



Managing Nebraska's Water Resources

Jennifer J. Schellpeper, Integrated Water Management

Beth Eckles, Permits and Registrations

Andrew Christenson, Floodplain Management

Carol Myers Flaute, Integrated Water Management



Department of Natural Resources

Overview

1. Who is DNR?
2. Surface and Groundwater Permitting in Nebraska
3. Floodplain Management, Mapping, and Mitigation
4. Integrated Water Management

WHO IS DNR?

Jennifer J. Schellpeper,
Integrated Water Management Acting Division Head

Water Planning and
Integrated Management



Who is NDNR?

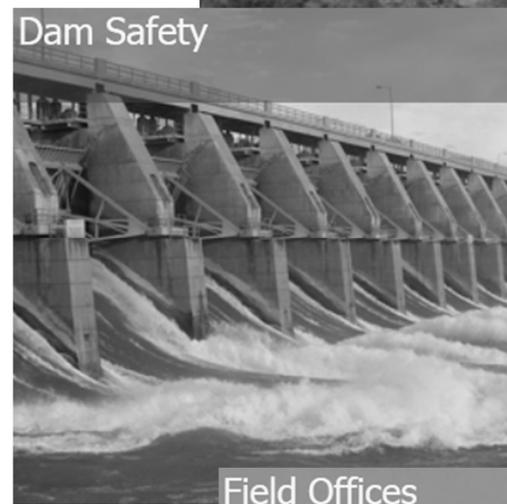
Groundwater



Surface Water



Dam Safety



Floodplain Management



Field Offices



Agency Mission

VISION and MISSION

- The DNR is dedicated to working with Nebraska's citizens and leaders to plan, establish, and administer policies and programs for the effective management and conservation of the State's water and land resources.
- Committed to performing statutory responsibility to manage and conserve the State's water and land resources in an effective and efficient manner.

Available Data

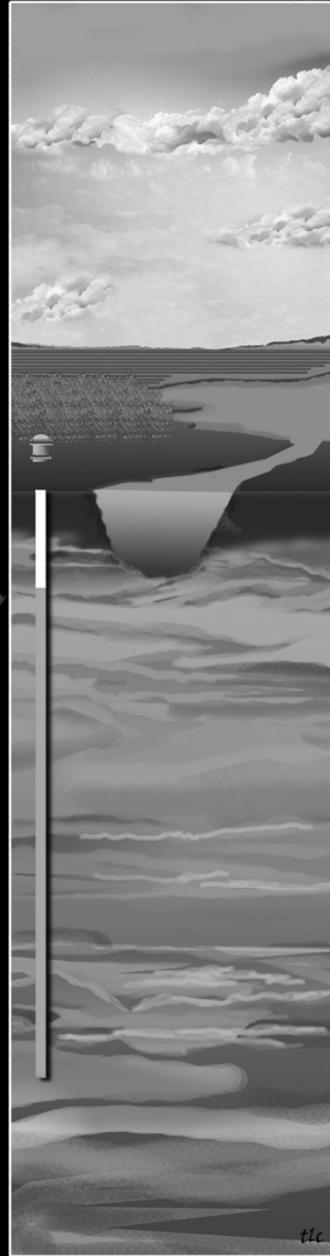
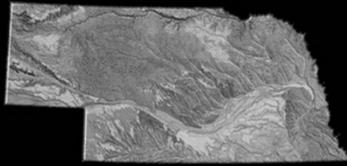
- New Website Design - <http://dnr.ne.gov/>
- Streamgaging - <http://data.dnr.nebraska.gov/RealTime>
- NERain - <http://nerain.dnr.nebraska.gov/nerain/>
- Ice Jam Monitoring - <http://dnr.ne.gov/fpm/ice-jam>
- INSIGHT - <http://dnr.ne.gov/insight/>
- Voluntary Water Use Database -
<http://data.dnr.nebraska.gov/wateruse>

SURFACE AND GROUNDWATER PERMITTING IN NEBRASKA

Beth Eckles, Natural Resources Program Specialist

Surface and Groundwater Permitting in Nebraska

- Surface water or groundwater?
- What is a water right?
- Types of water rights
- Filing an application
- Approval of an application
- DNR field offices
- Little known aspects
- Groundwater permitting



Groundwater

- Correlative Rights
- Regulated by local Natural Resources Districts

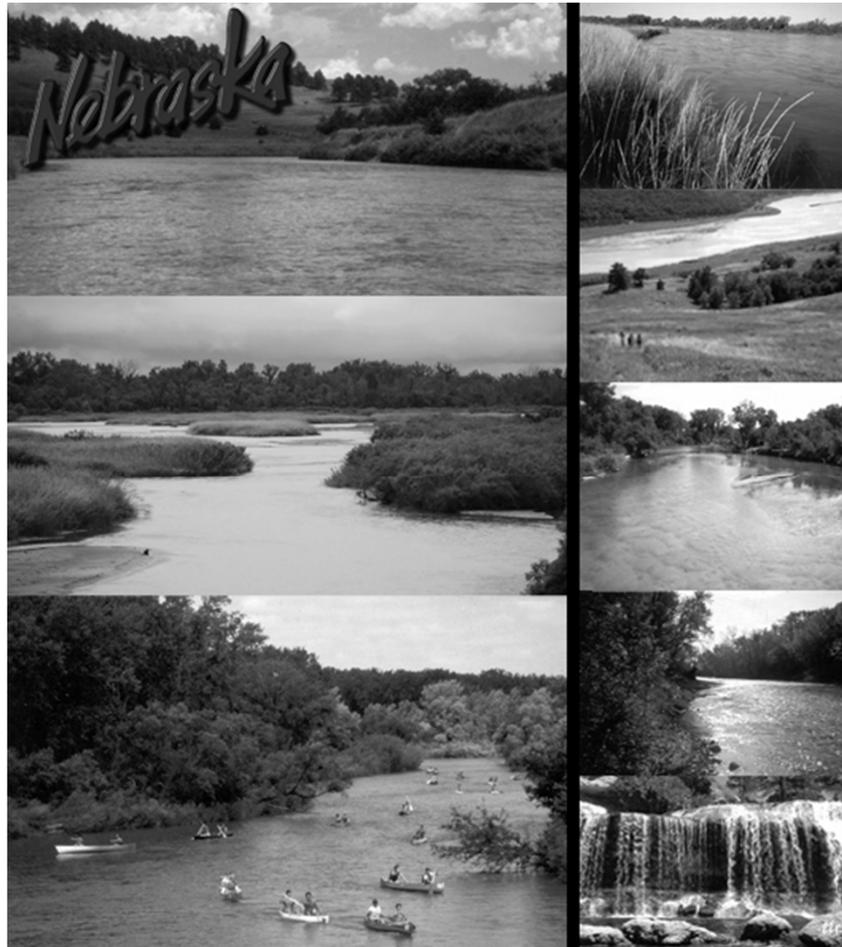
Share and share alike
Beneficial use

Surface Water

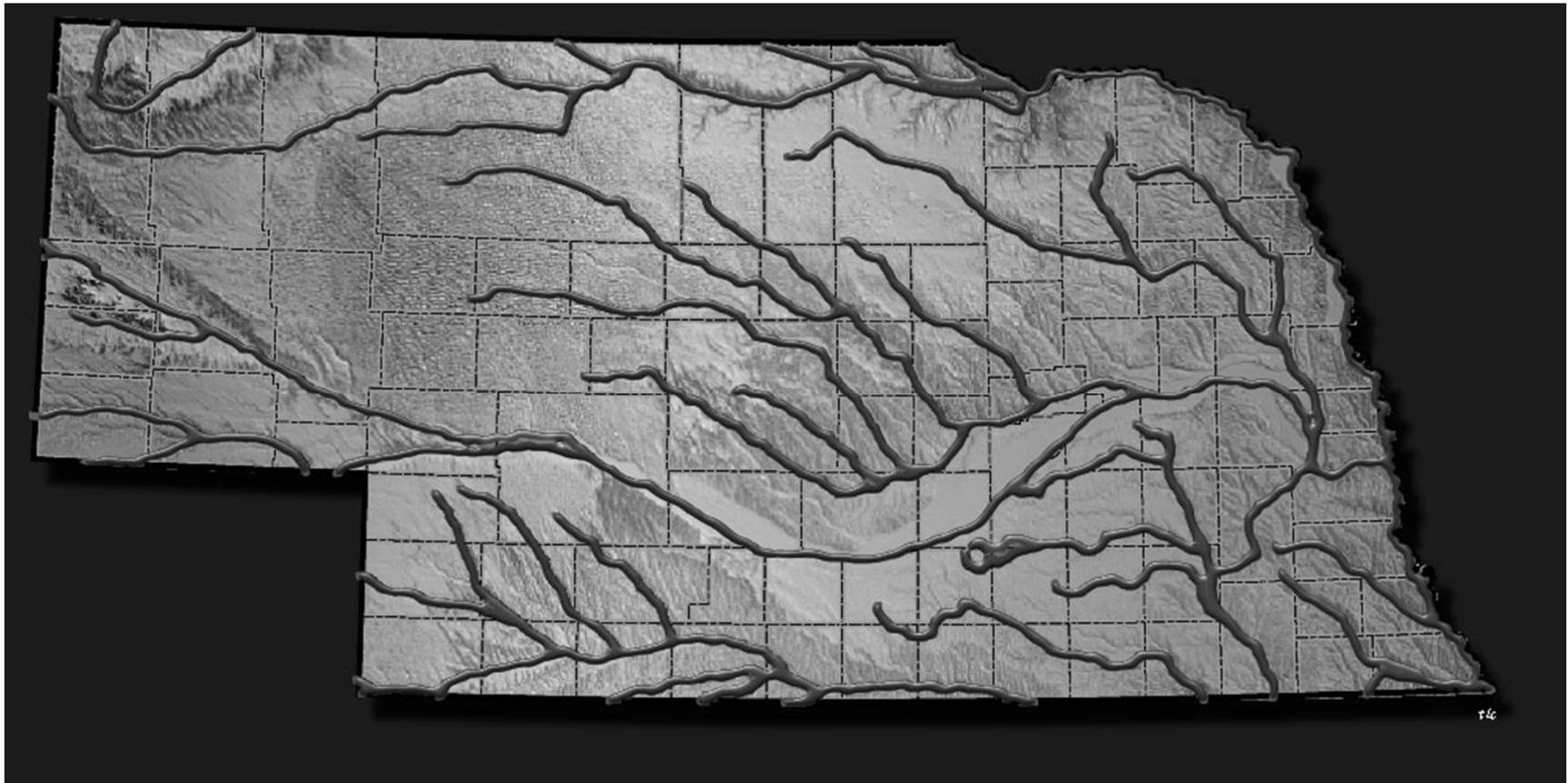
- Prior Appropriations
- Regulated by Nebraska Department of Natural Resources

