



October 29, 2024

NORTH PLATTE RIVER CHOKEPOINT
ANDERSON CONSULTING ENGINEERS, INC.
RIVER WORKS, LTD



PROJECT OVERVIEW

- Project Charter & Phase I Alternative Screening – August 2023
- Phase II Alternative Screening – Feb 2024
- Geomorphic and Sediment Transport Assessment – May 2024
- Phase III Alternative Evaluations: Analysis & Conceptual Design

NORTH PLATTE CHOKEPOINT

Problem

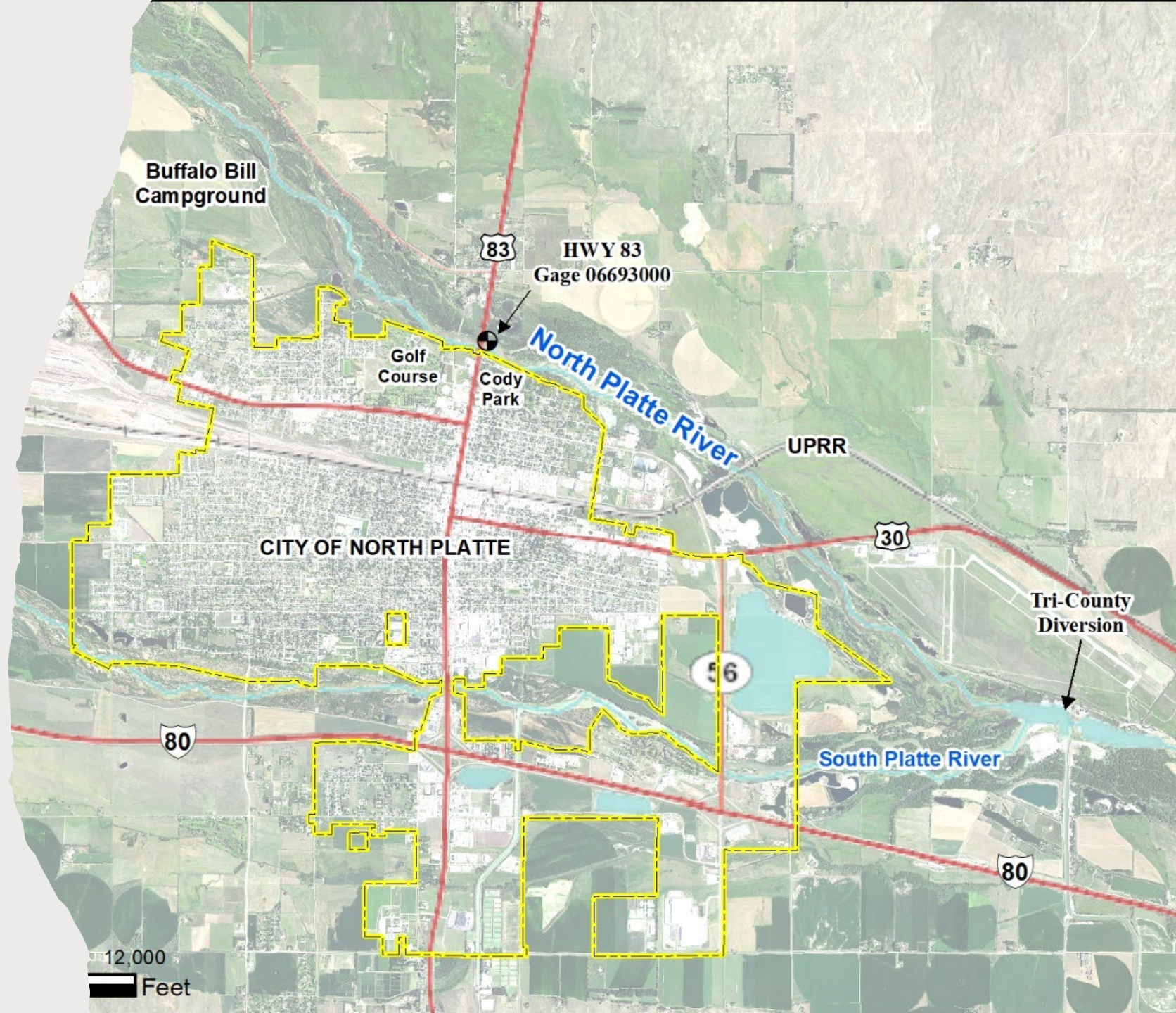
Hydraulic capacity at HWY 83 limits delivery of EA water to central Platte.

Project Goal

Identify and screen alternative solutions to increase hydraulic capacity through the chokepoint and/or provide delivery of flows downstream of the chokepoint through other systems.

Target

3,000 cfs at or Below 6' Minor Flood Stage (NWS)



PROJECT CONSIDERATIONS AND CONSTRAINTS

- Alternative solutions to achieve **3,000 cfs at or below NWS minor flood stage of 6.0 feet** at the North Platte River at North Platte Gage (06693000) at the State Highway 83 bridge.
- Alternatives **will not seek modification to minor flood stage** as defined by the NWS.
- Alternatives **will not adversely impact or disrupt any irrigation and/or hydro-power** generation operations.
- Alternatives **shall not adversely impact private properties.**
- Long-term O&M costs will be considered for all alternatives.
- Alternatives will not exceed a capital cost of ~\$15 million.

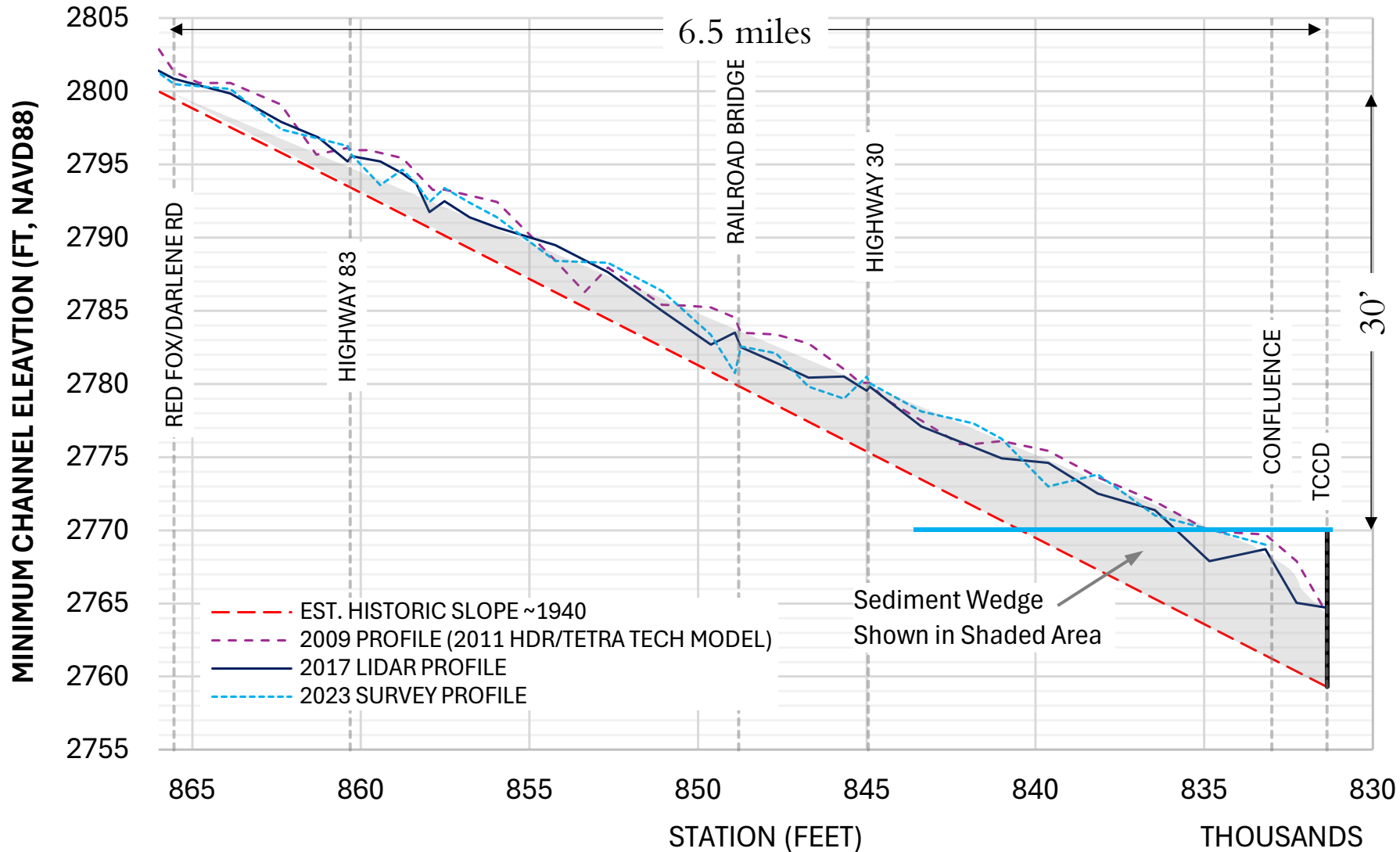


GEOMORPHIC STUDY: KEY FINDINGS

- **Lake McConaughy and the TCCD have altered flow and sediment regimes**, primary driver of aggradation and the long-term reduction in hydraulic capacity.
- **Backwater conditions from TCCD** to facilitate diversions have slowed and/or blocked movement of bed sediments through the system, resulting in the formation of the “**sediment wedge**” as far upstream as HWY 83.
- Chokepoint reach has been in a **quasi-equilibrium state for roughly 20 years**.
- Assuming that there are no significant changes in upstream reservoir operations, vegetation control, diversions and dredging at the TCCD, or climate shifts, the Chokepoint reach is expected to **remain in a quasi-equilibrium state into the future**.



SEDIMENT WEDGE



Historic Profile

1D Morphodynamic Modeling, Dr. Peter Nelson, CSU

Results: Backwater can have upstream impacts extending as much as:

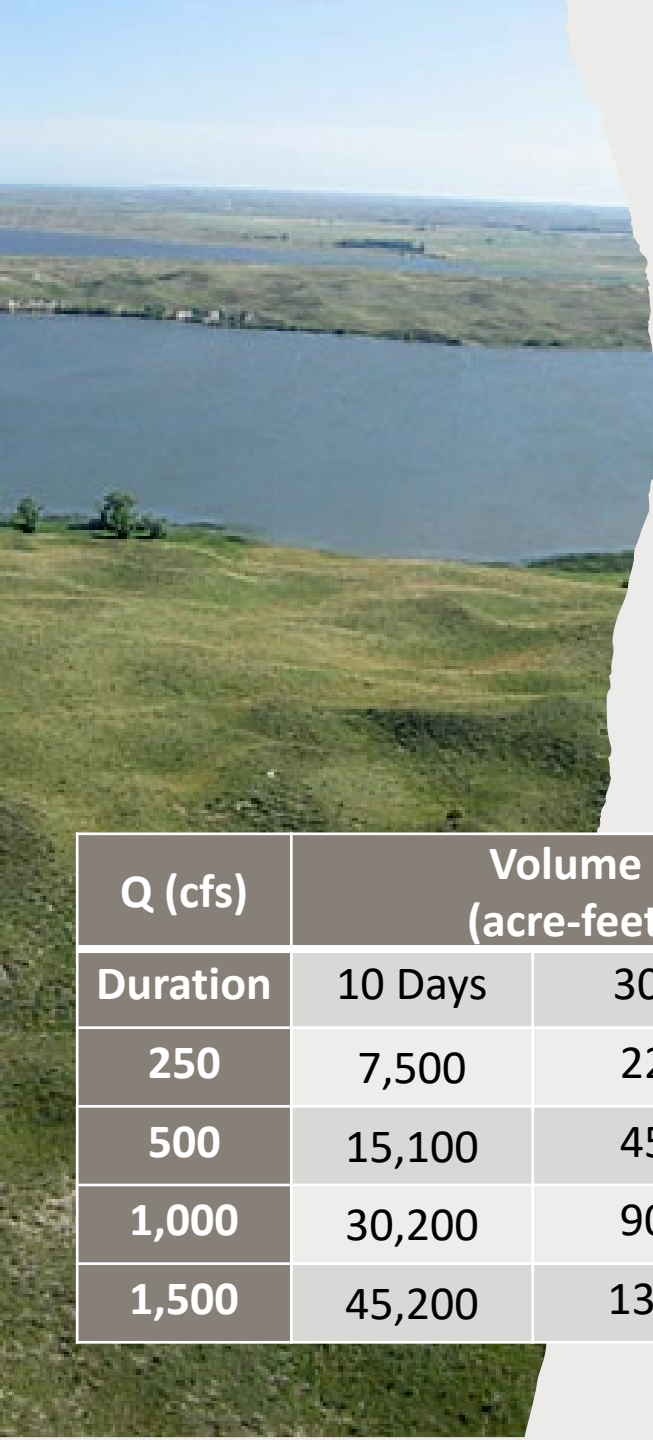
30' above dam height
8 miles upstream

Findings consistent with extents of deposition.

ALTERNATIVE SCREENING

- Phase I: Inventory and Review Previous Alts
- Phase II: Evaluation of Short List
 - **No Action**
 - South Platte Reservoir Storage
 - Upstream Sediment Sources
 - Purchase of Existing Irrigation Infrastructure
 - **Bypass Canal**
 - **Channel Modification/Sediment Removal**
 - **Modification of Tri-County Diversion**





SOUTH PLATTE STORAGE

Concept: Estimate storage volume required to achieve bypass flows of varying magnitudes and durations. (No specific storage project identified or proposed).

Volume est. assumes max release of up to 1,500 cfs, duration of 10 – 30 Days
Would supplement 1,500 capacity at Chokepoint
Release of 1,500 cfs for germination suppression at peak of irrigation season
Volume est. accounts for evaporative and transport losses

Q (cfs)	Volume (acre-feet)	
Duration	10 Days	30 days
250	7,500	22,600
500	15,100	45,200
1,000	30,200	90,400
1,500	45,200	135,600

- Range of Storage Volume Required: 45,200 – 135,600 acre-feet
- Flow Capacity at Confluence vs Flow Target (3,000 cfs): 3,000 cfs (100 %)
- Percent Increase to Flow Target: +44% (56% - 100%)
- Est Cost: Similar Projects > \$80 million

SOUTH PLATTE STORAGE

Storage Alternative	Capacity	1993 million ¹	2012 \$million ²	2024 \$million ³
Sutherland Reservoir with Seepage Cutoff or Other Lining	18,000 AF	\$101	\$200-\$300	\$300-\$600
	37,000 AF	\$104		
	78,750 AF	\$146		
Sutherland East Reservoir	7,500 AF	\$20	\$45	\$67
	12,500 AF	\$25	\$54.3	\$82
Outlet to South Platte River via Fremont Slough	1,400 cfs	N/A	\$10	\$15

- Sutherland Expansion and Sutherland East not currently viable – prohibitive cost, permitting, timelines
- Examples revisited to illustrate magnitude of cost for similar storage volume projects
- Program unable to accomplish storage project at this scale without stakeholder or outside sponsorship.

