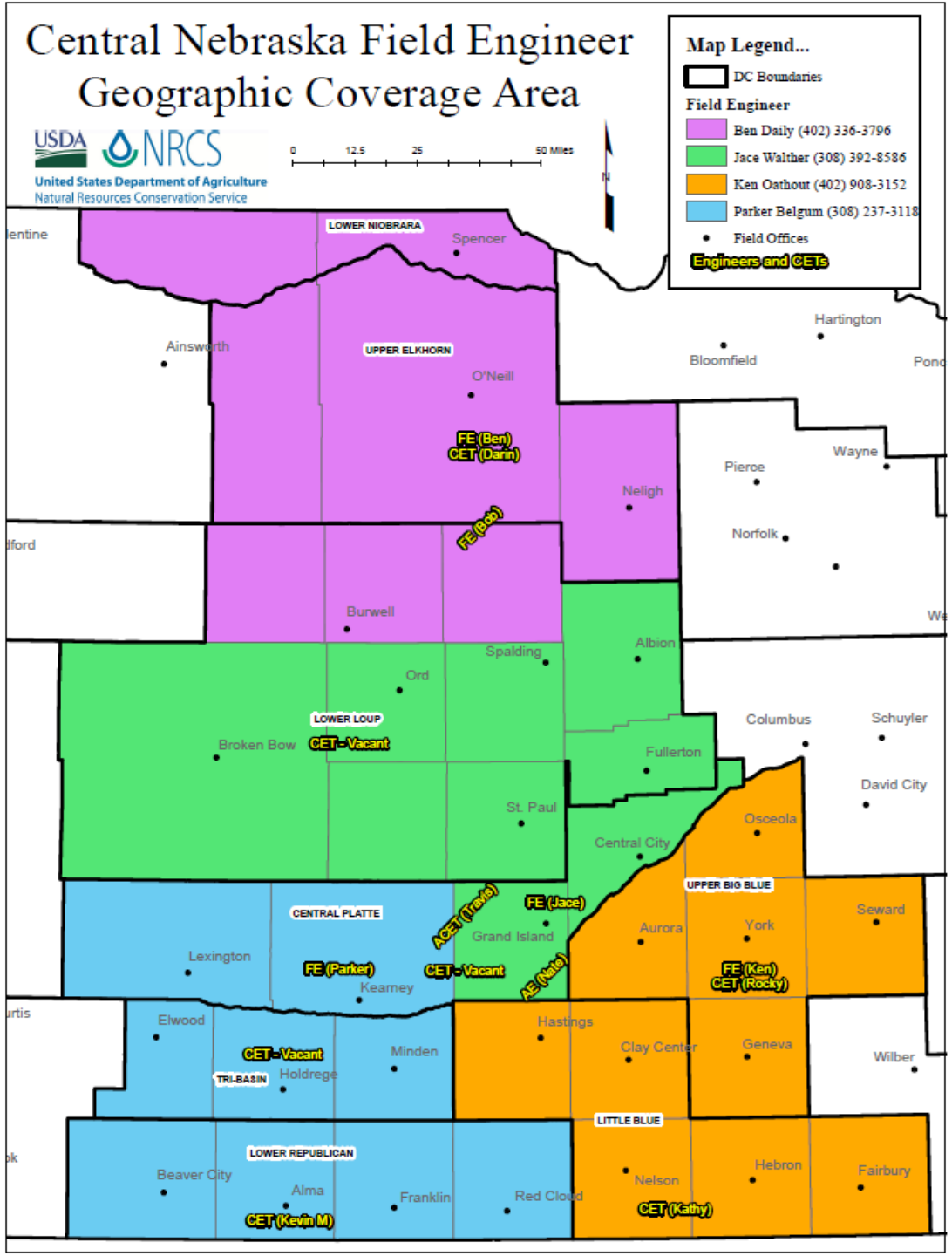
Integrated Planning - Engineering

NRCS Engineers

NRCS

Central Nebraska Field Engineer Geographic Coverage Area



Application, Ranking, Offers, Restoration – One engineer's opinion of timeline

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    - Assuming landowner accepts offer…

ACEP Team works their magic and easement is closed ~ 1 ½yr

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NRCS Wetland Restoration (CPS 657)

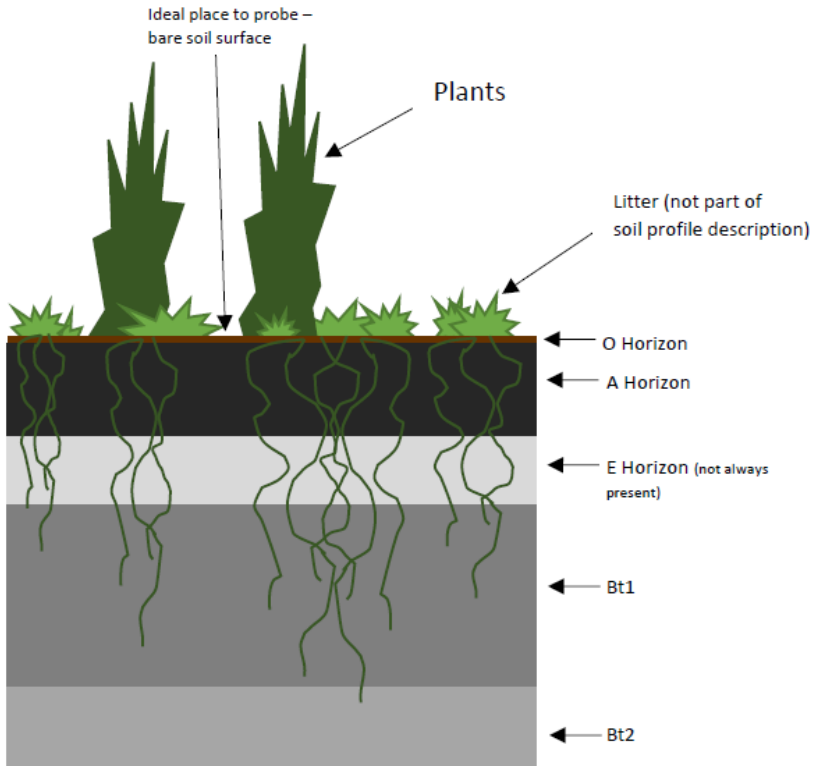
PURPOSE:

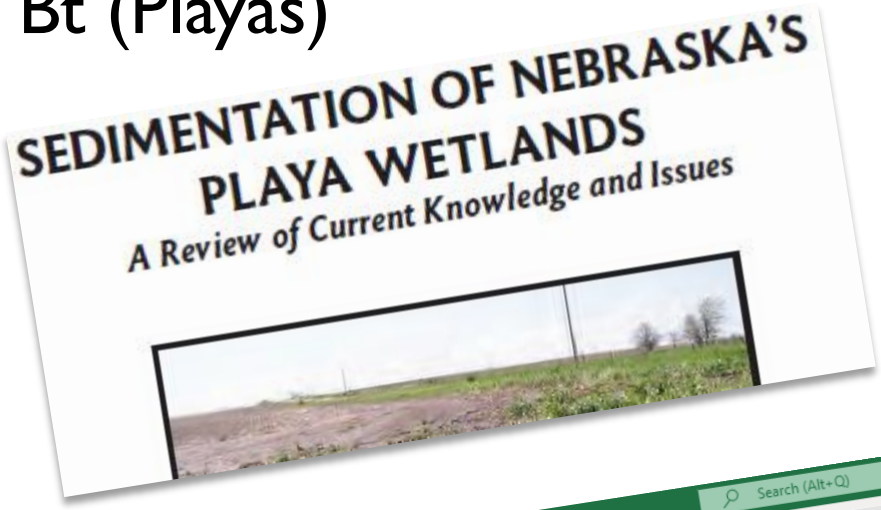
To restore wetland function, value, habitat, diversity, and capacity to a close approximation of the predisturbance conditions by restoring:

- Conditions conducive to **hydric soil** maintenance.
- Wetland **hydrology** (dominant water source, hydroperiod, and hydrodynamics).
- Native hydrophytic **vegetation** (including the removal of undesired species, and/or seeding or planting of desired species).
- Original fish and wildlife **habitats**.

