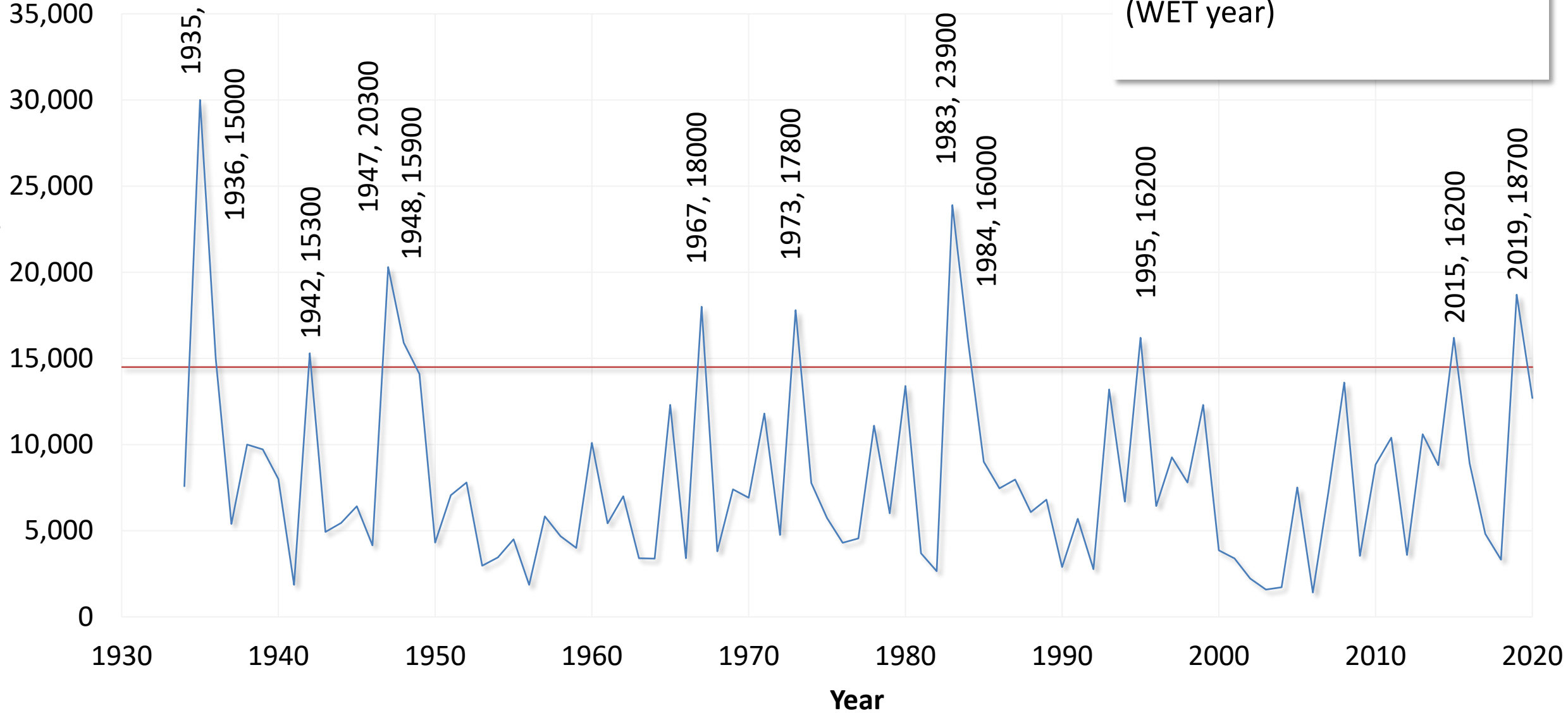


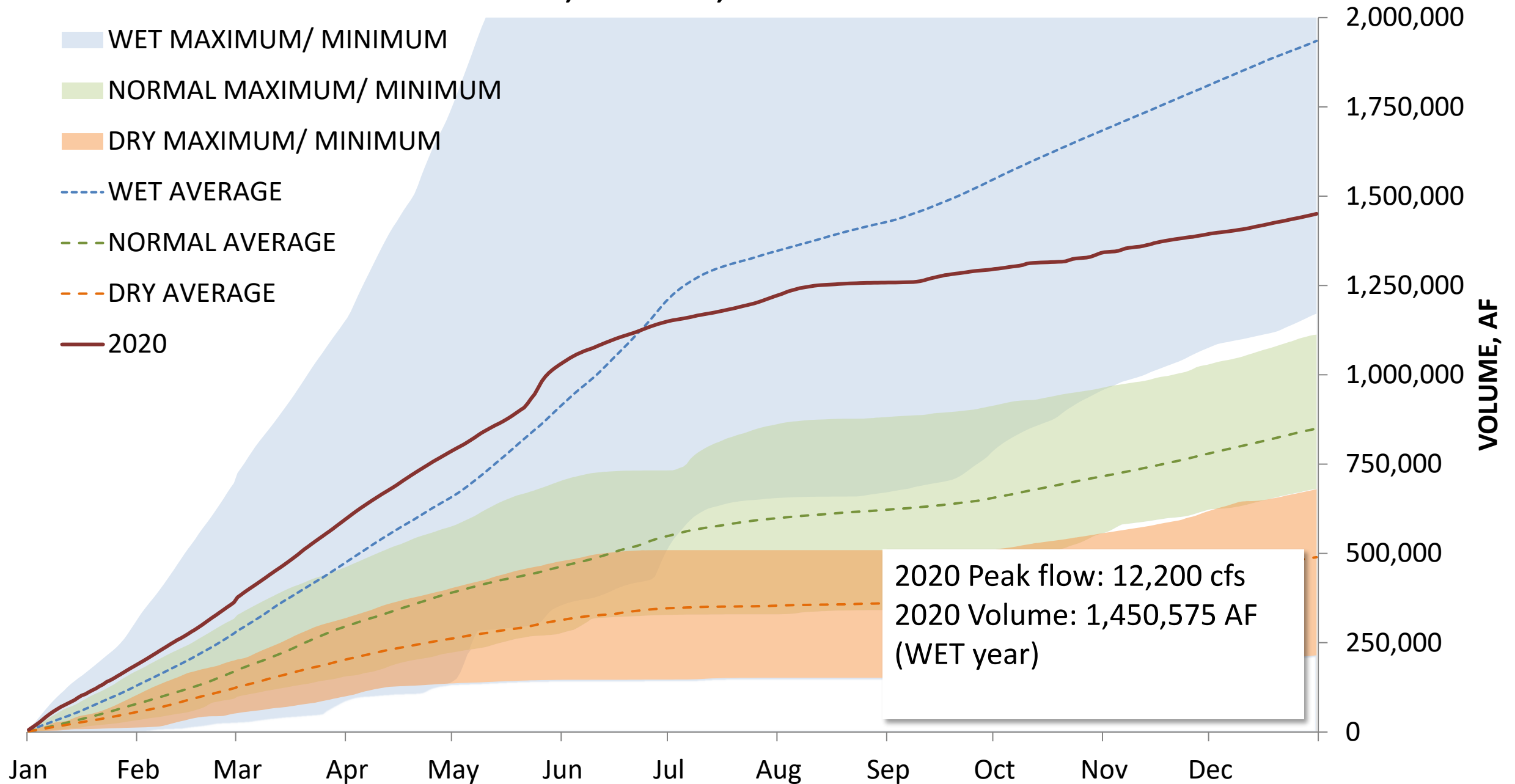
Grand Island Peak Annual Flow

2020 Peak flow: 12,200 cfs
2020 Volume: 1,450,575 AF
(WET year)

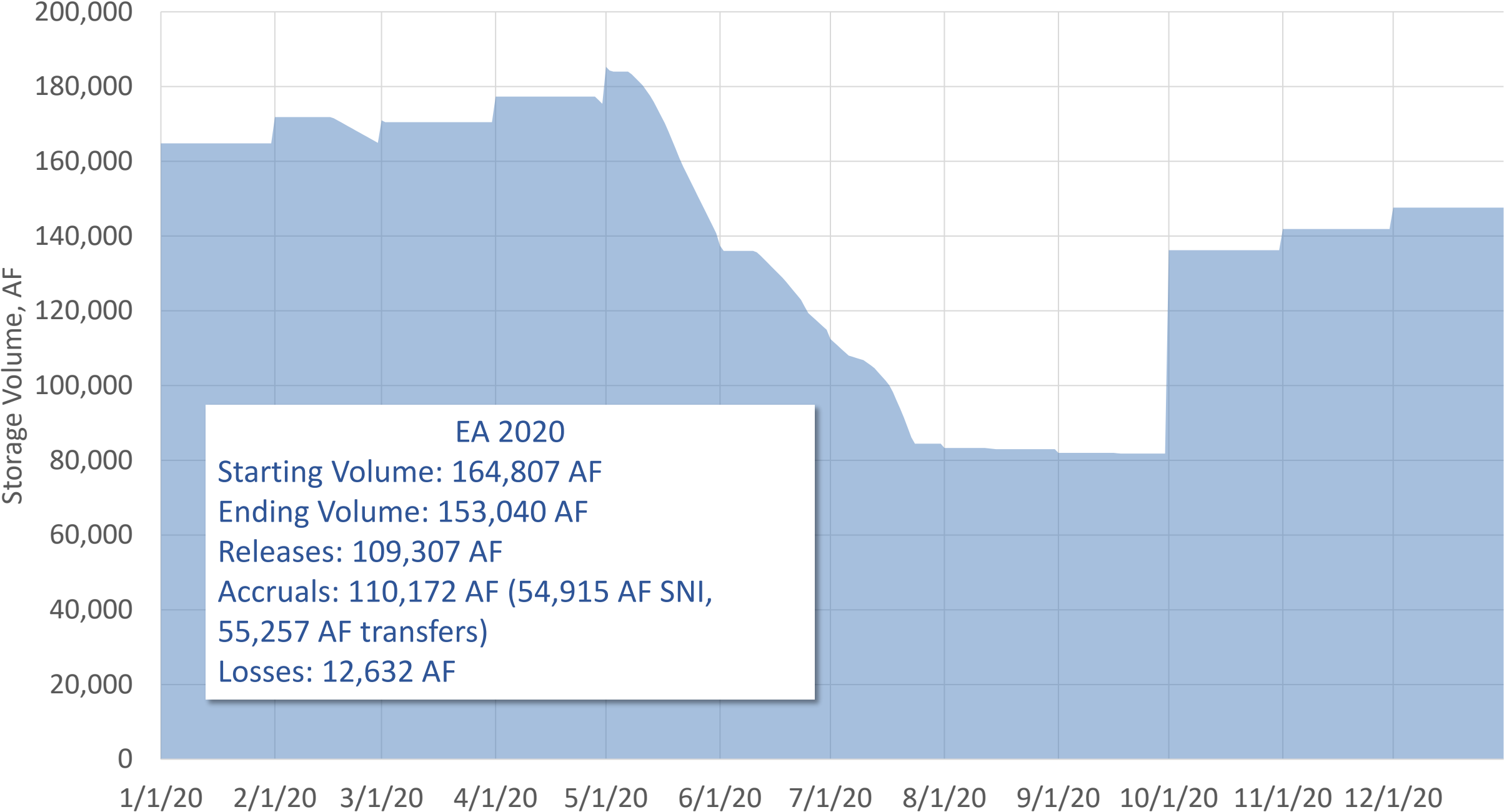
Peak Annual Flow, cfs



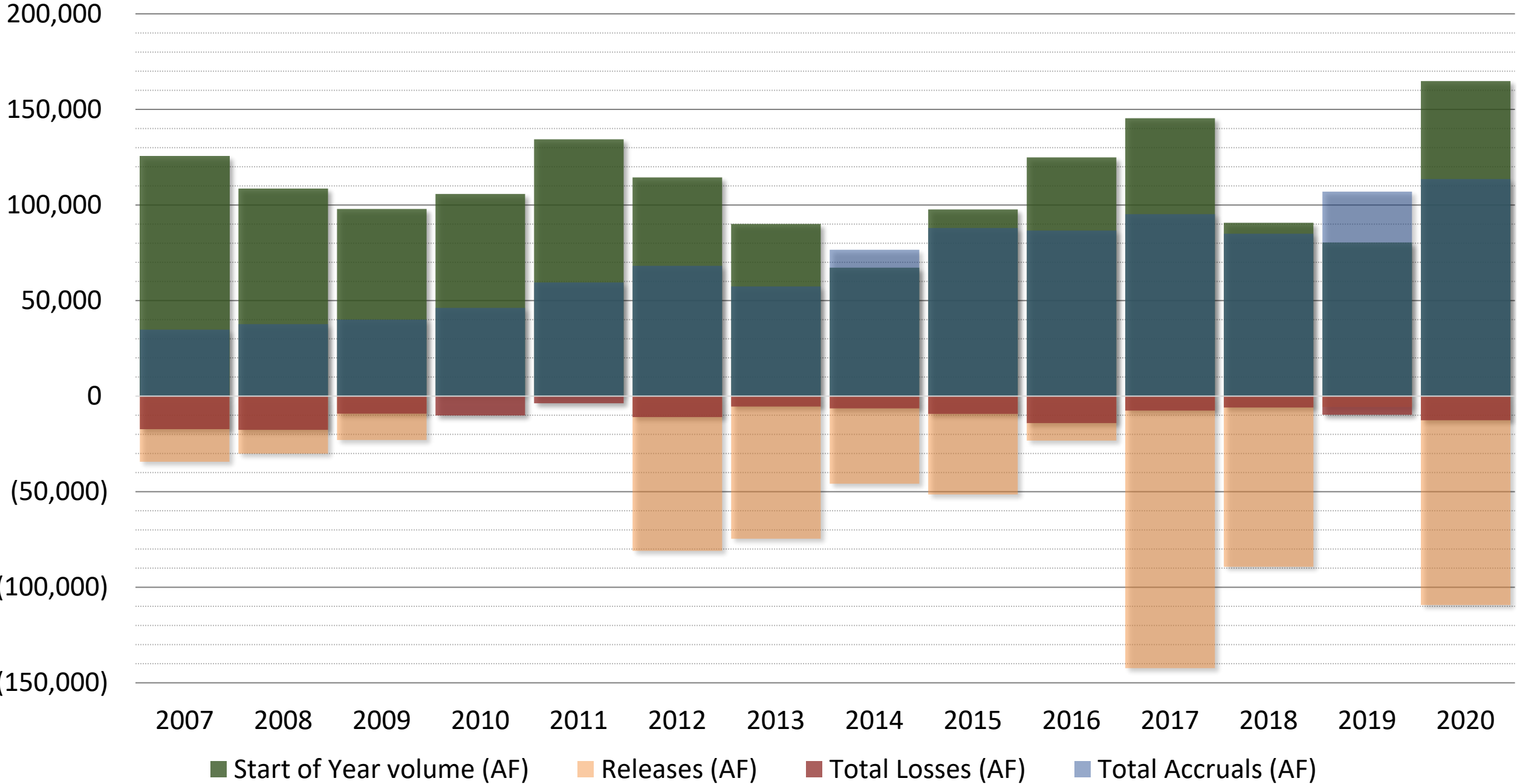
2020 CUMULATIVE GRAND ISLAND FLOW VOLUME WITH WET, NORMAL, AND DRY YEAR AVERAGES



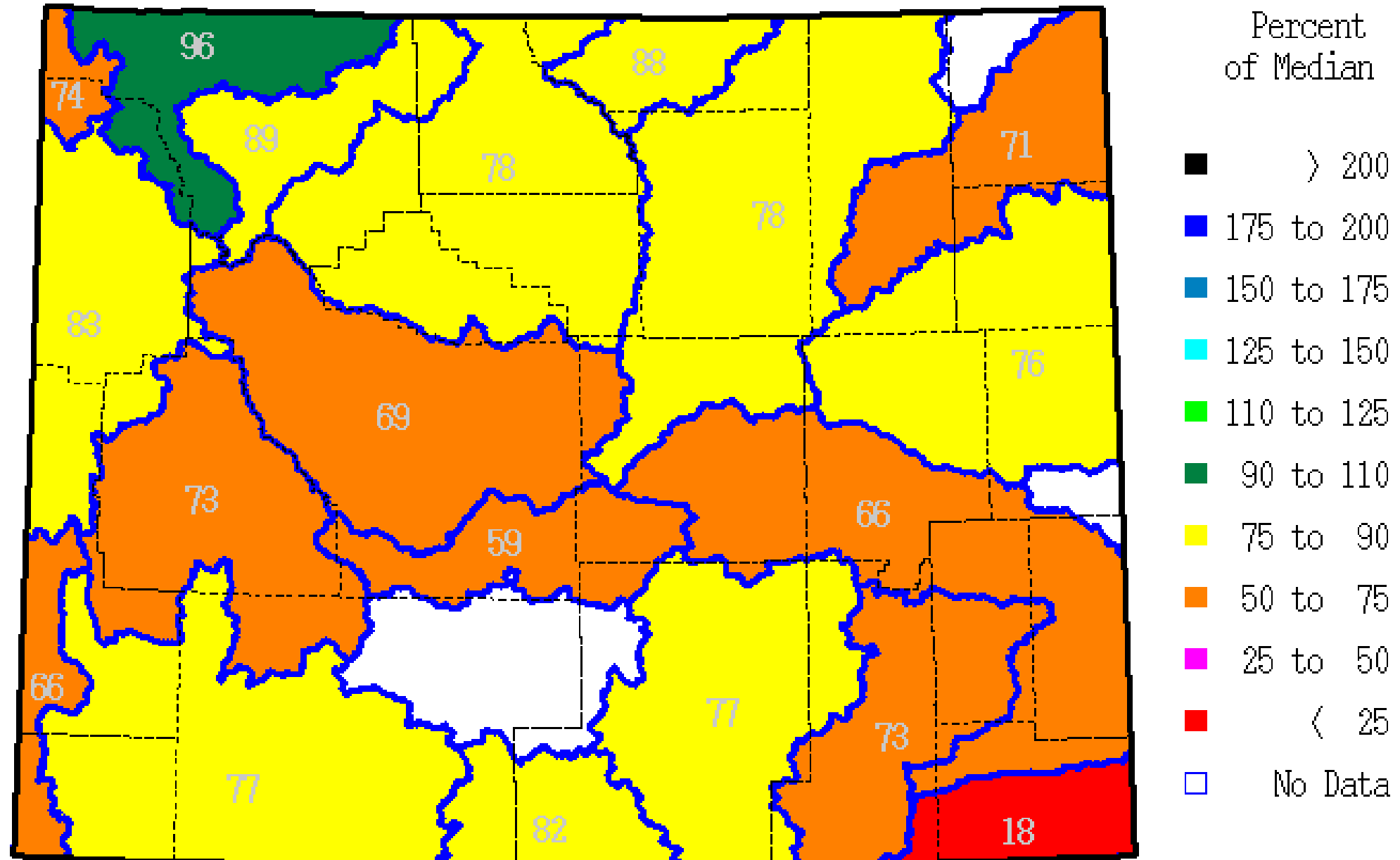
EA Storage



EA Volumes



SWE % of Median as of Wednesday, 27 January 2021