PHASE III ALTERNATIVE EVALUATIONS

2D Hydraulic and 1D Sediment Transport Modeling

- No-Action Alternative
- Sediment Removal
- Modification of TCCD

Conceptual Design, Permitting, Cost Estimate

- Sediment Removal Alternative
- Bypass Canal

MODEL REACH

North Platte

HWY 83 Gage

HWY 83

UPRR

HWY 30

HWY 83 Gage

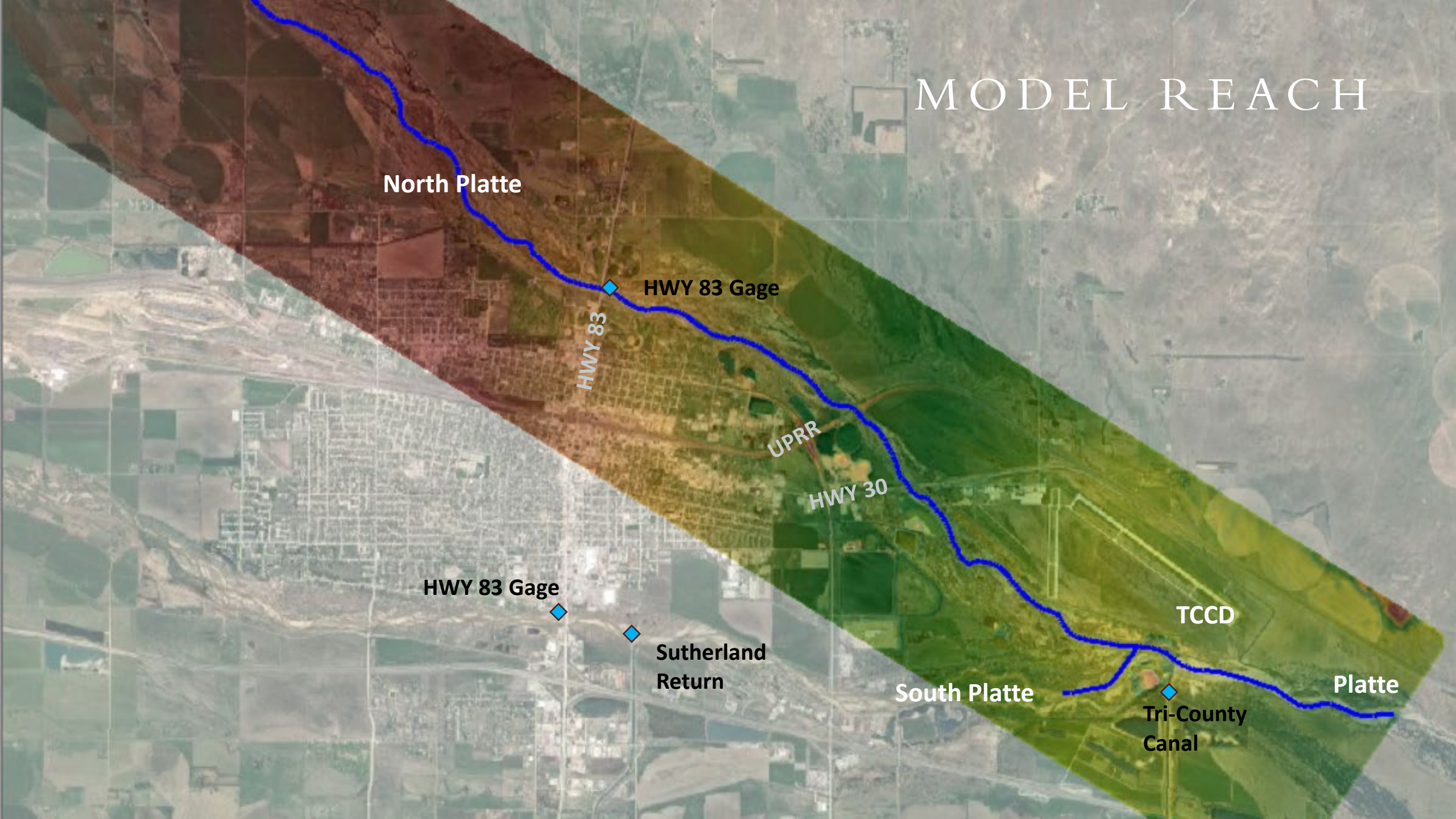
Sutherland
Return

TCCD

South Platte

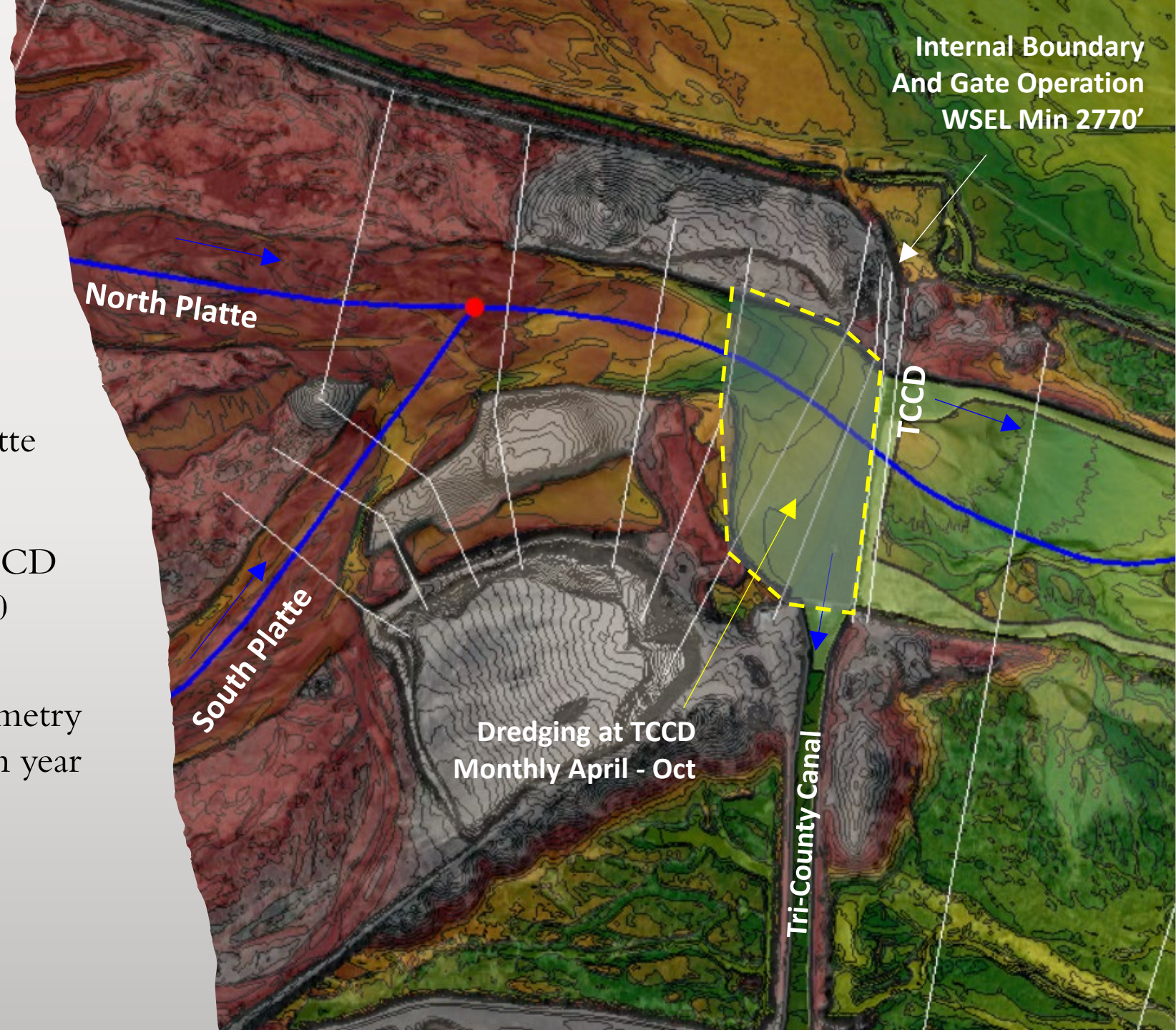
Tri-County
Canal

Platte



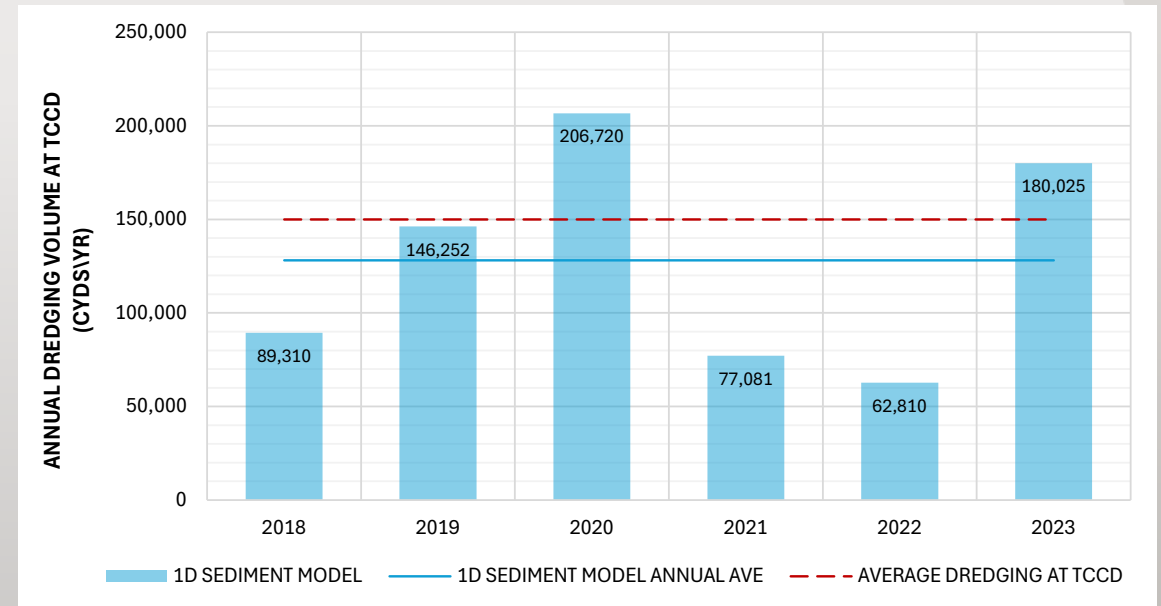
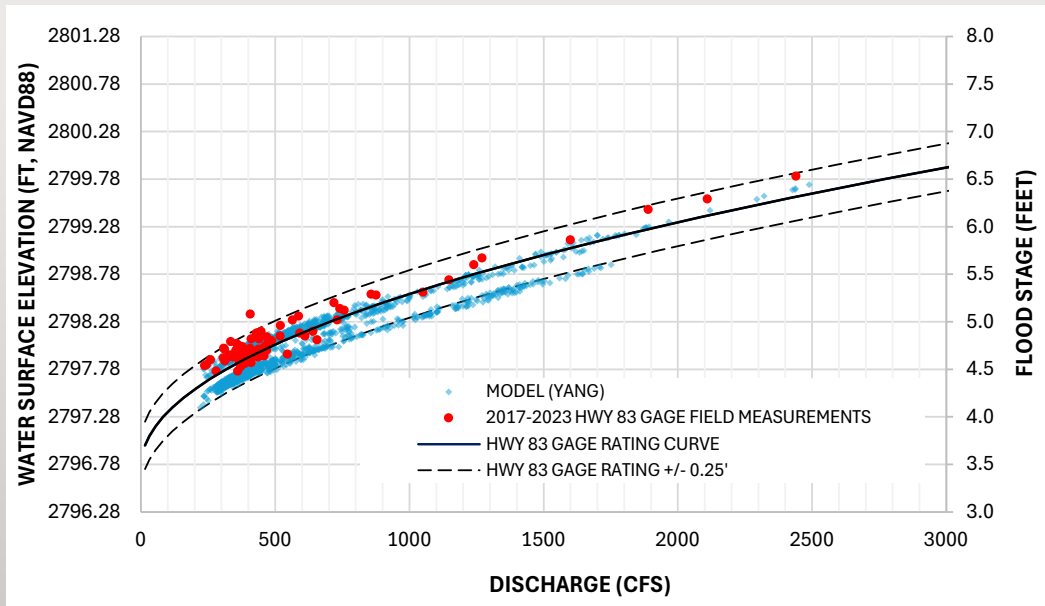
1D SEDIMENT TRANSPORT MODEL

- 2017 LiDAR
- Daily Flow from North & South Platte
- Daily TCCD diversion
- Internal boundary condition and TCCD w/ gate operation to maintain ~2770 headwater to facilitate diversion
- Dredging simulated by resetting geometry monthly between April and Oct each year



1D SEDIMENT TRANSPORT MODEL CALIBRATION

- Calibration Period 2017 – 2023
- Calibrated to: HWY 83 Gage Data and Annual Dredging Volumes at TCCD



1D SEDIMENT TRANSPORT MODEL 25 YEAR FORECAST MODEL

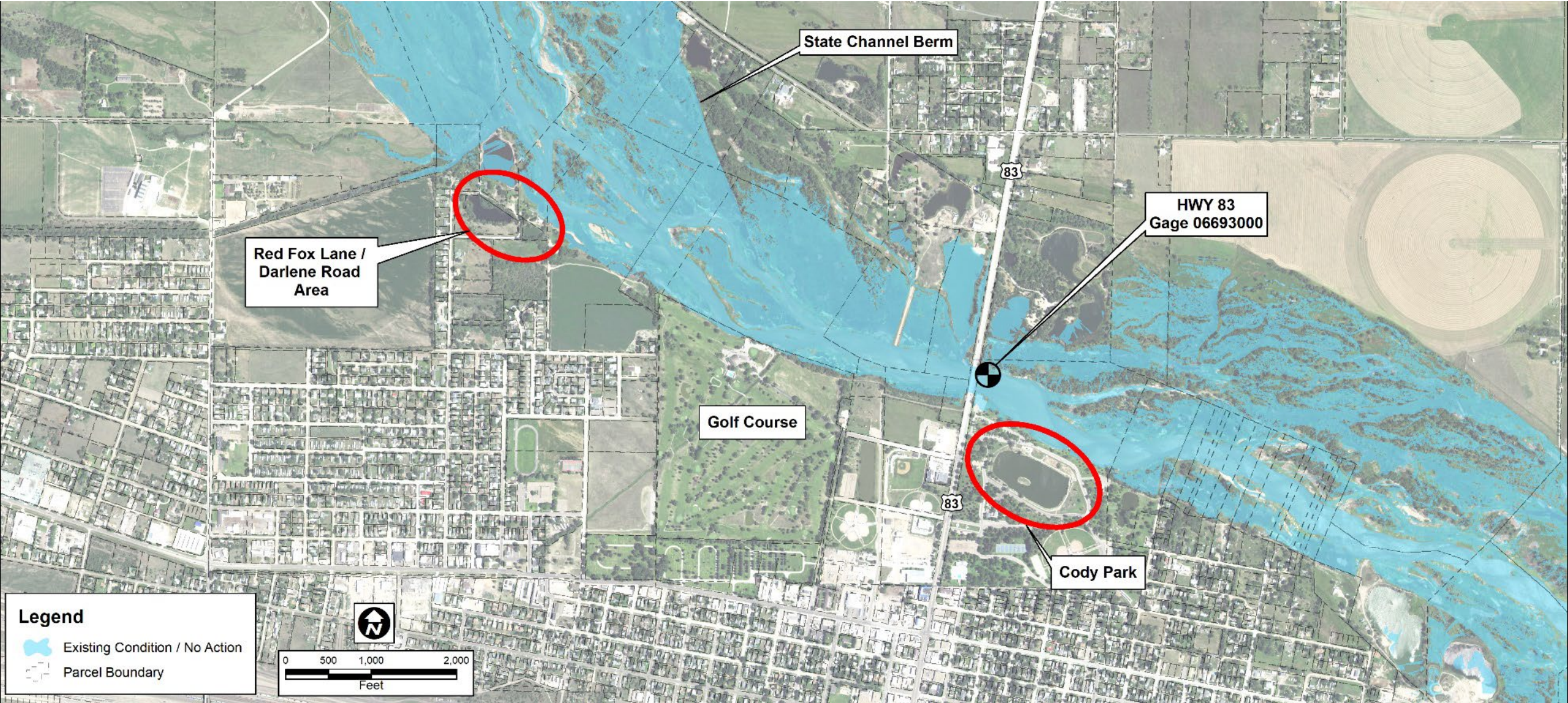
- No-Action & 4 Sediment Removal Alternatives
- 25-Year Hydrographs (3) Representing Previous 20 Years
- Assumes Continuation of TCCD Operations
- Results Used to Identify Trends, Not Deterministic



NO-ACTION ALTERNATIVE

Concept: Continuation of existing actions including vegetation control and CNPPID dredging at the Tri-County Canal Diversion (TCCD). Defining conditions under no-action provides a baseline for which alternatives can be compared.

