

# Multi-scaled Data Exchange to Support Integrated Water Resources Management

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# Agenda

- Who we are
- What we do
- How local data support our work at multiple scales
  - Interstate
  - Intrastate
  - Local

# NEBRASKA

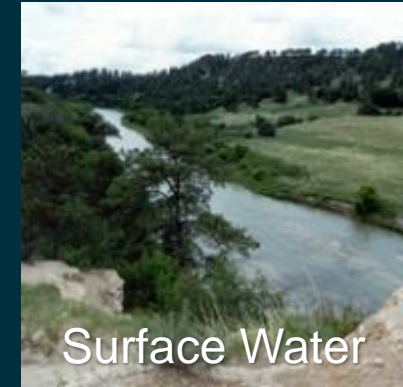
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Water Planning and Integrated Management



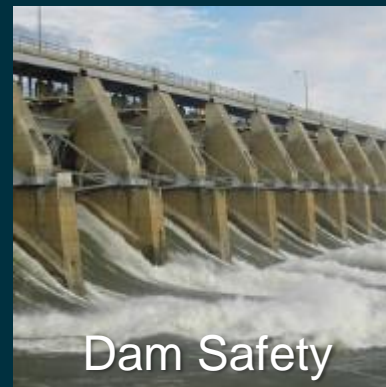
Surface Water



Groundwater



Floodplain Management



Dam Safety



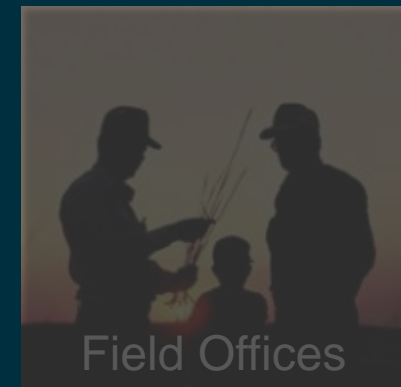
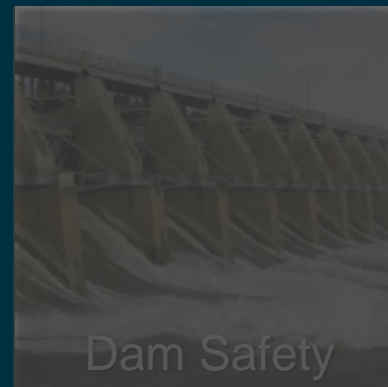
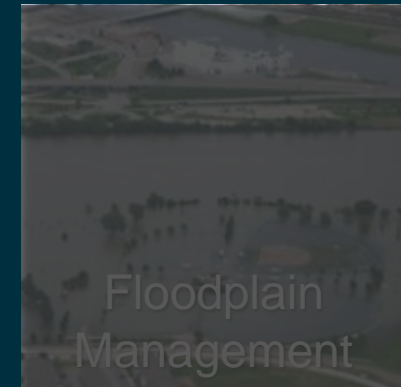
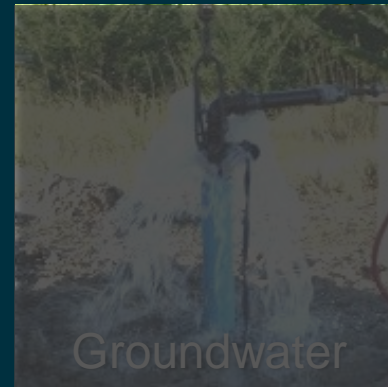
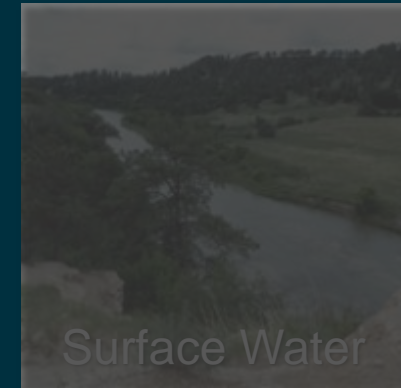
Field Offices

