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NATURAL
RESOURCES
DISTRICT



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Memorandum

To: File

From: Marlin J. Petermann, Asst. General Manager, P-MRNRD

Subject: Flood Emergency Activities on the Platte, Elkhorn and Missouri Rivers
March 2010

Date: April 5, 2010

Weekly River Ice Observations:

Record breaking heavy snowfall and severe cold temperatures in December 2009 and early January 2010 set the stage for possible ice jam induced flooding along the lower Platte and Elkhorn Rivers in Eastern Nebraska as snow melting and ice break-up occurred.

Preparations in readiness for such a possible event had begun months before with a River Ice Observers Workshop sponsored by the Nebraska Emergency Management Agency (NEMA) on December 11, 2009. The observers began filing weekly reports, along with summary statements prepared by NEMA, with the Nebraska Department of Natural Resources (NDNR) who places them on their web site for dissemination.

Ice Thickness Measurements:

Weekly ice thickness measurements taken by P-MRNRD personnel began on January 13, 2010 and were placed on the NDNR website. The ice thickness at the Union Dike near Valley was 16.6" on that day and reached an average thickness of 17.4" by the last day it was measured on March 3rd. This is not much different than the average thickness during that same time of the year in 1993 and 1997 when ice jam flooding occurred along the lower Platte (see attached memo, graph and table).

NWS Webinars and Emergency Management Meetings:

Ice and weather reporting webinars between river ice observers and other interested agencies, sponsored by the National Weather Service (NWS) in Valley to more effectively communicate upstream and downstream conditions, were held on January 22nd and February 12th. An emergency preparedness meeting for P-MRNRD staff was held February 2nd and Sarpy and Douglas County Emergency Management Agencies each held flood preparedness meetings on February 25th and March 4th, respectively.

ICE DUSTING:

Readiness activities also included preparations by NEMA for "dusting" of the Lower Platte River ice as a preventative measure to help melt and weaken the ice cover prior to breakup. On January 28, 2010 the Omaha District Corps of Engineers recommended to NEMA that ice dusting operations be carried out on the Lower Platte River (see attached map). On February

18th NEMA dusted 10 sites comprising 17 miles along the 50 mile reach of the Lower Platte from South Bend (I-80) to North Bend (Hwy 79). One of the sites (6B) was funded by the P-MRNRD and LPNNRD. These ice dusting strips were visually evident from the air and it is believed very helpful in averting any major ice jam flooding this season. In fact, at the location where ice thickness measurements were taken at Union Dike, the dusting strip is exactly where a channel opened up relieving the ice jam/blockage in that area during ice breakup. Weather conditions in February and early March also turned out ideal for slowly melting the snow and weakening the ice, averting any major problems during breakup.

Daily Monitoring:

District personnel monitored river ice conditions from the ground daily from March 1st until ice out; and by air via a fixed wing Civil Air Patrol plane on March 5th and 8th. Following is a listing of major breakup events on the Lower Platte and Elkhorn Rivers as ice moved out of the system. Graphs showing these events at river gauge locations are attached.

Ice Breakup:

March 5, 2010-Wednesday

Mostly intact ice cover of both Platte and Elkhorn Rivers. There was some evidence of ice moving around in the Platte downstream of I-80.

March 6-8, 2010-Saturday-Monday

There was considerable ice movement over the weekend as a wide open Platte River channel now exists from I-80 to the Missouri. The ice also moved out of the Platte between the mouth of the Elkhorn and Hwy 6. Unfortunately, the Platte just below Hwy 6 down to I-80 had not opened up and some minor overflows were noted in the Lincoln wellfield area south of Hwy 6. Ice on the Platte upstream of the Elkhorn was mostly intact. In the afternoon of March 8th breakup of the ice in the Elkhorn River in Douglas and Sarpy Counties occurred and an uneventful ice run from Maple to Q Street was observed from the air at approximately 4:00 pm.

March 9, 2010-Tuesday

A portion of Platte River channel in the area between Hwy 6 and I-80 opened up under the Lincoln Water System bridge, providing some relief in that area., however the larger west channel was jammed up with broken up ice. Ice movement was noted in some locations of the Platte upstream of the Elkhorn mouth. At about 2:00 pm an ice jam was reported by representatives of the Clear Creek Drainage District in the vicinity of Saunders County Road K (about 2 miles south of Hwy 92 between Vencils Island and the Clear Creek levee). Flood water was up about 2 feet on the levee.

March 10, 2010-Wednesday

Major breakup of the Platte River Ice in Douglas and Sarpy Counties occurred on this day and jams on the Platte were noted. See attached maps and descriptions below. Ice breakup began at site 1 in mid morning and temporarily jammed, causing high stages for a time, and after building up enough head of water to push through, the jam progressed on downstream through each of the sites in a similar manner until reaching the Elkhorn River confluence, just below site 4, by late afternoon and from there freely passed on to the Missouri River.

- 1) Union Dike – This area is located about 1.5 miles north of Hwy 64 near the location where ice thickness measurements were taken. It caused water to back up about 2 feet against the Union dike before breaking through the intact ice cover at about 10:30 am where the ice dusting strip was located.
- 2) Pacific to Blondo St. Area – This is where the upstream ice and water jammed next, causing stages to increase for a few hours in the area south of the Sokol Camp housing area until about 1:30 pm when it built up enough head to release the jam. Minor flooding in the vicinity of a couple of riverside cabins was noted. This jam was in the area dusted with funding by the two NRDs.
- 3) Clear Creek Levee/Vencils Island Area – The surge of ice and water then moved down to the existing jam located south of Hwy 92 which had moved down river about a mile to just below Saunders County Rd J. This was a major jam forcing high stages along the Clear Creek levee and was ready to overtop the levee at Rd. I as it was pushing downstream, but finally built up enough head to break through the downstream intact ice at about 4:30 pm. The lower 2 miles of the Platte above the Elkhorn confluence had cleared of ice previously, so only about a mile of intact ice had existed below the jam. Some flooding occurred on Vencils Island and the intersection of 252nd and Harrison Streets was flooded about a foot deep for a quarter mile section with about a foot of floodwater.
- 4) Lincoln Water System Island – The east channel under the LWS bridge had opened up the day before, but the west channel was still jammed with ice until the surge of this ice and water flow came through and fortunately blew it out with little resistance.

March 11, 2010-Thursday

At approximately 1:30-2:00 a.m. a large surge of ice and water passed through the Union Dike area upstream of Hwy 64 creating stages along the levee a couple of feet higher than experienced the day before. It is thought that this ice and water surge was the result of the North Bend ice jam releasing and progressing on downstream through a couple of other minor jam areas, including one at the north end of the Woodcliff Housing area (labeled as North Bend surge on attached gage graphs). Large ice flows, some measuring 36 inches, were shoved out of the channel against the Union dike levee. No appreciable damage except debris and fences was encountered, but as flows passed downstream it flooded a few riverside cabins just south of the Sokol Camp area and in the Hwy 92 area. Stages at the Venice gauge showed lower than the previous day during ice out, but flooding was about 2 feet deep over the intersection of 252nd and Harrison St. Also a small farmers dike was washed out at the north end of the Vencil cabin area and floodwater went through the county road overflow at the south end of Vencil's (north line of the P-MRNRD property). Stages in the Hwy 6 area were up against the WSCC Levee Project "Advanced Measure" emergency work completed by the Corps of Engineers in February. High water marks were set and will be surveyed in by P-MRNRD crews. After this event the Platte River essentially was ice free and stages continued to fall as snow melt runoff diminished.

March 12-13, 2010- Friday and Saturday

Although ice free, stages on the Elkhorn River continued to rise as upstream snowmelt progressed through the system. At approximately 2:00 pm on the 12th, floodwaters started entering the District's Elkhorn Crossing Recreation Area south of Hwy 36. The Waterloo gauge at Hwy 64 was reading approximately 10.2 feet at that time. The river peaked at 11.4 feet on the

13th, but did not recede until the 15th. Elkhorn Crossing was not severely flooded but all of the District's Platte and Elkhorn River public access locations were flooded and will require some cleanup.

BLASTING:

The District was prepared to implement the explosives contract with Dykon called for in the Ice Jam Interlocal Agreement between the 4 counties and 3 NRDs along the Lower Platte below Fremont. The contractor was placed on "Stand-by" status on March 3rd, but thankfully this last resort measure was not needed.