Produced by the Wyoming Water Resources Data System: <http://www.wrds.uwyo.edu>

* = Data may not provide a valid measure of conditions

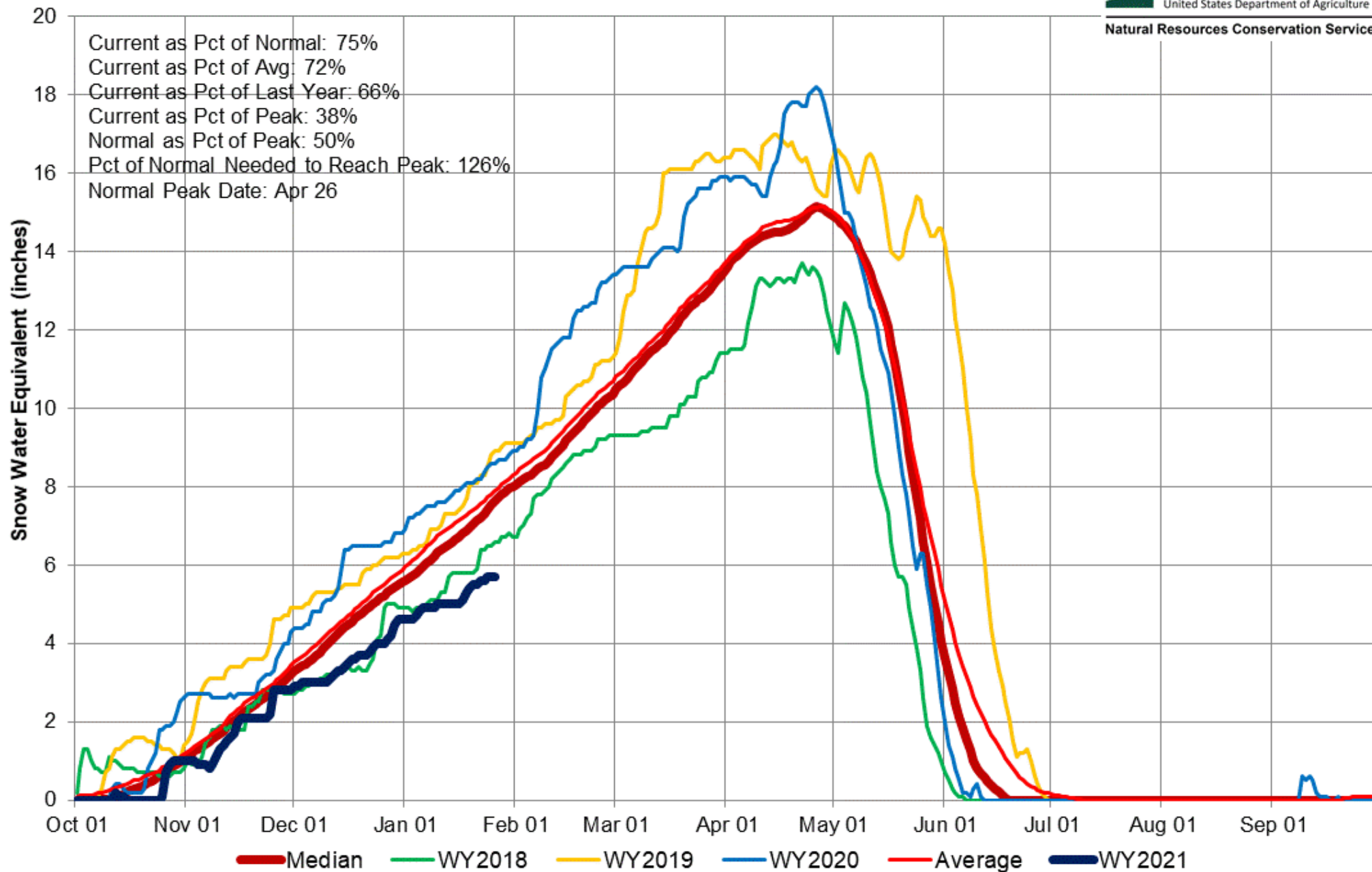
South Platte River Basin Time Series Snowpack Summary

Based on Provisional SNOTEL data as of Jan 26, 2021



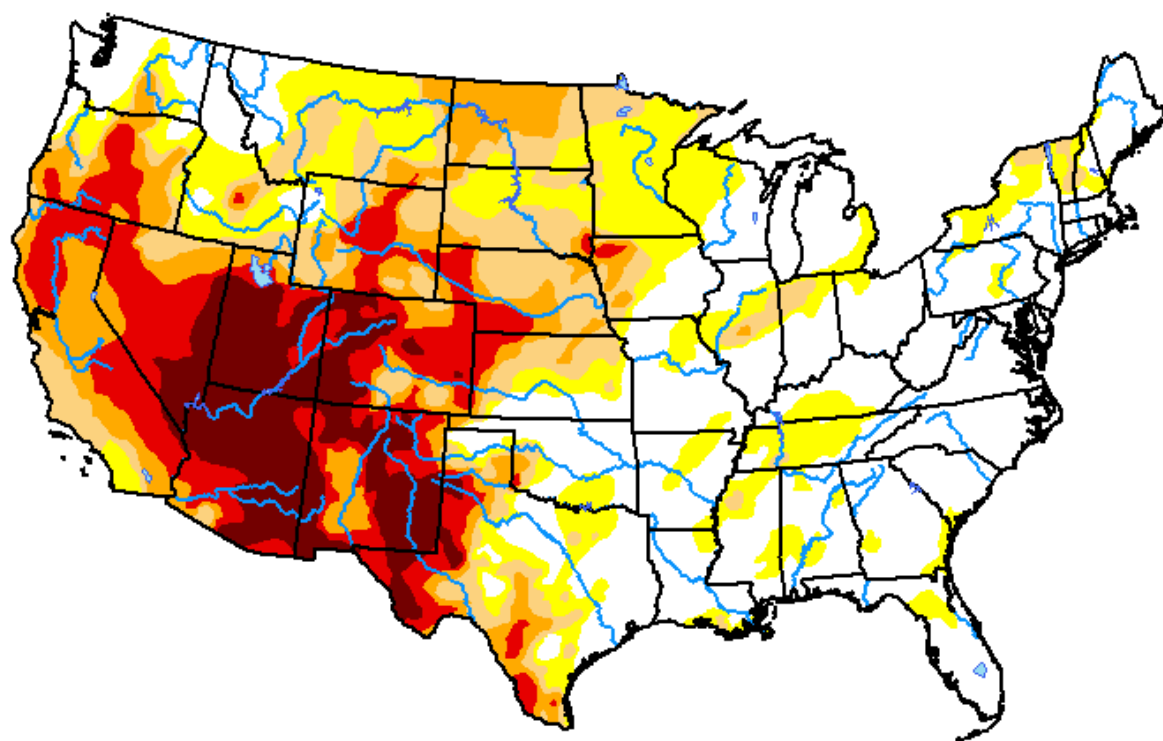
United States Department of Agriculture

Natural Resources Conservation Service

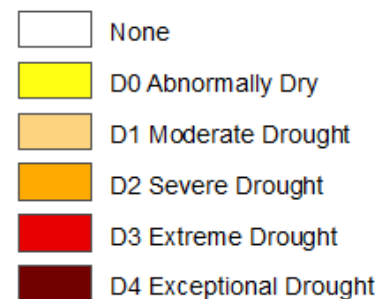


U.S. Drought Monitor Continental U.S. (CONUS)