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# IMPLEMENTATION

Water Management  
Projects

Strategic Planning Actions

# PLANNING AND PUBLIC PARTICIPATION

Goals and Objectives  
for Water Planning

Stakeholder Involvement

Water Availability and  
Water Shortages

Water Supplies and Water Uses

# SCIENCE

Hydrologic Models, Data, and Analyses

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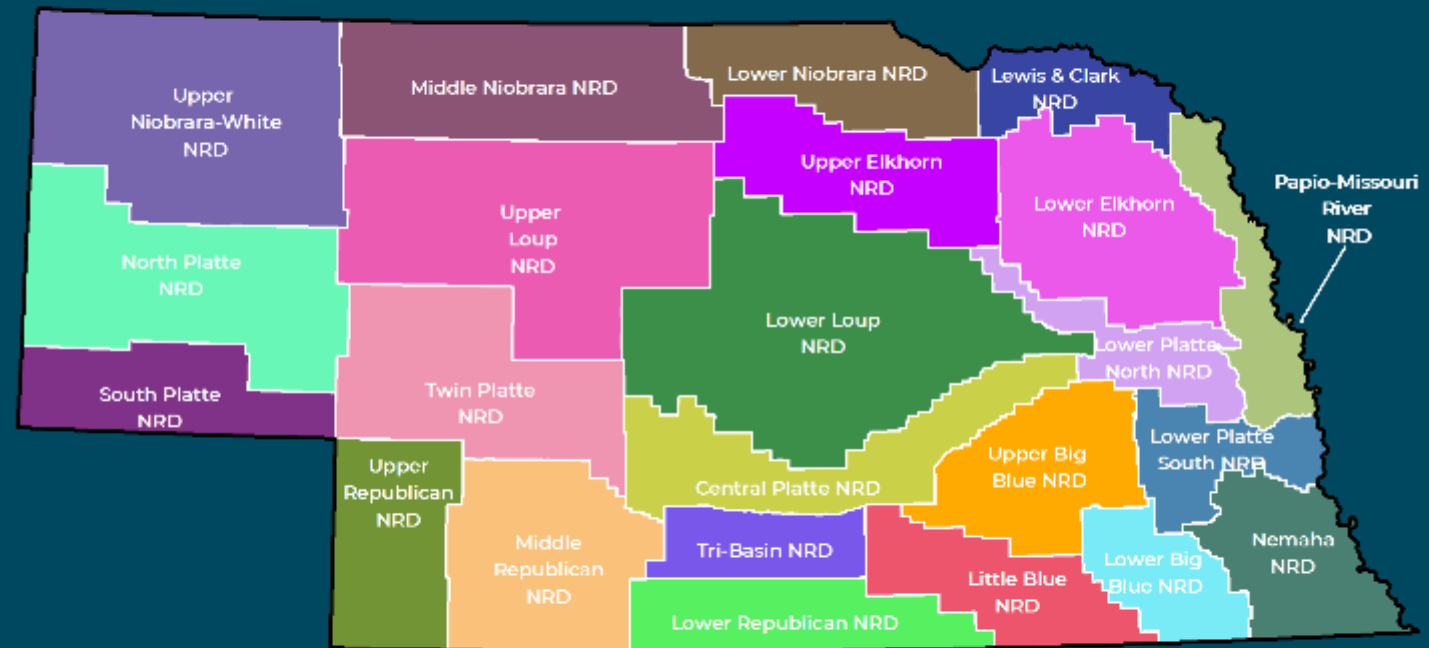
Water Supplies and Water Uses

# SCIENCE

Hydrologic Models, Data, and Analyses

# Nebraska's Natural Resources Districts

- Natural Resources District system created by act of legislature in 1969 (districts in place since 1972)
- Boundaries based on major river basins
- Created to solve flood control, soil erosion, irrigation runoff, and groundwater quality and quantify issues, among other responsibilities



## WATER QUANTITY

### SURFACE WATER QUANTITY

Nebraska Department of Natural Resources (NeDNR) has primary responsibility for surface water quantity. NeDNR and Natural Resources Districts (NRDs) are jointly responsible for surface and groundwater integrated management planning.

### GROUNDWATER QUANTITY

The organizations primarily responsible for groundwater quantity are NeDNR and local NRDs. They are jointly responsible for surface and groundwater integrated management planning.