First in time
is first in right

Surface Water Belongs to the People of Nebraska



Nebraska Has More Miles of River than Any Other State



Water Right, Permit, Appropriation

Three common types of water rights:

1. Irrigation from a naturally flowing source
2. Storage
3. Storage-use

Natural Flow Irrigation



Storage



Storage-use



Irrigation District River Diversion vs. Private Pumper



Application Form

DNR Form APA-001
August 2008

**STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
APPLICATION FOR A PERMIT TO APPROPRIATE WATER**

Complete items 1 through 10 by printing in ink or typing the appropriate information and by placing an X in the appropriate box.

	For Department Use Only
1. Name and address of owner of land under proposed project. Names must be exactly as described on the deed or document transferring ownership of property. Landowner must sign the application.	Filed in the office of the Department of Natural Resources at _____ a.m./p.m. on _____
E-mail address: _____ Telephone No. (____) _____	Application No. _____
2. Name, address, and telephone number of applicant if different than landowner.	Map No. _____
E-mail address: _____ Telephone No. (____) _____	Water Division _____
	Receipt No. _____ Amount _____
	Right ID _____
3a. A permit is sought to: <input type="checkbox"/> Use natural flow <input type="checkbox"/> Use impounded water*	3b. A permit is sought for the purpose of: <input type="checkbox"/> Irrigation <input type="checkbox"/> Manufacturing <input type="checkbox"/> Domestic <input type="checkbox"/> Other <input type="checkbox"/> Temporary**
4a. Identify the source of water (name of stream or reservoir).	4b. If applicable, identify the facility name for transporting water from the source (portable pump, name of canal or pipeline).
5. Identify the location of the <input type="checkbox"/> Headgate <input type="checkbox"/> Pump Section _____ Township _____ North, Range _____ E _____ W _____ County _____	
<p>The box at left represents one square mile (section). Place an X within each appropriate 40-acre tract to indicate the location(s) of each headgate or pump.</p> <p>If applicable, indicate the height, in feet, of any diversion or check dams on the line below.</p> <p>_____</p>	
<p>* A separate permit to impound water must be obtained. ** A temporary permit maybe granted for a maximum of one year.</p>	

DNR Form APA-001
August 2008
Page 2 of 2

6. If applicable, identify the location of lands by 40-acre subdivisions that will be irrigated.

LEGAL SUBDIVISIONS	Sec.	Twp.	Rge.	No. of Acres	LEGAL SUBDIVISIONS	Sec.	Twp.	Rge.	No. of Acres
TOTAL NUMBER OF ACRES TO BE IRRIGATED:									0.0

Enclosed is an aerial photograph that I have marked to show the approximate location of land to be irrigated as described above.

7. State the approximate quantity of water desired for appropriation. _____

<input type="checkbox"/> Gallons per minute
<input type="checkbox"/> Cubic feet per second
<input type="checkbox"/> Acre-feet (impounded water)

8a. State the estimated time required for completion of all water diversion facilities. _____

8b. State the earliest date when water will have been used for beneficial purposes. _____

9. Will this project be constructed under a federal program, receive federal funding, or have federal planning assistance?
 No Yes If yes, explain: _____

10. I certify that am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete and accurate.

Date _____ Signature of owner or owner's authorized agent (with proper documentation) _____

A final project map may accompany this application or must be filed within six months following departmental approval of this application, drawn in accordance with NAC Title 457 - Rules for Surface Water, Chapter 10. (http://dnr.ne.gov/SurfaceWater/Title_457_0608.pdf) At the request of the applicant, the Department will assist with preparation of the project map.

This form must be completed in full. An incomplete or defective application will be returned with 90 days being allowed for resubmission. Failure to resubmit a corrected application within this period shall cause dismissal of the application and consequent loss of priority and fees.

A non-refundable filing fee, payable to the Department of Natural Resources, computed from the table below must accompany this application. Forward this application and applicable fees to:

State of Nebraska
Department of Natural Resources
301 Centennial Mall South / P.O. Box 94676
Lincoln, Nebraska 68509-4676
(402) 471-3243

Nature of Use	Cost	Nature of Use	Cost
Domestic	\$10	Manufacturing	
Agricultural		General	\$10
Irrigation from Stream		Power Generation for each theoretical 50 horsepower	\$5
0-1,000 acres	\$200	Other	\$10
Each additional 1,000 acre unit or portion thereof in excess of the first 1,000 acre unit	\$100		
Irrigation from Storage Reservoir			
0-1,000 acres	\$50		
Each additional 1,000 acre unit or portion thereof in excess of the first 1,000 acre unit	\$25		
Each additional 1,000 acre unit or portion thereof in excess of the first 1,000 acre unit	\$25		

Required Plans Title 457 & Title 458



STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
APPROVAL OF APPLICATION A-18676
WATER DIVISION 2-F

ORDER

IT IS HEREBY ORDERED that application A-18676 is APPROVED subject to the following limitations and conditions:

The source of water is Bazile Creek.

The water shall be used for the purpose of irrigation.

The priority date is September 3, 2009.

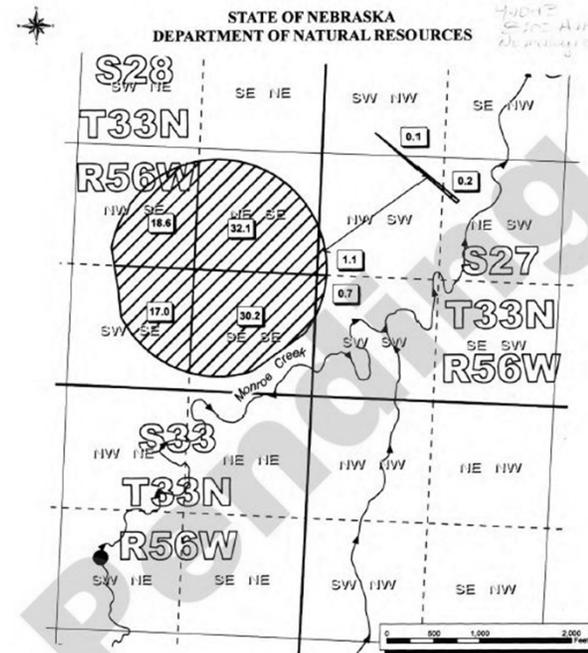
Only the land shown on map number 17750 may be irrigated under appropriation A-18676.

The rate that water may be diverted under appropriation A-18676 shall not exceed one cubic foot per second (cfs) for every 70 acres irrigated. Total annual volume of water diverted may not exceed 3 acre-feet per acre irrigated.

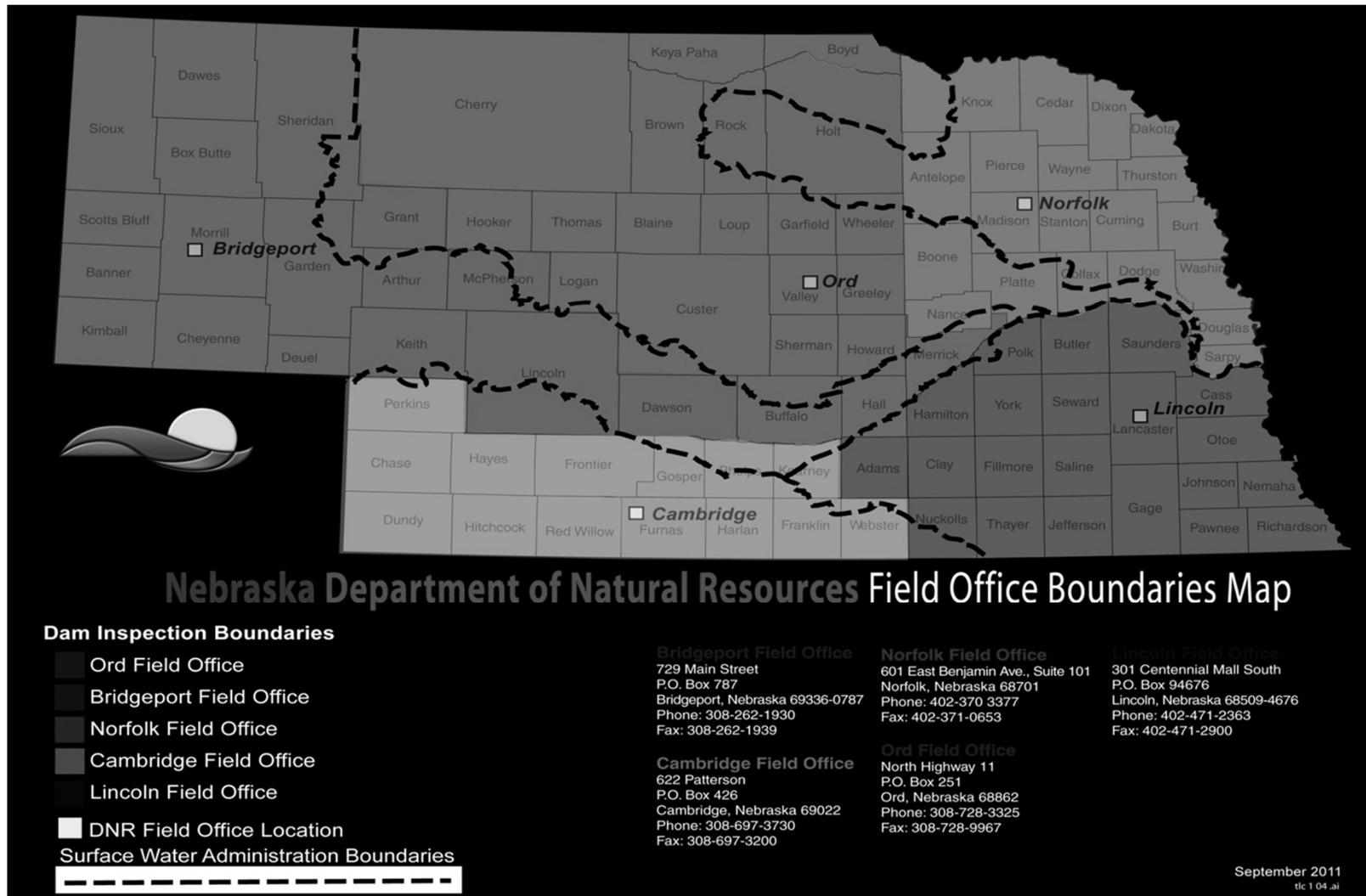
Any diversion or check dam for this appropriation shall not be larger than necessary. The Department or Norfolk field office retains the right to determine if a diversion or check dam is excessive or unlawful.

