

Update on NNDP and IMP Monitoring

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Review of Nebraska New Depletion Plan (NNDP) Requirements

Review of NNDP Requirements – Overarching Premises

- There is a moratorium on the issuance of any new surface water appropriations in the Platte River Basin upstream of the confluence of the Platte River with the Loup River
 - Implemented in early 90's
- There is a moratorium on the issuance of new groundwater well permits greater than 50 gpm in the NRDs within the 28/40 area
 - Implemented subsequent to 2004 (LB 962)
- Anything subject to the Federal Depletions Plan will not require offset by Nebraska
 - Not tracked as part of NNDP
- New use:
 - Groundwater and surface water uses begun or expanded between July 1, 1997 and the present day, regardless of location
 - That causes a depletion to the Platte River or tributary thereof
 - Which impacts
 - USFWS “target flows”
 - “state-protected flows”
 - Will be estimated and offset

Review of NNDP Requirements – Overarching Premises

- Location:
 - For groundwater: In the watershed of the Platte River upstream of Chapman Nebraska and Within the 28/40 area
 - For Surface Water: In the watershed of the Platte River upstream of the confluence with the Loup River

- Permitted New Activities:
 - DNR or NRD permitted activities after January 1, 2006 will require an offset from the permittee

- Unpermitted Activities:
 - Sandpits, unpermitted small reservoirs, wells less than 50 gpm, not covered by Federal Depletions Plan

Review of NNDP Requirements – Overarching Premises

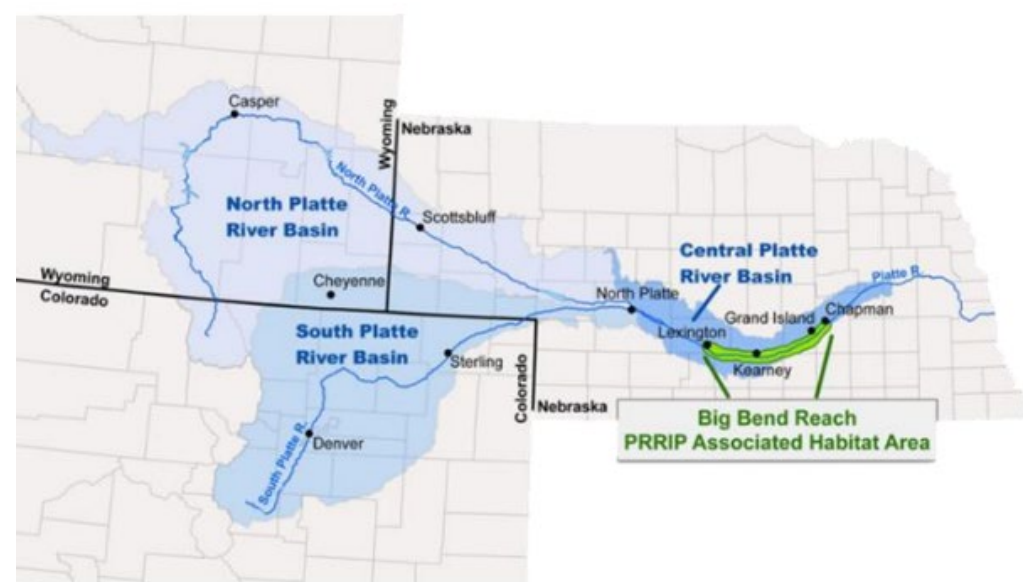
- Nebraska's will develop and maintain the hydrologic tools used by the state and the NRDs to determine the amount, timing, and location of depletions to state-protected flows, and target flows, and also to evaluate the effectiveness of proposed offset projects.
- In all cases, the offset objective will be to replace the water depleted in the amounts needed and at the times and locations needed to prevent harm to the water uses and/or the target flows for which such flow protection is required.
- All offset measures shall be constructed and operated or implemented so that they do not cause additional shortages to either target flows or state protected flows.

Review of NNDP Requirements – Uses not Subject to the NNDP

- New and expanded uses of groundwater
 - begun on or after January 1, 2006 and
 - are outside the watershed boundaries of the North Platte, South Platte and Platte Rivers and/or the 28% in 40 year lines
 - are not subject to this plan and therefore do not require mitigation for any adverse effects on state-protected flows or target flows,
 - every five years, any such uses will be assessed

- If the aggregate new depletions to target flows associated with all such uses are greater than 2,000 AF per year by the end of the next Program increment, for such subsequent increment, the depletion plan exemption for any such additional new or expanded uses may not be acceptable to the Governance Committee

Review of NNDP Requirements – Implementation Tasks



- A. Refine the COHYST models as needed following the completion of peer review;
- B. Determine the extent of any increase in irrigated acreage in the COHYST modeled area between 1997 and 2005 (moratoriums limited development after this time-frame);

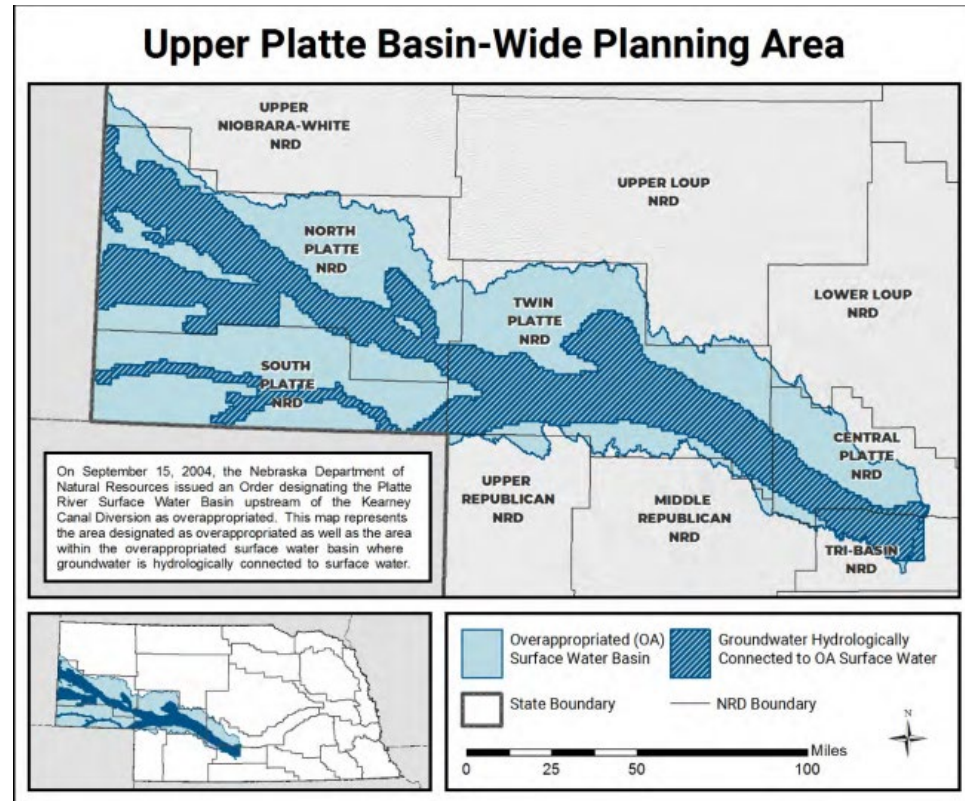
Review of NNDP Requirements – Implementation Tasks

