

Technical Programs Update

NARD Legislative Conference
January 30, 2019
Jesse Bradley and Carrie Wiese

NEBRASKA

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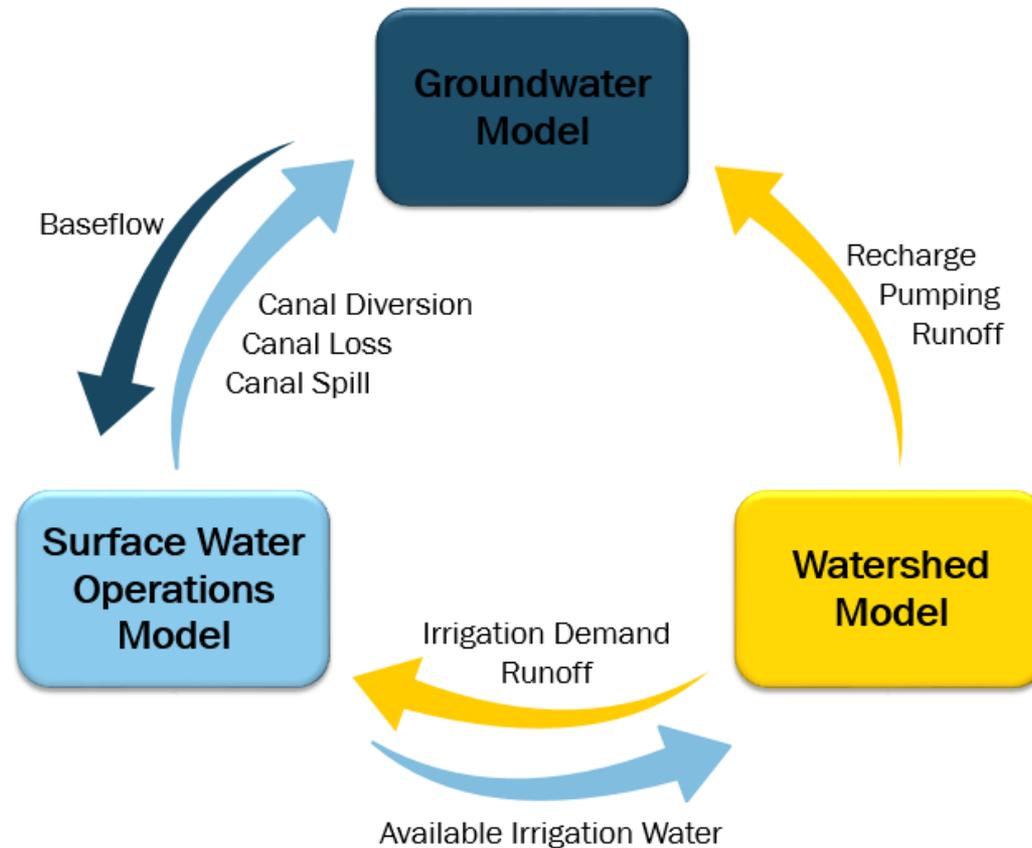
Overview

- Why does NeDNR use hydrologic models?
 - Existing models
- Models in development
- Other technical projects (SUSTAIN, CIR calculator, DSS)
- Questions

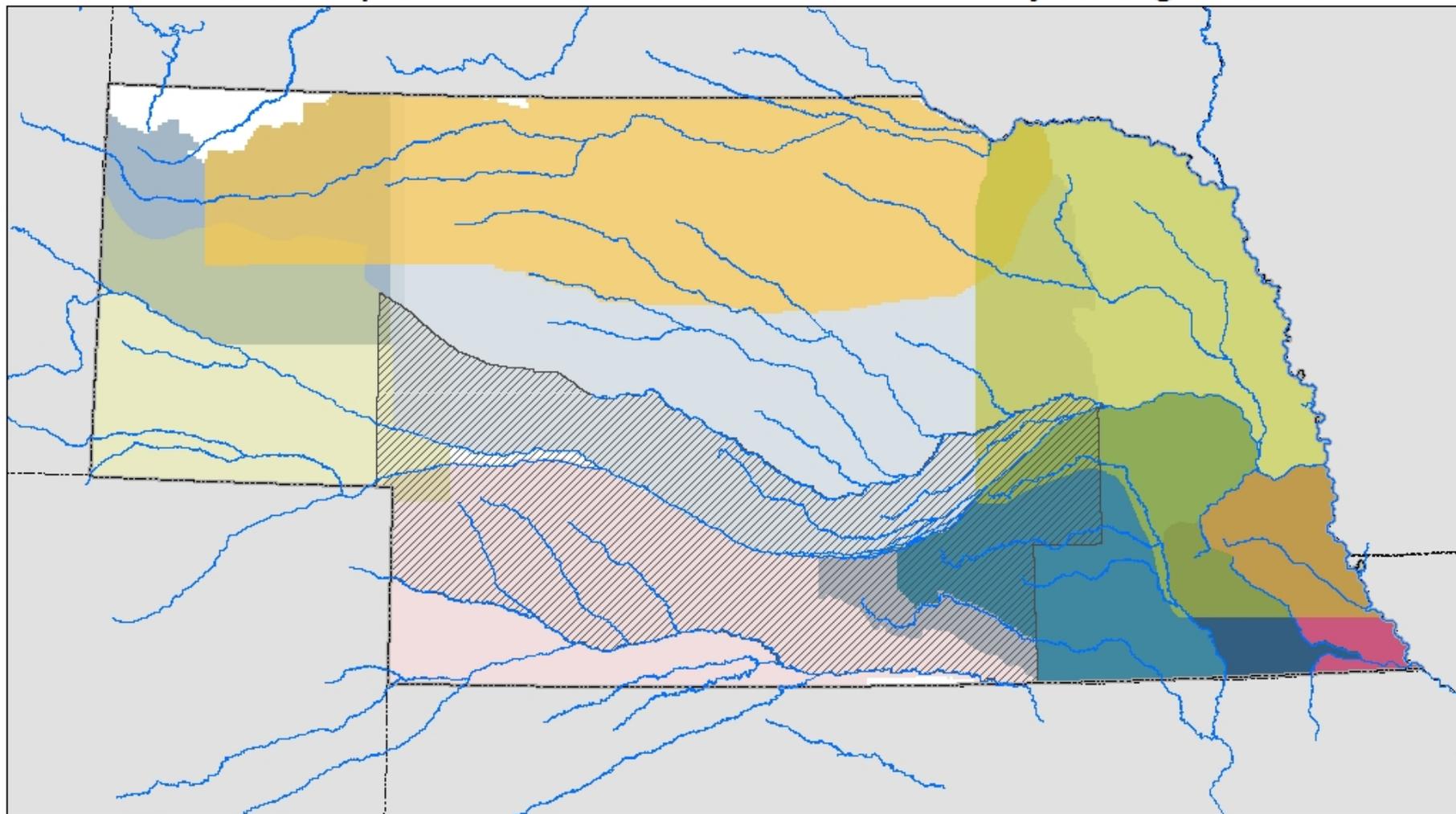
Why does NeDNR develop hydrologic models?

- Models play important role in planning and management of Nebraska's water resources, to meet objectives of local integrated management plans, basin-wide plans, state legislation, and interstate water agreements/compacts
- To assist with water management across Nebraska by providing a better understanding of regional hydrogeology and water availability
 - Management areas (10/50, 28/40, etc.)
 - Transfers
 - New uses
- Evaluate water budgets – pumping and recharge
- Each model developed in collaboration with NRDs and works to incorporate best available data

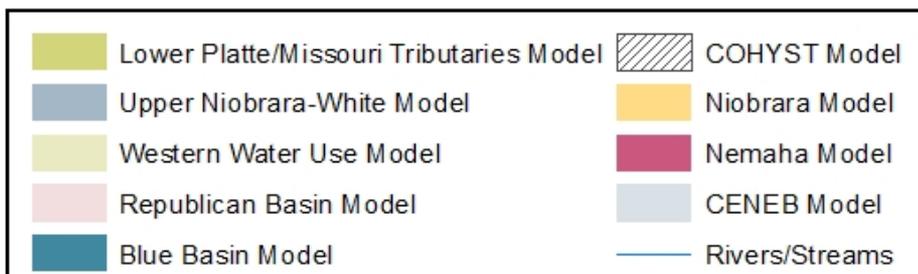
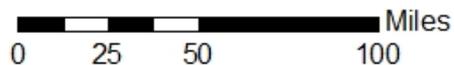
Integrated Hydrologic Models