The appropriator must comply with all relevant statutes. The statutes include, but are not limited to, the following:

Application Approval and a Pending Map



DNR Field Offices



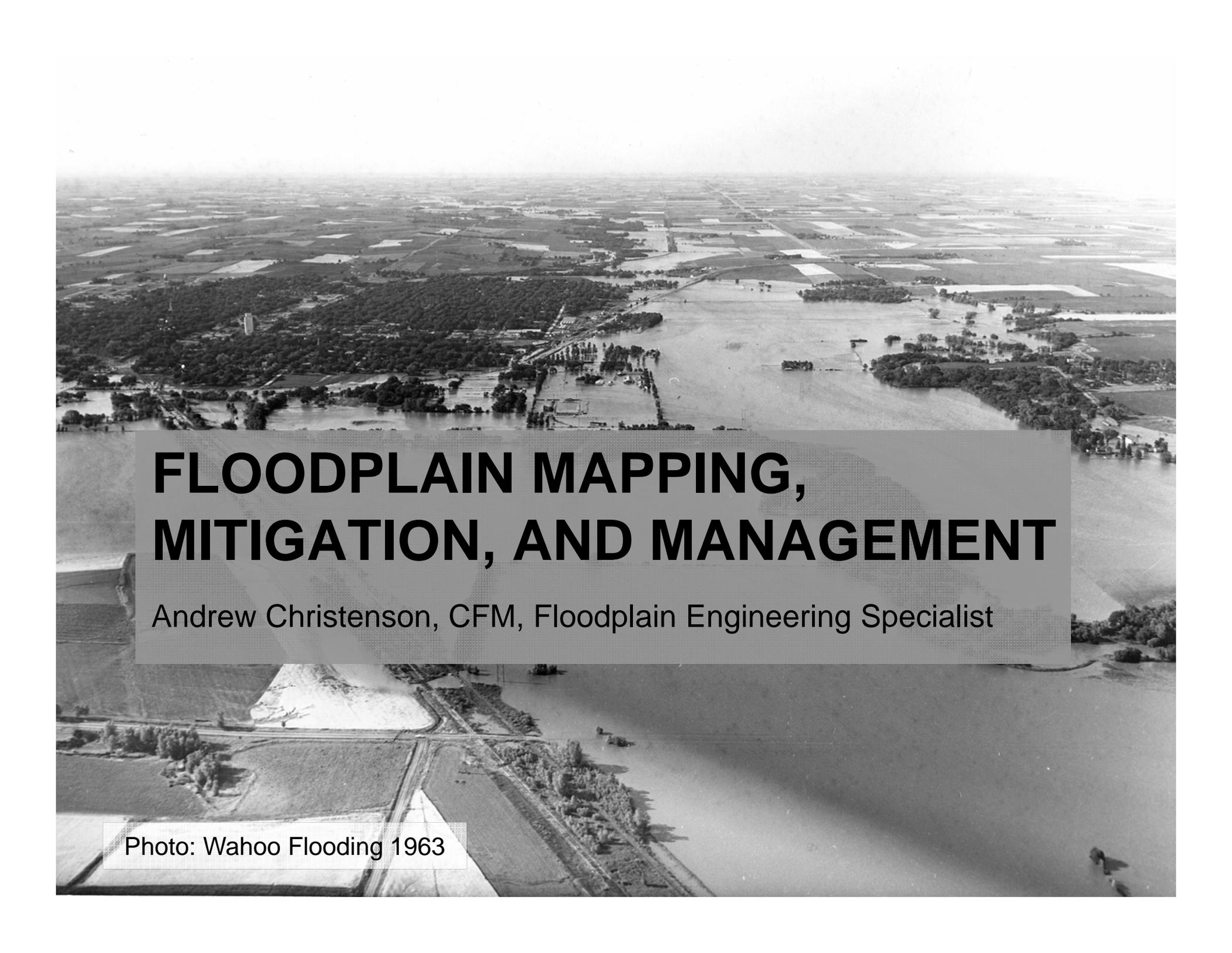
MAY BE A SURPRISE TO LEARN ABOUT CURRENT WATER LAW

- Nebraska law does not require any water to remain in a stream or river
- Water for cattle is not protected regarding natural flow diversion permits

Groundwater Permits at DNR

1. Municipal transfer permit – need depends on NRD rules
2. Industrial transfer permit
3. Transfers to adjoining state
4. Permits to violate well spacing

DNR does NO domestic and agricultural transfers – these are handled by the NRD



FLOODPLAIN MAPPING, MITIGATION, AND MANAGEMENT

Andrew Christenson, CFM, Floodplain Engineering Specialist

Photo: Wahoo Flooding 1963

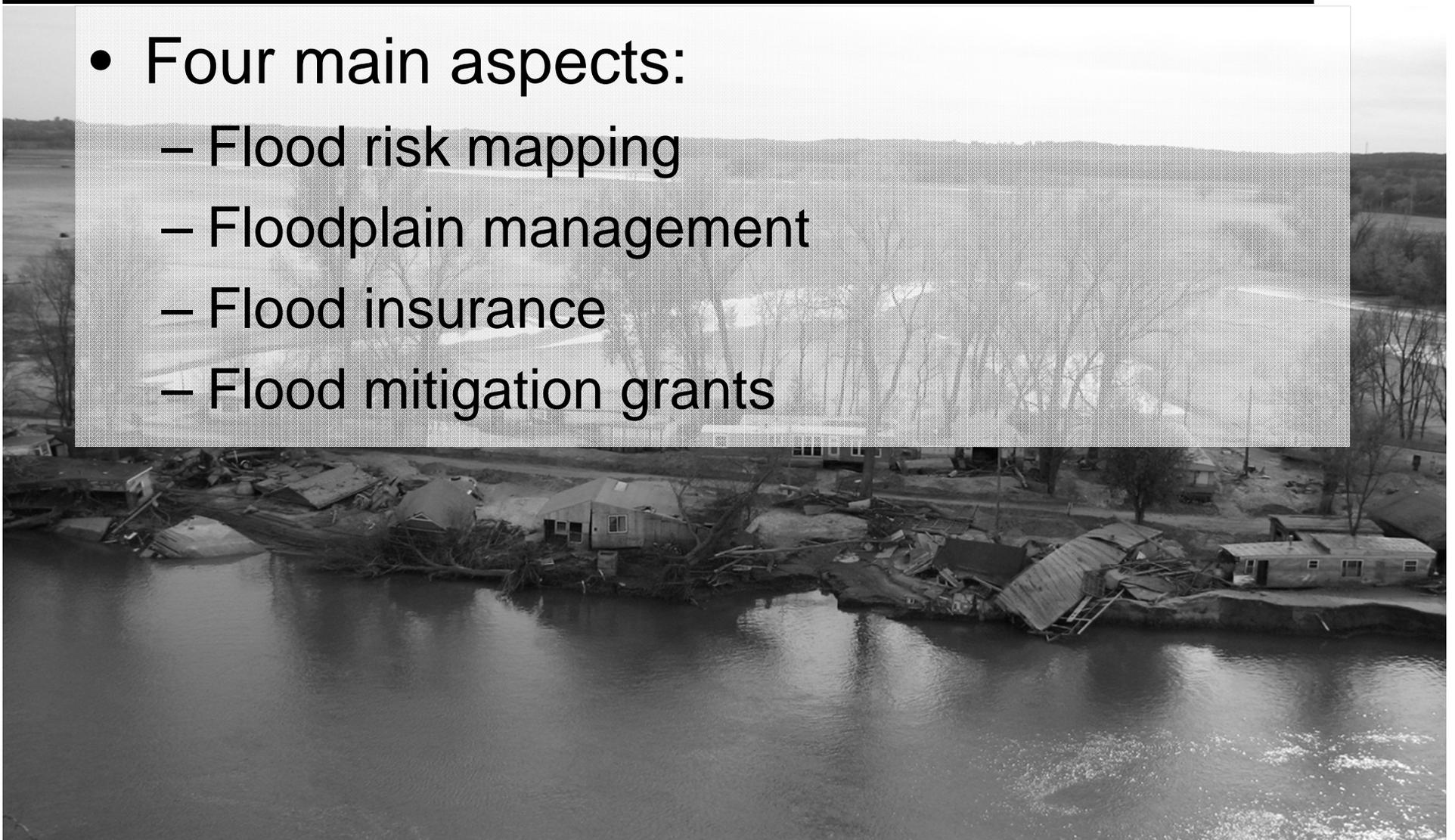


36

FOR SALE

National Flood Insurance Program

- Four main aspects:
 - Flood risk mapping
 - Floodplain management
 - Flood insurance
 - Flood mitigation grants



National Flood Insurance Program (NFIP)

The NFIP is a federal program:

- Established with the passage of the National Flood Insurance Act of 1968
- Enables property owners in participating communities to purchase insurance as protection against flood losses
- Participation is voluntary and based on an AGREEMENT between local communities and the Federal Government

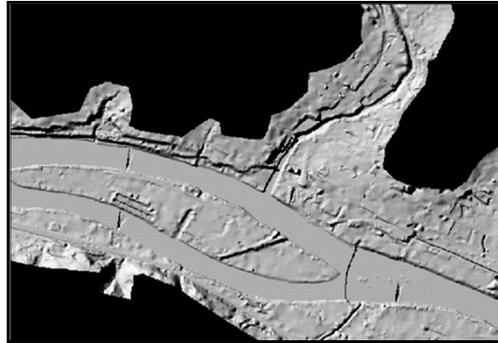
AGREEMENT: The Federal Government makes flood insurance available within communities as a financial protection against flood losses for communities that adopt and enforce a floodplain management regulations to reduce flood risk to new development in floodplains

Floodplain Mapping – How Are Floodplain Maps Created?