- C. Determine the extent of any increase in average annual consumptive water use by municipalities, industries, rural domestic and other new water related activities in the COHYST modeled area subsequent to 1997;
- D. Determine the amount, timing and location of any depletions to the Platte River or a base flow tributary because of any increase described in b. or c. above;
- E. Determine what measures will be utilized to offset, in amount, timing and location, the depletions quantified above;
- F. Adopt and implement, in at least six natural resources districts, integrated management plans governing the initiation of new water related activities and the expansion of water related activities that have been initiated through 2005; such plans will encompass at least the geographic area that is within the Platte River Basin and inside the 28% in 40 year lines for the Platte and base flow tributaries.

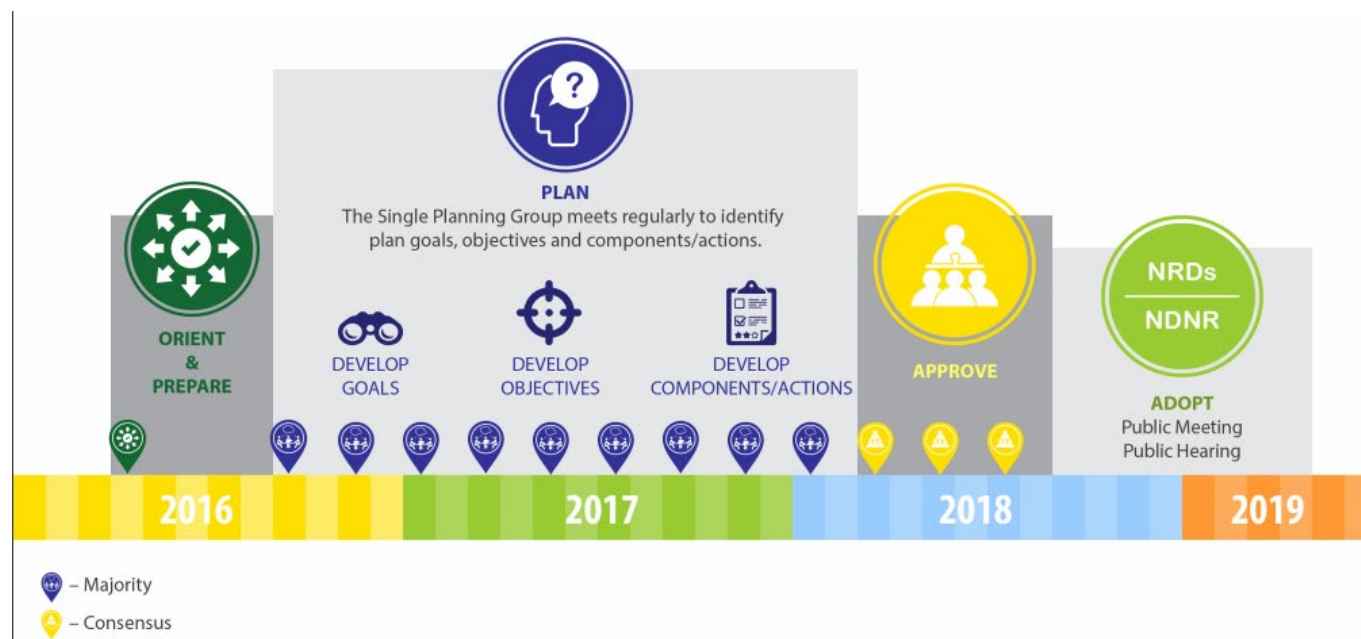
Review of Nebraska Basin Wide Plan and Integrated Management Plan Updates

Review of Nebraska Basin Wide Plan Goals

- Ensure compliance with PRRIP through the NNDP
- Incrementally work to achieve a fully appropriated condition (required under state law)
- Work with M&I users to maximize water use efficiency
- Identify and resolve disputes amongst water users
- Improve information and data sharing



Updates to Basin-Wide and Integrated Management Plans



- Maintain first increment progress
- Update targets for post-1997 depletions (Robust Review)
- Sharpen focus on drought contingency planning
- Implement the necessary incentive-based and regulatory-based management actions to achieve the goals
- Other key components left unchanged from the first increment