Nebraska Department of Natural Resources Hydrologic Models



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Models in Development

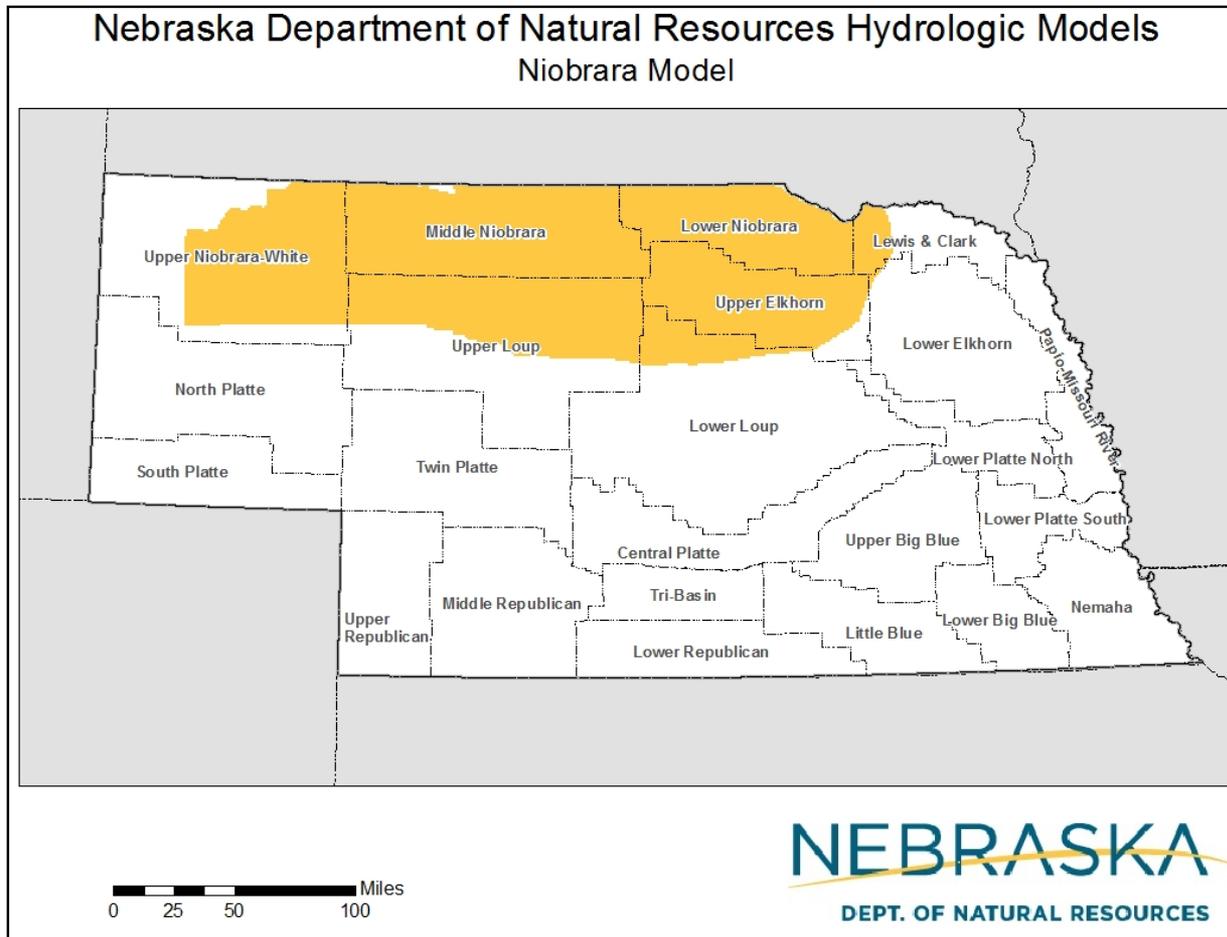
Carrie Wiese

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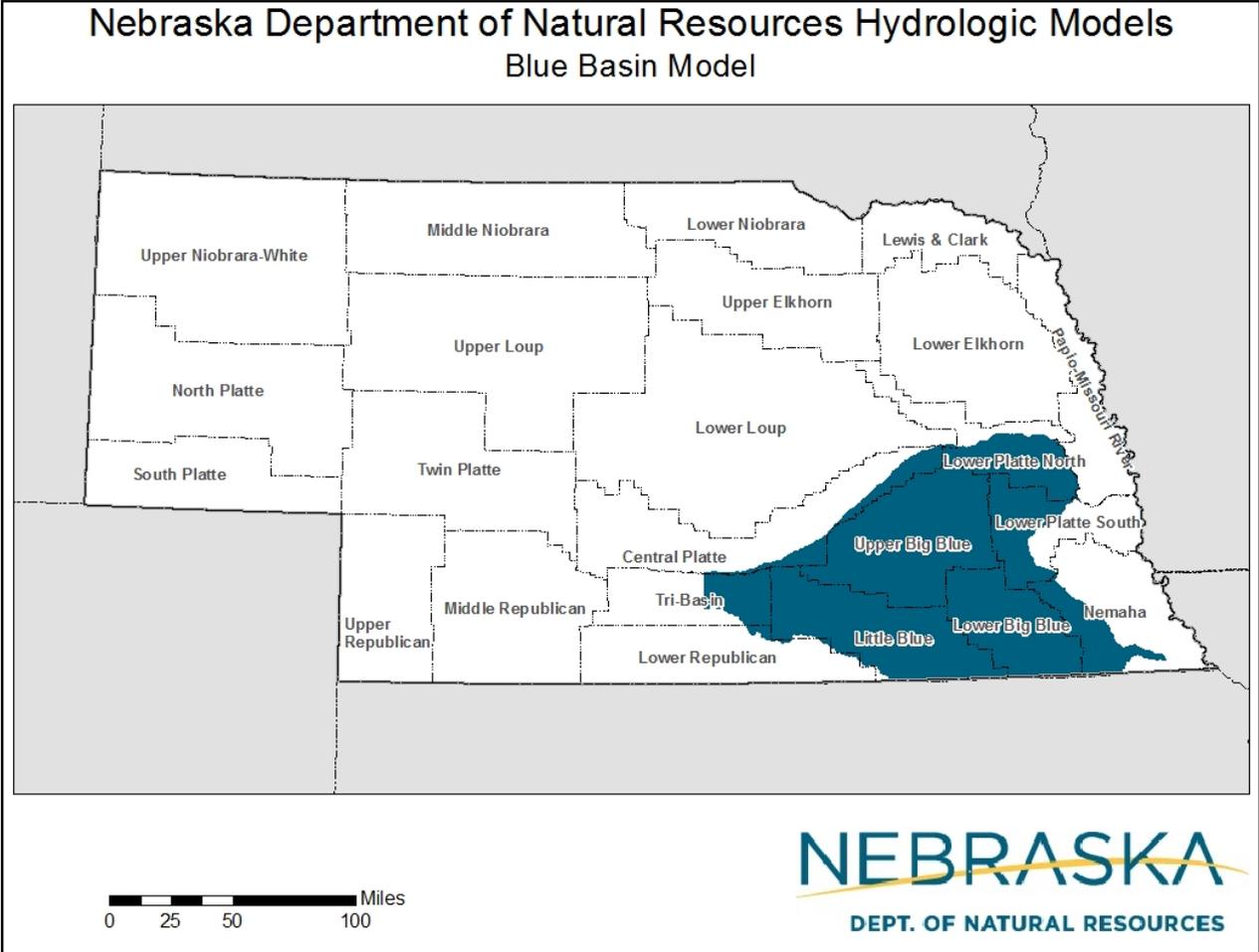
Niobrara Model



Niobrara Model

- NeDNR initiated development with Olsson Associates (now Olsson) in 2018
- Disagreement between UNW and CENEB models in areas of overlap (models were built to do different things)
- New model will provide unified modeling approach to Niobrara basin downstream of Box Butte Reservoir
- Olsson is testing model output dependent on inclusion of stream reaches, NeDNR has developed land use dataset

