for consistency with Basin-Wide Plan)
  - MHO methodology development (Action Item 1.3.2)
  - Projects with irrigation districts (efficiency, conjunctive management; Action Items 2.2.1, 2.2.2)
  - Irrigated acres retirements/conservation programs (Action Items 2.2.2, 2.4.1)
  - Preparation for annual meeting & annual report (Action Items 2.3.1, 3.2.1, 3.2.2)
  - HUC-12 watershed study discussions (Action Item 2.5.3)
  - Preparation for drought planning exercise (Action Item 2.8.1)
  - Development of plan implementation website (Action Item 3.2.1)
  - GovDelivery subscription list to communicate with former stakeholders (Action Item 3.2.3)
- Beginning soon:
  - Development of methodology for five-year technical analysis (Action Item 1.3.1)

*not an exhaustive list

Progress toward Goals, Objectives, and Action Items

Management Activities Summary

- 2014–2018 progress: NeDNR, NRDs, and stakeholders developed and adopted goals, objectives, and action items

- Plan implementation began 2019; reporting on action items to begin in 2nd annual report

Progress toward Goals, Objectives, and Action Items

Measurable Hydrologic Objectives (MHOs)

- Why?
  - Required by statute
  - To evaluate plan progress
- 2014–2018 progress: NeDNR, NRDs, and stakeholders developed and adopted 5 MHOs

Progress toward Goals, Objectives, and Action Items

Assessment of MHOs

- Plan implementation began 2019; assessment to begin in 2nd annual report
- Assessment frequency:
  - MHOs A, D, E: Annual
  - MHOs B, C: Every 5 years

Progress toward Goals, Objectives, and Action Items

MHO A

- Maintain each NRD's net groundwater depletions to streamflow within its portion* of Nebraska's allowable groundwater depletions to streamflow*
  - **As specified in IMPs*

Progress toward Goals, Objectives, and Action Items

MHO B

- Limit groundwater depletions to streamflow* to a relatively constant level over the long-term both across the basin as a whole and within each NRD
  - *For Tri-Basin NRD, evaluated as the net of:
    - Groundwater depletions to streamflow
    - The mound credit

NeDNR & NRDs committed to develop written assessment procedures before the first annual meeting

Progress toward Goals, Objectives, and Action Items

MHO C

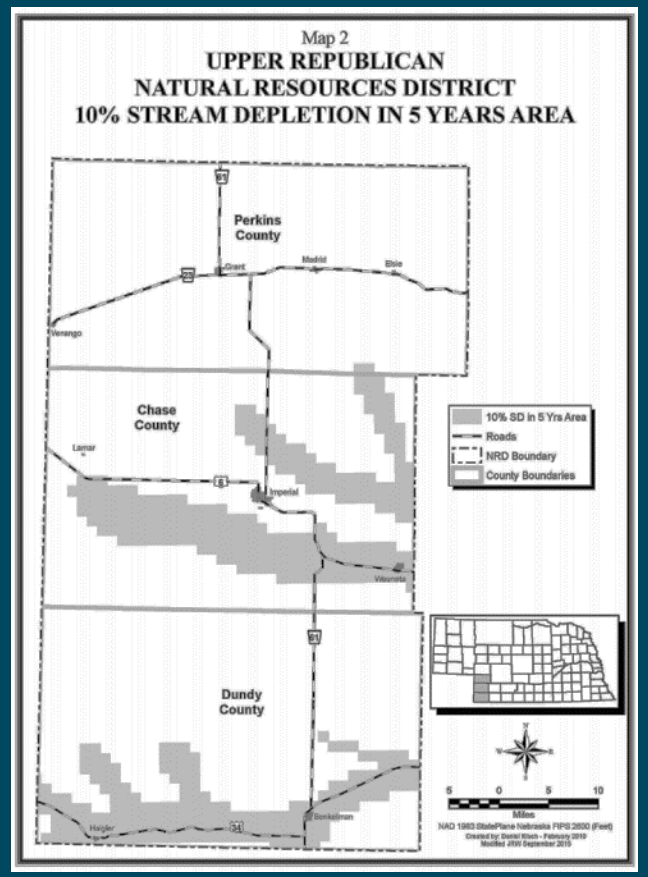
- Ensure there is always enough groundwater for all groundwater uses within the timeframe of this plan, either by stabilizing groundwater levels or managing declining groundwater levels

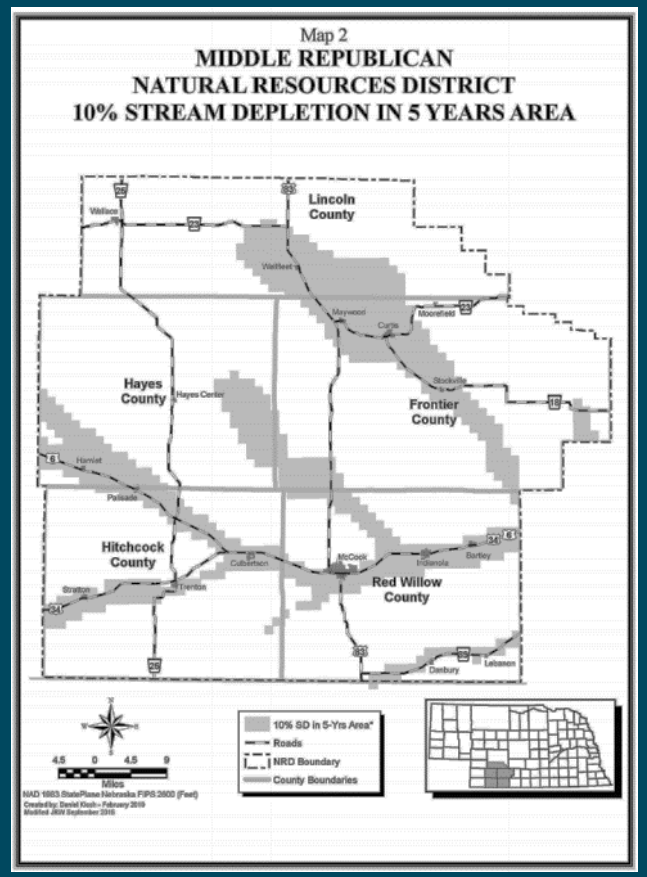
NeDNR & NRDs committed to develop written assessment procedures before the first annual meeting

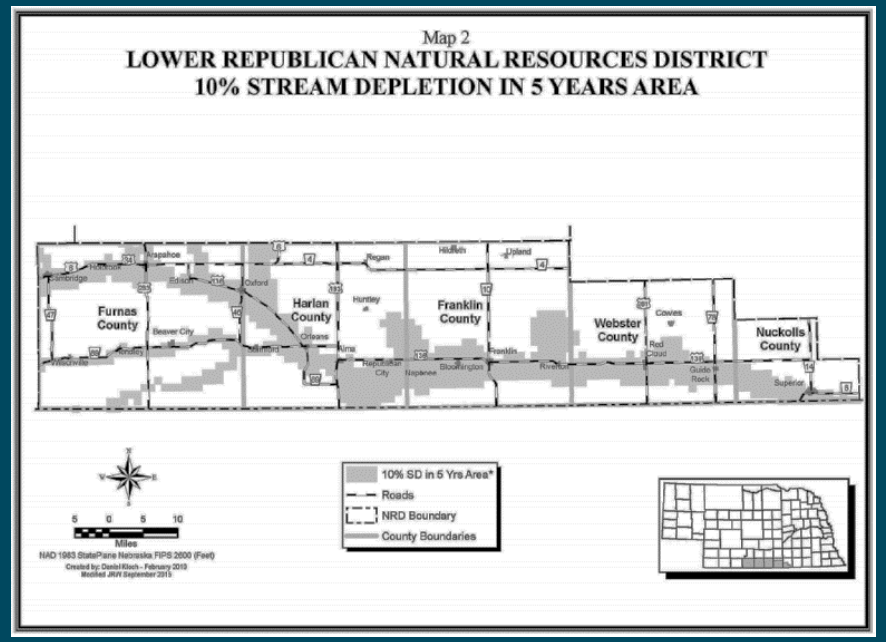
Progress toward Goals, Objectives, and Action Items

MHO D

- Continue existing and initiate new actions that reduce the need for special regulations in the Rapid Response Area for Compact compliance



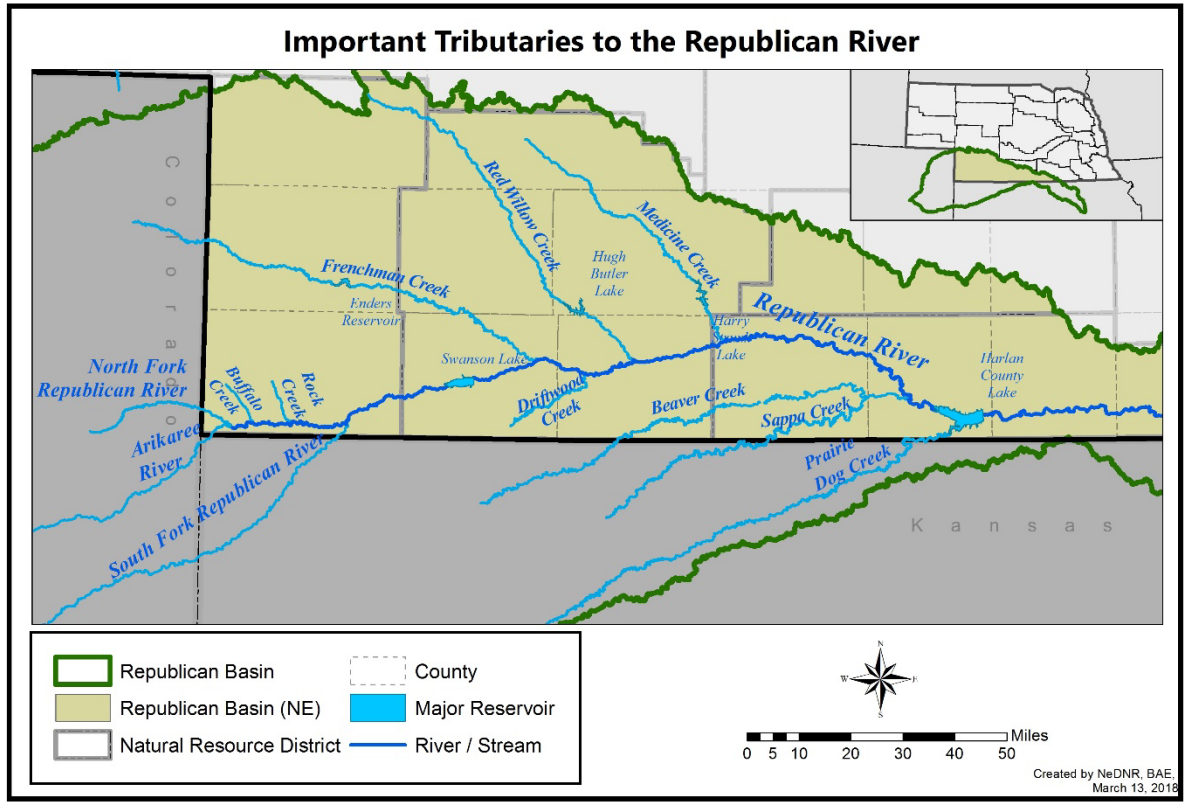




Progress toward Goals, Objectives, and Action Items

MHO E

- Continue existing and initiate new actions that reduce the need for administration of surface water use for Compact compliance*
  - *Excludes administration automatically triggered by the terms of the Compact/FSS



Annual Report

Water Supplies and Uses in the Basin

- Upper Republican NRD
- Middle Republican NRD
- Lower Republican NRD
- Tri-Basin NRD
- NeDNR

Annual Report
Water Supplies and Uses in the Basin

Upper Republican NRD

Nate Jenkins, URNRD

Upper Republican NRD

Current allocations for groundwater irrigation, 2018-2022

Total Allocation	65 Inches/Acre/5 Years
Annual or Base Allocation	Allocation is over 5 Years, not annual
Maximum Annual Use	65 Inches/Acre
Carry over amount that can be used in the following allocation period	7.5 Inches/Acre (Max)
Hard Cap	None
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.

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Upper Republican NRD

Current allocations for groundwater irrigation, 2018-2022

(continued)

Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	Not unless augmentation projects are insufficient to meet Compact obligations and Rapid Response Area allocations are needed. Allocations would depend upon projected Compact shortfalls.
Penalty for exceeding allocation	For every inch of excess use, 2 inches of allocation lost for next allocation period.
Penalty for exceeding carry over	2 inches carry-over deducted for every inch of carry-over used above 7.5 inches

Upper Republican NRD

Annual groundwater use for irrigation

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2014	442,612	430,200	370,392	10.3
2015	442,372	429,980	434,374	12.1
2016	442,781	430,389	388,715	10.8
2017	442,243	430,131	440,644	12.3
2018	441,987	430,154	349,833	9.8

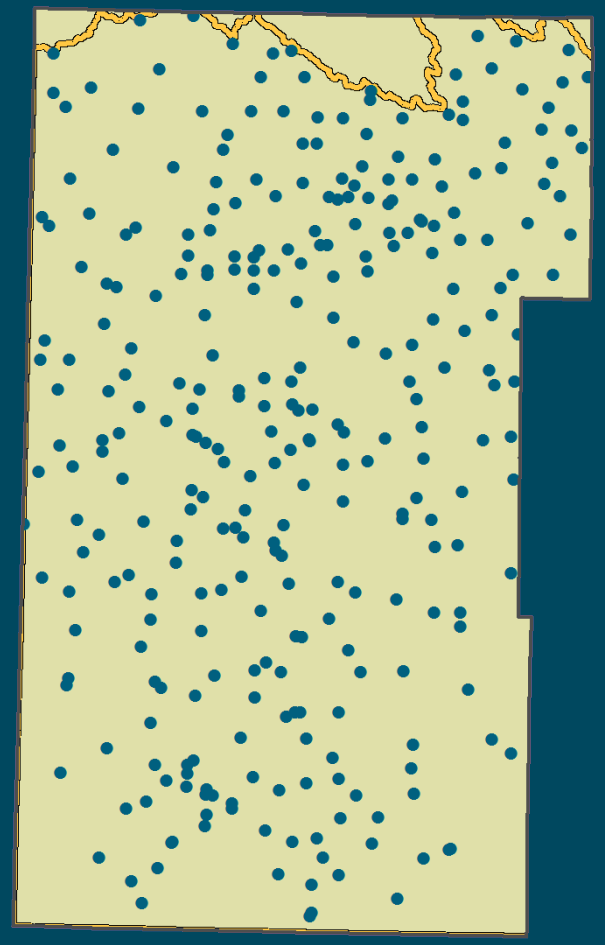
Upper Republican NRD

Acres retired from irrigation (temporarily or permanently)

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2014	10,870	1,546 (AWEP)
2015	10,846	1,546 (AWEP)
2016	10,846	1,546 (AWEP)
2017	10,566	1,546 (AWEP)
2018	10,287	1,546 (AWEP)

Upper Republican NRD

Observation Wells



Upper Republican NRD: 306 Observation Wells

Republican River Basin

Observation Wells

Observation well data obtained from UNL Conservation and Survey Division well database. NRDs may measure other wells.

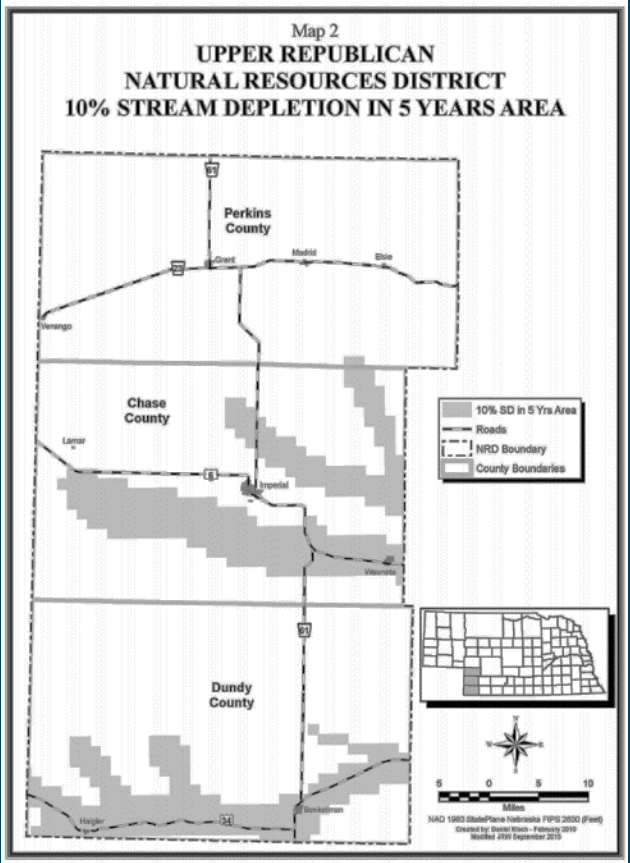
Observation well data available upon request

Upper Republican NRD

Curtailment of Groundwater Pumping for Compact Compliance

- Under IMP, pumping in Rapid Response Area may curtailed by NRD to ensure compliance with Republican River Compact

- From 2014–2018, did not curtail pumping in Rapid Response Area



Annual Report
Water Supplies & Uses in the Basin

Middle Republican NRD

Jack Russell, MRNRD

Middle Republican NRD

Current allocations for groundwater irrigation, 2018-2022

Total Allocation	60 Inches/Acre/5 Years
Annual or Base Allocation	12 Inches/Acre/Year
Maximum Annual Use	60 Inches/Acre (15 Inches/Acre in a Compact Call Year)
Carry over amount that can be used in the following allocation period	12 Inches/Acre (Max)
Hard Cap	15 Inches/Acre/Year
Pooling allowed?	Yes

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Middle Republican NRD

Current allocations for groundwater irrigation, 2018-2022

(continued)

Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	None
Penalty for exceeding allocation	The allocation for the next allocation period shall be reduced by the number of acre inches by which said allocation was exceeded in the prior period. A penalty of 1 inch for every inch over the first 3 inches and 2 inches for every inch over 3 inches of overuse will be applied. <u>Overuse</u> of the adjusted base allocation during a Compact Call Year shall result in a penalty of 2 inches for every inch over the first 3 inches and 3 inches for every inch over 3 inches of overuse will be applied. This penalty will result in a correction to the remaining allocation following the compact call year. This penalty shall be in addition to the penalties imposed by 5-4.16 if the compact call year is the last year of an allocation period.
Penalty for exceeding carry over	None

Middle Republican NRD

Annual groundwater use for irrigation

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2014	308,556.98	280,966.20	211,904.46	9.07
2015	297,136.02	282,613.86	229,514.28	9.75
2016	296,882.04	282,404.66	241,096.90	10.25
2017	296,801.43	281,904.14	254,656.21	10.84
2018	297,010.28	282,138.84	164,965.96	7.02

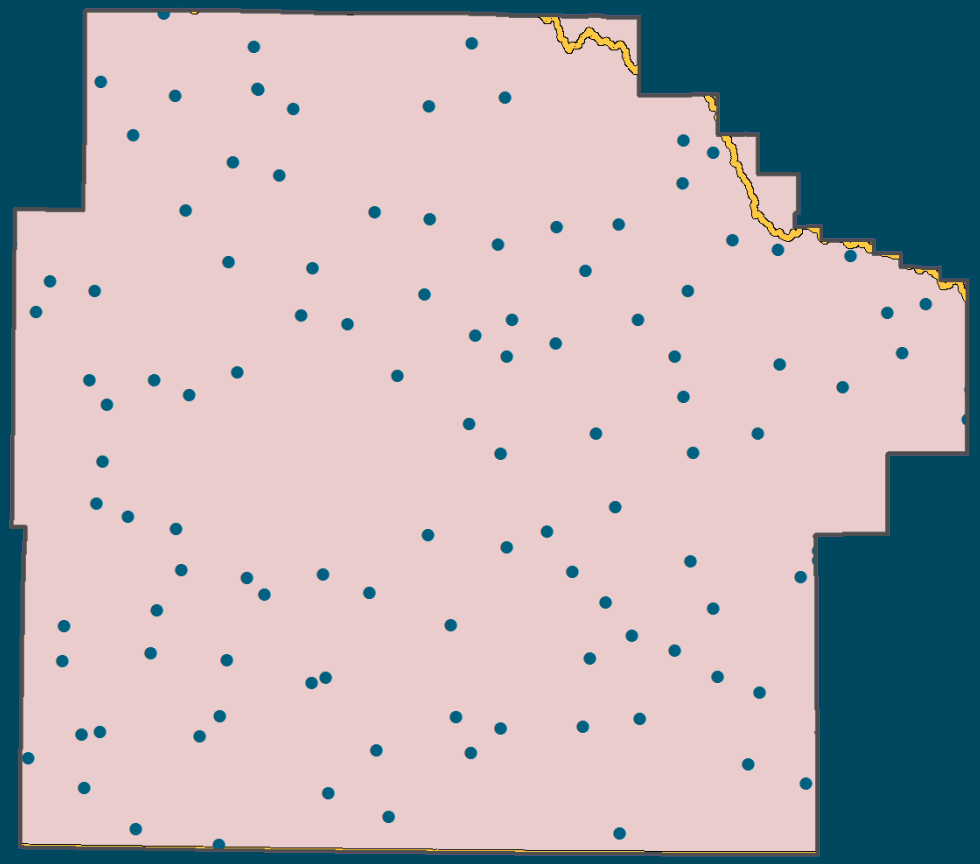
Middle Republican NRD

Acres retired from irrigation (permanently or temporarily)

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2014	16,917	2,423
2015	16,739	3,949
2016	16,629	3,427
2017	15,550	5,903
2018	15,661	6,521

Middle Republican NRD

Observation Wells



Middle Republican NRD: 108 Observation Wells

Republican River Basin

Observation Wells

Observation well data obtained from UNL Conservation and Survey Division well database. NRDs may measure other wells.

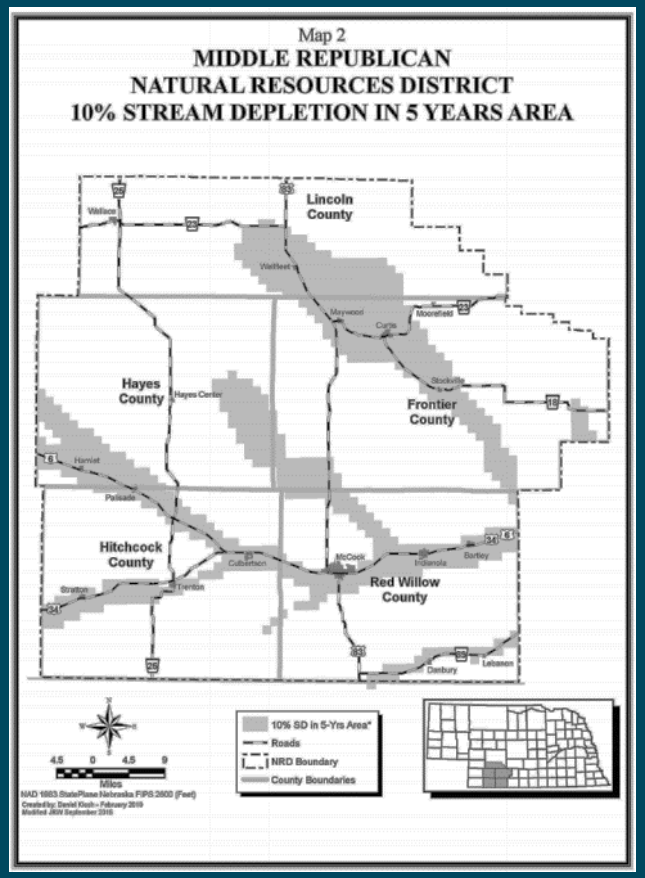
Observation well data available upon request

Middle Republican NRD

Curtailment of Groundwater Pumping for Compact Compliance

- Under IMP, pumping in Rapid Response Area may curtailed by NRD to ensure compliance with Republican River Compact

- From 2014–2018, did not curtail pumping in Rapid Response Area



Annual Report
Water Supplies & Uses in the Basin

Lower Republican NRD

Todd Siel, LRNRD

Lower Republican NRD

Current allocations for groundwater irrigation, 2018-2022

Total Allocation	45 Inches/Acre/5 Years
Annual or Base Allocation	9 Inches/Acre/Year
Maximum Annual Use	45 Inches/Acre (13 Inches/Acre in a Compact Call Year)
Carry over amount that can be used in the following allocation period	9 Inches/Acre (Max)
Hard Cap	13 Inches/Acre/Year (in a Compact Call Year)
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.

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Lower Republican NRD

Current allocations for groundwater irrigation, 2018-2022

(continued)

Special allocations for designated groundwater management areas? Or subbasins?	None
Rapid Response Area Allocations?	During Non-Compact Call years, the Rapid Response Area has the same Allocation as the rest of the District. During a Compact Call Year, the Allocation shall be set at the maximum allowable that would not cause the District's depletions to streamflow to exceed the District's allowable Ground Water depletions after taking into consideration other actions controls that the District would implement.
Penalty for exceeding allocation	Unless otherwise provided, imposition of penalties shall be at the discretion of the Board and may include, but are not limited to: 1. A reduction (in whole or in part) of a Person's Allocation of Ground Water; 2. 2. A reduction (in whole or in part) of a Person's Certified Irrigated Acres; and 3. Decommissioning of Water Wells
Penalty for exceeding carry over	

Lower Republican NRD

Annual groundwater use for irrigation

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2014	320,562.69	306,505.58	144,201.12	5.65
2015	320,318.79	310,441.06	188,869.29	7.30
2016	320,362.37	310,740.50	206.894.17	7.99
2017	320,208.13	310,613.67	167,629.89	6.48
2018	320,092.49	310,156.61	125,725.60	4.86

Lower Republican NRD

Acres retired from irrigation (permanently or temporarily)

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2014	7,749	6,308
2015	7,754	2,124
2016	7,509	2,112
2017	7,551	2,044
2018	7,928	2,008

Lower Republican NRD

Observation Wells

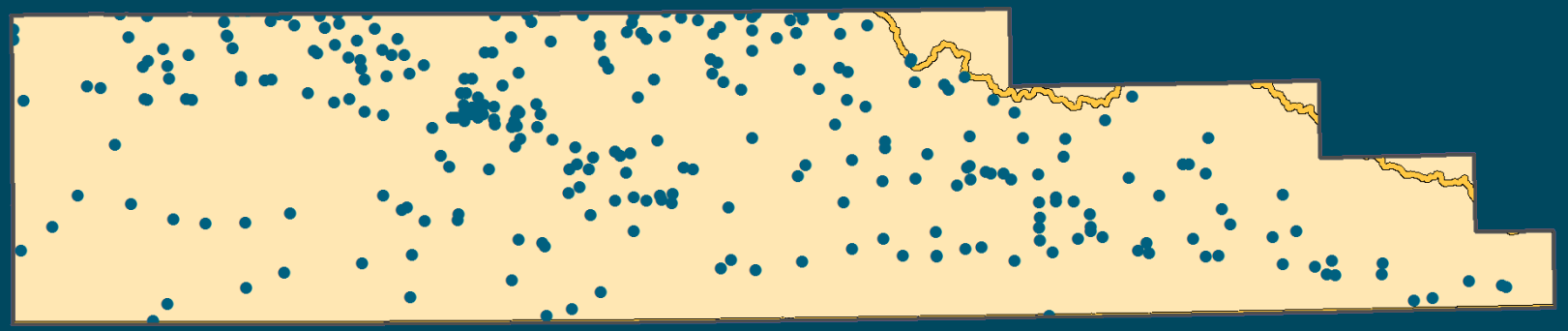
Lower Republican NRD: 280 Observation Wells

Republican River Basin

Observation Wells

Observation well data obtained from UNL Conservation and Survey Division well database. NRDs may measure other wells.