- Base + Topography + Flood Data = DFIRM



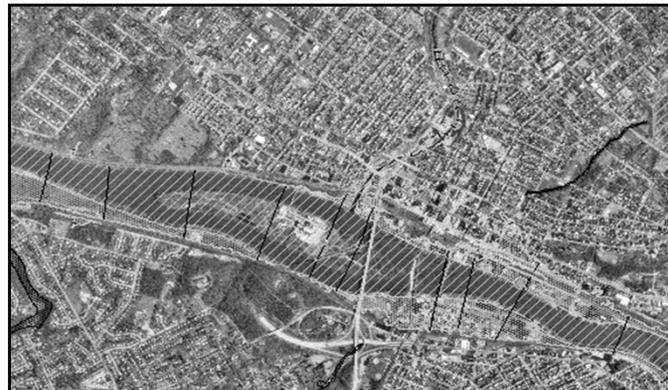
Base



Topography



Flood Data



DFIRM

Floodplain Management

Overall community program of corrective and preventative measures for reducing future flood damage



- Guide future development away from high flood risk areas
- Floodplain Management Regulations
 - Minimum State Standards
 - 44 CFR 60.3
 - Minimum Federal Requirements
 - Local Higher Standards

The Black and White

- If **development** occurs in the floodplain, it requires a **permit**
- Types of **development**:
 - Including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations or storage of equipment or materials.

Structures

- Definition for floodplain management:
walled and roof buildings
- Definition for flood insurance:
2 rigid walls and a roof
- 2 main types of structures:
 - Residential
 - Nonresidential



**Elevation with flow-
through walls
(residential)**

Lincoln, NE

Common Risk Mitigation Techniques

- Techniques
 - Elevation
 - Relocation / Buyout / Acquisition (*Floodplain Evacuation*)
 - Localized Berms and Floodwalls
 - Dry Flood Proofing (non-residential only)
 - Wet Flood Proofing
- Grant Funding Sources
 - Flood Mitigation Assistance –NDNR
 - Hazard Mitigation Grant Program – NEMA
 - Pre-Disaster Mitigation - NEMA

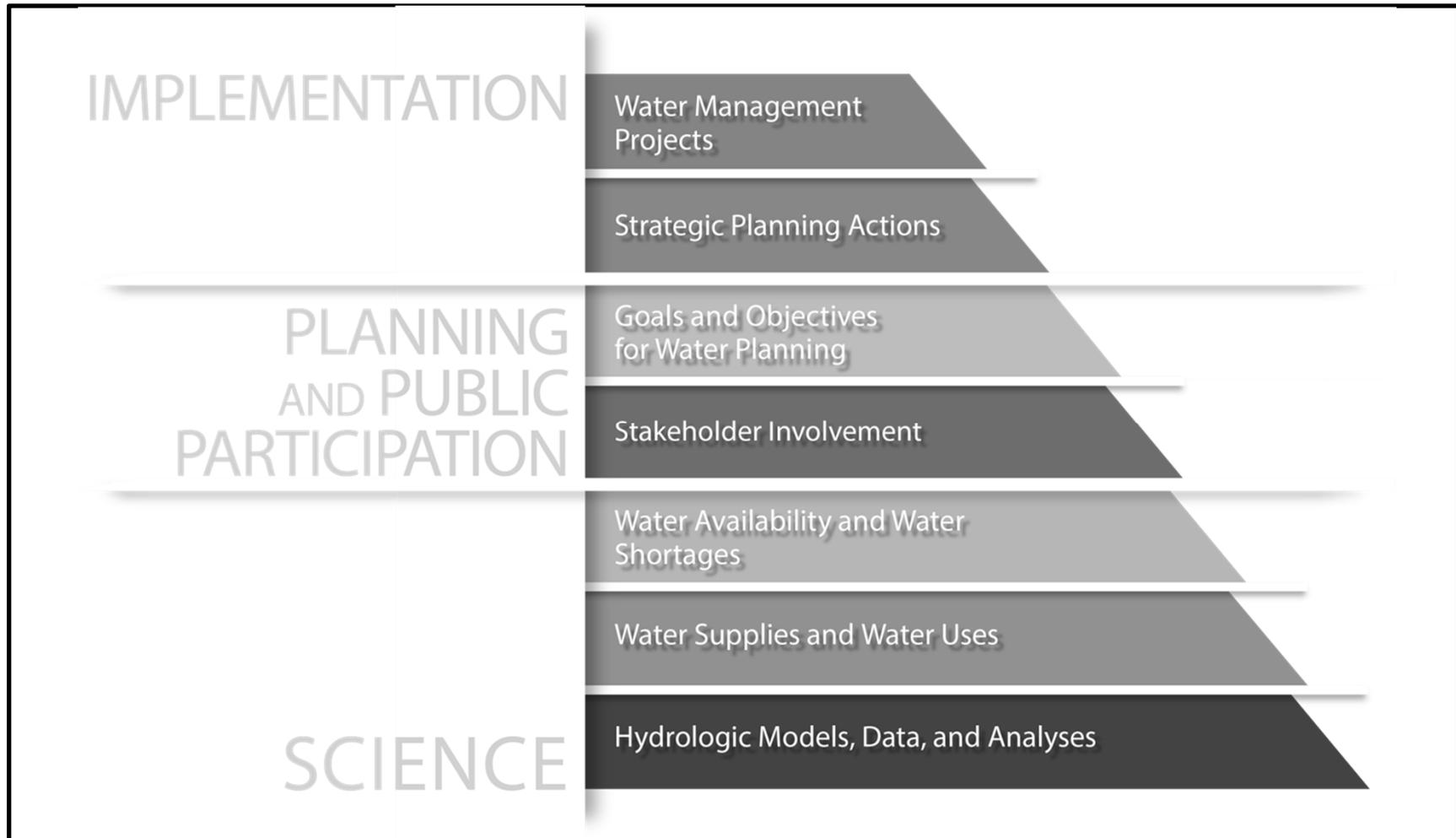
Thank You

- Contacts:
 - Andrew Christenson – Presenter
402-471-1223 andrew.christenson@nebraska.gov
 - John Callen – NFIP Coordinator
402-471-3957 john.callen@nebraska.gov
 - Mitch Paine – Mitigation Specialist
402-471-9252 mitch.paine@nebraska.gov