MISSOURI RIVER:

Due to extremely high snowfall amounts in Northwest Iowa and the Dakota's, high water from the tributary rivers downstream of Gavin's Point Dam, including the Platte River caused the Missouri River to rise to very near flood stage at Omaha and well above it at Nebraska City and other areas downstream of the Platte River confluence (see attached graphs). As a result there was flooding in some low spots in the Omaha area and along the District's R-616 and 613 Missouri River levees downstream of Bellevue. The District did close a couple of slide gates, including the one at the Offutt Ditch to help reduce the possibility of flooding Offutt Air Force Base, roads, agricultural ground, commercial buildings and the Paradise Lakes housing area that are all protected by the levee. The slide gates were closed at 10:40 am on 3-19-10 when the riverside staff reading was 5.6 feet and the landside staff reading was 2.0 feet. The Missouri River peaked sometime on the 21st when staff gage readings at 3:30 pm were 7.0 on the riverside of the levee and 1.6 on the landside of the levee. The slide gates were open at 11:00 am on 3-29-10 when the riverside read 2.75 feet and the landside staff read 1.45 feet. No flooding occurred landward of the levees that we are aware of.

RECOMMENDATIONS:

Ice dusting performed by the Nebraska Emergency Management Agency (NEMA) during the middle of March was very helpful in preventing a major flooding disaster along the Lower Platte River this season. It is recommended that NEMA continue to budget for this activity annually and add four areas to the 9 programmed for dusting in 2010, as follows:

- 1) A one mile segment immediately south of Hwy 6. This has been a chronic problem ice jam area almost every year in the recent past, especially including 1997, 2001, 2008 and 2009.
- 2) A five mile segment of the Platte River from the confluence with the Elkhorn River upstream to Harrison Street near the Clear Creek Levee upper tie-back. This has been a severe problem area every year. In 2009 floodwaters overtopped the Clear Creek levee in the vicinity of Saunders County Road H (documented by P-MRNRD high water marks); and now in 2010 it nearly overtopped at County Road I, before the jams released.
- 3) A two mile segment between Pacific and Blondo Streets above Hwy 92. This is the area funded by the P-MRNRD and LPNNRD this year.
- 4) A one mile segment immediately south of the BNSF RR at Fremont. This has been a chronic problem area over the years.

MEMORANDUM

TO: File 536

FROM: Ron Lehman, O&M Superintendent

SUBJECT: Platte River Ice Thickness Measurement Along Union Dike

DATE: March 3, 2010

On March 3, 2010, the writer performed ice thickness measurements on the Platte River. The measurements were taken perpendicular to the river flow, near the Dike's 10 jetties project location, near Werner's Property south line, at approximately Station 160+00 (1.2 miles upstream of Highway 64).

A gas powered auger was used to drill the holes. The location of the holes on the table below were measured (stepped off) from the east bank of the Platte River. There was 3 inches deep snow cover on river ice.

Distance From East Bank (Feet)	Ice Thickness (Inches)	Depth From Top of Ice to River Bed (Inches)
36	22.5	38
136	20.5	35
286	13.5	63
436	14.0	72
586	16.5	40
786	16.0	50
880**	17.0	31
936*	19.0	22

The average ice thickness is **17.4 inches**.

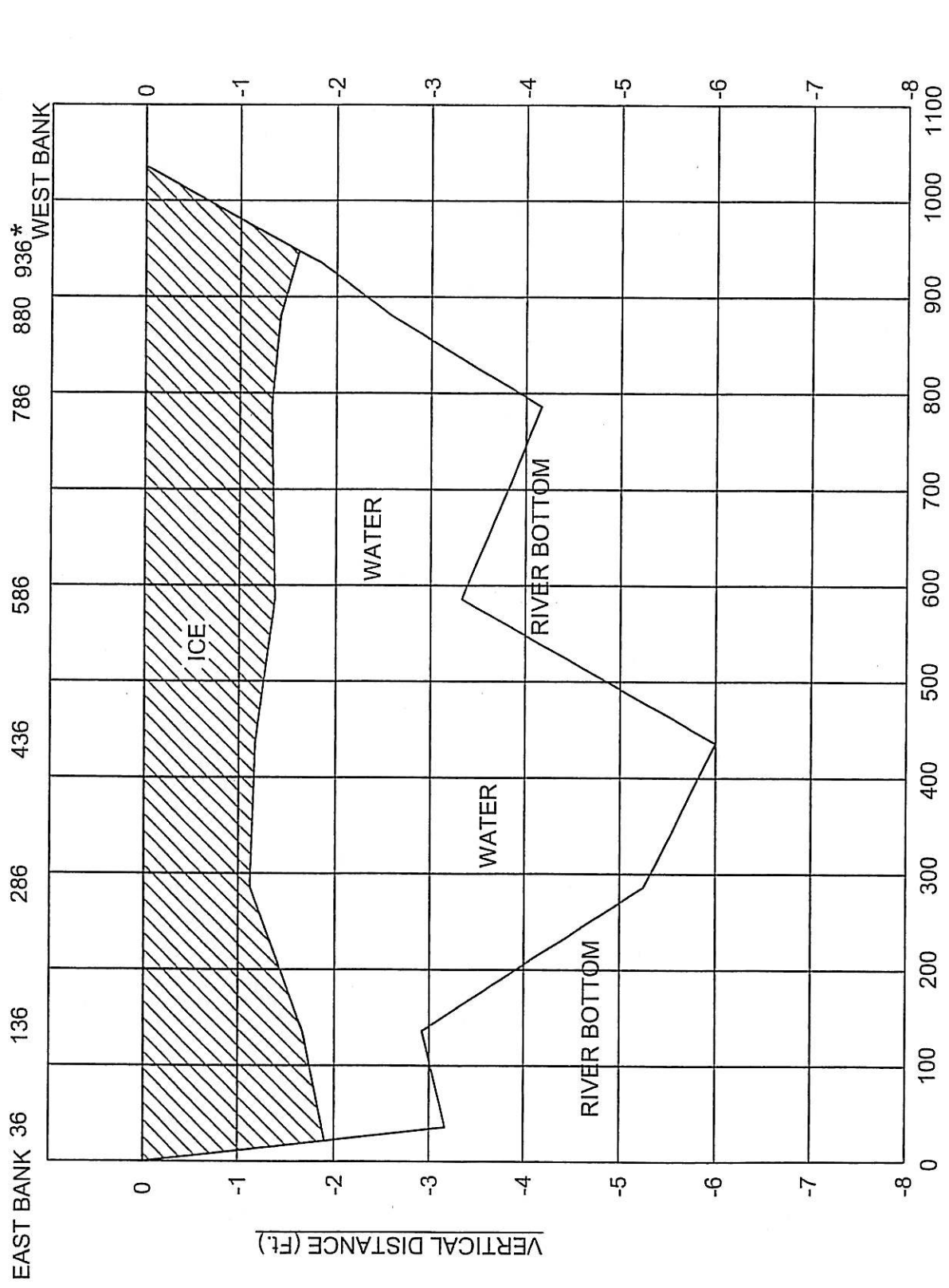
*This hole is located about 75 feet from the west bank of the river.

** The ice thickness at this boring centered in the 60 ft. ice dusting strip has not changed since the river was dusted on February 18th. However, there is evidence that the dusting is helping, as it did melt the 3 inches or so of snow cover on the ice and looks like it is starting to melt into the ice now. Photos were taken.

Enclosure: Cross-section

CC: John Winkler, Marlin J. Petermann, Martin Cleveland, Amanda Grint,
Emmett Egr, and Directors, P-MRNRD
Sheila Hascall, NEMA
Bill Jones, NDNR
Jeff Reese, NWS
Pam Graham, USACE

PLATTE RIVER: 1.2 Miles Upstream of Hwy. 64 (STA. 160+00, UNION DIKE)



*Hole location is approx. 75' from the west bank.
March 3rd, 2010

HORIZONTAL DISTANCE (Ft.)