Observation well data available upon request



Lower Republican NRD

Curtailment of Groundwater Pumping for Compact Compliance

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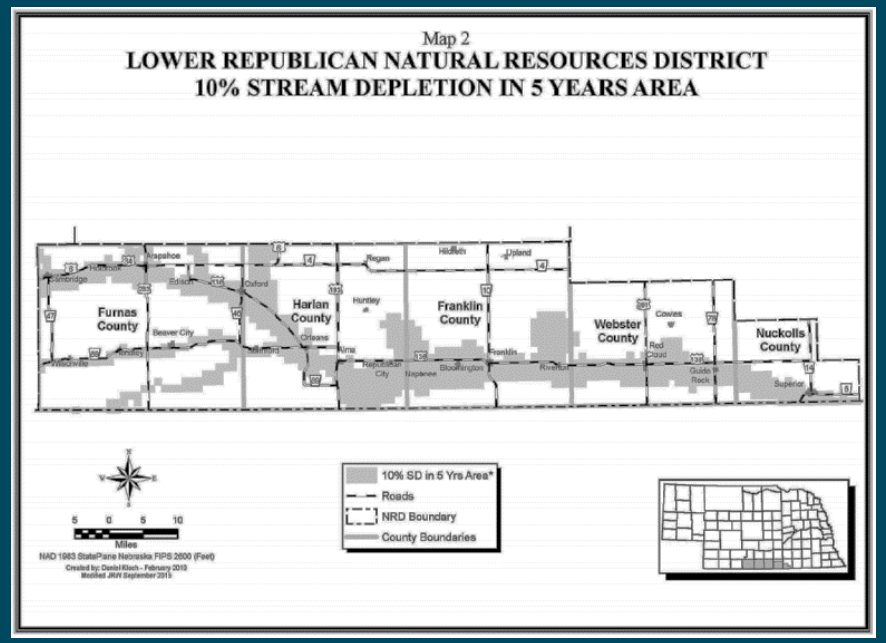
- From 2014–2018, did not curtail pumping in Rapid Response Area



Annual Report
Water Supplies & Uses in the Basin

Tri-Basin NRD

John Thorburn, TBNRD

Tri-Basin NRD

Current allocations for groundwater irrigation, 2018–2020

Total Allocation	27 Inches/Acre/3 Years
Annual or Base Allocation	9 Inches/Acre/Year
Maximum Annual Use	27 Inches/Acre
Carry over amount that can be used in the following allocation period	9 Inches/Acre (Max)
Hard Cap	None
Pooling allowed?	Yes
How are the allocations affected by surface water use?	Allocations are not affected by surface water use. Irrigators may use their full groundwater allocation, regardless of any surface water use.

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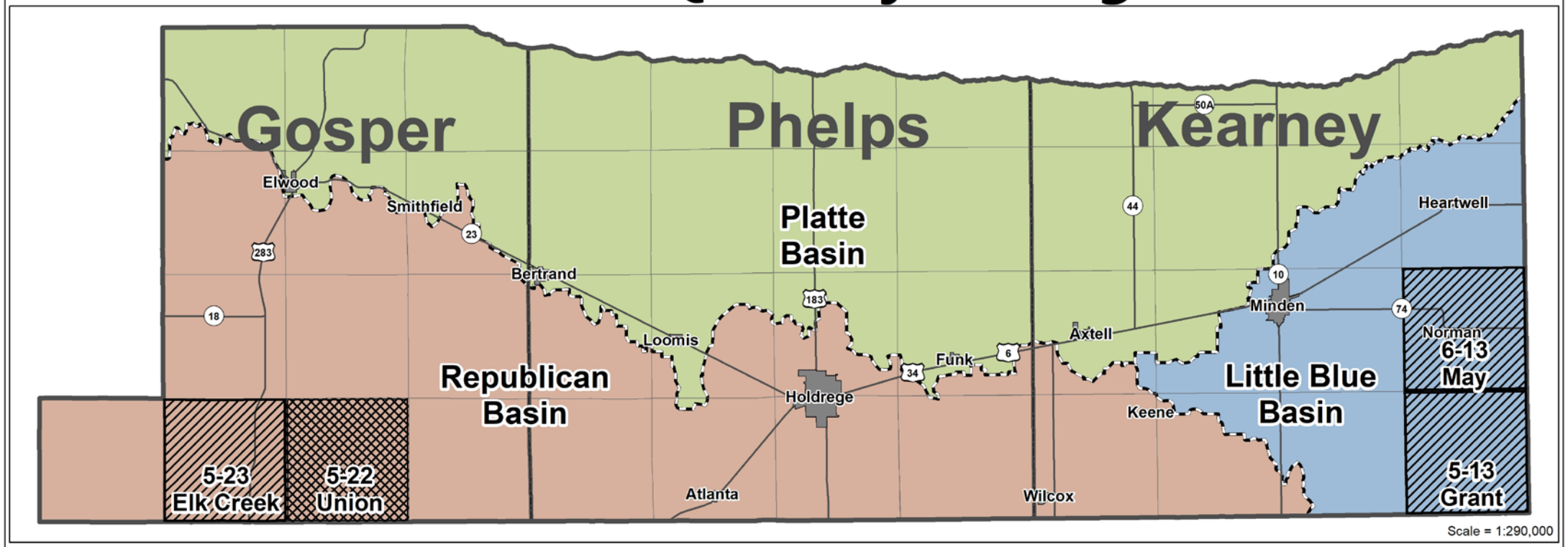
Tri-Basin NRD

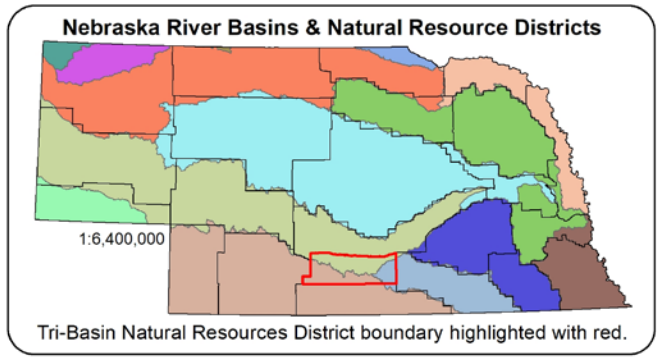
Current allocations for groundwater irrigation, 2018–2020

(continued)

Special allocations for designated groundwater management areas? Or subbasins?	Allocation only required in Phase 3 groundwater quantity management areas. Current Phase 3 area is Township 5 North, Range 22 West (Union Twp.) in Gosper County.
Rapid Response Area Allocations?	None
Penalty for exceeding allocation	1.5 times the overuse amount
Penalty for exceeding carry over	1.5 times the overuse amount

Tri-Basin Natural Resources District
Groundwater Quantity Management





Designation	River Basin	
Phase II	Republican	Community
Phase III	Little Blue	Highway
	Platte	County
		Township

*The entire district is regulated under Phase I regulations.

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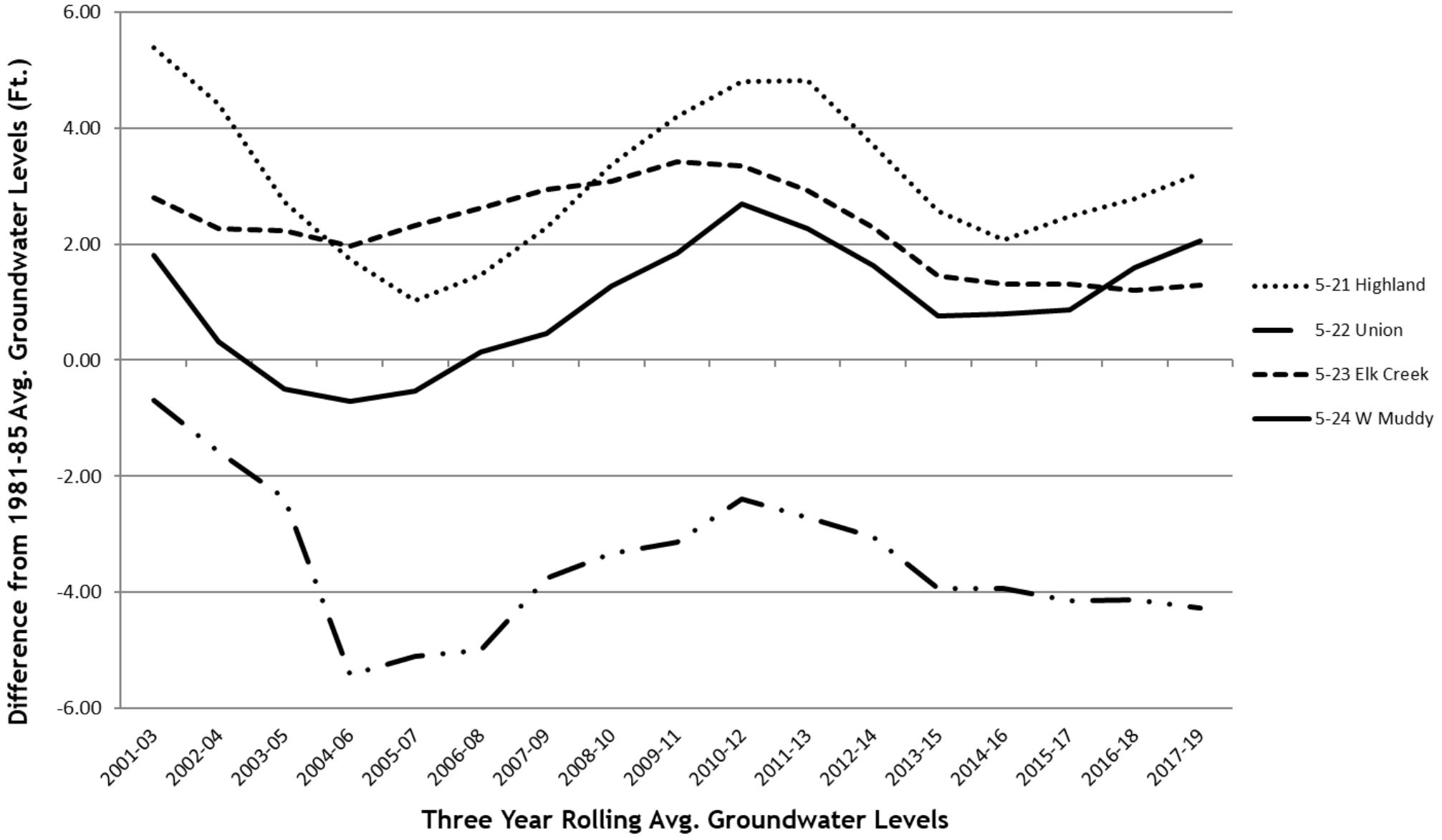
Nolan Little
January 2019
Tri-Basin Natural Resources District

Tri Basin Natural Resources District

Tri-Basin NRD
Southern Gosper County Water Level Changes



Tri-Basin NRD

Annual groundwater use for irrigation (Republican Basin)

Year	Certified Acres	Effective Acres	Volume Pumped (acre-feet)	Average Depth (inches/effective acre)
2014	189647.14	187870.54	97774	6.25
2015	189969.1	188192.50	137221	8.75
2016	189982.99	188206.39	162157	10.34
2017	189882.31	188228.31	117370	7.48
2018	190260.62	188606.62	81306	5.17

Tri-Basin NRD

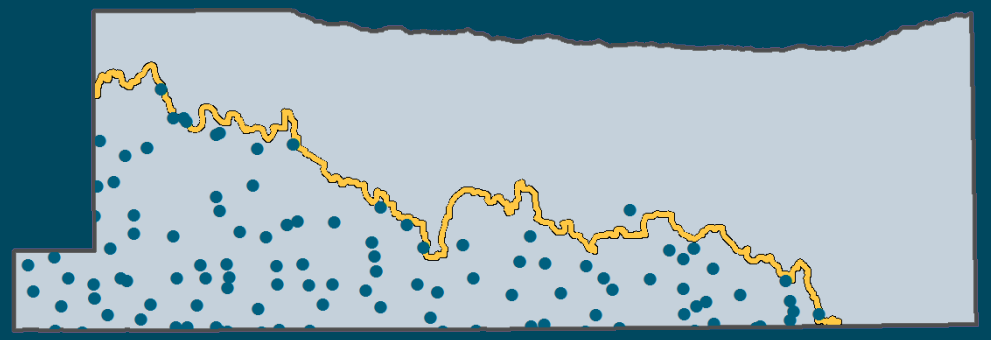
Acres within the Republican River Basin retired from irrigation (permanently or temporarily)

Year	Acres Enrolled in CREP	Acres Enrolled in Other Retirement Programs
2014	1,602*	None
2015	1,602*	None
2016	1,570	None
2017	1,752	None
2018	1,831	None

*CREP totals for 2014 and 2015 include all acres throughout the District. This includes 32 acres in the Platte River Basin. The total number of acres enrolled in CREP within the Republican River Basin portion of TBNRD in these years was 1,570 acres.

Tri-Basin NRD

Observation Wells (Republican Basin)



Tri-Basin NRD:
114 Observation Wells

Republican River Basin

Observation Wells

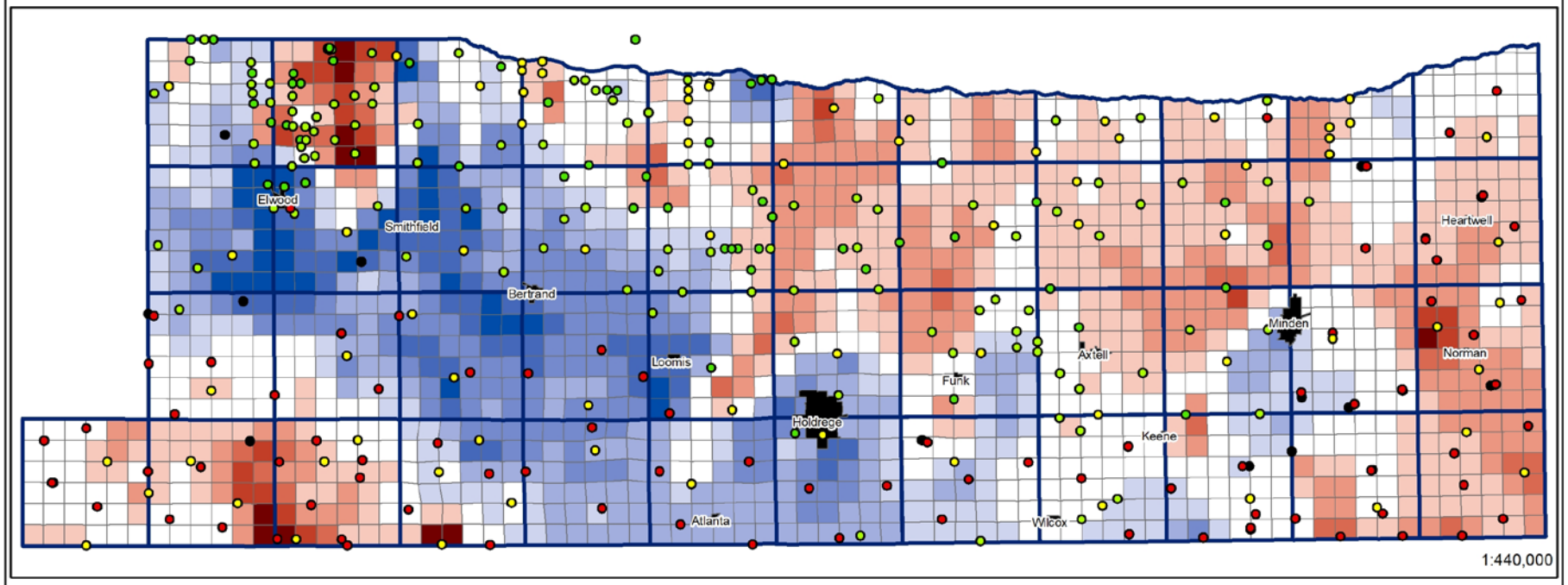
Observation well data obtained from UNL Conservation and Survey Division well database. NRDs may measure other wells.

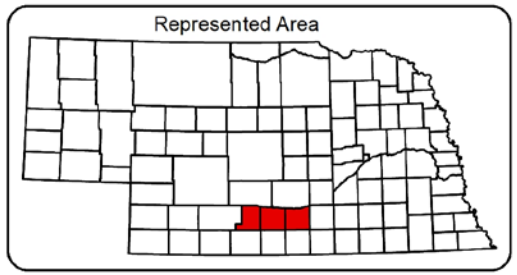
Observation well data available upon request

Tri-Basin Natural Resources District

Change in Groundwater Elevation

2017-2019 Average vs 1981-1985 Average





Well

- CNPPID
- Irrigation
- Observation
- Abandoned

Groundwater Elevation Change in Feet

-40 - -25 | -25 - -20 | -20 - -15 | -15 - -10 | -10 - -5 | -5 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 67

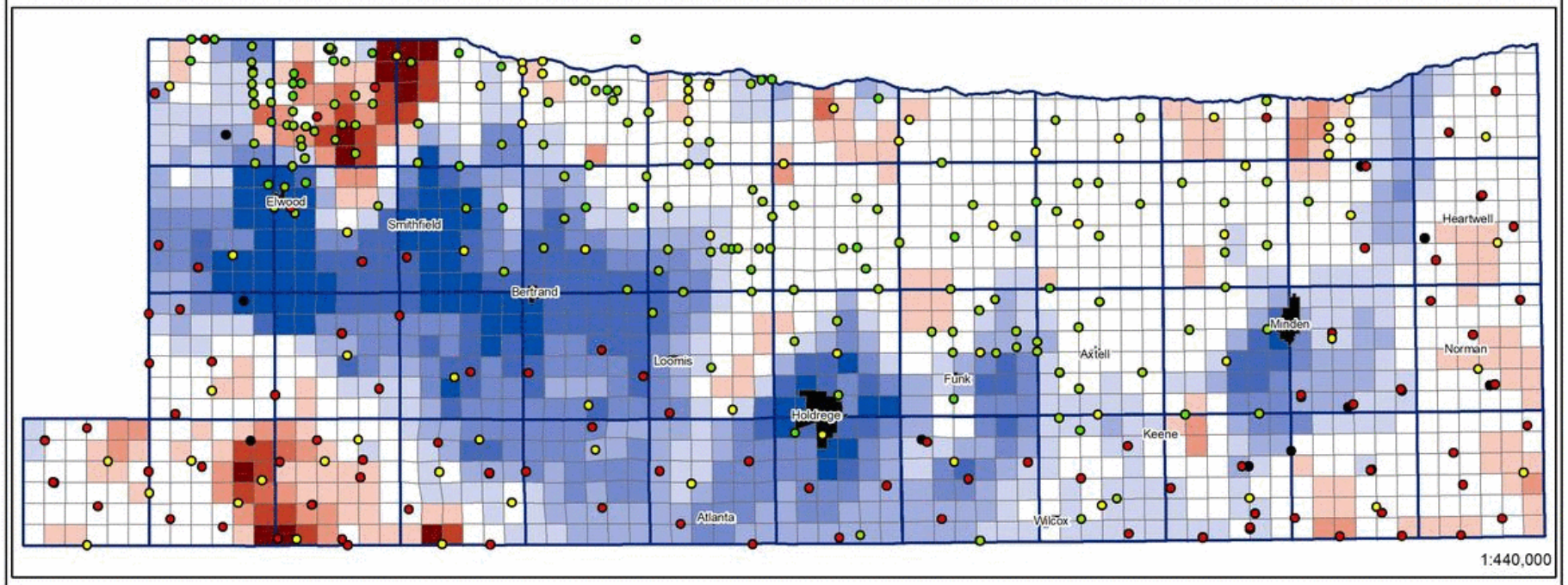
N W E S

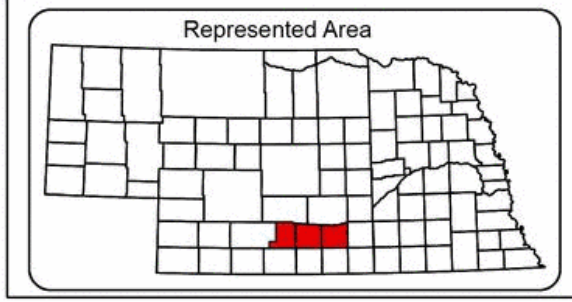
Nolan Little
June 2019
Tri-Basin Natural Resources District

Tri-Basin Natural Resources District

Change in Groundwater Elevation

2010-2012 Average vs 1981-1985 Average





Well

- CNPPID
- Irrigation
- Observation
- Abandoned

Groundwater Elevation Change in Feet

-46 - -25 | -25 - -20 | -20 - -15 | -15 - -10 | -10 - -5 | -5 - 5 | 5 - 10 | 10 - 15 | 15 - 20 | 20 - 25 | 25 - 71

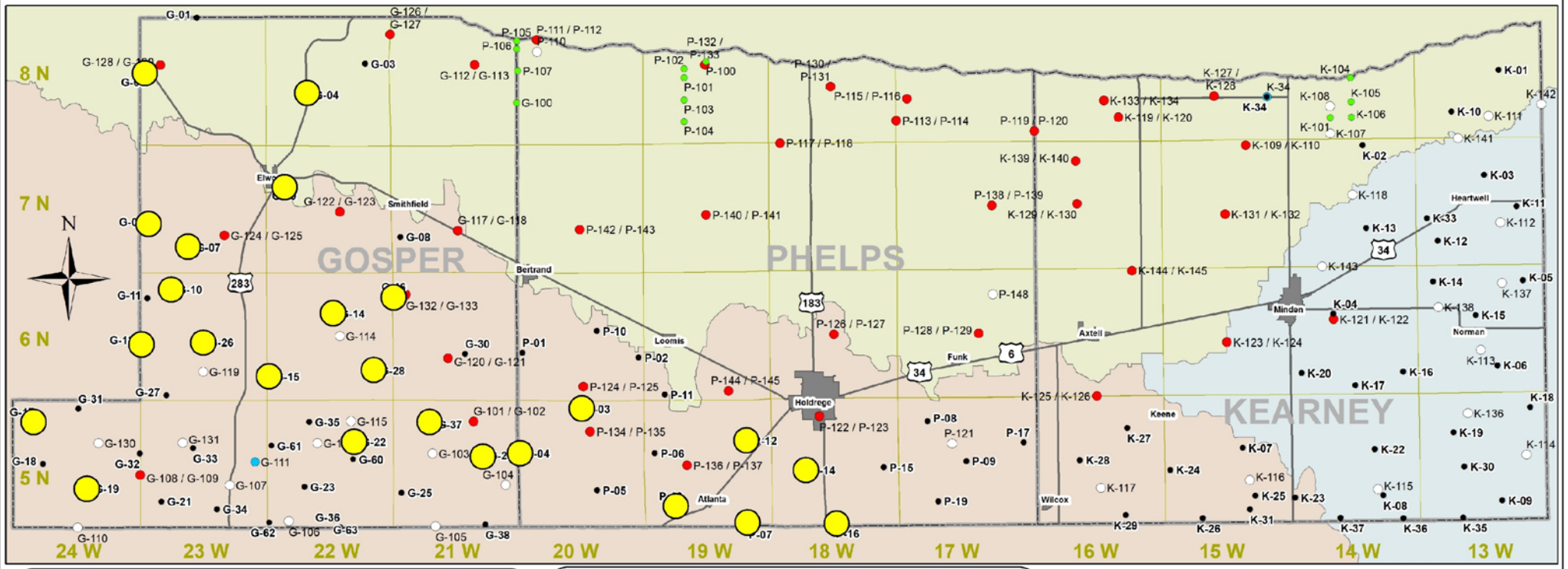
Nolan Little
January 2013
Tri-Basin Natural Resources District

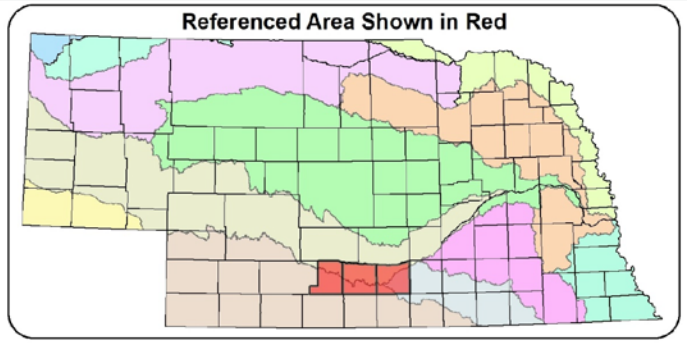
Spring 2019 Record Top 3 High

24/7

Tri-Basin Natural Resources District

Static Water Measurement Wells





- Irrigation Well
- Transect Well
- Single Well
- Nested Well
- Other Well
- Highway
- Community
- County Boundary
- Township
- Little Blue Basin
- Republican Basin
- Platte Basin

Observation Well Stats:
- 84 Sites
- 38 Nested Wells
- 122 Data Loggers
- 12 Hour Interval

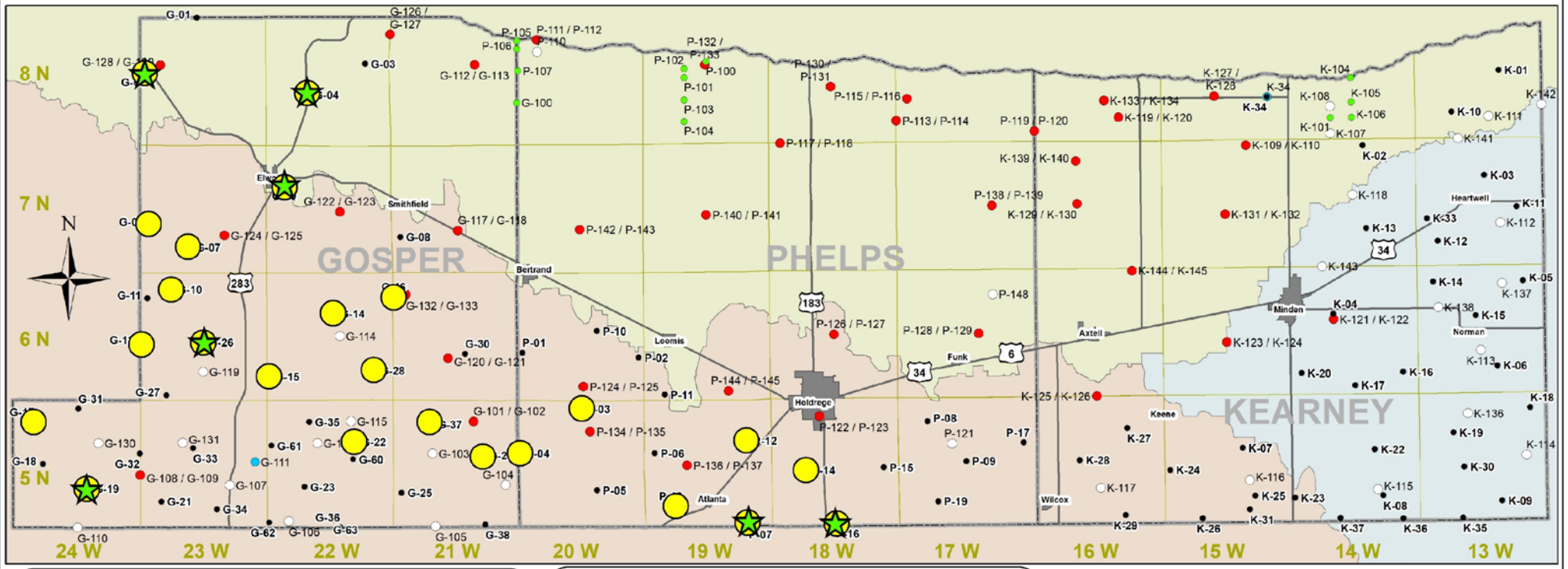
Irrigation Well Stats:
- 8 Platte Basin
- 22 Little Blue Basin
- 60 Republican Basin
- 90 Measured Wells
- Spring & Fall