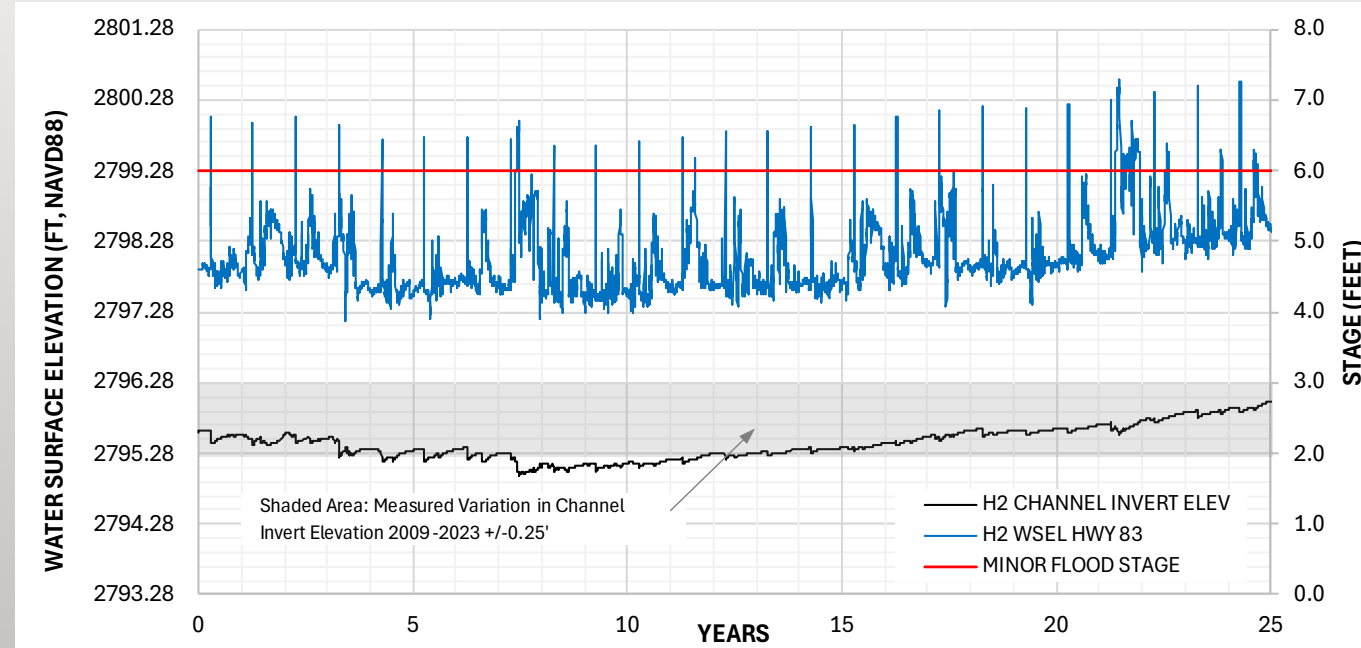
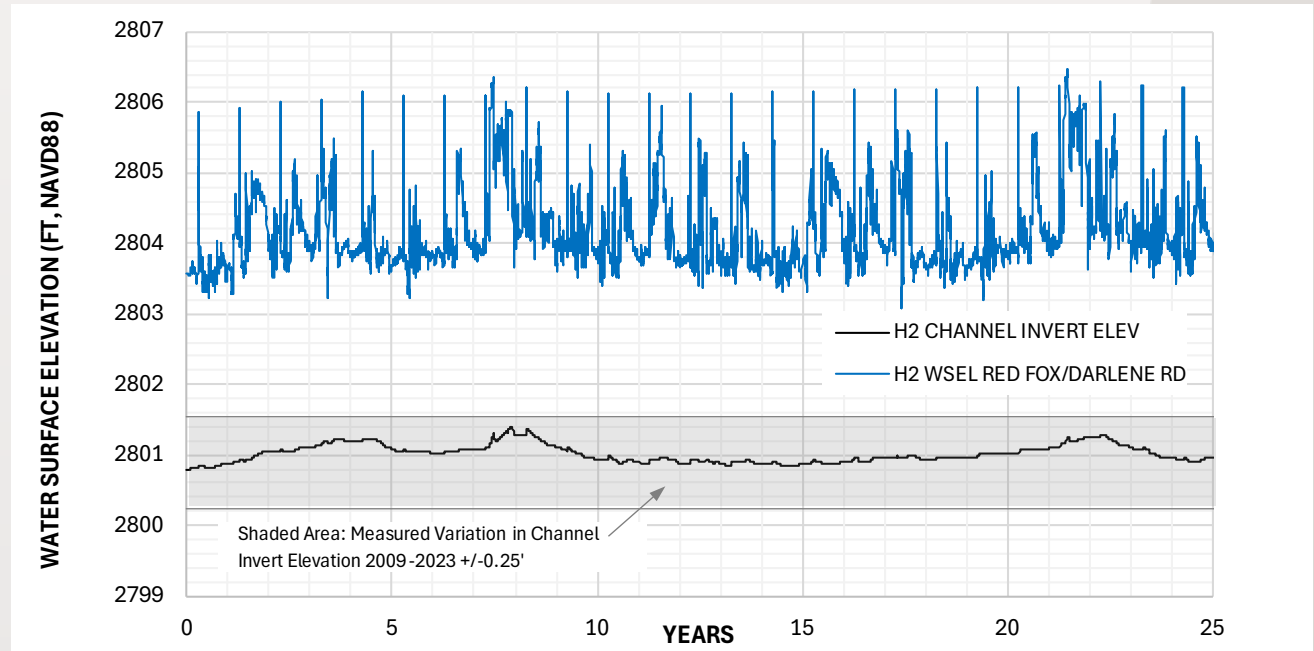
- Geomorphic Study: Capacity has held steady for last 20-years
- Ave Capacity at Minor Flood Stage of 1,700cfs (w/ range 1,550–2,150 cfs)
- EA releases and irrigation demand in competition during drought when both are urgently needed.



NO ACTION
INUNDATION MAPPING AT 3,000 CFS

NO ACTION 25-YR FORECAST HWY 83

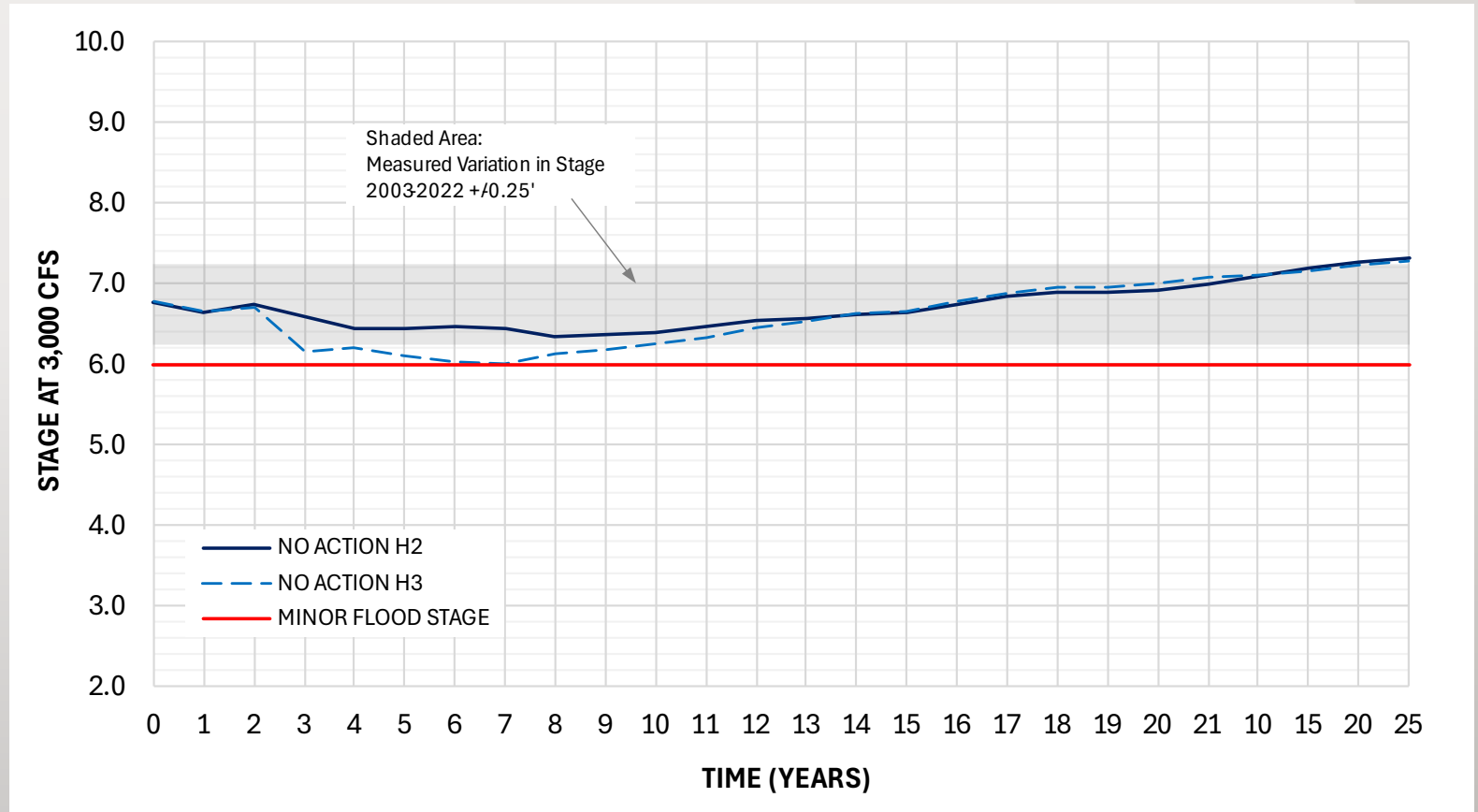
- Bed and water surface elevations generally stable and within measured variation between 2009-2023



NO ACTION 25-YR FORECAST

Results & Interpretation

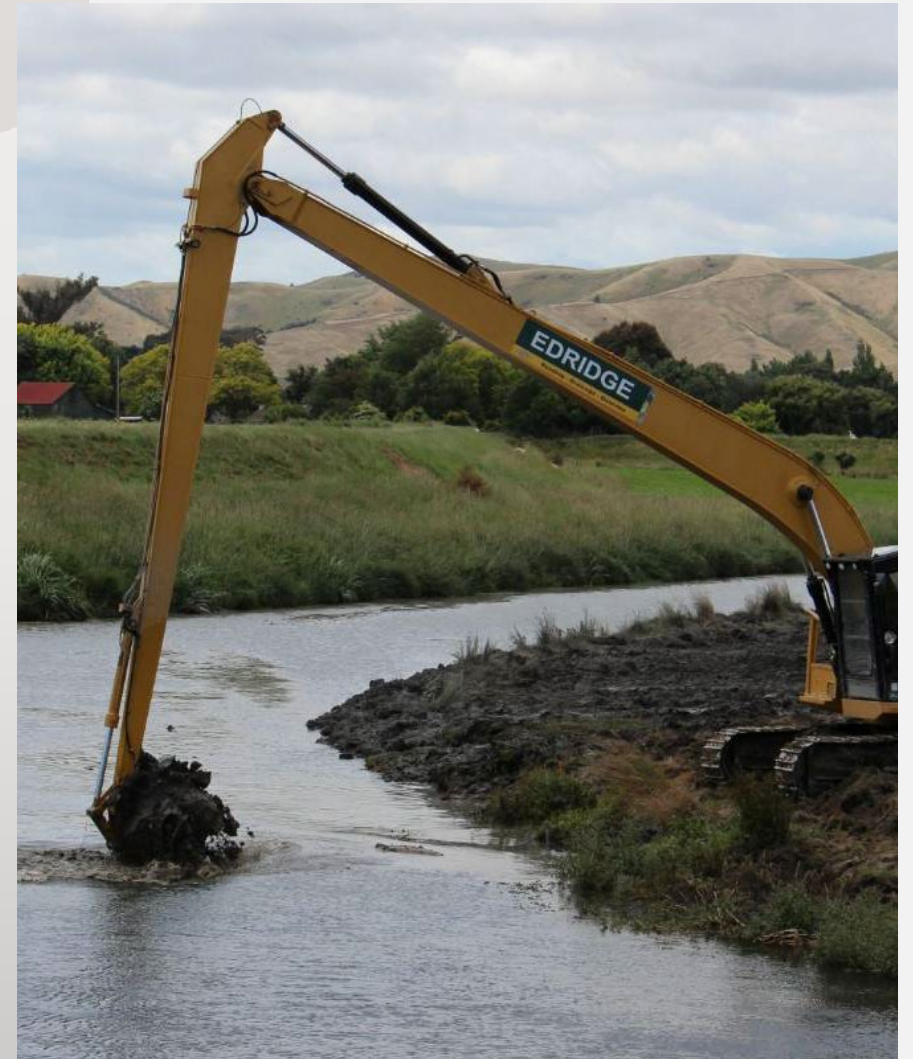
- Chokepoint likely to remain in quasi-equilibrium
- Baseline for comparison to other alternatives



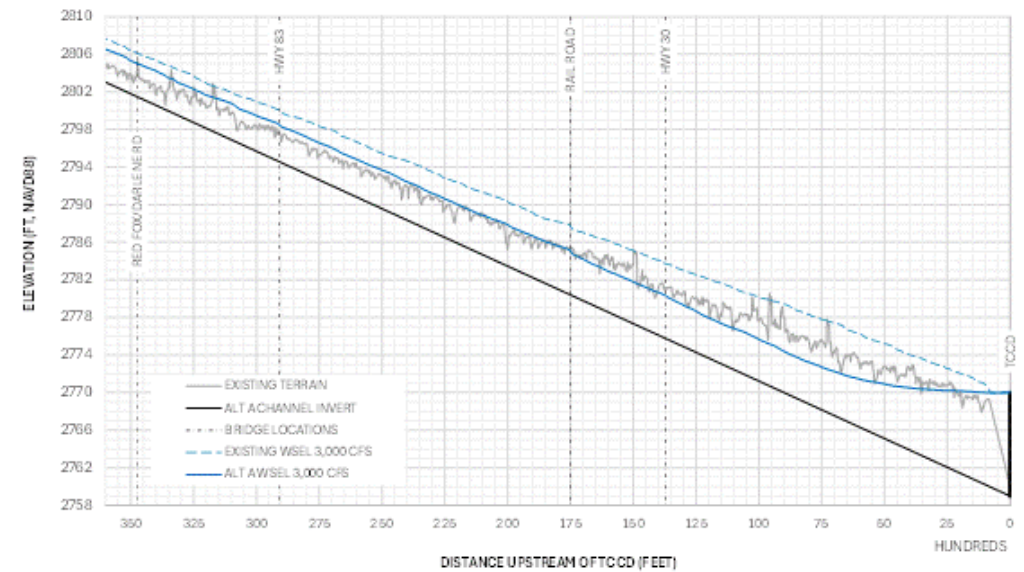
CHANNEL MODIFICATION / SEDIMENT REMOVAL

Concept: Construct channel modifications and remove sediment along the North Platte River through the Chokepoint to increase and maintain hydraulic capacity at HWY 83.

- 4 Sediment Removal Alternatives
- All provide initial capacity of 3,000 cfs or more at 6ft
- Address loss of capacity due to “sediment wedge”
- Modeling to evaluate sustainability

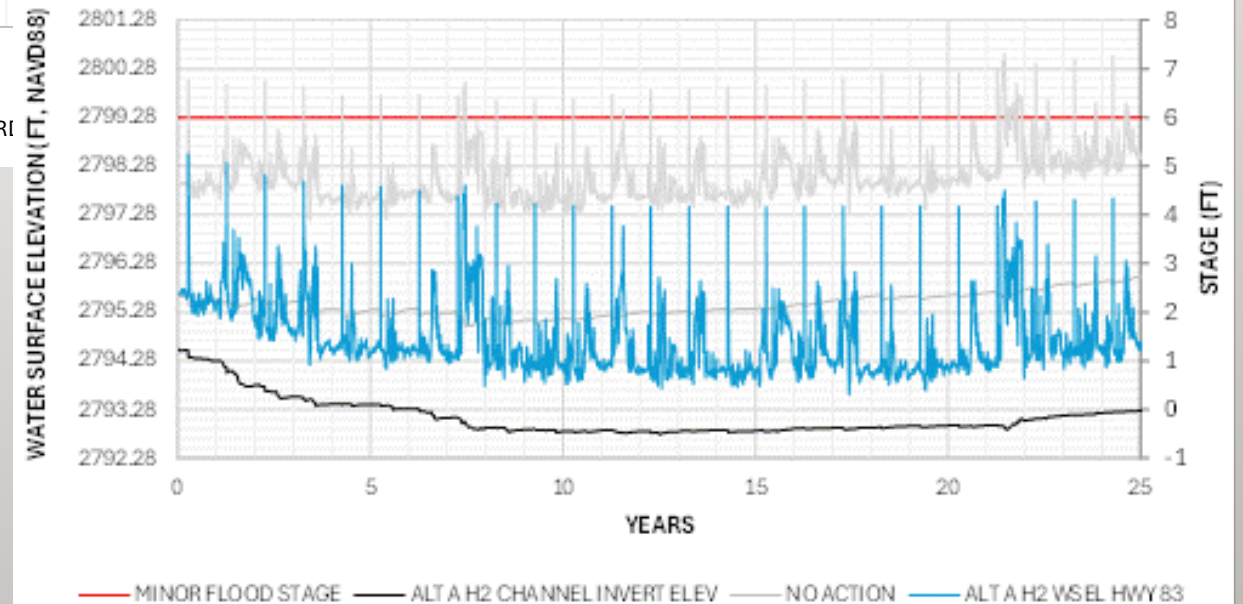
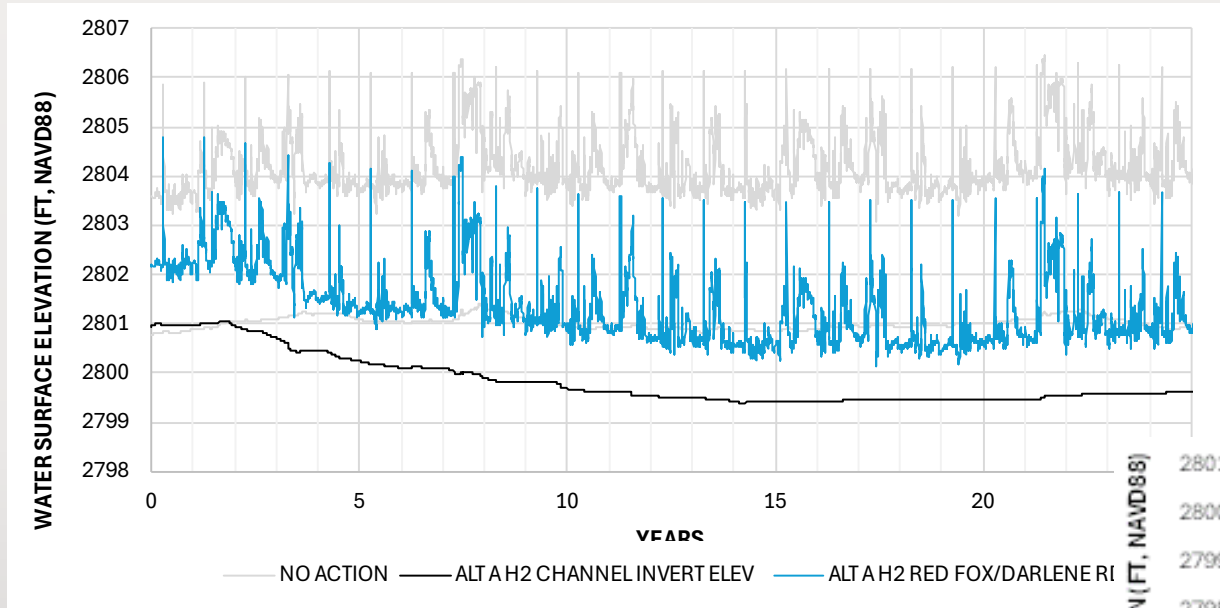