NeDNR  
ADMINISTERS  
WATER  
COMPACTS

NeDNR  
COORDINATES STATE  
WATER PLANNING &  
REVIEW PROCESS

NeDNR  
REGULATES  
DAMS

NeDNR  
MONITORS  
STREAMFLOW

NeDNR  
DELINEATES  
FLOODPLAINS

NeDNR  
PERMITS  
SURFACE  
WATER &  
INSTREAM  
USE

NeDNR  
CONDUCTS  
INTEGRATED  
WATER  
MANAGEMENT  
PLANNING

NRD / NGPC  
HOLDS  
INSTREAM  
WATER RIGHTS  
FOR FISH,  
WILDLIFE AND  
RECREATION

NeDNR  
REGISTERS  
WELLS

NRD  
OPERATES  
SMALL WATER  
SYSTEMS

NRD  
MANAGES  
GROUNDWATER  
EXTRACTIONS AND  
PERMITTING

NeDNR  
PERMITS INDUCED  
GROUNDWATER RECHARGE

NRD  
MONITORS AND  
REGULATES  
GROUNDWATER  
QUALITY

DHHS  
LICENSSES  
CONTRACTS &  
ENFORCES  
WELL  
STANDARDS

NDEQ  
PERMITS  
ANIMAL LOTS,  
INDUSTRIAL/  
MUNICIPAL  
WASTE WATER

NDEQ  
COORDINATES  
AND LICENSSES  
CHEMIGATION

NRD  
PERMITS  
INJECTION  
WELLS

NDEQ

NDEQ

NDA  
REGULATES  
PESTICIDE  
USE

DHHS  
MONITORS  
DRINKING  
WATER  
QUALITY

NDEQ  
MONITORS  
SURFACE  
WATER  
QUALITY

## WATER QUALITY

### SURFACE WATER QUALITY

Nebraska Department of Environmental Quality (NDEQ) has primary responsibility for surface water quality. Other agencies have responsibility within specific areas.

SURFACE  
WATER

GROUND-  
WATER

### GROUNDWATER QUALITY

NRDs have primary responsibility for groundwater quality related to nonpoint source pollution. NDEQ has primary responsibility for point source pollution of groundwater and authority parallel to the NRDs for nonpoint source pollution.



# Interstate Data Exchange

# Compact Compliance: Republican River Compact Administration (RRCA)

- Compact signed by three states and ratified by Congress in 1943
- Divides “virgin water supply” of the Republican River between Colorado, Kansas, and Nebraska
  - Virgin water supply = water supply undepleted by the activities of man
- 11% to Colorado, 40% to Kansas, 49% to Nebraska
- Long legal history between Kansas and Nebraska
  - Kansas filed suit in 1998 with major points of contention being proliferation of well development (depleting streamflow) in Nebraska and chronic overuse by Nebraska in several subbasins
  - Settlement laid out accounting procedures
- Annual data exchange

# RRCA Data Exchanged

## NeDNR Data

- Non-federal surface water uses
  - Location, diversion amount, acres
- Water administration
  - Dates and curtailment information
- Streamflow records
- New wells
  - Physical information, intended use
- Crop irrigation requirements\*
- Non-federal reservoirs\*\*
  - Surface area, capacity, evaporation

\*Combines NASS and HPRCC data

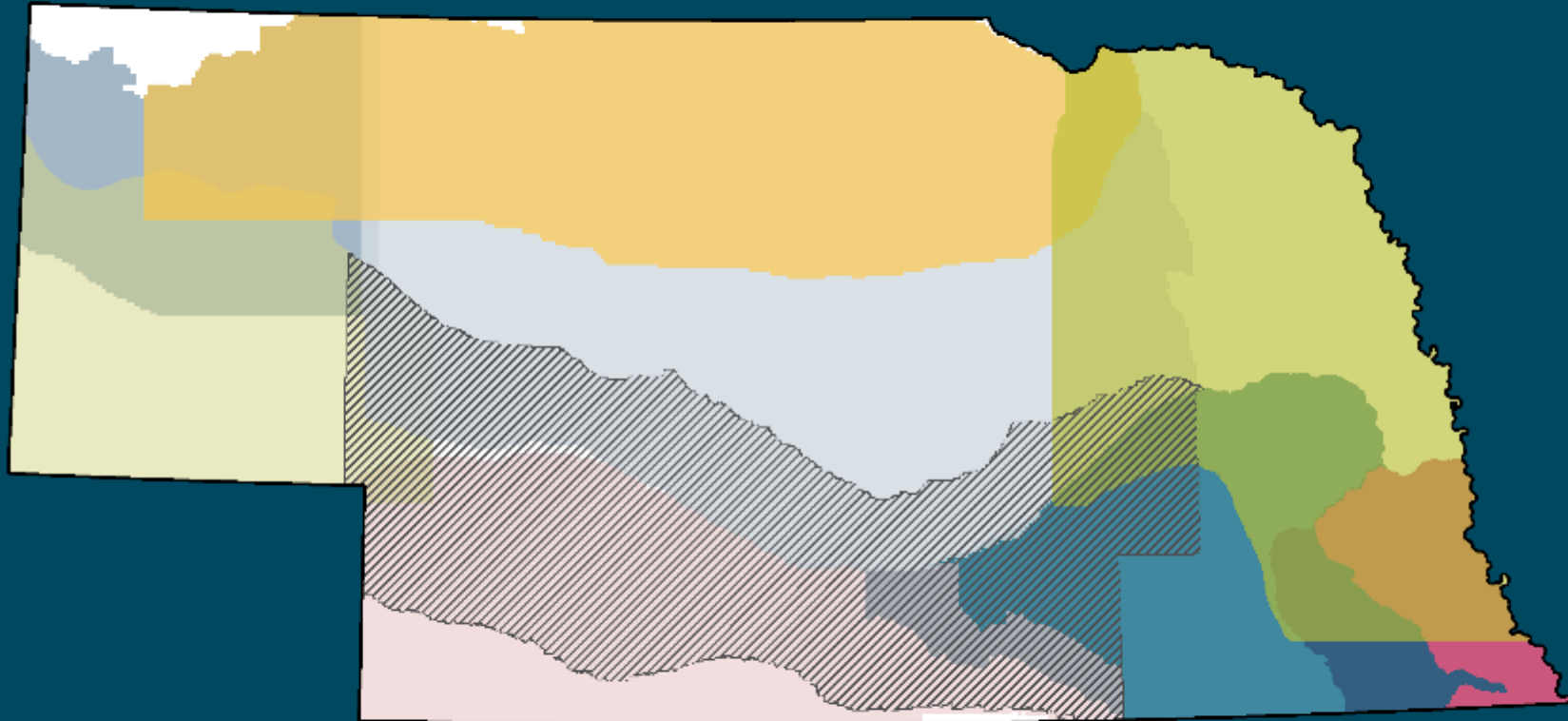
\*\*Calculations based on dam inventory, field office notes, and USBR data