Nolan Little
January 2019
Tri-Basin Natural Resources District

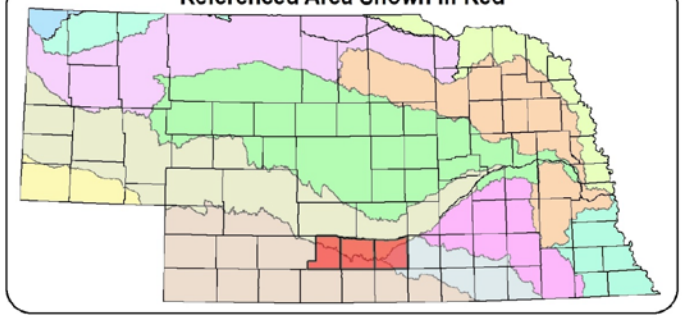
Spring Record High

Tri-Basin Natural Resources District

Static Water Measurement Wells



Referenced Area Shown in Red



- Irrigation Well
- Transect Well
- Single Well
- Nested Well
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- County Boundary
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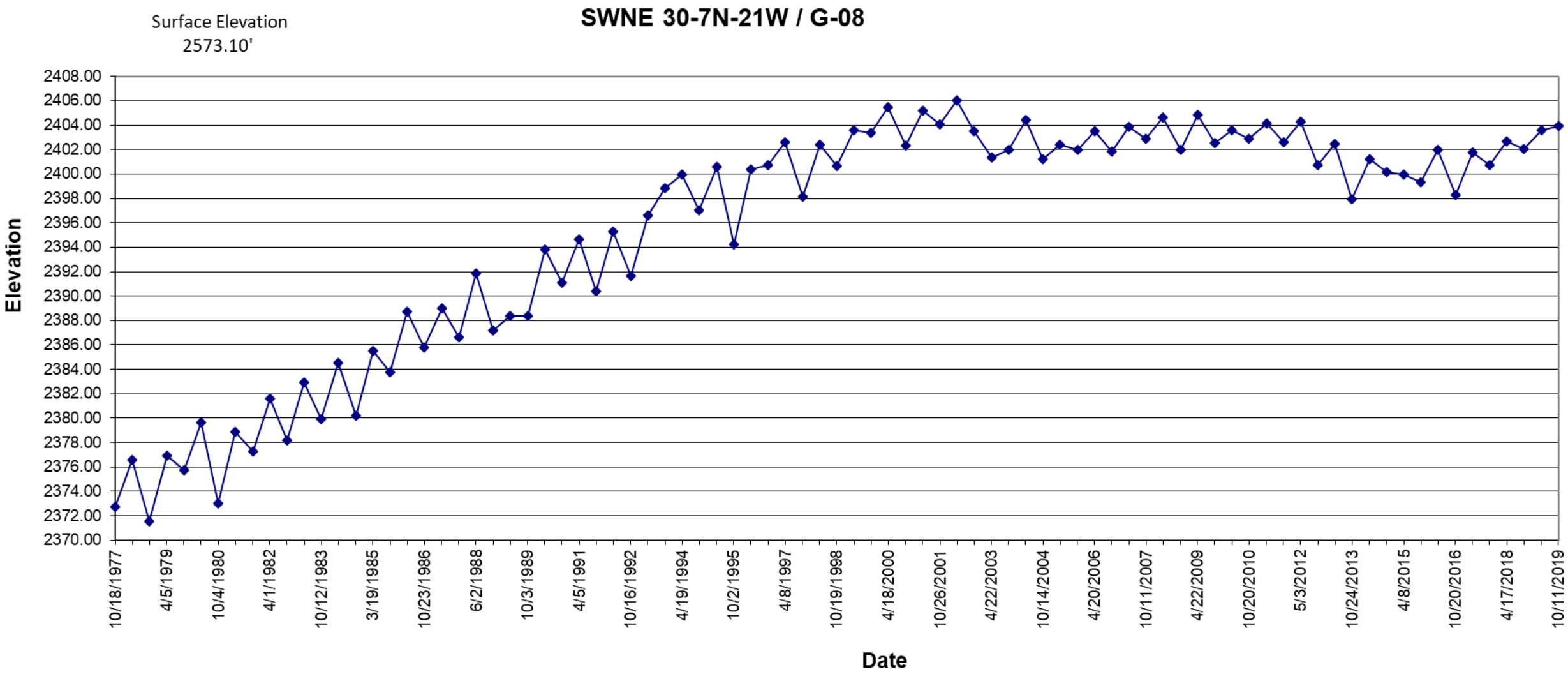
Nolan Little
January 2019
Tri-Basin Natural Resources District


SWNE 30-7N-21W / G-08
Surface Elevation
2573.10'
Elevation
2408.00
2406.00
2404.00
2402.00
2400.00
2398.00
2396.00
2394.00
2392.00
2390.00
2388.00
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2382.00
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2378.00
2376.00
2374.00
2372.00
2370.00
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4/5/1979
10/4/1980
4/1/1982
10/12/1983
3/19/1985
10/23/1986
6/2/1988
10/3/1989
4/5/1991
10/16/1992
4/19/1994
10/2/1995
4/8/1997
10/19/1998
4/18/2000
10/26/2001
4/22/2003
10/14/2004
4/20/2006
10/11/2007
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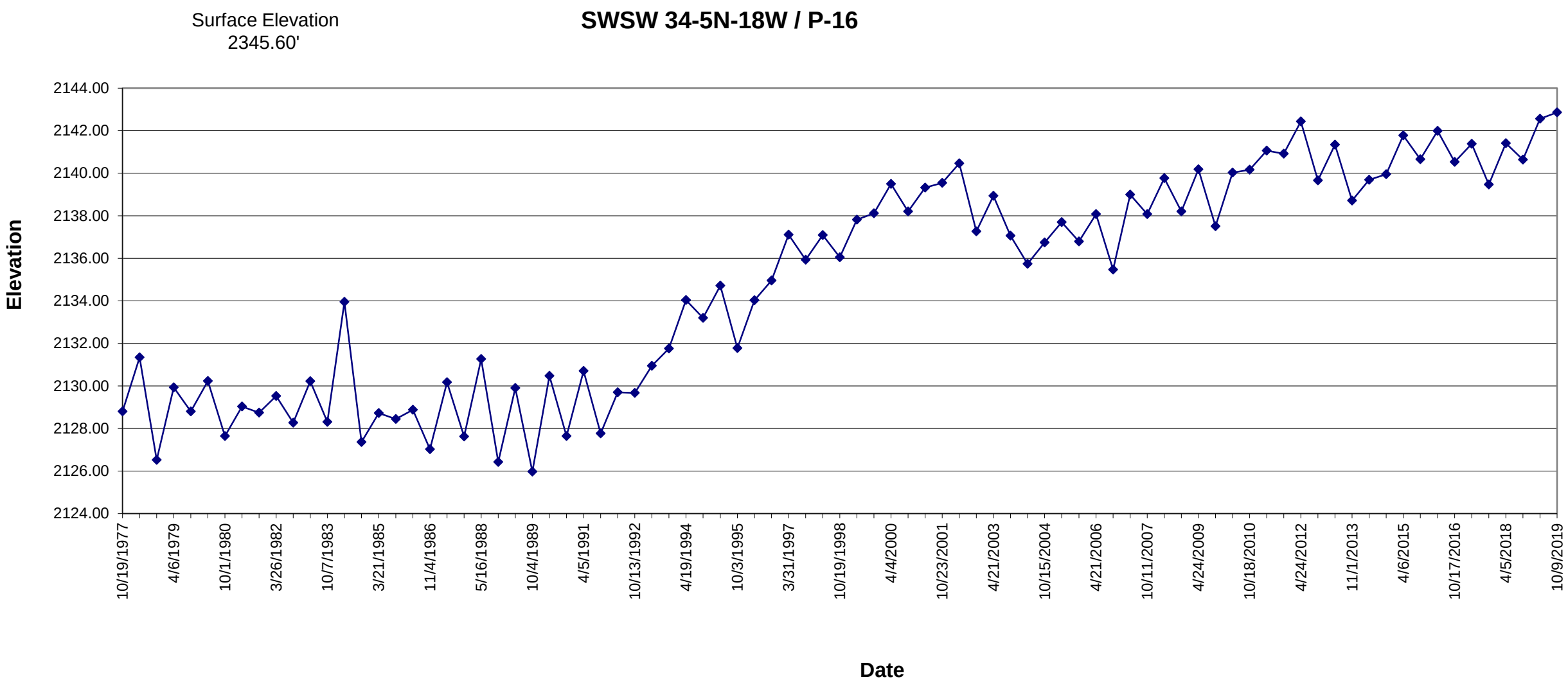
5/3/2012
10/24/2013
4/8/2015
10/20/2016
4/17/2018
10/11/2019
Date


Surface Elevation
2345.60'
SWSW 34-5N-18W / P-16
Elevation
2144.00
2142.00
2140.00
2138.00
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2132.00
2130.00
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4/5/1991
10/13/1992
4/19/1994
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10/11/2007
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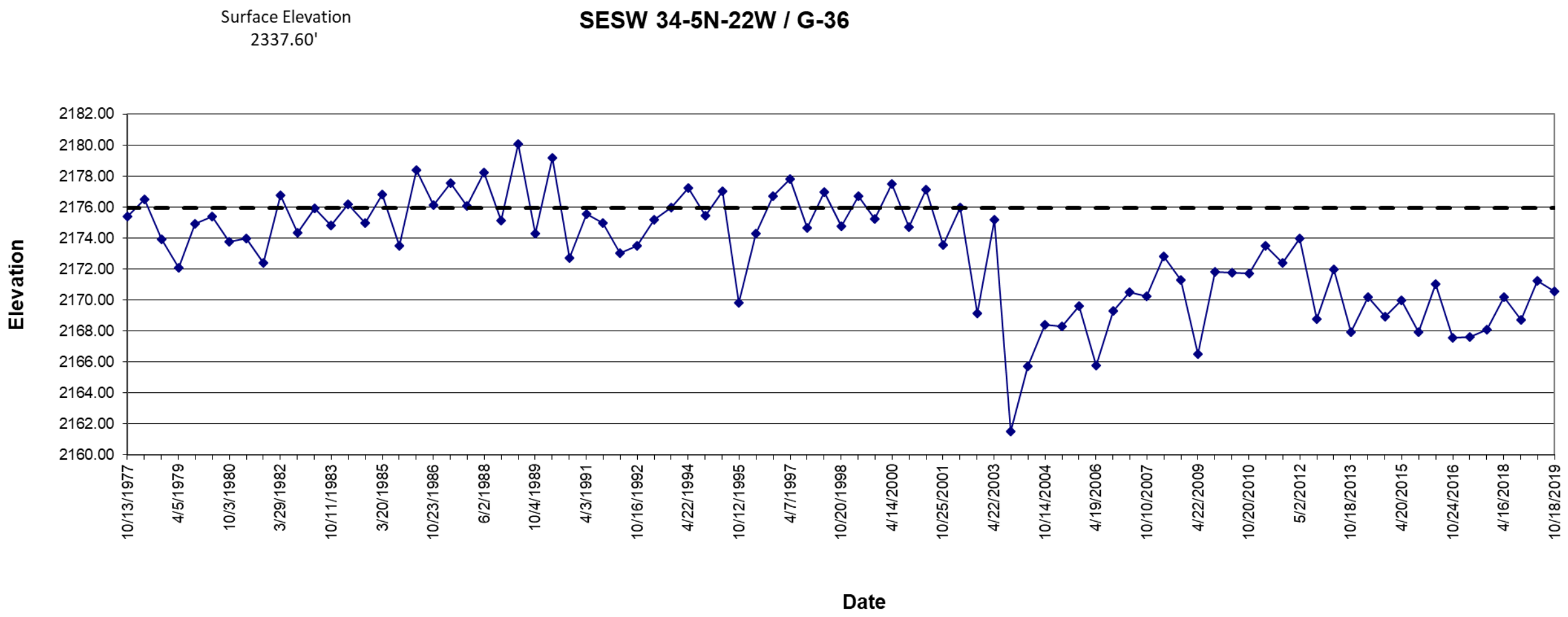
4/24/2012
11/1/2013
4/6/2015
10/17/2016
4/5/2018
10/9/2019
Date


Surface Elevation
2337.60'
SESW 34-5N-22W / G-36
Elevation
2182.00
2180.00
2178.00
2176.00
2174.00
2172.00
2170.00
2168.00
2166.00
2164.00
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2160.00
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3/29/1982
10/11/1983
3/20/1985
10/23/1986
6/2/1988
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4/3/1991
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4/22/1994
10/12/1995
4/7/1997
10/20/1998
4/14/2000
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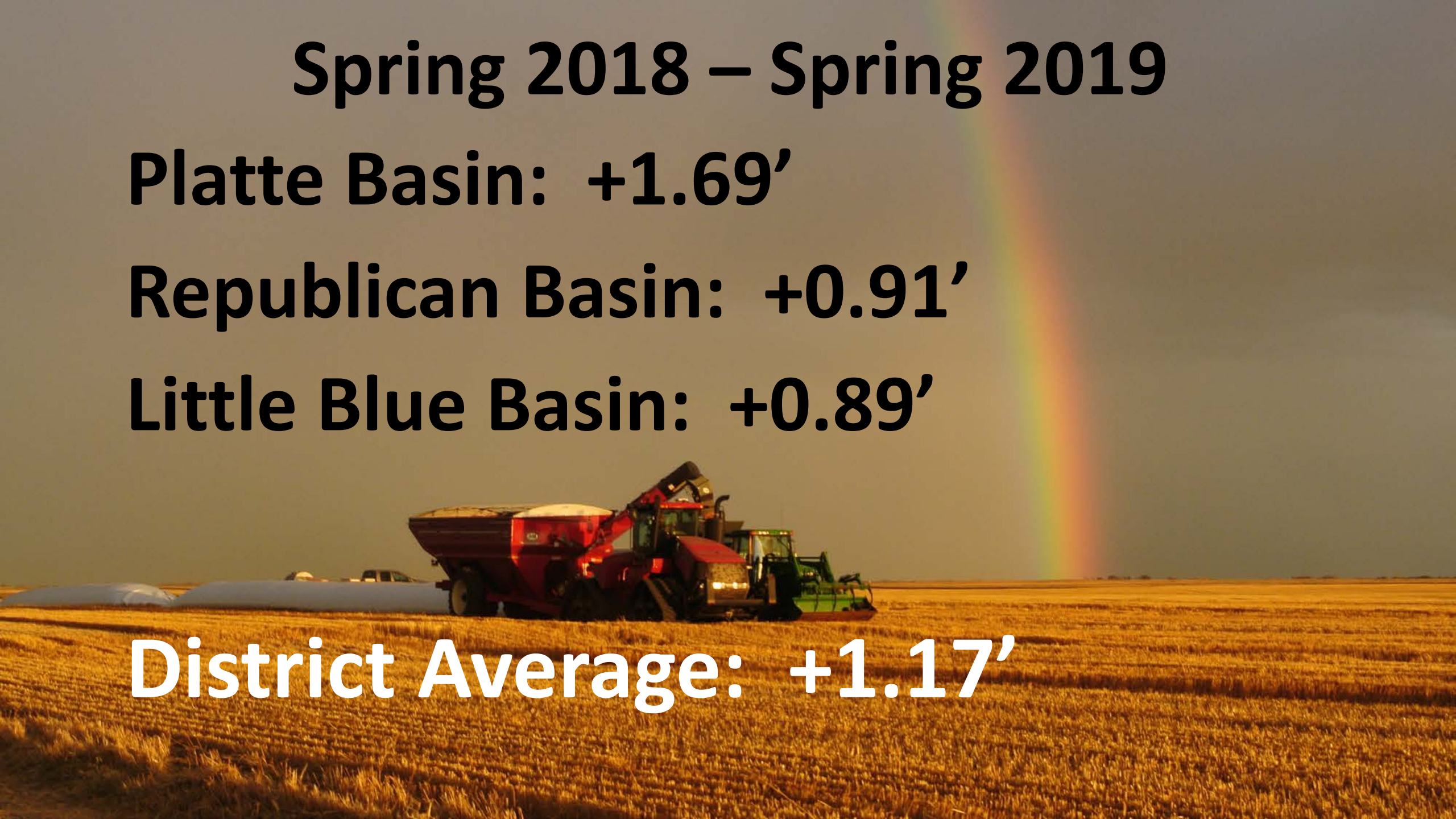
4/22/2003
10/14/2004
4/19/2006
10/10/2007
4/22/2009
10/20/2010
5/2/2012
10/18/2013
4/20/2015
10/24/2016
4/16/2018
10/18/2019
Date

Spring 2018 – Spring 2019

Platte Basin: +1.69’

Republican Basin: +0.91’

Little Blue Basin: +0.89’



District Average: +1.17’

Spring 2014 – Spring 2019

Platte Basin: +1.50’

Republican Basin: +1.22’

Little Blue Basin: -2.84’

District Average: +0.72’

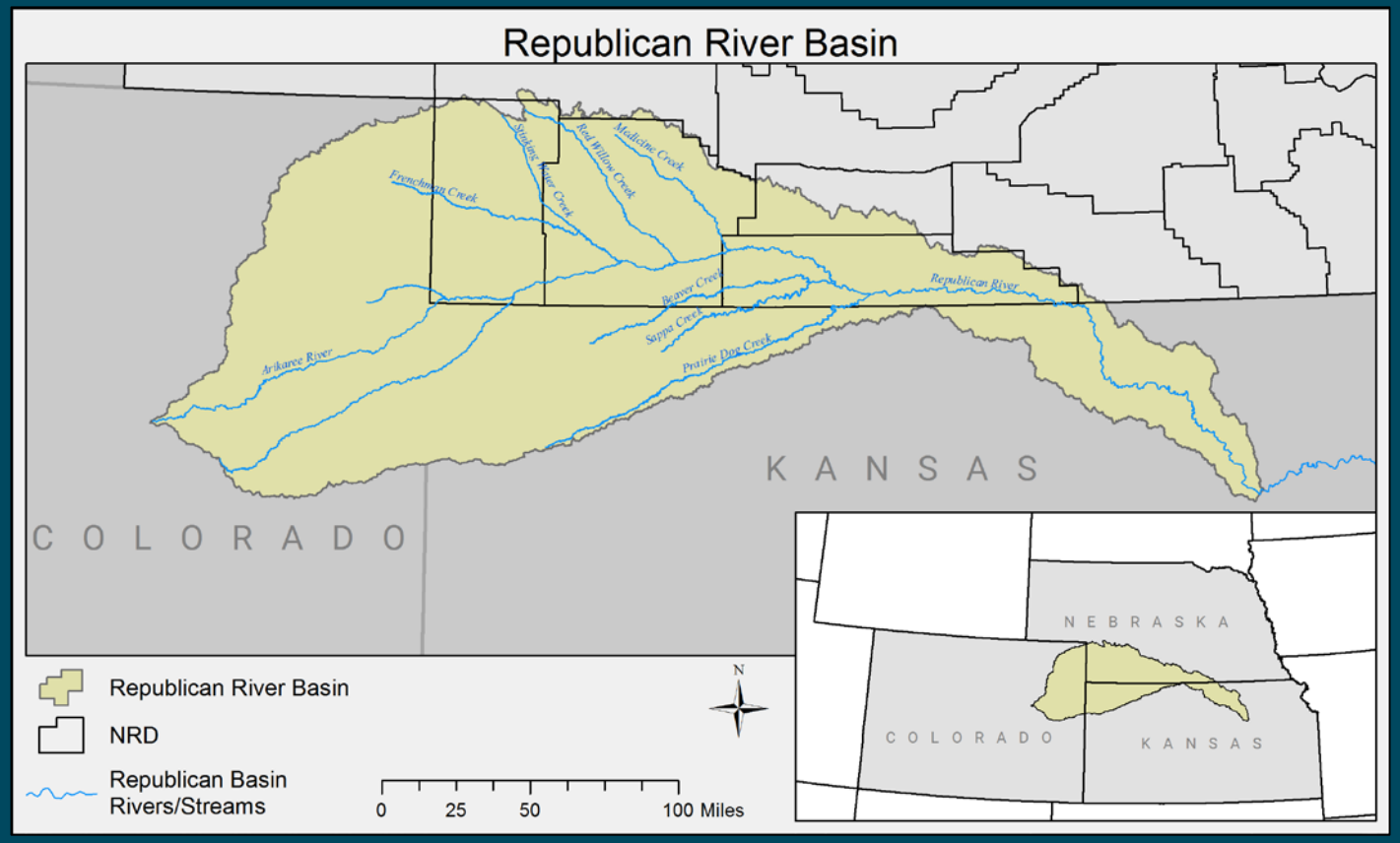
Annual Report
Water Supplies & Uses in the Basin

Nebraska DNR

Andy Pedley, NeDNR

NeDNR

Republican River Basin within Nebraska, Kansas, and Colorado

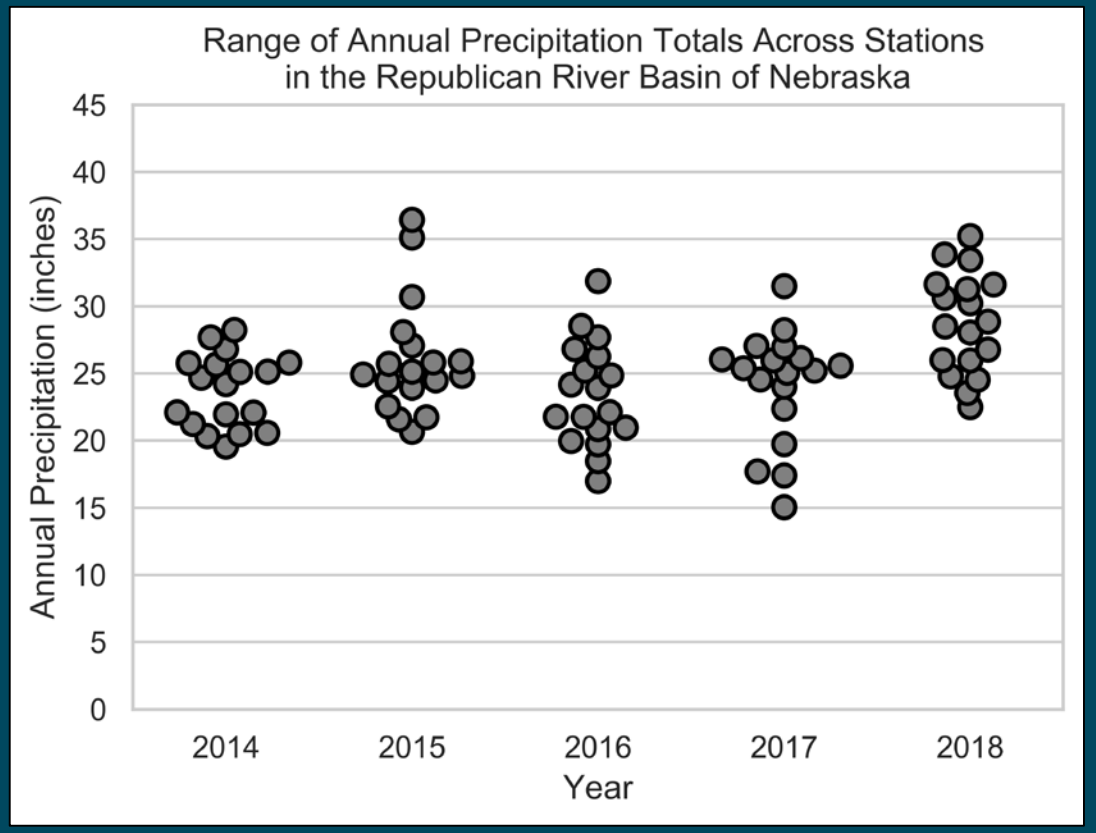


State	Republican River Basin Area (mi²)
Colorado	7,816
Kansas	7,551
Nebraska	9,546

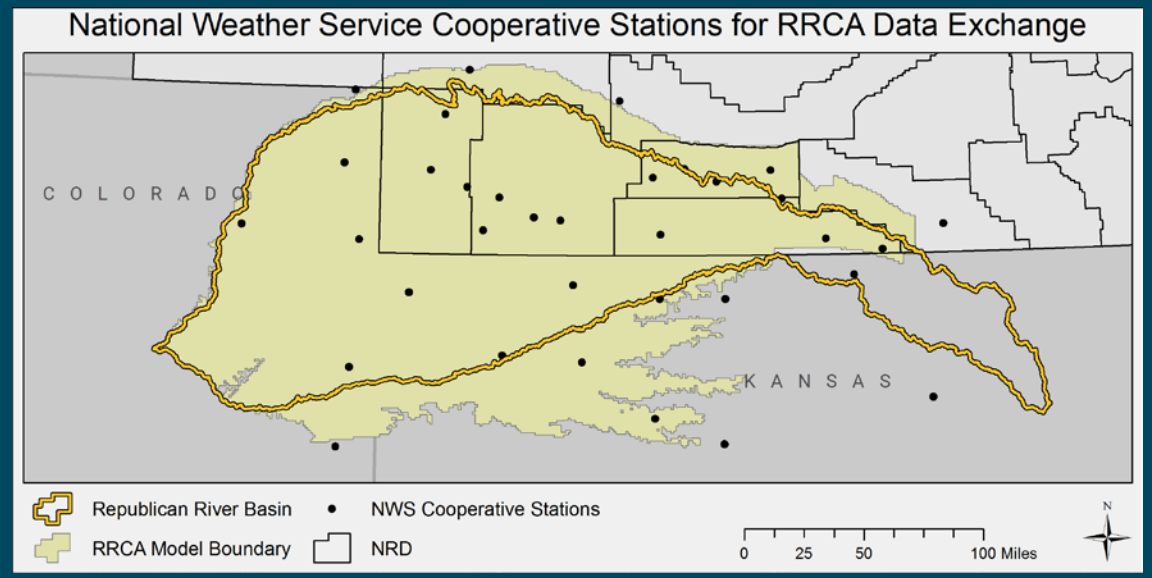
Page 22 of the Annual Report.