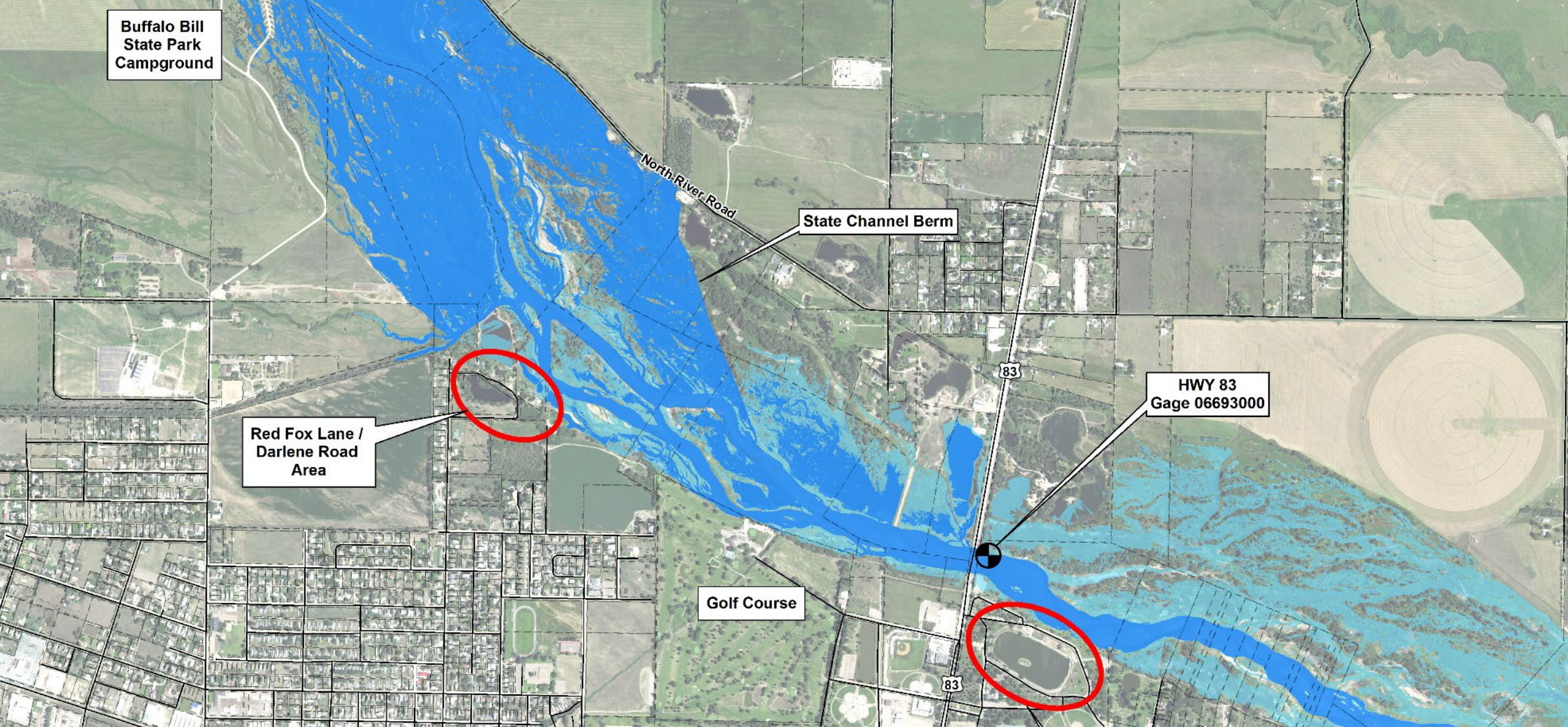
SEDIMENT REMOVAL ALT A



- Excavate Channel in Sediment Wedge
- Sediment Removal, 150' Wide Channel, 0.125% Slope
- Excavation Volume 1,170,000 CY

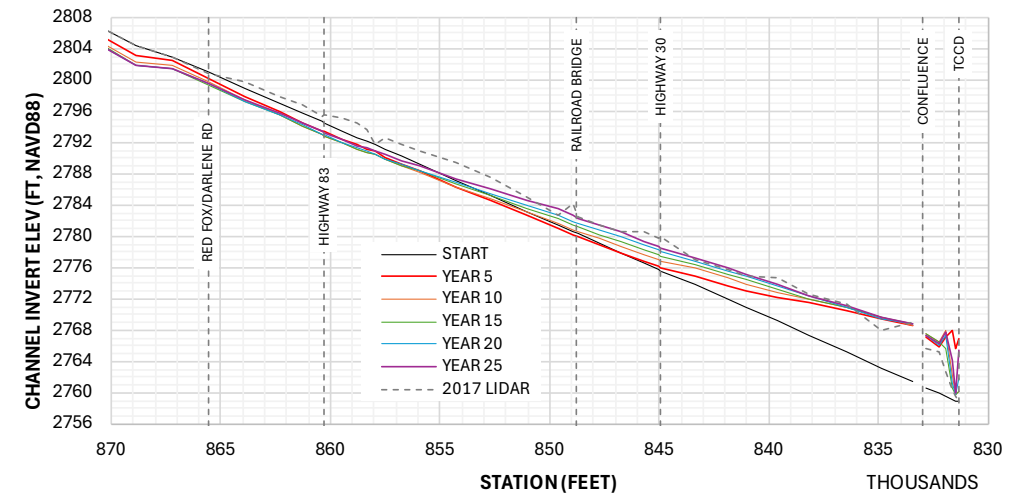
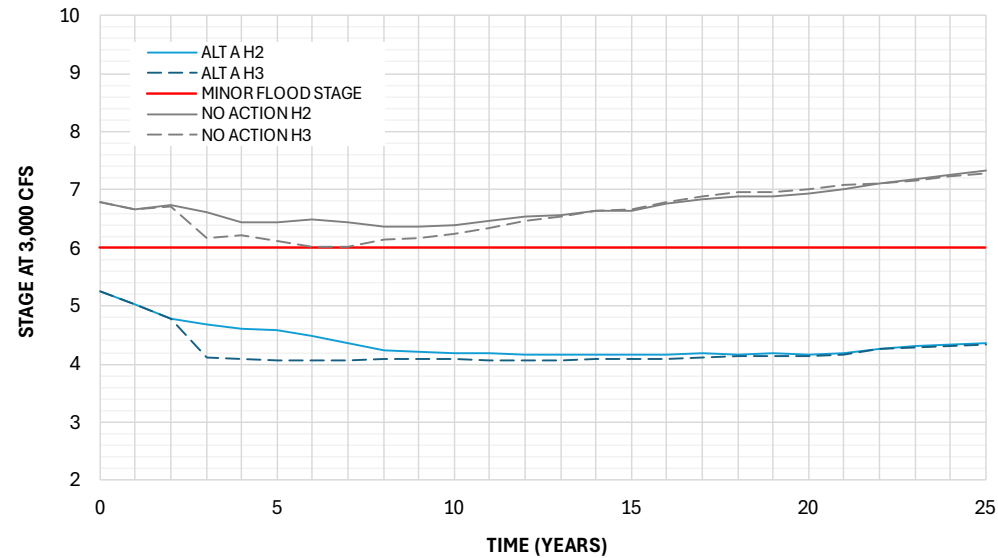
SED REMOVAL ALT A 25-YR FORECAST





SEDIMENT REMOVAL ALT A
INUNDATION MAPPING AT 3,000 CFS

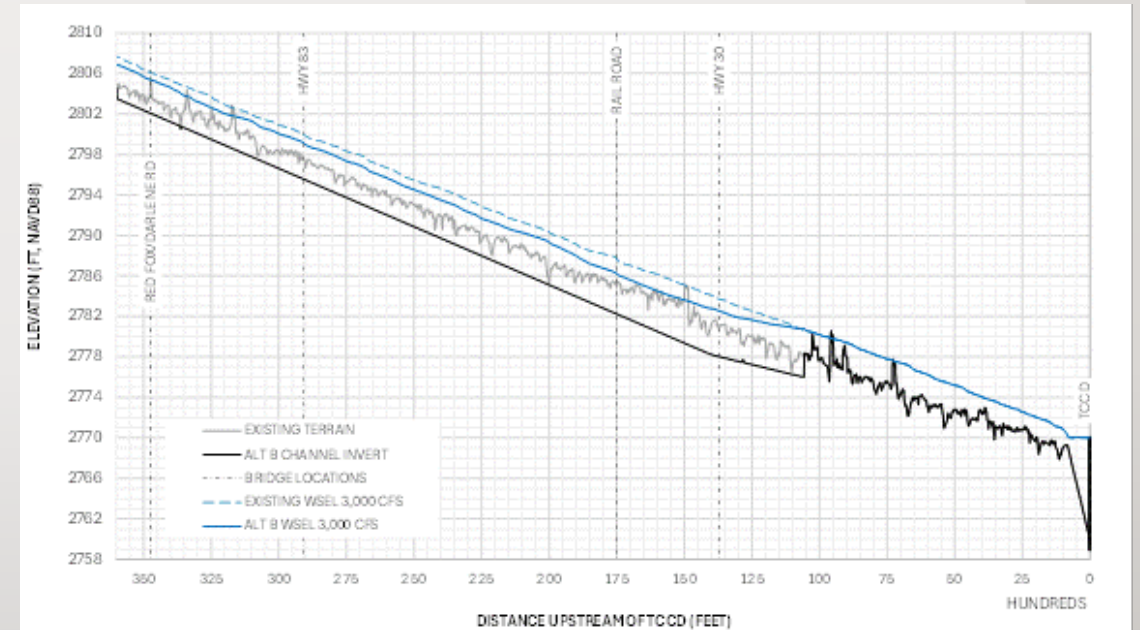
SEDIMENT REMOVAL ALT A 25-YR FORECAST



Results

- Initial Capacity 6,000 cfs
- Sustainable for 20-30 years, Periodic Monitoring
- Sediment wedge re-established below HWY 30 in first 5 years

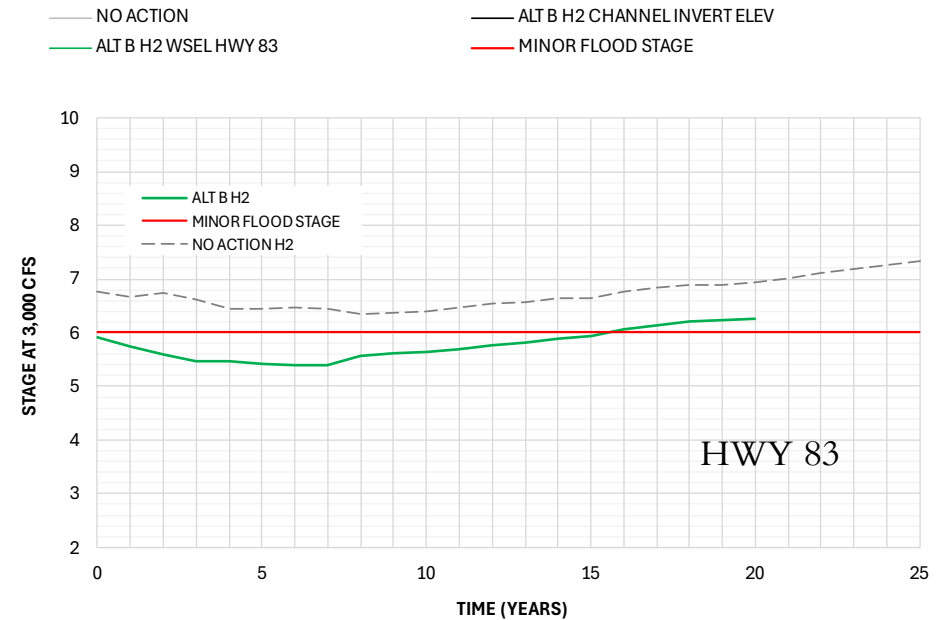
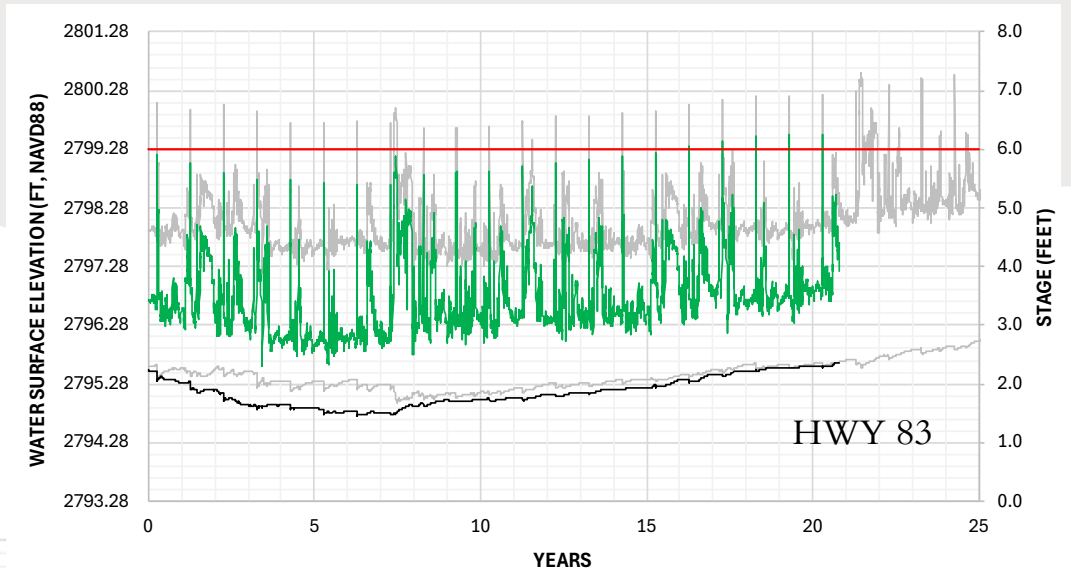
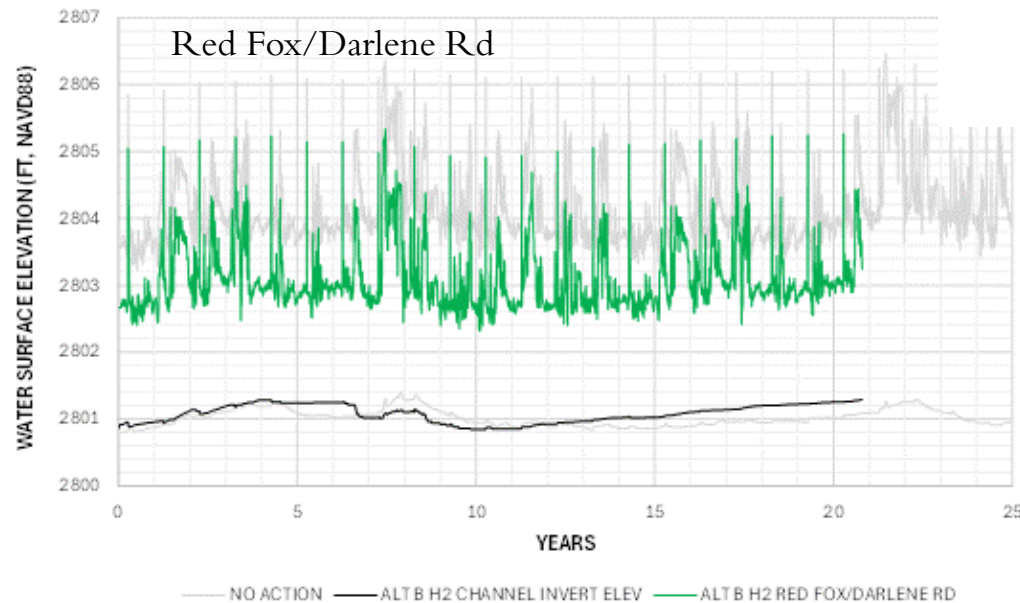
SEDIMENT REMOVAL ALT B