January 19, 2021
(Released Thursday, Jan. 21, 2021)
Valid 7 a.m. EST



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:

Richard Tinker
CPC/NOAA/NWS/NCEP



droughtmonitor.unl.edu



WAP Update: First Increment Progress

PRRIP Water Advisory Committee
February 2, 2021

WAP Update Report

- Purpose
 - ▣ Document water plan progress, 2007-2019
 - ▣ Reflective of late 2019 conditions
- 5 Report Sections
 - ▣ Introduction
 - ▣ Water Action Plan Timeline
 - ▣ Status of Program Water Projects
 - ▣ Lessons Learned
 - ▣ Next Steps

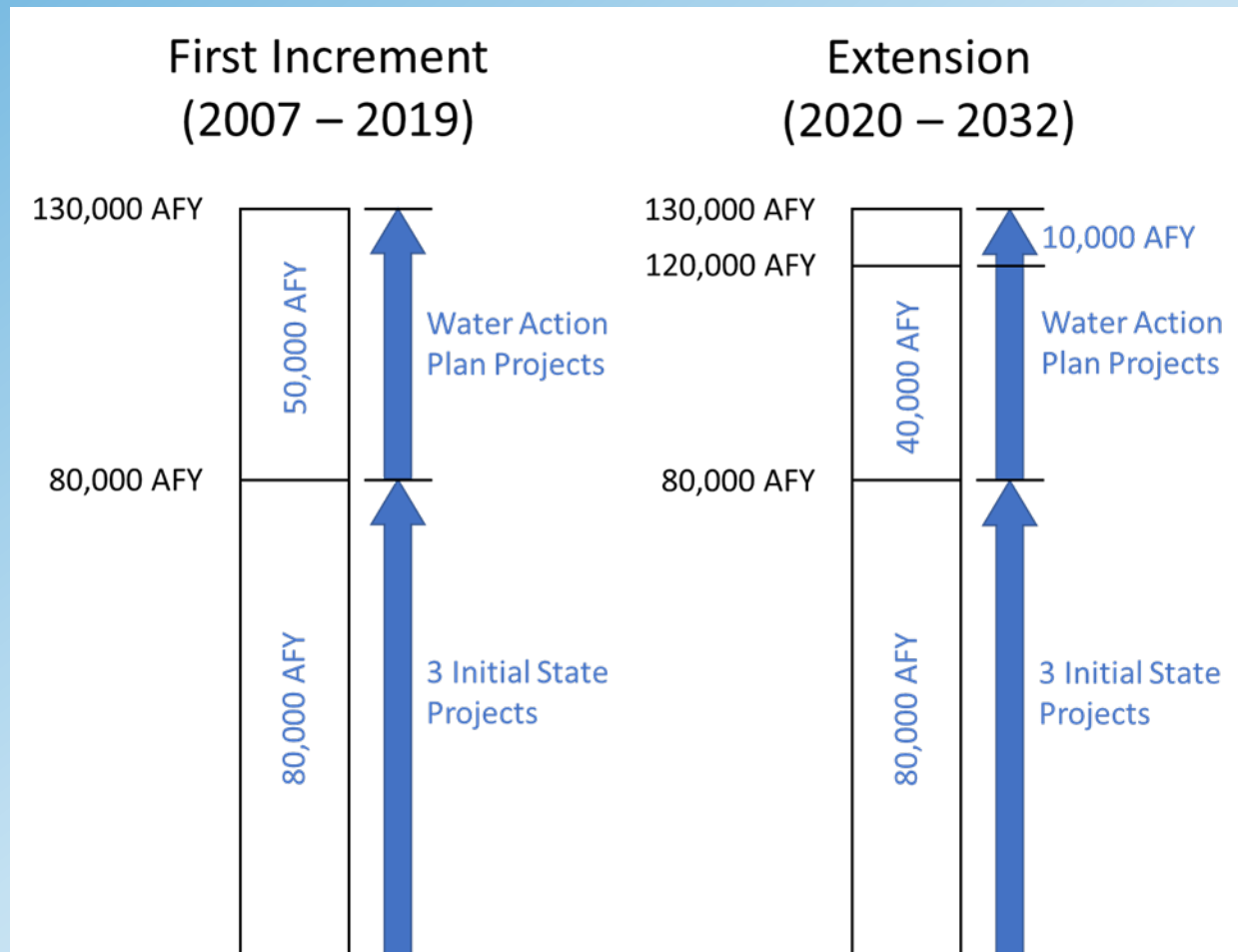


Introduction

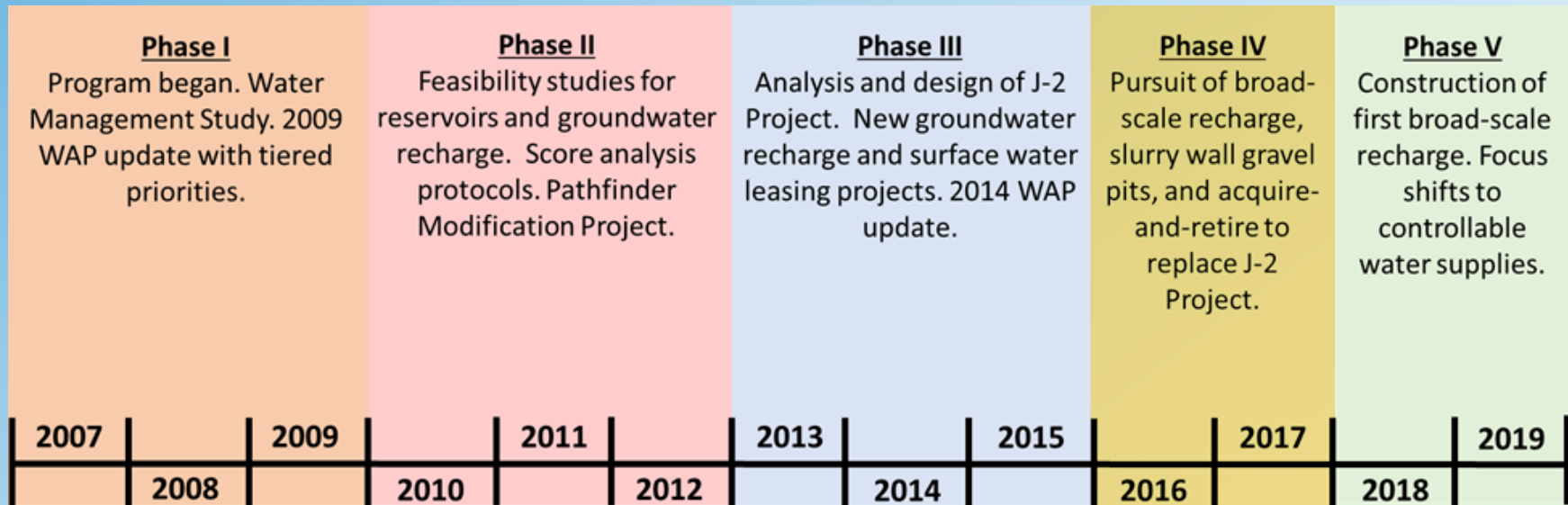
- ❑ First Increment Water Objective: Reduce target flow shortages by 130k-150k AFY
- ❑ 3 initial state projects: 80k AFY
- ❑ Milestone 4: Implement WAP to reduce target flow shortages by at least 50k AFY
 - ❑ Step 4.4: 2009 WAP Update (Year 3)
 - ❑ Step 4.5: 2014 WAP Update (Year 8)
 - ❑ New WAP Update not mandated
- ❑ Addendum to Program Document:
 - ❑ Still committed to 130k AFY
 - ❑ 120k AFY “as quickly as possible”
 - ❑ Science to determine if next 10k AFY justified



Introduction



WAP Timeline



Report documents key decisions and events in each year

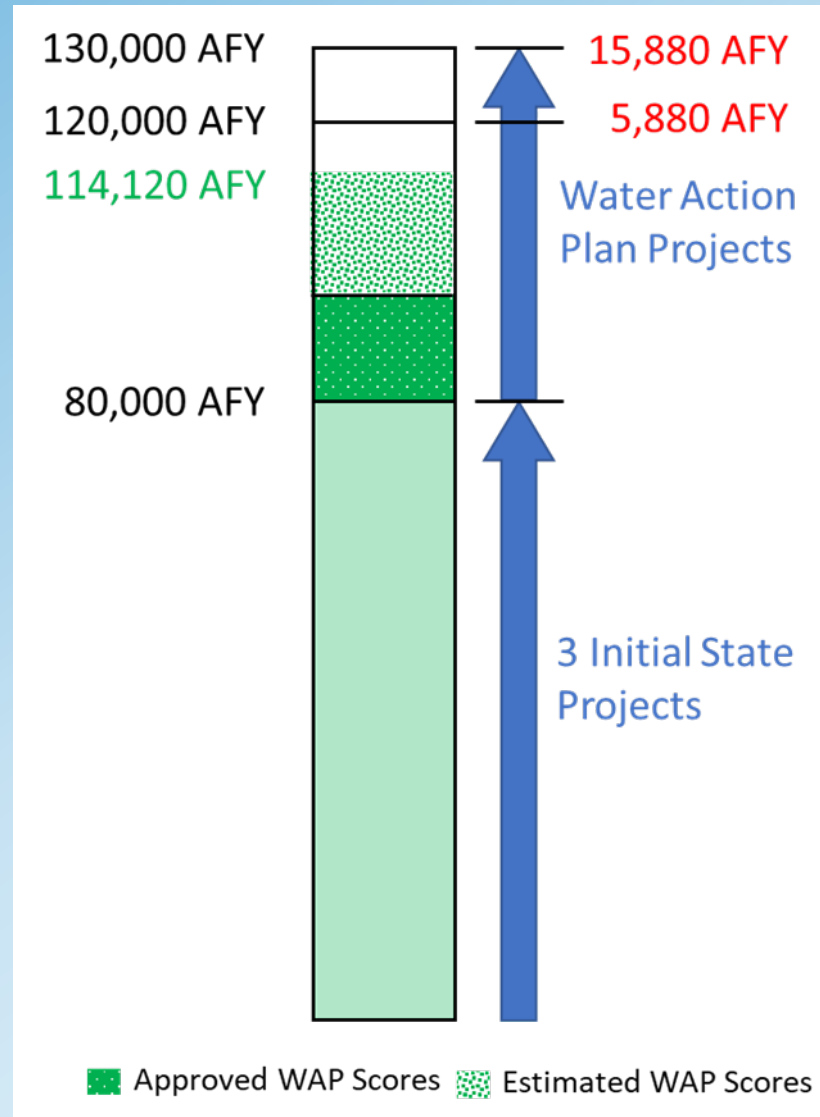


Status of Program Water Projects

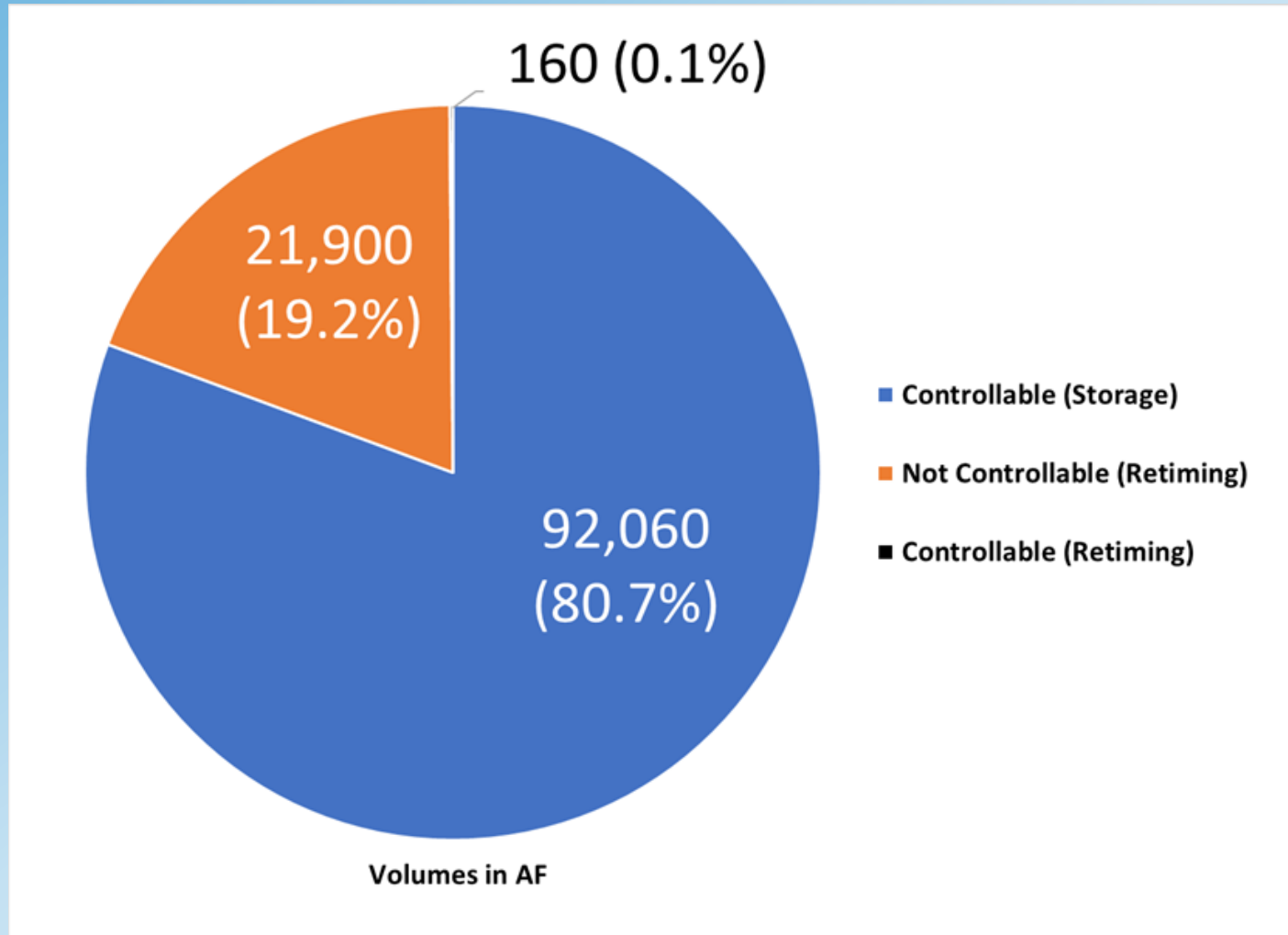
- 11 active WAP projects
- 2 major categories:
 - Groundwater recharge (Nebraska)
 - Water leasing (Nebraska + Pathfinder)
- Score summary
 - 6 approved = 14,170 AFY
 - 5 estimated = 19,950 AFY
 - Total = 34,120 AFY