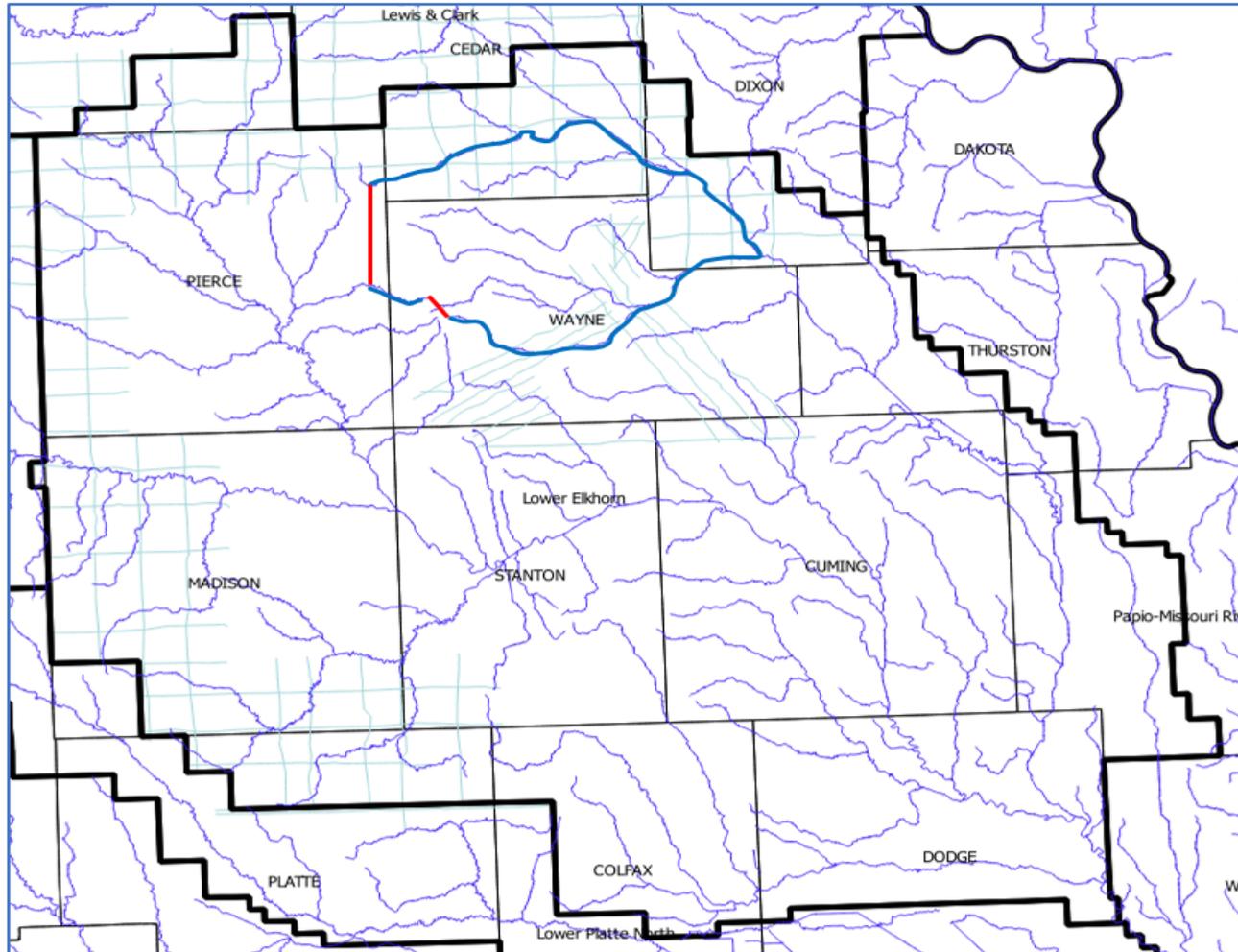
Blue River Basin Model



Blue River Basin Model

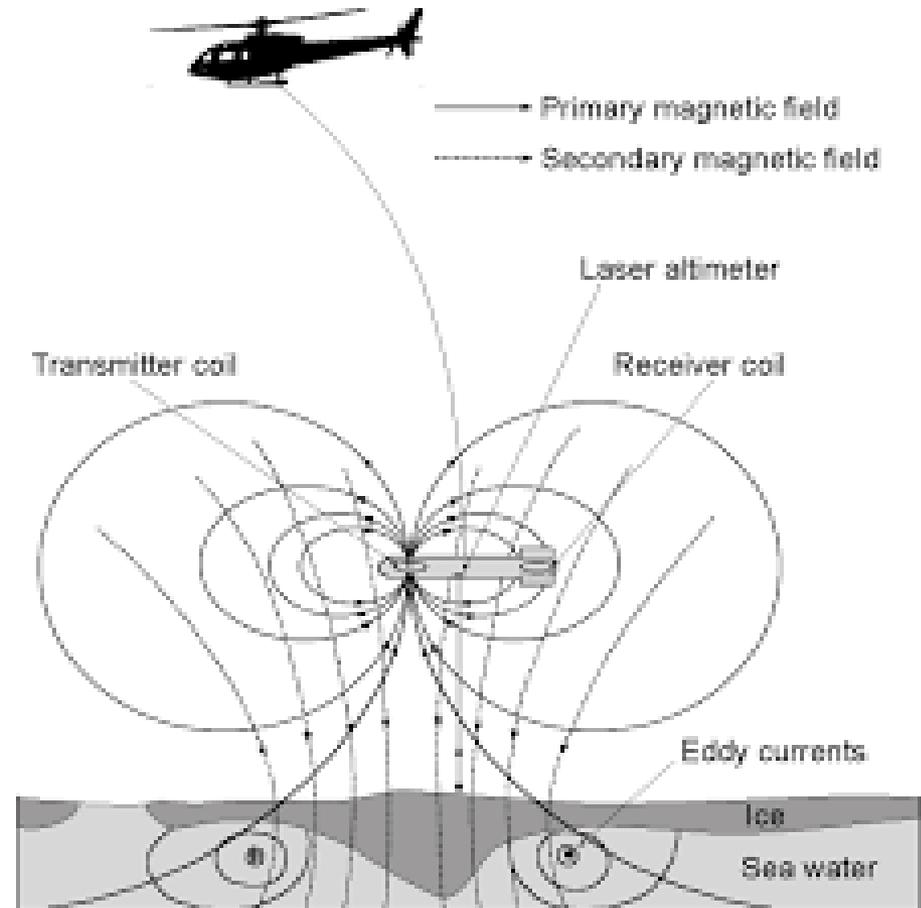
- NeDNR worked with HDR to develop a model – finalized and calibrated in 2013 – to evaluate appropriation status of the basin and impacts of groundwater well pumping on stream baseflow
- NRDs also developed groundwater models to answer more localized questions, like well-to-well interference and water quality concerns
- UBBNRD, LBBNRD, LBNRD, TBNRD and NeDNR partnered beginning in 2018 to develop sub-regional model to better satisfy both regional and more localized needs
- Development of the sub-regional model expected to be ongoing for the next few years

