NWS River Forecast Centers

Water Forecasts for the Highs and Lows

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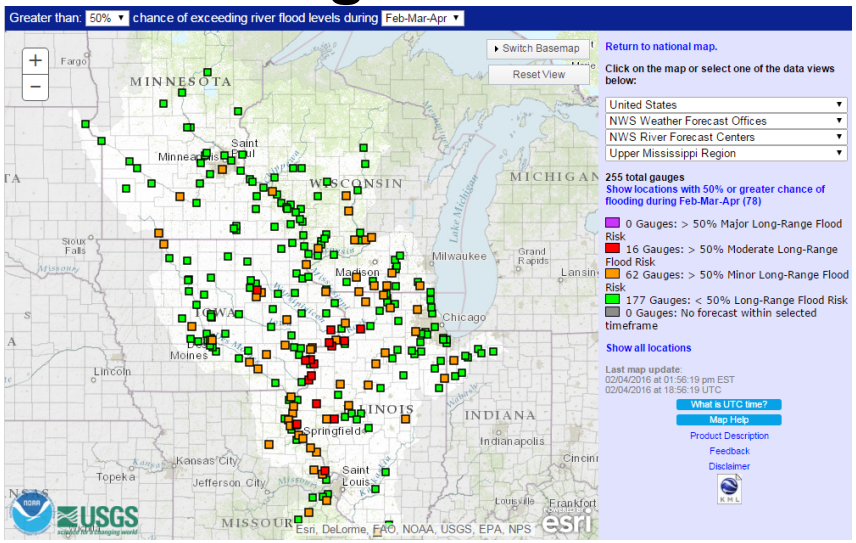
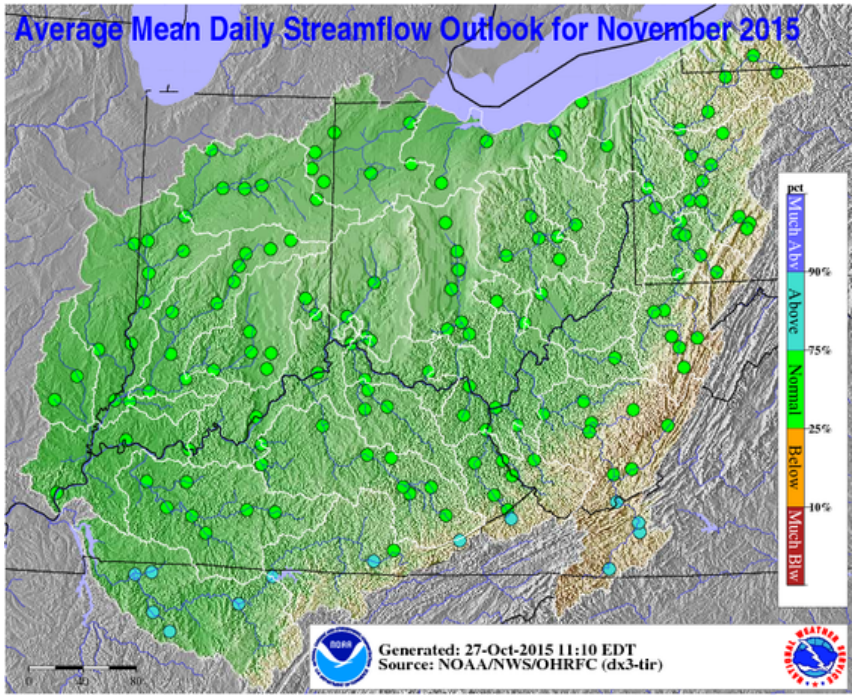
NWS Building Blocks

River Forecast Centers produce Water Resources Outlooks up to 90-days in advance to improve situational awareness for both drought and flood risk.