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**PLATTE RIVER ICE THICKNESS
ALONG UNION DIKE
NEAR VALLEY**

	<u>DATE</u>	<u>AVERAGE THICKNESS (INCHES)</u>
2010	January 13	17
	March 3	17
2009	January 21	14
2008	February 20	15
2004	February 15	15
2001	January 3	15
	March 7	20
1997	February 11	17
1996	February 6	18
1994	February 8	25
	February 28	28
1993	January 27	12
	March 1	18

Assessment of State of Nebraska Request for Technical Assistance, 28 January 2010

1. This office has reviewed meteorologic data for this winter and has concluded that there is a moderate to high probability for ice jam related flooding along the lower Platte River and its tributaries this spring (see "Assessment of Ice Conditions on Lower Platte River, 19 January 2010"). As part of that assessment, this office is recommending that the State of Nebraska conduct ice dusting operations at up to 9 sites along the Platte River between the Interstate 80 crossing and North Bend, Nebraska, as shown in the following figure:

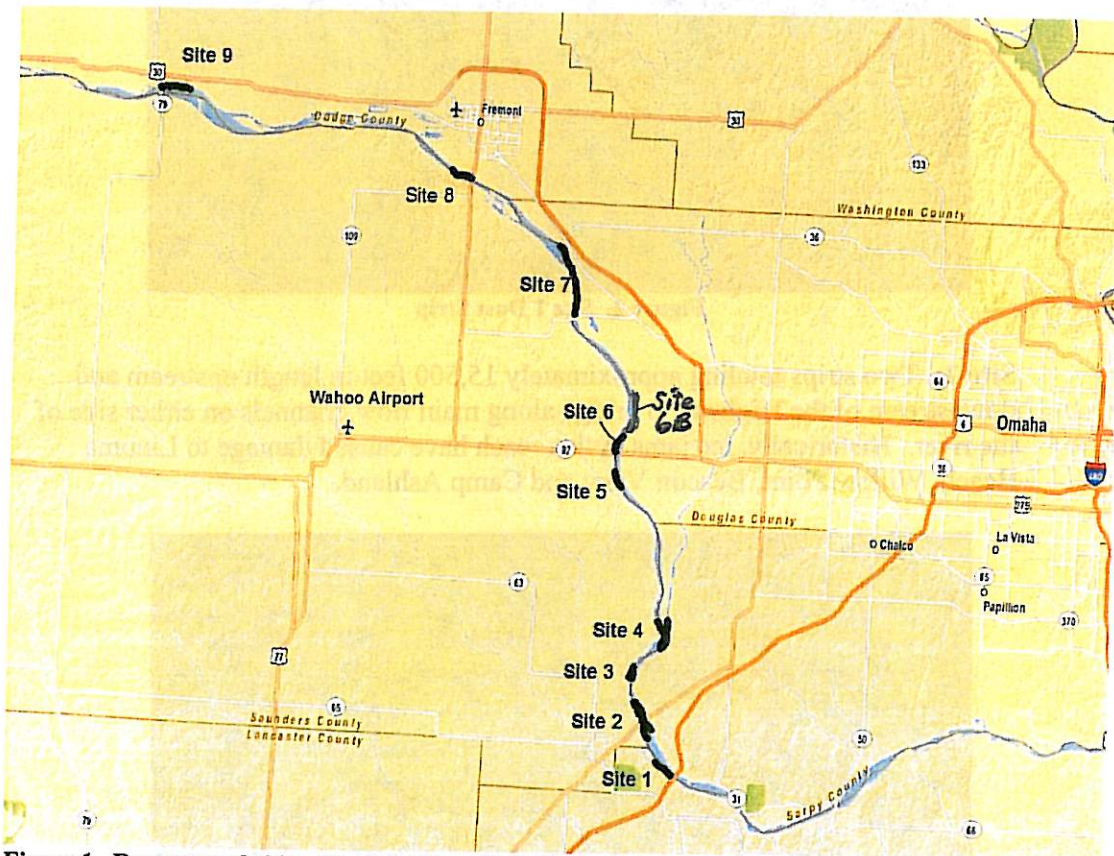


Figure 1. Recommended Ice Dusting Sites, Platte River

The sites are described as follows:

Site 1: Approximately 4700 ft in length from upstream of Interstate 80 to just upstream of the Salt Creek confluence. This site was dusted during 1979 ice dusting operations and has historically been a source of ice jams when Salt Creek ice releases into the Platte prior to the Platte River ice releasing.