Lower Elkhorn NRD (LENRD) Sub-regional Pilot Study

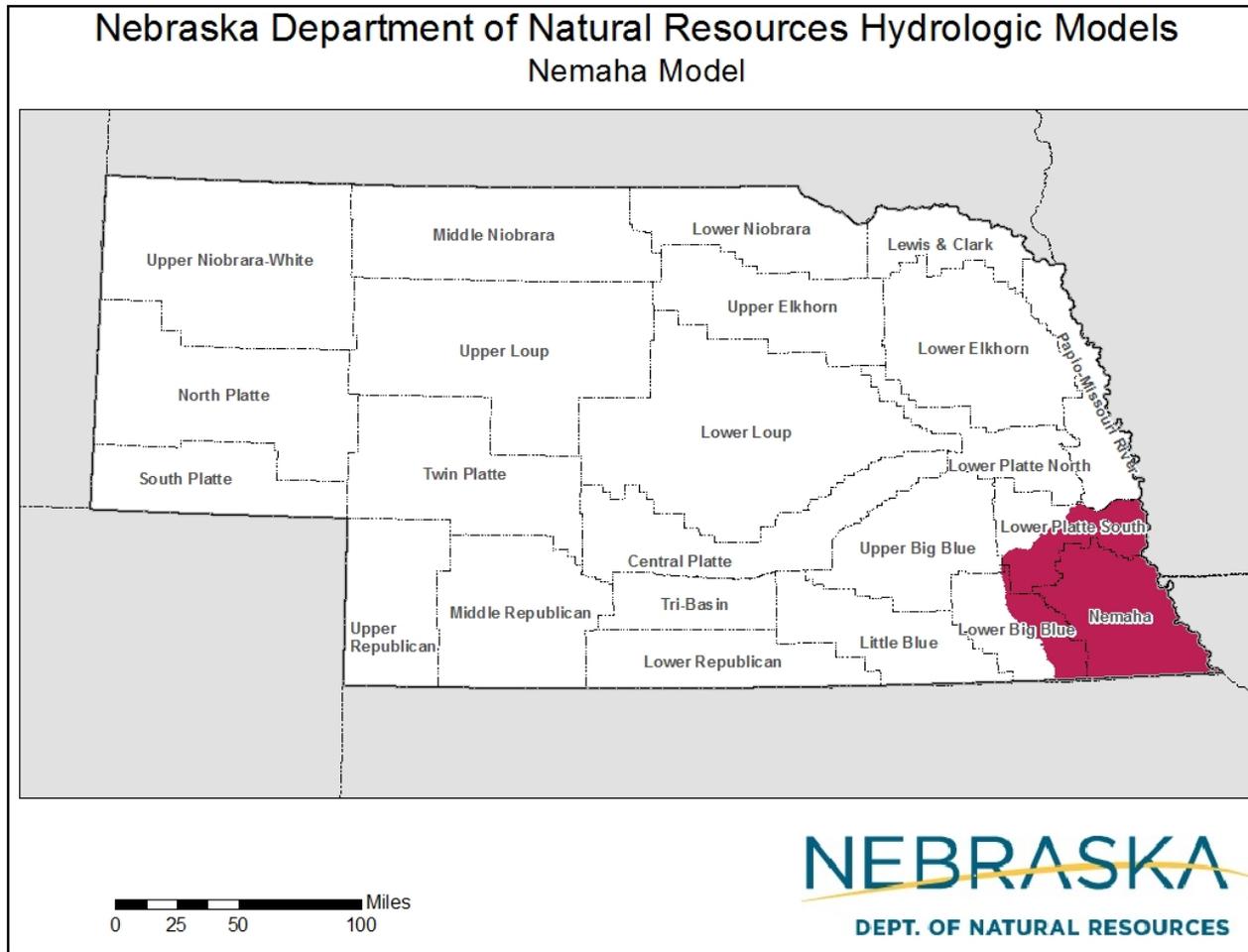


LENRD Sub-regional Pilot Study

- NeDNR is partnering with LENRD and JEO on development of a sub-regional pilot study/model
- Incorporating AEM data



Nemaha Model (to be developed)



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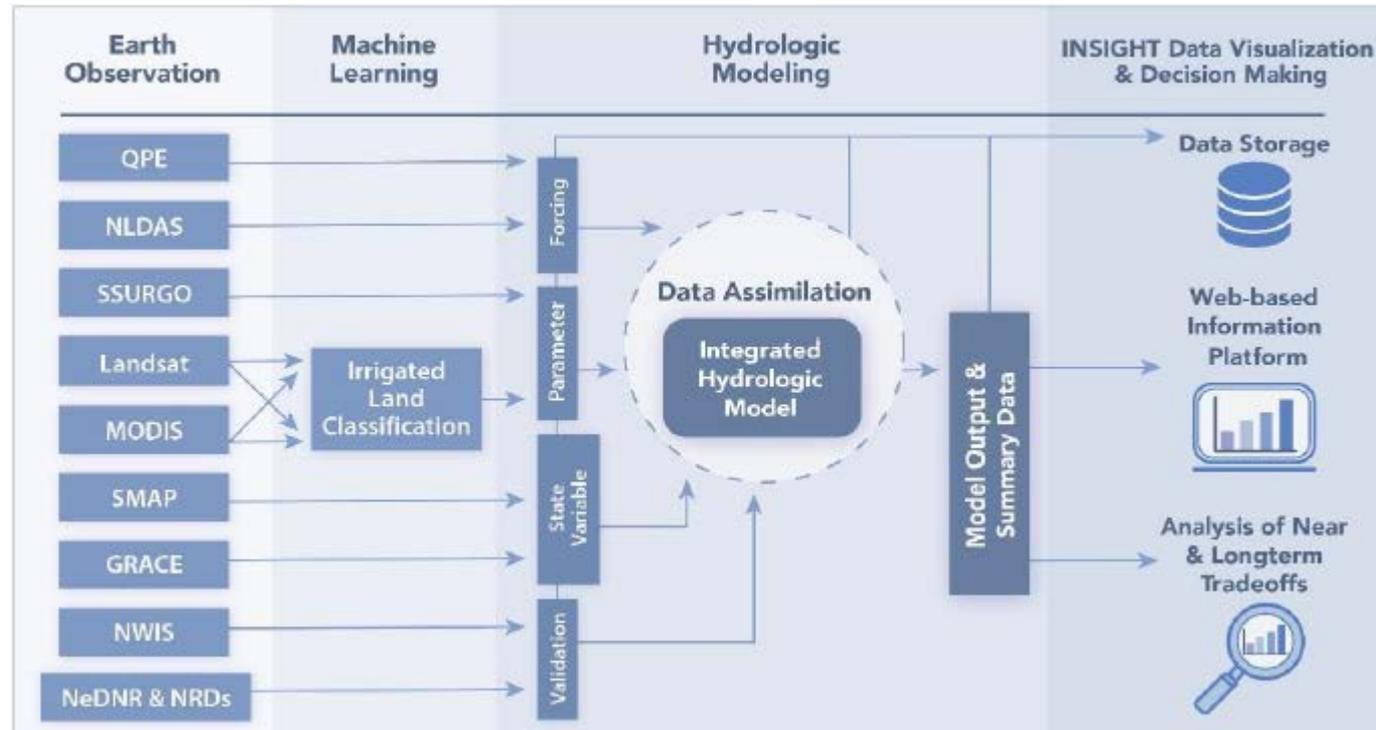
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Other Technical Projects

Jesse Bradley

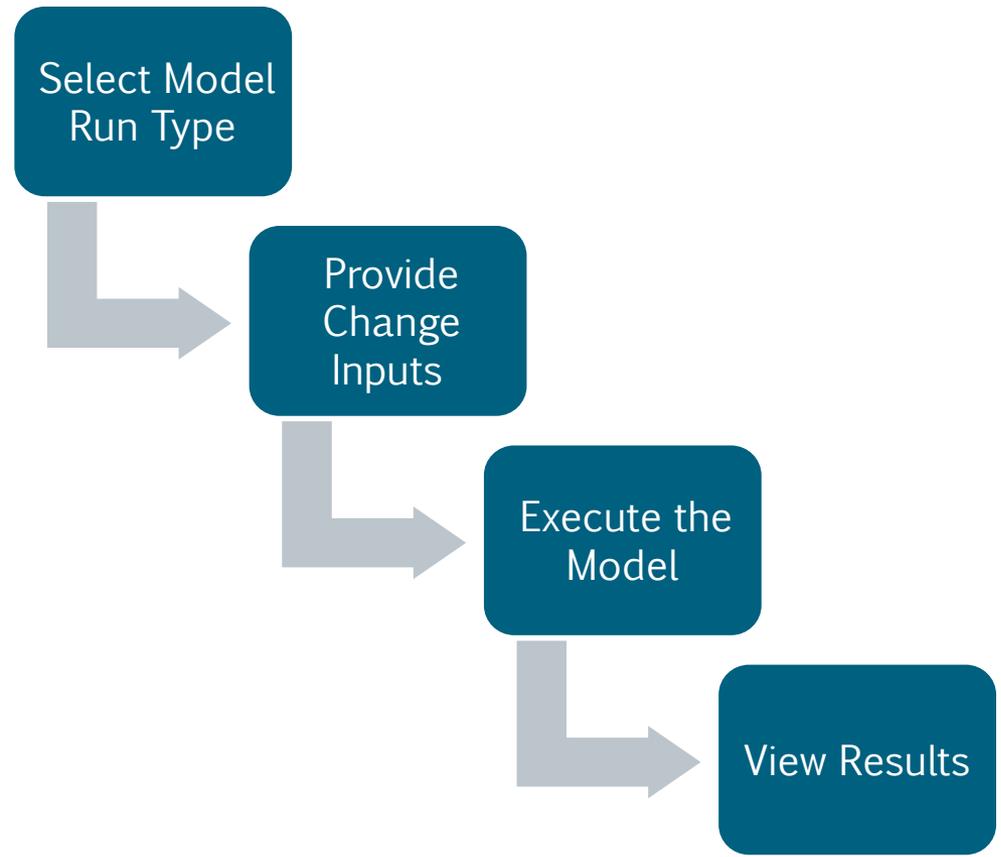
Data Integration Projects

- Leverage available earth observation data
- NRD/NeDNR data
- Improve efficient in data formatting and data processing
- Output to visualization platforms



SUSTAIN

- Improve access to watershed model results (land use, pumping, recharge)
- GUI for model analysis (recharge and pumping changes)
- View results at the county, NRD, or user defined level



SUSTAIN

SUSTAIN is:

- a software program developed by NeDNR to allow access to watershed model data and groundwater models
- intended to increase transparency and water manager's evaluation of options

SUSTAIN allows NRDs and water managers to:

- access regional data used in watershed and groundwater models
- make maps and graphs displaying model input and output data
- evaluate management scenarios
- run regional groundwater model
- process scenario results

SUSTAIN

- Models planned to be included in SUSTAIN in the near future:
 - UNW
 - LPMT
 - CENEB
- Continuing work:
 - New release February/March (when LPMT is fully implemented)
 - Incorporating CENEB this spring
 - Offer training spring/summer (local, at request)

CIR Calculator

- NRD accounts will be able to access online
- Uses available model data (COHYST/LPMT soon!)
 - Pumping
 - Recharge
 - SDF (stream depletion factor)
- Assess new uses and transferred uses with simple inputs of location and crop type
- Store information and generate reports for IMPs and Basin Planning (future release)
- Goal to develop additional connections to groundwater model updates and INSIGHT updates.