Status of Program Water Projects



Status of Program Water Projects



Lessons Learned

- New infrastructure projects
 - ▣ Land acquisition
 - ▣ Permitting
 - ▣ Staff time
 - ▣ On the ground realities
 - ▣ Weather
- Surface water leases
 - ▣ Incentives to participate
 - ▣ Agricultural market conditions
 - ▣ Management of Lake McConaughy EA
- Groundwater recharge
 - ▣ Lack of Program control
 - ▣ Inefficient: large volumes input for comparatively low scores
 - ▣ Slow returns: steady baseflow, but not significant shortage reduction



Next Steps

- Need ~6,000 AFY to reach 120,000 AFY
- 3 potential future projects
 - Recapture wells = up to 8,000 AFY
 - North Platte leases = 2,500 AFY or more
 - CNPPID storage lease = 6,600 AFY
- Nebraska grand water bargain
 - Recharge + storage water projects
 - Long-term funding
 - Exceed 120,000 AFY on paper
- On track, but 2021 is pivotal
- Extension water management activities to be coordinated with AMP



Please provide comments
on the
Draft WAP Update Report
by
Friday February 12

Cottonwood Ranch Recapture Network

WAC Meeting

02/02/2021

Recapture Network

Memo to GC (regarding Cook well), May 2015:

- *“After the pilot is conducted in 2015/2016, the ED Office intends to compile data regarding groundwater levels, drain levels, pumping volumes and estimated scores and provide the information to the WAC. The groundwater pumping project could be expanded in the future, if supported by the WAC and GC.”*
- Have been talking w/ NRDs and DNR over last year about how to expand recapture project
- Phase I: Pilot sized recapture “network” ... more than 1 well
- Phase II: Regional recapture network

CWR Recapture Network

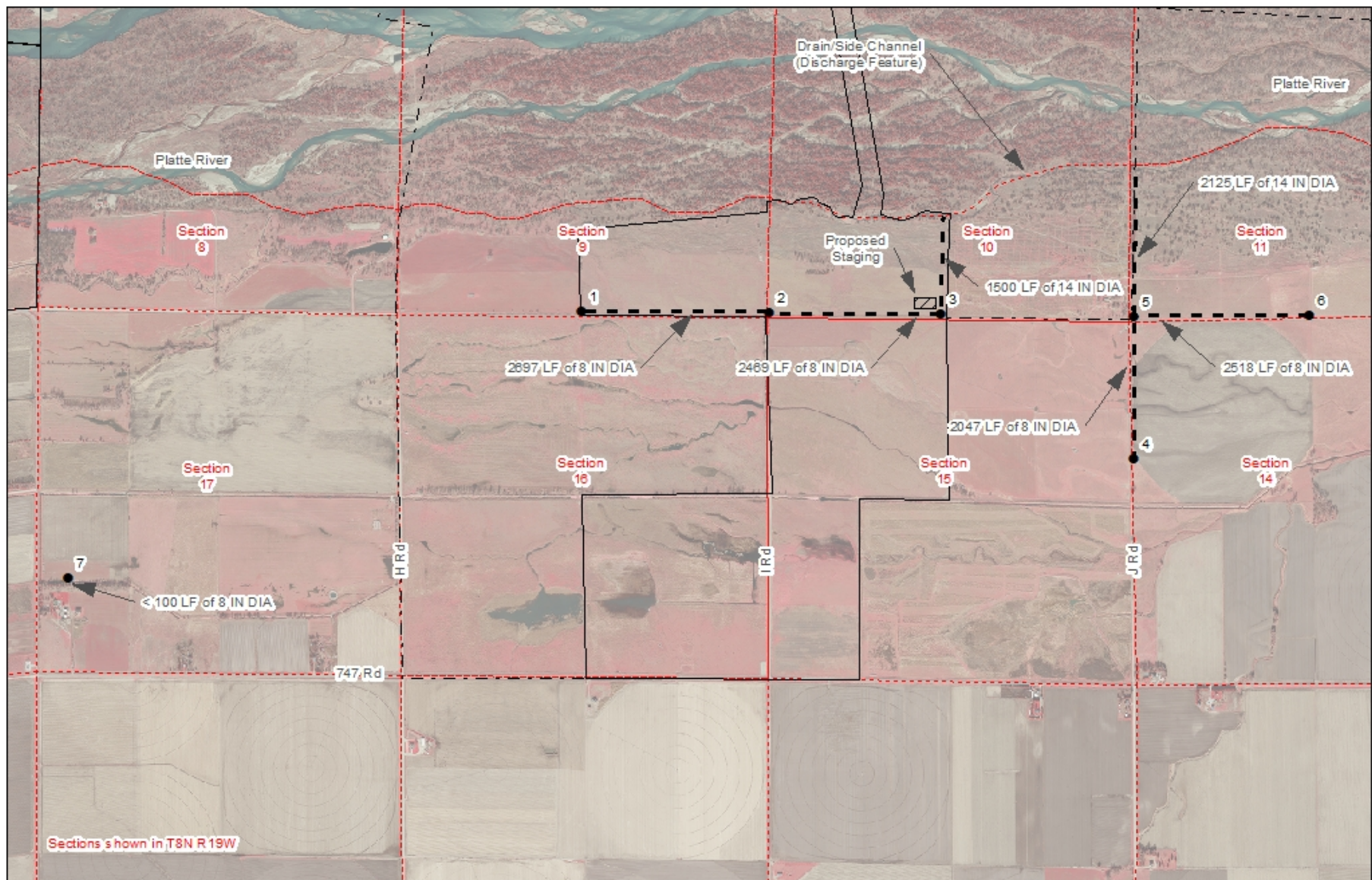
- Recapture network downstream/gradient of CWR recharge project

Benefits:

- Pilot project with “network” of several wells
- Re-time accretions from Phelps, Elwood and CWR recharge projects
- Controllable water adds for flexibility (test flows, etc.)
- Dewatering
- Rural support for fire departments

CWR Recapture Network

- Bid packages developed
- Agreements are secured
 - Network owned and operated by NRD
 - Program pays via WSA
 - Approved by GC and NRD Board
- Easements
 - Secured w/ non-PRRIF landowners
 - GC approval of PRRIF easements in March
- Permits



General Augmentation Plan

Conceptual/Draft for Review

Legend

- Augmentation Wells
- - - Pipeline Alignments
- ▨ Proposed Staging
- - - Program Leased
- ▭ Program Owned
- - - Sections



0 0.25 0.5 Miles

**Figure
1**

Date:
2/1/2021

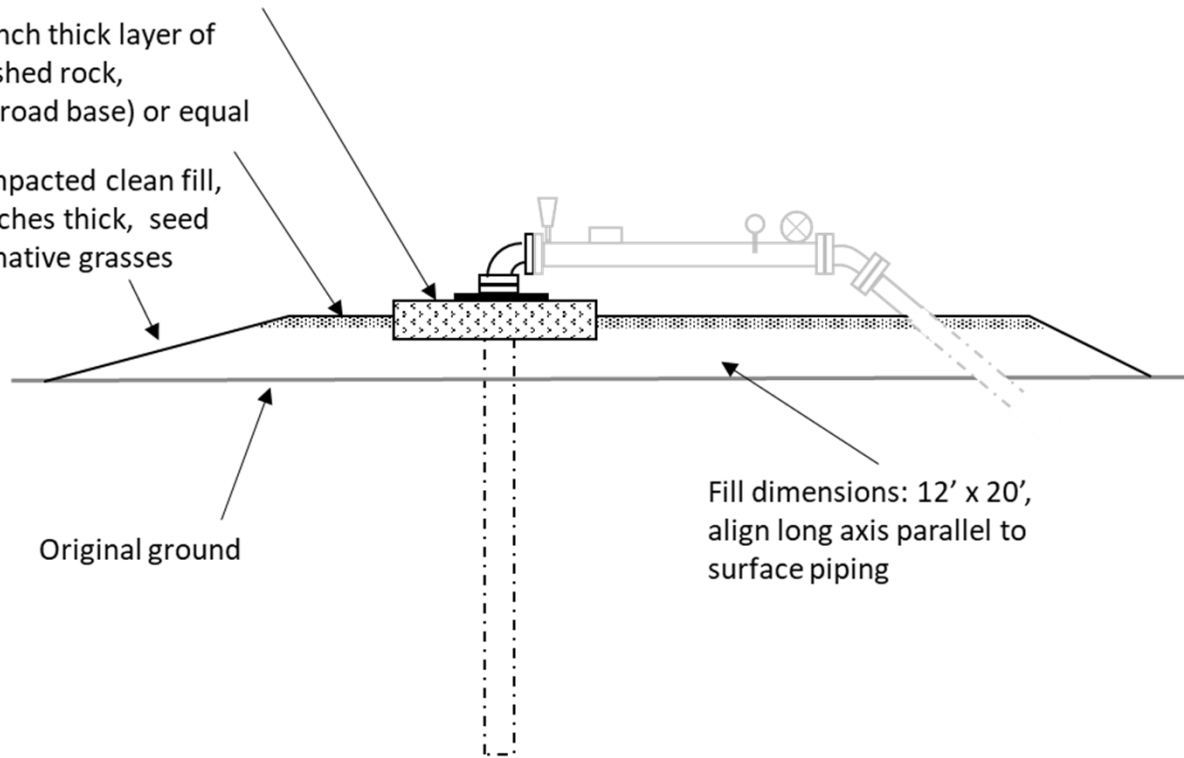
PRRIF Easements

- Construction, operation, maintenance, etc. related to wells and pipelines ...
- Drafts reviewed by ED and NCF
- Going to GC in March

Concrete pad per NEDHHS Title 178 Water Well Standards

4" inch thick layer of
crushed rock,
#5 (road base) or equal

Compacted clean fill,
8 inches thick, seed
w/ native grasses



Fill dimensions: 12' x 20',
align long axis parallel to
surface piping

Original ground

Not to Scale

Include air/vac valve, pressure gauge, flow control valve, backflow preventer (this contract). Flow meter provided by Owner. Provide minimum straight, obstruction-free distances upstream and downstream of meter, per specifications.