NeDNR

Annual Precipitation



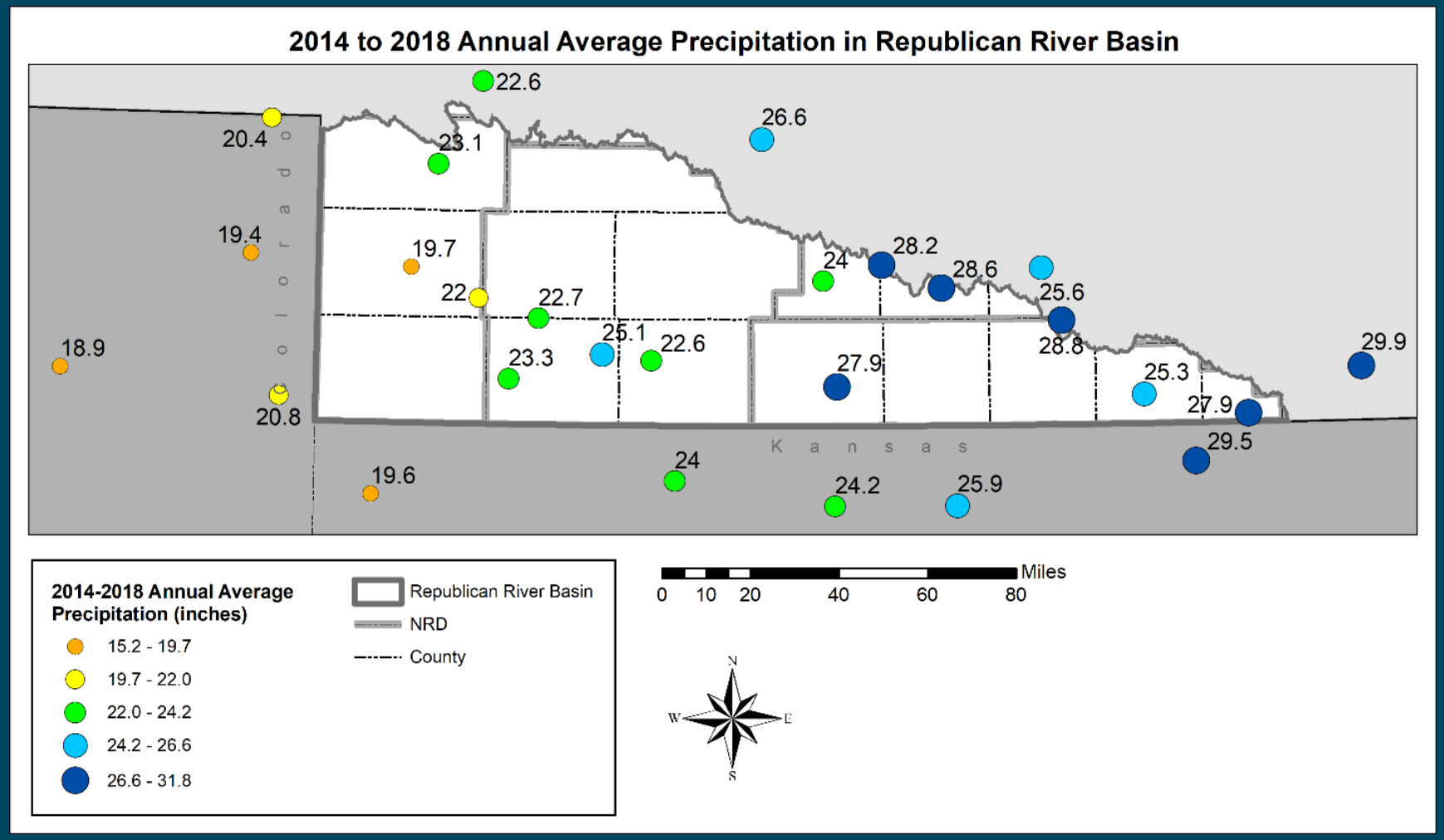
- Annual distribution of precipitation measured at National Weather Service cooperative stations across the Republican River Basin in Nebraska



Page 23 of the Annual Report.

NeDNR

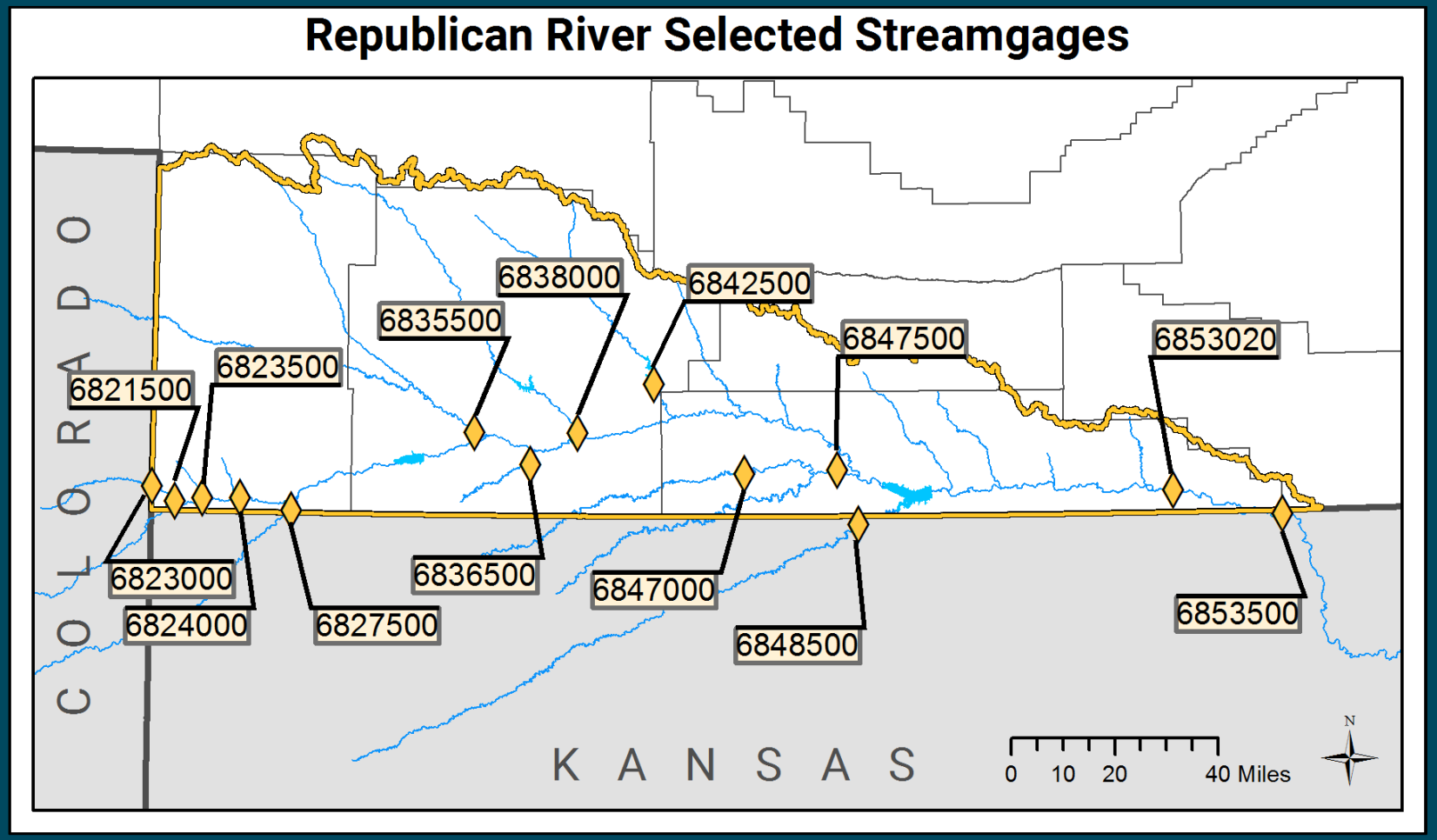
Average Annual Precipitation



- 2014-2018 annual average precipitation from National Weather Service cooperative stations, as used in RRCA groundwater model processing

Page 24 of the Annual Report.

NeDNR Republican River Streamgages Annual Streamflow

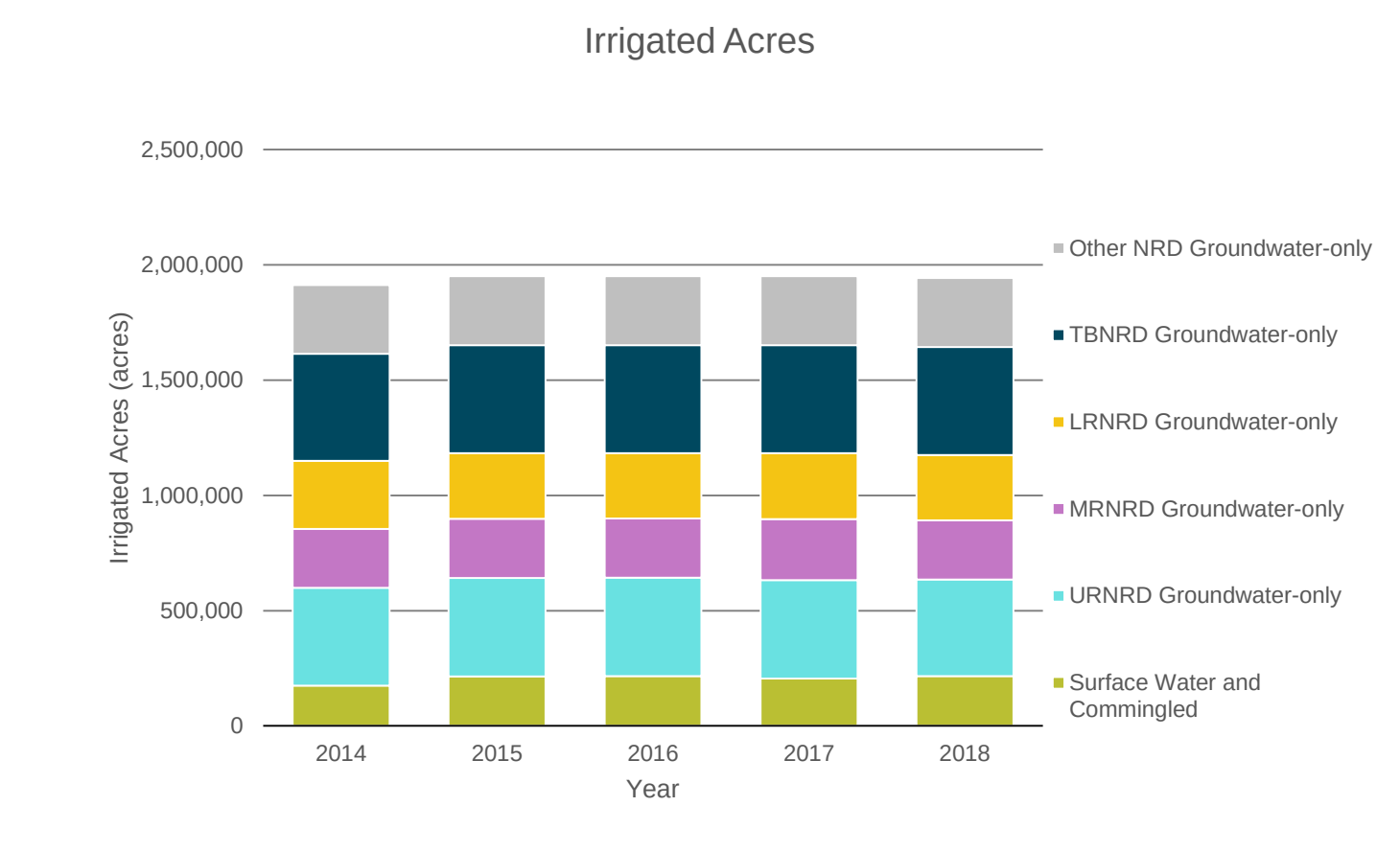


- Location of subbasin streamgages within the Republican River Basin and annual streamflow (total volume and average rate) from 2014-2018.

Pages 25-27 of the Annual Report.

NeDNR

Irrigated Acres



- Annual acres irrigated by surface water and commingled (surface water and groundwater irrigated), or acres irrigated by only groundwater, in NE portion of RRCA groundwater model*

*TBNRD includes irrigated acres from all 3 basins

Page 28 of the Annual Report.

NeDNR

Computed Beneficial Consumptive Use (CBCU)

- Annual total Computed Beneficial Consumptive Use (CBCU) by Kansas and Colorado and annual Nebraska total surface water CBCU and division of groundwater CBCU by each NRD

	CBCU (acre-feet)				
	2014	2015	2016	2017	2018
Colorado	32,100	33,780	33,930	31,810	35,130
Kansas	60,060	50,890	51,320	62,040	51,450
Nebraska Surface Water	20,603	45,820	51,038	47,924	43,733
Lower Republican NRD Groundwater	44,218	49,336	51,221	49,298	51,418
Middle Republican NRD Groundwater	50,429	54,705	56,353	52,594	66,622
Upper Republican NRD Groundwater	79,170	79,883	83,551	78,367	87,235
Tri-Basin NRD Groundwater	9,819	11,979	12,032	11,976	14,779
Other NRD Groundwater	1,778	1,822	1,929	1,987	2,284

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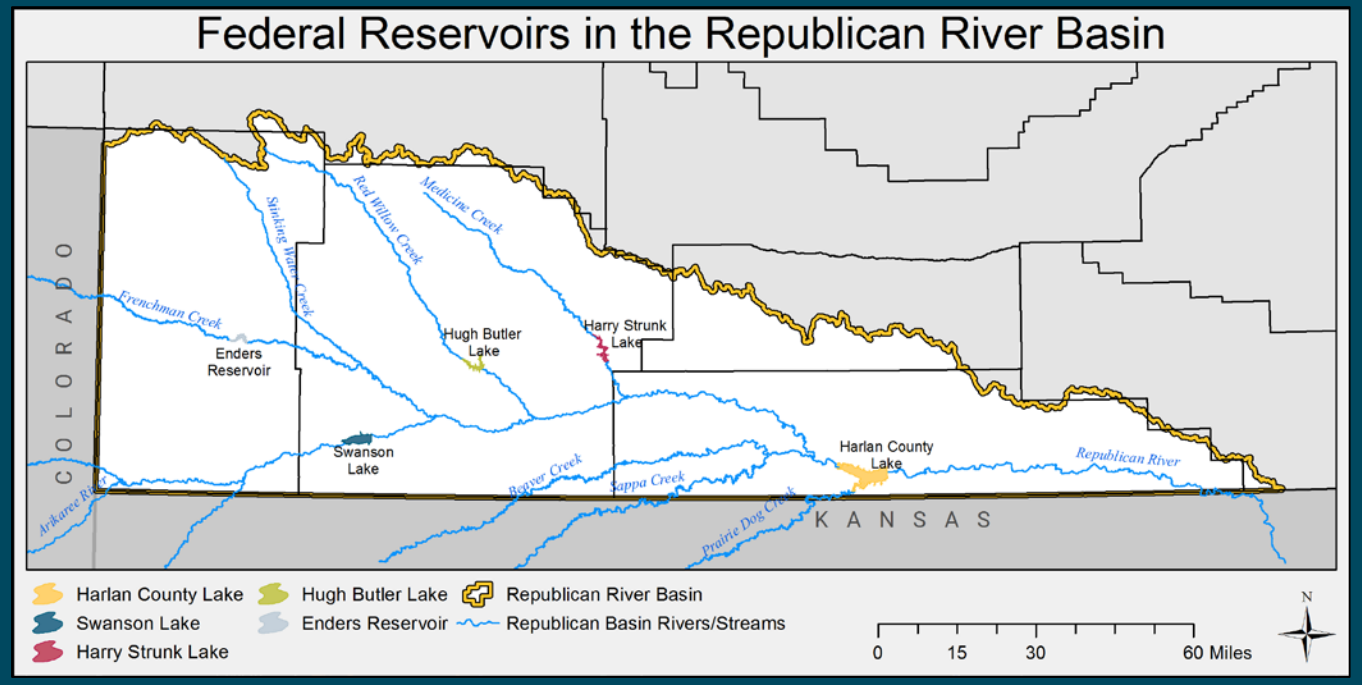
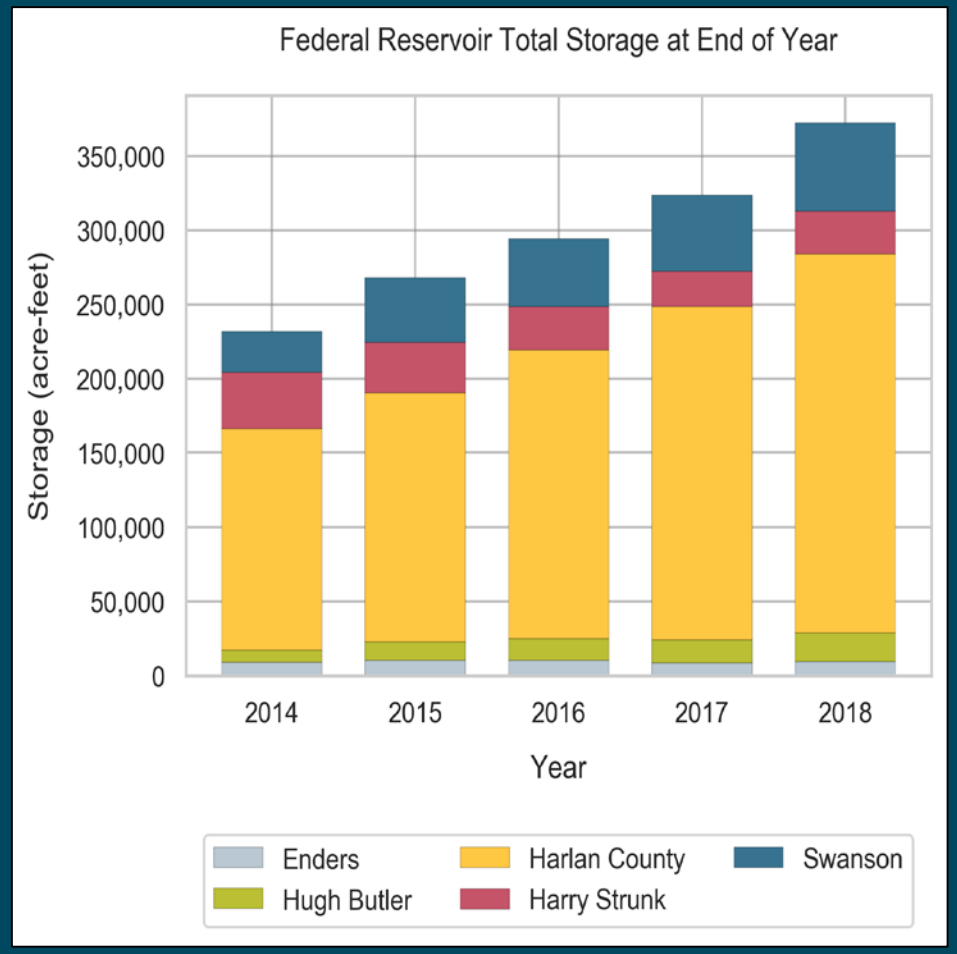
NeDNR

Federal Reservoirs & Reservoir Storage

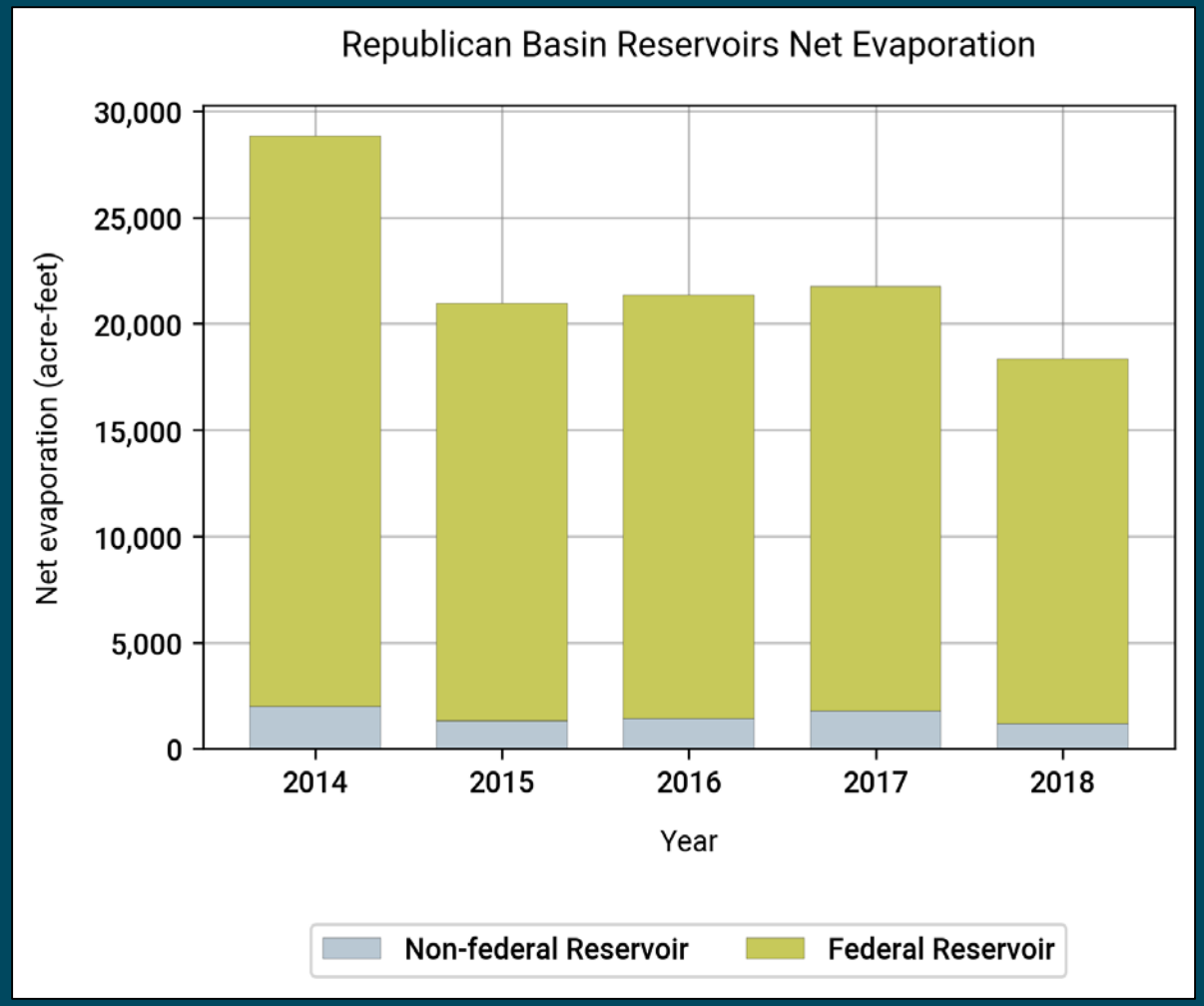




Pages 31-32 of the Annual Report.

NeDNR

Reservoirs Net Evaporation



- Total volumes of annual net evaporation (evaporation minus direct precipitation) from non-federal reservoirs and the five federal reservoirs in the Nebraska portion of the Republican River Basin

Page 33 of the Annual Report.

NeDNR

Surface Water Administration for Compact Compliance

Year	Water Administration for Compact Compliance due to Compact Call
2014	January 1, 2014: closing notice mailed to all irrigation and storage permit holders June 27, 2014: opened appropriations up to 3/29/1923 July 2, 2014: opened all appropriations upstream of Harlan County Lake; opened appropriations downstream of Harlan County Lake up to 2/26/1948 September 5, 2014: closed all appropriations in the basin to 8/23/1945
2015	January 1, 2015: closed all permits in the basin February 26, 2015: opened all IR (irrigation) and senior SO (storage use only) permits upstream of Harlan County Dam
2016	None
2017	None
2018	None

Page 34 of the Annual Report.

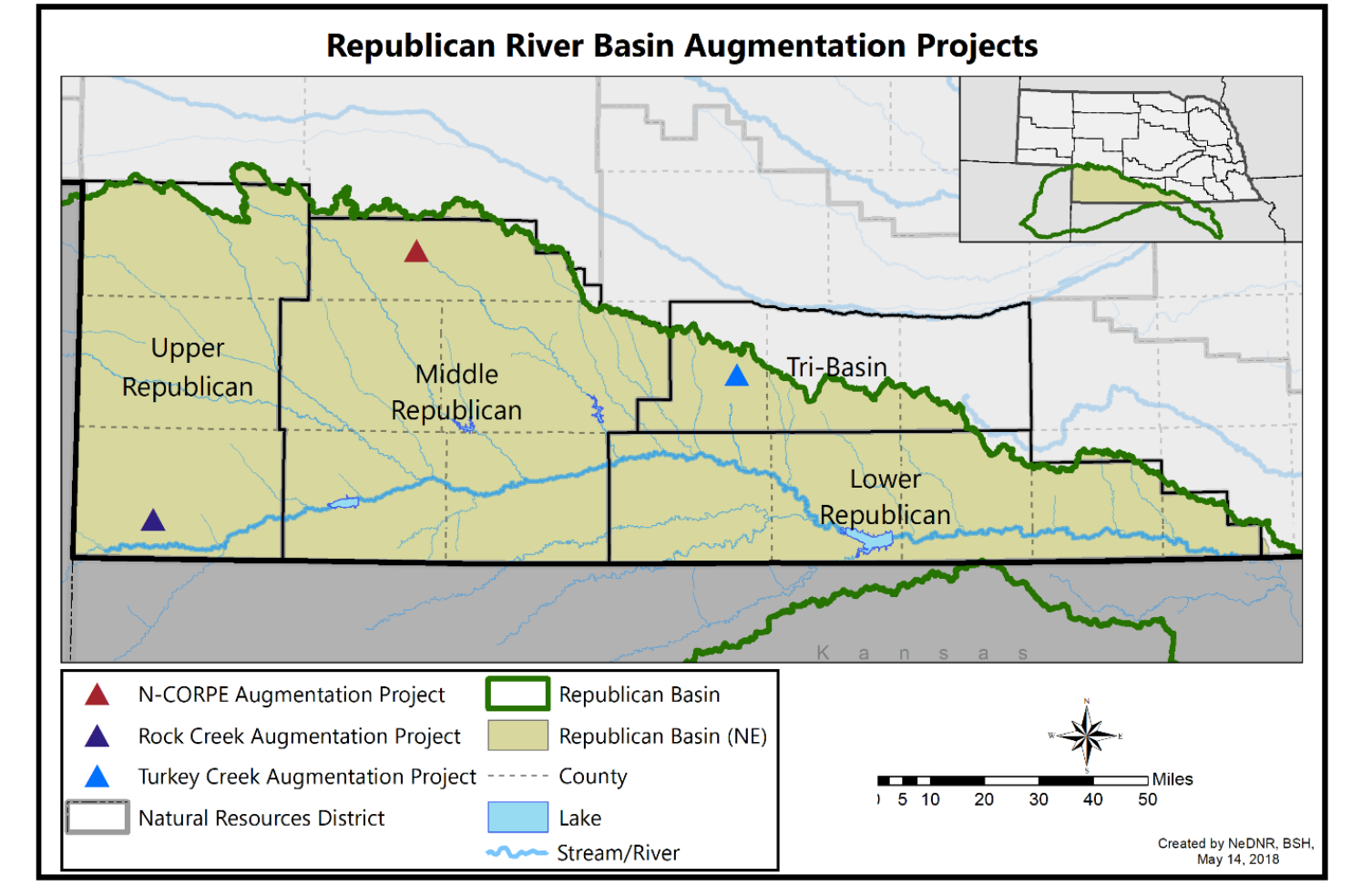
Annual Report
Water Supplies & Uses in the Basin

Augmentation

Kari Burgert & Carol Flaute, NeDNR

Augmentation

Republican River Basin Augmentation Projects



Augmentation

N-CORPE Augmentation Pumping

Year	Days Pumped for Compact Compliance	Total Pumped Volume (acre-feet)
2014	321	42,758
2015	159	25,932
2016	185	25,503
2017	89	8,438
2018	0	97