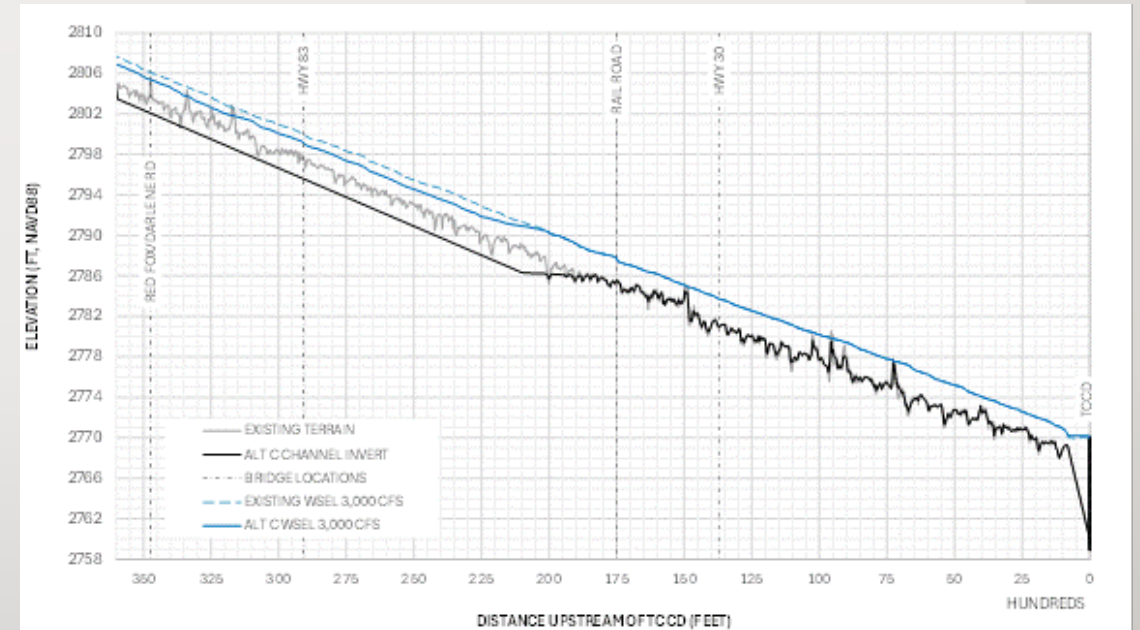
- Downstream Extent Below HWY 30
- Sediment Removal, 150' Wide Channel, 0.115% Slope
- Excavation Volume 330,000 CY (30% of Alt A)

SEDIMENT REMOVAL ALT B

- Initial Capacity 3,000 cfs
- Sustainable for 5-15 years
- Downstream tie-in problematic
- Annual Monitoring
- Additional round of sediment removal



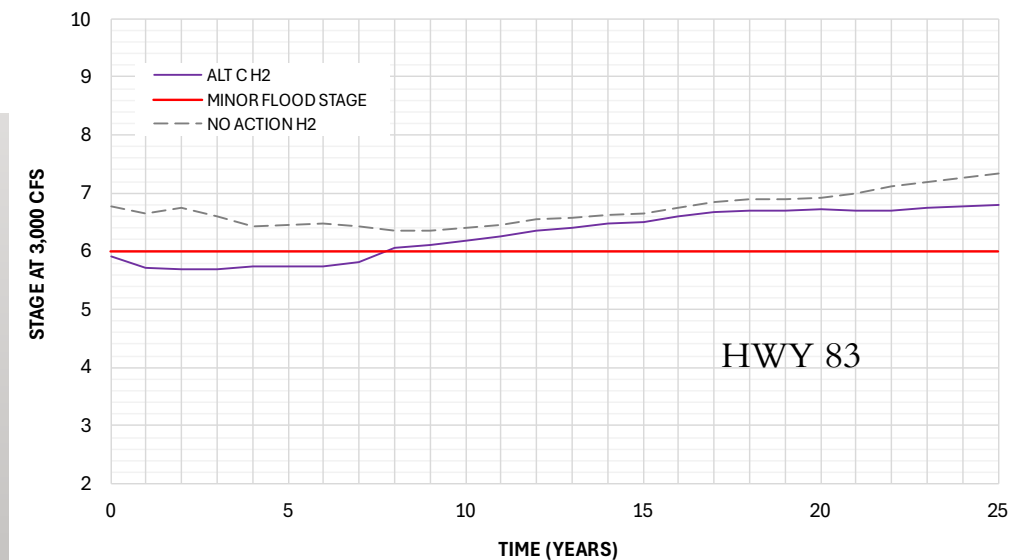
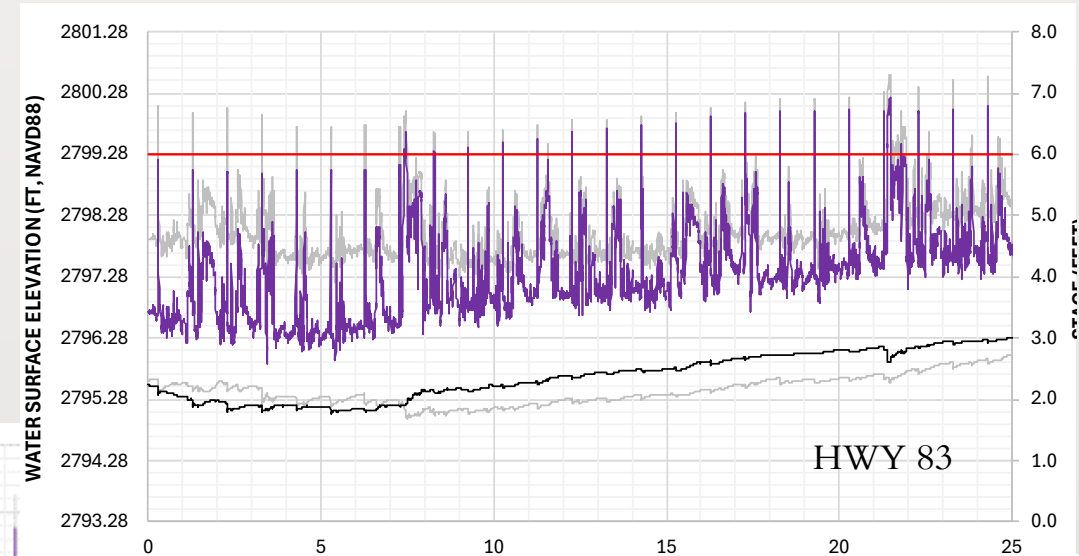
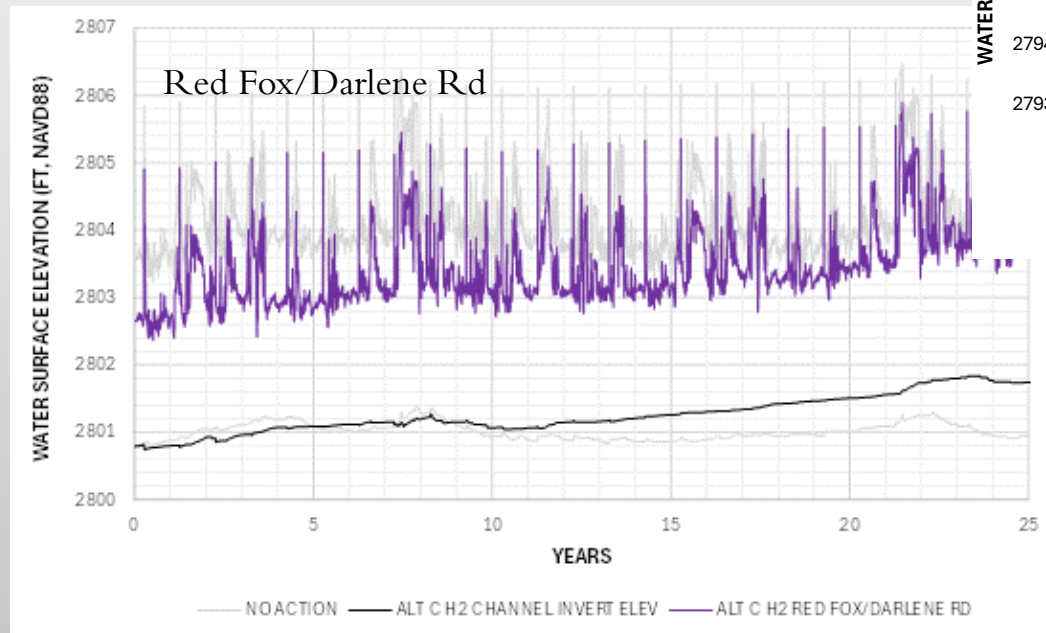
SEDIMENT REMOVAL ALT C



- Downstream Extent Below Upstream Railroad
- Sediment Removal, 150' Wide Channel, 0.115% Slope
- Excavation Volume 233,000 CY

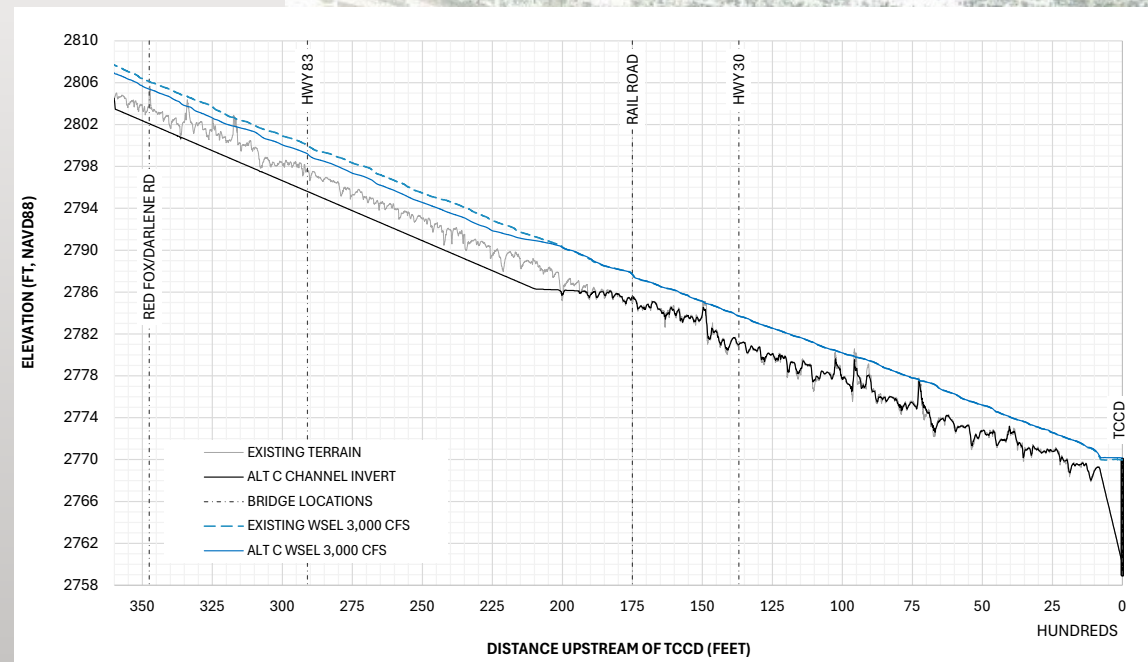
SEDIMENT REMOVAL ALT C

- Initial Capacity 3,000 cfs
- Sustainable for 3-10 years
- Annual Monitoring
- Additional round of sediment removal

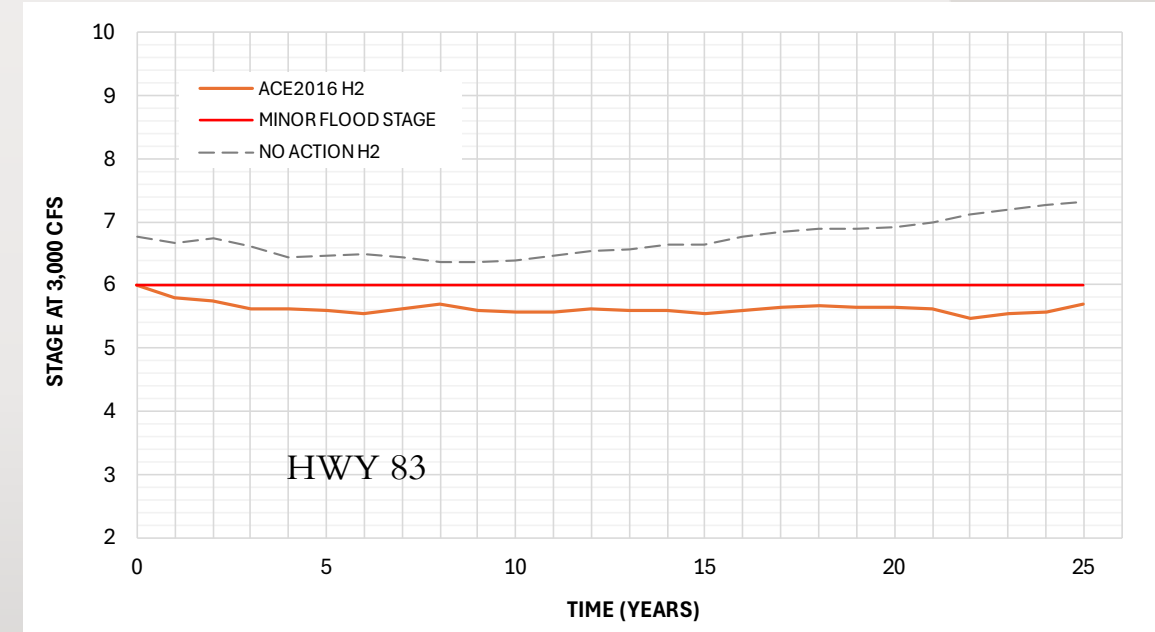
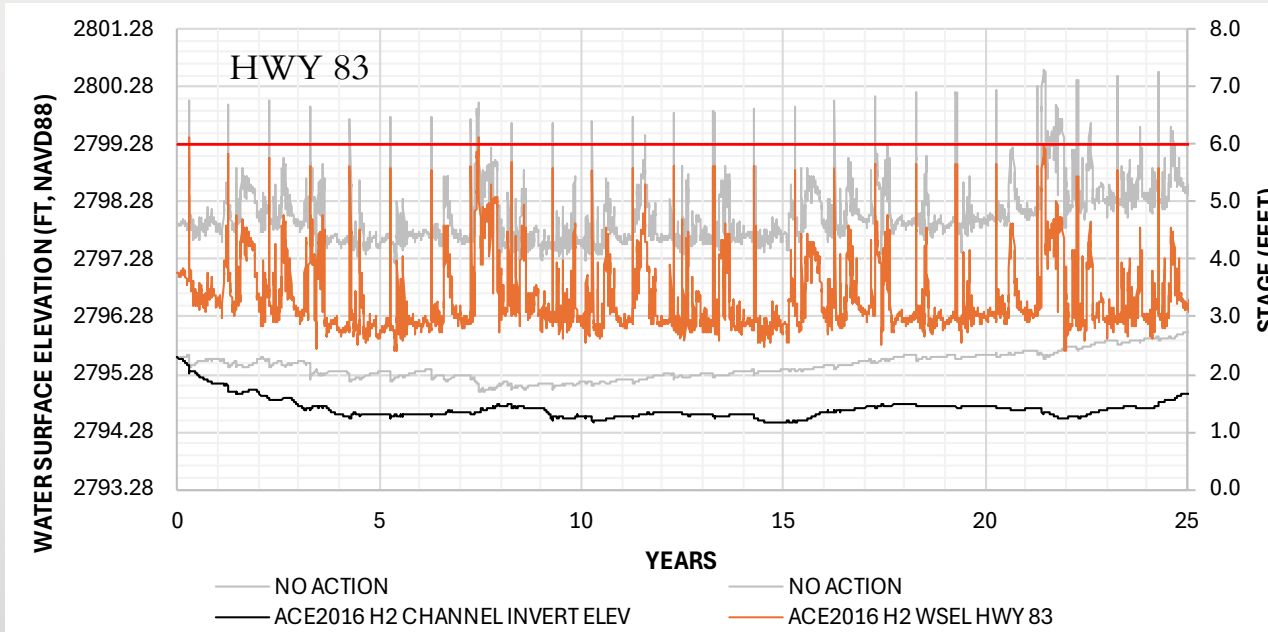