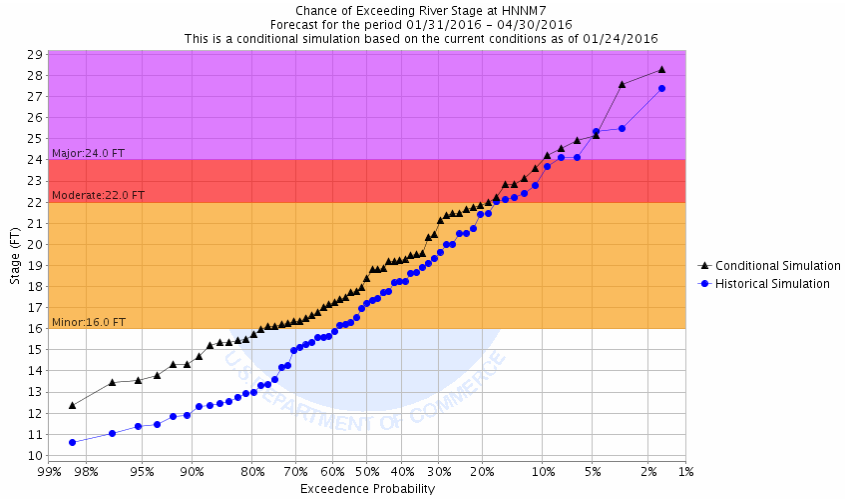
Seasonal Flood Risk Levels



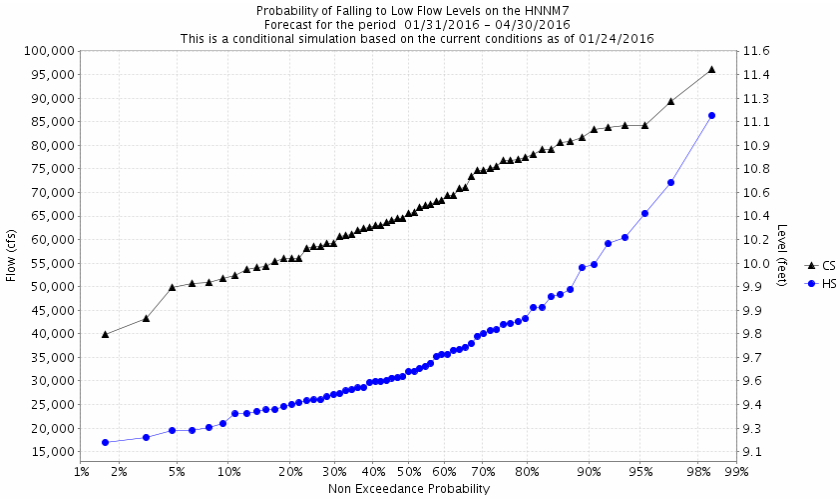
Forecast Flow Rate Characterization

High Flow Examples

Looking 90 days into the future using climate records since 1948. Climate forecasting models will be incorporated as their spatial resolution improves.