## Data from Other Local Partners

- Platte River reservoirs (irrigation districts)
  - Inflow, outflow, net evaporation
- Augmentation projects (Natural Resources Districts)
  - Physical information, daily pumping data
- Groundwater pumping (Natural Resources Districts, irrigation districts)
  - Pumping amount (from power or meter records), system type, acres irrigated

# Intrastate Data Exchange

# Hydrologic Modeling Efforts Across Nebraska



- |   |                |
|---|----------------|
| Lower Platte/Missouri Tributaries Model | COHYST Model   |
| Upper Niobrara-White Model              | Niobrara Model |
| Western Water Use Model                 | Nemaha Model   |
| Republican Basin Model                  | CENEB Model    |
| Blue Basin Model                        |                |

# Data Used in Hydrologic Modeling

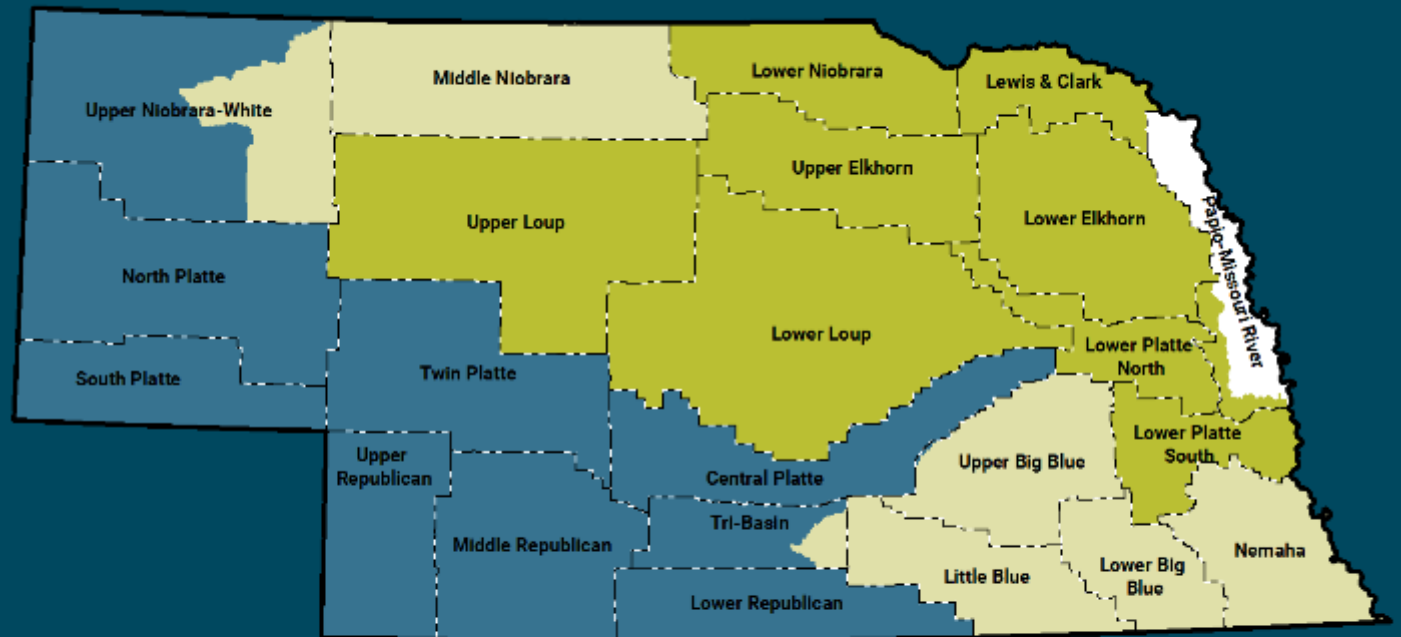
- Climate
- Soils
- Land Use
  - Natural Resources District certified irrigated acres
- Groundwater pumping
  - Natural Resources District metered data – irrigation
  - Municipal and industrial pumping
- Geology
  - University Conservation and Survey Division test holes
  - NeDNR registered wells
  - Airborne electromagnetic survey data
- Surface water
  - NeDNR stream gage data
  - Headwaters seepage/springs locations
  - Local operations data