SEDIMENT REMOVAL ACE 2016

- ACE Channel Modification Concept 2016 (Promote sediment continuity)
- Channel Widening to 300' Upstream of HWY 83
- Sediment Removal, 150' Wide Channel, 0.115% Slope
- ~203,000 CY Excavation



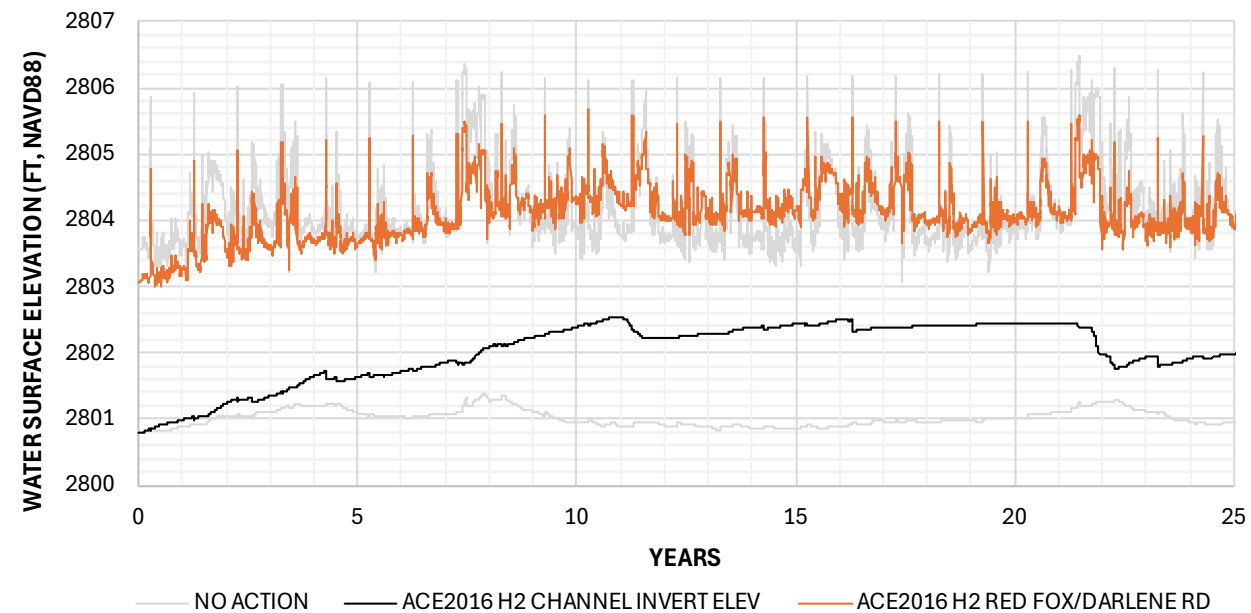
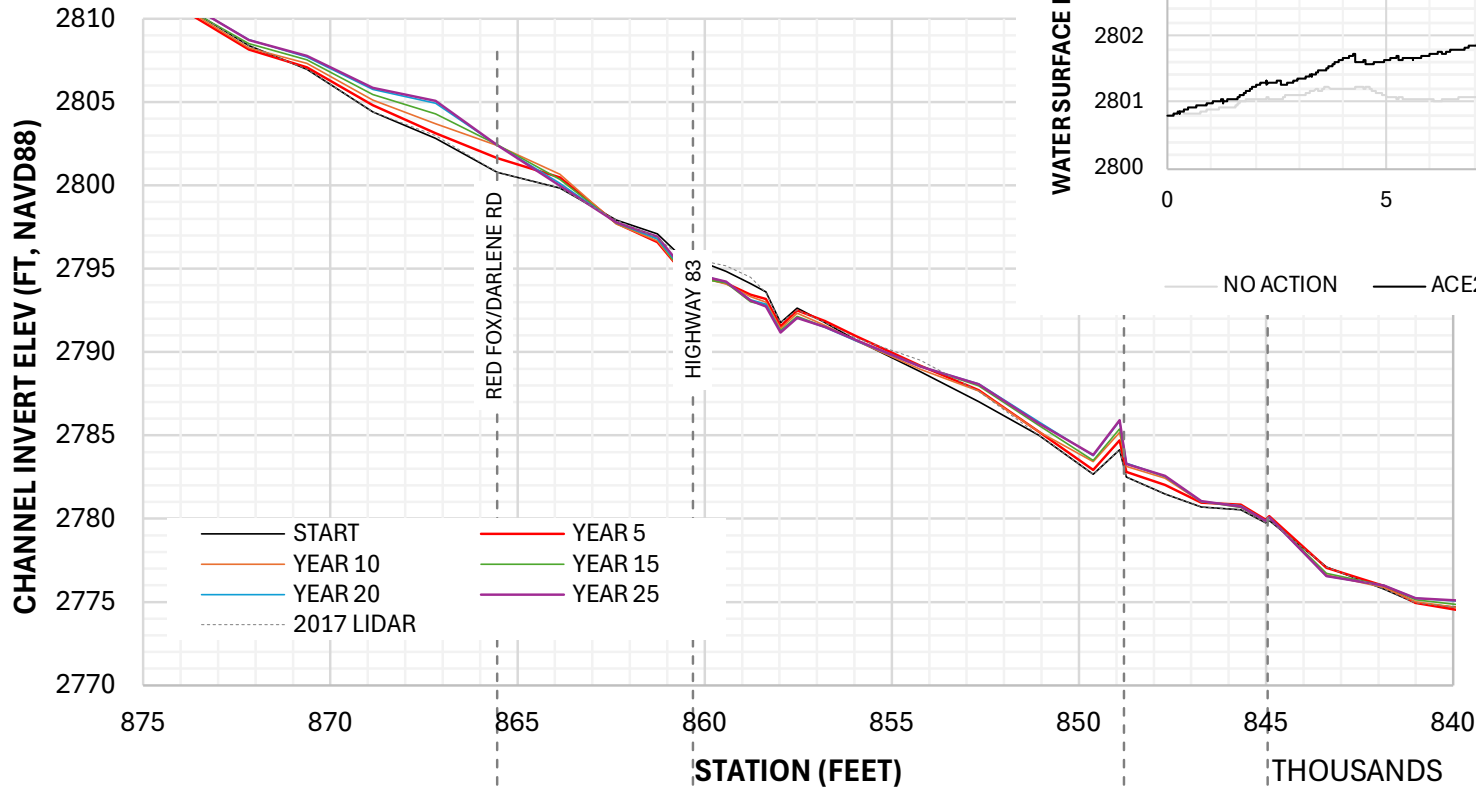
SEDIMENT REMOVAL ACE 2016



- Initial Capacity 3,000 cfs
- Sustainable for 3-15 years, due to rising water levels near Red Fox/Darlene Rd
- Annual Monitoring
- Potential for additional round of sediment removal

SEDIMENT REMOVAL ACE 2016

Deposition in area of channel widening at Red Fox/Darlene Rd limits sustainability.



SEDIMENT REMOVAL ALTERNATIVES

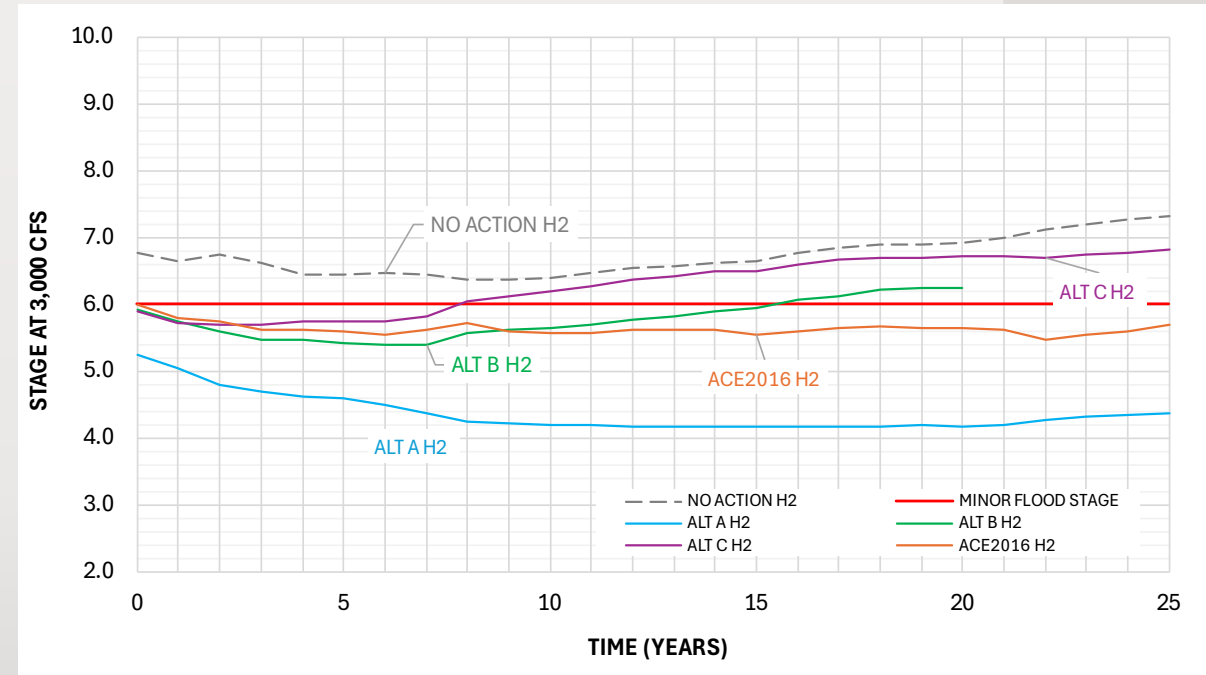
Sustainability related to volume of excavation

Alt A

- Exceeds target, but sustainable 20-30 yrs
- Higher level of confidence in sustaining capacity

Alts B, C, ACE16

- Limited by downstream slope
- Higher degree of uncertainty in long term sustainability
- Higher risk of loosing capacity



	Removal Volume (CY)	Channel Slope	Sustainability*	Long Term Monitoring and Maintenance 25 Years
Alt A	1,170,000	0.125%	20 - 30 yrs	Periodic Monitoring
Alt B	330,000	0.115%	5 - 15 yrs	Annual Monitoring, Additional Sediment Removal Likely
Alt C	233,000	0.115%	3 - 10 yrs	
ACE 2016 Alt	203,000	0.115%	3 - 15 yrs	

A topographic map of a river area, likely the Colorado River, showing a proposed sediment removal project. The map uses color to represent elevation, with red and orange indicating higher elevations and green and yellow indicating lower elevations. A winding river channel is visible, with a proposed design area highlighted in yellow and green. The map also shows various land parcels and infrastructure.

SEDIMENT REMOVAL ALT A CONCEPTUAL DESIGN

Cost

- Est Capital Cost **\$37 million**
- Annual O&M Est \$400,000/yr

Benefits

- Exceeds Target Capacity
- Sustainable for 2 – 3 decades

Issues/Considerations

- Permitting
- 49 Private Land Parcels
- Staging and Disposal of Sediment
- Constructability
- Capital Costs

SEDIMENT REMOVAL ALT A CONCEPTUAL DESIGN

Permitting

- Individual Section 404 Permit / EA / EIS
- Significant Impact to Wetlands (as much as 200 acres)
- LEDPA? (Bypass Canal)

49 Private Land Parcels

- Landowner Approval / Construction Easements, “Good Neighbor” Policy

Staging and Disposal of Sediment

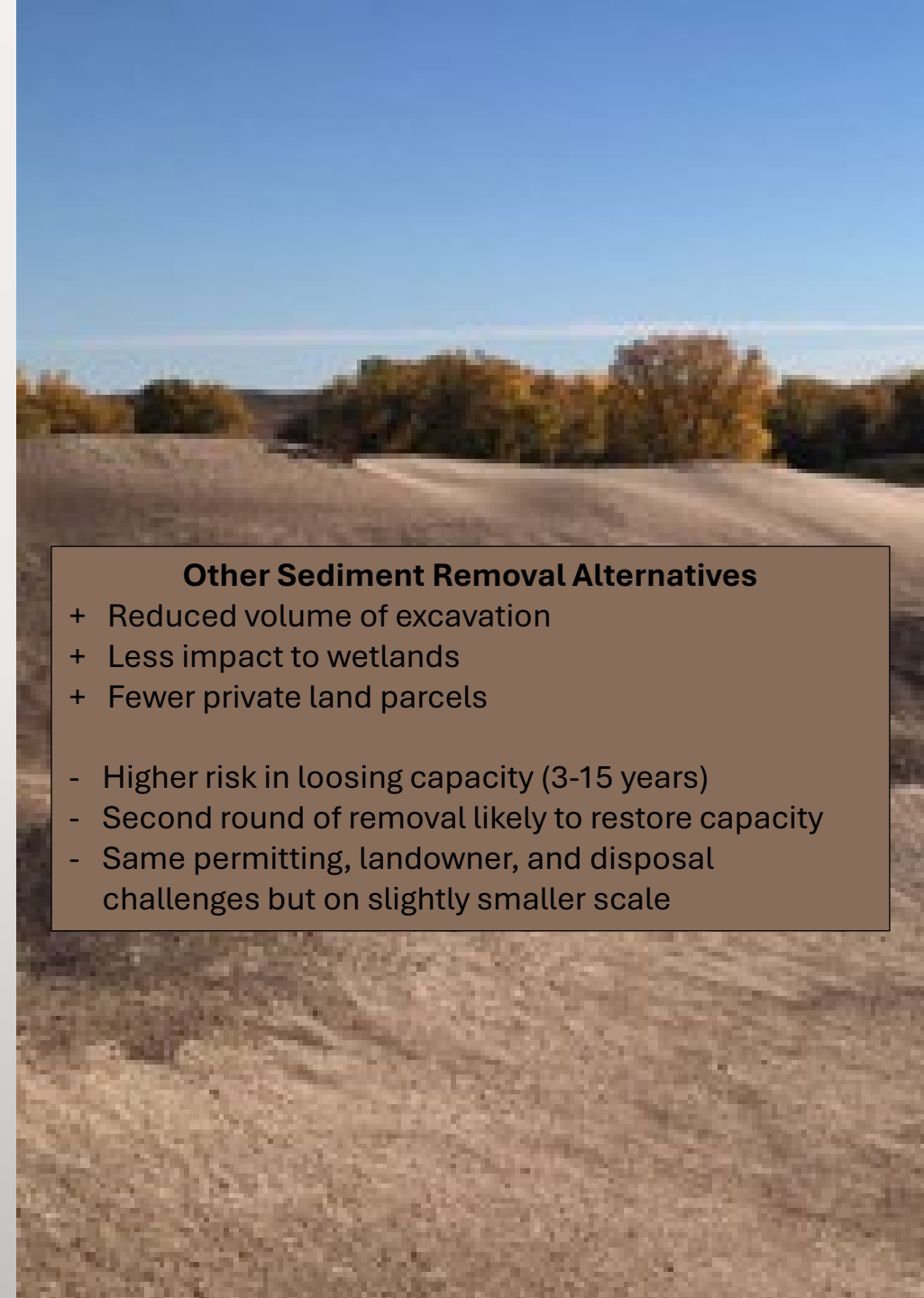
- Locations Significant Unknown
- CNPPID had similar issue with disposal of sediment at TCCD

Capital Costs

- Estimates on low end of possibilities
- Unknowns related to staging and disposal
- Use of heavy equipment in wet conditions / redirecting flow / access etc.