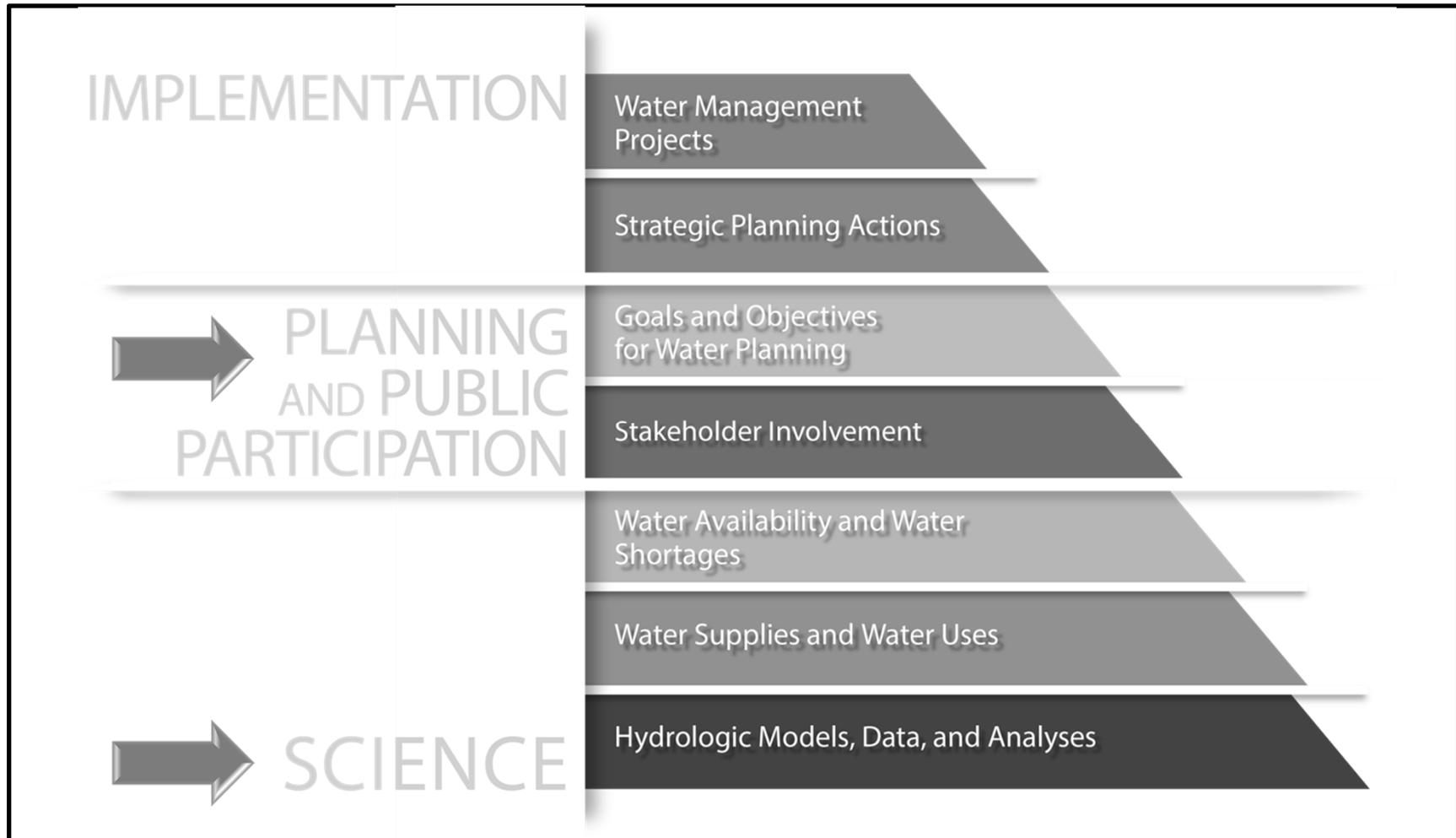
INTEGRATED WATER MANAGEMENT

Carol Myers Flaute, Integrated Water Management Analyst

Integrated Water Management



Integrated Water Management



Planning and Public Participation: Integrated Management Plans and Basin-Wide Plans



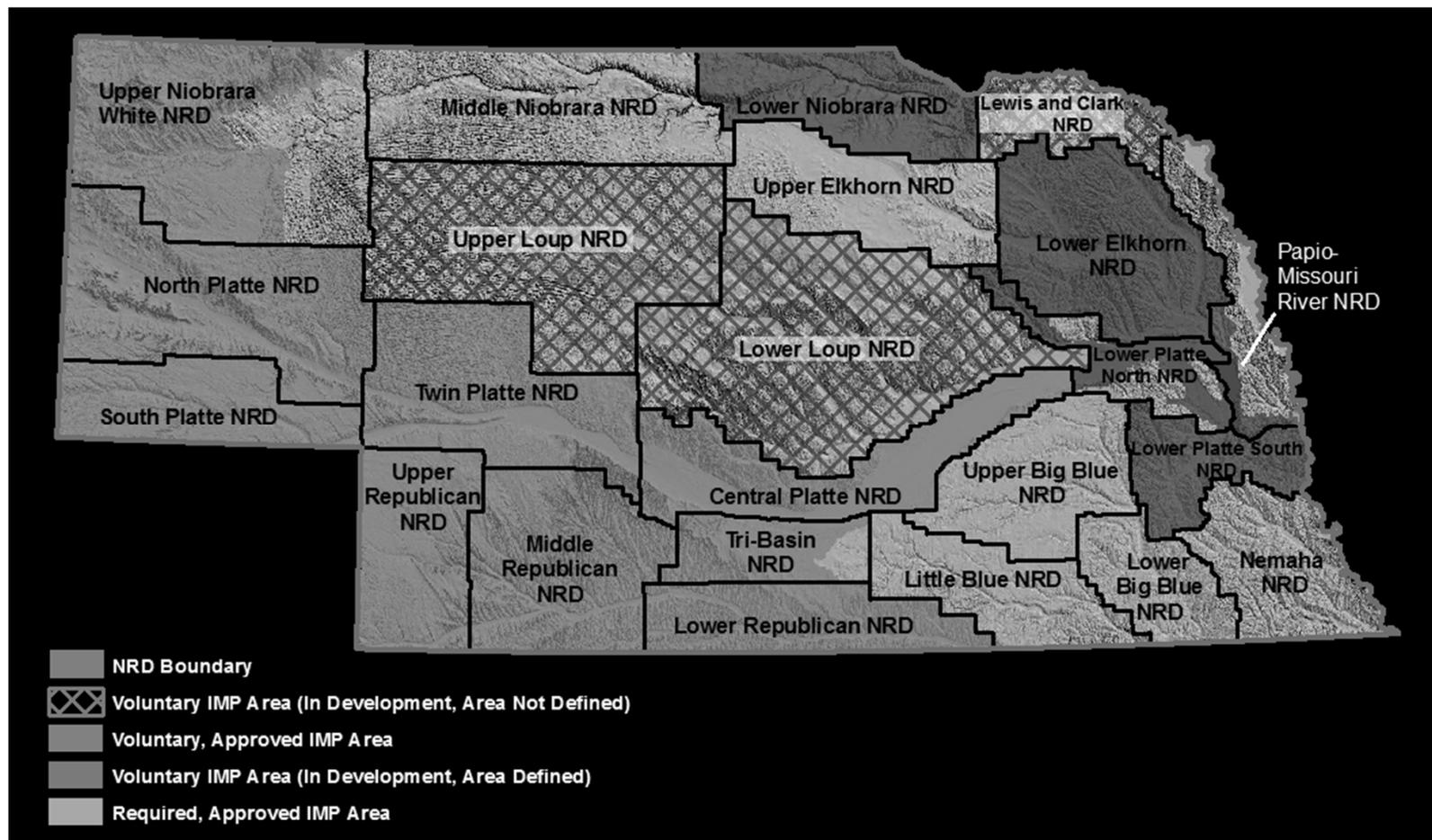
Integrated Management Planning: What Is It?

- A pro-active approach to address water supply opportunities & issues
- Combines surface water and groundwater management
- Jointly developed with a local NRD
- Flexible—Adaptive Management



Integrated Management Planning in Nebraska

(As of November 2014)



Integrated Management Planning: Stakeholder Involvement

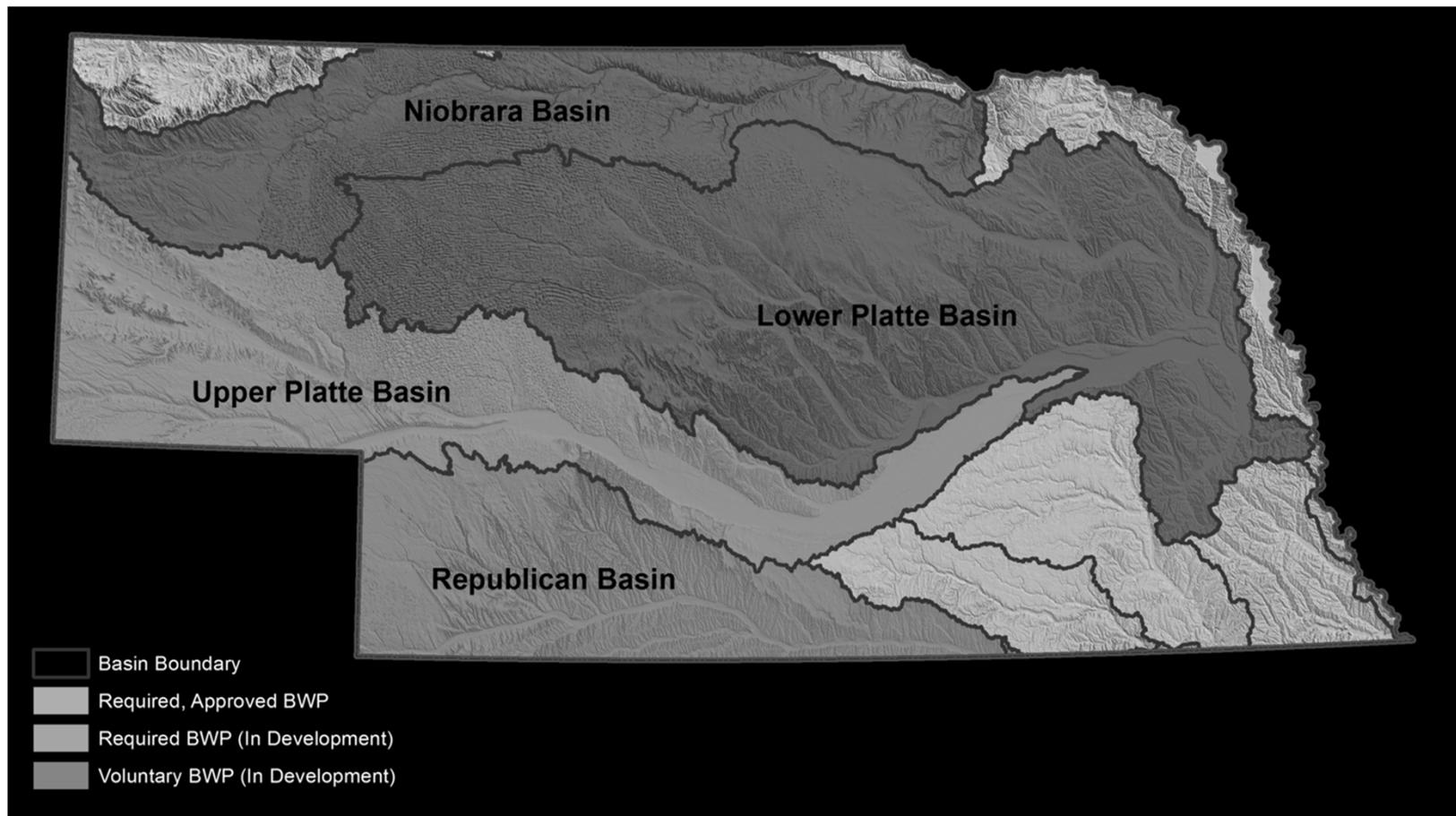
- Each IMP development process includes a stakeholder advisory committee
- DNR and the NRD consult with the stakeholder committee to:
 - Identify local issues and priorities
 - Determine planning goals and objectives
- Each plan's action items and controls are based on these goals and objectives