Planning Information needed

- Soils investigation (Soil Scientist)
  - Sedimentation depths / Depth to Bt (Playas)





Average_sediment_depth_from LaGrange_et_al_2011 (2).xlsx • Last Modified: 8/27/2018

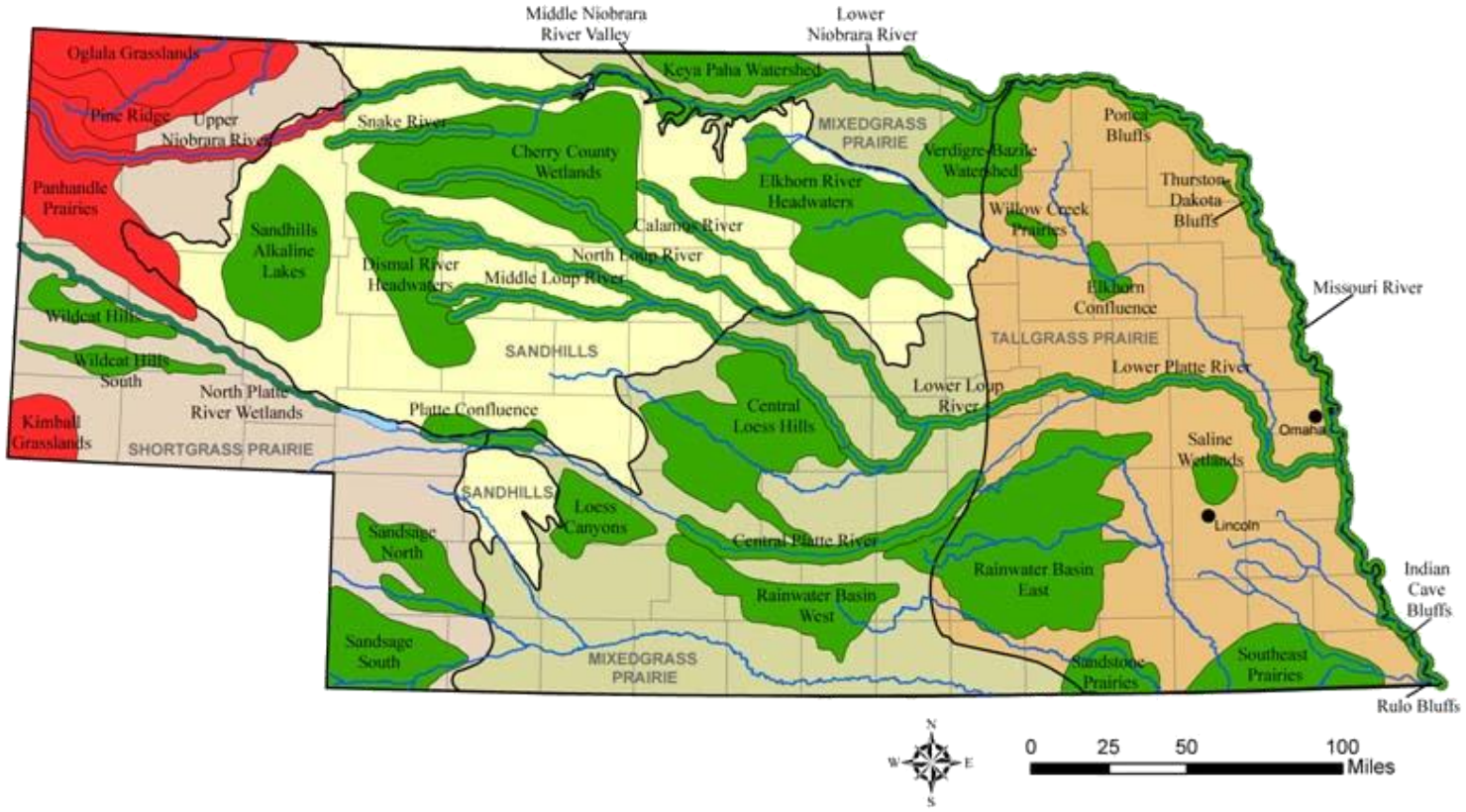
County	Year printed	Playa Complex Region	Soil Name	Depth to Claypan	Low Depth	High Depth	Average Depth	Land Use	Notes
Adams	1923	Rainwater Basin	Scott silt loam	1 to 12 inches	1	12	6.5	pasture and waste	"gray layer " (E horizon) desc
Butler	1929	Rainwater Basin	Scott Silt Loam	5 to 11 inches	5	11	8	pasture, hayland and waste	A: 3 to 6 inches thick; E: 2 to 5 inches thick
Clay	1927	Rainwater Basin	Scott Silt Loam	8 to 12 inches	8	12	10	pasture and hayland-some waste	"gray layer " (E horizon) desc
Fillmore	1918	Rainwater Basin	Scott silty clay loam	1 to 4 inches	1	4	2.5	35 percent drained and cultivated ; the rest is pasture and hayland	No "gray layer" (E horizon) described
Fillmore	1918	Rainwater Basin	Scott Silt	7 to 25	7	25	16	20 percent under cultivation	"gray layer " (E horizon) desc

Planning Information needed

- Soils investigation (Soil Scientist)
  - Sedimentation depths / Depth to Bt (Playas)
  - Depth to sand (Wet Meadows & River Sloughs)
  - Depth to ground water (Wet Meadows & River Sloughs)
  - Wetland delineation (Borrow or spoil areas)