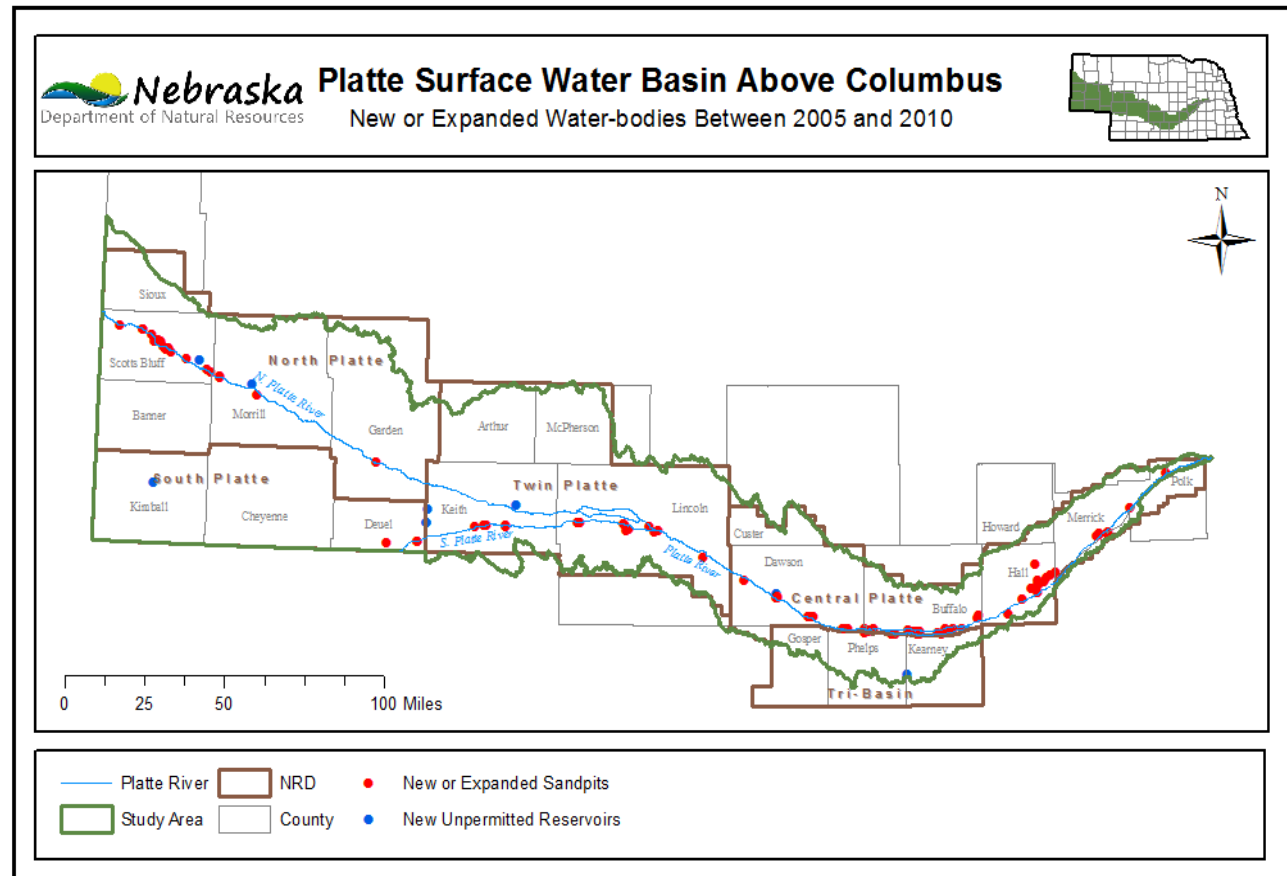
Robust Review

Goals of “Robust Review”

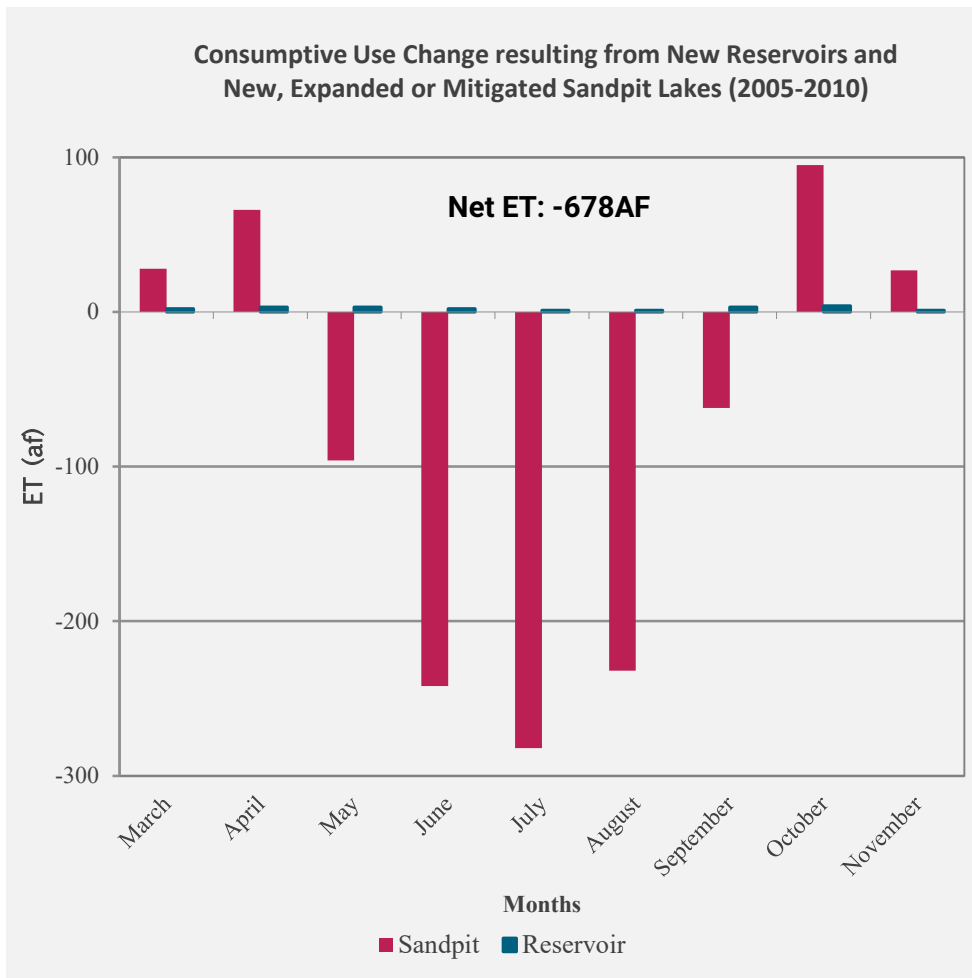
- Update new net depletions due new or expanded uses of water subsequent to July 1, 1997
 - Small reservoirs/sand pits (unpermitted) changes
 - Rural domestic population and livestock changes
 - Groundwater irrigated acres
 - Crop-type changes
 - M&I changes
 - Management actions (regulatory and non-regulatory)
 - Canal recharge
 - Augmentation
 - Allocation
 - Retirements/leases

Small Reservoirs and Sand Pits

- Farm Service Agency (FSA) Orthophotography from 2005 and 2010 was used to inventory and classify waterbodies within the Platte River Surface Water Basin.
- Change analysis was conducted to identify new or expanded sandpits and new small reservoirs (smaller than 15AF)
- The Natural Resources Conservation Service (NRCS) Evapotranspiration Calculator was used to estimate the impact of new sandpits or small reservoirs on water consumption within the study area.

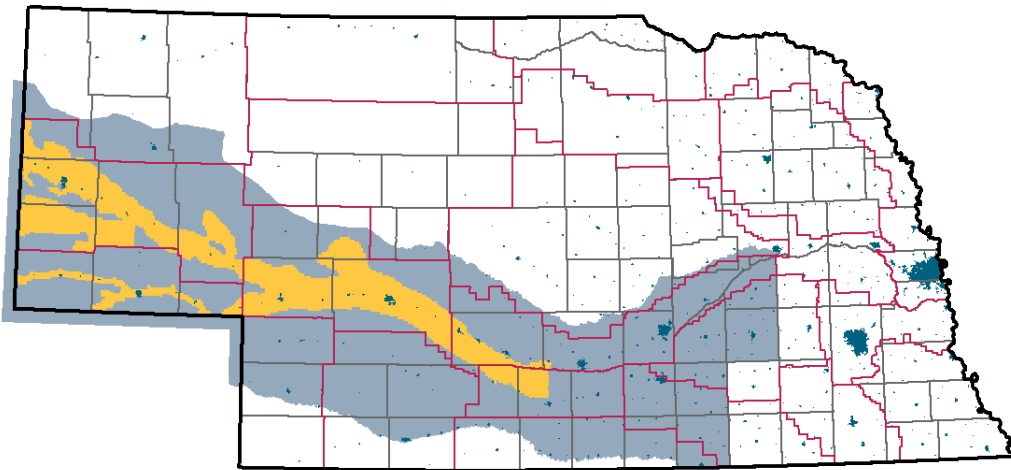


Small Reservoirs and Sand Pits



- Net ET change due to new small reservoirs: **18.4 AF**
- Net ET change due to new or expanded sandpits: **-698 AF**
- Net ET change due to both small reservoirs and sandpits: **-678 AF**
- Analysis presented and approved by WAC in 2014
- Because changes in small reservoirs and sandpits did not have a net negative impact on water supplies, they were not updated in the robust review.