Basin-Wide Planning

- Involves DNR and all NRDs in a basin
- A framework for consistent basin-wide goals & objectives
- Addresses connectivity between NRDs
 - Facilitates water management projects that cross NRD boundaries
 - Can help establish consistent, agreed-upon basin-wide guidelines for monitoring and distribution of data

Basin-Wide Planning in Nebraska

(As of November 2014)



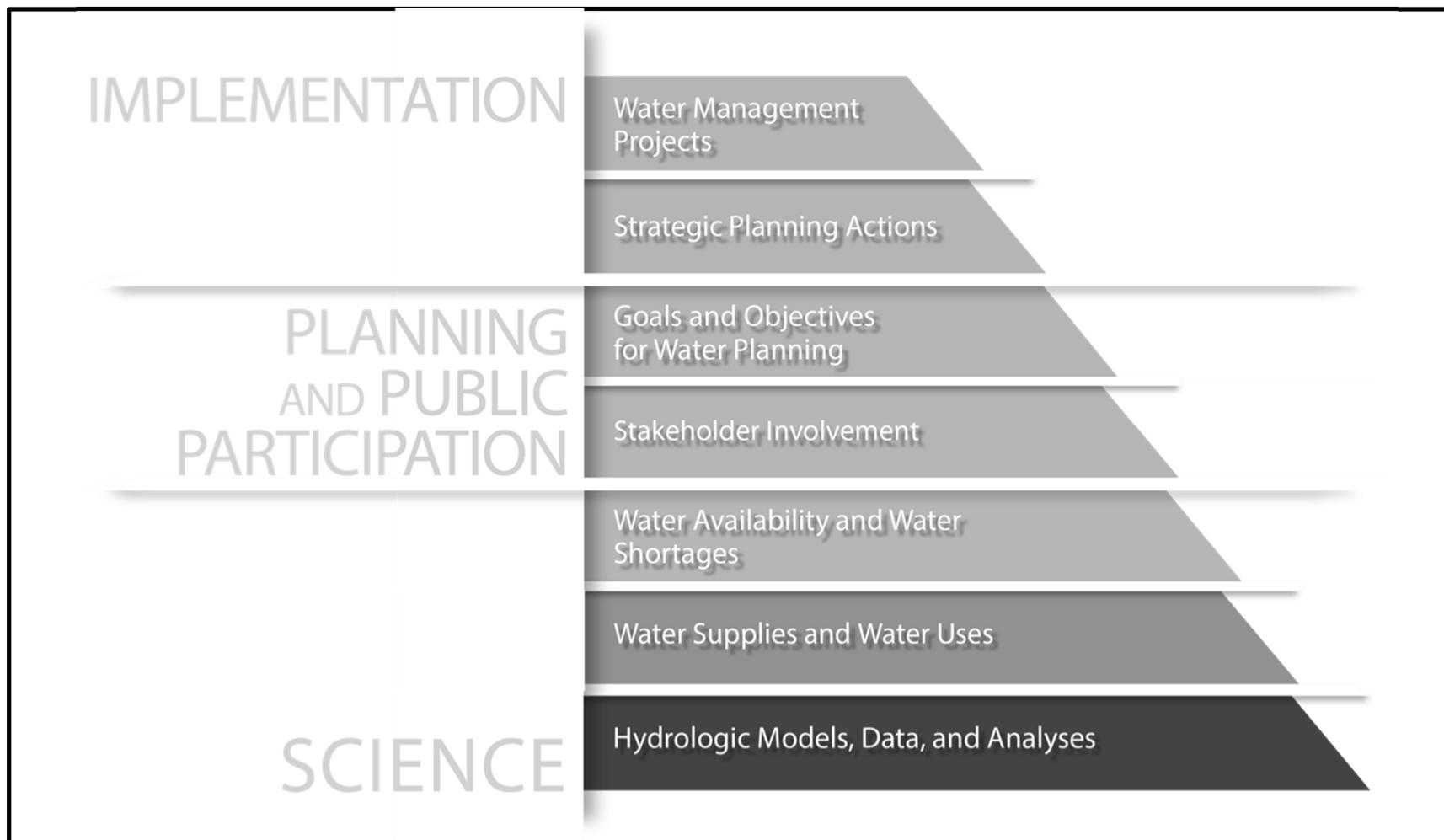
To Learn More about Basin-Wide Planning

- Lower Platte:
<http://dnr.nebraska.gov/LPRBC>
- Upper Platte:
<http://dnr.nebraska.gov/iwm/upper-platte#BasinWide>
- Niobrara:
<http://dnr.nebraska.gov/iwm/niobrara#BasinWide>
- Republican:
Page Coming Soon!

Niobrara Basin-Wide Plan Public Input Survey

- <http://go.unl.edu/39wo>
- Deadline March 11, 2015

Science: Fully Appropriated Basin Analysis and INSIGHT



Annual Fully Appropriated Basin Analysis: New Rules/Methodology

- Current method:
 - Based on the amount of water that the most junior irrigation right in a basin has been able to divert, relative to the amount of water a corn crop needs (“65/85 Rule”)
- Proposed method:
 - Based on a water balance concept – is the water supply in a basin sufficient to meet short and long-term demands?

Annual Fully Appropriated Basin Analysis: New Rules/Methodology

- Current status:
 - Public meetings and public input deadline occurred in December 2014
 - Expect public hearing soon
- For more information:
 - <http://dnr.nebraska.gov/iwm/state-laws-and-rules#newFABrules>

INSIGHT Example: Loup Basin, Basin Overview

INSIGHT
An Integrated Network of Scientific Information & GeoHydrologic Tools

HOME ABOUT MODELING DATA

Nebraska
Department of Natural Resources

Welcome to INSIGHT. The data and charts represent our first release and we anticipate modifications and updates based on user feedback. Please click this link if you would like to provide a comment or suggestions.

SELECT BASIN ▾

Explore the Loup Basin

Use this page to explore hydrologic data for the Loup Basin in the tab area below. If you'd rather learn more about one of the Loup's subbasins, use your mouse to hover over the map to the right and click on the subbasin you want to learn more about. Hydrologic data at the basin and subbasin levels are presented below in each tab by big picture, supplies, demands, nature and extent of use, and balance.

Navigate to another basin by selecting one from the drop-down list or use the back button in your browser to reach the statewide map to click on another basin in the map.

Basin Overview **Big Picture** Supply Demand Nature & Extent of Use Balance

At a Glance

Basin: **Loup**

Approximate Area: **14,200 square miles**

Basin Water Supply: **2,097,424 acre-feet/year**

Near Term Water Demand: **2,208,510 acre-feet/year**

Long Term Water Demand: **2,515,742 acre-feet/year**

Projected Water Demand: **2,641,828 acre-feet/year**

Number of Irrigated Acres: **890,980 acres****

The Loup Basin is located in central Nebraska, and is entirely contained within the state. The Loup Basin has an area of approximately 14,200 square miles.

At its farthest western extent, the Loup Basin boundary is about halfway between Alliance, Nebraska, and Hiwanna, Nebraska, in Sheridan and Garden Counties. The Loup River headwaters are about seven miles northwest of Hiwanna, Nebraska. The basin is defined as draining to the confluence of the Loup River and Beaver Creek, about 25 miles upstream from Columbus, Nebraska. The Loup River extends beyond the basin boundary to its junction with the Platte River at Columbus, Nebraska.

According to the 2010 U.S. Census, the largest city in the basin is Broken Bow, with a population of about 3,600. In descending order, the next largest cities include St. Paul (2,300), Ord (2,100), Ravenna (1,400), and Fullerton (1,300).

The topography of more than half of the upstream end of the Loup Basin consists of sand hills, which are sand dunes stabilized in place by a grass cover. The downstream portion of the basin consists mostly of dissected plains, with small areas of upland plains. The upland plains are land that is flat to gently rolling and dissected plains are where streams have cut into former plains creating hilly land with steep slopes and sharp ridge crests, along with remnants of the plains on the hilltops. There are several valleys in the Loup Basin, which are the flat-lying areas along the Loup River and its major tributaries.

The primary aquifer in the Loup Basin is the Ogallala Formation, which consists of poorly sorted, generally unconsolidated clay, silt, sand, and gravel. The Ogallala Formation is part of a vast system of related sediments that make up the High Plains Aquifer. The eastern margin of the basin is uncertain