CIR Calculator

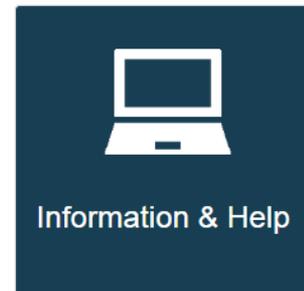
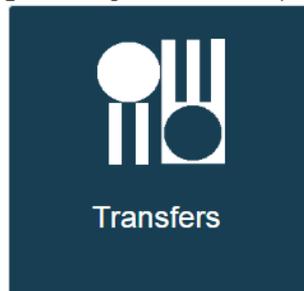
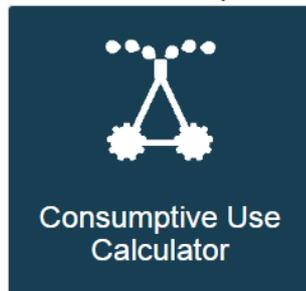
- Structured for individual NRD accounts with log-in



Crop Irrigation Requirement (CIR) Calculator



jesse.bradley@nebraska.gov - Nebraska Department of Natural Resources



CIR Calculator

- Determine current use and transferred use location/crop type



Transfers

Section	Township	Range	Crop	Acres	
<input type="text" value="Sect"/>	<input type="text" value="Townsl"/>	<input type="text" value="Rai"/>	<input type="text" value="Choose..."/>	<input type="text" value="Acre"/>	<input type="button" value="-"/>
<input type="button" value="+"/>					
<input type="text" value="Sect"/>	<input type="text" value="Townsl"/>	<input type="text" value="Rai"/>	<input type="text" value="Choose..."/>	<input type="text" value="Acre"/>	<input type="button" value="-"/>

Choose...
Irrigated Corn
Irrigated Sugar Beets
Irrigated Soybeans
Irrigated Sorghum (Milo, Sudan)
Irrigated Dry Edible Beans
Irrigated Potatoes
Irrigated Alfalfa
Irrigated Small Grains
Range/Pasture/Grass (Brome, Hay, CRP)
Urban Land
Open Water
Riparian Forest and Woodlands
Wetlands
Other Agricultural Lands (Farmsteads, Feedlots, etc.)
Irrigated Sunflower
Summer Fallow
Roads
Dryland Corn
Dryland Soybeans

Calculate Clear

CIR Calculator

- Present conditions and future conditions
- Results (CIR, Recharge, GW withdrawal, Stream Depletion %, and Estimated depletions)



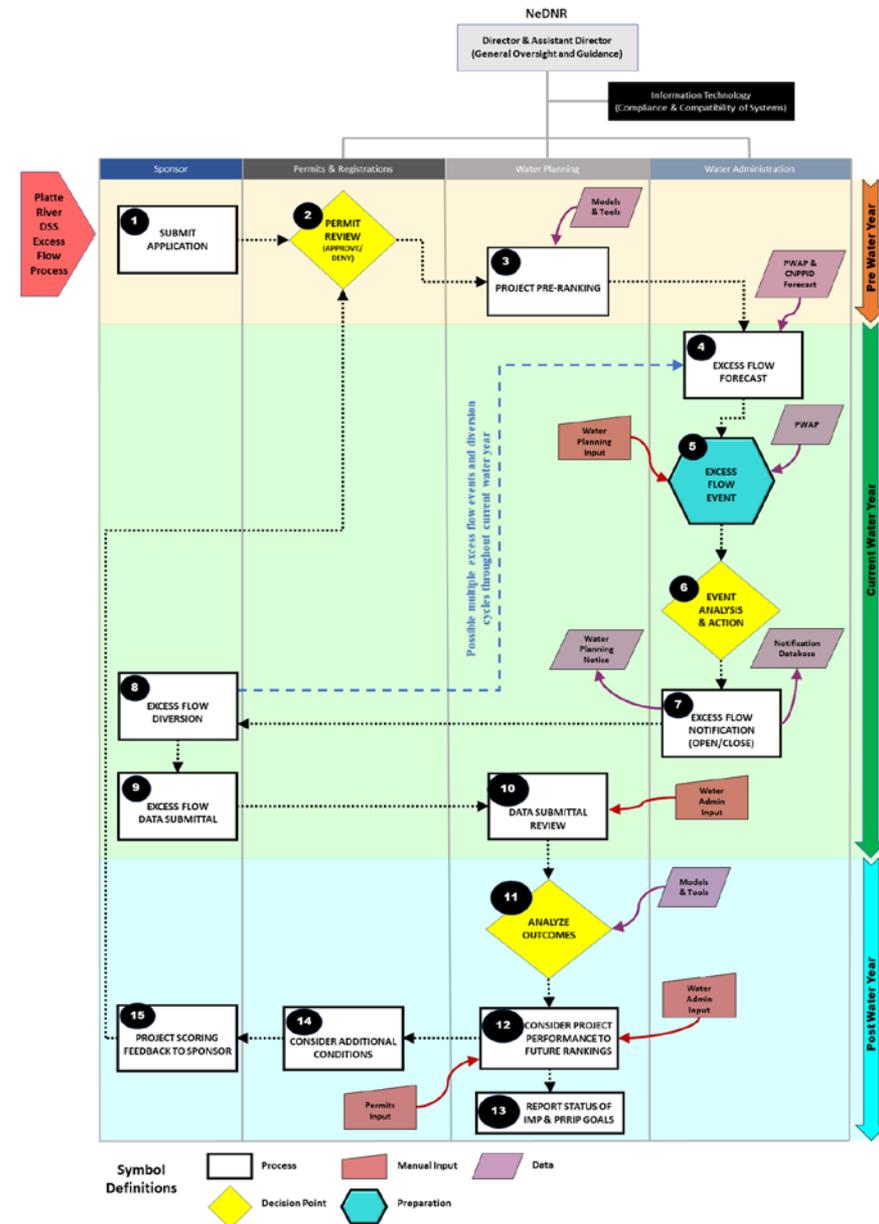
Results									
Section	Township	Range	Crop	Acres	CIR (in)	Recharge (in)	GW withdrawal (af)	Stream depletion (%)	Estimated net depletion (af)
Present Conditions									
10	10	10	Irrigated Corn	100	14.66	5.52	76.17	8	6.09
Total				100			76.17		6.09
Future Conditions									
10	10	9	Irrigated Corn	100	16.12	4.67	95.42	7	6.68
Total				100			95.42		6.68
Net Impact to Stream (Acre-Feet)									0.59

[Print Results](#)