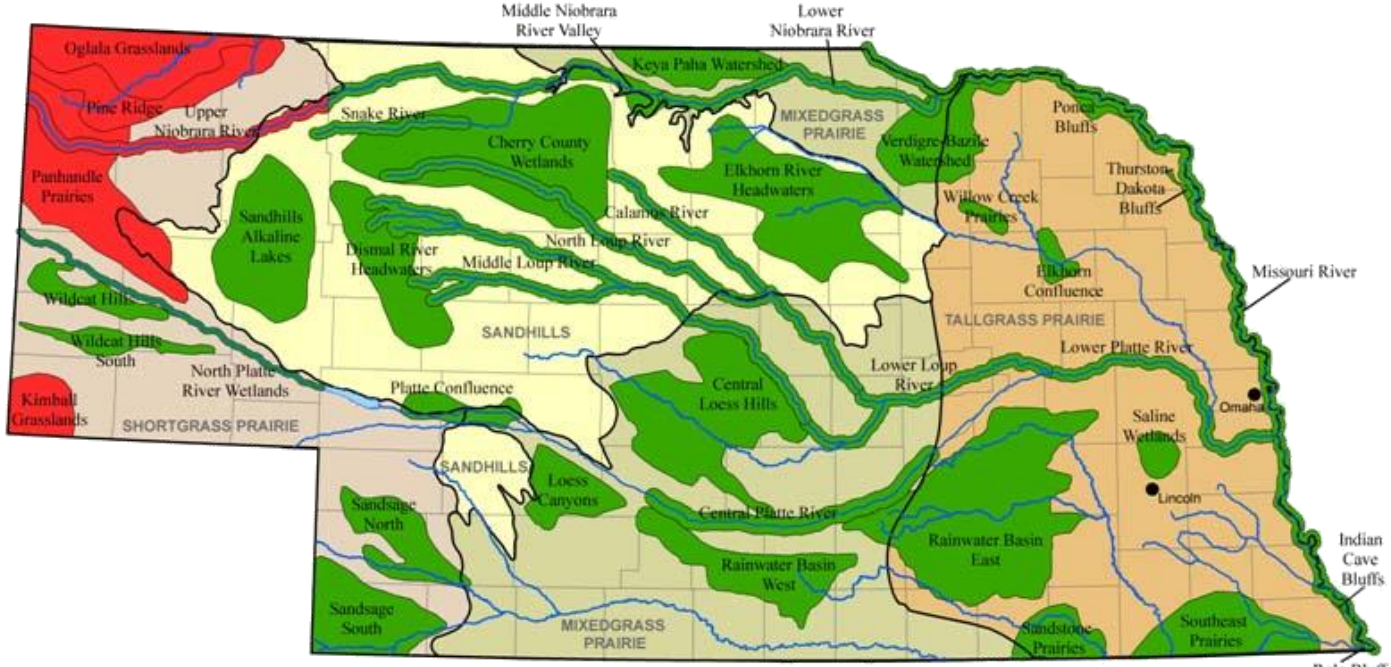
Planning Information needed

- Biological goals (NRCS Team Lead, Ducks Unlimited, FWS, NGPC, PF, …)
  - Wetland Complex / Type / Historical Function
    - Restoring Vegetation
    - Tree & brush removal



Planning Information needed

- Biological goals (NRCS Team Lead, Ducks Unlimited, FWS, NGPC, PF, …)
  - Wetland Complex / Type / Historical Function
    - Restoring Vegetation
    - Tree & brush removal
  - Inundation depths, hydroperiods, saturated vs inundated areas
    - Restoring Hydrology

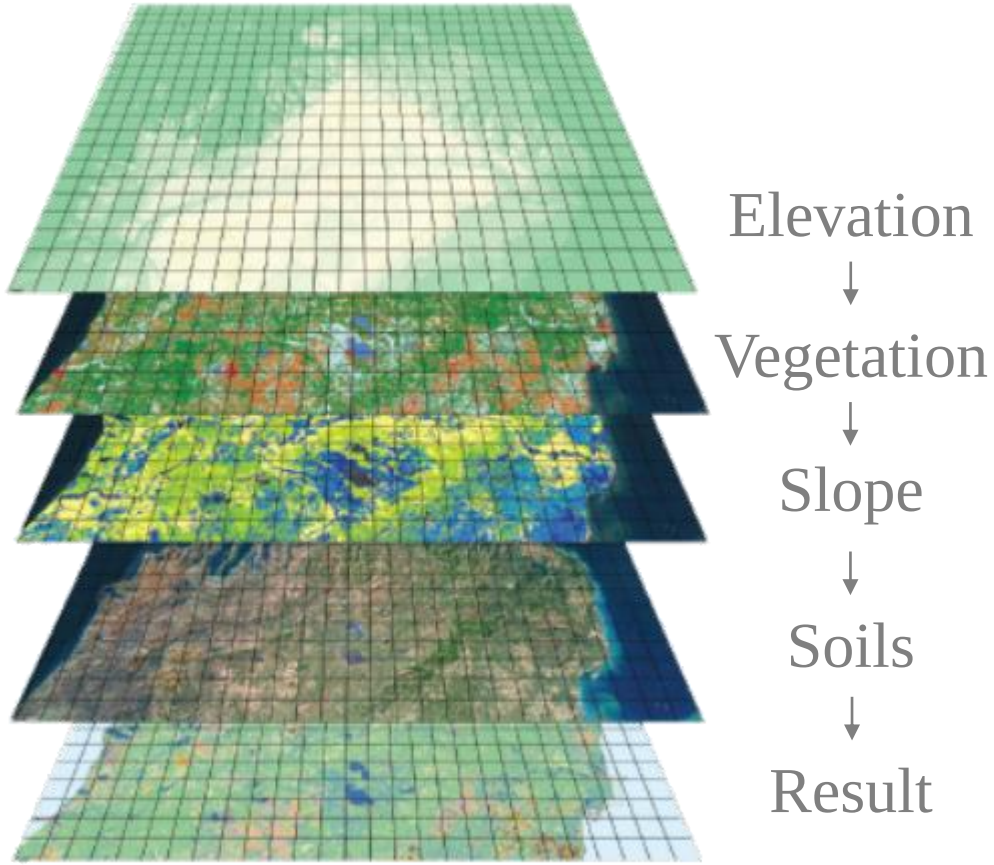


Planning Information needed

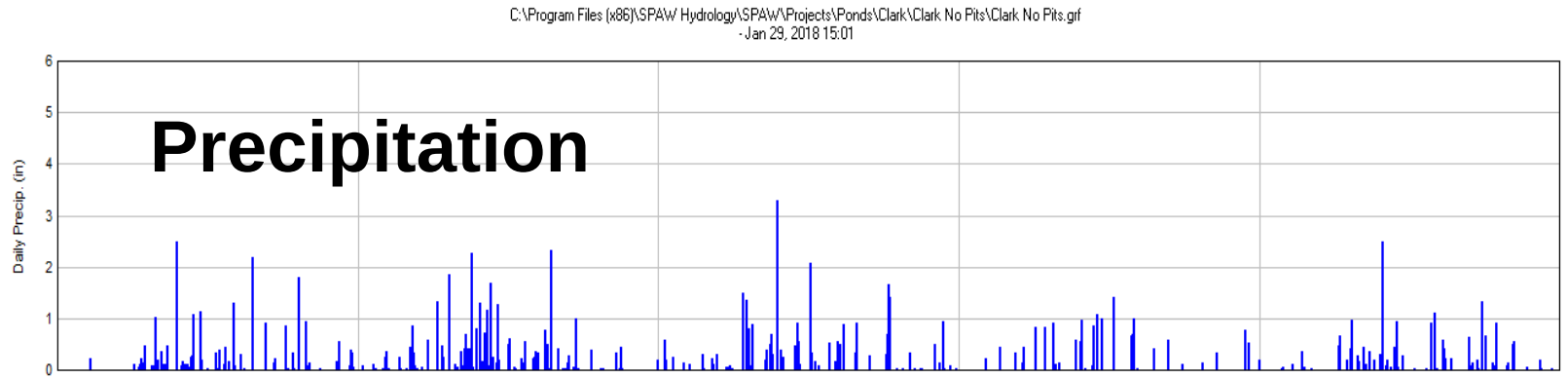
- Engineering Evaluation
  - GIS
    - Aerials & LiDAR + Soils
  - Hydrologic data
    - Water budgets (spreadsheets, SPAW, EFH-2, WETS Tables)
  - Hydraulic analysis
    - USGS stream gauge data, HEC-RAS, Mannings Eqn, Groundwater