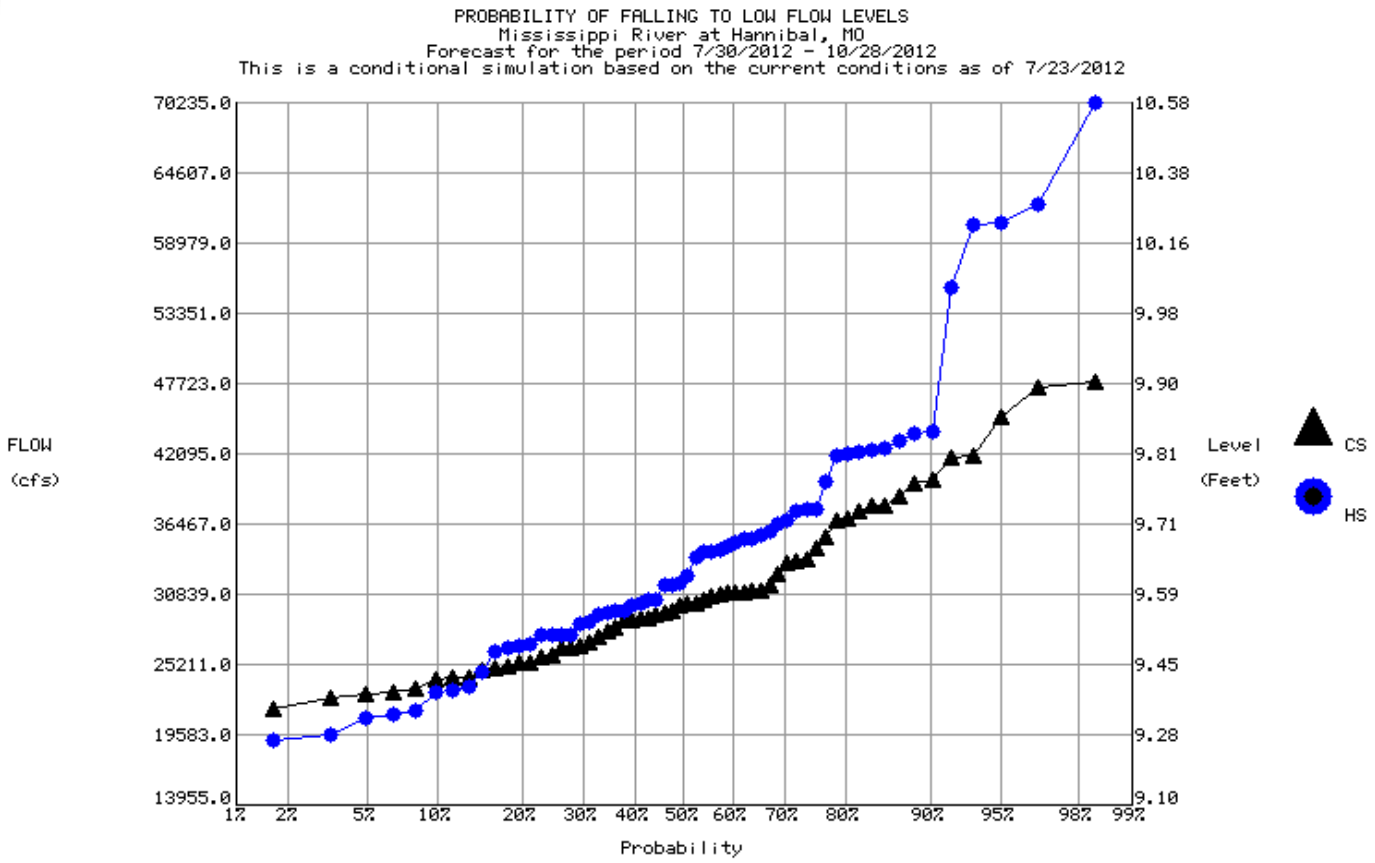
Chances of Exceeding Historical Highs



Chances of Breaching Historical Lows

Hannibal Missouri outlook for this spring indicates flows more likely to exceed historical highs than breach historic lows.

Low Flow Example



90 day outlook July 23, 2012 indicated more likely to breach lows.

Value Added Examples

- Reservoir Management
- Water Supply Intake Monitoring
- Non-Governmental Organization