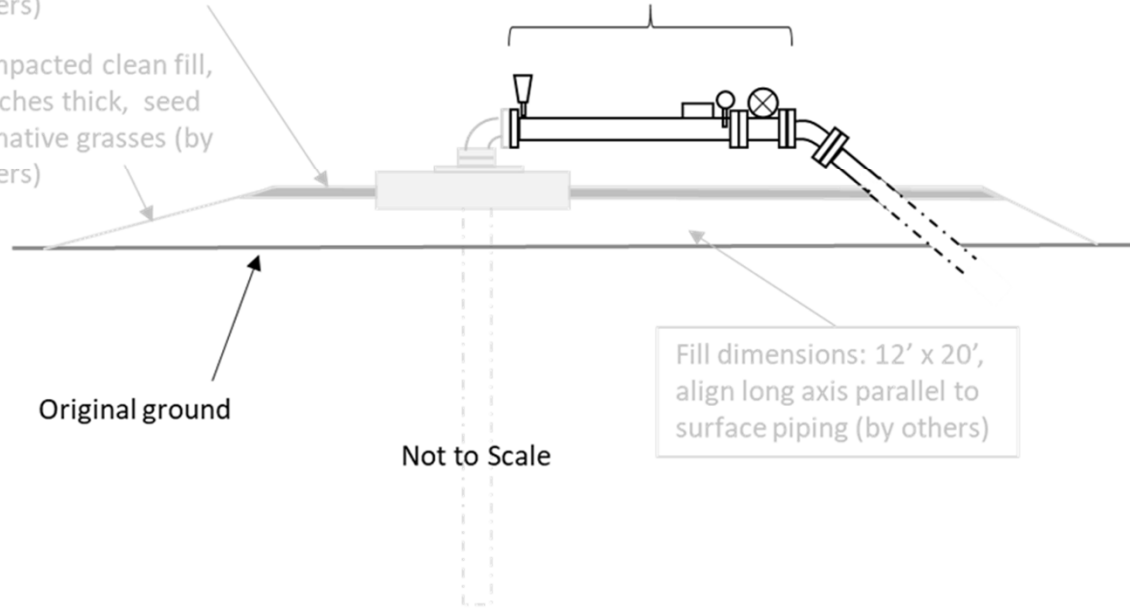
4" inch thick layer of crushed rock, #5 (road base) or equal (by others)

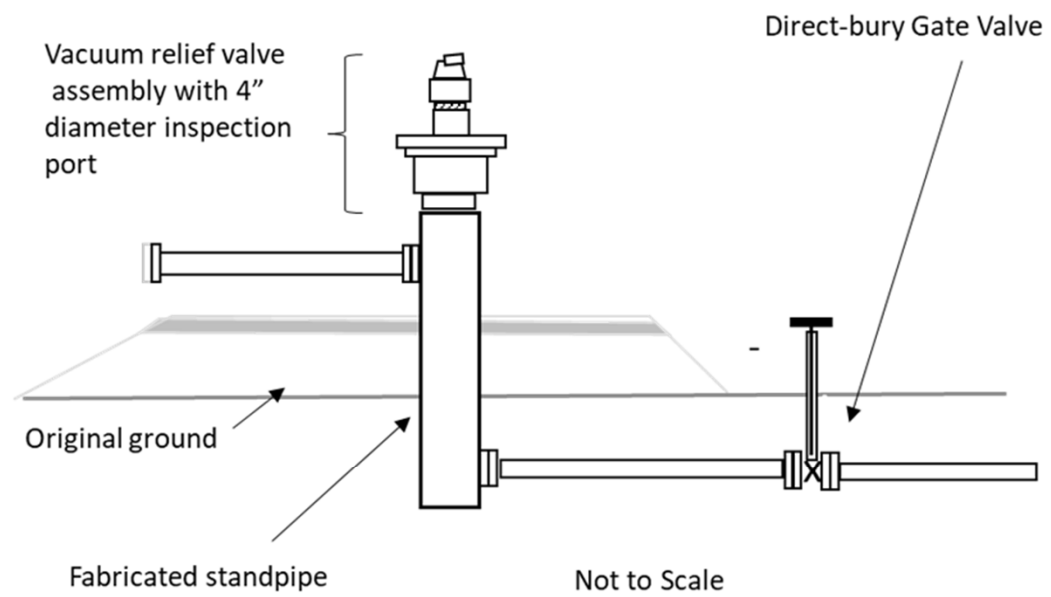
Compacted clean fill, 8 inches thick, seed w/ native grasses (by others)

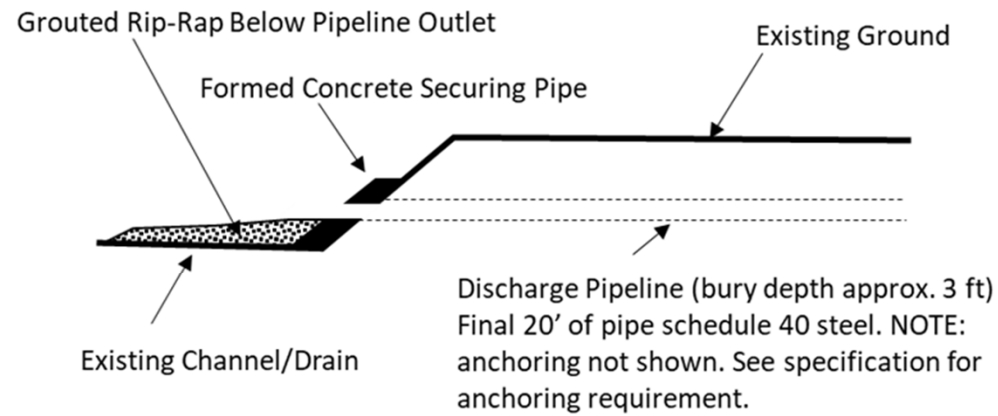
Original ground

Not to Scale

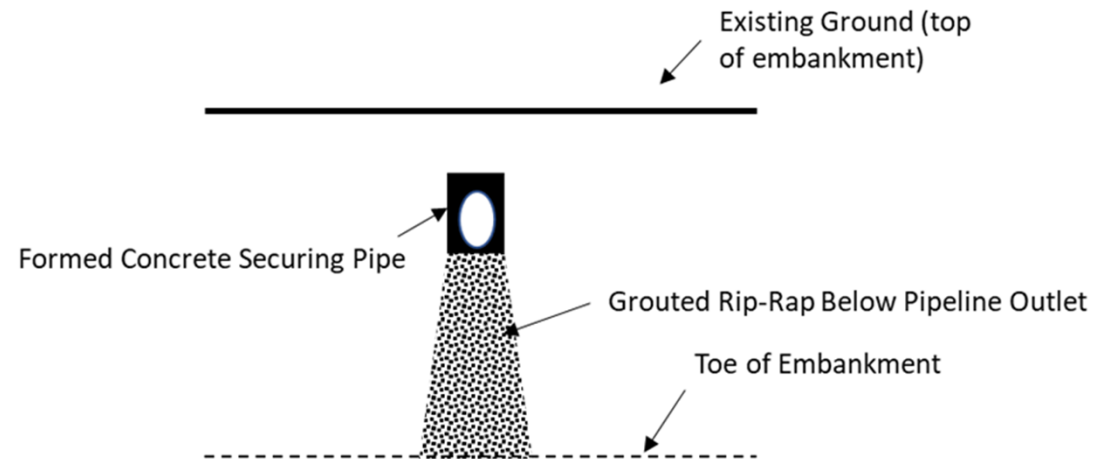
Fill dimensions: 12' x 20', align long axis parallel to surface piping (by others)







Profile



Plan

Timeline (all dates in 2021)

- Feb: Submittal to USACE
- March – April: Bid
- May: Permit from USACE
- May – August: Build
- Fall: Operate?



Operations

- Rules agreed to by NRD and PRRIP ... used primarily to reduce deficits to target flows, allows for control for other purposes
- NRD operates at request of PRRIP
 - SCADA for remote operation
 - Flow meters record outputs
- Observation wells to monitor gw levels

Reach-Wide Monitoring WAC Meeting Feb. 2, 2021

Julia Grabowski



Outline

RWM Background



RWM Report Contents

- Methods
- Preliminary Results



Future of RWM

RWM Goals

- Document spatial and temporal trends in channel morphology and vegetation
- Evaluate relationships between the changes and natural drivers (flow)
- Serve as effectiveness monitoring for PRRIP management
- Serve as a resource for evaluating PRRIP hypotheses
- Deliverable: annual report

Background

- Field Methods: 2010-2016
- Scale: 40 sites at 5 mi intervals
- Channel morphology: bed elevation transects
- Land cover: quadrat surveys
- Sediment supply: samples at 5 bridges
- Remote Sensing: 2017-



Remote Sensing Methods

- Scale:
 - 3-foot resolution aerial imagery (B,G,R,NIR)
 - 1-foot resolution LiDAR (highest-hit; topobathymetric)
- Channel morphology: 2D hydraulic modeling
- Land cover: Object-based classification
- Sediment supply: Topobathymetric elevation differencing

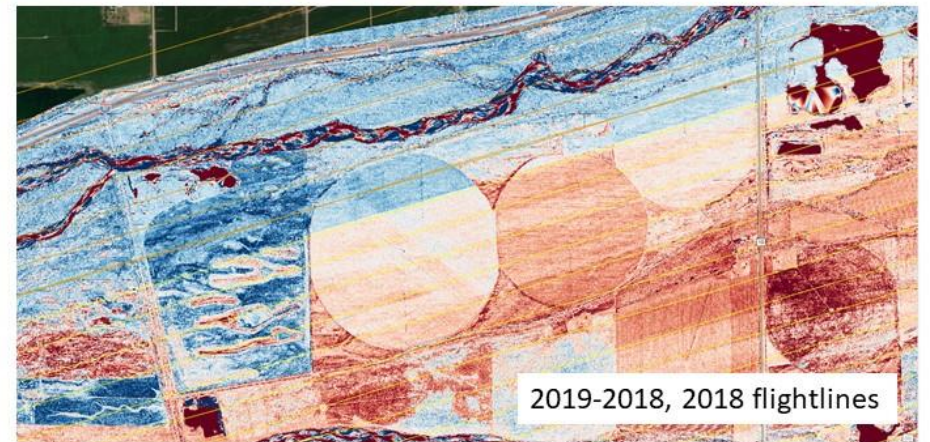
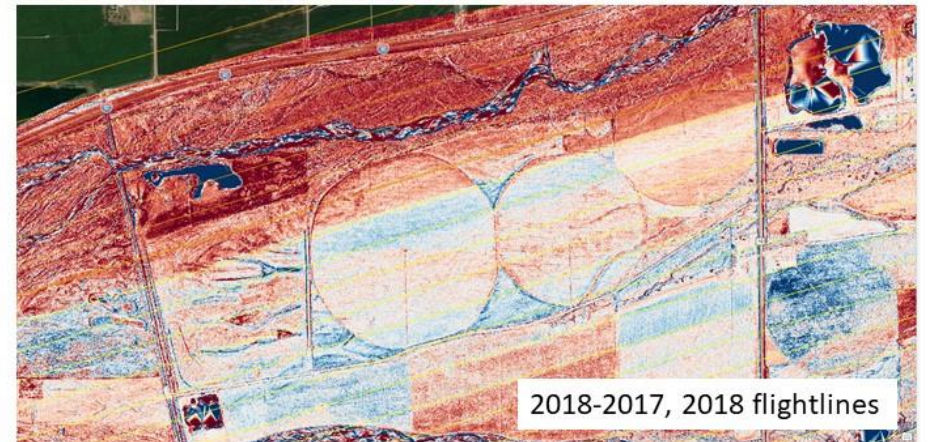
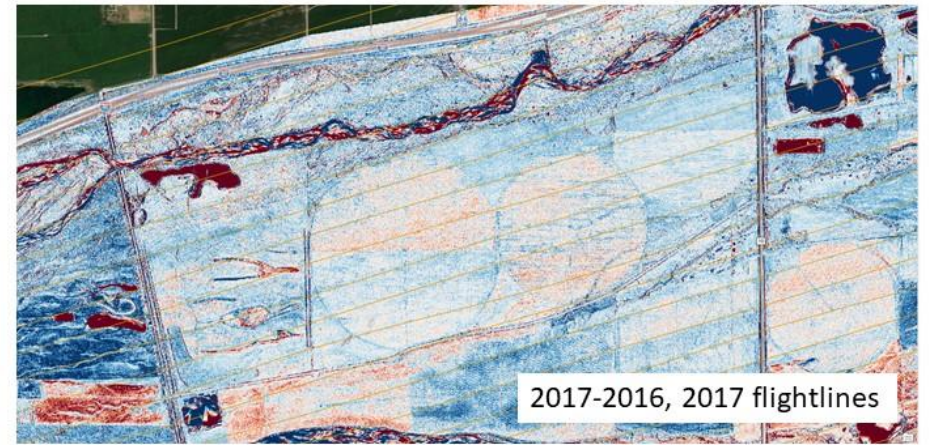
RWM Contents

- Hydrologic Conditions
- Management Actions
- Channel Morphology and Hydraulics Analysis
- In-Channel Vegetation and Land Cover Analysis
- Volume Change Analysis
- Whooping Crane Metrics
- Analysis of in-channel vegetation drivers

LiDAR Issues

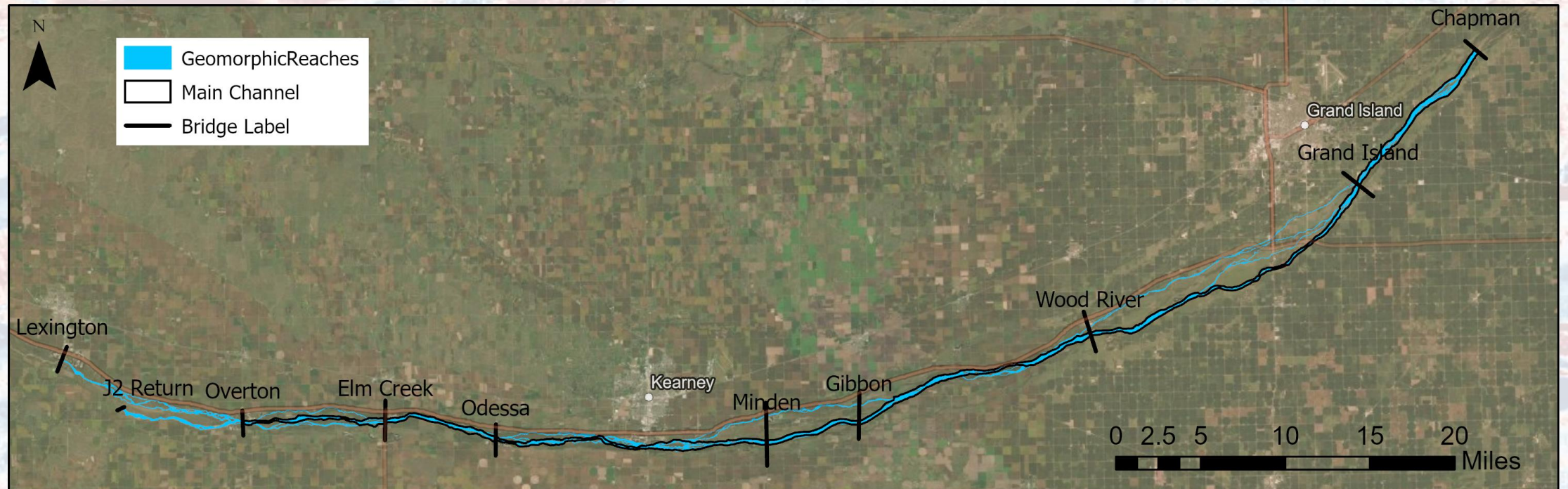
*** All results in this presentation are preliminary ***