Augmentation

Rock Creek Augmentation Pumping

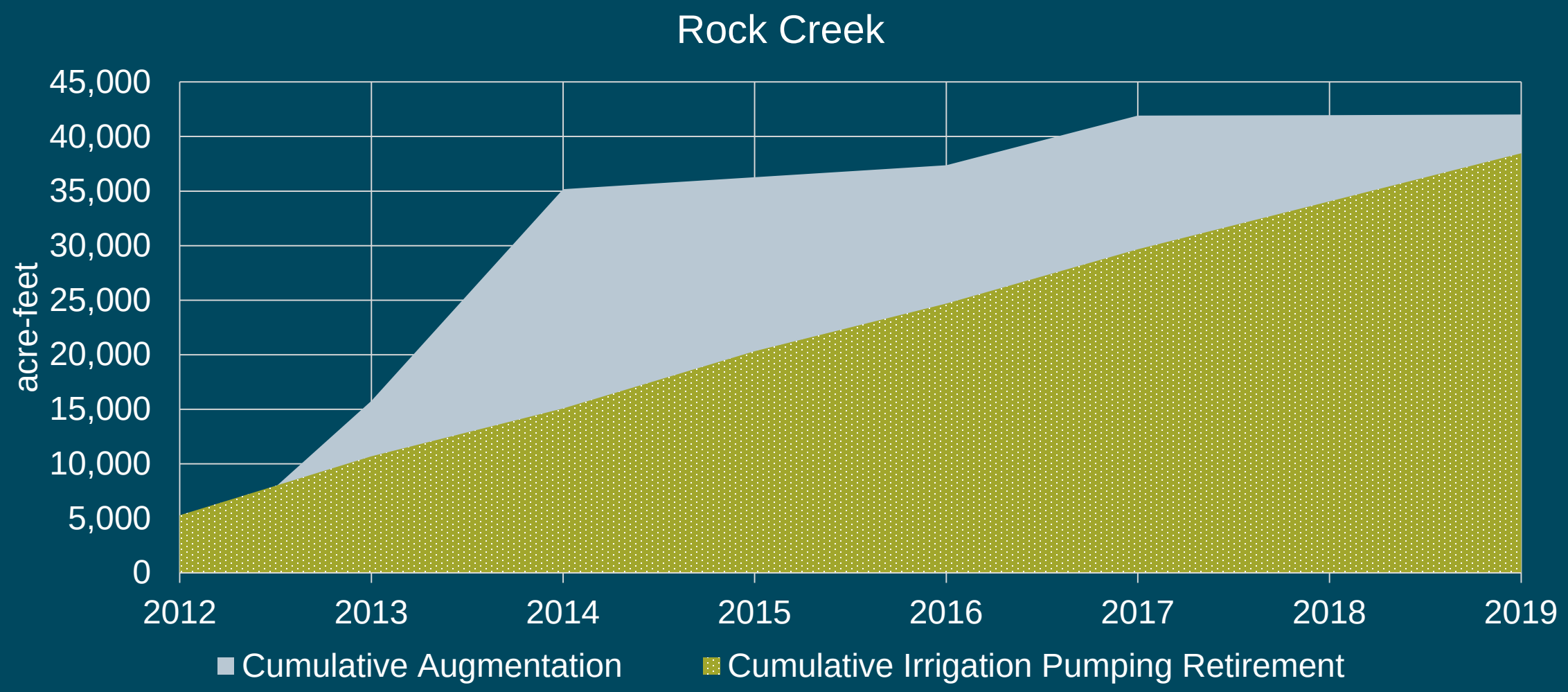
Year	Days Pumped for Compact Compliance	Total Pumped Volume (acre-feet)
2014	350	19,297
2015	50	1,098
2016	48	499
2017	140	4,563
2018	21	47

Augmentation Impacts - IMP

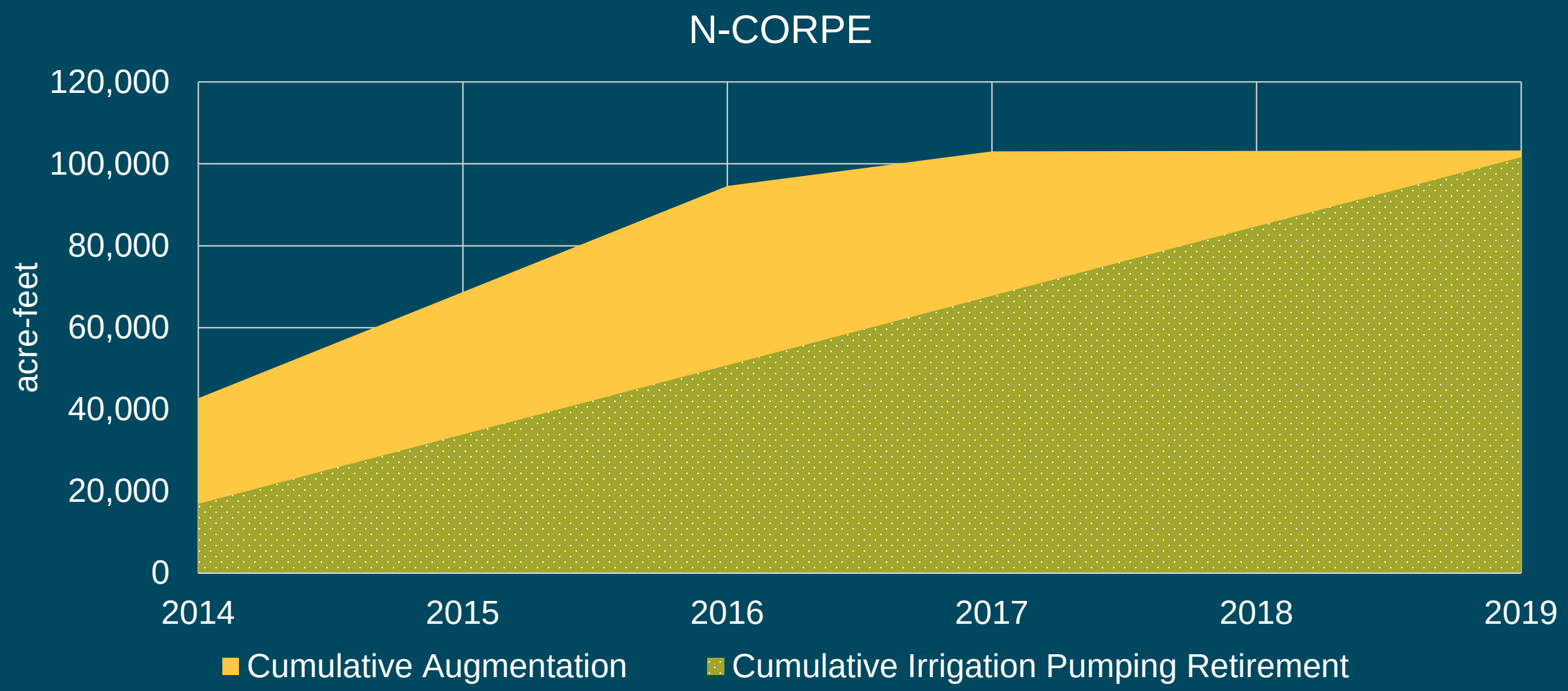
- Our IMPs state:

"…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."

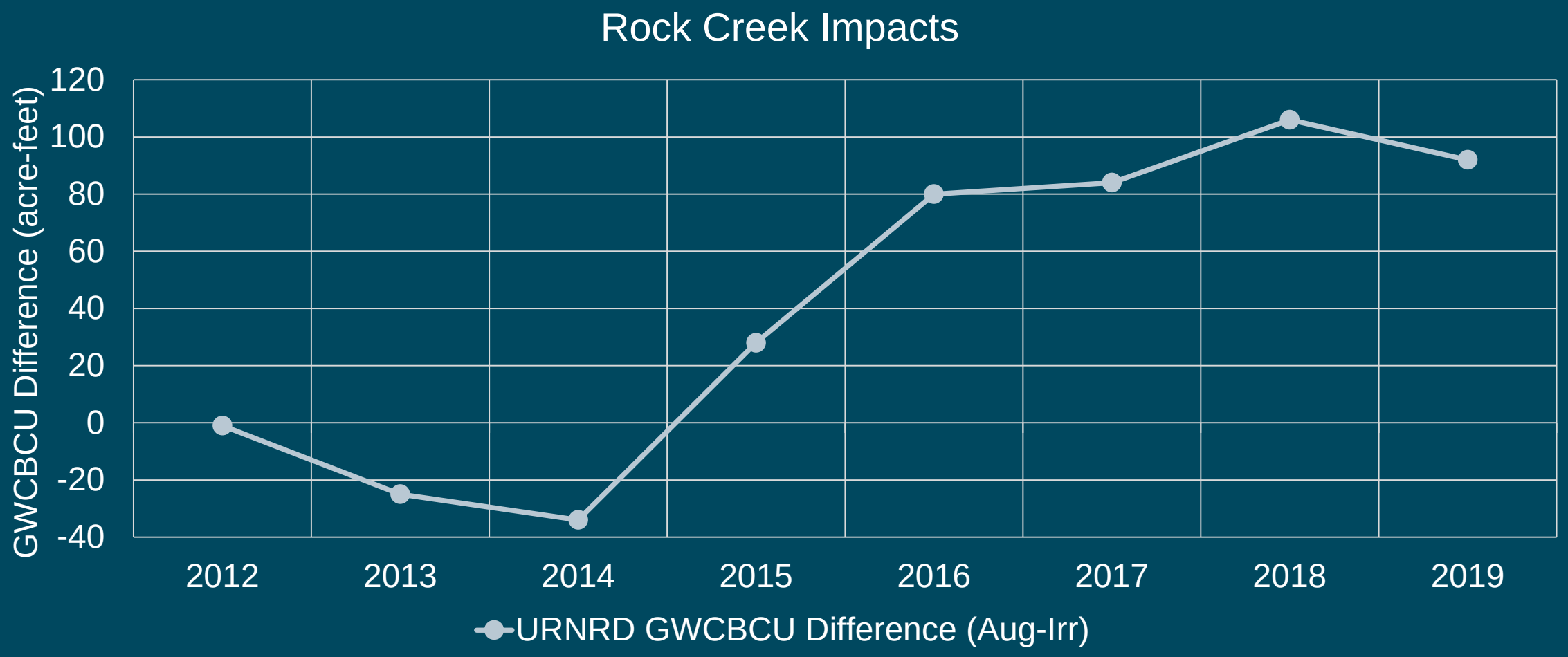
Augmentation Impacts – Model Inputs



Augmentation Impacts – Model Inputs

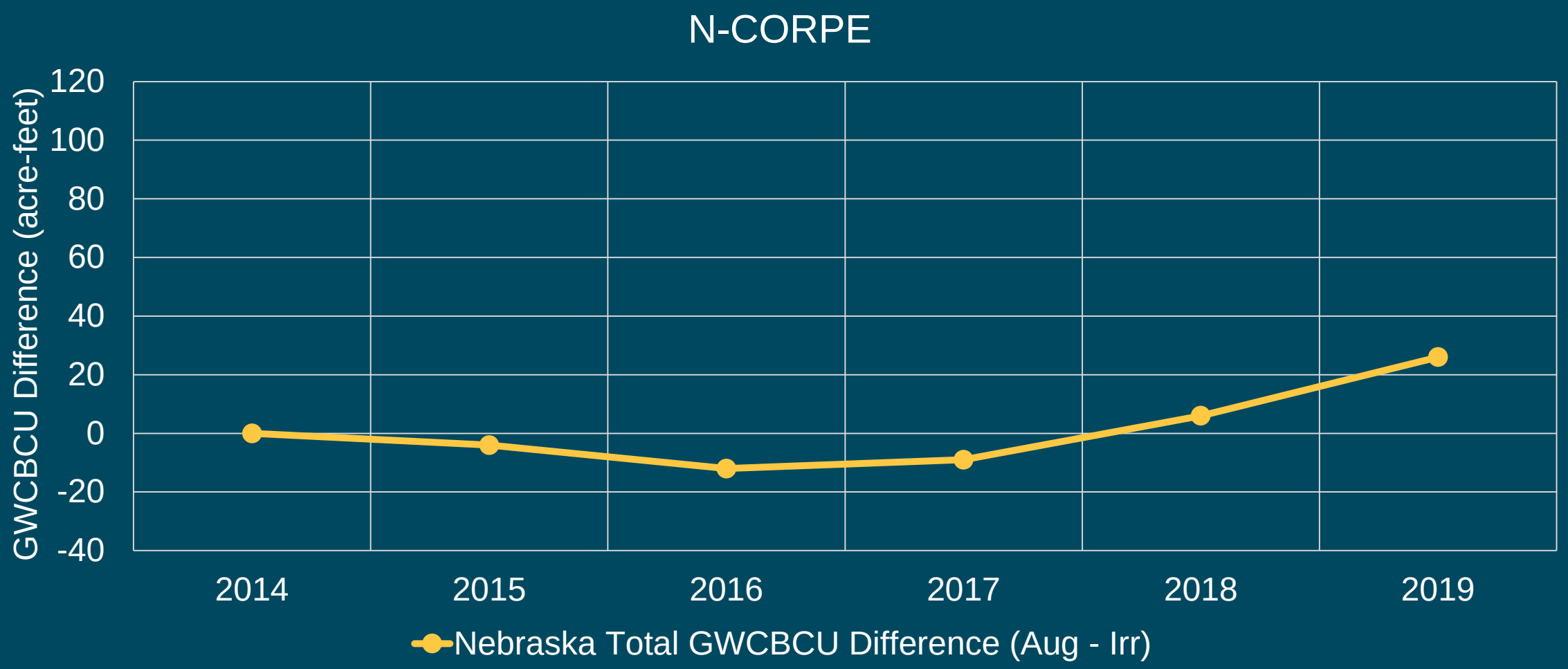


Augmentation Impacts – January 2020 run*



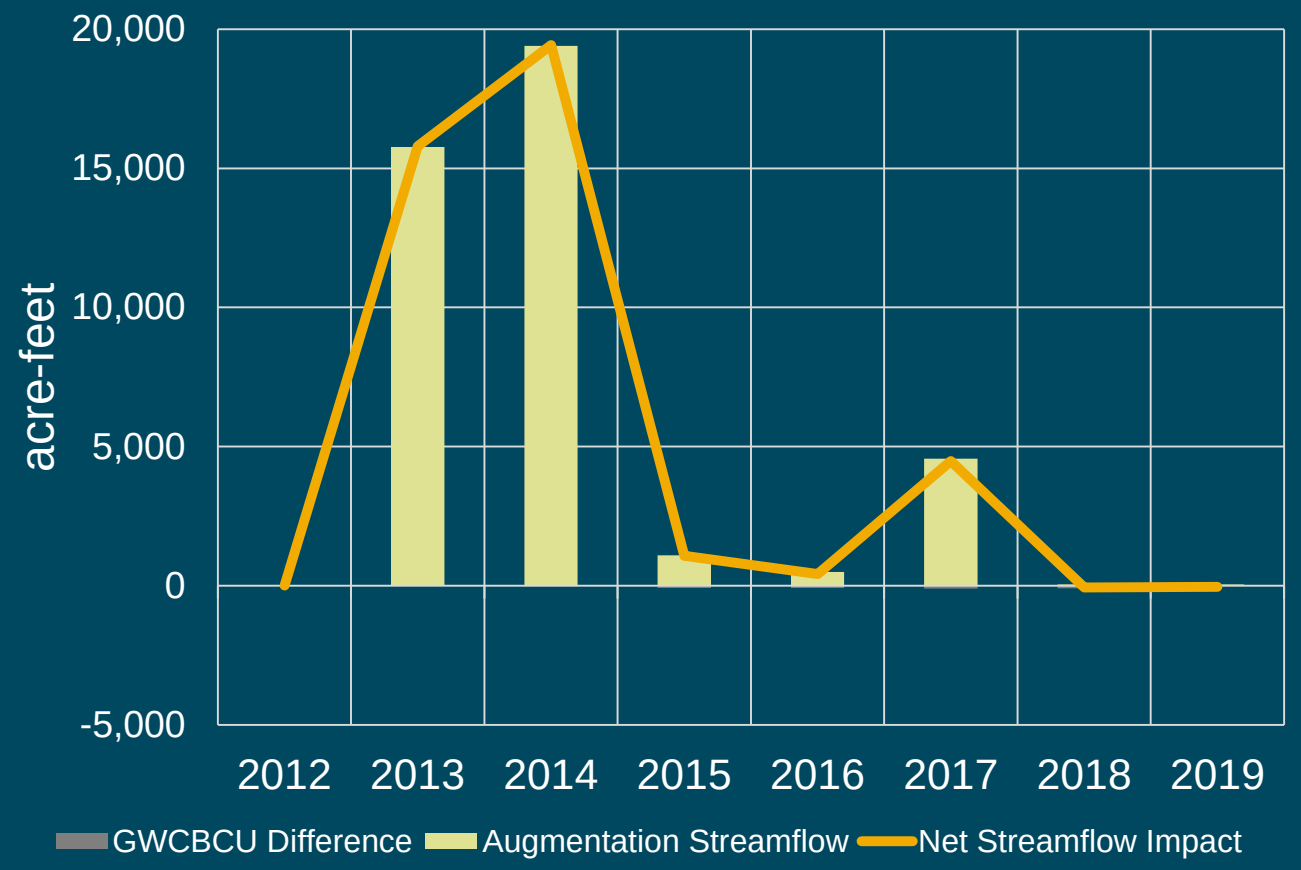
* 2019 pumping repeated from 2018, preliminary data/model run

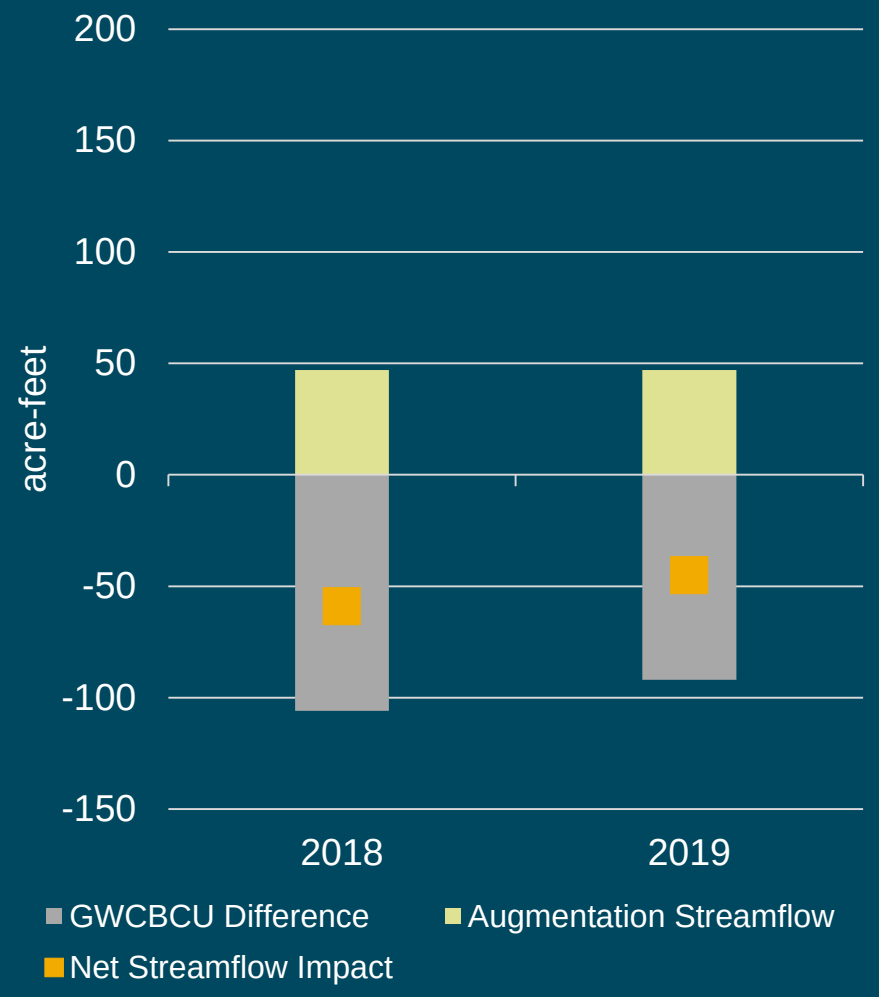
Augmentation Impacts – January 2020 run*



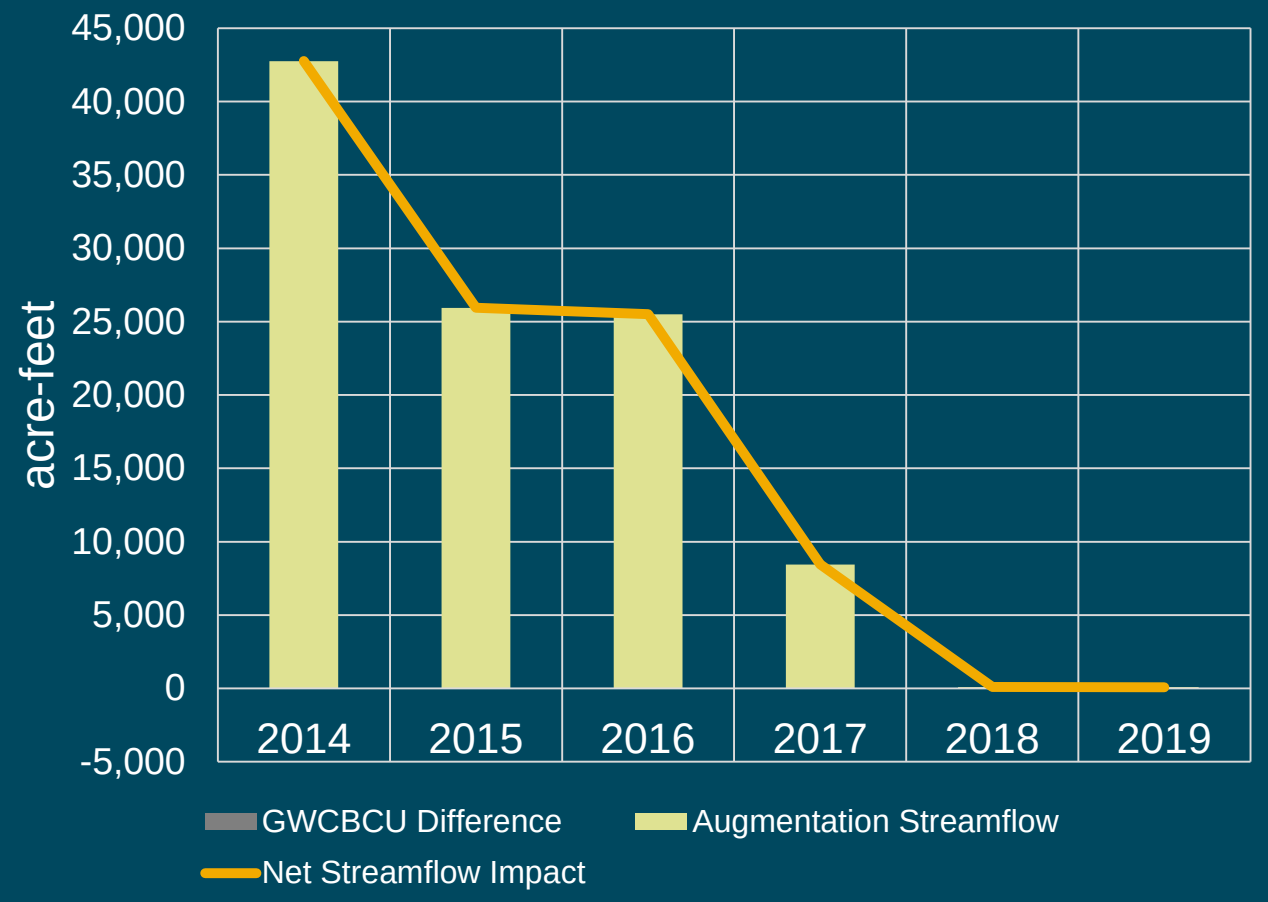
* 2019 pumping repeated from 2018, preliminary data/model run

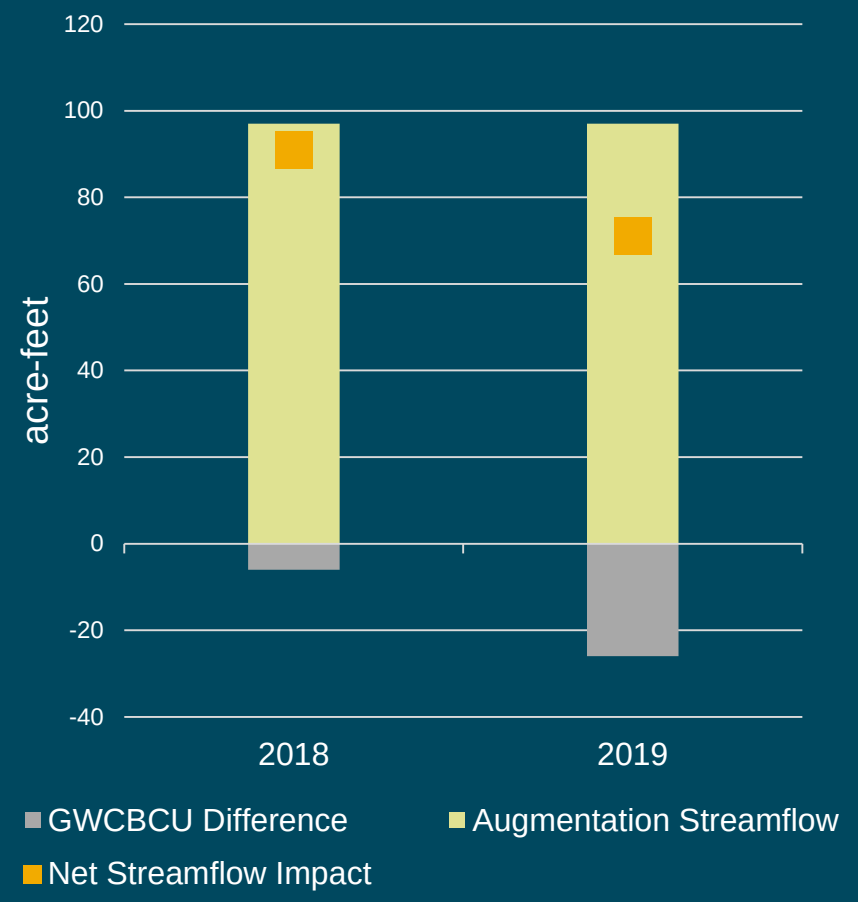
Augmentation Net Streamflow Impacts – Rock Creek