Rural Population Changes



COHYST Model Area
 Overappropriated Area
 Counties
 Urban Places
 Natural Resources Districts

- Throughout the entire COHYST model area, rural population **decreased** by **6,127 (6.7%)** from 1997 to 2017
- In the overappropriated area, rural population **decreased** by **966 (5.7%)** from 1997 to 2017
- Rural population change did not have a negative impact on water supplies and therefore was not included in the robust review update

Estimated Population within the COHYST Model Area 2017

	1997	2005	2017	Change 1997 to 2017 (%)
Urban Place Population	257,071	281,481	292,293	35,222 (13.7%)
Rural Population	91,660	92,887	85,533	-6,127 (-6.7%)
Total	366,731	374,368	377,826	11,095 (3.0%)

Estimated Rural Population within the COHYST Overappropriated Area by NRD

	1997	2005	2017	Change 1997 to 2017 (%)
Central Platte	1,854	1,901	1,802	-52 (-2.8%)
North Platte	8,235	8,267	7,210	-1,025 (-12.4%)
South Platte	698	711	617	-81 (-11.6%)
Tri-Basin	1,292	1,220	1,097	-195 (-15.1%)
Twin Platte	4,915	5,401	5,302	387 (7.9%)
Total	16,994	17,500	16,028	-966 (-5.7%)

- Urban population changes will be discussed further in conjunction with M&I pumping changes

Livestock Changes

Estimated Change in Annual Water Consumption (AF) 1997-2013			
NRD	Average Difference	High Value (Year)	Low Value (Year)
CPNRD	-297	102 (1999)	-610 (2004)
TBNRD	-22	78 (2007)	-101 (2003 & 2005)
TPNRD	52	176 (2013)	-44 (2003)

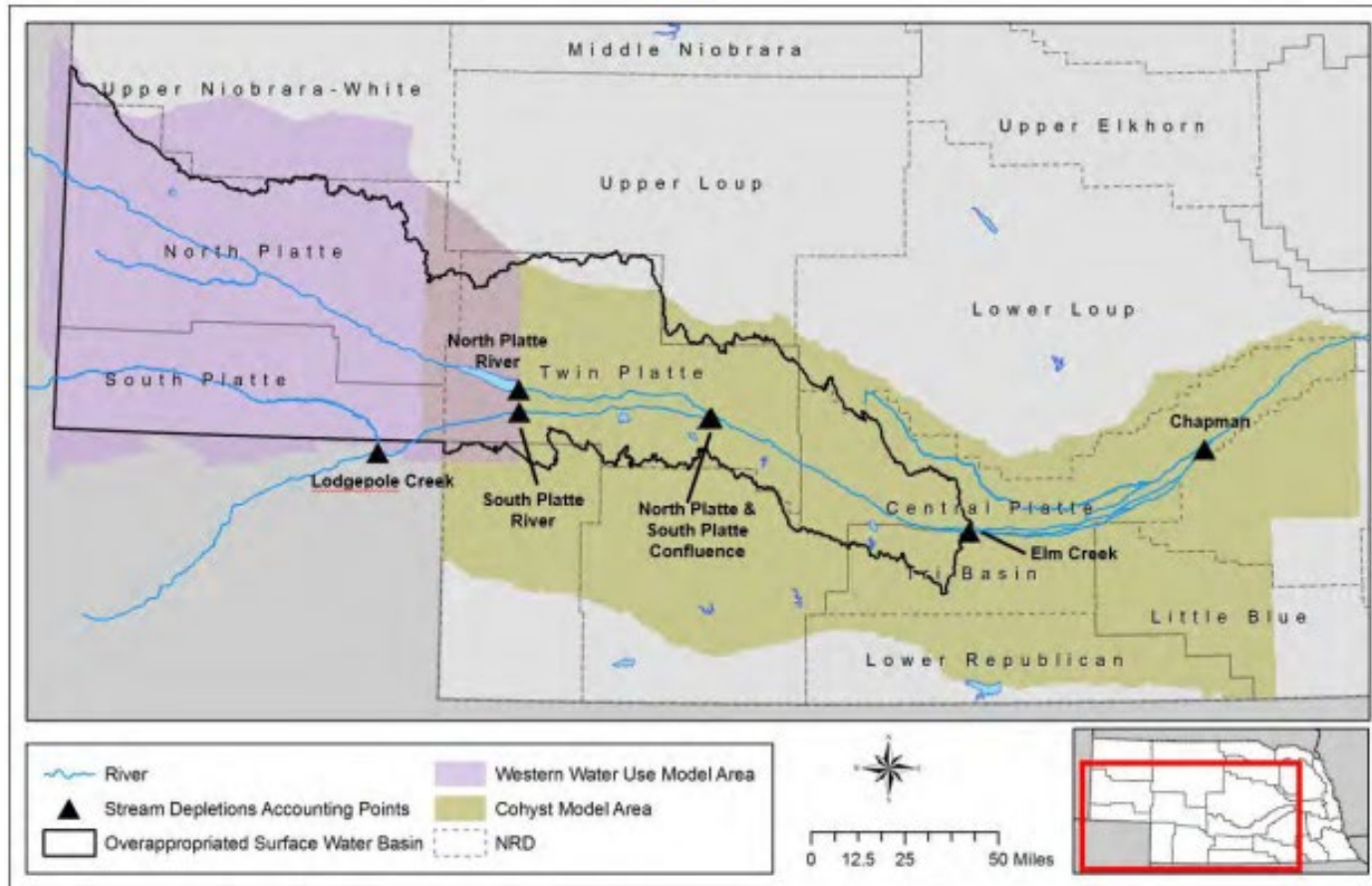
From Robust Review Appendix B.1.1

Difference Between 1997 and Successive Year's Estimated Pumping for NPNRD and SPNRD (AF)					
	NPNRD	SPNRD		NPNRD	SPNRD
1998	124	10	2006	-115	-76
1999	151	0	2007	-19	-71
2000	151	-19	2008	-54	-75
2001	119	-38	2009	-67	-96
2002	17	-62	2010	41	-87
2003	-91	-81	2011	-296	-168
2004	-112	-95	2012	-48	14
2005	-108	-86	2013	-112	-31