- Reprocessed data coming this Spring



Reporting Scale

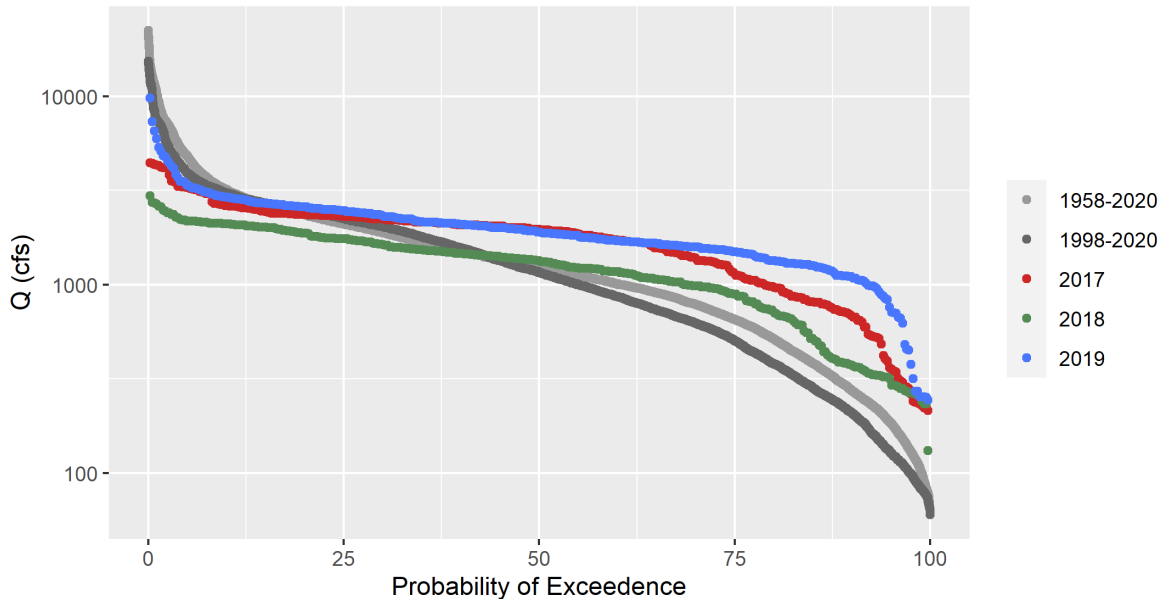
- Year
- Geomorphic Reach
- Channel type (main, side, all)



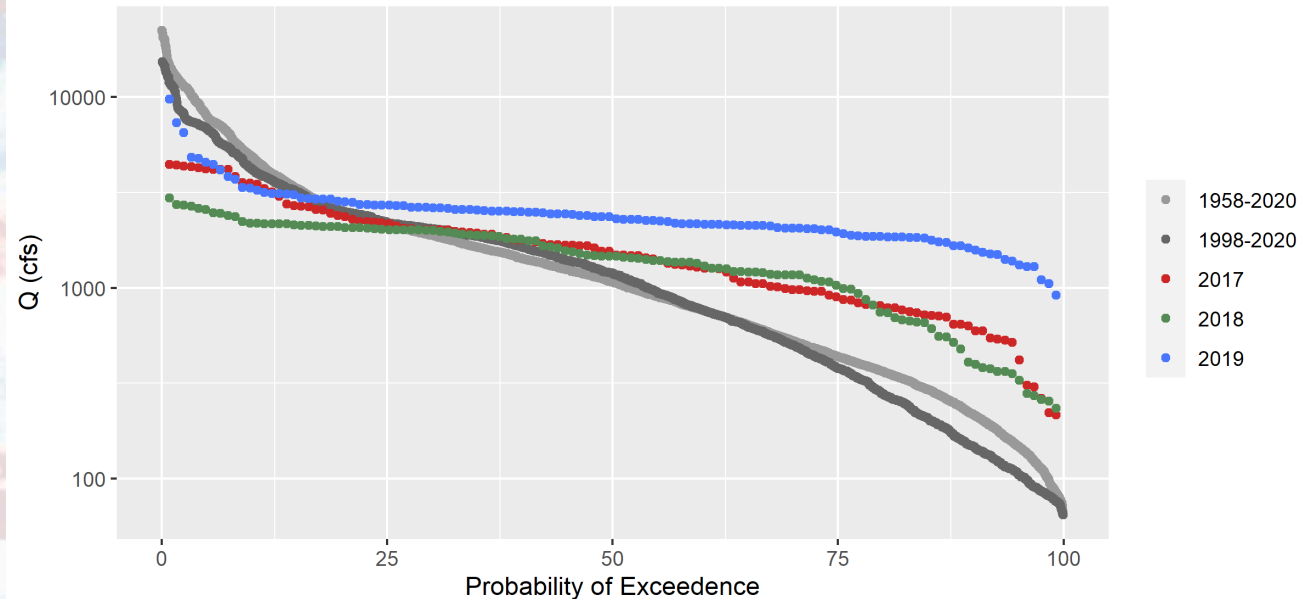
Hydrologic Conditions

- Q_{Max} , $Q_{40\text{Avg}}$, $Q_{\text{Germination}}$, Q_{SpringWC} , Q_{FallWC}

Flow Exceedence Curve, Overton Gage, Full Water Year



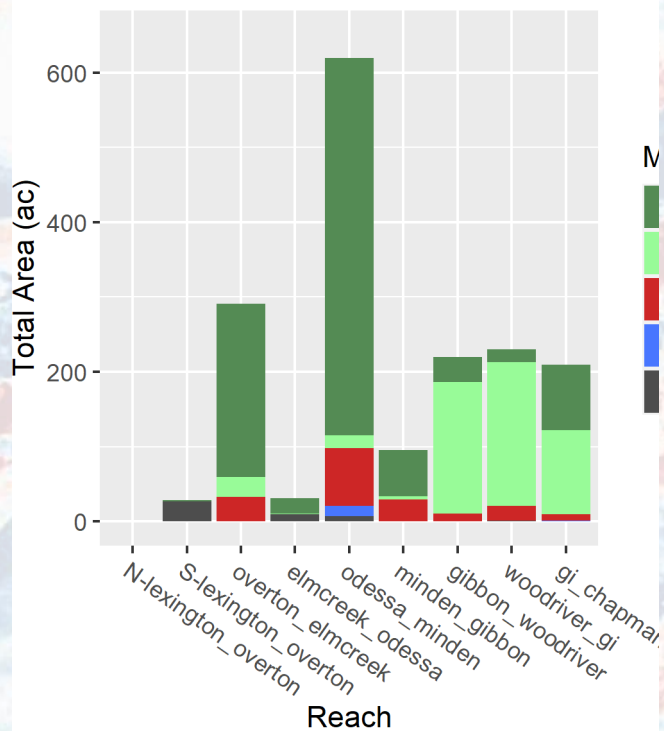
Flow Exceedence Curve, Overton Gage, Germination Season : 4-1:7-31



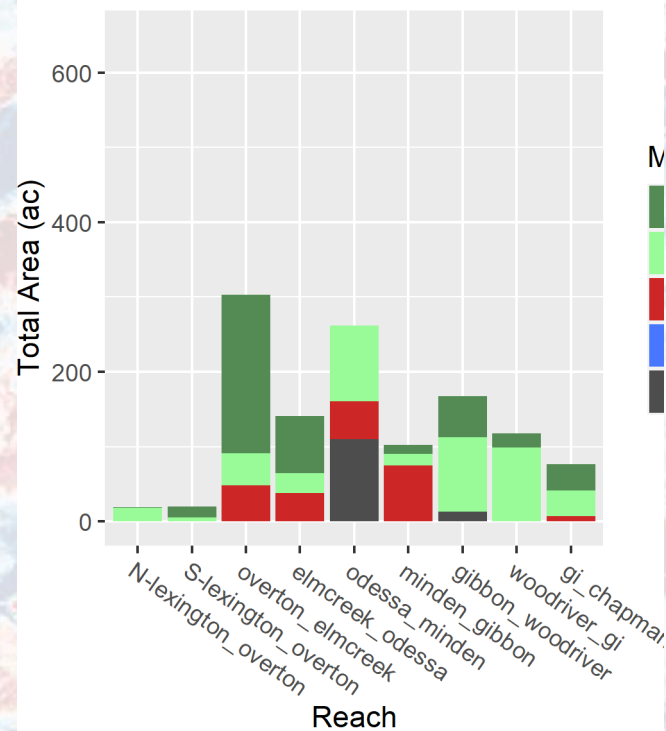
Management Action Data

- Geodatabase compiled by Tim Tunnell
- Area, in acres of each type of management action by geomorphic reach

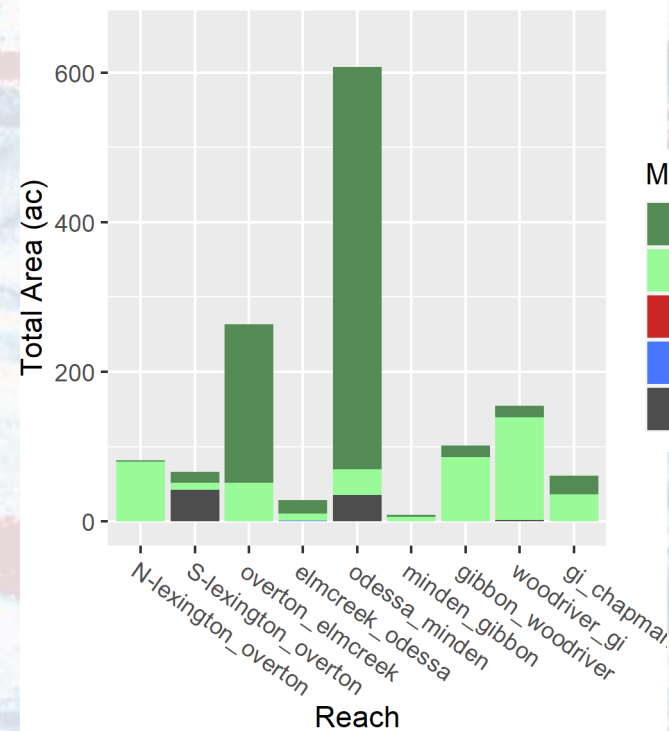
Area of Management Actions, 2017



Area of Management Actions, 2018



Area of Management Actions, 2019



Mgmt Action Type

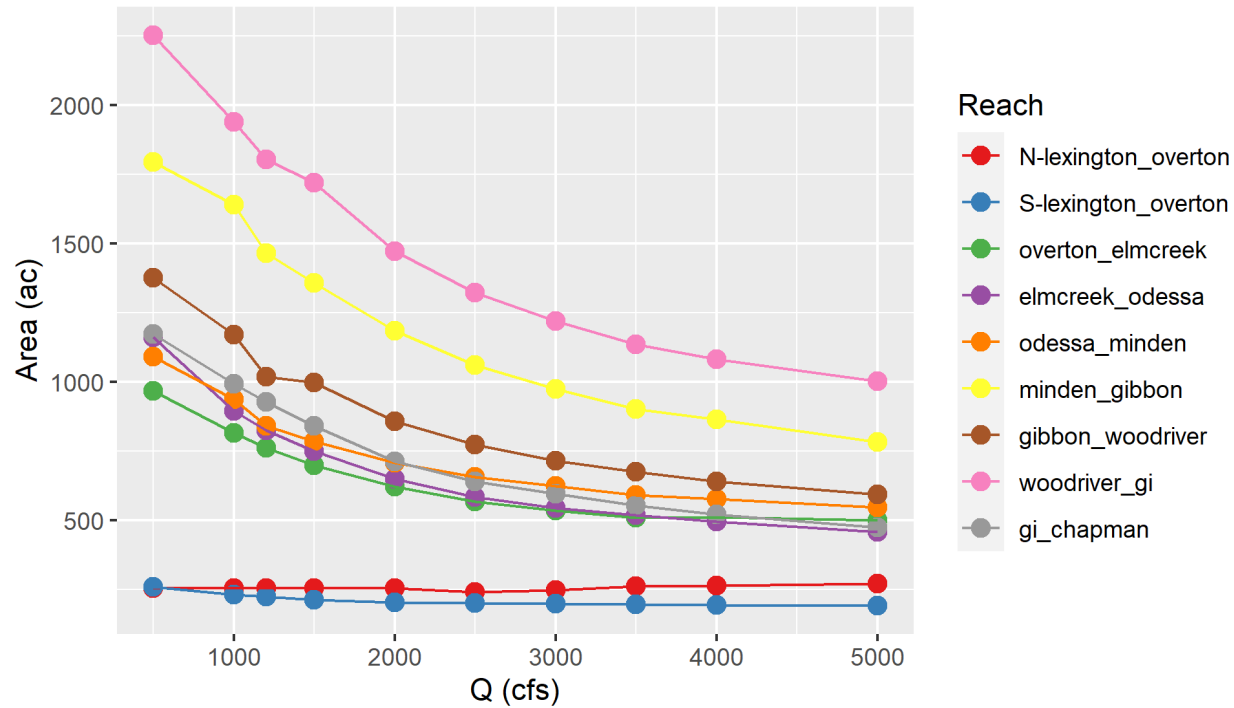
- Herbicide Application, PRRIP Property
- Herbicide Application, Other Property
- Disking
- Tree Clearing
- Prescribed Burning