Reservoir Vigilance

MINNESOTA POWER ISLAND LAKE DRAFT OPERATING PLAN – May 2005

TIMEFRAME	DRY CONDITION	NORMAL TO WET CONDITION
Pre-Winter		
Pre-Winter Drawdown Period (November Mtg to discuss overwinter drawdown) (November 1st through January 31st) ➢ Review past 6 months of precipitation ➢ Assess antecedent conditions and determine if in dry period ➢ Determine if dry winter is predicted ➢ Document process and decisions	Determine if dry conditions are present, and adjust drawdown schedule (maximum of 2.5 feet drawdown reduction see below). Future adjustment of drawdown schedule may eventually be based upon a long-term forecast by the National Weather Service and the State Climatology Office. Pre-winter drawdown adjustments will not be made unless consensus is reached concerning the accuracy of the long term forecast. Maintain FERC license minimum flow (cfs): November – 180 December – 170 January and February – 175 March – 215	Drawdown to 27.8 feet by March 31st. Maintain FERC license minimum flow (cfs): November – 180 December – 170 January and February – 175 March – 215
Mid-Winter		
Mid-Winter Drawdown Period (February Mtg to discuss extent of drawdown) (February 1st through March 31st) ➢ Review updated precipitation data and forecast to determine if in dry period ➢ Review current snow cover ➢ Review model runoff prediction ➢ Determine if adjustments are necessary ➢ Document process and decisions	Maintain FERC license minimum flow requirement. Evaluate if dry conditions are present and adjust drawdown schedule. Drawdown adjustment decisions may include snow depth, moisture content, frost depth, spring runoff forecast, etc. A spring runoff forecast will be developed by the National Weather Service and the State Climatology Office depending upon availability of weather observer volunteers. Maximum reduction of overwinter drawdown from 38.5 to 30.3 feet (2.5 ft reduction which is one-half of the remaining water volume left under a full drawdown schedule of 10.7 feet). Maintain FERC license minimum flow (cfs): November – 180 December – 170 January and February – 175 March – 215	Drawdown to 38.5 to 27.8 feet (10.7 feet) or below if there is an above normal amount of snow cover Maintain FERC license minimum flow (cfs): November – 180 December – 170 January and February – 175 March – 215
Spring		
Spring Refill Period (Mid-April to Mid-May Mtg to discuss refill forecast) Dry Refill Period – April 1st through July 15th Normal to Wet Refill Period – April 1st through June 1st ➢ Review updated precipitation data and spring runoff forecast ➢ Determine if dry period persists ➢ Develop a modified plot of Island Lake Reservoir elevations for the calendar year showing minimum discharge, actual discharge, inflow, normal refill curve, upper dry refill curve, and lower dry refill curve. ➢ Document process and decisions.	The Q95 minimum flow (cfs) are: April – 186 (84 cfs less than current minimum) May – 219 (106 cfs less than current minimum) June – 263 (77 cfs less than current minimum) July – 164 (1 cfs less than current minimum) If a Dry Drawdown Period is declared in the previous period, and when the U.S. Drought Monitor indicates D1 status or greater (moderate, severe, extreme, or exceptional drought), the Q95 minimum flow (cfs) or inflow, whichever is less, will be implemented. If a Dry Drawdown Period is declared in the previous period and the U.S. Drought Monitor indicates D0 status (abnormally dry), the Q95 minimum flow (cfs) will not be instituted until the actual Reservoir Refill elevation line intersects the Upper Dry Refill Curve.	Maintain FERC license minimum flow (cfs): April – 270 May – 325 June – 340 July – 165