From Robust Review Appendix B.1.2

- Two studies were conducted to estimate the change in annual water consumption due to changes in cattle populations from 1997-2013
- Both studies used National Agricultural Statistics Survey (NASS) data from the USDA.
- The first study (Appendix B.1.1 of the Robust Review) looked at cattle populations in CPNRD, TBNRD, and TPNRD
- The second study (Appendix B.1.2 of the Robust Review) looked at CFO cattle populations in NPNRD and SPNRD
- Both studies generated results that when taken in conjunction with other not permitted activities did not warrant inclusion in the robust review analyses

Robust Review Model Simulations



- COHYST and WWUM models
- Evaluation period 2013 - 2063 (50-years)

Robust Review Model Simulations

- Include changes in groundwater irrigated acres and crop types after 1997
 - Use metered pumping in SPNRD and NPNRD (allocations)
 - WWUM repeats metered pumping from 2009-2013 for 2014-2063
 - COHYST repeats 2013 landuse with 1985-2010 climate repeated for 2014-2063
- Include changes in M&I pumping since 1997
- Include management actions implemented through 2013

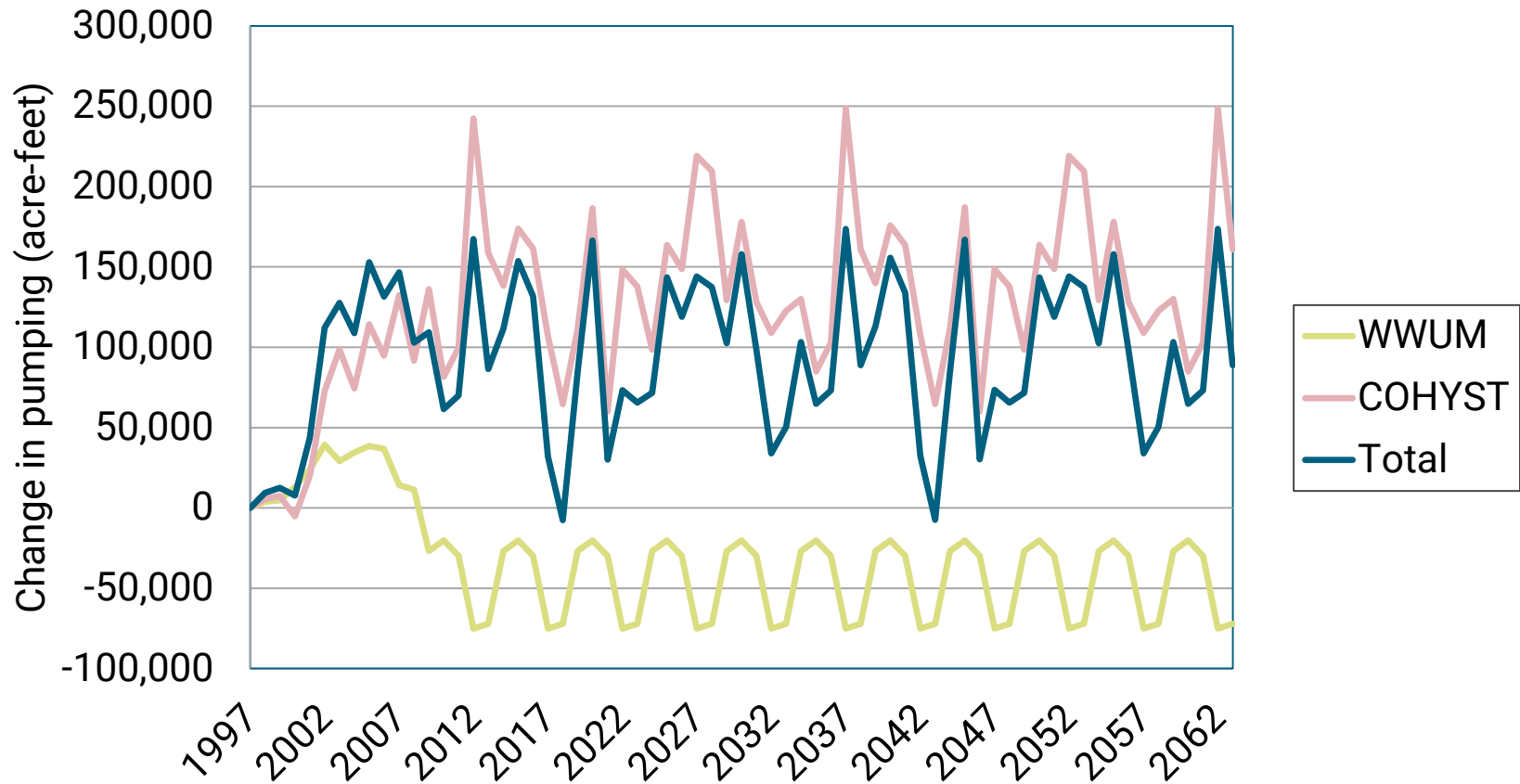
Land Use and Pumping Changes

- Development of groundwater-only irrigated acres after 1997
 - COHYST: difference in 2013 and 1997 groundwater-only irrigated acres for all of TPNRD, CPNRD, and TBNRD
 - WWUM: difference in the 2009-2013 average and 1997 groundwater-only irrigated acres for NPNRD and SPNRD