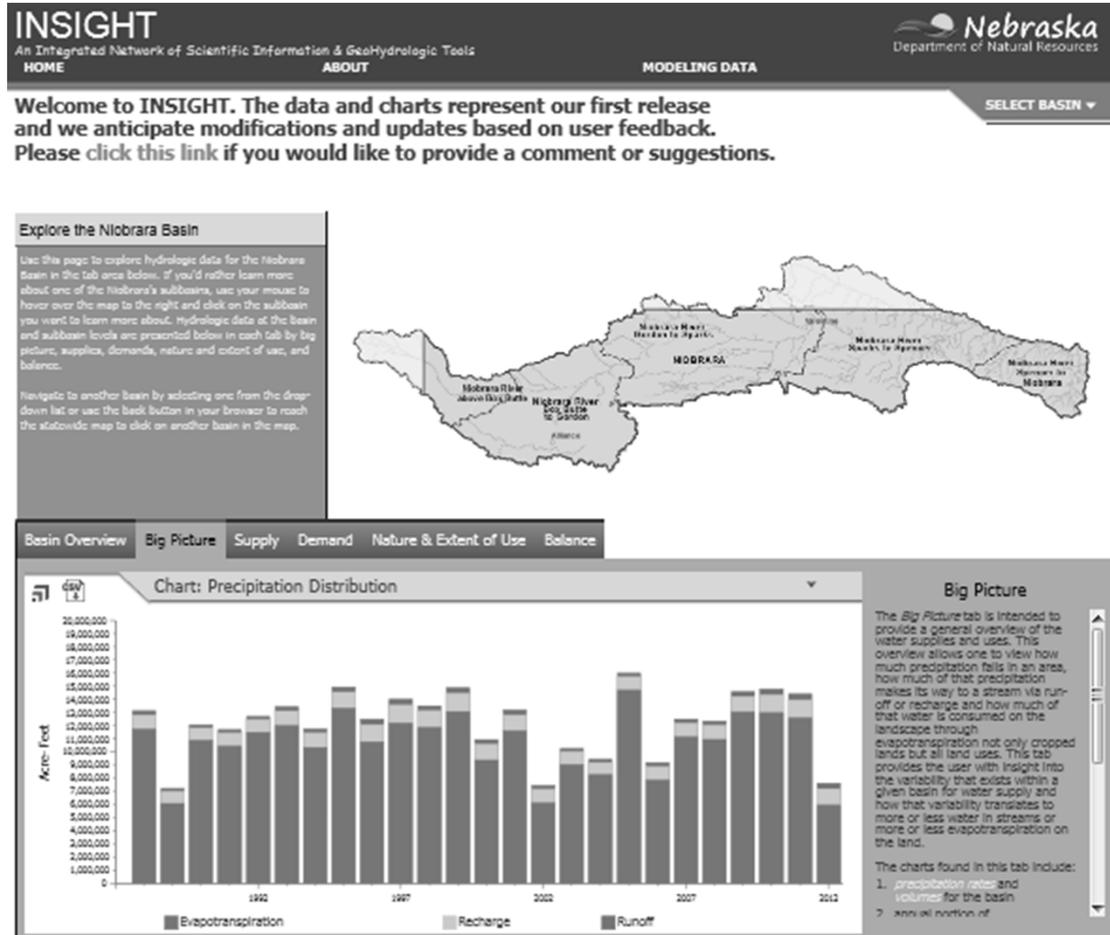
Average Consumption by Sector (Acre-Feet)

	Surface Water		Groundwater	
Irrigation	144,832	100%	419,054	99%
Municipal	0	0%	3,882	1%
Industry	0	0%	1,089	0%

** Fields suffixed with a * display the most recent year's total. All other data displayed above is computed as an average of available years of record.

INSIGHT Example:

Niobrara Basin, Precipitation Distribution



INSIGHT Example: Elkhorn Basin, Basin Water Supply

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HOME ABOUT MODELING DATA



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Explore the Elkhorn Basin

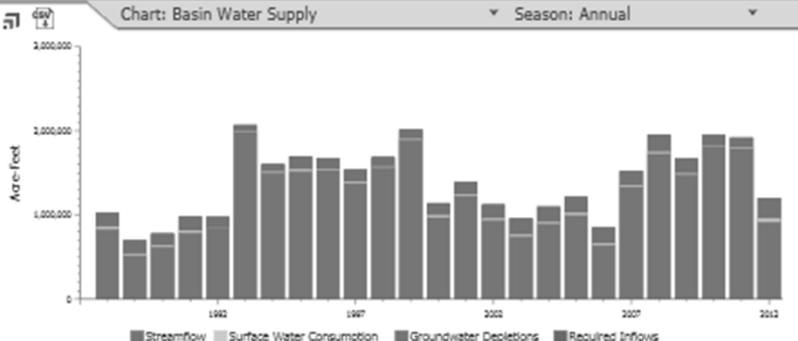
Use this page to explore hydrologic data for the Elkhorn Basin in the tab area below. If you'd rather learn more about one of the Elkhorn's subbasins, use your mouse to hover over the map to the right and click on the subbasin you want to learn more about. Hydrologic data at the basin and subbasin levels are presented below in each tab by big picture, supplies, demands, nature and extent of use, and balance.

Navigate to another basin by selecting one from the drop-down list or use the back button in your browser to reach the statewide map to click on another basin in the map.



Basin Overview
Big Picture
Supply
Demand
Nature & Extent of Use
Balance

Chart: Basin Water Supply Season: Annual



Supply

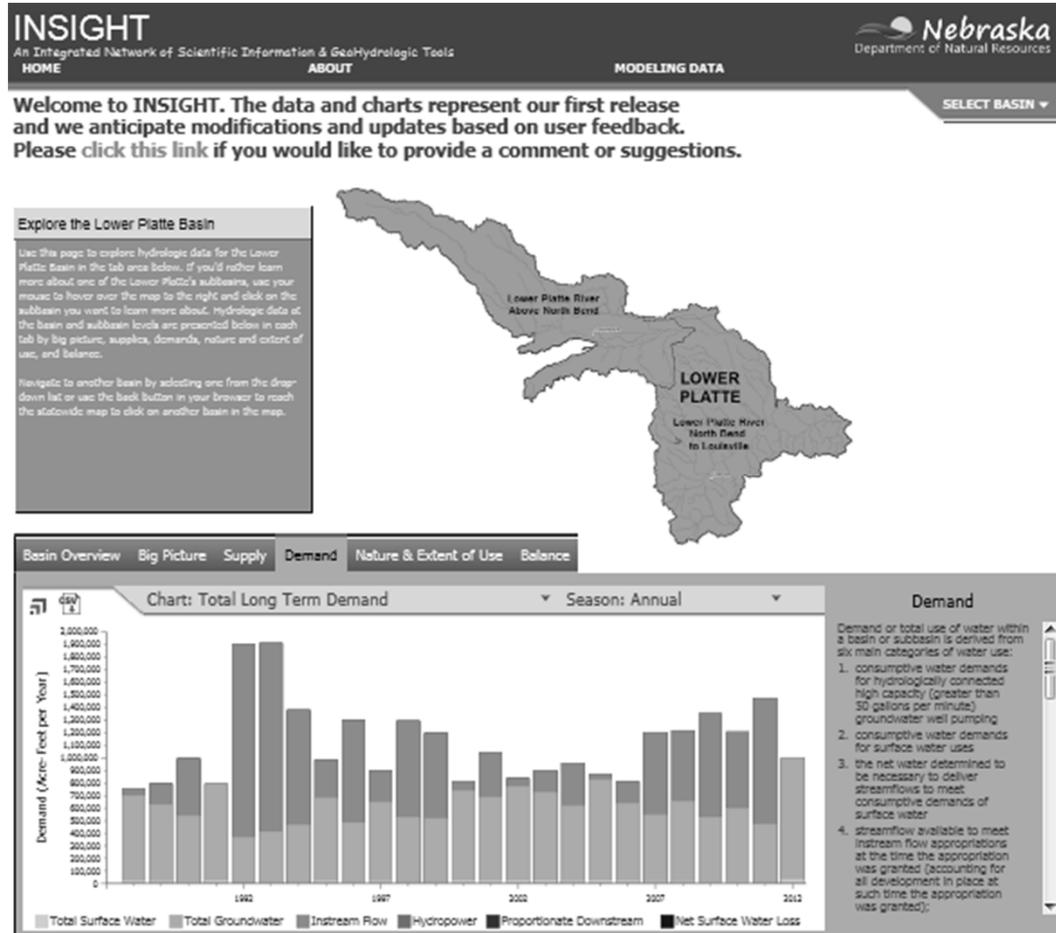
Basin water supplies represent the water supply that is available for total use within a river basin or subbasin. If no surface water or groundwater use was occurring by humans in a basin, the basin water supply would be represented by the streamflow data captured at a streamflow gaging station. However, streamflow is impacted by human activity; therefore, to calculate a total basin water supply, four water supply components are added together. These four water supply components include:

1. Streamflow¹
2. Surface water consumptive uses
3. Groundwater depletions
4. Required inflows

The charts found in this tab include

INSIGHT Example:

Lower Platte Basin, Total Long Term Demand



INSIGHT Example: Big Blue Basin, Average Total Demand

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Explore the Big Blue Basin

Use this page to explore hydrologic data for the Big Blue Basin in the tab area below. Hydrologic data at the basin level are presented below in each tab by big picture, supplies, demands, nature and extent of use, and balance.

Navigate to another basin by selecting one from the drop-down list or use the back button in your browser to reach the statewide map to click on another basin in the map.



Basin Overview
Big Picture
Supply
Demand
Nature & Extent of Use
Balance

Chart: Average Total Demand by Category



Annual
Total: 337,852 Acre Feet



June - August
Total: 127,073 Acre Feet



September - May
Total: 210,779 Acre Feet

Total Surface Water Consumption
 Total Groundwater Consumption
 Instream Flow
 Hydropower
 Downstream Demands
 Net Surface Water Loss