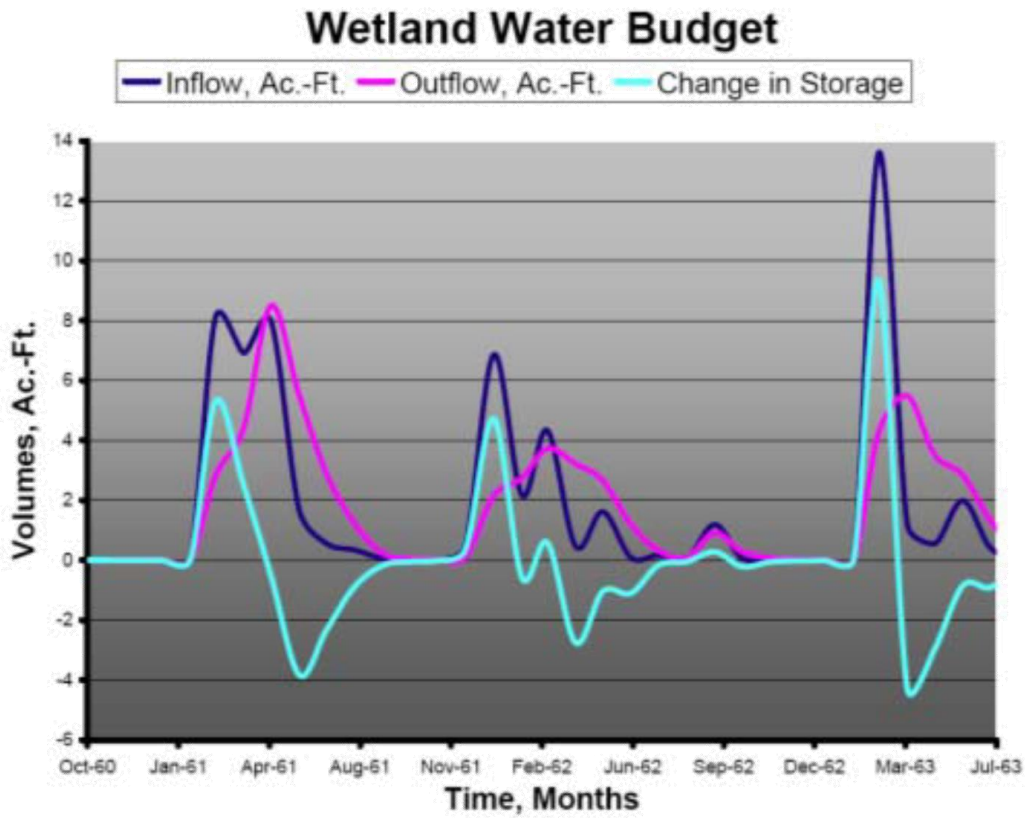
Planning Information

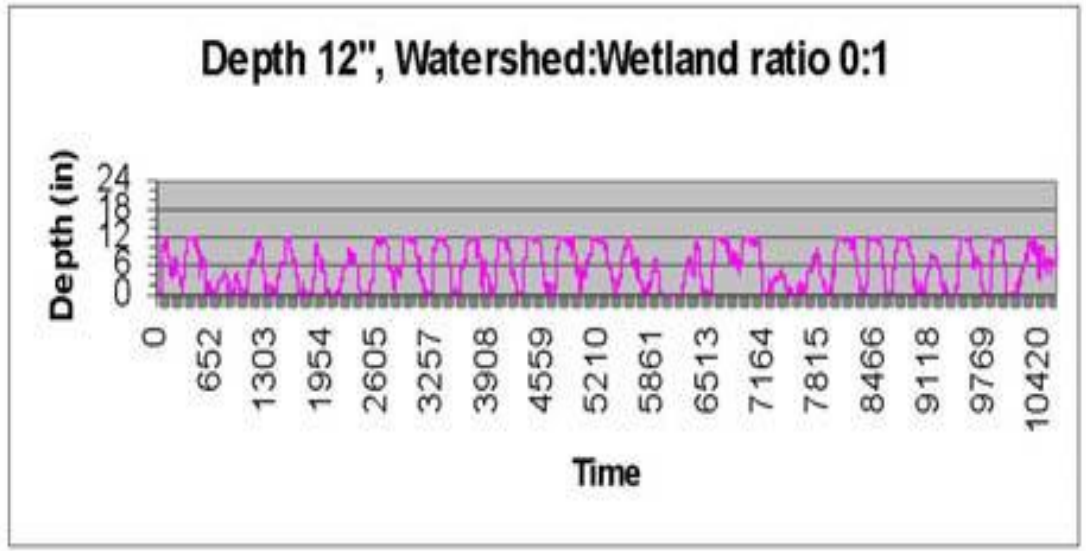
- Engineering Evaluation
  - Layer stack



Hydrologic Data - SPAW







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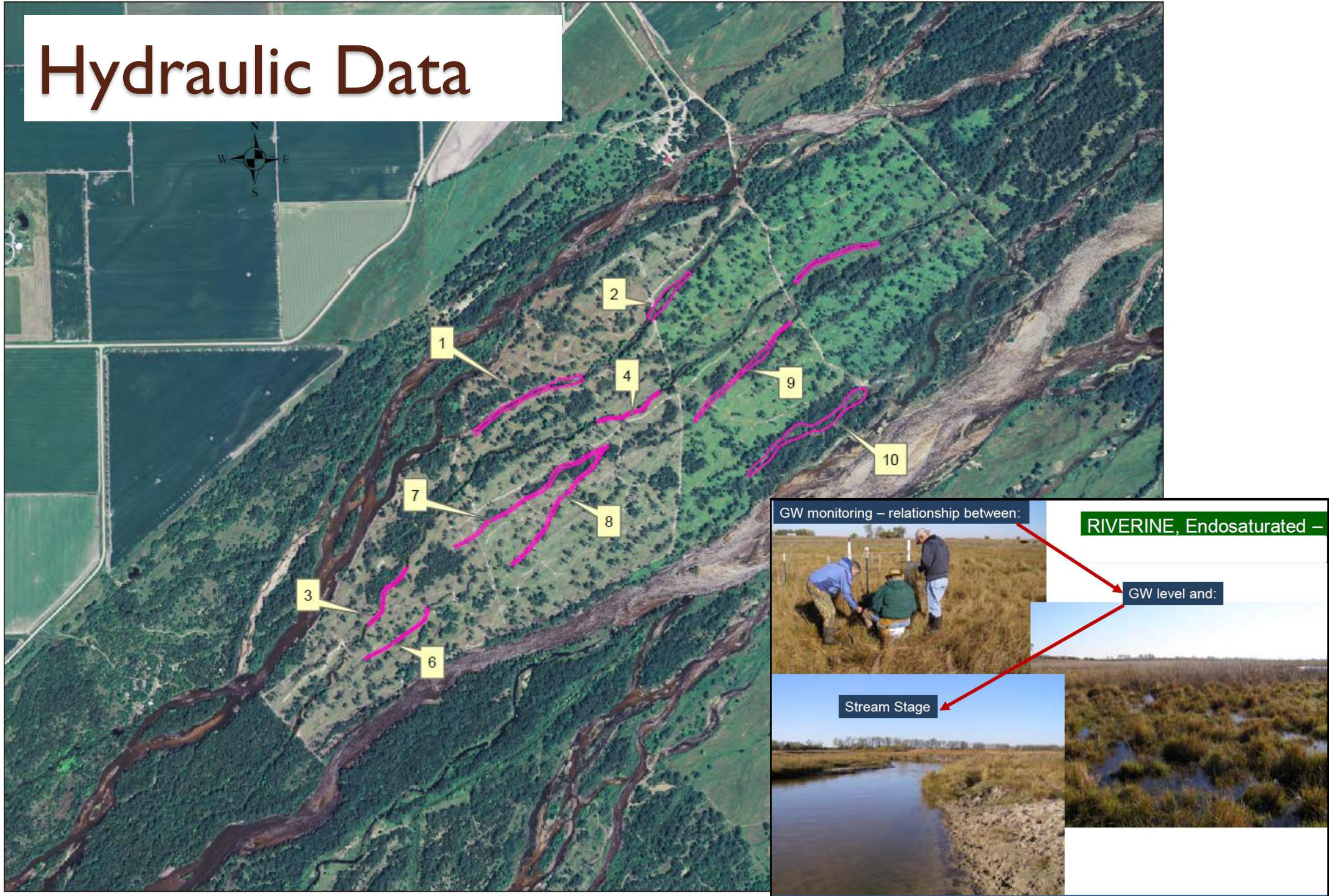
Hydraulic Data