Other Sediment Removal Alternatives

- + Reduced volume of excavation
- + Less impact to wetlands
- + Fewer private land parcels
- Higher risk in losing capacity (3-15 years)
- Second round of removal likely to restore capacity
- Same permitting, landowner, and disposal challenges but on slightly smaller scale



MODIFICATION OF CANAL DIVERSION

Concept

- Promote sediment passage and continuity
- Induce headcut upstream/increase capacity
- Extend sustainability of sediment removal

Typical Applications

- Improve overall river health
- Remove barrier for fish passage
- Seasonal irrigation diversions





MODIFICATION OF TRI-COUNTY CANAL DIVERSION

Current Operations

- Existing structure can pass large amounts of flow/sediment (example Sept 2013, 18,000 cfs)
- Year-round diversions
- Dredging
- Provides barrier for invasive aquatic species

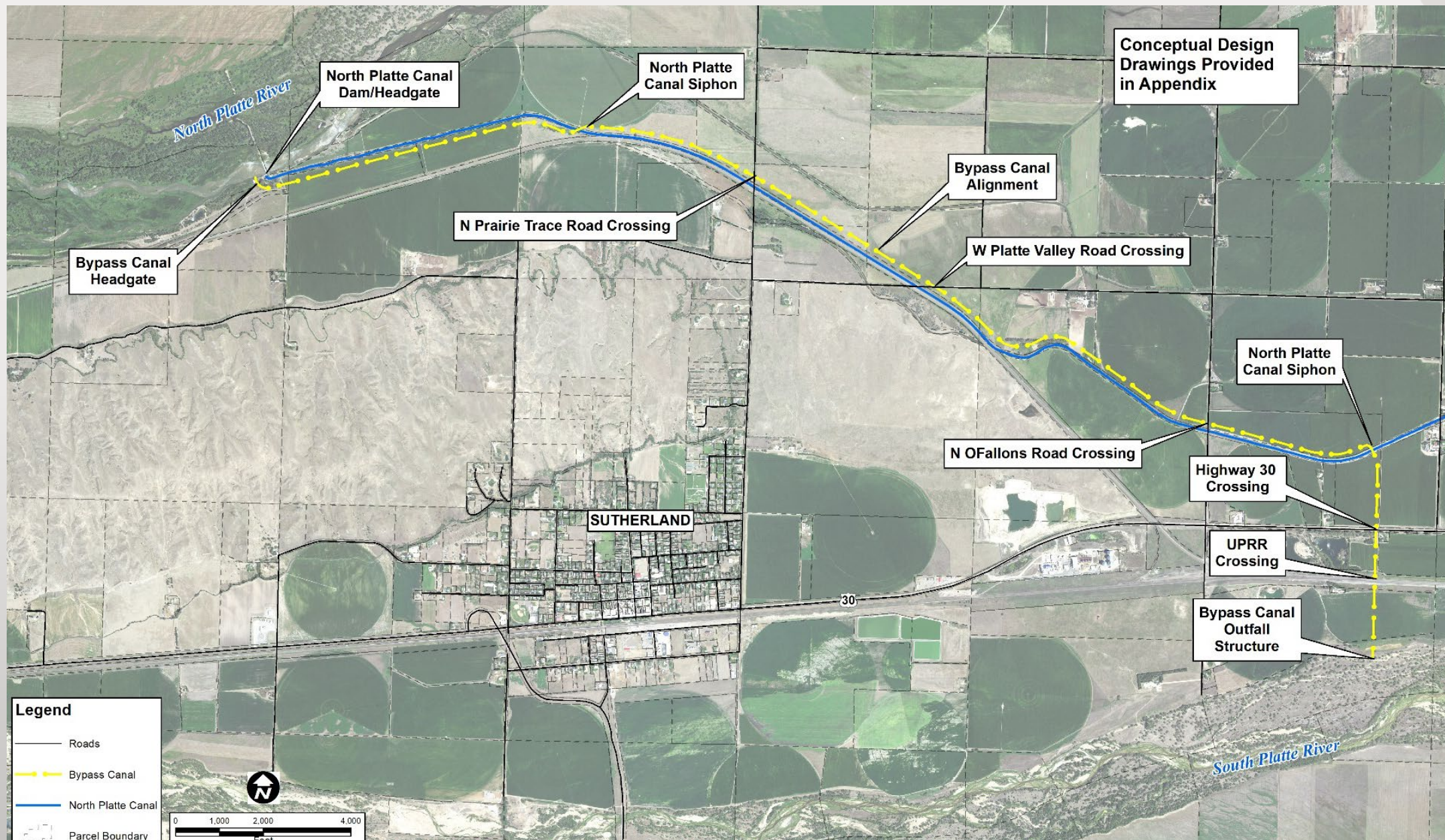
Operation of Modified Structure

- Conflict with diversion/headwater needs
- No added benefit to sediment removal alternative
- Limited flow on North Platte to flush sediment (600 days of 3,000 cfs with no headwater/diversions)
- Remove barrier to invasive aquatic species

BYPASS CANAL CONCEPTUAL DESIGN

- Earthen Canal w/ Capacity of 1,500 cfs
- Diversion Structure on North Platte
- Geometry
 - 6.3 miles in length
 - Trapezoidal 60' BW, 96' TW, 6' depth, 3:1 SS
 - 24' W Access Road
 - 90' wide rectangular concrete sections at transitions/curves
 - 570,000 CY Excavation
- Maintenance/Access Road
- Crossing Structures
 - 3 Siphons under North Platte Canal
 - 5 Large Road Crossings
 - 10 Local Access Rd / Lateral Crossings Bridges
- Outfall Structure





BYPASS CANAL CONCEPTUAL DESIGN

Cost

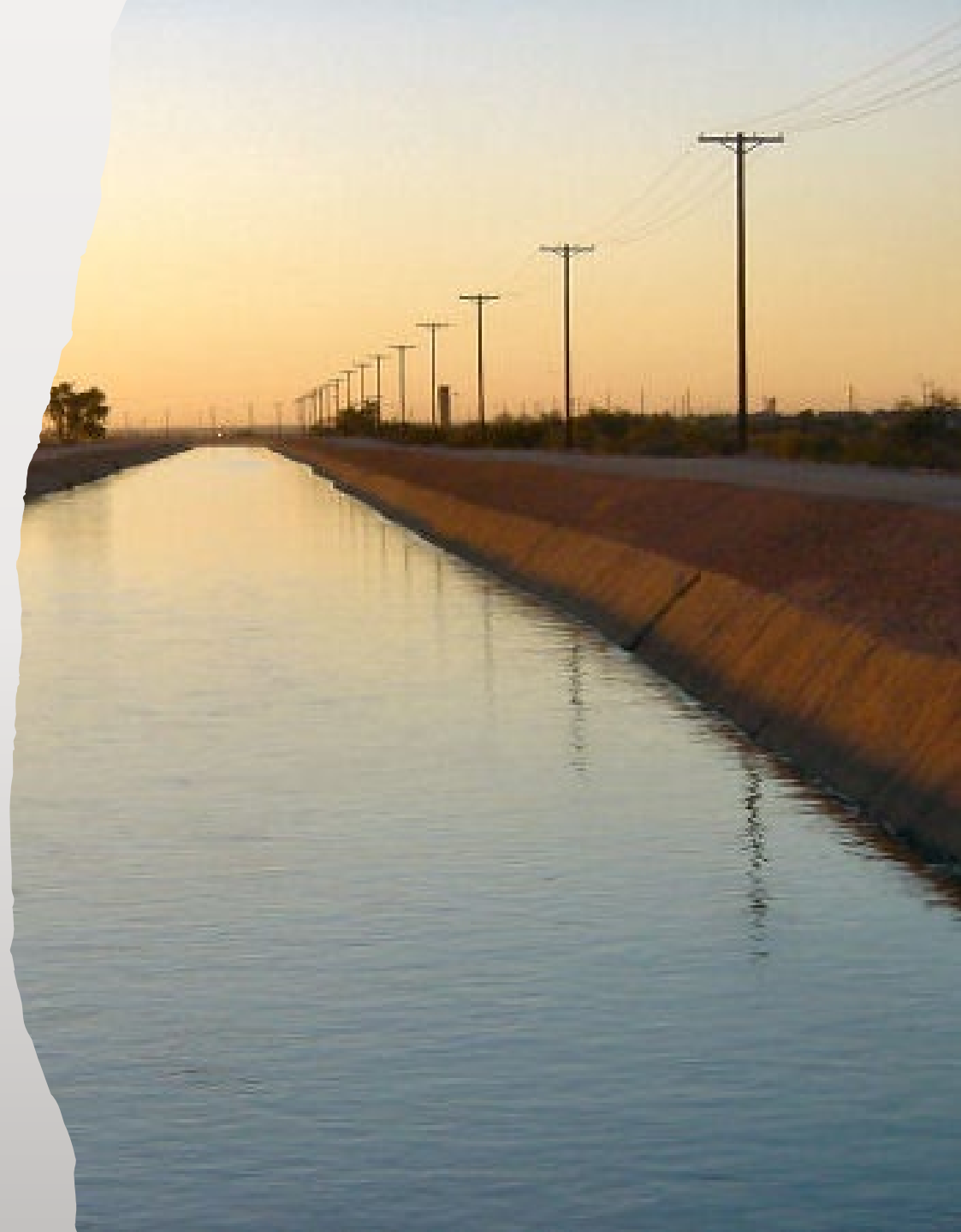
- Est Capital Cost **\$31 million**
- Annual O&M Est \$400,000/yr

Benefits

- Meets Target: 1,500 cfs Bypass + 1,500 cfs Chokepoint (note: in-channel flow competes with irrigation demand)
- Dedicated bypass of 1,500 cfs
- Potential for other diversions and/or recharge

Issues/Considerations

- Land Acquisition and Easements: 23 Privately Owned Parcels “Good Neighbor” Policy
- Major Infrastructure Construction Project
- Seepage Losses (potential of 25%)
- Long Term O&M



S U M M A R Y

No Action

- Current capacity of 1,700 cfs projected to continue assuming similar hydrologic conditions
- Existing capacity competes with irrigation demand during dry conditions when urgently needed

Sediment Removal Alternative (\$37 mill)

- 3,000 cfs target capacity for 2 – 3 decades
- Sustainability directly related to sediment removal volume
- Issues related to permitting, private property, sediment staging/disposal, constructability, cost
- Less cost but higher risk in losing hydraulic capacity with smaller projects

Bypass Canal Alternative (\$31 mill)

- Dedicated bypass canal 1,500 cfs capacity
- Combined w/ North Platte meets 3,000 cfs target
- Long term O&M \$400,000/yr
- Property acquisition/easements

South Platte Storage (\$80-\$600 mill)

- Program unable to accomplish storage project at this scale without stakeholder or outside sponsorship

Modification of Tri-County Canal (\$21 mill +)

- Limited benefit beyond current capabilities
- No added value to sediment removal alternative
- Conflict with diversion/dredging
- Limited flushing flows in North Platte

October 2024 Platte Basin Hydrology Update

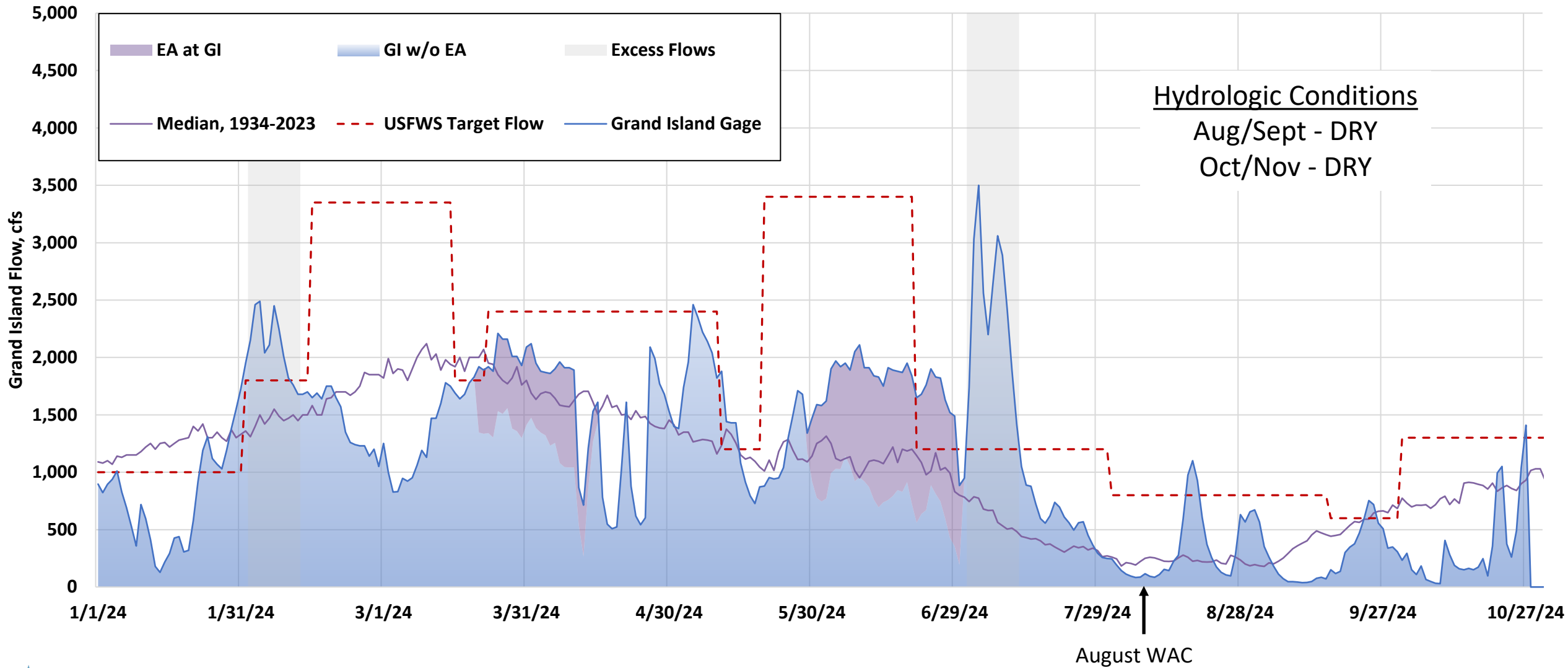
Ed Weschler, E.I.