# Local Data Exchange

# Nebraska's Integrated Management Planning (IMP)

## Process

- 2004: LB962 required IMPs in fully and over-appropriated basins
- 2010: LB764 allowed for voluntary IMPs
- 2014: LB1098 Water Sustainability Fund
  - Several goals, including to promote goals and objectives of approved IMPs
- 2018: All Natural Resources Districts in the state participating in IMPs



■ Required, Adopted   ■ Voluntary, In Development  
■ Voluntary, Adopted   - - - NRD boundary



# Data Exchanged for IMP Annual Reports

## Natural Resources District data

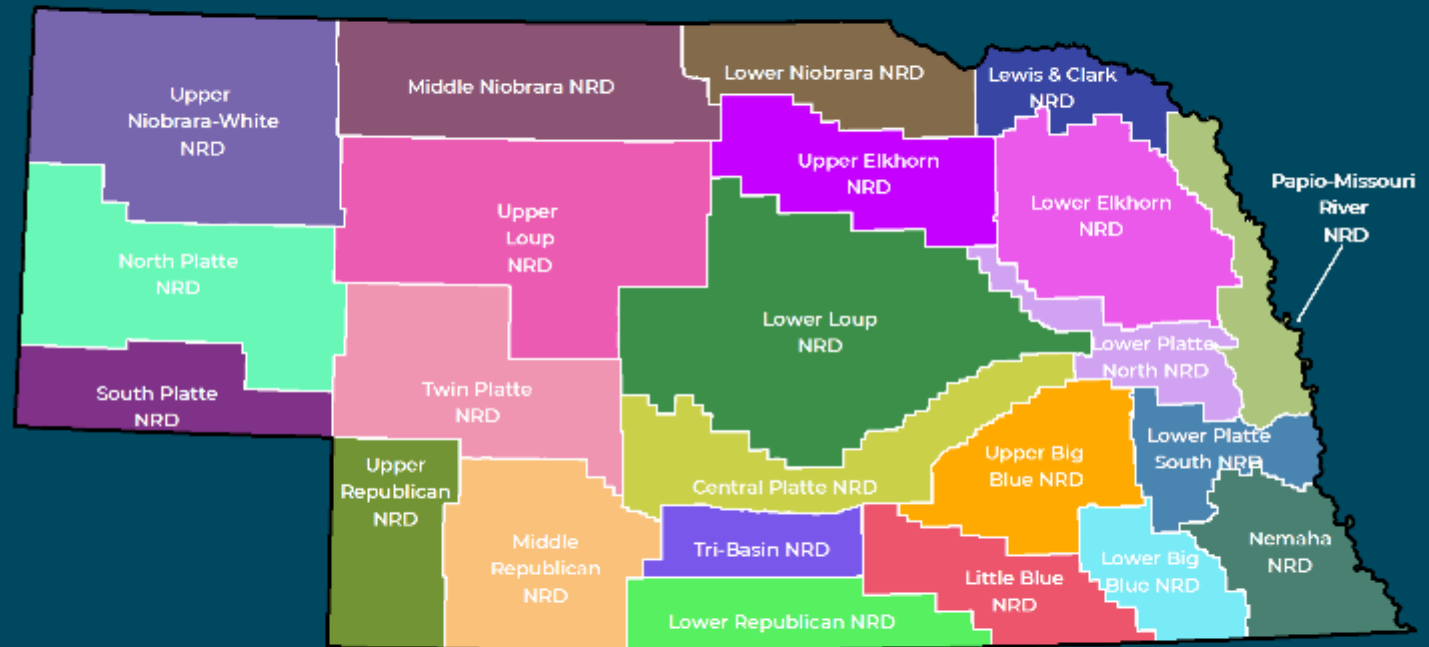
- Static groundwater levels
- Certified acres/changes
- Municipal/industrial uses
- Metered data (irrigation)
- Stream gage measurements
- Well construction permits issued/denied
- Variances granted
- Transfer permits granted
- Depletions to streamflows resulting from new, retired, or other changes to uses