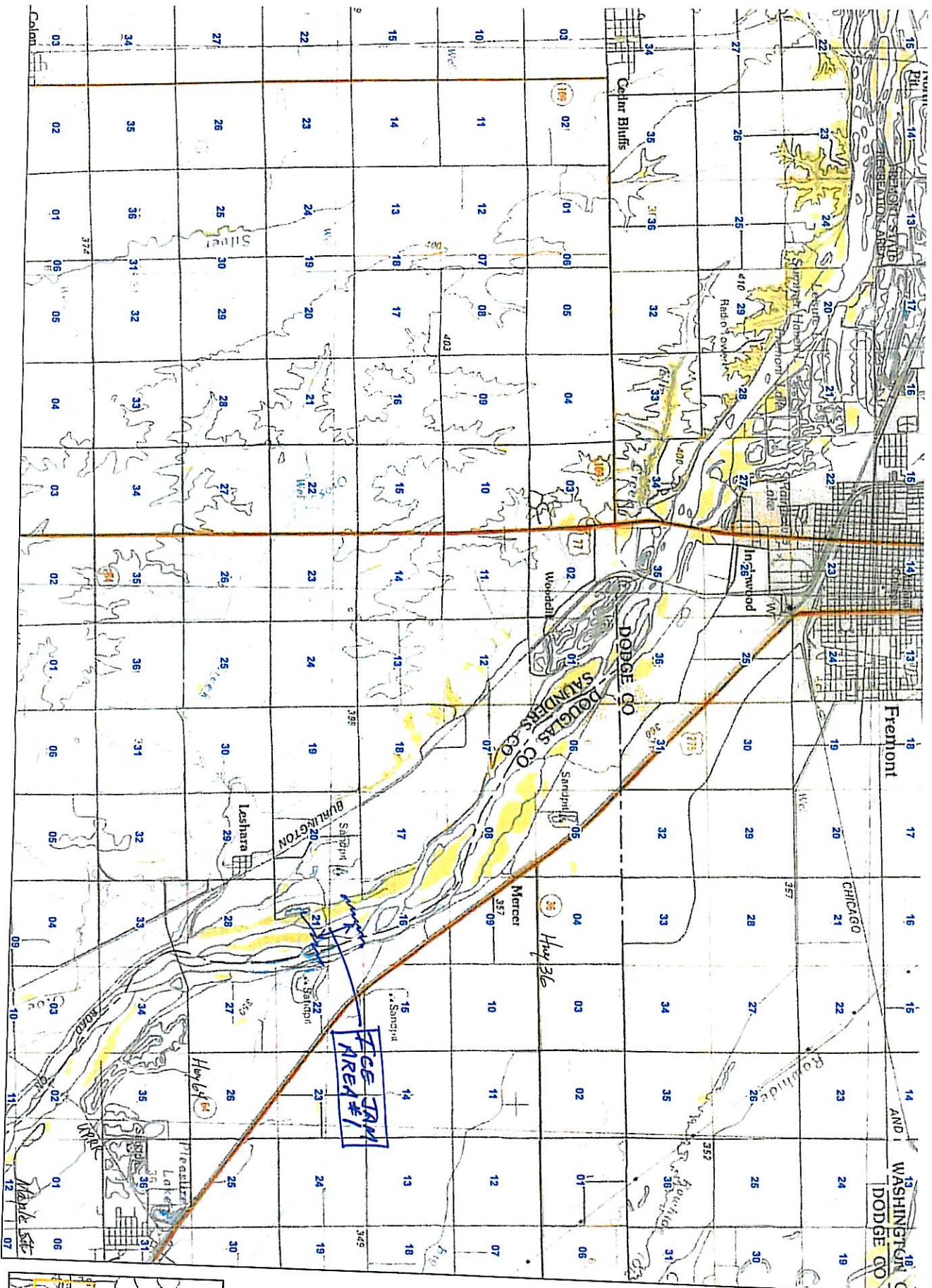


Plate 1

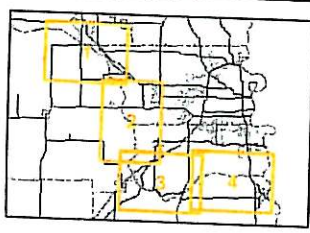
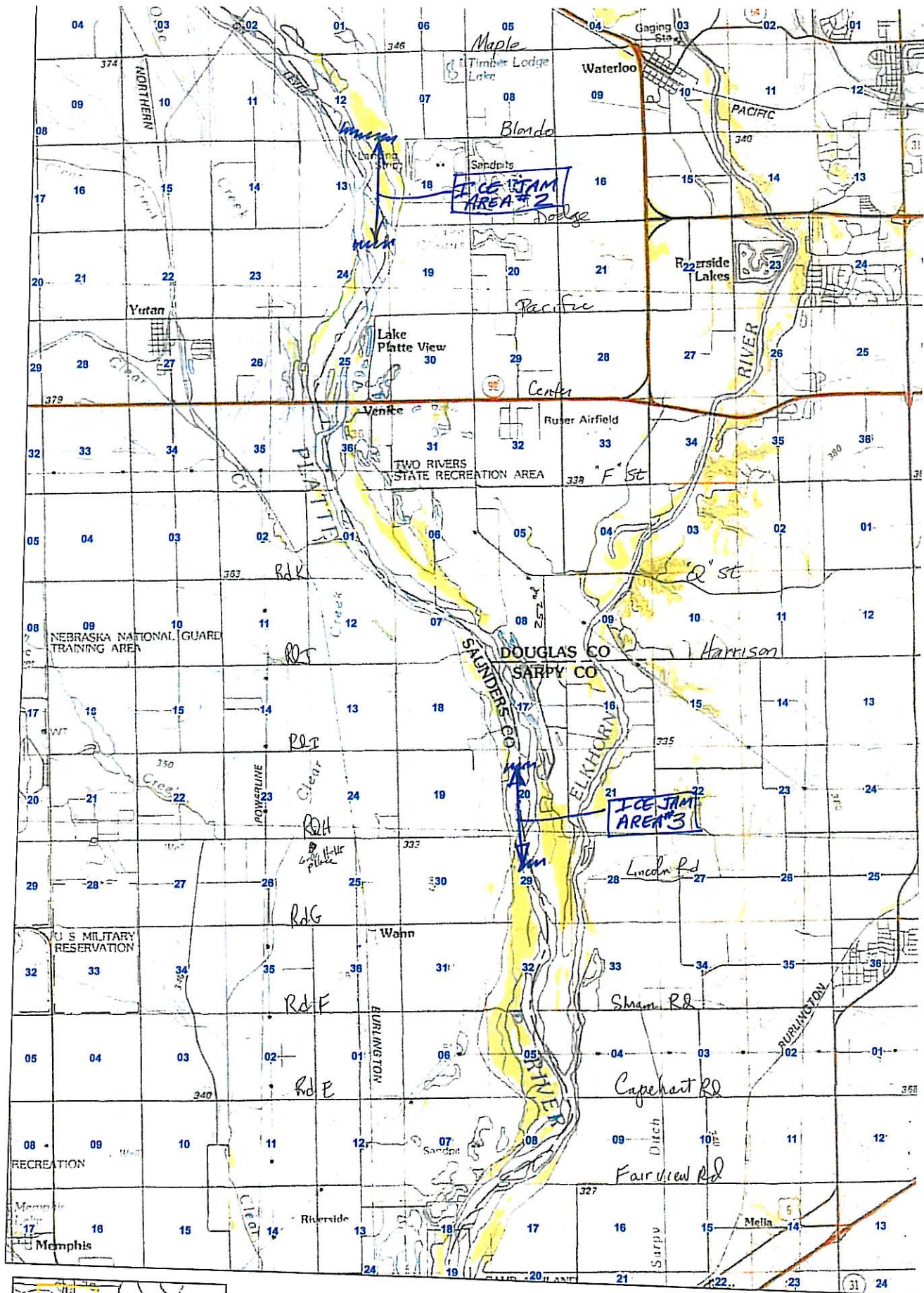
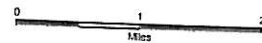


Plate 2

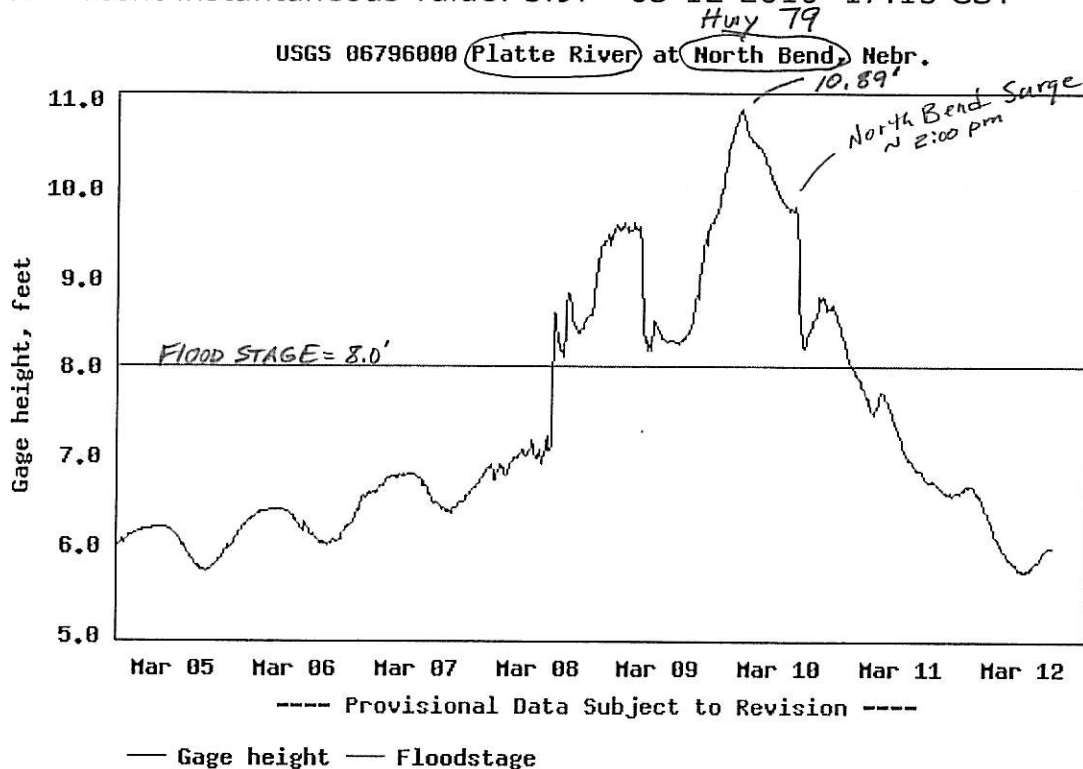


Available Parameters All 3 Available Parameters for this site ✓ 00065 Gage height ✓ 00060 Discharge 00045 Precipitation	Output format ◦ Graph Graph w/ stats Graph w/o stats Table Tab-separated	Days 7 (1-120)	<input type="button" value="GO"/>
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Summary of all available data for this site

Gage height, feet

Most recent instantaneous value: 5.97 03-12-2010 17:15 CST



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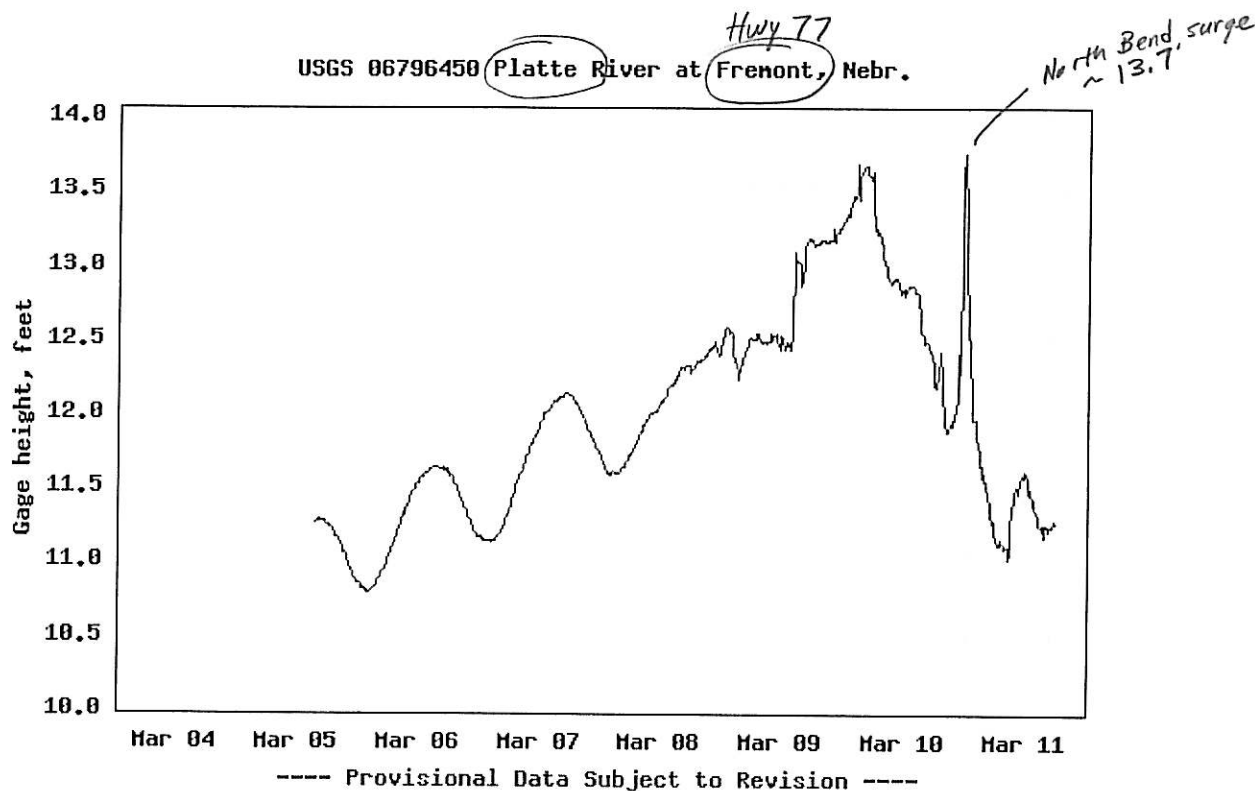
NOTE: Forecasts for the Platte River near North Bend are issued as needed during times of high water, but are not routinely available.