Channel Morphology and Hydraulics

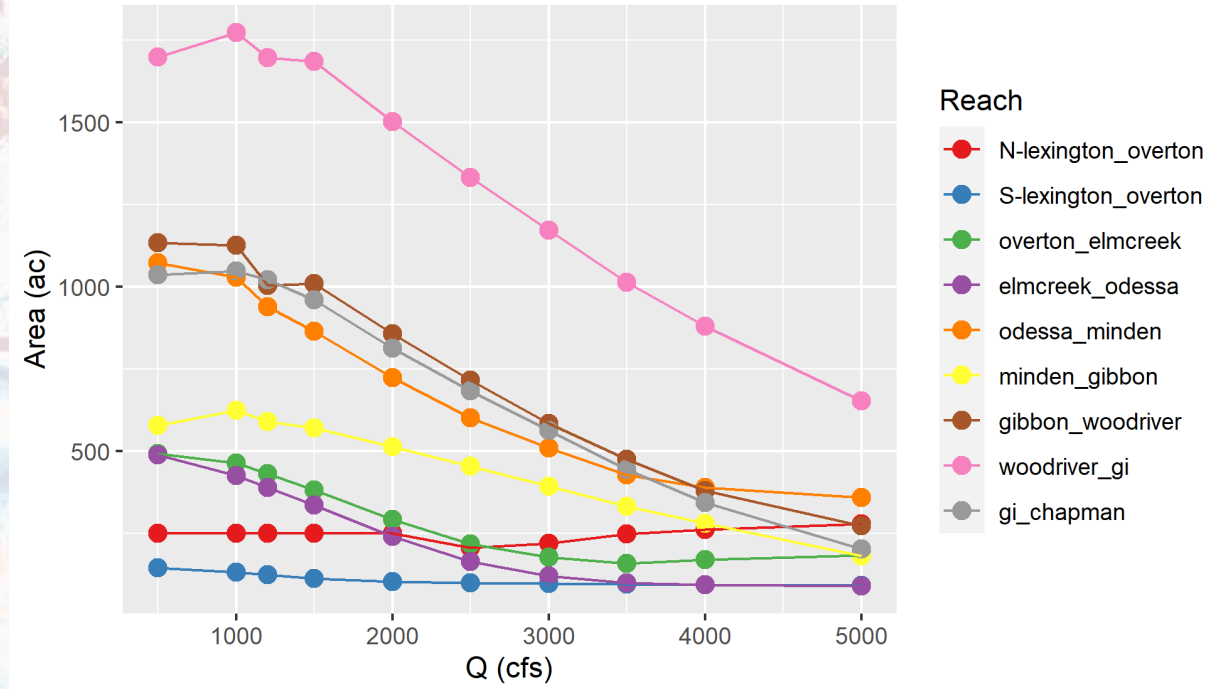
- 2D Modeling with LiDAR data – Tom Smrdel
- 2018 and 2019 have been run, 2017 on deck
- RWM Metrics:
 - Total wetted area
 - Average depth
 - Average width
 - Width to depth ratio
 - Total area with depth less than one foot

Hydraulic Modeling Results

Width:Depth Ratio by Flow: All Channels, 2019



Area <1 ft Area by Flow: All Channels, 2019

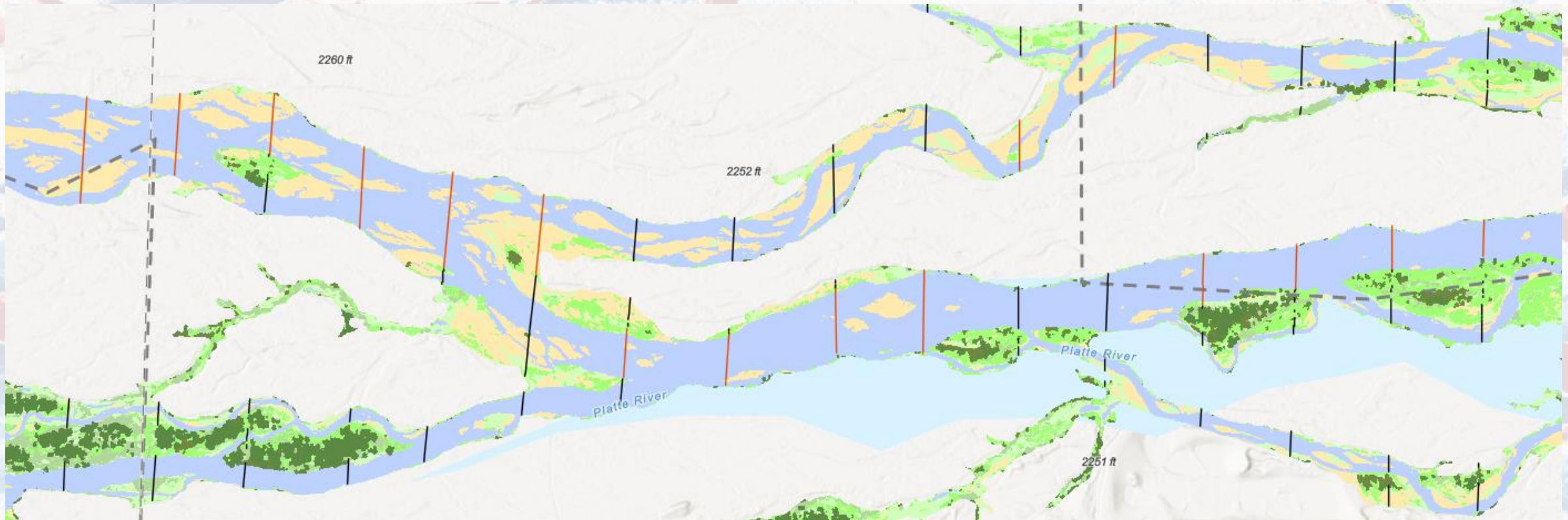


In-Channel Vegetation Cover Analysis

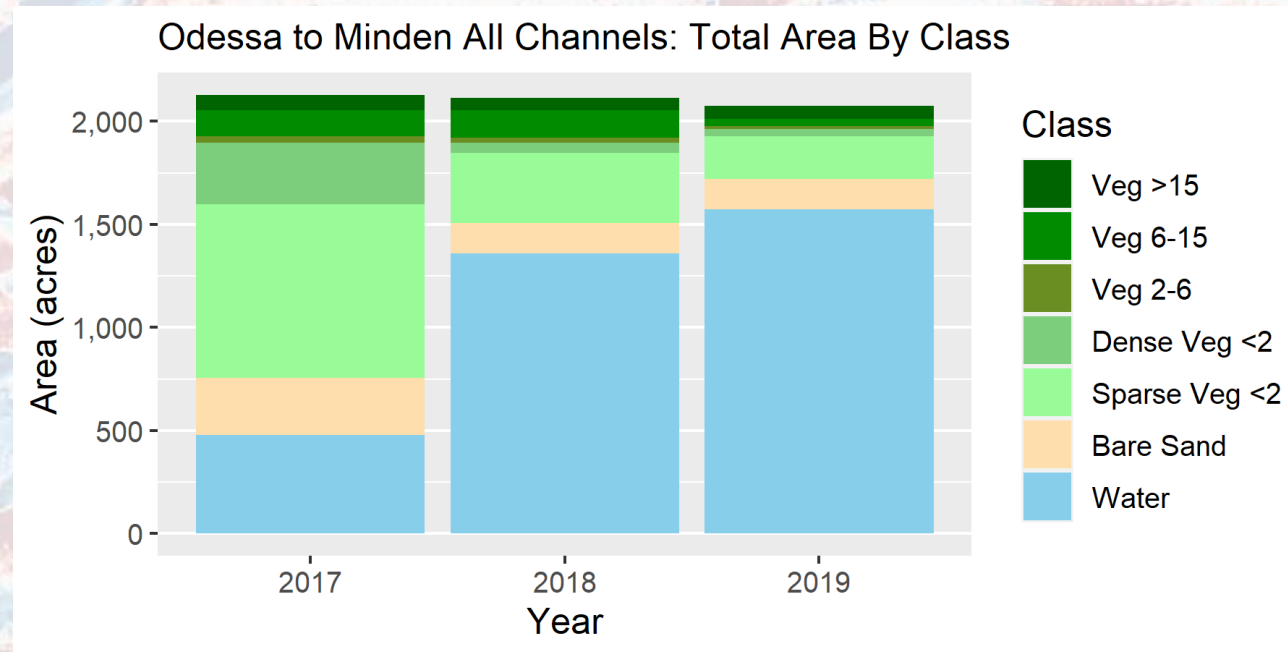
- Classification of LiDAR DSM (HH-BE) and aerial imagery with E-Cognition object-based methods
 - NDWI, NDVI, Vegetation height
- Masking: 5,000 cfs polygon
- Classes:
 - Water
 - Bare Sand
 - Vegetation: <2 (Sparse+Dense); 2-6; 6-15; 15+ ft
- Comparison to field points
- Calculating total and maximum unobstructed (<2ft) width (TUCW&MUCW)

TUCW and MUCW

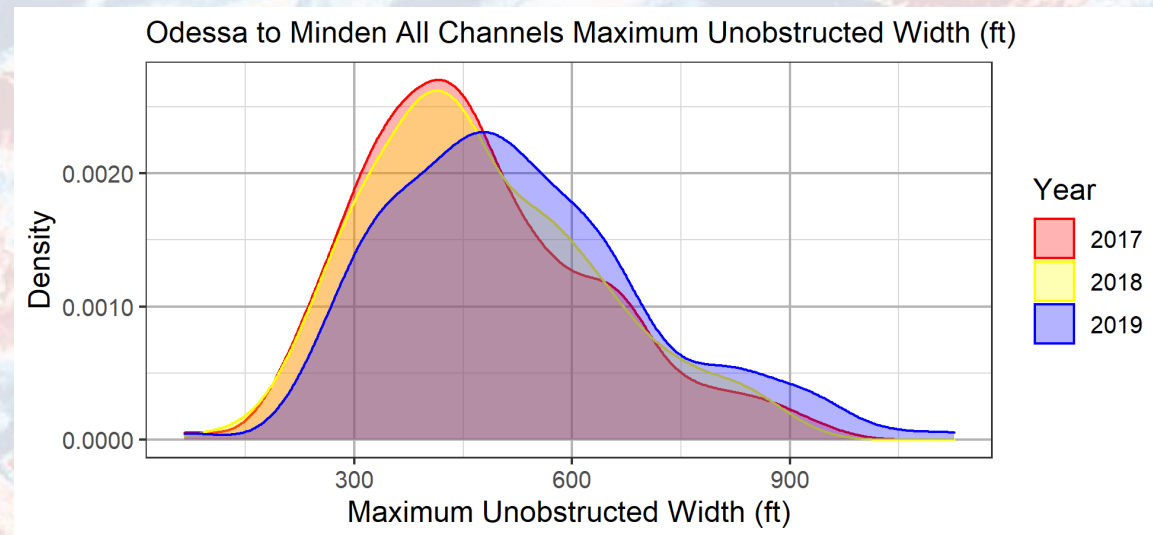
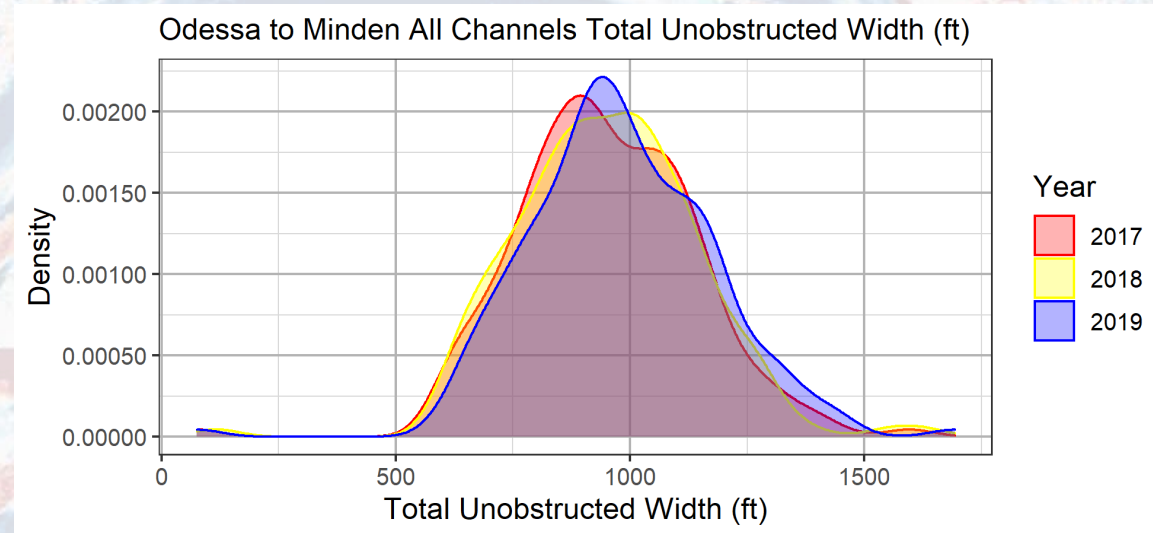
- TUCW: black + red lines
- MUCW: red lines only