Platte River DSS

Initial Phases

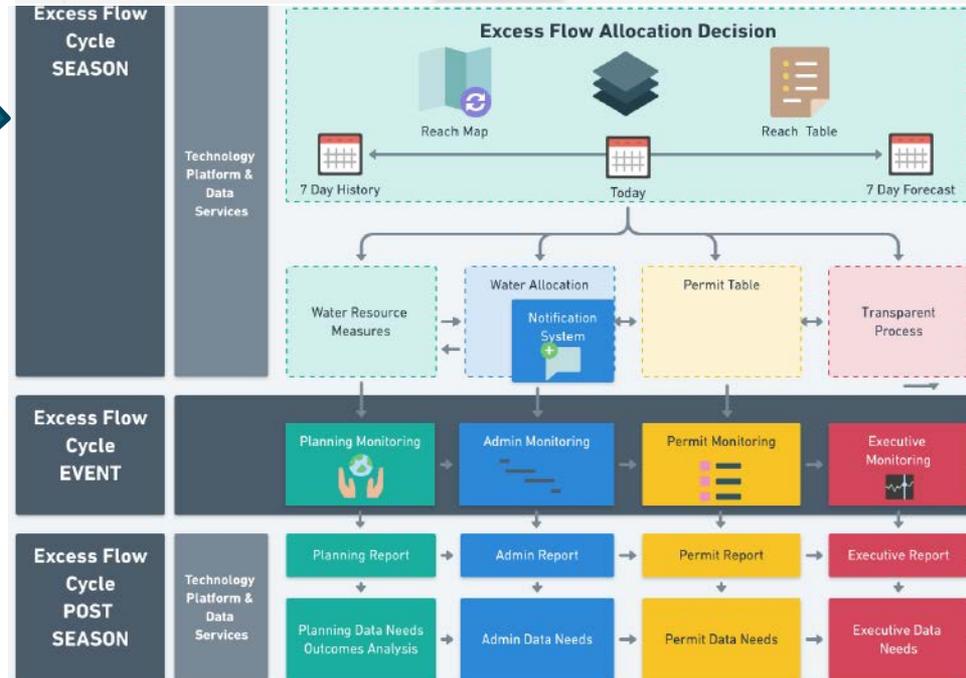
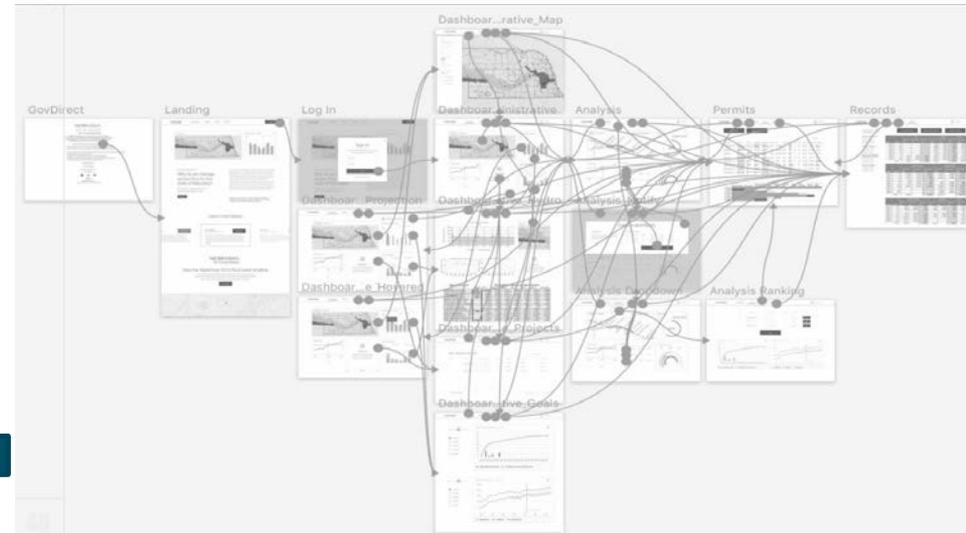
- Ensure “excess flows” are being most effectively used for IMP/PRRIP purposes
- Support timely administration of excess flow permits
- Connect water administration activities in the Upper Platte and Lower Platte
- Create transparent guidelines for excess flow rankings
- Improving tracking and reporting of benefits achieved through excess flow diversions



Platte River DSS

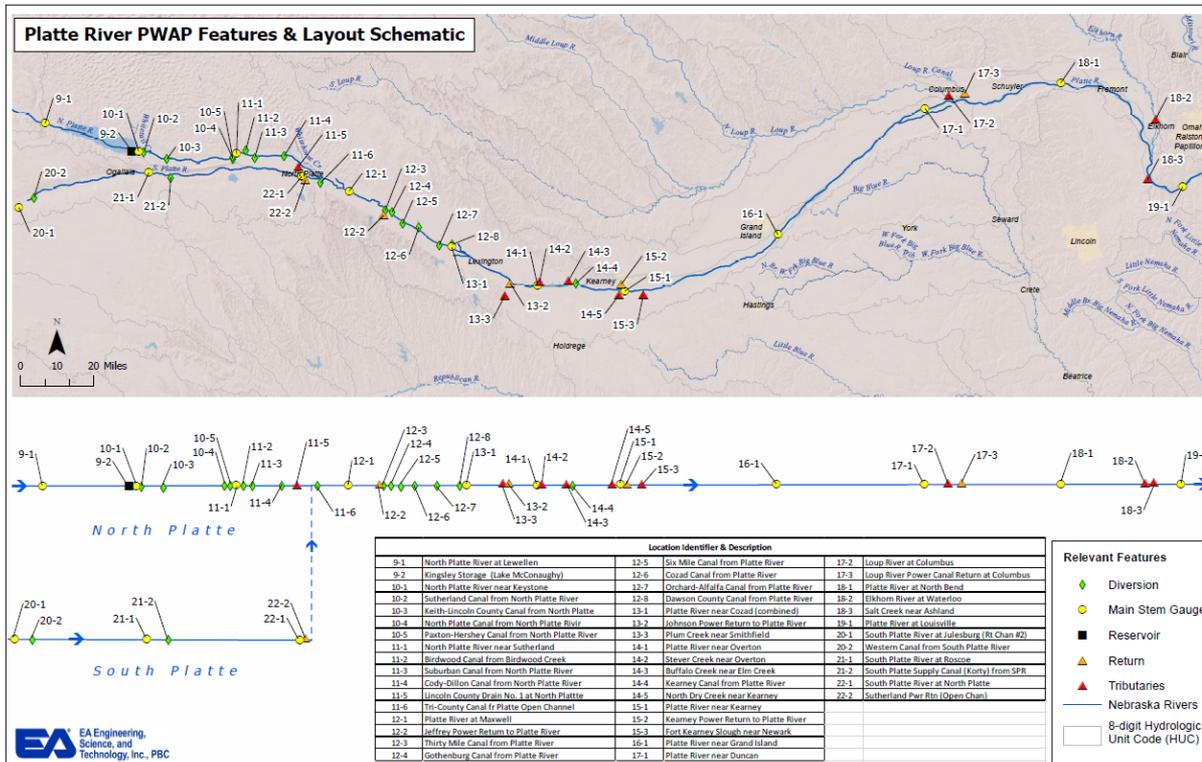
Initial Phases

- Efficiently connect multiple data sources and platforms through one platform
- Leverage existing data and models (no new models are being developed)
- Put tools and data into the center of decision making



Platte River DSS

Initial Phases



- Goal is for initial phases to role out in late 2019
- Future phases will add additional features (reports, post-audit evaluations, model updates, etc.)
- Establish information and data management platform that can be expanded to other basins in the future

Summary

- NeDNR continues to invest significant resources in foundational tools to support IMP development and implementation
- NRDs and other stakeholders are important partners to these efforts
- Feedback from use of these tools is encouraged and helps guide future efforts
- NeDNR is happy to support workshops, presentations, one-on-ones to make these tools more accessible

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A thick yellow swoosh graphic that starts under the 'N', goes under the 'B', 'R', 'A', 'S', and 'K', and ends under the 'A'.

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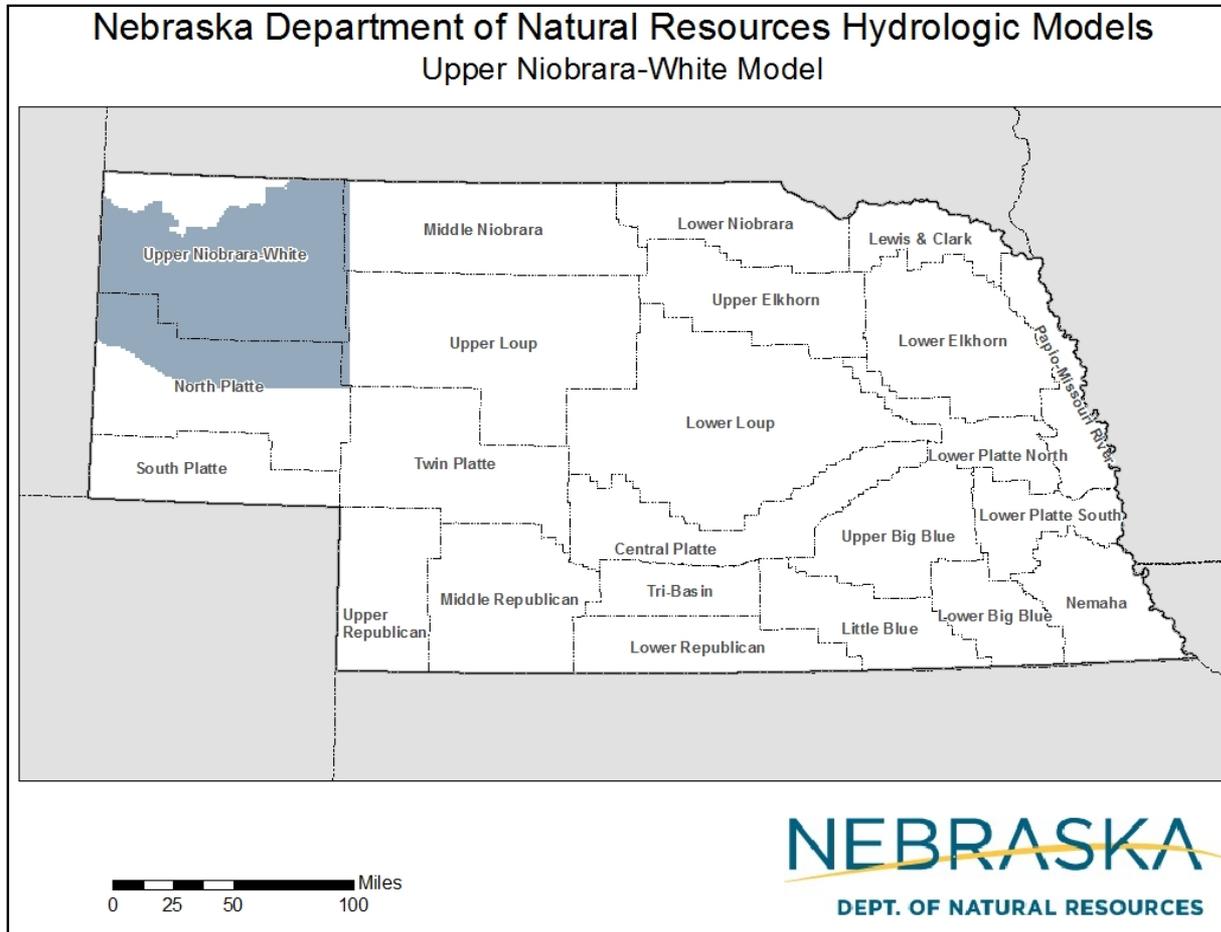
301 Centennial Mall South, 4th Floor