Area	Change in Acres
WWUM	12,000
COHYST	197,000

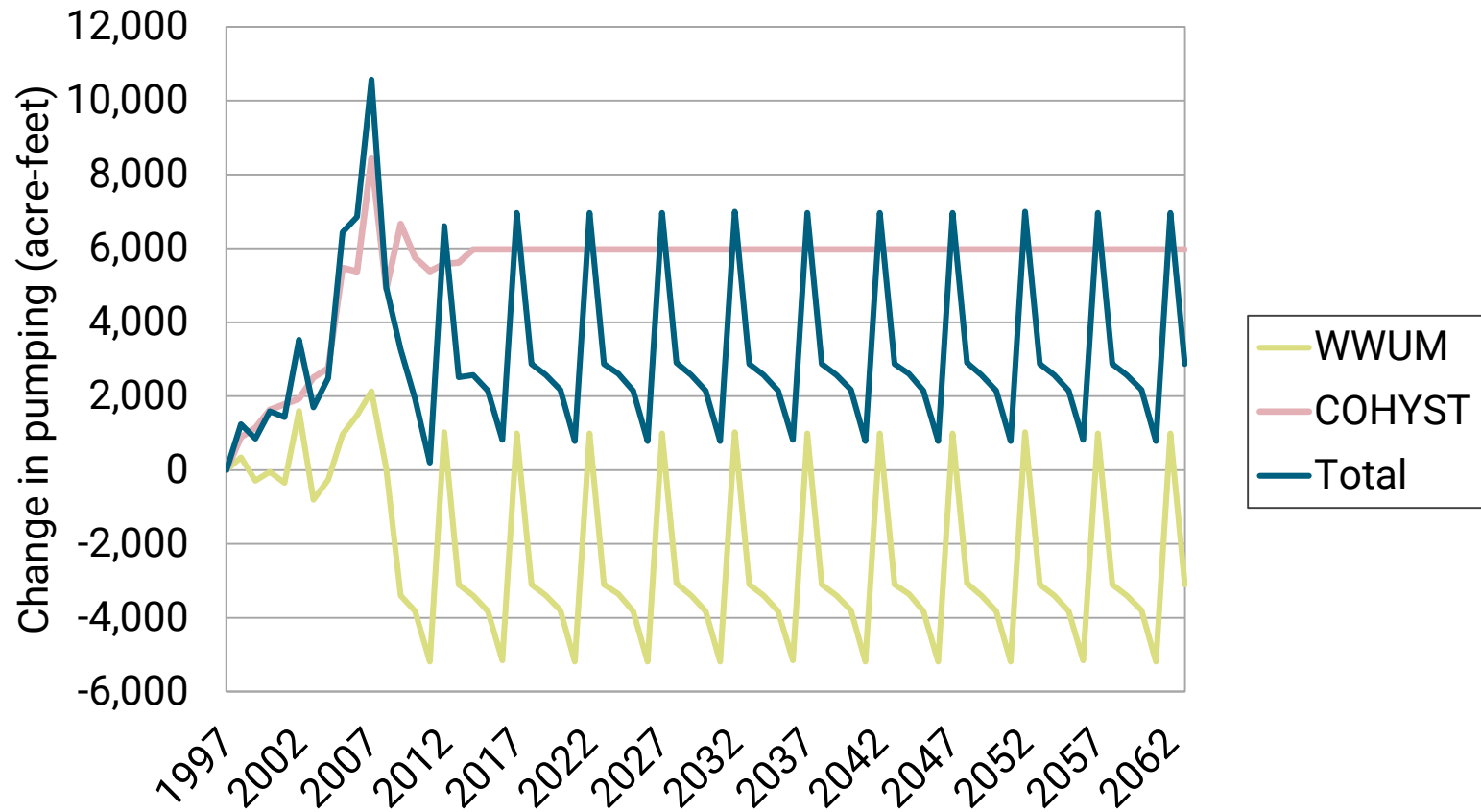
Land Use and Pumping Changes

- Change in groundwater-only irrigation pumping



Land Use and Pumping Changes

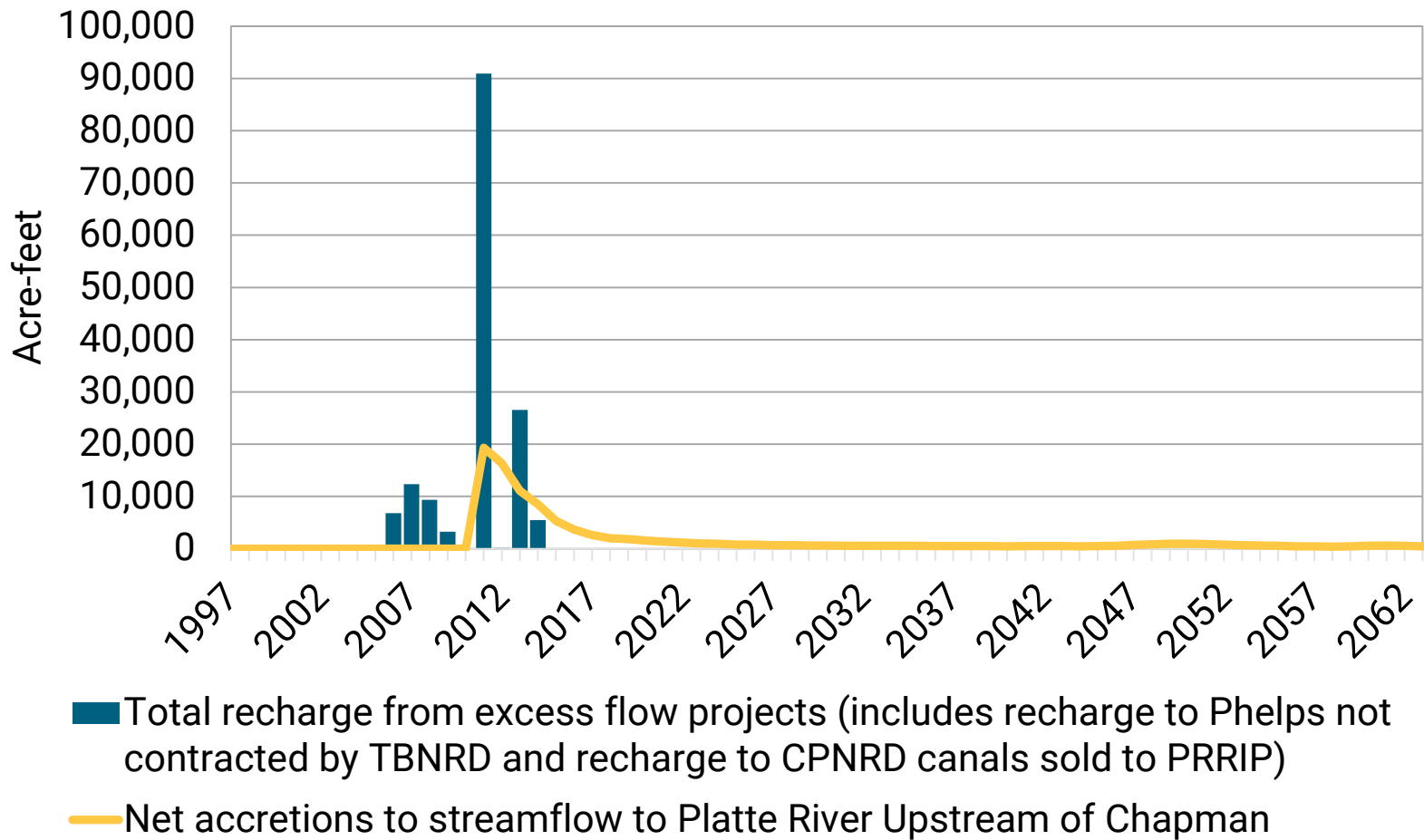
- Change in municipal and industrial groundwater pumping