Example: Odessa to Minden Reach



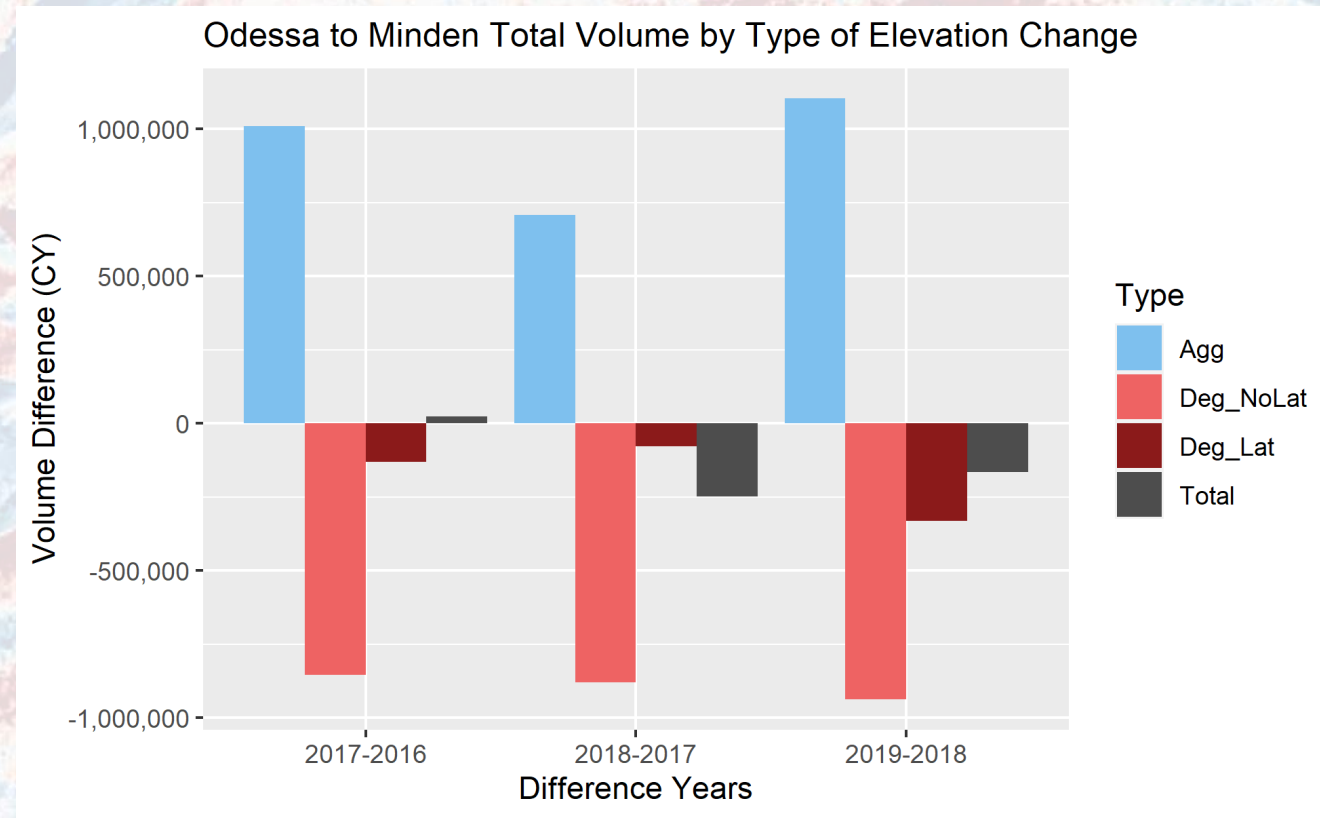
Example: Odessa to Minden Reach



Volume Change Analysis

- Difference topobathymetric LiDAR rasters
- Sum total volume change
- Classify volume change by type
 - Aggradation (>0 ft)
 - Degradation (0 : -2 ft)
 - Lateral Erosion (<-2 ft)

Example: Odessa to Minden

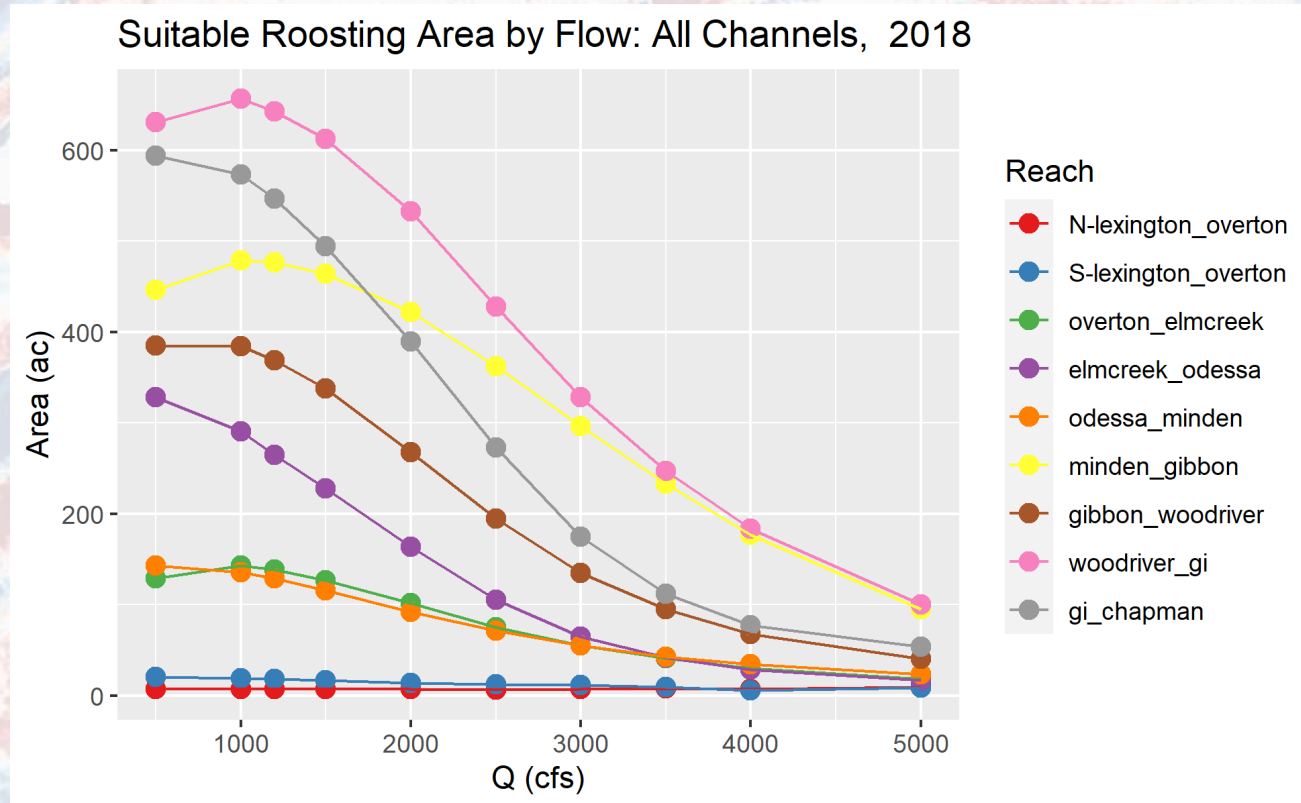


Agg=Aggradation; Deg_NoLat=Degradation (0:-2 ft); Deg_Lat=Lateral Erosion

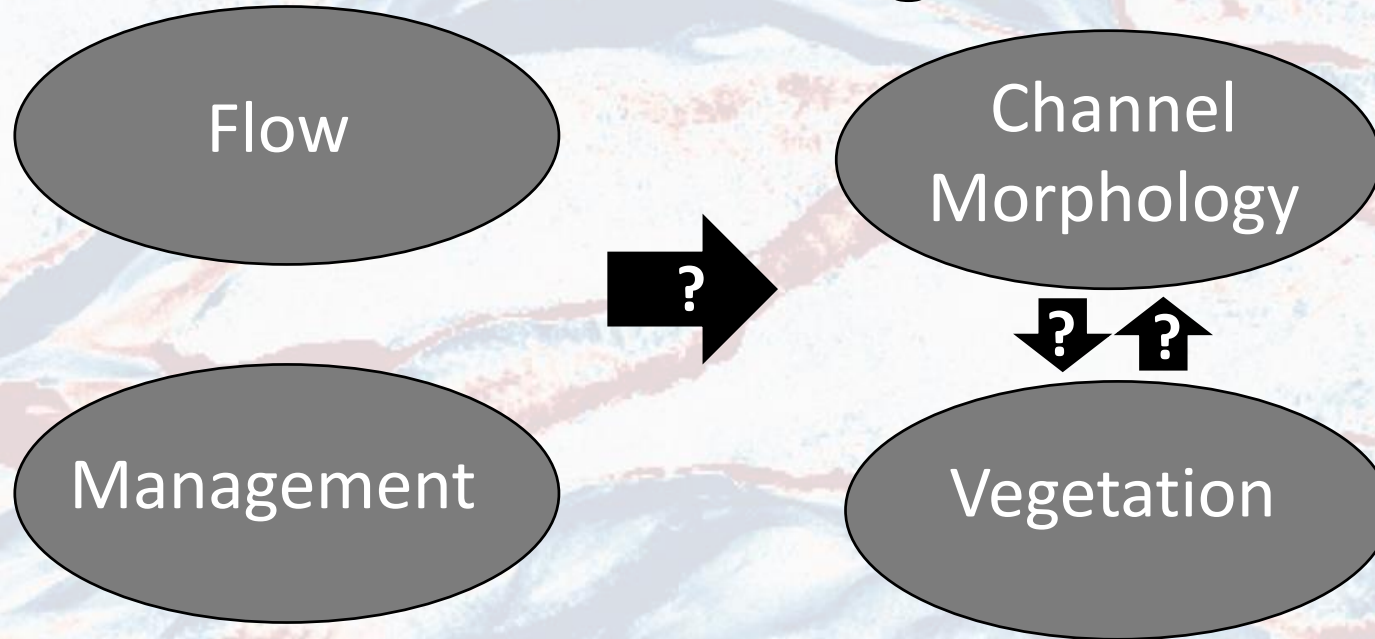
Whooping Crane Habitat Metrics

- Maximum Unobstructed Channel Width
- Suitable Roosting Area, by modeled flows
 - MUCW >650 ft
 - Water <1 ft deep

Suitable Roosting Area



Analysis of in-channel vegetation drivers



- SedVeg model?
- Other models in development
- Comparison of RWM Metrics: PRRIP-management vs other

Future of RWM

- For now: revising methods; seeking input from stakeholders
- Short-term
 - Re-running analysis with revised LiDAR
 - Representation of results with ArcGIS Online
- Long-term
 - Addressing other hypotheses?
 - Seeking academic partners?

Questions?

Julia Grabowski

grabowskij@headwaterscorp.com



2021 Water Plan Tasks

PRRIP Water Advisory Committee
February 2, 2021

North Platte Chokepoint

- ❑ Final report of 2020 flow test distributed in December
- ❑ Reconvene planning workgroup
 - Same members as last year (need to add reps from Nebraska DNR and environmental groups)
 - Late February-Early March
 - Review next steps options from report
 - Make recommendations
- ❑ Present specific actions to WAC and GC
- ❑ Up to \$10k budgeted for vegetation control measures in 2021



Water-related work plans

- ❑ Finalize WAP Update Report
- ❑ Finish CPNRD/NPPD recharge scoring (subject to completion of COHYST revisions)
- ❑ Water projects accounting for 2019 and 2020
- ❑ Glendo water lease (Enterprise)
- ❑ Operation of the Cottonwood Ranch BSR project
- ❑ Installation and operation of the recapture well pilot project



Water-related work plans

- ❑ Modeling of EA releases to support AMWG efforts
- ❑ Documentation of wet meadows hydrologic study
- ❑ Documentation of Cottonwood Ranch groundwater model
- ❑ Sediment Augmentation, Year 5: 80k more tons and cumulative analysis
- ❑ Germination suppression experiment design and implementation
- ❑ Finalize and continue reach-wide monitoring (geomorph and veg monitoring)