PO Box 94676

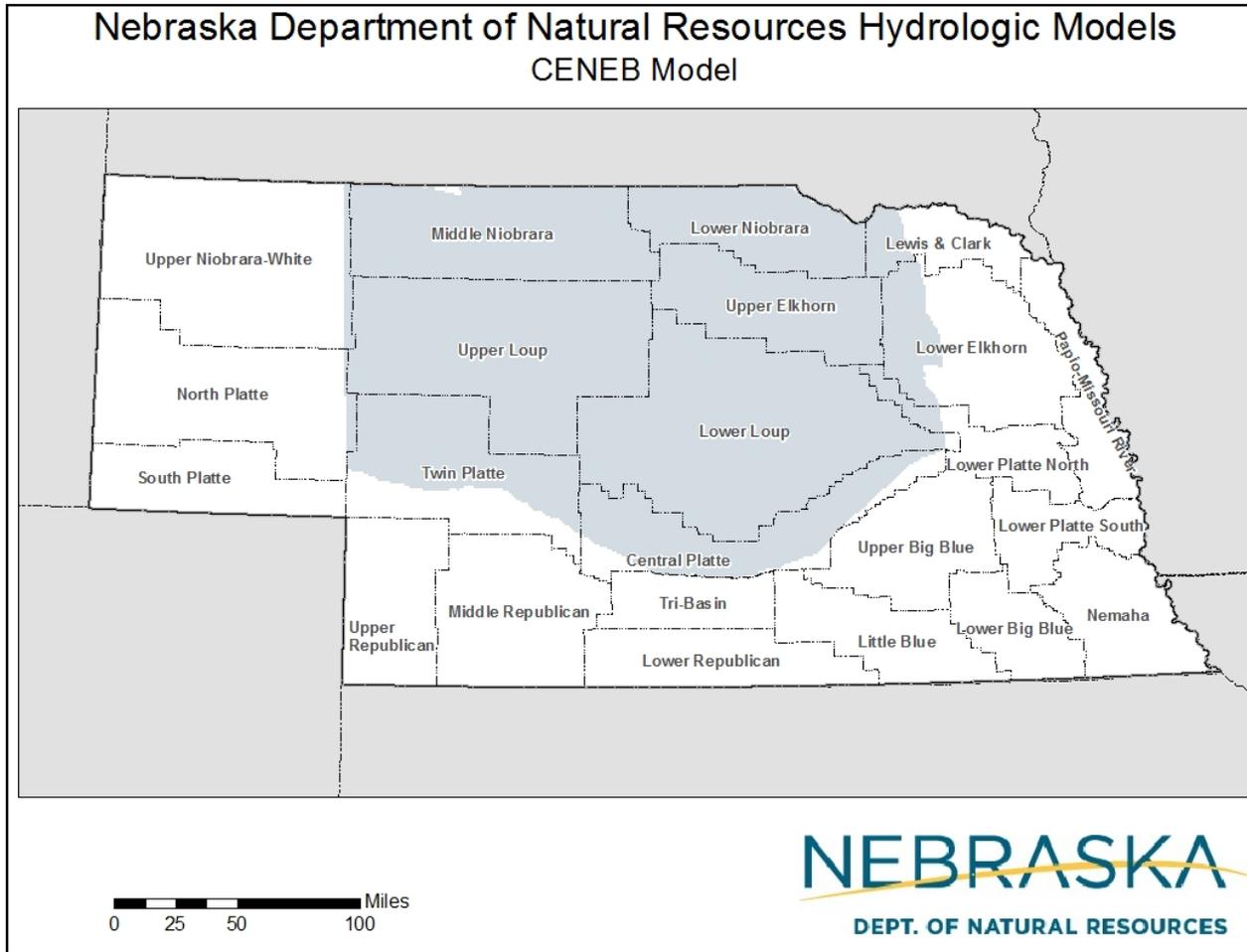
Lincoln, NE 68509-4676

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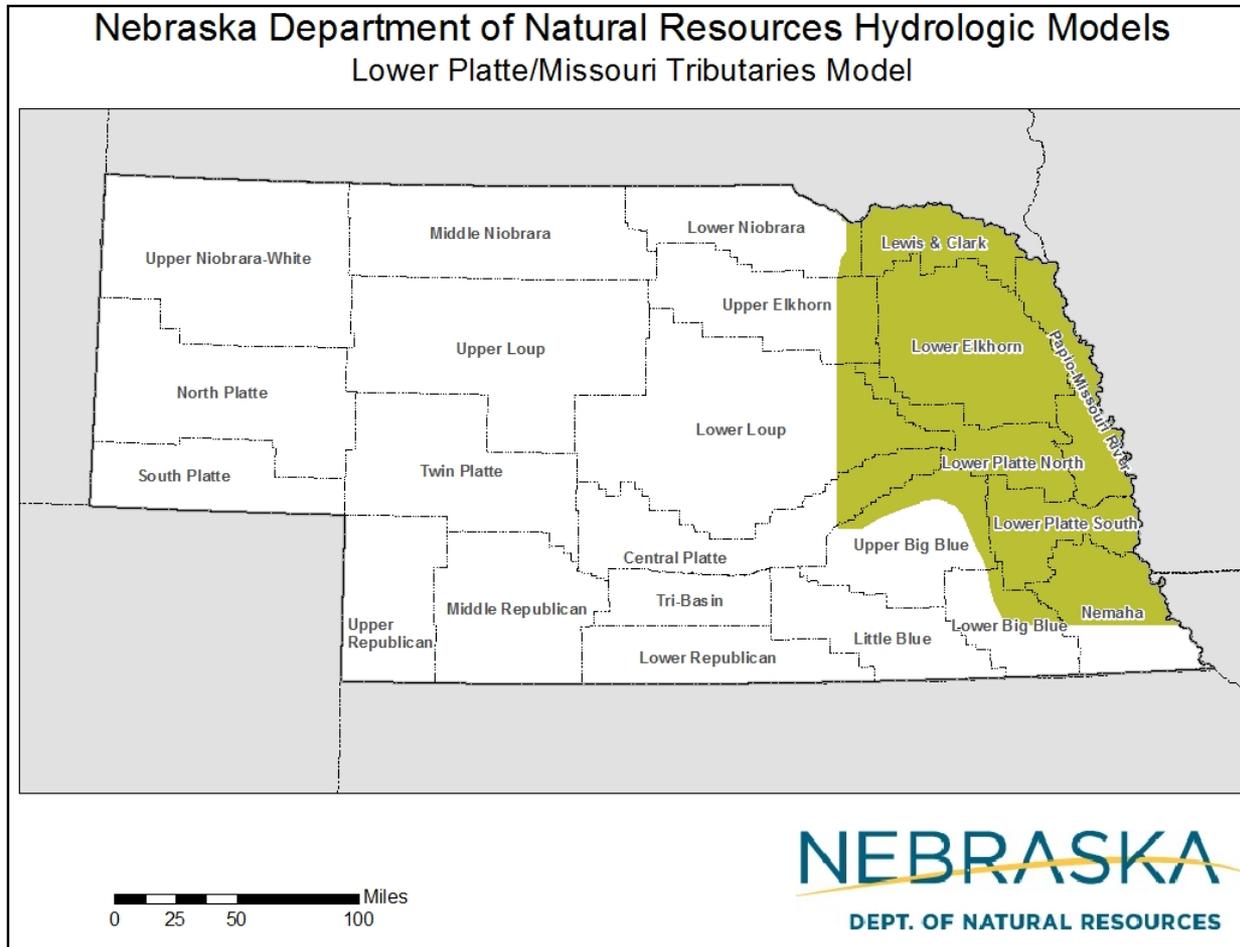
Upper Niobrara-White Model