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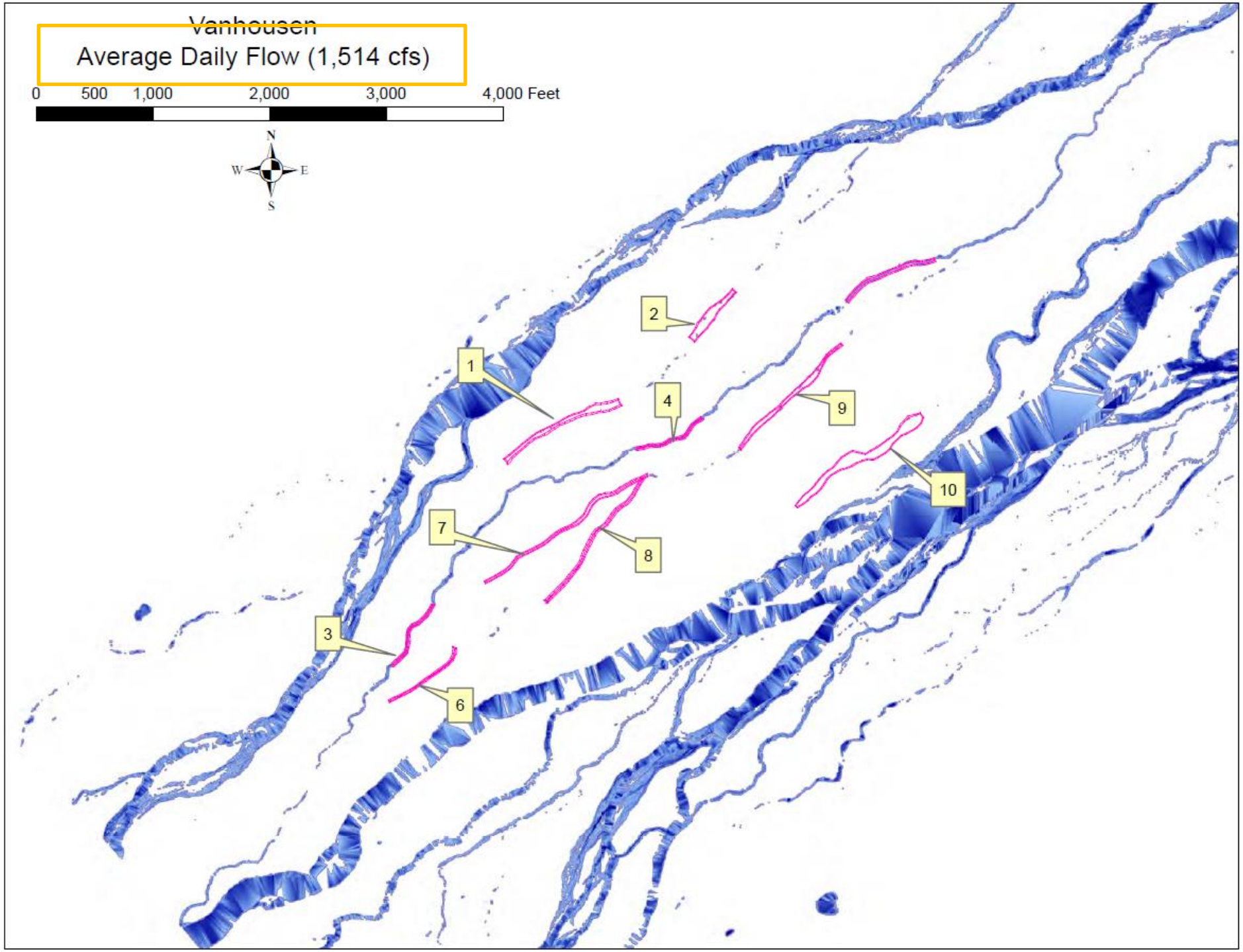
Vanhousen
Average Daily Flow (1,514 cfs)
0 500 1,000 2,000 3,000 4,000 Feet
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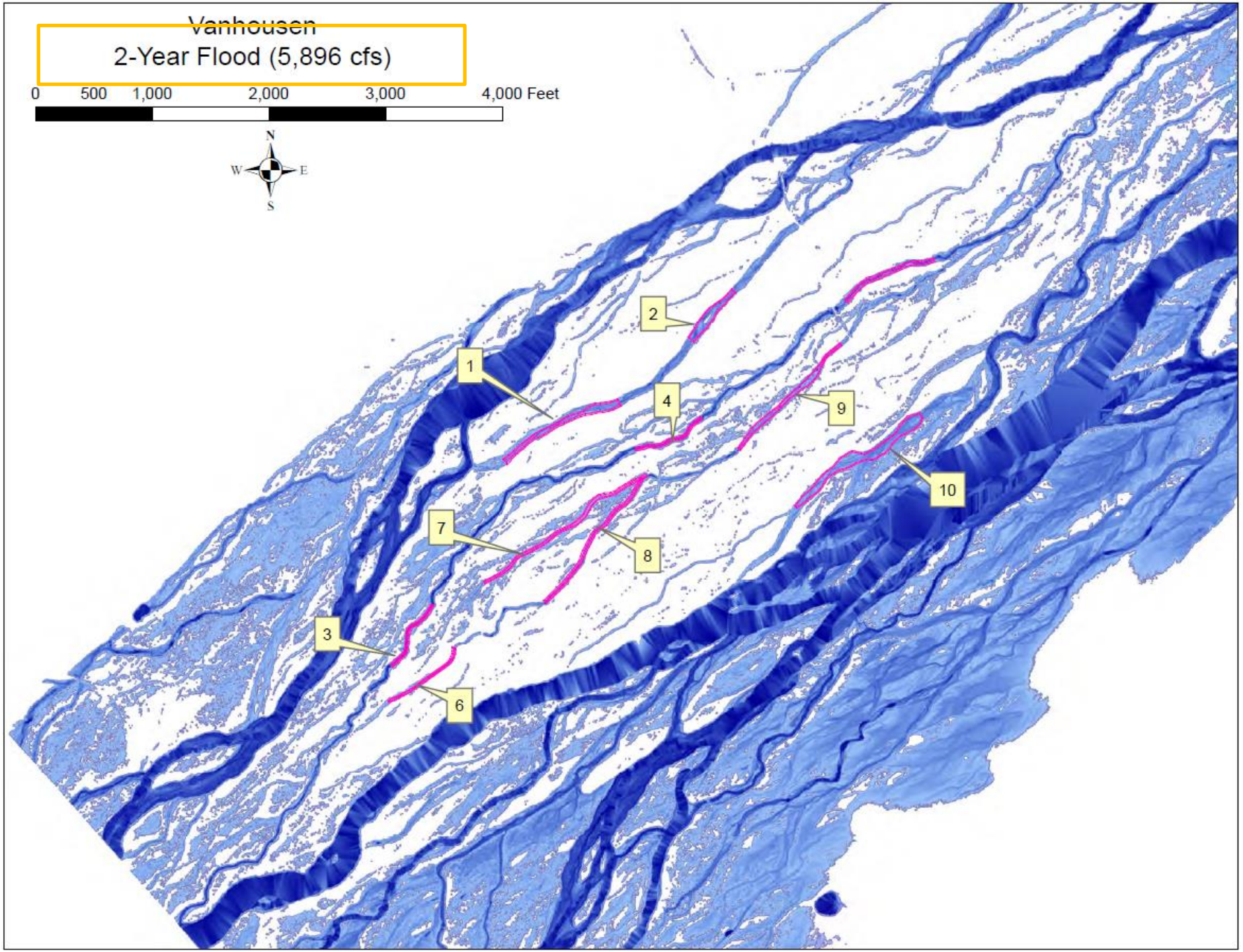
NRCS