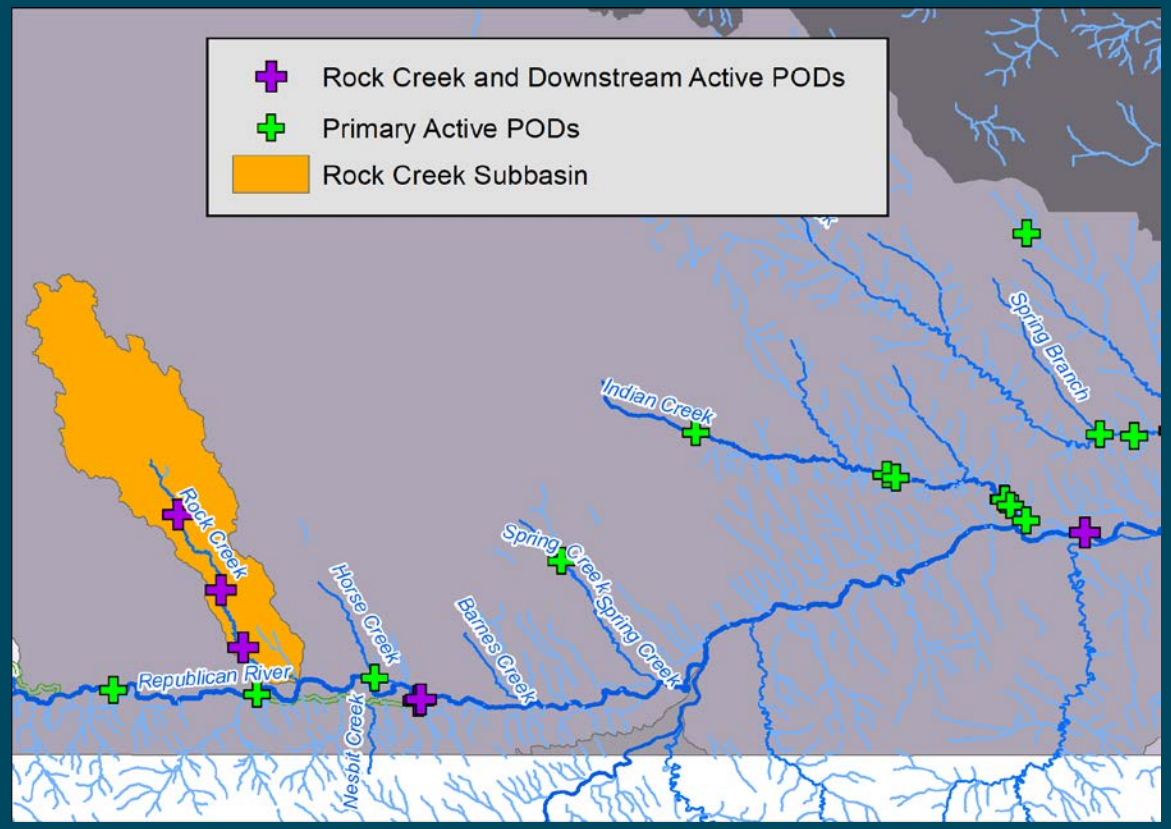


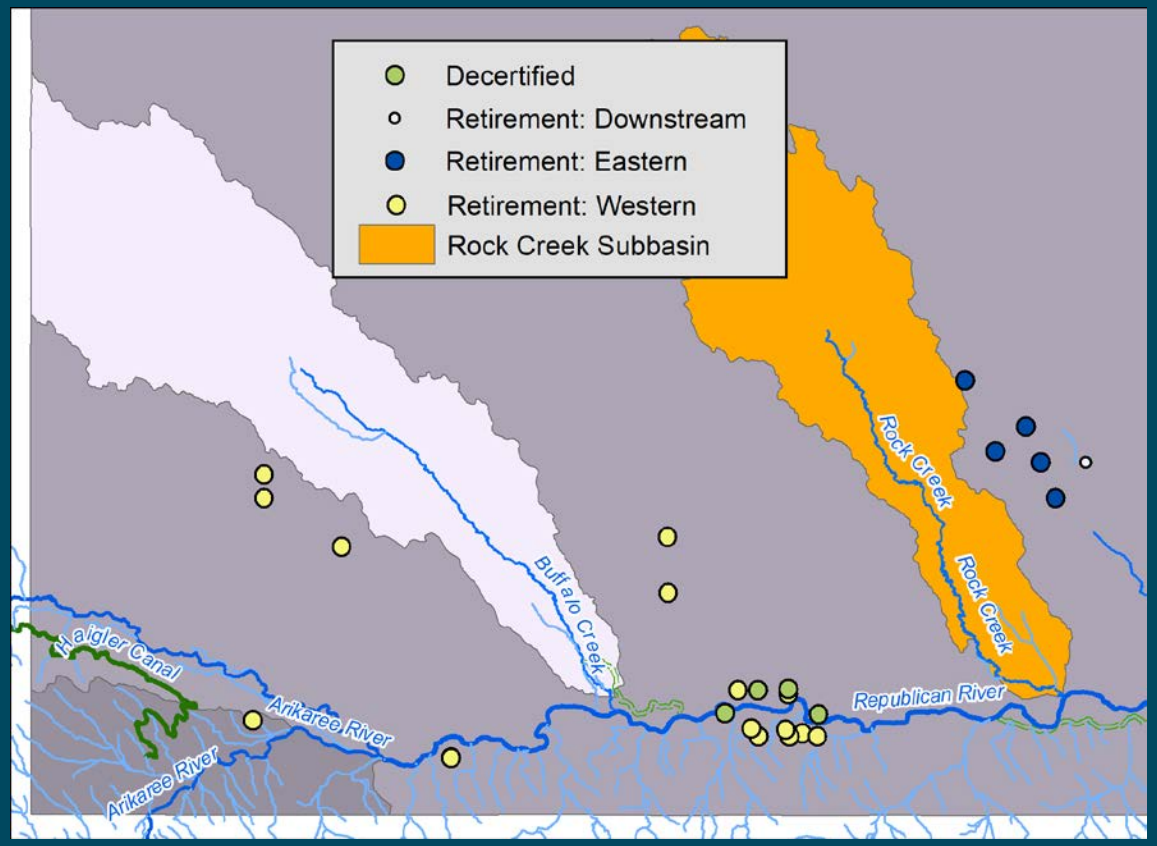
Augmentation Net Streamflow Impacts – N-CORPE



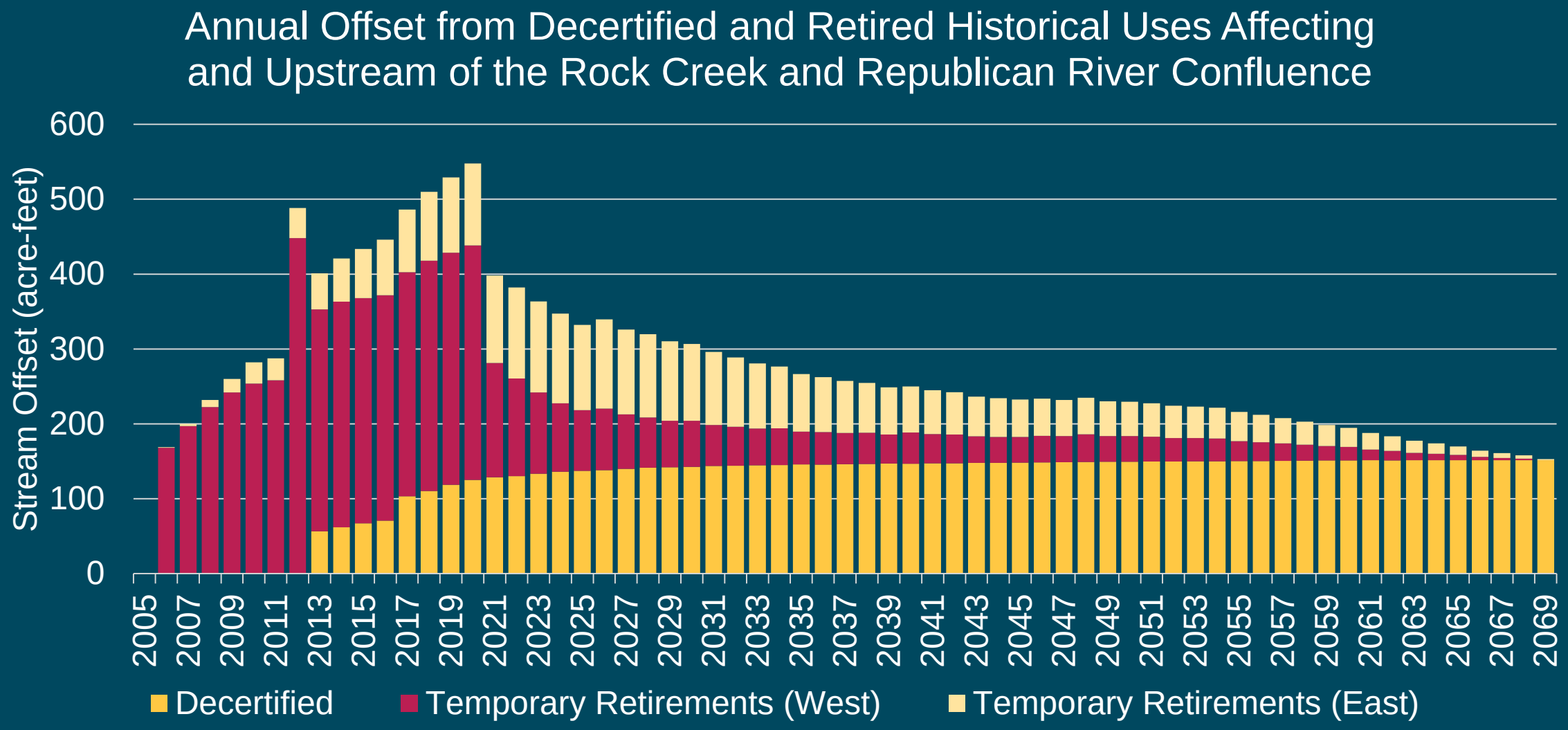


Augmentation Impacts – Rock Creek Offsets





Augmentation Impacts – Rock Creek Offsets



Annual Report
Water Supplies & Uses in the Basin

Qualitative Summary of Impacts

Carol Flaute, NeDNR

Qualitative Summary of Net Impacts of Management Actions for Compact Compliance on Water Supplies

Management action for Compact compliance	Years	Qualitative summary of net impacts on water supplies
Augmentation pumping (URNRD, MRNRD, LRNRD)	2014–2017	Increased streamflow when operated; also no new depletions (see Augmentation Net Impacts Analysis); minimized the need for IMP management actions*
Purchase of water to release from Enders Reservoir (MRNRD)	2014, 2017	Increased streamflow; reduced water available in Enders Reservoir for FVID & H&RWID; minimized the need for IMP management actions*
2014 Dry Year Lease program, LRNRD	2014	Reduced depletions to streamflow; minimized the need for IMP management actions*
Surface water administration due to Compact Call (see annual Report table 19 for summary)	2014–2015	While closings were in effect, reduced surface water availability for irrigation and storage permit holders
MRNRD use 1200 af credit from LRNRD	2015	Helped avoid the need for IMP management actions*
Permanent retirements (Riverside Irrigation Company, MRNRD; groundwater irrigated acres, LRNRD)	2016–2017	Reduced depletions to streamflow; helped avoid the need for IMP management actions*
Culbertson Canal diversion natural flow bypass (MRNRD)	2017	Increased streamflow through reduced consumptive use; helped avoid the need for IMP management actions*

*IMP management actions = surface water administration and/or curtailment of pumping in Rapid Response Area

Annual Report Appendices

Measurable Hydrologic Objectives (MHOs) Methodology

- Overview
- Procedures for MHO B Analysis (Appendix A)
- Procedures for MHO C Analysis (Appendix B)

MHO Methodology

Introduction

Margeaux Carter, NeDNR

MHO Methodology

Overview

- MHO B and C deal with identifying long term trends in hydrologic systems
  - MHO B - Streamflow Depletions
  - MHO C - Groundwater Levels
- Streamflow Depletions and Groundwater Levels
  - Low data availability in time and space
  - Trends are influenced by management actions

MHO Methodology

The Mann Kendall Test

Advantage

- Identifies existence and direction of trend
- Not affected by extremes
- Applicable for small datasets
- Used by USGS, EPA, PNNL, others

Disadvantage

- Cannot find mathematical relationships
- Significance dependent on the number of observations

Sources:
https://vsp.pnnl.gov/help/Vsample/Design_Trend_Mann_Kendall.htm
https://www.epa.gov/sites/production/files/2016-05/documents/tech_notes_6_dec2013_trend.pdf
https://pubs.usgs.gov/twri/twri4a3/pdf/chapter12.pdf

MHO Methodology

MHO B

Margeaux Carter, NeDNR

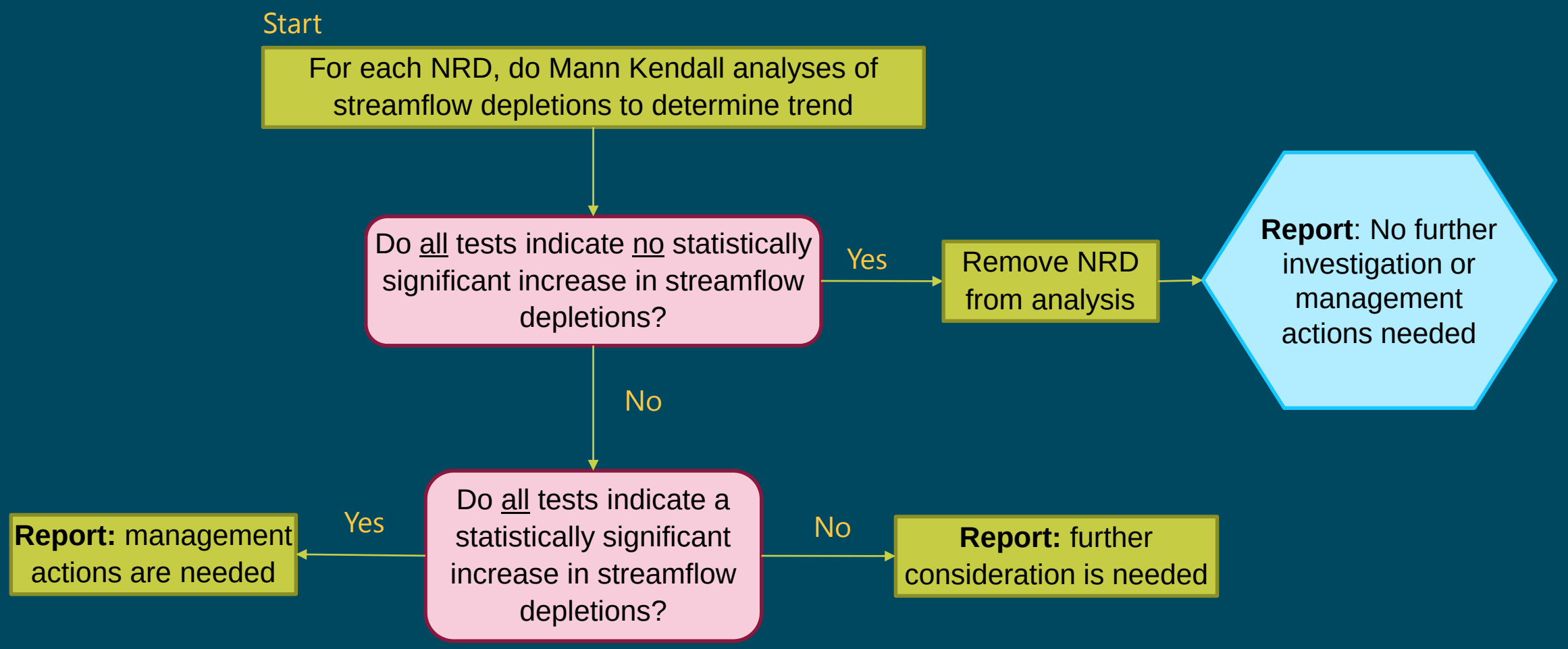
MHO B Methodology

MHO B: Limit groundwater depletions to streamflow to a relatively constant level over the long-term both across the basin as a whole and within each NRD

MHO B Methodology

Screening Phase

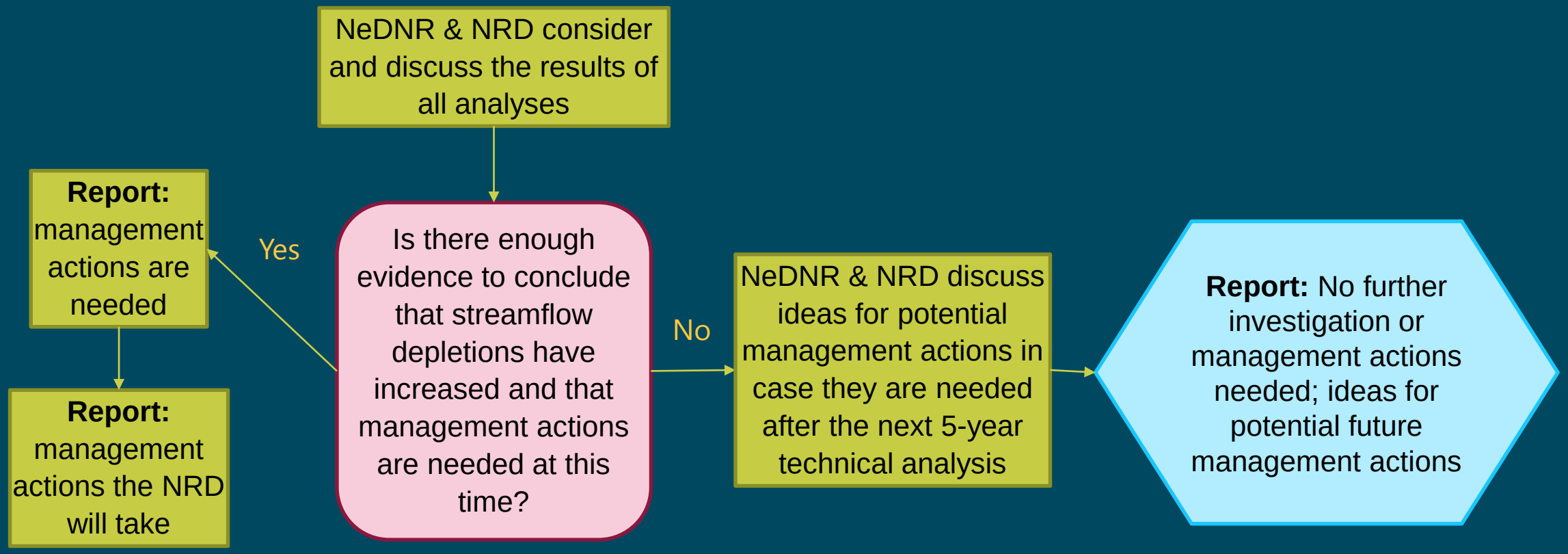
[Every 5 Years (part of 5-Year Technical Analysis)]



MHO B Methodology

Discussion Phase

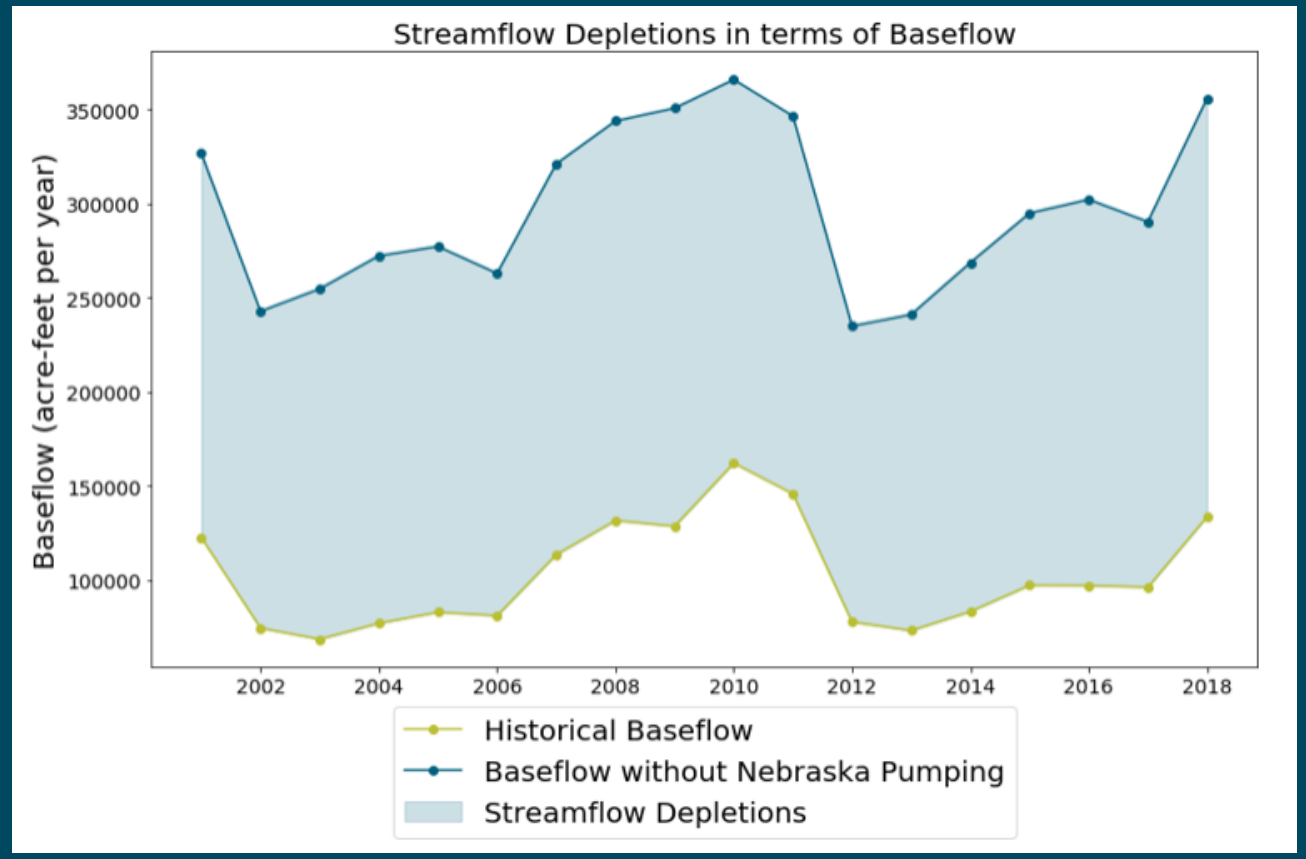
[Within 12 Months (i.e., by 1st annual meeting after 5-Year technical analysis presented)

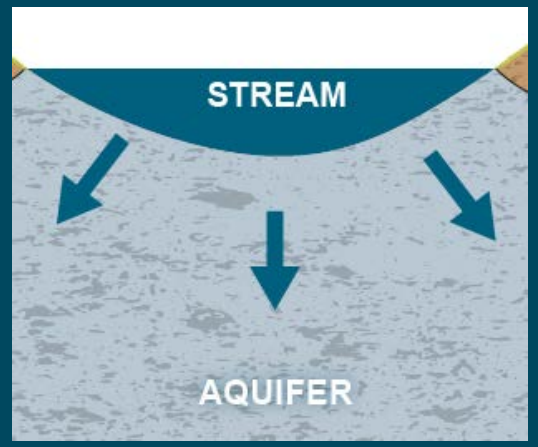


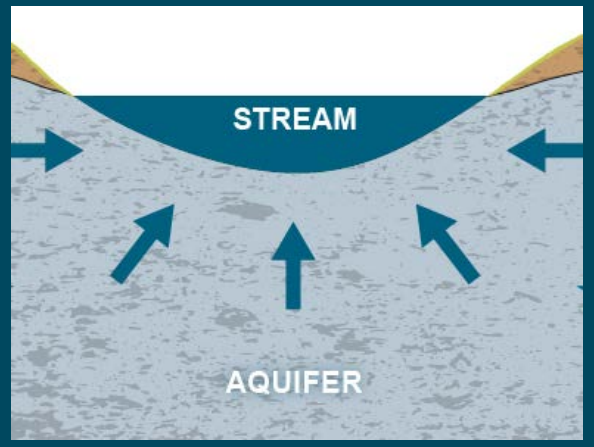
MHO B Methodology

Streamflow Depletions

- Baseflow: the water which flows between the stream and aquifer
- Depletions: the difference in baseflow with and without groundwater use
- Trends assessed beginning in
  - 2008 for Upper, Middle, Lower Republican NRD
  - 2013 for Tri-Basin







MHO B Methodology

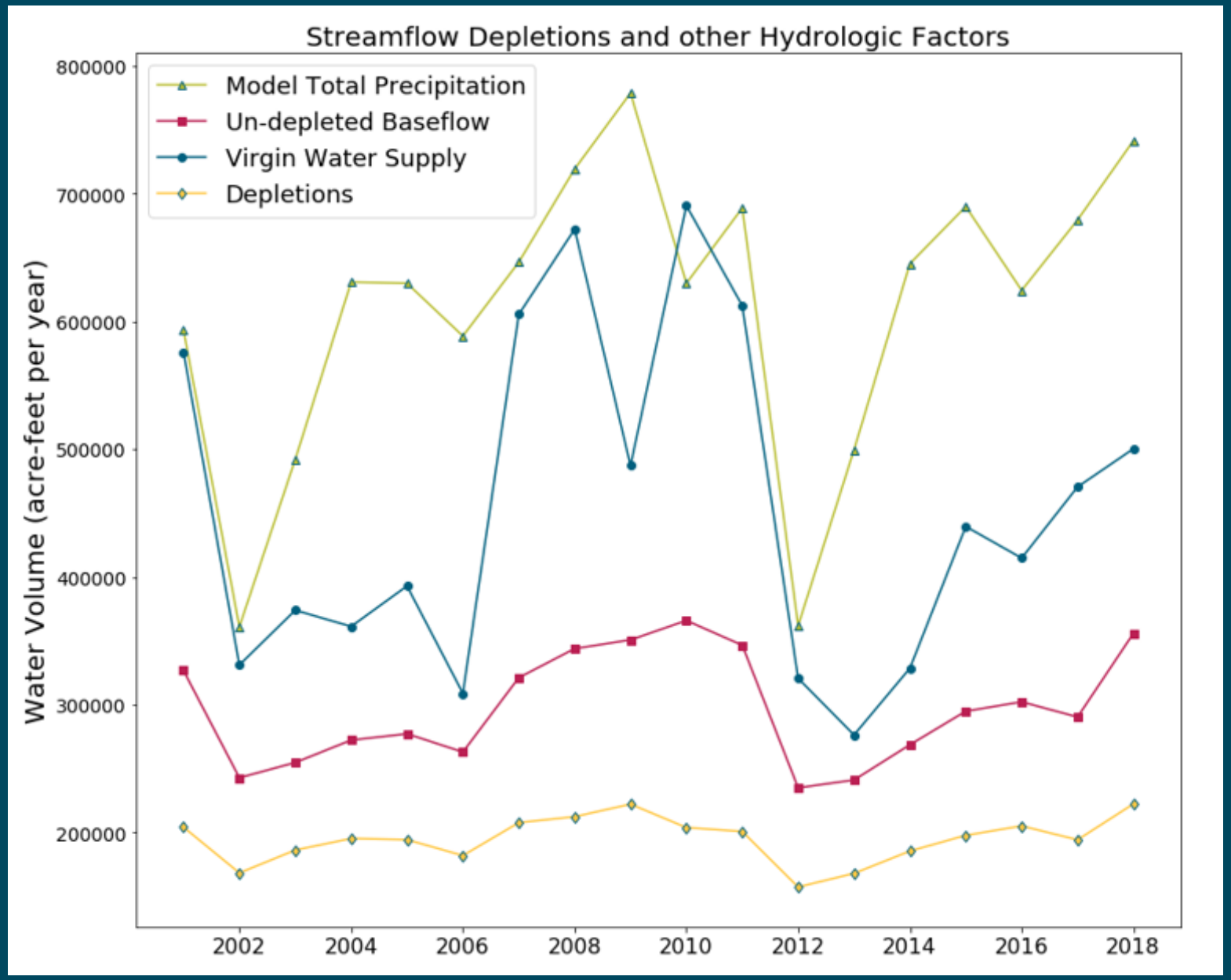
Finding Trends over the Long-Term

- Streamflow depletions are influenced by many factors
  - Water use
  - Climate and weather
  - Prior conditions
- Remove environmental influence outside Nebraska Control
  - Precipitation
  - Baseflow in absence of pumping (un-depleted baseflow)
  - Virgin Water Supply as defined in accounting procedures