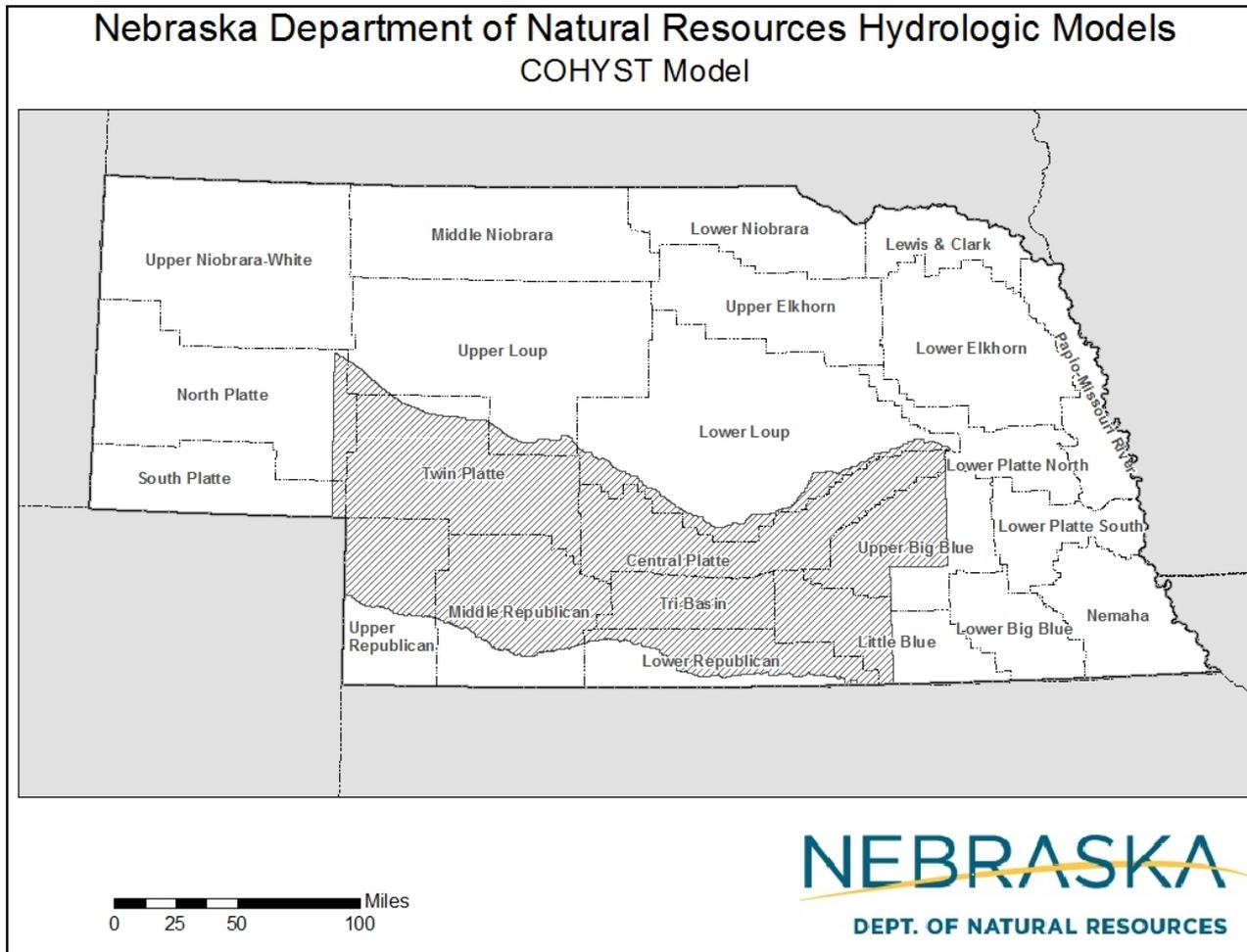
Central Nebraska (CENEB) Model



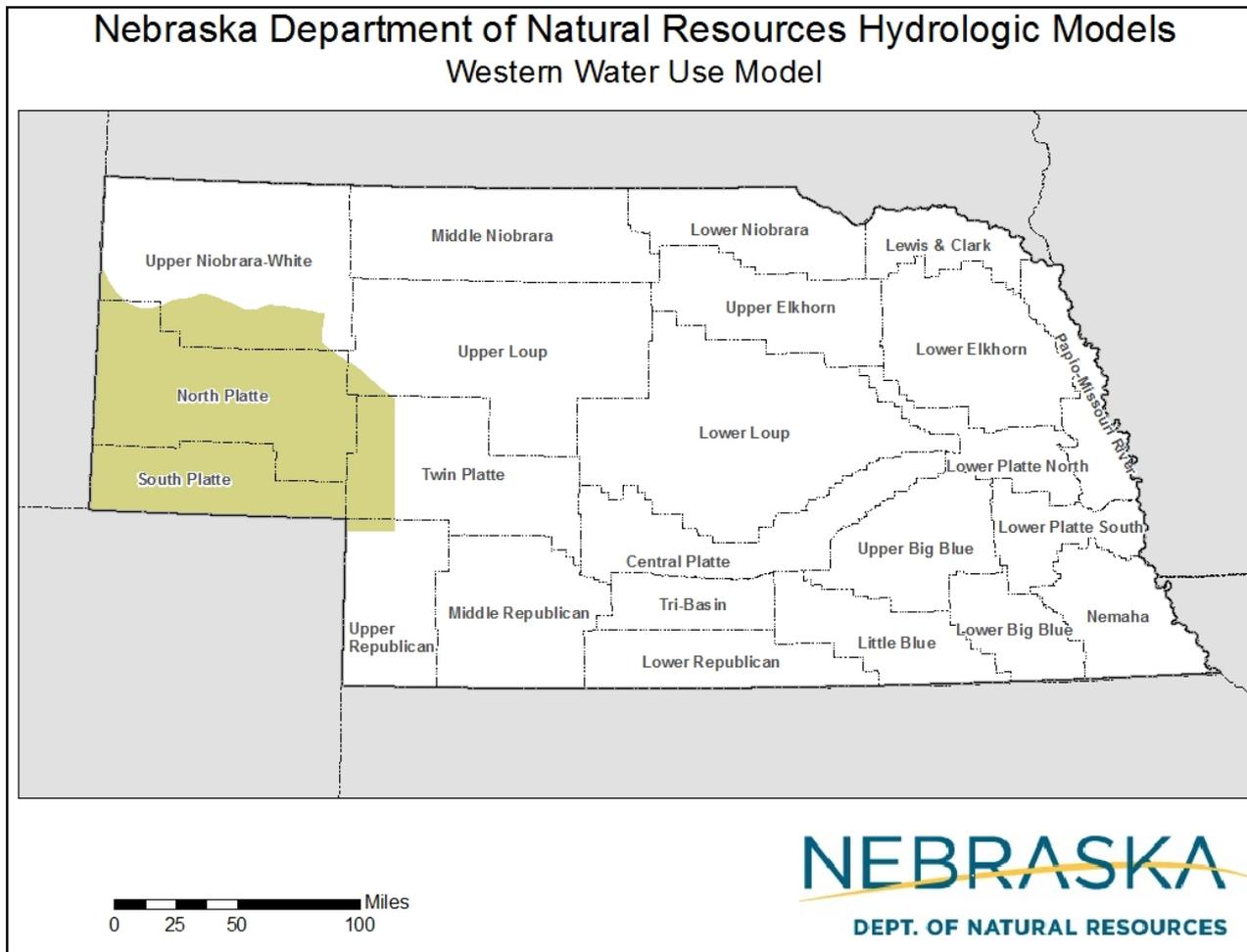
Lower Platte-Missouri Tributaries (LPMT) Model (recently completed)



Cooperative Hydrology Study (COHYST) Model



Western Water Use Model (WWUM)



Republican River Compact Administration (RRCA) Model