Vanhousen
2-Year Flood (5,896 cfs)
0 500 1,000 2,000 3,000 4,000 Feet
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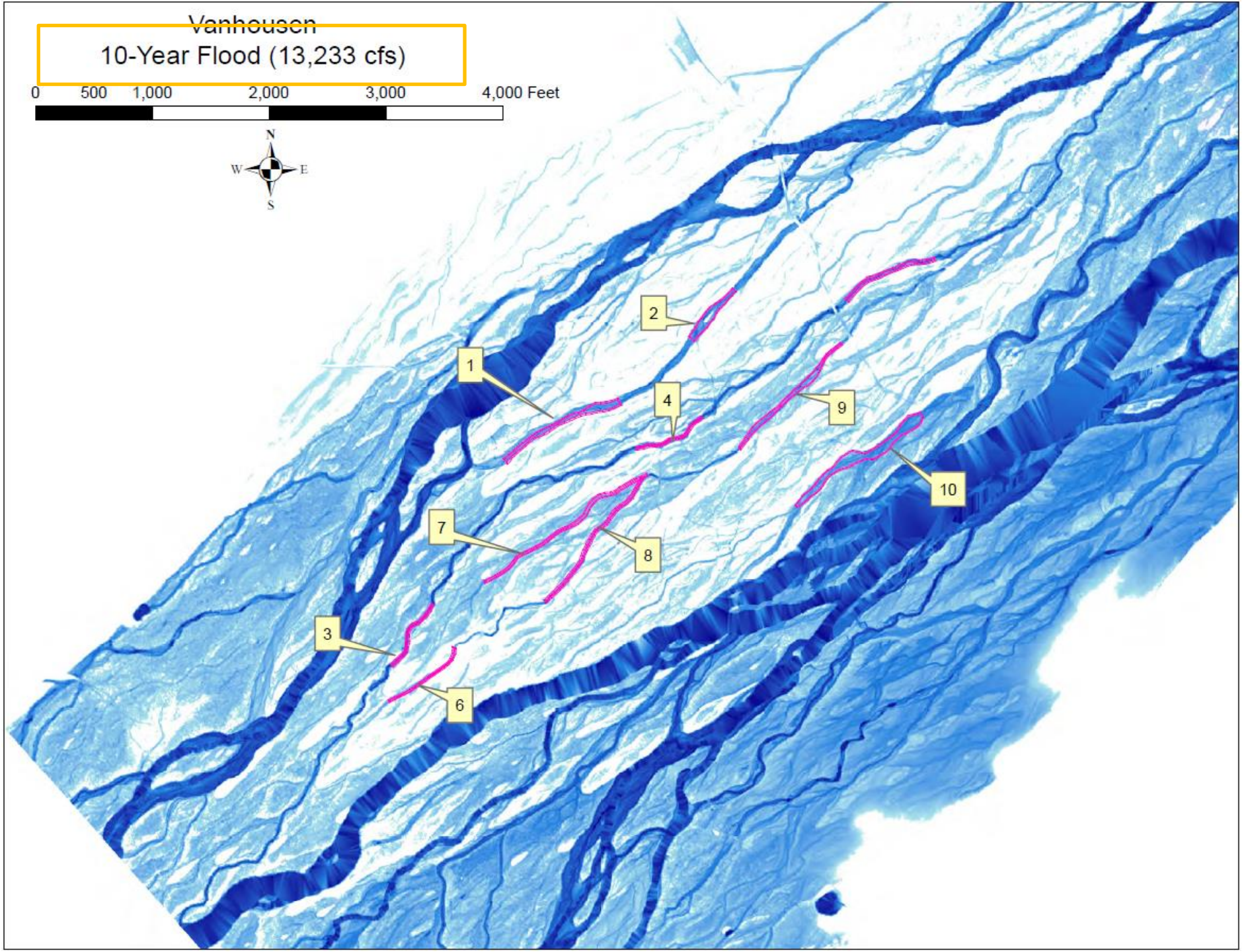
NRCS


Vanhousen
10-Year Flood (13,233 cfs)
0 500 1,000 2,000 3,000 4,000 Feet
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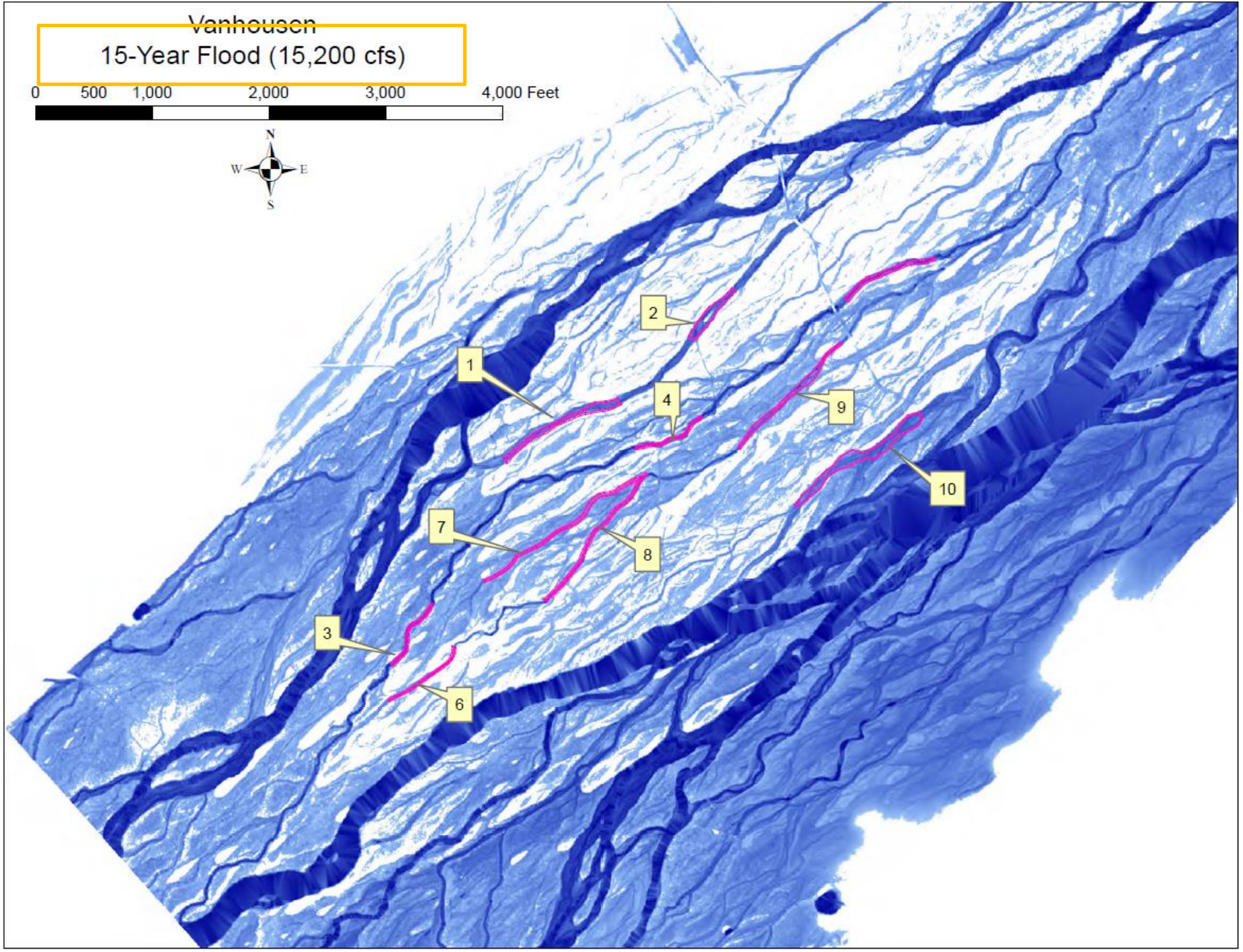
Vanhousen
15-Year Flood (15,200 cfs)
0 500 1,000 2,000 3,000 4,000 Feet
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- Evaluating Alternatives (Feasibility)
  - Stakeholder Objectives vs Program vs Cost $ for full restoration