[Return to Area Map](#)[← Upstream Gauge](#)[Downstream Gauge →](#)**Flood Categories (in feet)**

Major Flood Stage: 15
 Moderate Flood Stage: 12
 Flood Stage: 8
 Action Stage: 7

Historical Crests

(1) 15.55 ft on 03/19/1978
 (2) 12.24 ft on 02/20/1971
 (3) 10.97 ft on 03/08/1993



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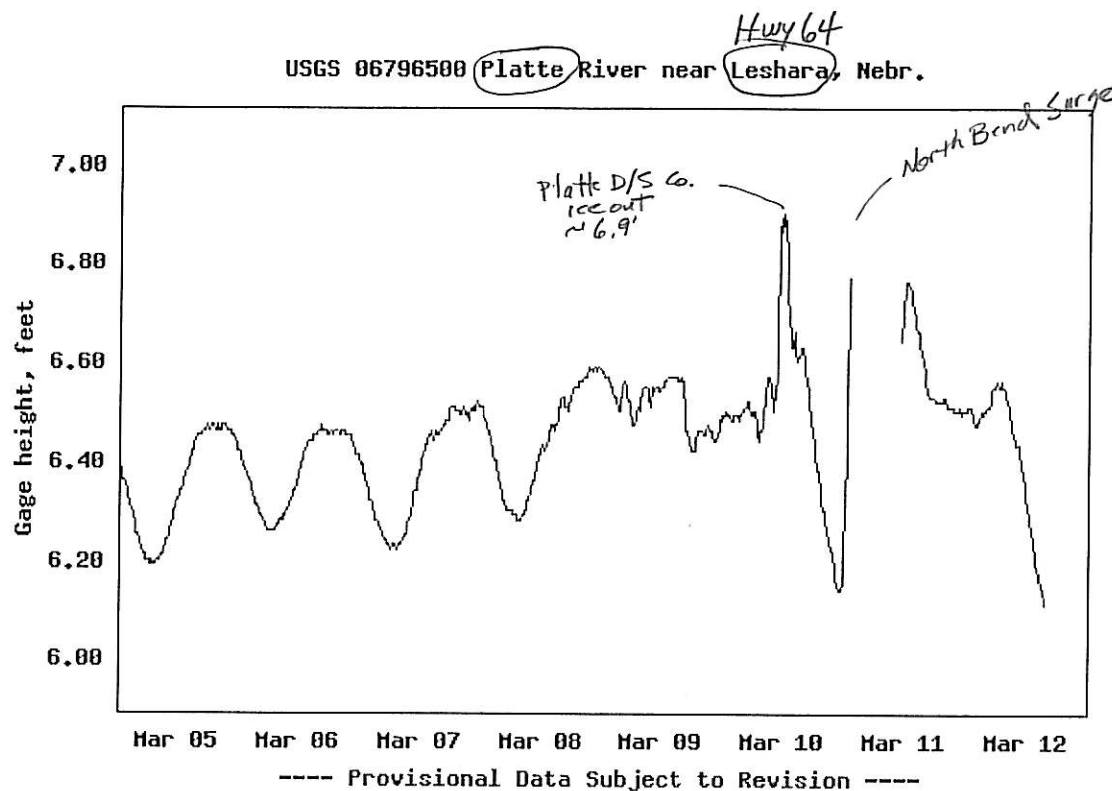
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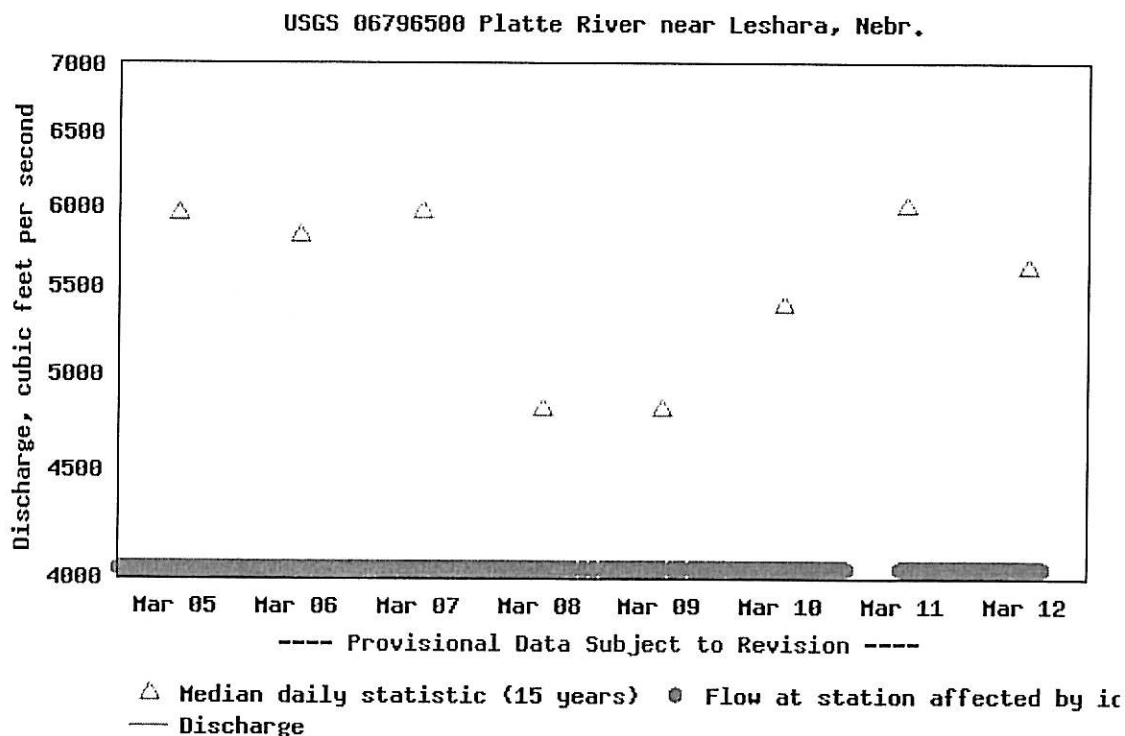
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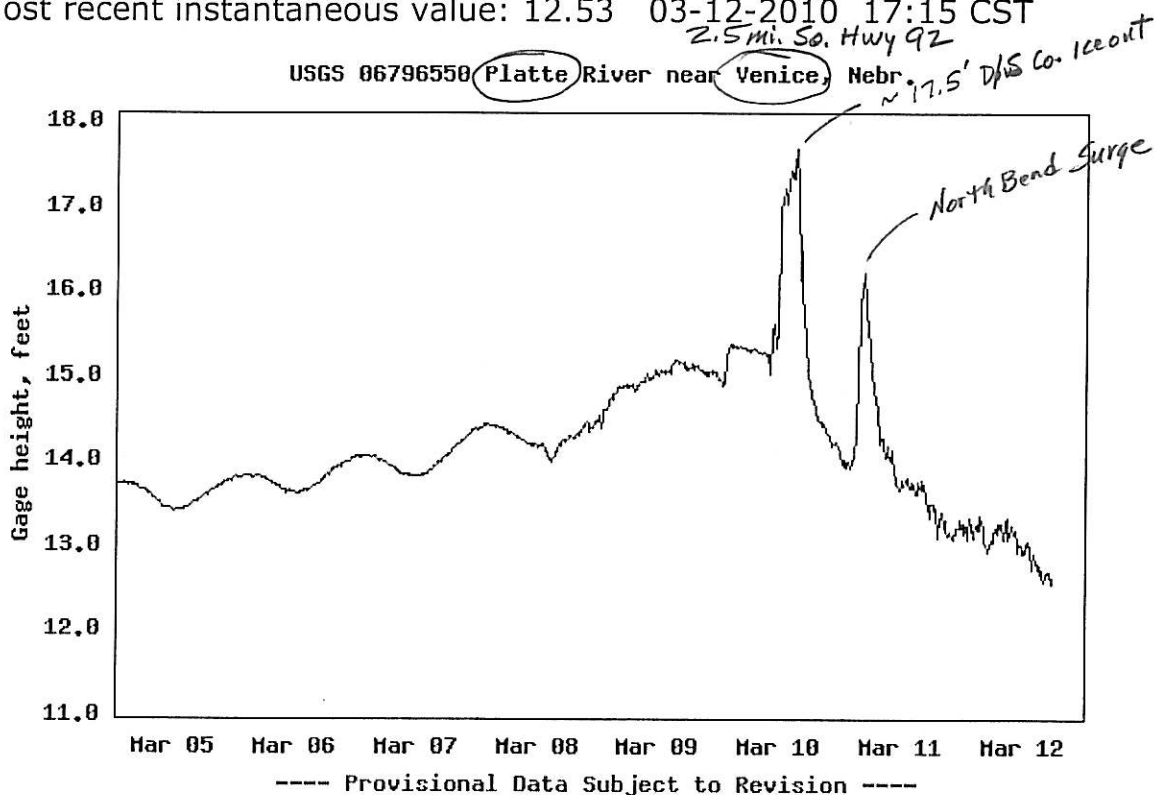
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Gage height, feet