MHO B Methodology

Data Series and Correlation

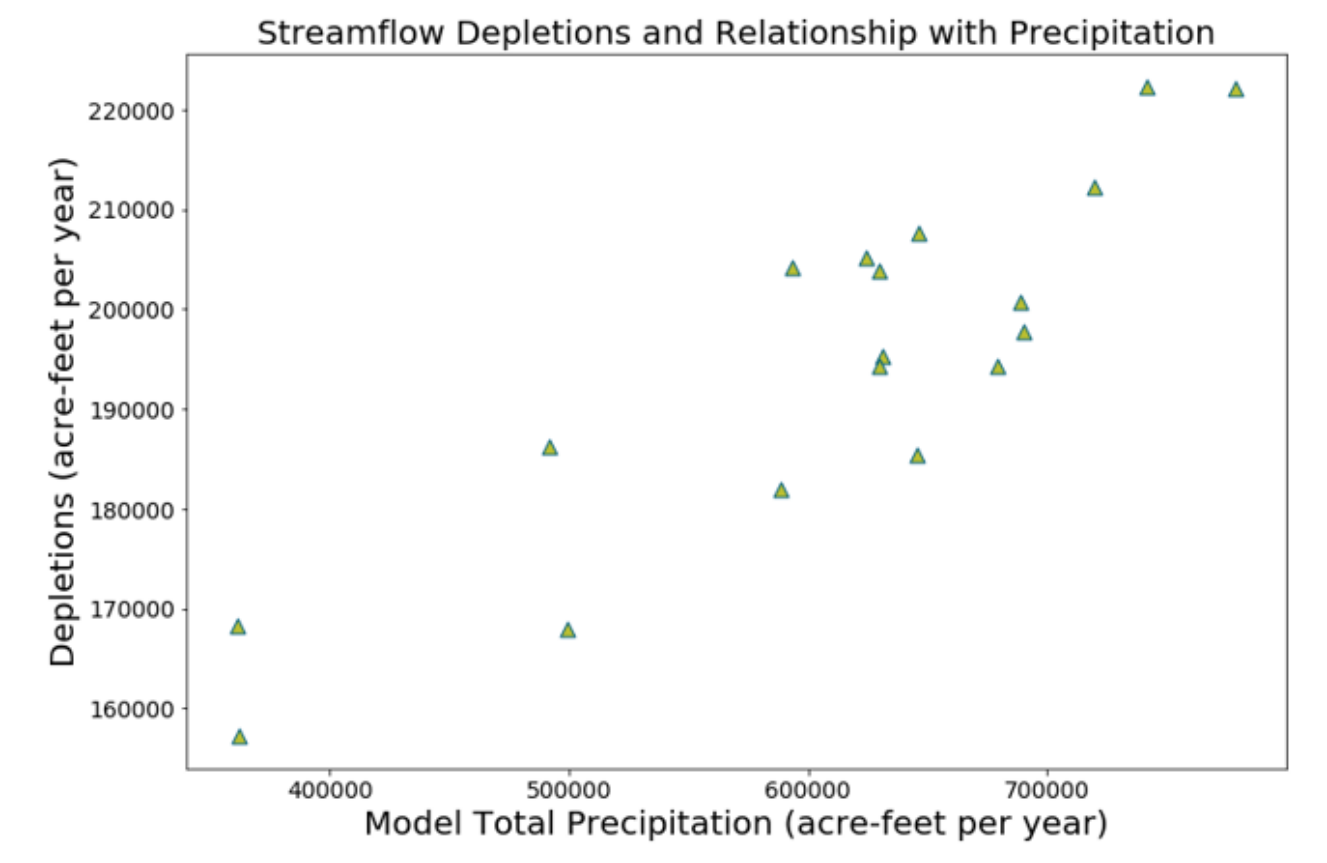
- Correlation describes the relationship between two variables
- Decorrelation removes influence of one variable on another



MHO B Methodology

Decorrelating for Annual Precipitation

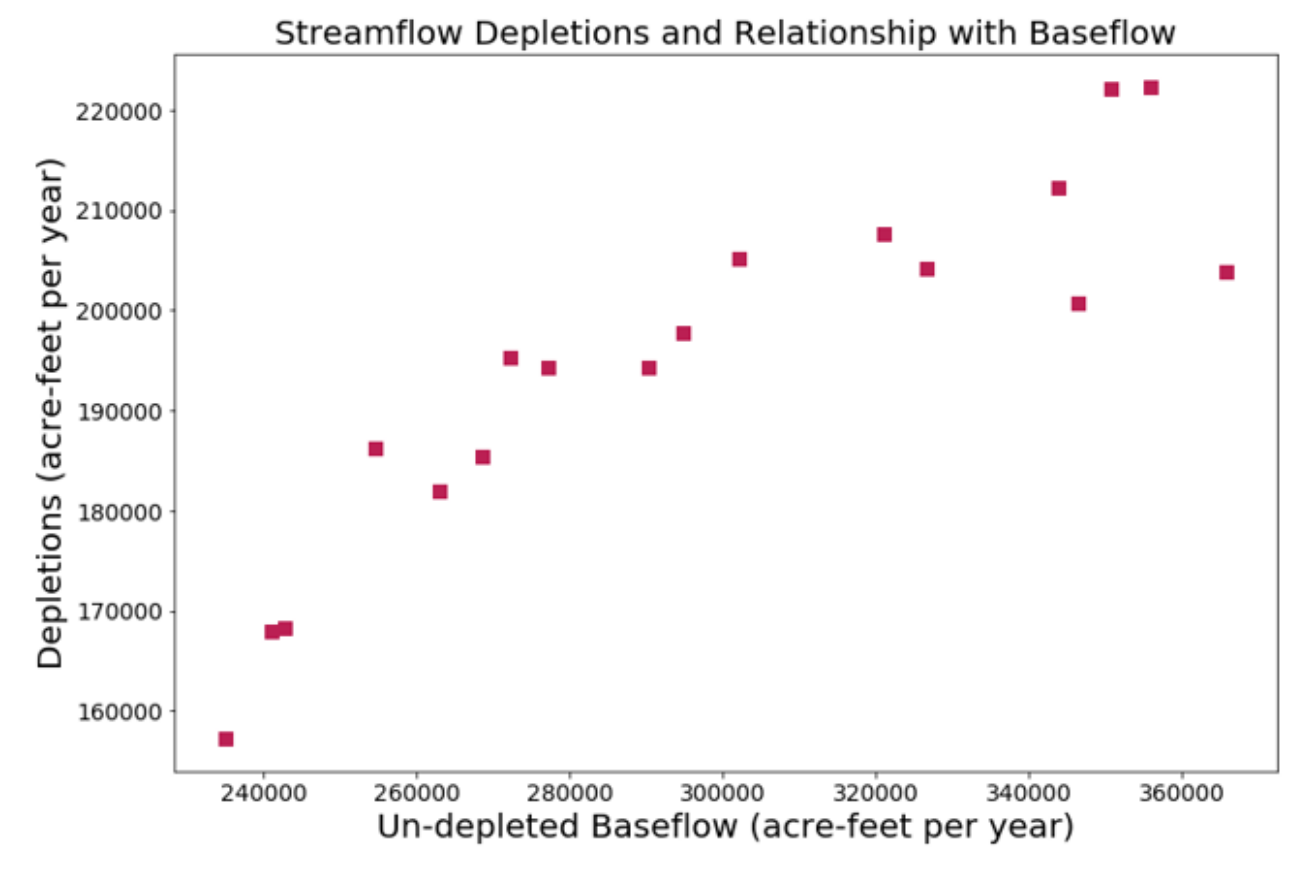
- Precipitation input for RRCA groundwater model
- Highly correlated to annual depletions
  - Local recharge
  - Impacts to crop irrigation requirements



MHO B Methodology

Decorrelating for Un-depleted Baseflow

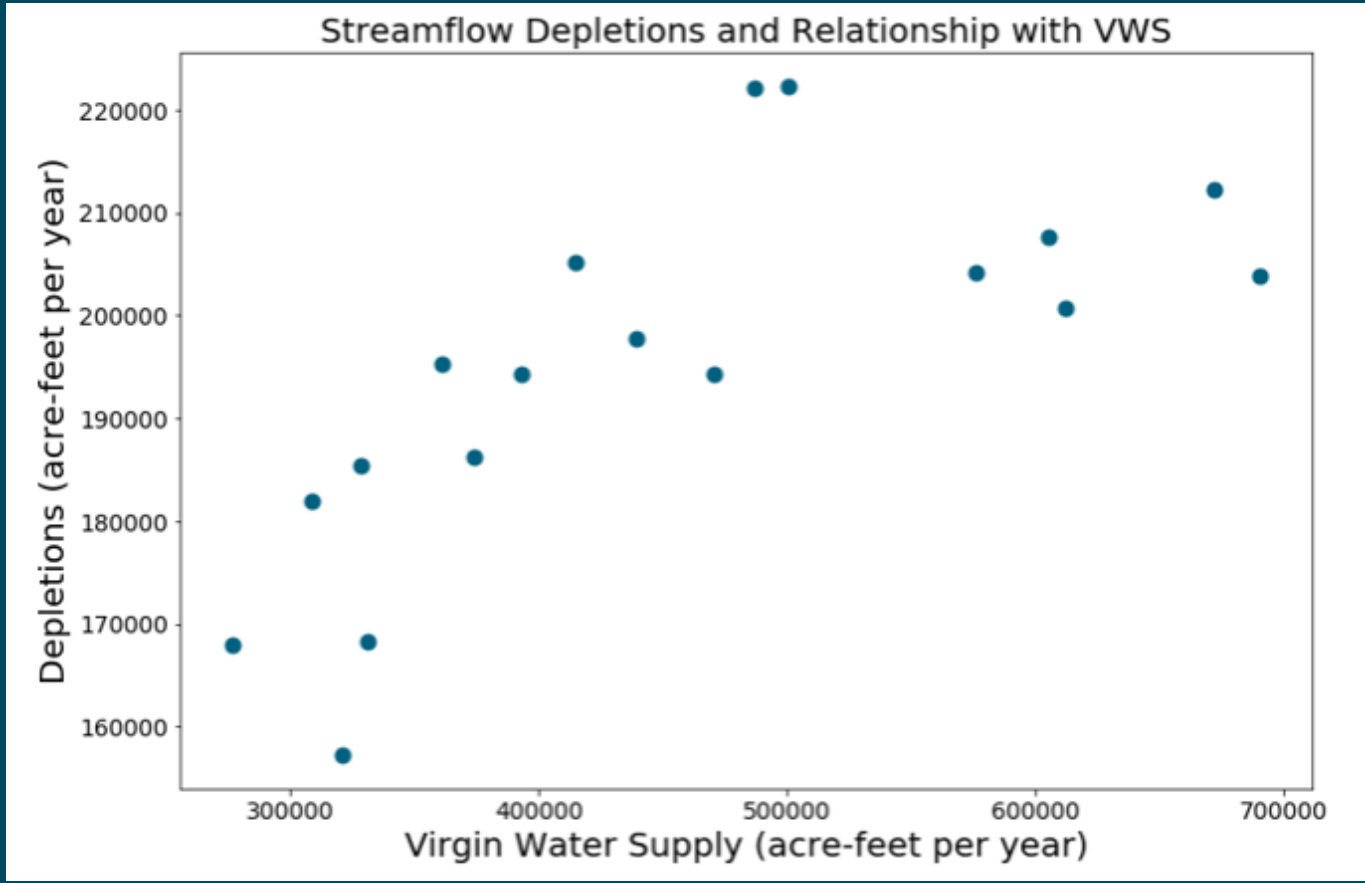
- Annual un-depleted baseflow is calculated using RRCA groundwater model
- Un-depleted baseflows sets the annual limit of baseflow available for depletions
  - Conceptually similar
  - Similar assumptions and uncertainties



MHO B Methodology

Decorrelating for Virgin Water Supply (VWS)

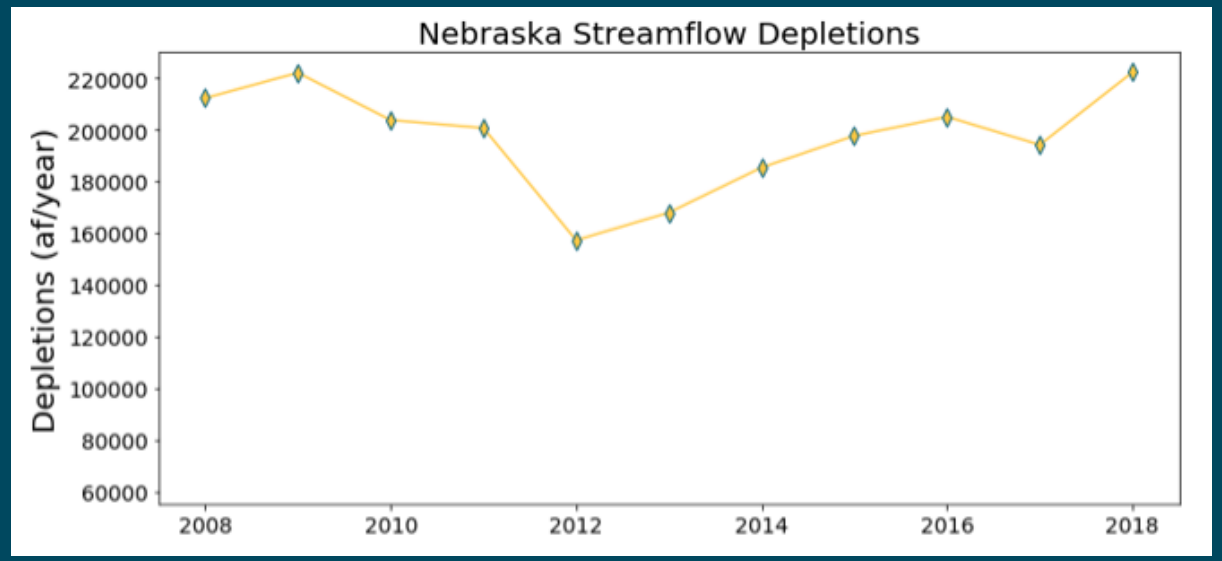
- Defined in the RRCA Accounting Procedures as a sum of
  - Annual streamflow
  - Computed consumptive use of streamflow
  - The change in reservoir storage minus imported water
- VWS is a broad indicator of hydrology
  - Un-depleted baseflow
  - Precipitation
  - Groundwater depletions
  - Other sources of streamflow

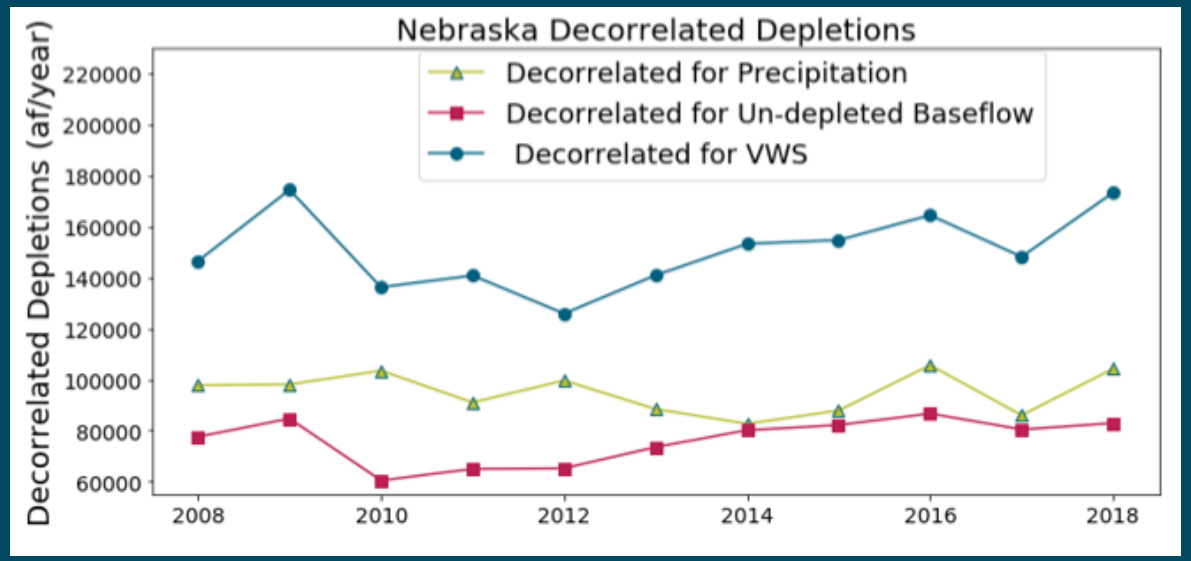


MHO B Methodology

MHO B Analysis Nebraska Depletions for 2008-2018

Mann-Kendall Results	
Nebraska Streamflow Depletions	No Trend
Decorrelated for Precipitation	No Trend
Decorrelated for Un-depleted Baseflow	No Trend
Decorrelated for VWS	No Trend





MHO Methodology

MHO C

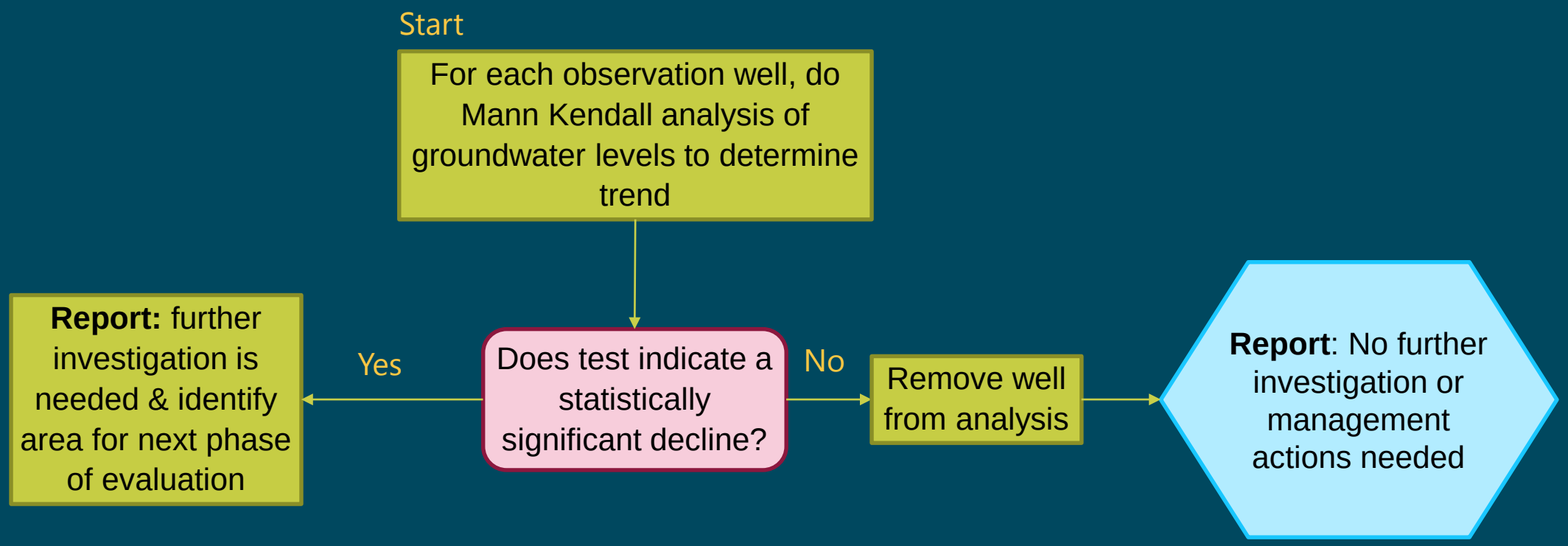
Margeaux Carter, NeDNR

MHO C: Ensure there is always enough groundwater for all groundwater uses within the timeframe of this plan, either by stabilizing groundwater levels or managing declining groundwater levels

MHO C Methodology

Screening Phase 1

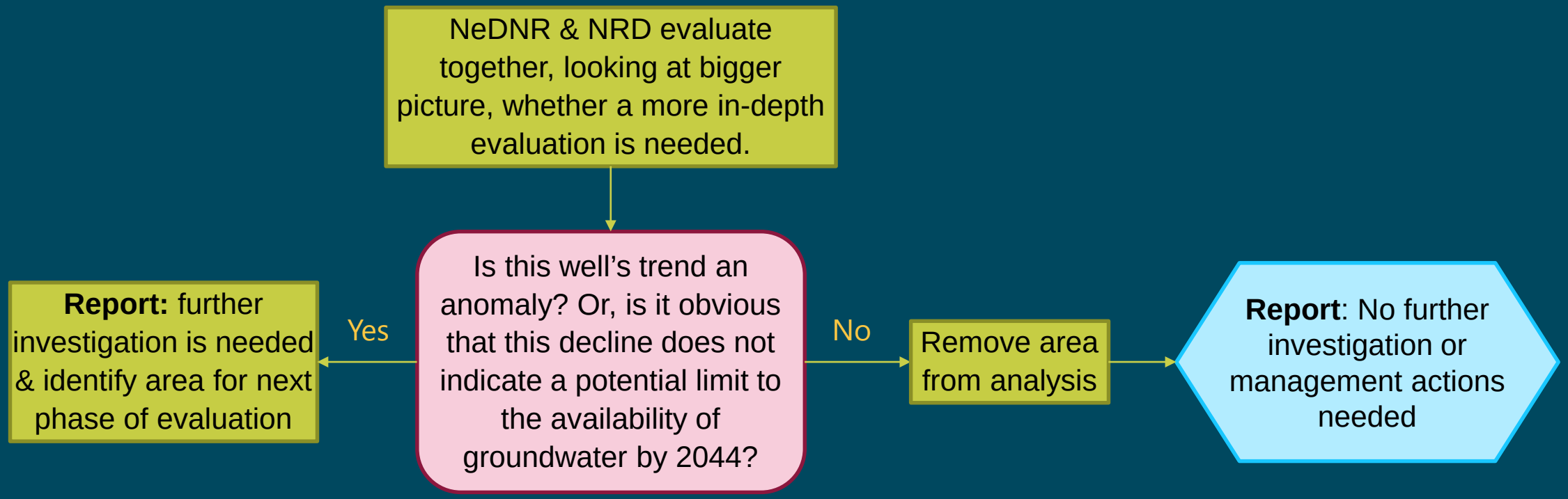
[Every 5 Years (part of 5-Year Technical Analysis)]



MHO C Methodology

Screening Phase 2

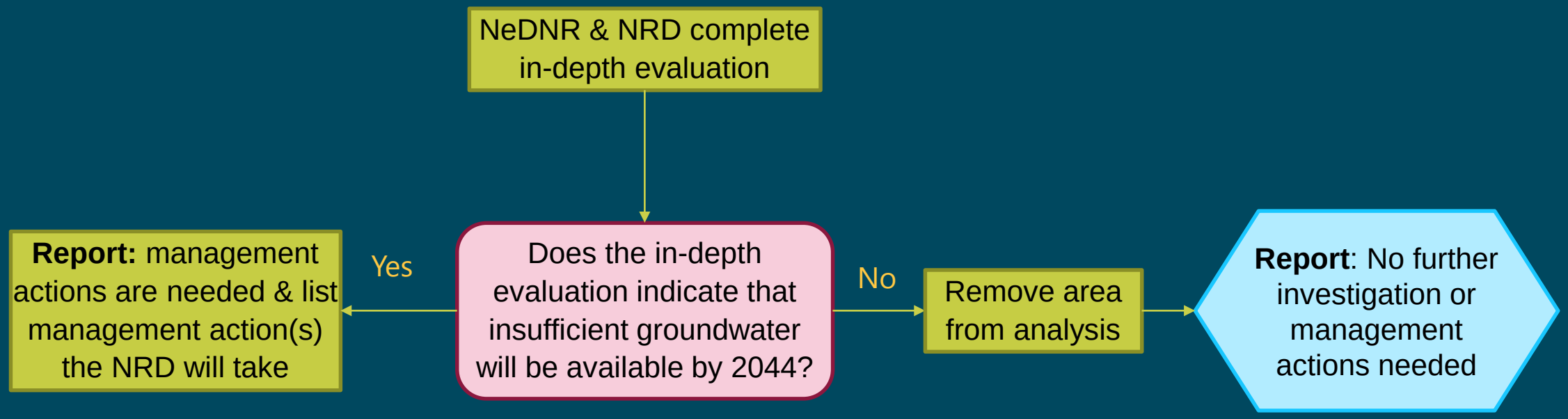
[Within 12 months (i.e., by next Annual Meeting after 5-Year Technical Analysis presented)]



MHO C Methodology

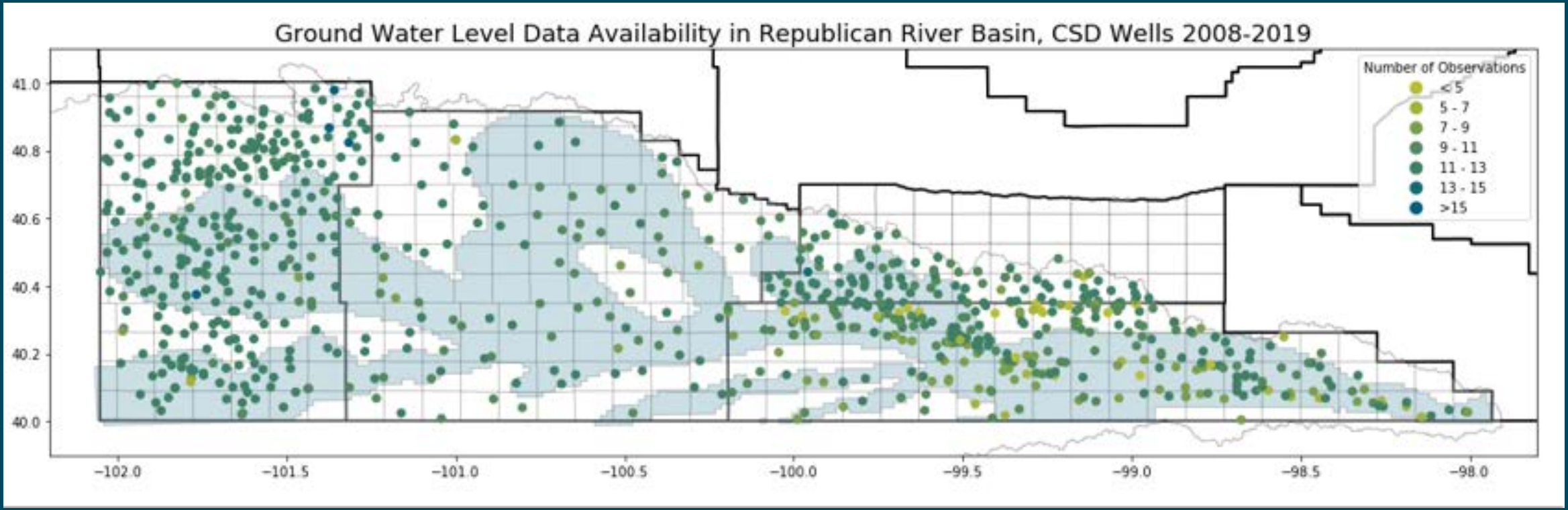
Screening Phase 3

[Within 24 months (i.e., by 2nd Annual Meeting after 5-Year Technical Analysis presented)]