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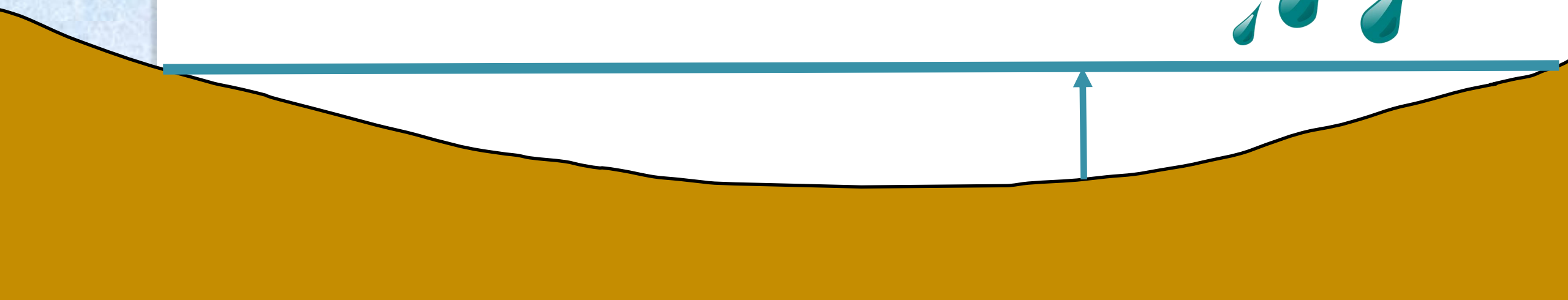

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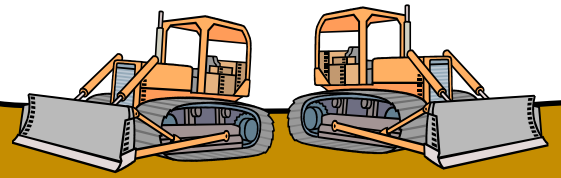

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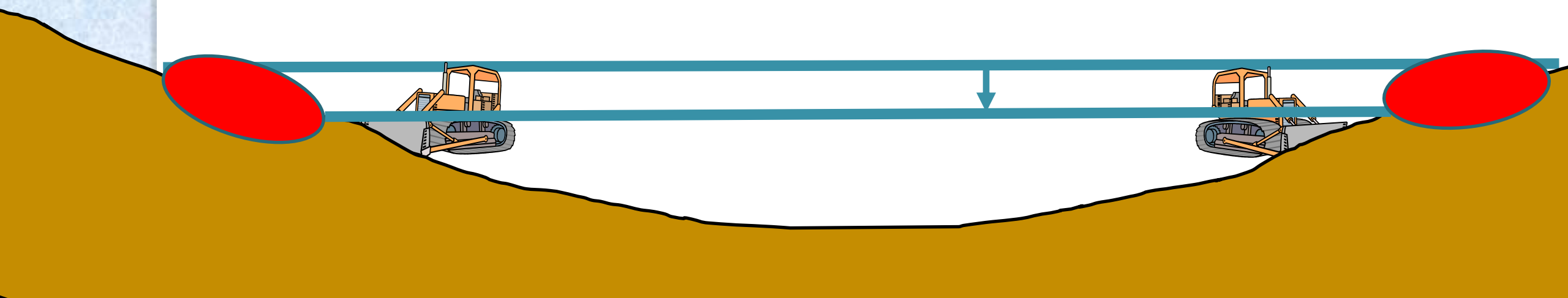

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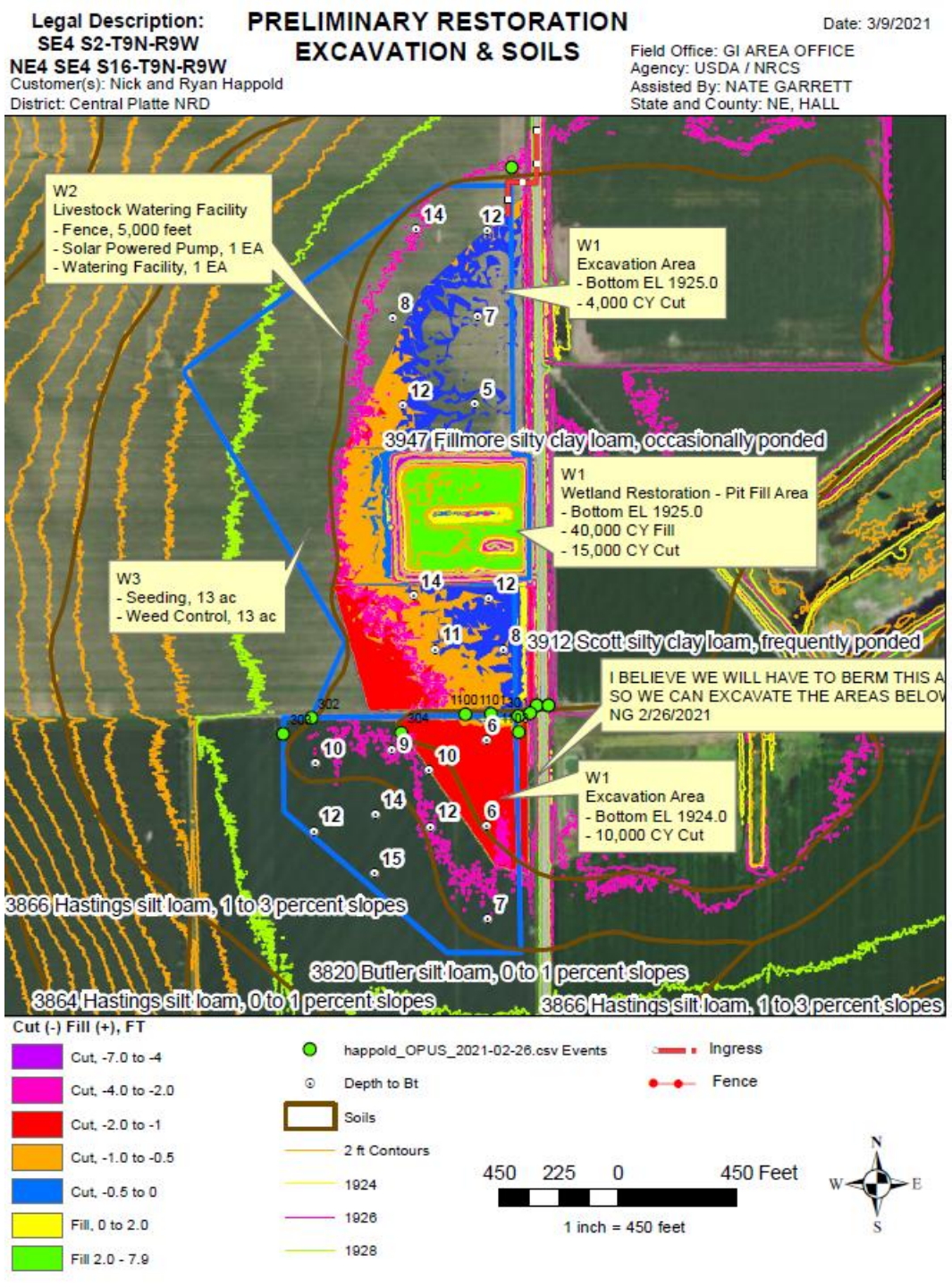
    - 3rd Party Conversion
  - Permitting
  - Constructability