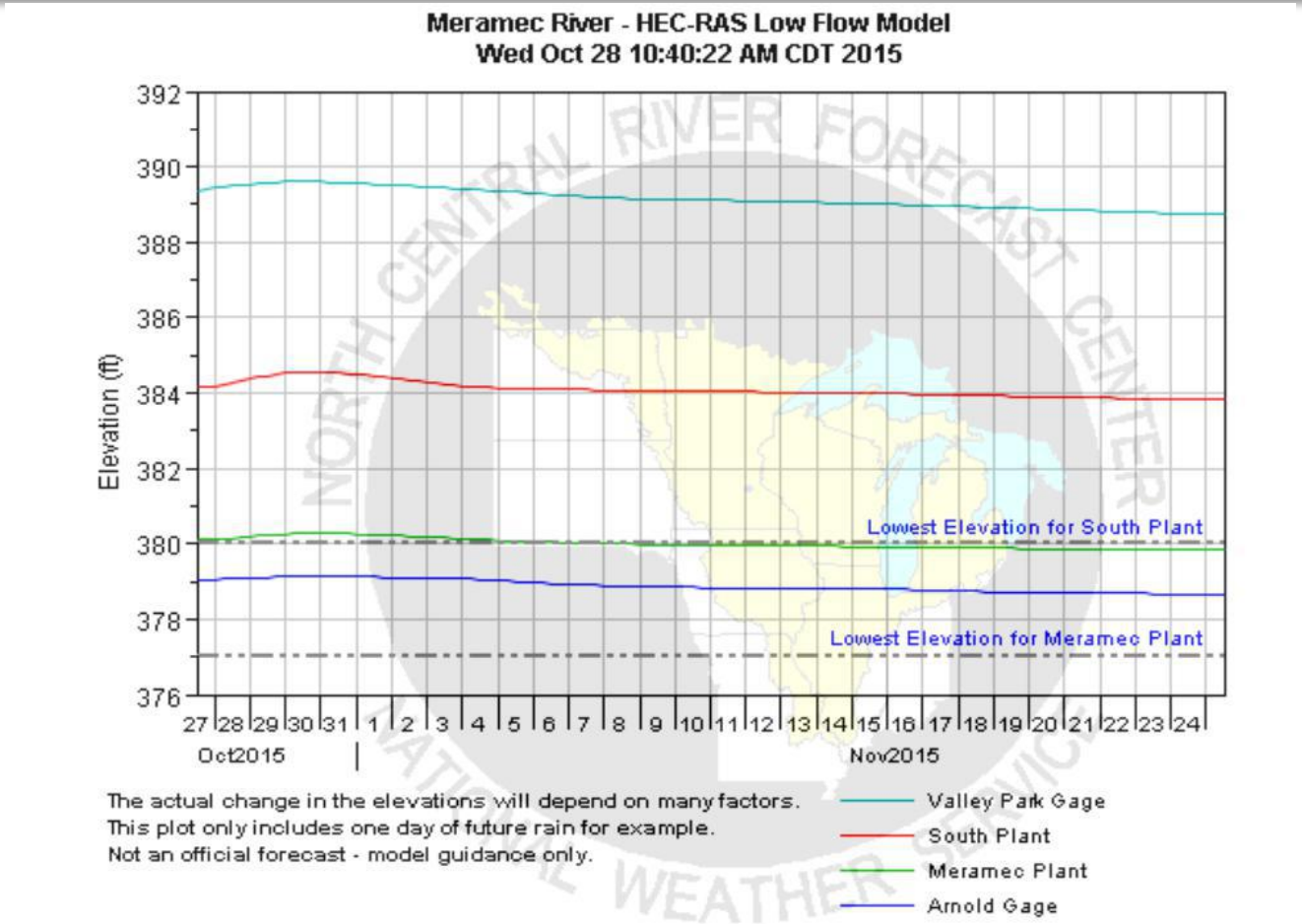
Operations Guidance Matrix

Probability of Inflow Summary

	Dry Conditions Lower Target 36	Dry Conditions Upper Target 37.5	38.5
4/1 – 7/15	58%	50%	40%
3/21 – 7/15	58%	52%	43%
2/25 – 7/15	60%	53%	45%