## NeDNR data

- Irrigation use
- Municipal/industrial use
- New appropriations granted
- New groundwater permits issued
- Stream gage measurements
- Transfers/cancellations of appropriations
- Administrative actions taken
- New depletions accounting
- New data collected or model/study results

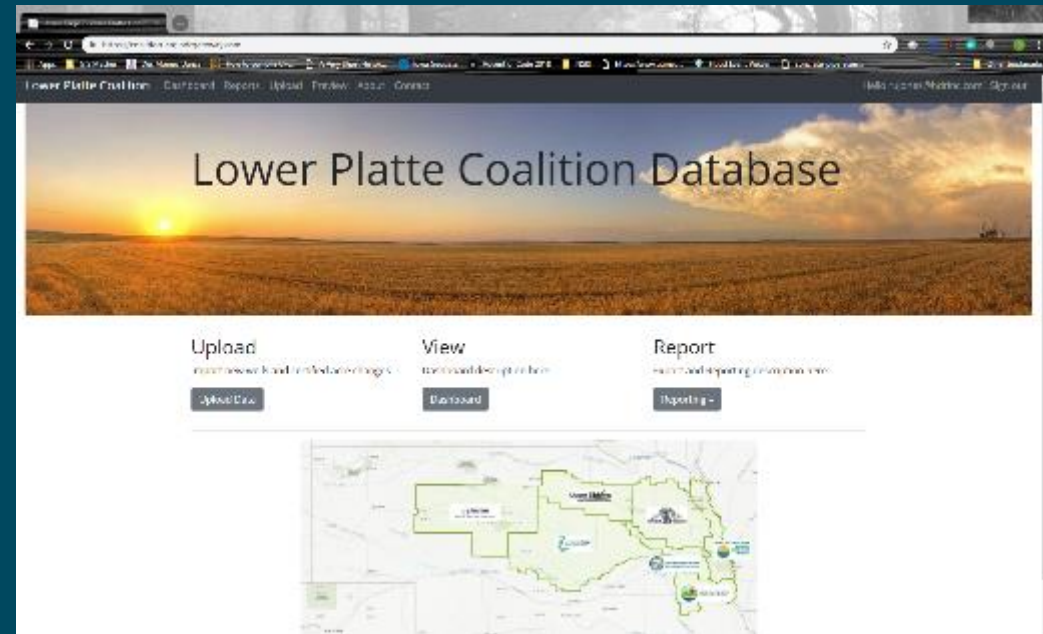
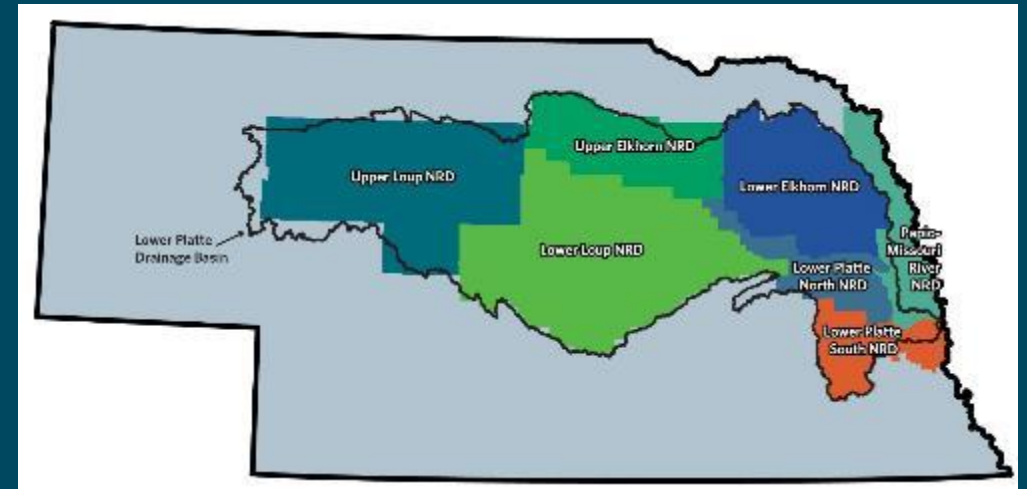
# Data Exchange Challenges

- NeDNR has 23 partners in effort
- Challenges
  - Data types/Level of detail vary
  - Technology/experience
  - Formats
  - Nomenclature, units, etc.
- Critical to the fundamental IMP feedback loop



# Database development

- Lower Platte Basin Coalition – 2018 Basin Plan
- Opportunity to establish consistency in data collection and storage
- Coincident effort with USGS WUDR statewide database development for non-agricultural uses
- Two purposes:
  - Importing, storage, and reporting for IMP and basin plan annual reporting
  - Data record for plan monitoring, future modeling efforts



# Importing and Storing Data

- Standardized format – template files
- Compatibility with existing databases – not creating work!
- Robust validation