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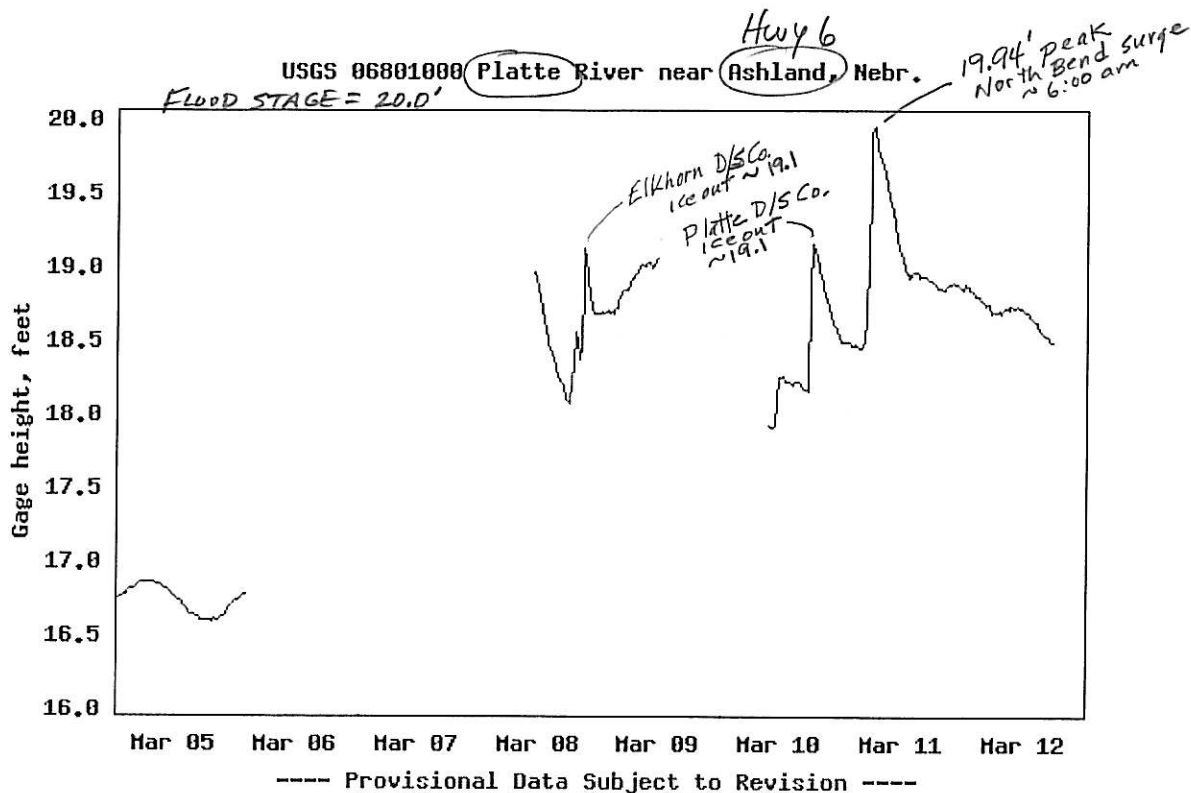
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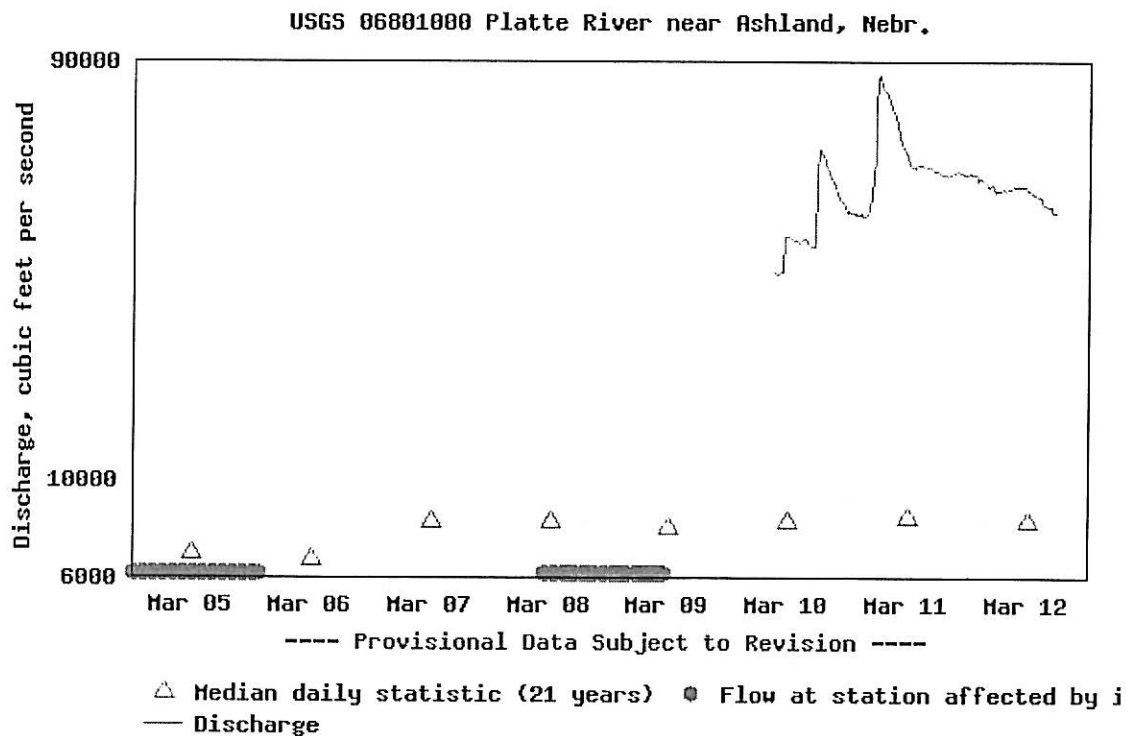
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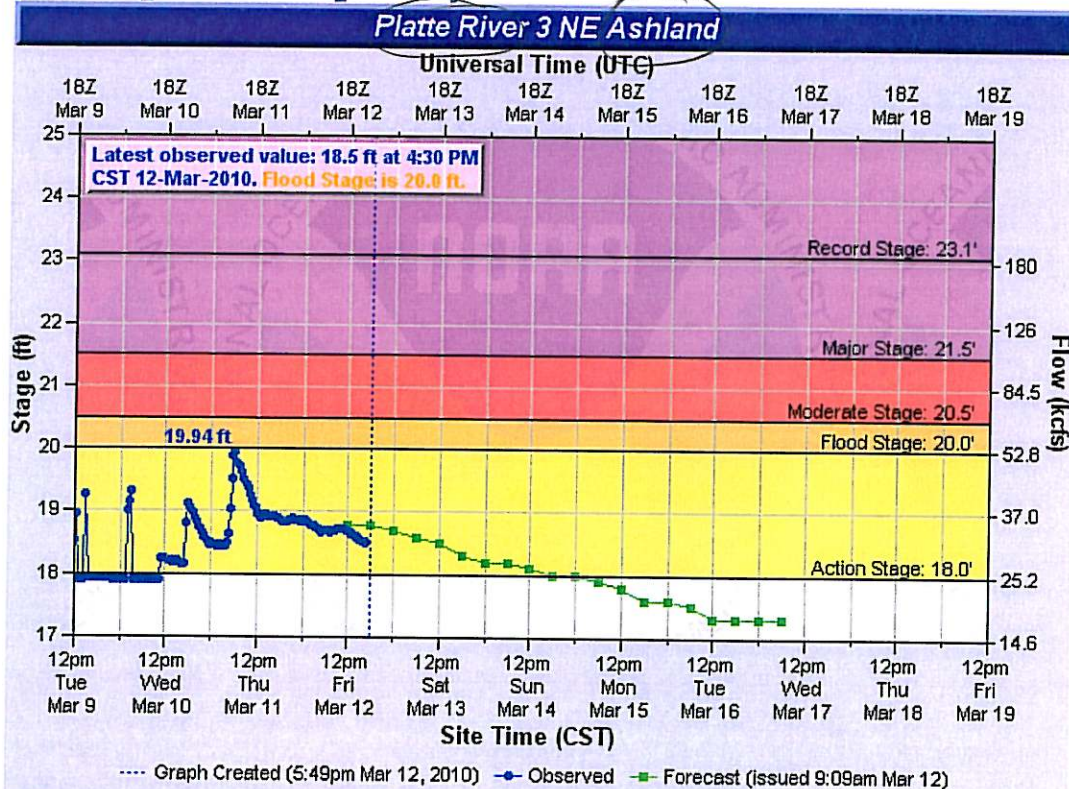
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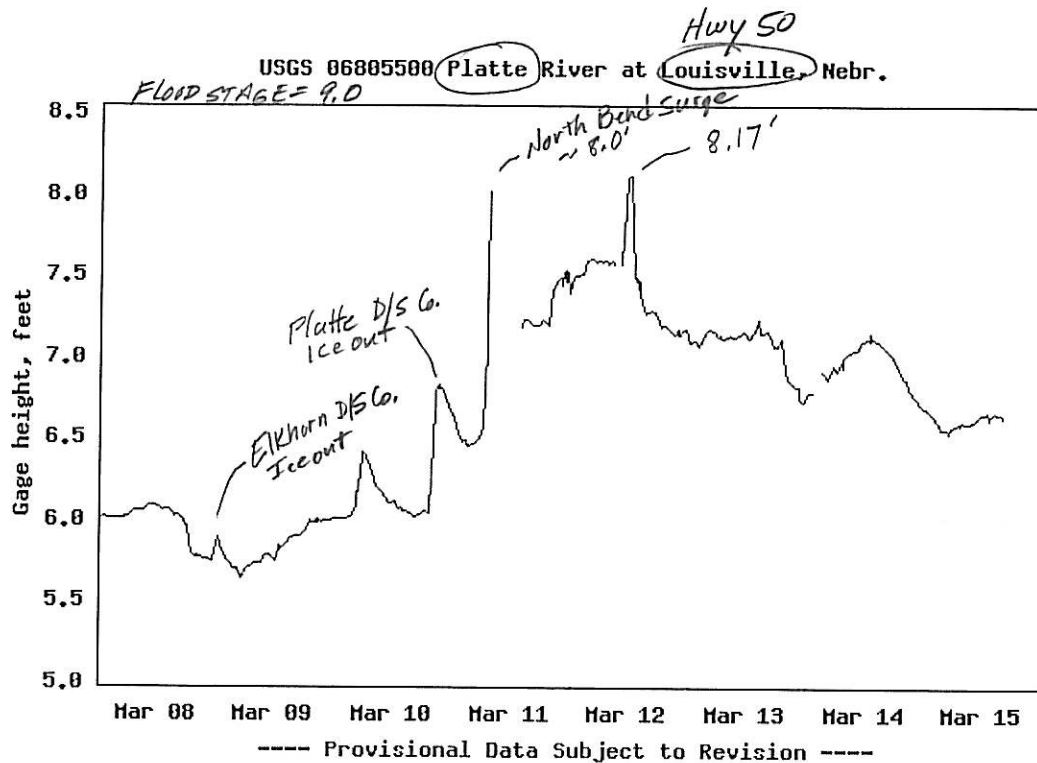
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Major Flood Stage: 21.5
 Moderate Flood Stage: 20.5
 Flood Stage: 20
 Action Stage: 18