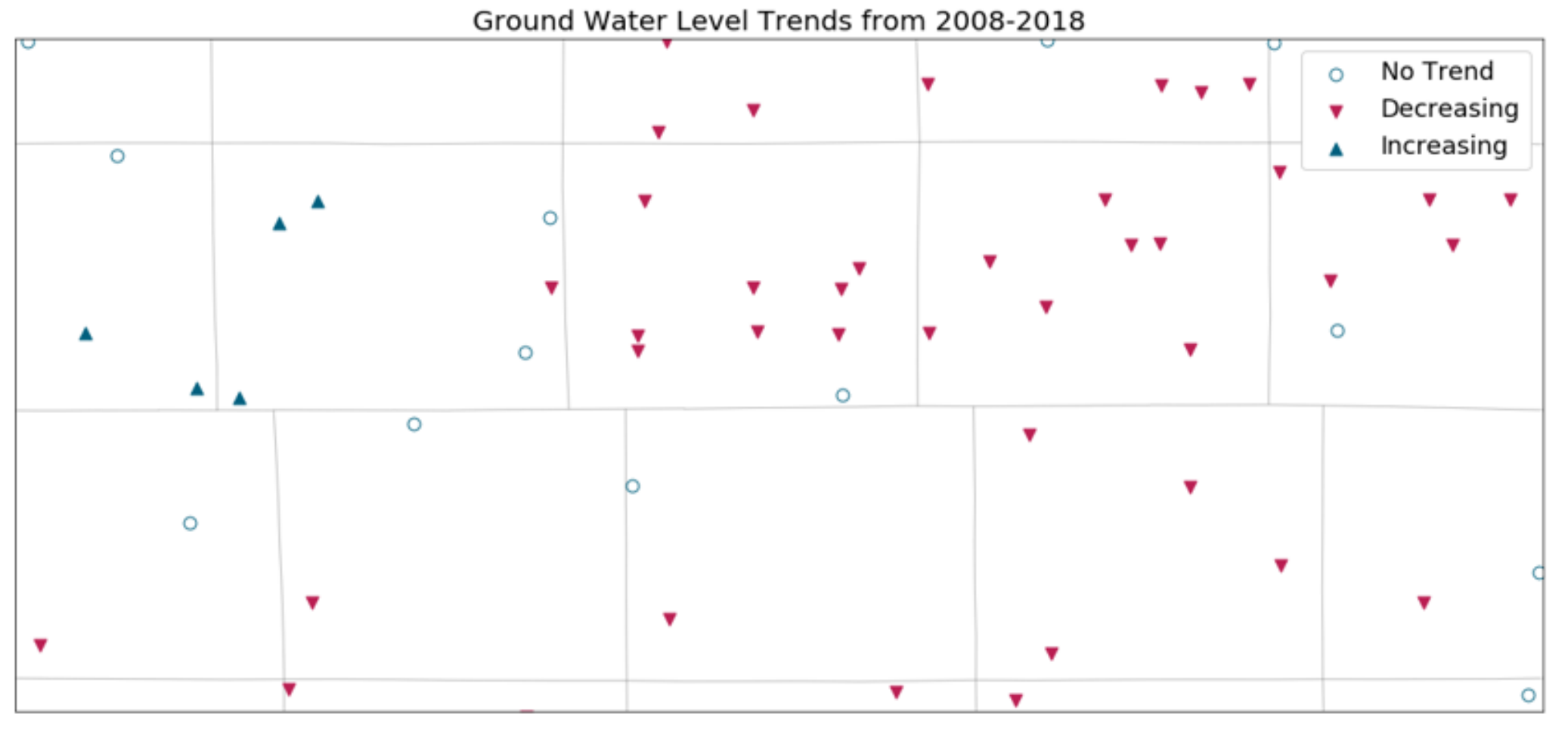
MHO C Methodology

Groundwater Level Data



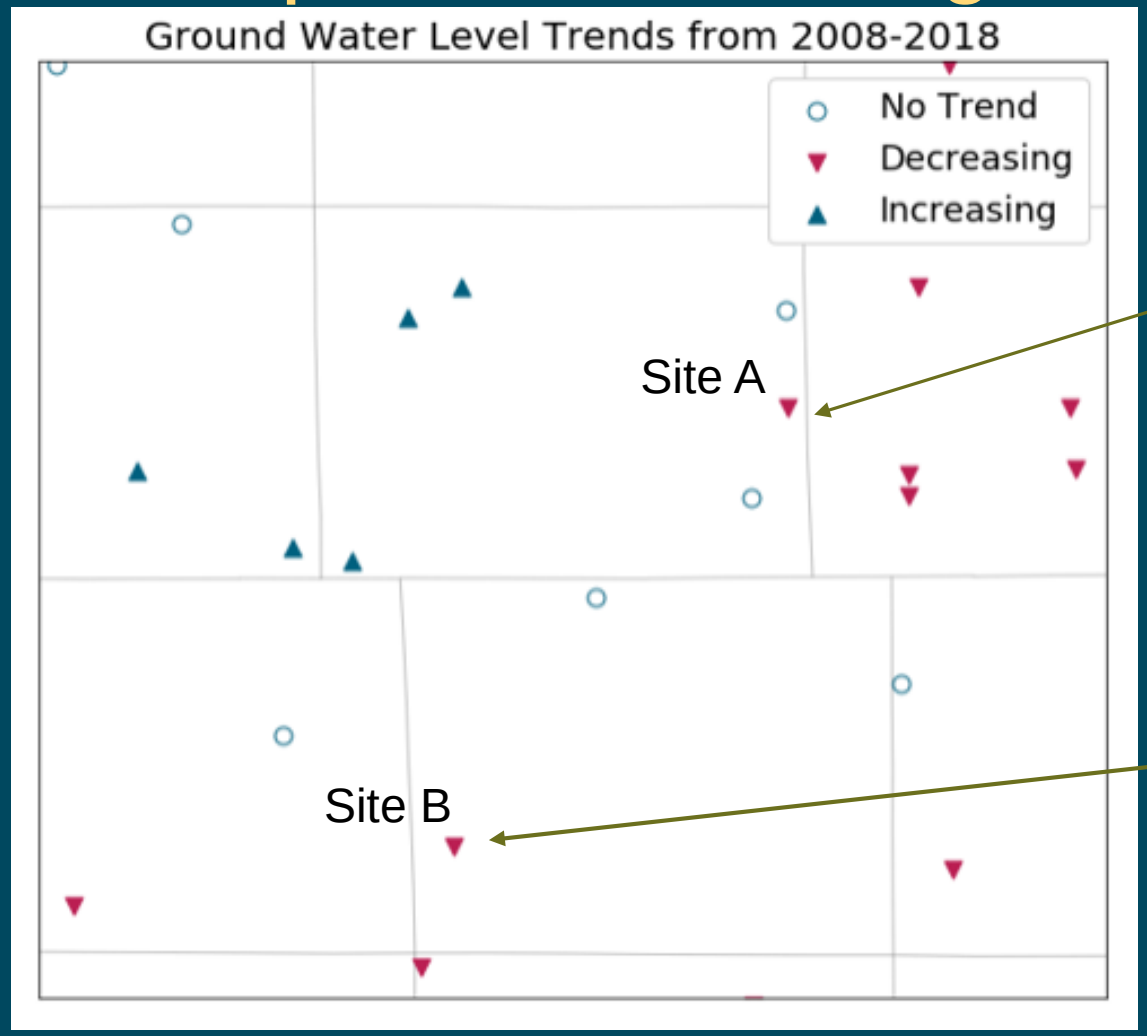
MHO C Methodology

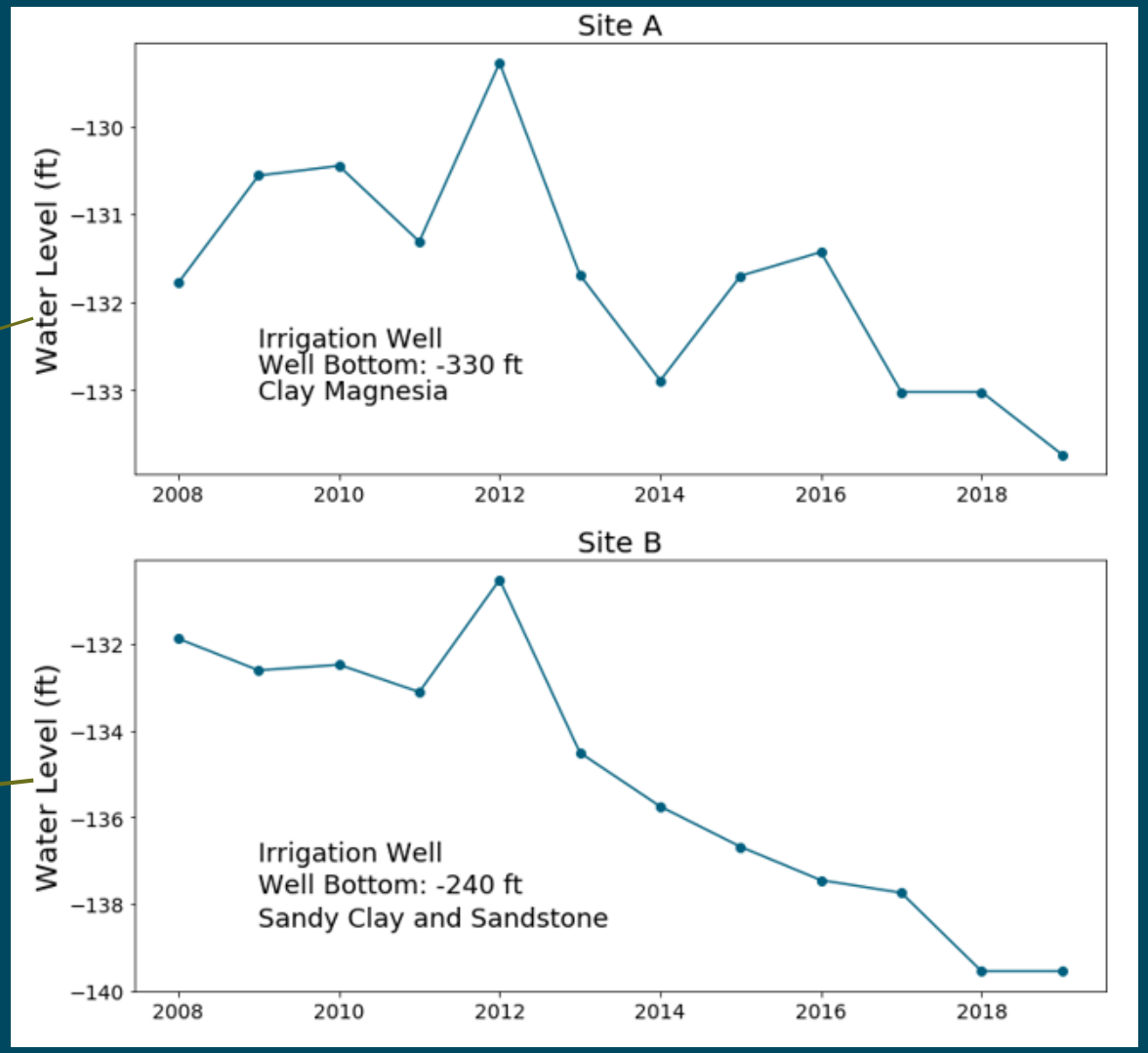
Example Trend Identification



MHO C Methodology

Example Trend Investigation





Feasibility and Potential Impacts of Planned Projects

- Platte-Republican Diversion Project

Feasibility and Potential Impacts of Planned Projects

Platte-Republican Diversion Project

Todd Siel, LRNRD, and John Thorburn, TBNRD

Collaboration

- Existing and potential new water conservation programs
- Information sharing about water user management practice improvements
- HUC 12 watershed project (Water for Food)
- Weed management

Existing and Potential New Water Conservation Programs

- CREP, AWEP
- Water Resources Cash Fund
- Water Conservation Incentive Program

Water Conservation Programs

CREP & AWEP

Carol Flaute, NeDNR

Conservation Reserve Enhancement Program (CREP)

- Administered by USDA Farm Service Agency (FSA)
  - Part of the USDA Conservation Reserve Program (CRP)

- Participation is Voluntary
  - 10-15 year contracts with producers to remove environmentally sensitive land from production and establish resource conserving plant species.
  - Producers are paid an annual rental rate along with other federal and non-federal incentives as applicable per each CREP agreement.

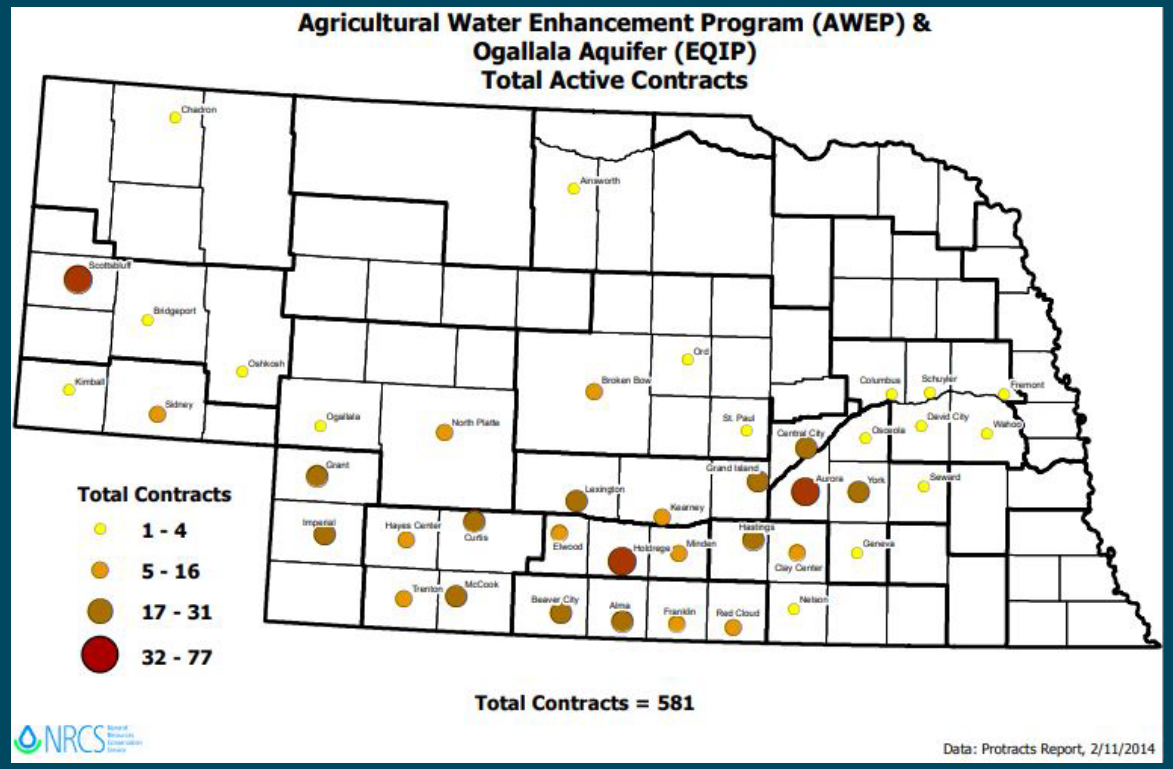
CREP

- Goals
  - Reduce application of water for cropland irrigation
  - Increase surface water and groundwater retention
  - Establish conservation buffers and restore wetlands
  - Reduce the application of triazine, and phosphate products
  - Reduce leaching of nitrate compounds into streams and groundwater
  - Reduce nitrogen and phosphorus levels from agricultural activities
  - Establish native grassland habitat for wildlife
  - Reduce the consumption of fossil fuels and electricity for irrigation.

CREP & AWEP

Agricultural Water Enhancement Program (AWEP)

- Administered by Natural Resource Conservation Service (NRCS)
  - Part of the Environmental Quality Incentives Program (EQIP)
    - Repealed as part of the 2014 Farm Bill, however NRCS honors contracts prior to 2014
- Provides financial and technical assistance to producers
  - For implementation of water enhancement activities on agricultural land
    - Conservation of surface water
    - Conservation of groundwater
    - Improvement of water quality



Water Conservation Programs

Water Resources Cash Fund (WRCF)

Carol Flaute, NeDNR
Nate Jenkins, URNRD
Jack Russel, MRNRD
Todd Siel, LRNRD

Water Resources Cash Fund

Overview

- Administered by NeDNR
- To aid management actions taken to:
  - Reduce consumptive use
  - Enhance streamflows

    OR
  - Enhance groundwater recharge
- Eligible areas:
  - Fully appropriated or overappropriated

    OR
  - Bound by an interstate compact, decree, or formal state agreement

Water Resources Cash Fund

Colorado Settlement: Surface Water Projects

- $4 million for surface water projects in the Republican River Basin

Water Resources Cash Fund

Current WRCF Contracts by NRD

- Upper Republican NRD: $6,000,000
- Middle Republican NRD: $3,300,000
- Lower Republican NRD: $3,300,000

Water Resources Cash Fund

Upper Republican NRD

- Upper Republican NRD/State Irrigation Retirement
  - Water Resources Cash Fund: $6 million
  - URNRD Funds: $4 million
  - $17 million in bids received to retire 5,700 acres
  - Bids ranked based on per-acre-foot cost of stream flow benefit using SDF and historical use data
  - $10 million in accepted bids for 3,500 acres with average SDF of 63.5% and annual usage of 12.5"
  - Program incentivizes re-enrollment in CREP

Water Resources Cash Fund

Middle Republican NRD

Water Resources Cash Fund

Lower Republican NRD

- Original WRCF contract signed on August 23, 2018
- NeDNR Financial assistance: up to $3,300,000
  - 60% of approved project expenses
- LRNRD Financial Commitment: up to $2,200,000
  - 40% of approved project expenses
- Currently, no contracted projects have been submitted
- Projects under consideration:
  - Ground water irrigation retirements – up to ½ of available WRCF funds
  - Streamflow enhancement projects

Water Conservation Programs

Water Conservation Incentive Program

John Thorburn, TBNRD

Water Conservation Incentive Program (WCIP)–TBNRD

Overview

- A new initiative to help conserve groundwater and reduce stream depletions
- Landowners agree to accept limits on pumping in exchange for incentive to conserve water
- Five year contracts
- Landowners enroll land on a field-by-field basis
- 8000 acre total enrollment limit for groundwater users
- 1450 acres enrolled so far this year

Water Conservation Incentive Program (WCIP)–TBNRD

Details

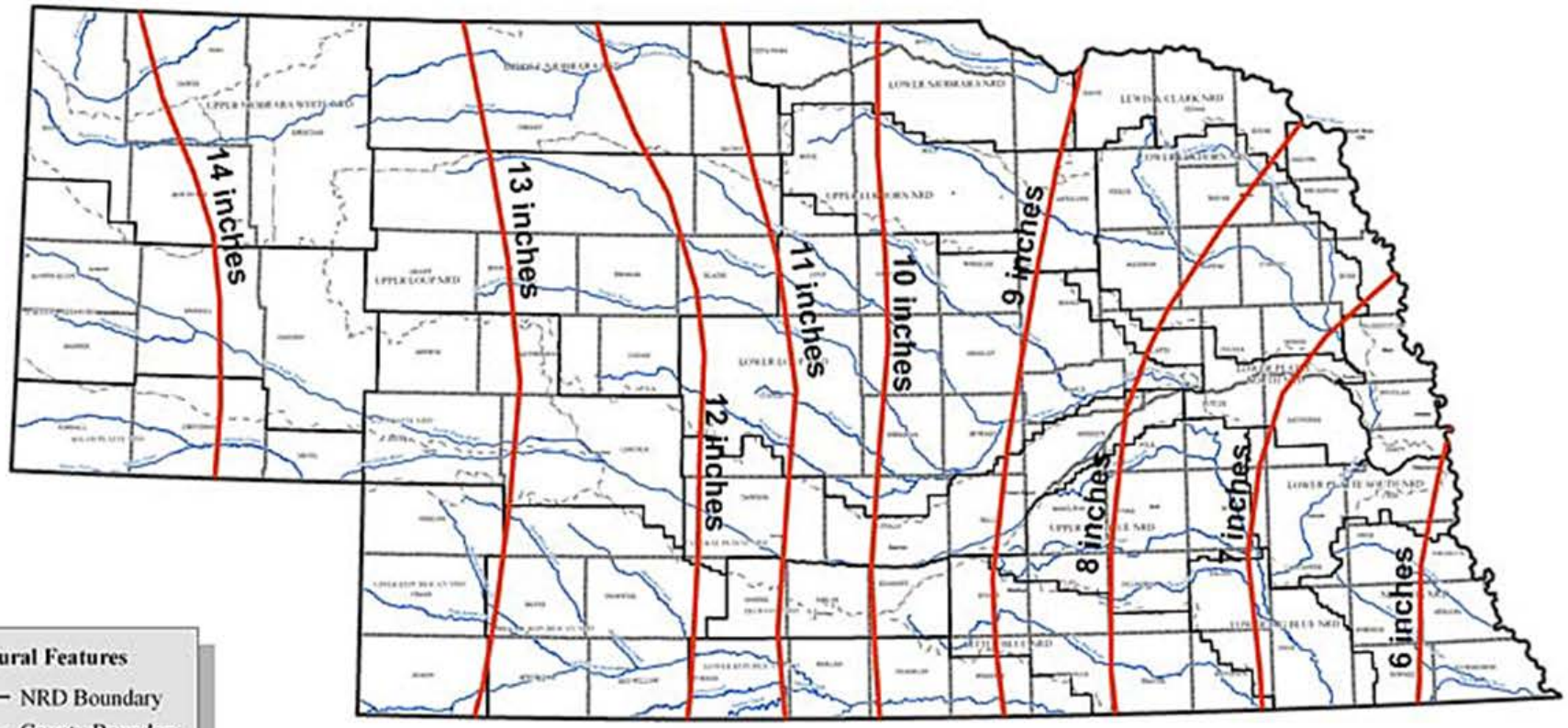
- Every enrolled field will have a water credit “account” containing water use credits
- Allocations will be set equal to UNL Average Corn crop irrigation requirement
- Incentive payment offered only if irrigators use at least one inch per acre less than allocation

CORN CROP IRRIGATION REQUIREMENT

STATE OF NEBRASKA

Planning and Assistance Division

This map is intended to supply only general information concerning the matter stated in its title. Boundaries and the location of features portrayed on this map are not to be construed as legal boundaries or actual locations, and may change as additional or better data become available. User assumes all risks associated with interpretations of this map beyond its intended purpose.



Cultural Features

- NRD Boundary
- County Boundary
- State Boundary

0 10 20 40 60 80 Miles

- Nebraska Basins
- Corn Crop Irrigation Requirement

Water Conservation Incentive Program (WCIP)–TBNRD

Details

- Two payment options: $5/Ac./Yr.($25 per acre over five years) or up to five times $4 Ac. ($20/Ac.) at end of contract
- Payments offered on NRD-certified irrigated acres
- Landowners can “pool” allocations between fields
- Pooling allocations between fields under common management, but different ownership, requires separate pooling agreement with NRD

Water Conservation Incentive Program (WCIP)–TBNRD

Details

- Participants can irrigate all land within enrolled fields, not just certified irrigated acres (unless irrigation prohibited by transfer agreement or other contracts).
- Participants will have opportunities to market water use credits to other water users and possibly to outside interests
- Landowners or operators initially sign an application
- Selected applications will be offered five-year contracts, which must be signed by landowners

Water Conservation Incentive Program (WCIP)–TBNRD

This sounds good so far…what's the catch?

- You must have flowmeters installed on all participating fields
- Only groundwater-irrigated land can be enrolled (fields with CNPPID water rights not eligible)
- By signing a contract you agree to limit your irrigation water use on selected fields for five years
- The only way to get out once you're in is to refund any payments made by NRD and buy unused credits from other participants to equal remaining allocation amount, or go dryland
- Allocation in Phase three groundwater management area (Union Township in Gosper County) is contract water use limit for fields in that township

Water Conservation Incentive Program (WCIP)–TBNRD

What do I need to do to participate?

- You must sign and submit an application form before March 31
- If your application is selected, you will need to sign a contract to participate in the program
- You must report water use annually to the NRD
- You must allow NRD staff to visit wells on participating fields to spot check flowmeters

Water Conservation Incentive Program (WCIP)–TBNRD

NEW! For 2020-WCIP

“Commingled” Option for CNPPID Customers

- Open to CNPPID customers who have irrigation wells
- TBNRD will pay $35 per CNPPID Contract acre per year
- Landowners must agree to use no more than one inch per acre per year of groundwater for irrigation
- If you use more than one inch per acre, reimbursement is reduced by $5 per acre-inch pumped
- If CNPPID can’t deliver nine inches, you can pump the difference without penalty

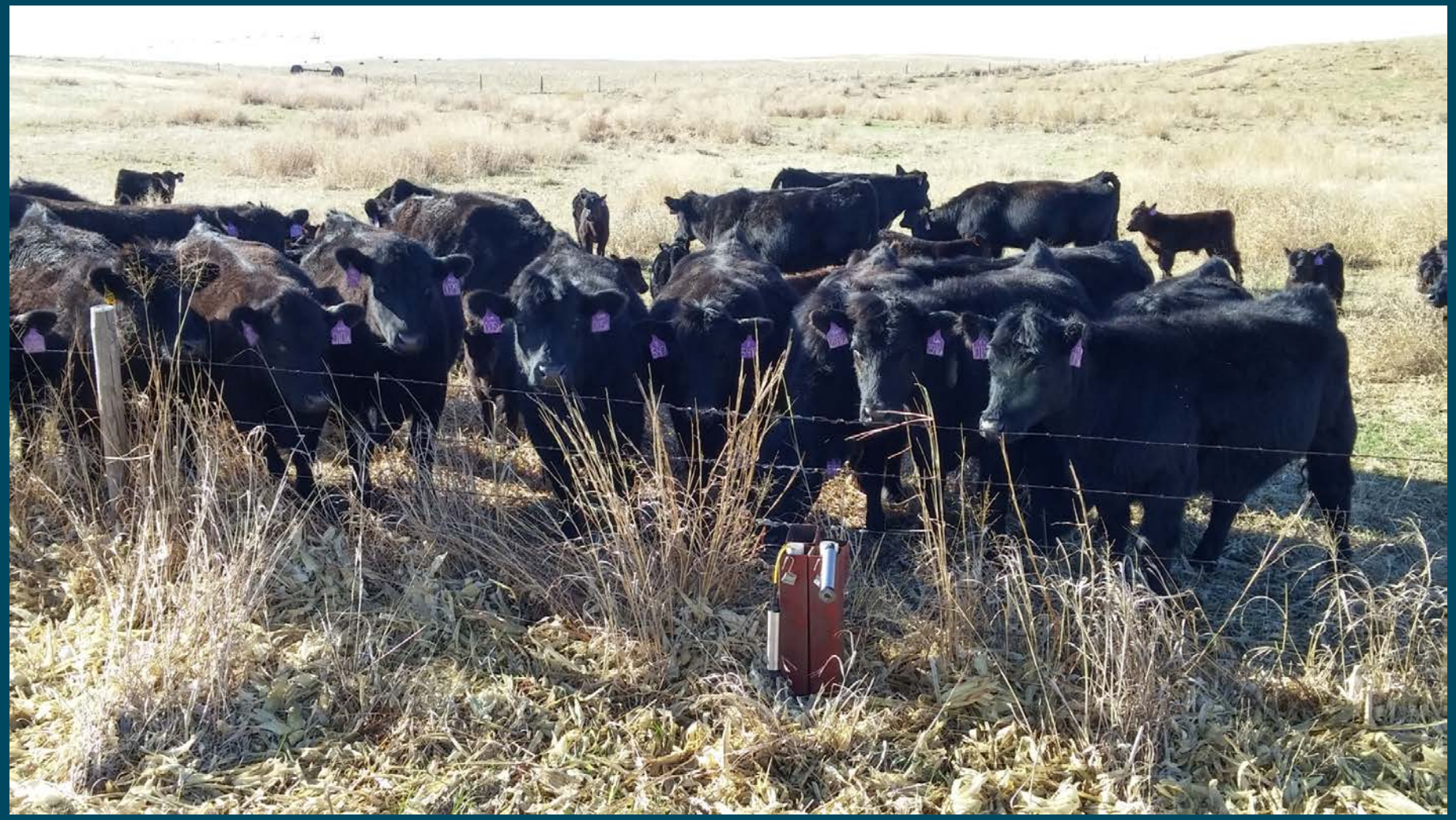
Water Conservation Incentive Program (WCIP)–TBNRD

WCIP “Commingled” option for CNPPID Customers (Continued)

- Five year contracts
- You must have an active CNPPID contract for water delivery (not in cancellation process)
- Funding available to enroll up to 8000 acres
- Individual landowners can contract up to 320 acres
- A ranking system will be used to prioritize applications if they exceed 8000 acres

Water Conservation Incentive Program (WCIP)–TBNRD

Questions?



Conflicts Resulting from Implementation of the Plan

- None submitted for consideration

Public Comment

Thank you!

rrbwp.nebraska.gov

carol.flaute@nebraska.gov

UPPER REPUBLICAN NRD

Middle Republican Natural Resources District

Lower Republican Natural Resources District

Tri Basin Natural Resources District

NEBRASKA DEPT. OF NATURAL RESOURCES