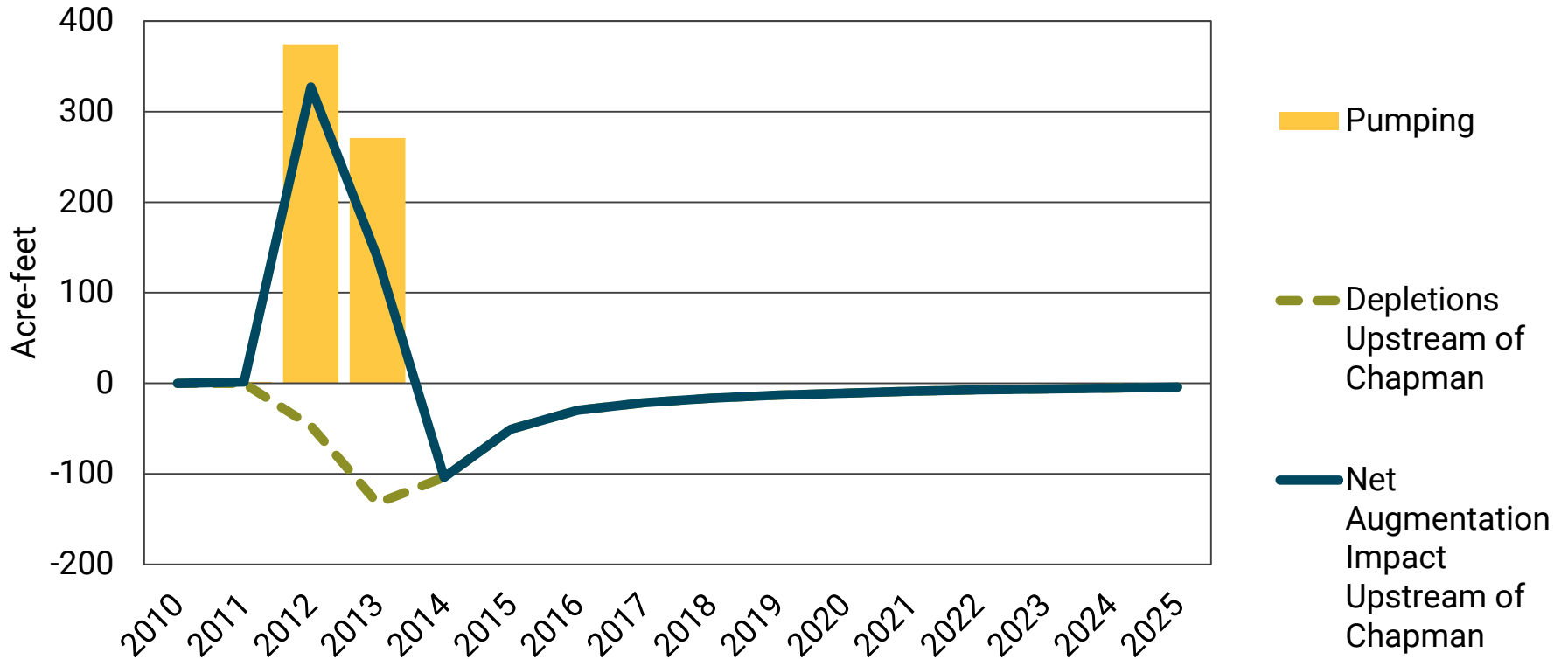
Management Actions

- Evaluating those implemented through 2013
 - Offsetting
 - Excess flow recharge projects
 - Augmentation well (North Dry Creek)
 - Reductions in groundwater use
 - Retirements
 - Allocations

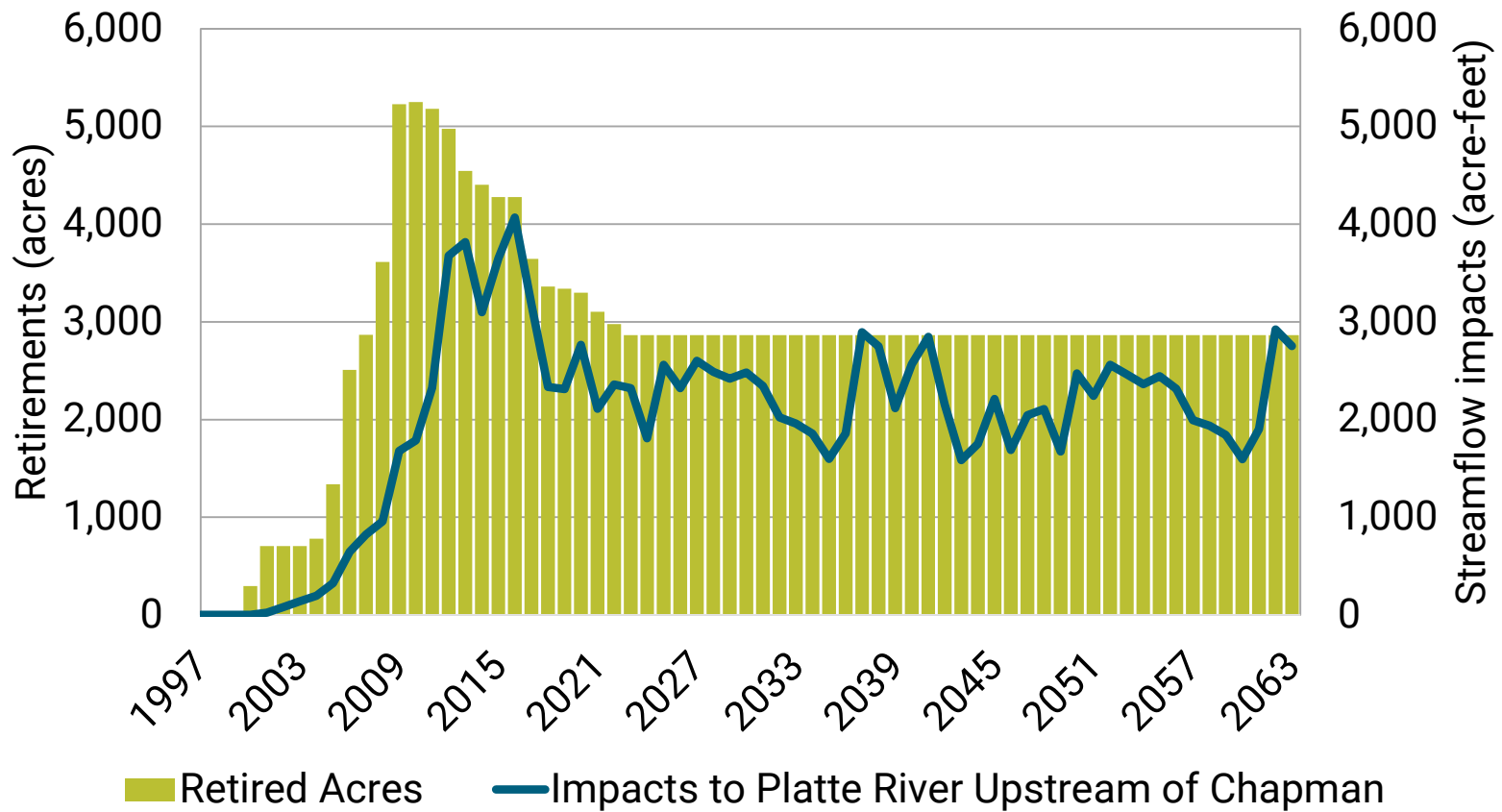
Management Actions: Recharge Projects



Management Actions: North Dry Creek Augmentation



Management Actions: Retirements



Results:

Streamflow impacts from post-1997 activities

– 5 NRDs

Year	North Platte River (af)	South Platte River (af)	Lodgepole Creek (af)	Platte River between North and South Platte confluence and Elm Creek (af)	Platte River Elm Creek to Chapman (af)	Total Upstream of Elm Creek (af)	Total Upstream of Chapman (af)
2019	16,400	-5,700	4,300	-22,000	5,600	-7,100	-1,500
2020	16,400	-5,900	4,300	-22,200	5,600	-7,300	-1,700
2021	16,500	-6,000	4,300	-22,400	5,700	-7,600	-1,900
2022	16,500	-6,200	4,300	-22,500	5,800	-7,900	-2,100
2023	16,500	-6,300	4,300	-22,700	5,900	-8,200	-2,300
2024	16,600	-6,500	4,400	-22,900	5,900	-8,400	-2,500
2025	16,600	-6,600	4,400	-23,100	6,000	-8,700	-2,700
2026	16,700	-6,800	4,400	-23,300	6,100	-9,000	-2,900
2027	16,700	-6,900	4,400	-23,500	6,200	-9,300	-3,100
2028	16,700	-7,100	4,400	-23,700	6,300	-9,600	-3,300
2029	16,800	-7,200	4,500	-23,900	6,300	-9,800	-3,500

- No new management actions beyond 2013 are included in these results

Results:

Streamflow impacts from post-1997 activities
– Other NRDs in COHYST

Year	Other NRDs' Impact on Platte River Upstream of Chapman (af)
2019	400
2020	300
2021	300
2022	300
2023	200
2024	200
2025	100
2026	100
2027	0
2028	0
2029	-100

Results – Compared to Luckey 2008 (Previous Robust Review)

Year	2019 Robust Review: Total Impact on Platte River Upstream of Chapman (af)	Luckey 2008 Report: Depletions due to development 1997-2005 (Acre-feet per year)
2019	-1,100	-21,600
2020	-1,400	
2021	-1,600	
2022	-1,800	
2023	-2,100	-22,600
2024	-2,300	
2025	-2,600	
2026	-2,800	
2027	-3,100	
2028	-3,300	
2029	-3,600	-23,600

Causes for increased depletions:

- Model assumptions (updated soil water balance modeling)
- Incorporation of M&I pumping (COHYST)
- Modeled aquifer/stream connection (COHYST)

Causes for decreased depletions:

- Management actions (excess flows, retirements, allocations)
- Refinement of land use and crop types (WWUMM)

Results – Second Increment Plan

Year	Total Upstream of Elm Creek (af)	Total Upstream of Chapman (af)	Management Actions (af)	Total Upstream of Elm Creek (af)	Total Upstream of Chapman (af)
2020	-7,300	-1,700	7,850	750	6,350
2021	-7,600	-1,900	7,850	550	6,150
2022	-7,900	-2,100	7,850	250	5,950
2023	-8,200	-2,300	7,900	0	5,800
2024	-8,400	-2,500	18,950	10,750	16,650
2025	-8,700	-2,700	18,950	10,550	16,450
2026	-9,000	-2,900	18,950	10,250	16,250
2027	-9,300	-3,100	18,950	9,950	16,050
2028	-9,600	-3,300	34,900	25,600	31,800
2029	-9,800	-3,500	35,000	25,400	31,700

- Management actions consist of SW retirements in the CPNRD (2,250 af/yr) and N-CORPE augmentation pumping (5,600 af/yr)

Permitted Activities Subsequent to 2014

Year	Groundwater Transfer Permits	Groundwater Well Permits	Groundwater Variance Permits	Surface Water Permits
2014	87	91	6	7
2015	65	79	6	9
2016	52	45	3	5
2017	46	41	2	19
Total	250	256	17	40

Source of data: Annual Reports for 2014-2018

Impacts of Permitted Activities Subsequent to 2014

Year	Upstream of Critical Habitat Reach			Within Critical Habitat Reach			Both Reaches
	New Use	Mitigation	Net effect	New Use	Mitigation	Net Effect	Total Net Effect
2014	-27	77	50	-8	21	12	62
2015	-104	188	84	-22	43	21	105
2016	-208	343	135	-49	76	27	162
2017	-306	511	205	-83	110	27	232
2018	-373	613	240	-108	133	25	264
2019	-424	686	263	-129	149	21	283

Impacts of permitted activities 2014-2017

Source of data: Annual Reports for 2015-2018

Summary

- Second increment goals changed due to:
 - Model assumptions (updated soil water balance modeling, more intensive land use updates, improved M&I data, model recalibration)
 - Management actions (excess flows, retirements, allocations)
- Various assumptions will be revisited:
 - Impacts of conservation practices (primarily tillage)
 - Land use/crop typing updates/water use measurements
 - New management actions subsequent to 2013
 - Assumed climate conditions
- Updates to Robust Review scheduled for 2023 and 2027

Summary

- Nebraska has completed all tasks required in the NNDP
- IMPs will result in state-wide compliance in excess of post-1997 mitigation requirements by 2029 (state law based requirements)
- Nebraska will be mitigating post-1997 water use activities through various management actions, exclusive of the J-2 project score (starting in 2020)
 - Achievement of Milestone 9 in PRRIP extension proposal

Links to More Information:

- <https://dnr.nebraska.gov/water-planning/upper-platte-basin-wide-plan>
 - links to robust review documentation, basin-wide plan, and stakeholder presentations
- <https://dnr.nebraska.gov/water-planning/central-platte-nrd>
- <https://dnr.nebraska.gov/water-planning/north-platte-nrd>
- <https://dnr.nebraska.gov/water-planning/south-platte-nrd>
- <https://dnr.nebraska.gov/water-planning/tri-basin-nrd-0>
- <https://dnr.nebraska.gov/water-planning/twin-platte-nrd>
- links to each respective NRDs IMP page with copies of plans and stakeholder materials

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