Nature and Extent of Use

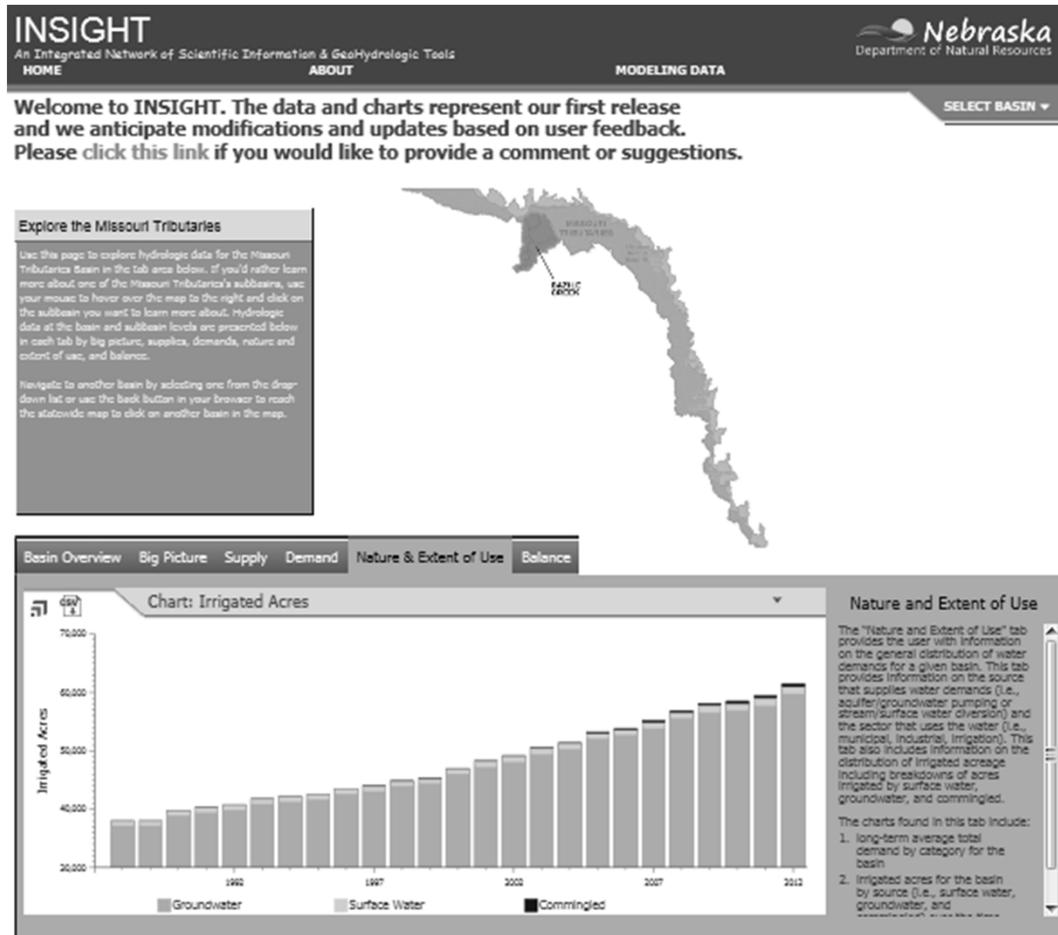
The "Nature and Extent of Use" tab provides the user with information on the general distribution of water demands for a given basin. This tab provides information on the source that supplies water demands (i.e., aquifer/groundwater pumping or stream/surface water diversion) and the sector that uses the water (i.e., municipal, industrial, irrigation). This tab also includes information on the distribution of irrigated acreage including breakdowns of acres irrigated by surface water, groundwater, and commingled.

The charts found in this tab include:

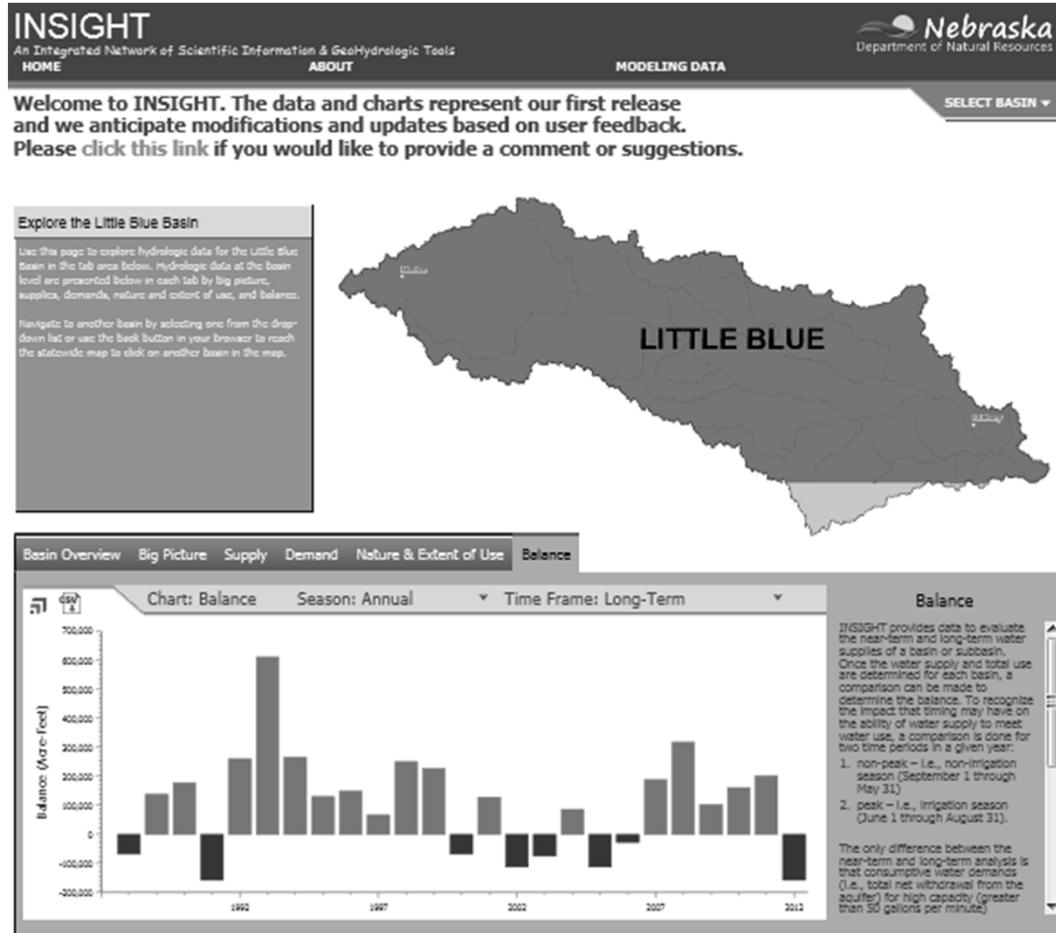
1. long-term average total demand by category for the basin
2. irrigated acres for the basin by source (i.e., surface water, groundwater, and commingled)

INSIGHT Example:

Missouri Tributaries Basin, Irrigated Acres



INSIGHT Example: Little Blue Basin, Long Term Balance



INSIGHT: Feedback

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Water Management in Nebraska

HISTORY OF NEBRASKA WATER MANAGEMENT

ERA OF INDEPENDENT MANAGEMENT OF GROUND AND SURFACE WATERS

1895
Surface water allocations are assigned according to doctrine of prior appropriation (first in time, first in right).

1920
Nebraska constitution is amended to recognize public rights in water use.

1933
Correlative use doctrine is adopted for groundwater established through Nebraska Supreme Court ruling.

1943
Nebraska enters into Republican River Compact with Kansas and Colorado to allocate surface water flow volumes across states.

1967
Legislature directs state Soil and Water Conservation Commission to prepare a State Water Plan.

1968-71
First portions of the State Water Plan are published.

1971
Legislature passes Nebraska Environmental Protection Act and creates the Nebraska Department of Environmental Control (now Environmental Quality).

1972
Legislature creates Natural Resources Districts as multipurpose, locally elected management bodies.

1975
Legislature directs primary responsibility for regulating groundwater to Natural Resources Districts.

Legislature prohibits state agencies from taking actions that jeopardize endangered species or their critical habitat.

1976
Legislature passes standards complementary to the National Safe Drinking Water Act.

1978
At request of Legislature, Natural Resources Commission and other state agencies issue a policy statement and workplan which recommends replacing the State Water Plan with a State Water Planning and Review process.

ERA OF WATER PLANNING AND POLICY DEVELOPMENT

1981
Legislature authorizes a Water Planning and Review process.

1984
Legislature authorizes instream flows to protect recreation, fish and wildlife.

Legislature requires Natural Resources Districts to prepare local groundwater management plans.

1986
Legislature passes bills to implement groundwater quality protections, including expanding water quality authorities.

1991
Legislature requires Natural Resources Districts to expand their management plans to include protection of groundwater quality.

1993
Legislature enacts laws governing the use of pesticides.

1996
Legislature establishes integrated management of ground and surface water.

ERA OF COLLABORATIVE WATER PLANNING PROCESS IMPLEMENTATION

2000
Natural Resources Commission is merged with Department of Water Resources to create the present Department of Natural Resources.

2004
Legislature directs local/state collaboration of Integrated Water Management Plans to address surface water and groundwater as a single resource.

2010
Legislature allows voluntary Integrated Water Management Plans.

2014
First voluntary Integrated Water Management Plans adopted.

WATER MANAGEMENT AND REGULATORY ROLES

DNR Department of Natural Resources

- Responsible for surface water rights for storage, irrigation, power, manufacturing, navigation flows, and other beneficial uses.
- Coordinates the annual state water planning and review process (annual safety information, groundwater monitoring, water data, water planning and design of projects, verifiable stream activities).
- Issues permits for surface water, instream use, water storage, instream groundwater recovery for public water supplies, and diversions by certain groundwater irrigation wells.
- Registers wells and delineates hydrologically connected aquifers on streams and rivers.
- Regulates the construction, operation, and maintenance of dams.
- Identifies and delineates floodplains and provides related assistance and coordination.
- Administers interstate water compacts, treaties, and agreements.

AG Department of Agriculture

- Leads on issues relating to pesticides and water quality and develops and implements state management plans for the prevention, evaluation and mitigation of occurrence of pesticides, or pesticide breakdown products, in ground and surface water.
- Regulates the distribution, storage, and use of all pesticides, and certifies and licenses pesticide applicators.
- Manages the Nebraska Buffer Strip Program for riparian adjacent to perennial and seasonal streams, ponds, and wetlands.

EPD Environmental Protection Department

- Ensures that water resource projects and programs consider and provide for fish and wildlife resources and the habitat that support them.
- May hold a surface water right for instream flows.

HSR Department of Health and Human Services

- Issues drinking water quality through testing of public water systems and water wells.
- Licenses well and pump installation contractors.

DEQ Department of Environmental Quality

- Conducts surface water quality sampling in lakes, streams, and rivers.
- Conducts groundwater quality monitoring, review, and studies.
- Issues Clean Water Act requirement declarations.
- Coordinates clean-up programs and issues applicator certifications.
- Licenses groundwater pollution remediation.
- Issues public water supplies to prevent contamination.
- Issues permits for injection wells, concentrated animal operations, and treatment and discharge of industrial and municipal wastewater and stormwater.



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Beth Eckles, Permits and Registrations
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