Chance of Achieving Sufficient Inflow Volume

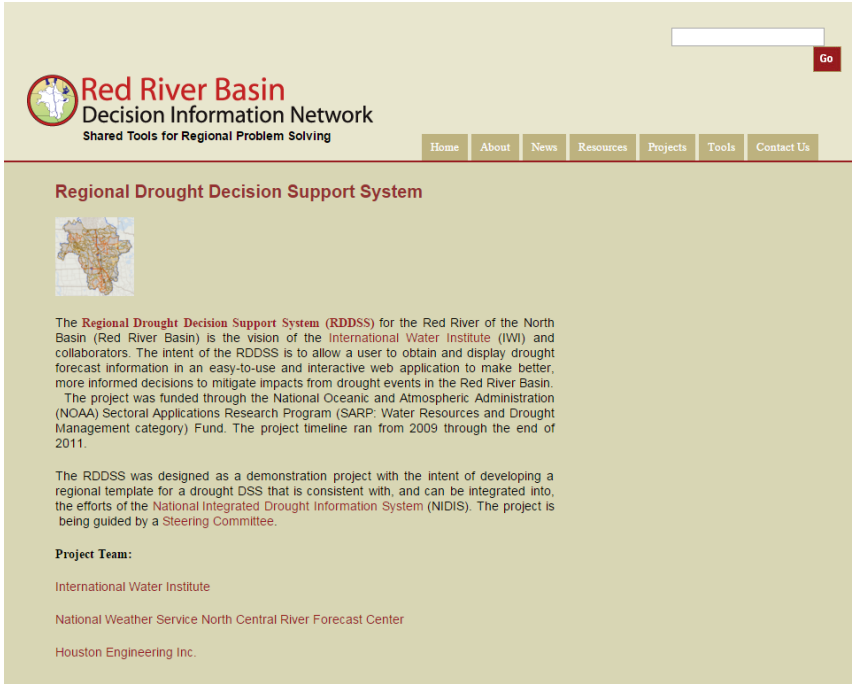
Water Supply Intakes

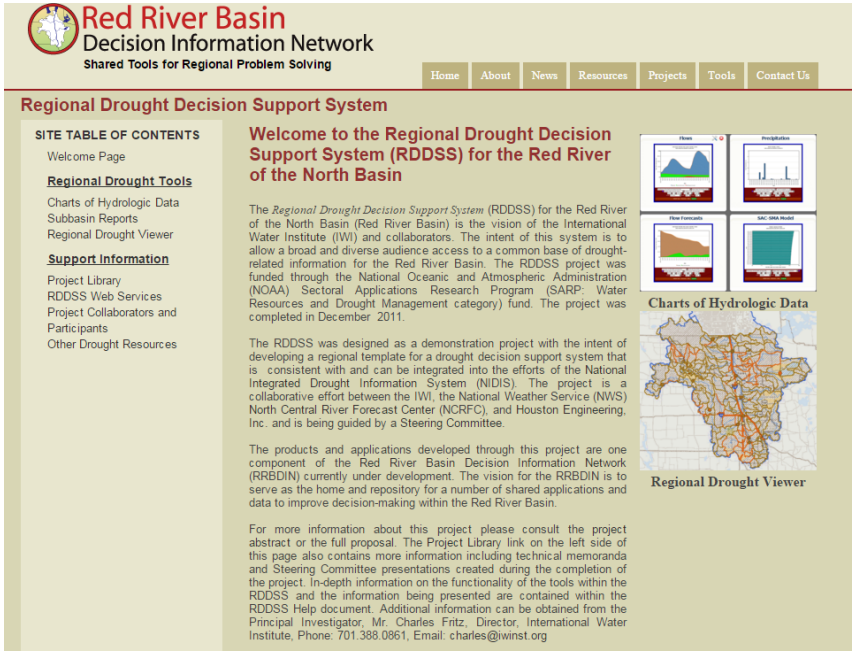


Plot forecast river levels with water intake levels

NGO As Regional Aggregator

The International Water Institute and their consultant worked with Federal, State and Local government units to compile a regional drought resource.





NGO As Regional Aggregator

Detailed Water Availability and Use Reports

Weekly Subbasin Forecast Conditions Water Report

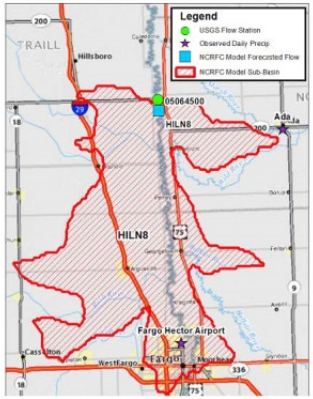
Subbasin Name: Red River of the North at Halstad, MN