Preliminary Design

- Preliminary Design
  - Soils and depth to Bt
  - Topography
  - Restoration limits & quantities
  - Grazing infrastructure
  - Notes, issues, concerns, challenges



Preliminary Design

- Engineering Deliverables
  - Preliminary plans and cost estimate

LANDOWNER OBJECTIVES:
Restore native grasslands, native wildlife habitat and wetlands to the fullest extent possible
TEAM OBJECTIVES:
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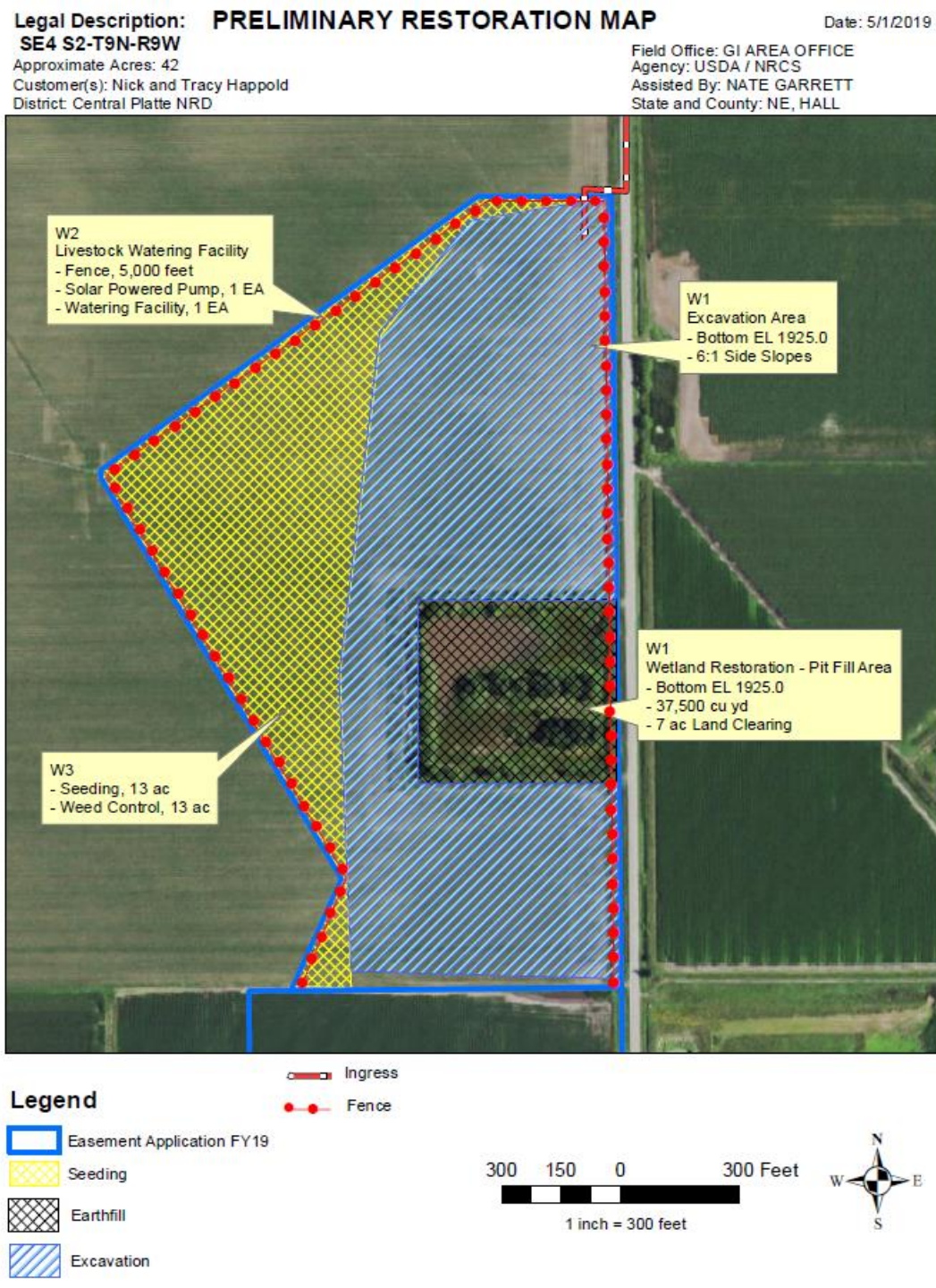
FIELD #	PRACTICE	QNT	UNIT $	EST. COST
W1	(644/645) Wetland and Upland Wildlife Habitat	42	ac	---
W1	(657) Wetland Restoration	29	ac	---
W1	(657) Earthfill - Pit Fill (yd3)	38000	$4.00	$152,000
W1	(460) Land Clearing - Tree removal, burn/bury	7	$3,400.00	$23,800
W2	(642) Well (ft)	200	$50.00	$10,000
W2	(533) Pumping Plant (Each)	1	$10,000	$10,000
W2	(614) Tank (Ea)	1	$5,000	$5,000
W2	(382) Fence (Ft)	5000	$2.00	$10,000
W2	RWBJV Financing Grazing Infrastructure	1	$35,000.00	($35,000)
W3	(315) Herbaceous Weed Control (acres)	13	$50.00	$650
W3	(550) Range Seeding - seed, site prep (acres)	13	$400.00	$5,200
			TOTAL ESTIMATED RESTORATION COST	$181,650

NOTES: 181650 / 42 = 4325 $/ac
Please note that the Preliminary Restoration Plan has been completed in the absent of necessary information
needed to finalize restoration plans such as topographic surveys, biological surveys and sediment investigations.
This can lead to changes in planned activities, estimated quantities and actual cost.

INITIAL & DATE - LANDOWNER: _____ NRCS: _____ FWS/NG&P: _____



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Questions?

LEMBURG RESTORATION, 2021