Lower Platte Connection Dashboard Reports Upload Preview About Contact

### Import Preview

Upload file: NP\_data\_201610\_NE\_20102283.xlsx

Fast to update | Load to database | View details

- Success - 16 Error data rows from the New Well Worksheet have been validated and are shown in Preview below
- Success - 54 Error data rows from the Change/Control/Alter Worksheet have been validated and are shown in Preview below
- To finish report click Load to Database button

Preview fields: Preview Changes Import Action

Show 1 to 10 entries

MWD (Well ID)	NRD (Well ID)	UFD (Well ID)	D&I Well Reg.	County	Use	NRD Approval Date	Status	Pump Capacity (gpm)	Replacement Well
UR	18111	JE 16471	G-100203	WABASH	1	11/14/2015	N	500	01
UR	18012	JE 16402	G-100201	WABASH	1	12/14/2010	A	1000	01
UR	18111	JE 16474	D-100401	WABASH	1	10/17/2015	N	500	01
UR	18014	JE 16474	G-100202	WABASH	1	01/02/2017	A	500	01
UR	1711900	JE 1711900	W-201601	WABASH	1	06/02/2017	N	500	01
UR	1711901	JE 1711901	G-100404	WABASH	1	02/14/2017	N	500	01
UR	1740105	JE 1740105	G-201703	WABASH	1	01/14/2017	A	1000	01
UR	1711902	JE 1711902	D-100405	WABASH	N	06/02/2017	N	500	01
UR	1741010	JE 1741010	G-201708	WABASH	1	02/14/2017	A	1000	01
UR	1711900	JE 1711900	W-201602	WABASH	1	06/02/2017	N	500	01

Showing 1 to 10 of 64 entries

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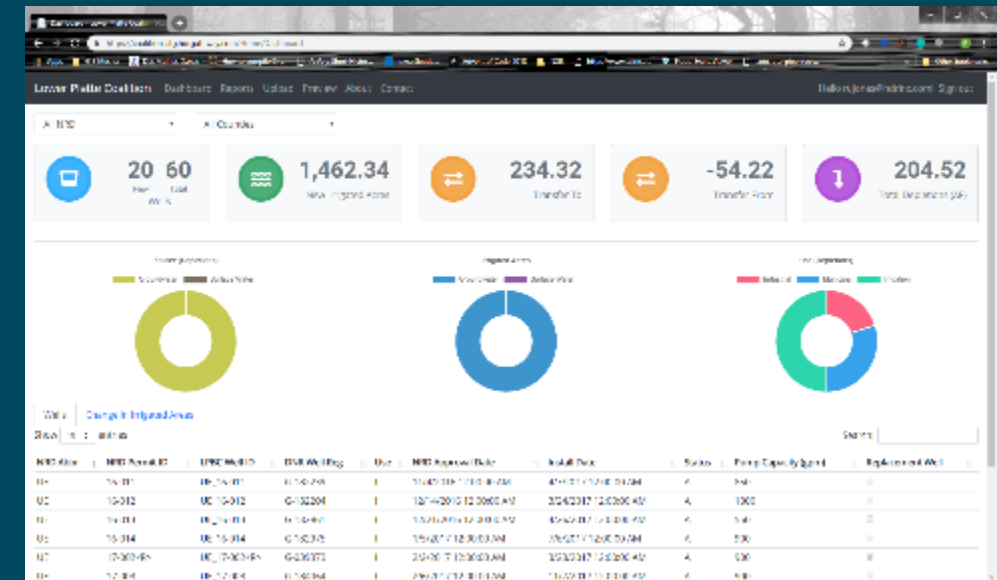
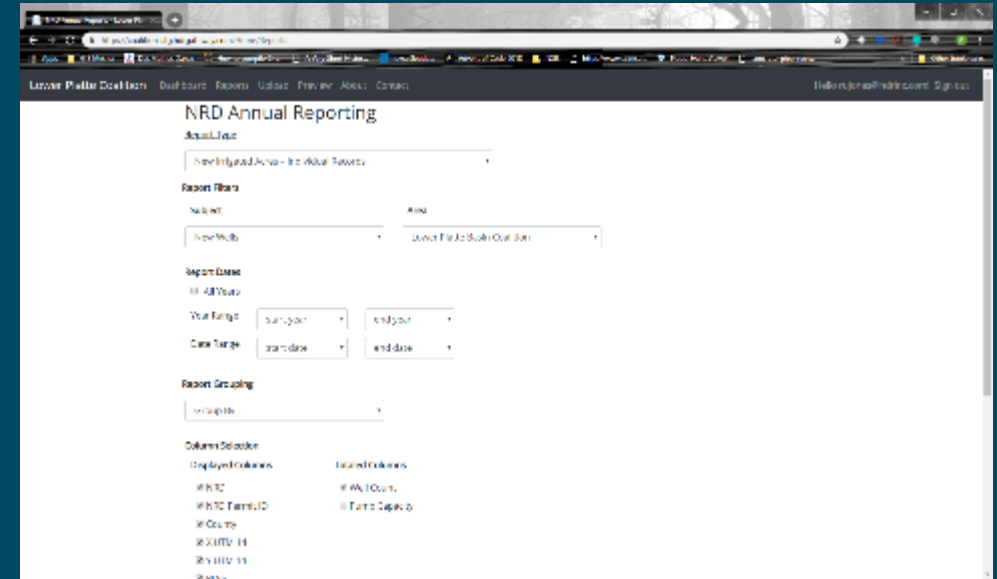
Show 1 to 10 entries