Water Resources Engineer

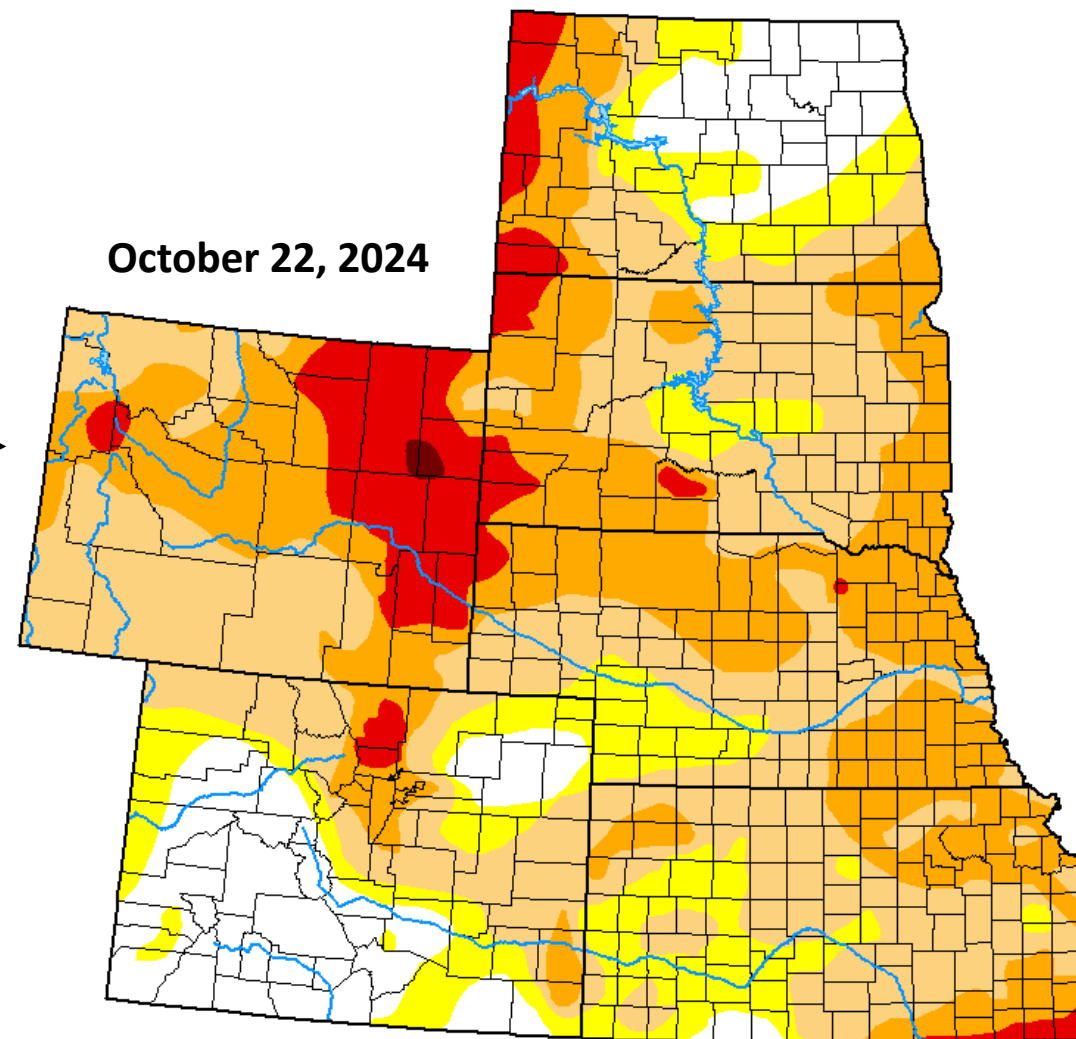
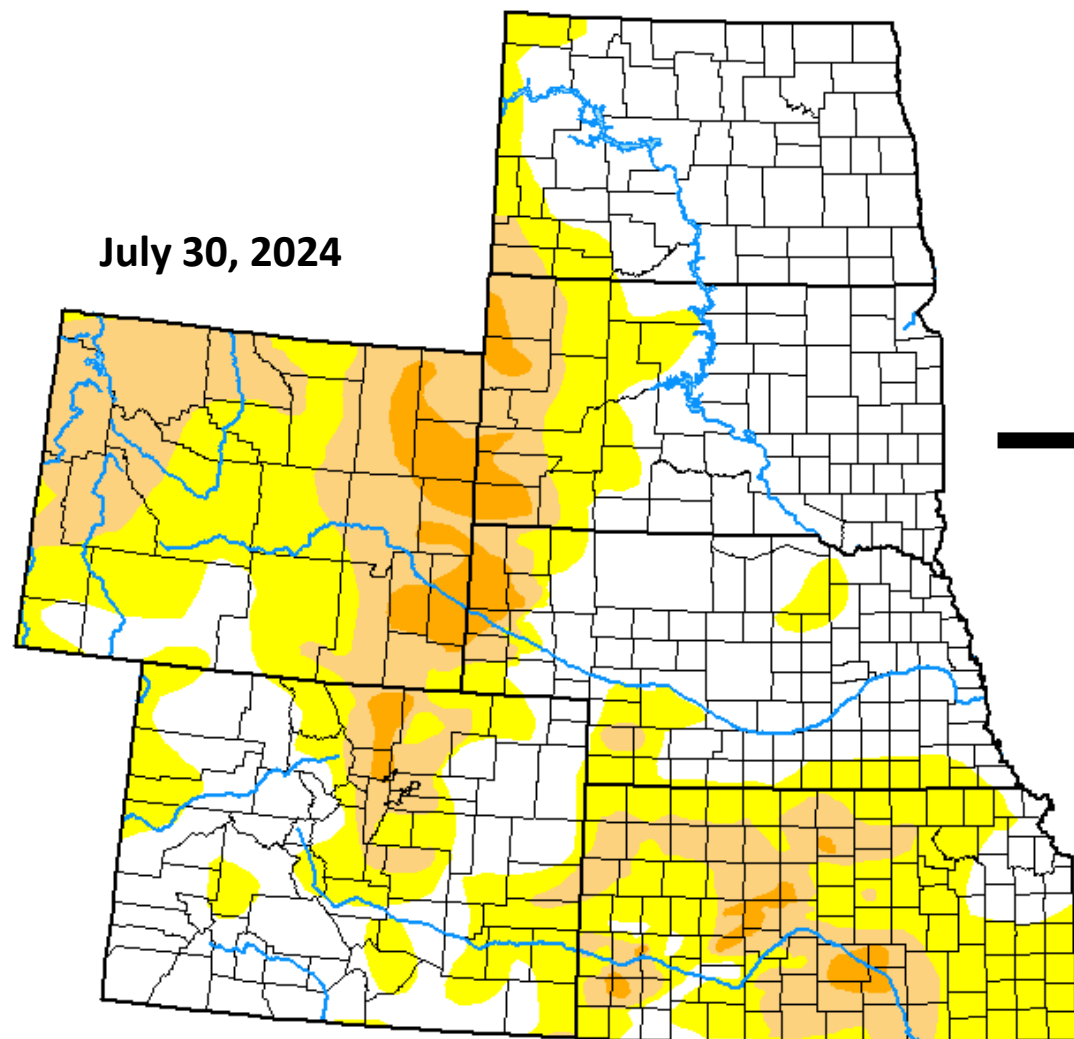
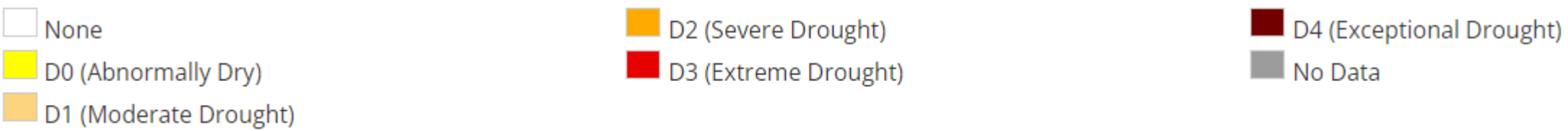
Water Advisory Committee Meeting

October 29, 2024

2024 Grand Island Year-to-Date Flow Summary

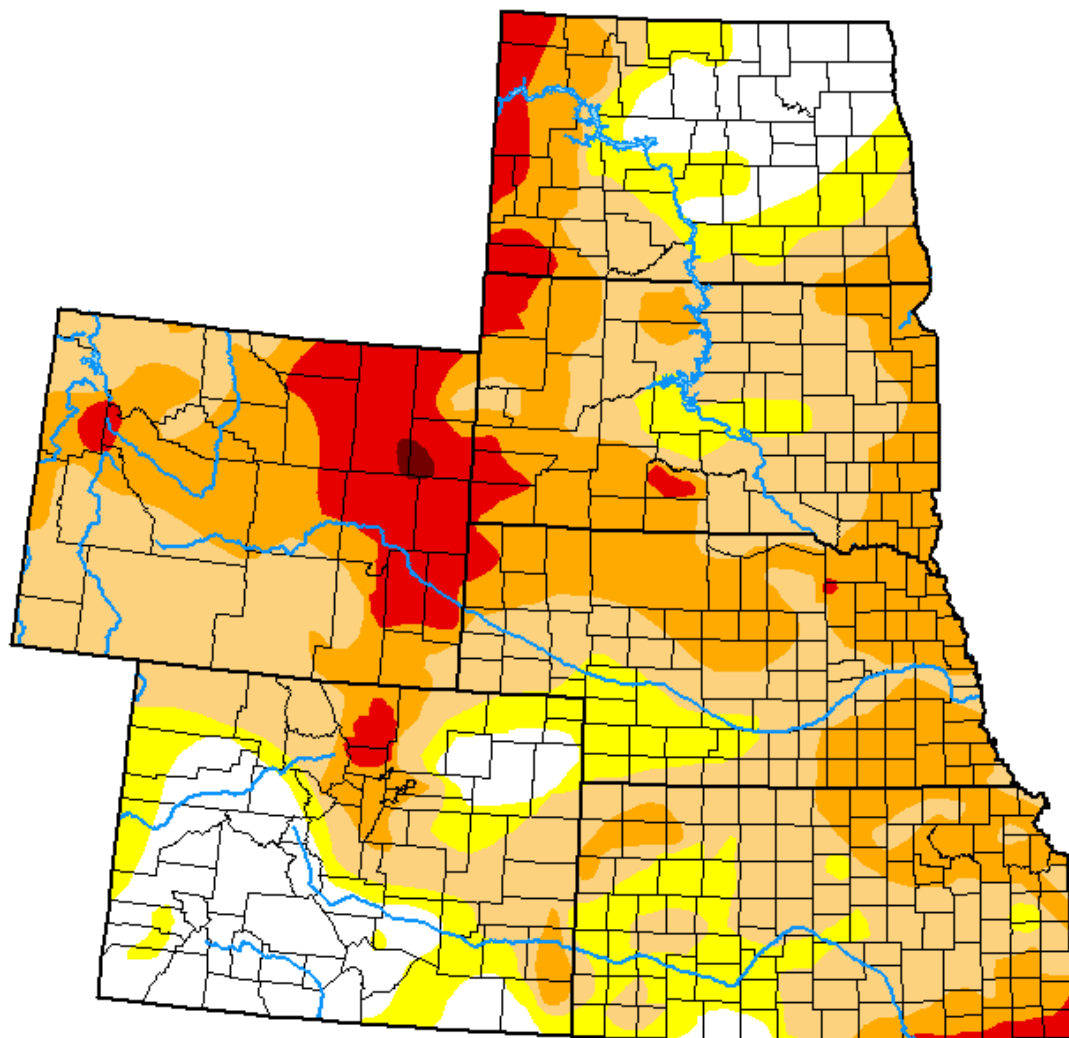


Drought Classification

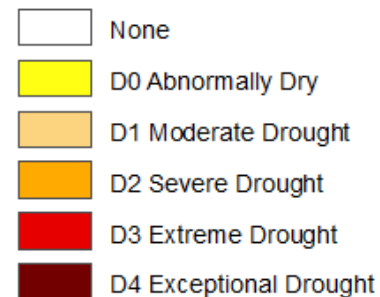


U.S. Drought Monitor High Plains

October 22, 2024
(Released Thursday, Oct. 24, 2024)
Valid 8 a.m. EDT



Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Rocky Bilotta
NCEI/NOAA



droughtmonitor.unl.edu



PLATTE RIVER
RECOVERY IMPLEMENTATION

A photograph of a bird, possibly a grebe, standing in shallow water at sunset. The water is dark with golden reflections from the low sun. The bird is silhouetted against the water. In the background, there are dark, rocky or sandy banks.

Thank You!

October 2024 Water Plan Updates

Seth M Turner, PE
PRRIP Water Plan Coordinator
Water Advisory Committee Meeting
October 29, 2024

Leasing, Recharge, and Recapture Project Operations

Recharge and Recapture

- Recharge: No diversions since early July
 - Phelps ~715 AF
 - Elwood = 0 AF
 - Cottonwood Ranch ~800 AF
- Recapture wells: No pumping since early July
 - 2024 cumulative pumping = 2,440 AF
 - Wells off due to concern of creating river depletions

Surface Water Leases

- Credits to Lake McConaughy EA in October
 - CPNRD = 14,358 AF
 - NPPD = 3,306 AF
 - CNPPID irrigator lease = 790 AF
 - No-Cost NCCW = 314 AF
- Pathfinder accounts
 - EA = 32,068 AF released
 - Municipal Account = 9,600 AF released
 - Combined credit to Lake McConaughy EA = 36,859 AF (88%) from 9/17-10/3

Cottonwood Ranch Recharge Project

- Several ongoing maintenance/repair activities
 - Digital pressure gages
 - Electrical conduit drains
 - North vault valve actuator
- Working on new agreement with CNPPID
 - Similar to agreement with Tri-Basin for recapture wells
 - CNPPID to handle all recharge operations and some maintenance
 - Program reimburse costs
 - Will likely require communications hardware upgrades (budget item)
 - Anticipate review/approval by GC in December

CNPPID Irrigator Lease

- Completed update to economics and alternatives analyses
- George Oamek presented to GC in September
- Proposed terms for 2025
 - One-year extension
 - Increase unit cost to \$160/acre
 - Delay enrollment period to March (instead of preceding Fall)
- GC deferred action until December
- Working with CNPPID on draft amendment to leasing agreement

2025 Water Plan Budget

WPRT-1 Retiming Projects (Canal Recharge)

- Phelps County Canal
 - 2022 WSA pre-paid for 50,000 AF of excess flow diversions at \$35.92/AF
 - Zero additional budget for 2025
- NPPD recharge
 - WSA expires 12/31/2025
 - Zero budget allocated due to limited diversions since 2020
- CPNRD recharge
 - WSA expires 12/31/2024, not extended
 - Zero budget
- WPRT-1 total = \$0

WPRT-2 Retiming Projects (Reservoir Recharge)

- Elwood Reservoir Recharge
 - 2022 WSA pre-paid for ~135kaf at \$54.54/AF
 - Zero additional budget for 2025
- Elwood Outlet Feasibility Study
 - Next phase of Expanded Recapture Study (moved from WPRT-4)
 - Working with LRE Water team on scope and budget
 - Preliminary budget = \$500,000
- Plum Creek
 - LiDAR and multi-spectral imagery flown fall 2024
 - Initial payment from WPRT-4 in late 2024
 - Second payment in 2025 = \$25,000
- WPRT-2 total = \$525,000

WPRT-3 Retiming Projects (Broad-Scale Recharge)

- Includes:
 - Maintenance and controls for Rubicon gates
 - Other site/berm maintenance and electricity
 - Engineering/construction of fix for outlet valve cavitation
 - Installation of new monitoring well in/near Cell 8
 - Replacement of Gate 6 gearbox
 - Replacement of north vault valve actuator parts
 - Communications upgrades to interface with CNPPID SCADA
 - CNPPID staff time, mileage, expenses
- Does NOT include water deliveries
 - About \$870,000 balance remains on delivery pipeline
 - Equivalent to ~27,700 AF
- WPRT-3 total = \$253,000

WPRT-4 Retiming Projects (Recapture Wells)

- Augmentation agreement with Tri-Basin NRD
- Program reimburses all costs for operations and maintenance
- Includes:
 - Electricity
 - Well/pipeline/discharge channel maintenance
 - TBNRD staff time, mileage, and expenses
 - Insurance
 - Easements
 - SCADA software subscriptions
- WPRT-4 total = \$100,000

WPST-1 Storage Leases (Lake McConaughy Sources)

- Long-term agreements still in progress and uncertain
- Assume 1-year agreements again for 2025
 - CPNRD surface water lease: up to 15,000 AF at \$90/AF
 - NPPD surface water lease: up to 3,306 AF at \$90/AF
 - CNPPID storage water lease: up to 10,000 AF at \$90/AF
- WPST-1 total = \$2,548,000

WPST-2 Storage Leases (Upstream Sources)

- Pathfinder Municipal Account lease
 - Lease contract through 2032
 - Maximum annual lease of 9,600 AF at \$65/AF
- WPST-2 total = \$624,000

WPIR-1 Irrigator Leases

- CNPPID irrigator lease
 - Assume amendment to extend by 1 year
 - Max enrollment = 3,000 acres
 - Proposing to increase payment from \$100/acre to \$160/acre
 - \$10,000 administrative fee paid to CNPPID
- WPIR-1 total = \$490,000

WPLW-1 Land for Water Property Maintenance

- Several properties acquired for future water projects
- Includes:
 - Fencing and road maintenance
 - Noxious weed control
 - Mowing
- WPLW-1 total = \$10,000

WPWM-1 Water Monitoring Activities

- Surface water, groundwater, and weather monitoring
- Includes:
 - Cottonwood Ranch stream gages
 - Overton stream gage
 - J2 Return/South Channel stream gage (installed 2024)
 - Grand Island gage camera maintenance
 - Nebraska Mesonet weather stations at Morse (Cottonwood Ranch) and Binfield South
 - Telemetry subscriptions
 - Replacement data loggers and other miscellaneous equipment
- WPWM-1 total = \$55,000

WPCP-1 North Platte Chokepoint

- Assumes GC does not take immediate action on any sediment removal or bypass alternatives
- Includes small budget for as-needed maintenance of State Channel Berm
- WPCP-1 total = \$10,000

WPSA-1 Special Advisors

- Hydrogeology and groundwater modeling
 - Long-time SA Bill Hahn retiring
 - Need groundwater model to score Cottonwood Ranch recharge project
 - Eventually expand model to include Phelps and Elwood recharge and recapture wells
- Surface water modeling
 - OPSTUDY model is obsolete in terms of platform, study period, and representation of Platte Basin operations
 - Need to develop a model with appropriate current and future conditions
 - EDO to seek outside expertise
 - Expected to be the start of a multi-year process
- WPSA-1 total = \$100,000

2025 Water Plan Budget Summary

Line Item	Description	Proposed 2025 Budget
WPRT-1	Retiming Projects (Canal Recharge)	\$ -
WPRT-2	Retiming Projects (Reservoir Recharge)	\$ 525,000.00
WPRT-3	Retiming Projects (Broad-Scale Recharge)	\$ 253,000.00
WPRT-4	Retiming Projects (Recapture Wells)	\$ 100,000.00
WPST-1	Storage Leases (Lake McConaughy Sources)	\$ 2,548,000.00
WPST-2	Storage Leases (Upstream Sources)	\$ 624,000.00
WPIR-1	Irrigator Leases	\$ 490,000.00
WPLW-1	Land for Water Property Maintenance	\$ 10,000.00
WPWM-1	Water Monitoring Activities	\$ 55,000.00
WPCP-1	North Platte Chokepoint	\$ 10,000.00
WPSA-1	Special Advisors	\$ 100,000.00
TOTAL =		\$ 4,715,000.00