NWSRFC Subbasin ID: HILN8

Area: 560 sq. miles

Water balance time period: 04/30/2015 - 05/06/2015

Report Created: February 05, 2016



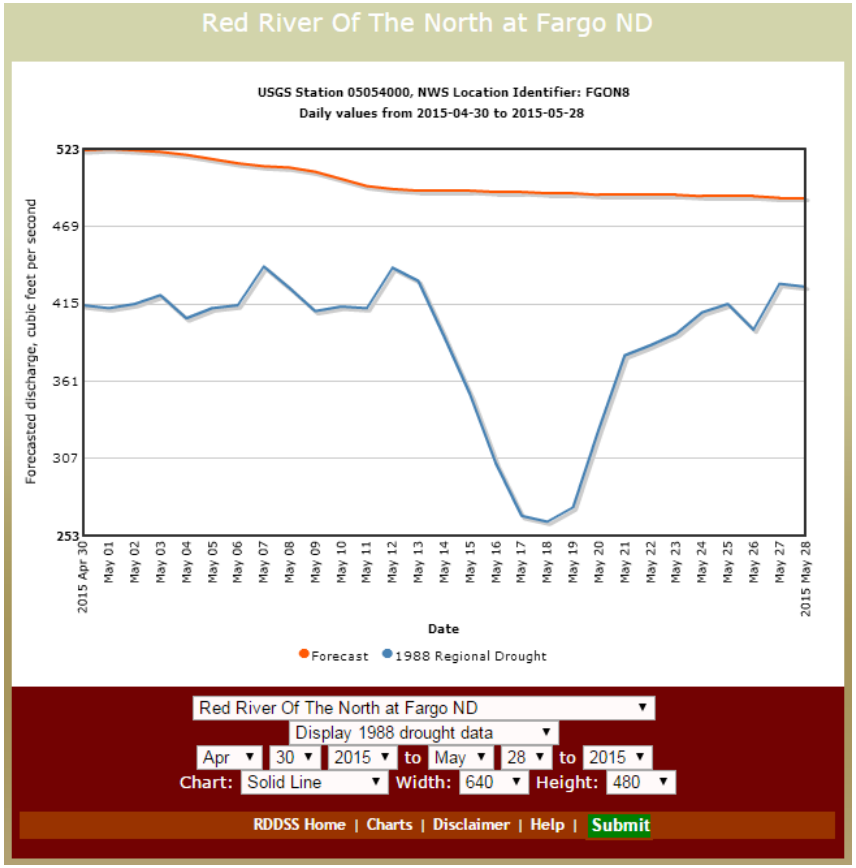
Forecasted/Modeled Values

Forecast streamflow:
- Source: NWS NCRFC
- Average streamflow: 803 cfs
- Average streamflow volume: 1,594 AF/day
- Normal average streamflow: 8,035 cfs
- Departure from Normal: -7232.00 cfs
- Percent of Normal: 10%
- Decile: No Data

Forecast UZTWC:
- Source: NWS NCRFC
- Average depth: 1.4 inches
- Average volume: 1,060,310 AF (assumes uniform soil moisture content over whole sub-basin)
- Normal average depth: 1.47 inches
- Departure from Normal: -0.07 inches
- Percent of Normal: 95%
- Decile: 5

Permitted Withdrawers in the Subbasin

Top 5 Permittees	Permitted Volume		Permitted Rate		Max Allowable
	(acre-ft/year)	cfs	(gallons/minute)	(cfs)	Withdrawal Rate(cfs)
FARGO, CITY OF	109,500	151.3	67,320	150.0	151.3
MOORHEAD PUBLIC SERVICE	3,650	5.0	6,950	15.5	15.5
MOORHEAD PUBLIC SERVICE	9,000	12.4	0	0.0	12.4
AMERICAN CRYSTAL SUGAR CO.	1,841	2.5	3,456	7.7	7.7
FARGO, CITY OF	4,480	6.2	2,782	6.2	6.2
Sum of top 5 permitted withdrawers in the subbasin (cfs)					193.1
Sum of all permitted withdrawers in the subbasin (cfs)					197.8
Percent of Normal Average Streamflow					2472.5%
Percent of Forecasted Average Streamflow					24.6%



Graphical Presentations