Historical Crests

(1) 23.05 ft on 02/20/1997
 (2) 21.45 ft on 07/25/1993
 (3) 21.39 ft on 03/15/2001



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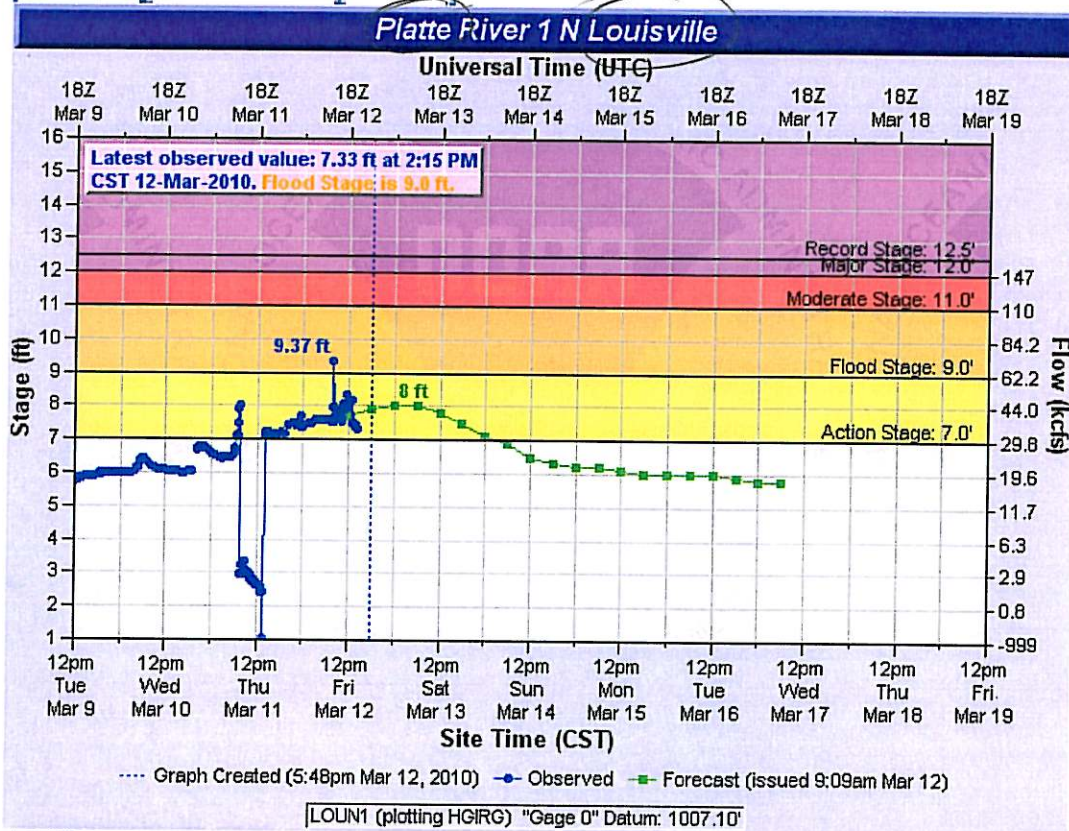
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Major Flood Stage: 12
 Moderate Flood Stage: 11
 Flood Stage: 9
 Action Stage: 7

Historical Crests


(1) 12.45 ft on 03/30/1960
 (2) 11.90 ft on 07/25/1993
 (3) 11.47 ft on 03/10/1993