MWD (Well ID)	MWD Transaction ID	UFD (Well ID)	Perm	Change Type	Authorized	Surface Water Ratio	Use of Inground Acre	Stream Discharge Factor	MTH (Well ID)
UR	201501	JE 201601	1	None	0		0	0	45
UR	201200	JE 201602	1	None	0.5		10	10	13
UR	201504	JE 201604	1	None	10.4		7	7	47
UR	201204	JE 201604	1	None	0		27	27	32
UR	201505	JE 201605	1	None	10		25	25	49
UR	201506	JE 201606	1	None	0		34	34	49
UR	201207	JE 201607	1	None	0		30	30	47
UR	201508	JE 201608	1	None	13		45	45	54
UR	201200	JE 201609	1	None	0.9		30	30	52
UR	201510	JE 201610	1	None	15		48	48	54

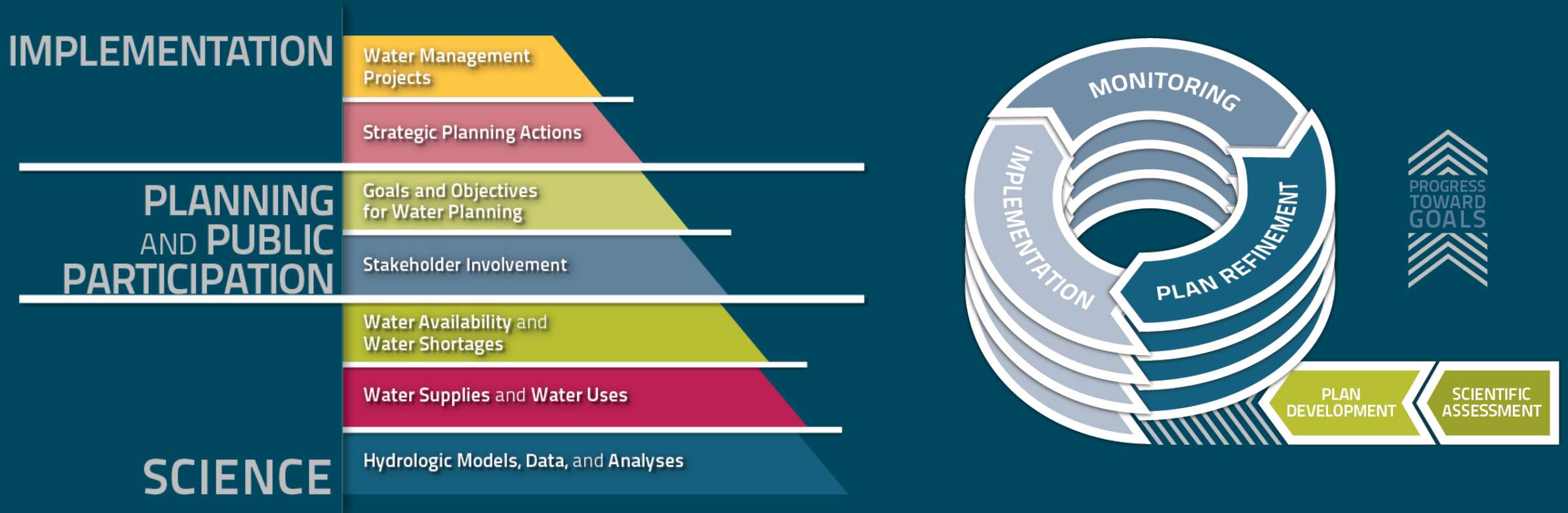
Showing 1 to 10 of 51 entries

# Reporting

- Multiple database queries:
  - Spatial
  - Temporal
  - Type (use, transfer, retirements, etc.)
- Standardized reporting tables and graphics
- Timing and location record of new uses stored for monitoring and modeling updates



# Data Exchanged Annually Informs Adaptive Management



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