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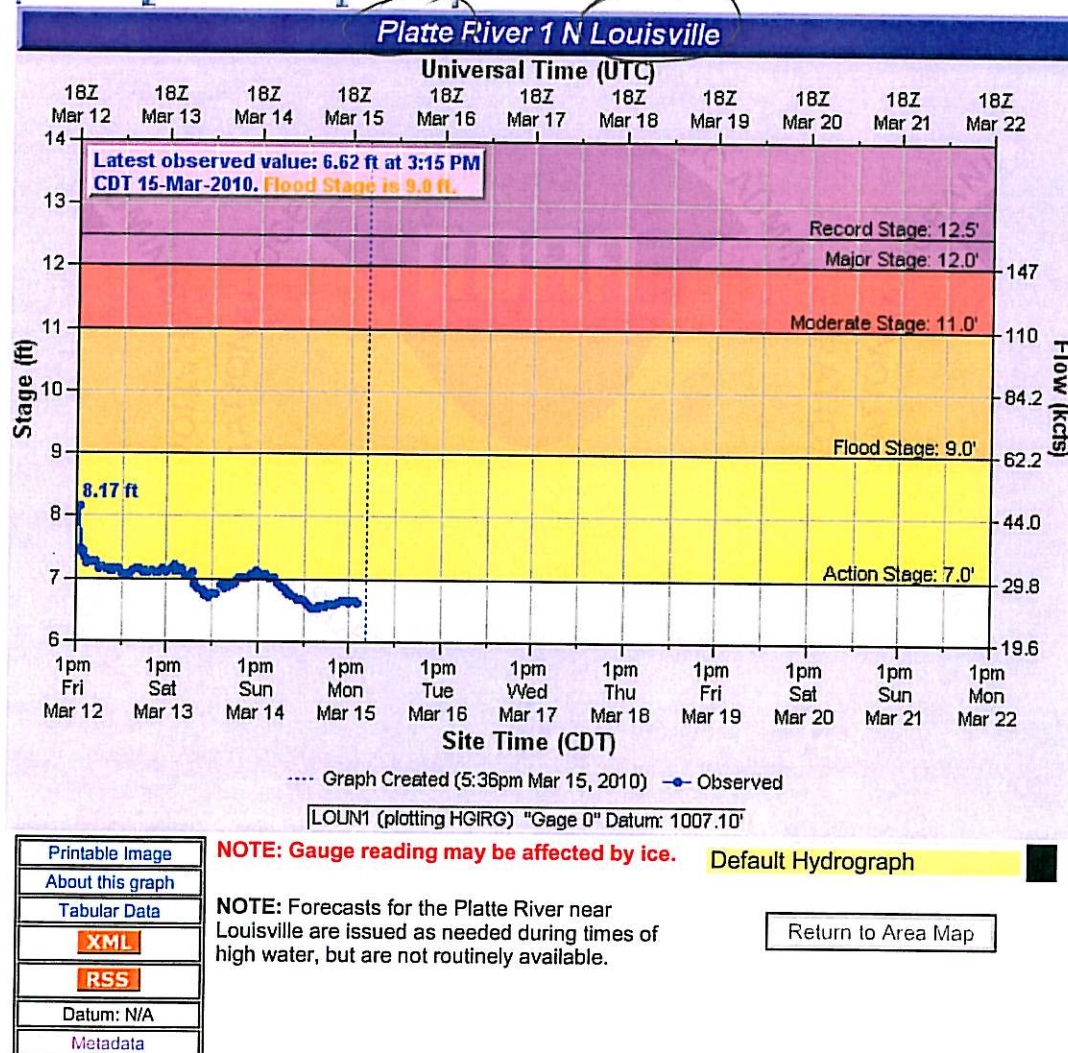
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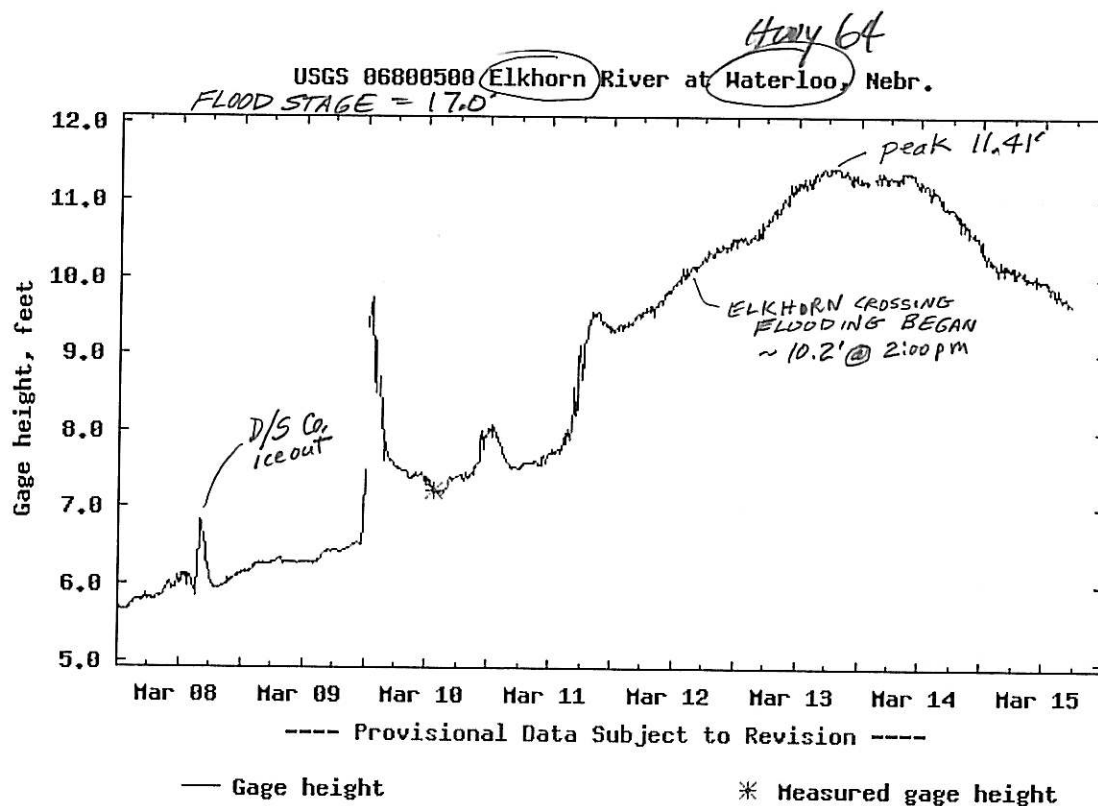
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Flood Categories (in feet)

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 Moderate Flood Stage: 11
 Flood Stage: 9
 Action Stage: 7

Historical Crests

 (1) 12.45 ft on 03/30/1960
 (2) 11.90 ft on 07/25/1993
 (3) 11.47 ft on 03/10/1993
 (4) 11.35 ft on 06/14/1984
 (5) 10.83 ft on 03/20/1978

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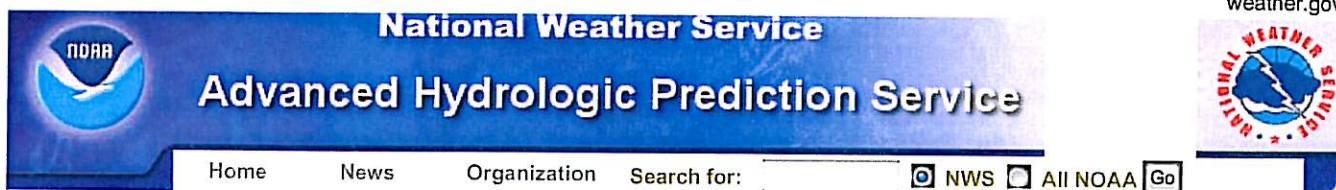
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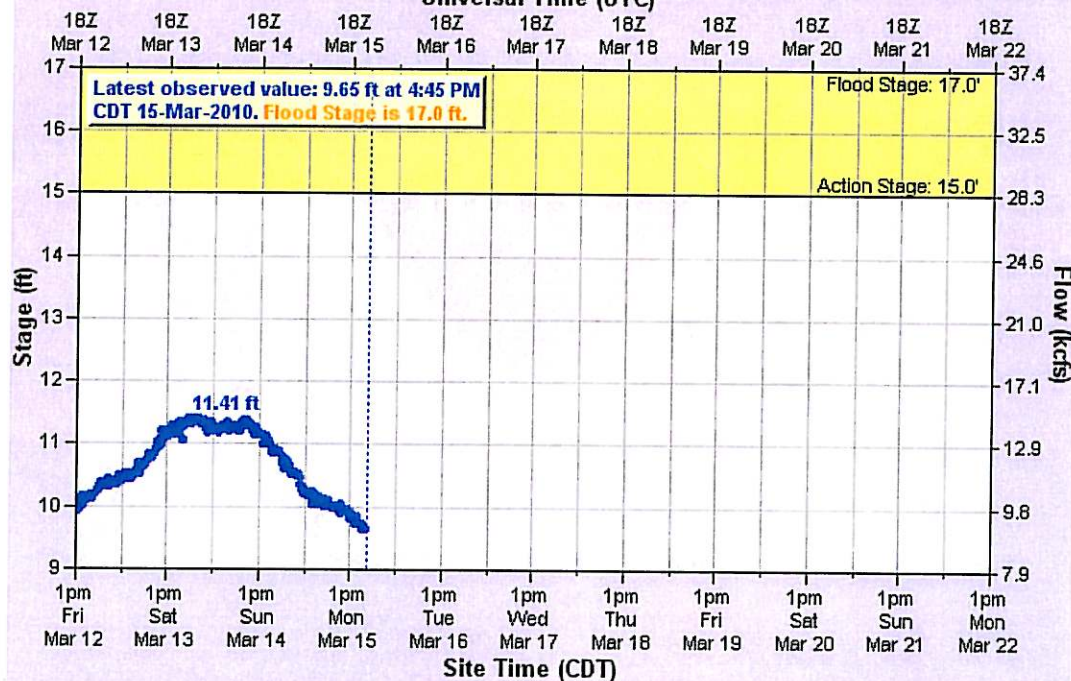
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Weekly Chance of Exceeding Levels

Chance of Exceeding Levels During Entire Period

Elkhorn River AT Waterloo

Universal Time (UTC)



---- Graph Created (5:37pm Mar 15, 2010) ● Observed

WTRN1 (plotting HGIRG) "Gage 0" Datum: 1104.73'

Observations courtesy of the US Geological Survey

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NOTE: Gauge reading may be affected by ice.

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114

Datum: N/A

Metadata

NOTE: Forecasts for the Elkhorn River at Waterloo are issued as needed during times of high water, but are not routinely available.

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Flood Categories (in feet)

Major Flood Stage:	21
Moderate Flood Stage:	18
Flood Stage:	17
Action Stage:	15

Historical Crests

(1) 19.12 ft on 03/29/1962
(2) 19.11 ft on 04/02/1960
(3) 18.22 ft on 02/22/1971
(4) 18.12 ft on 06/18/1984
(5) 17.80 ft on 06/16/1967

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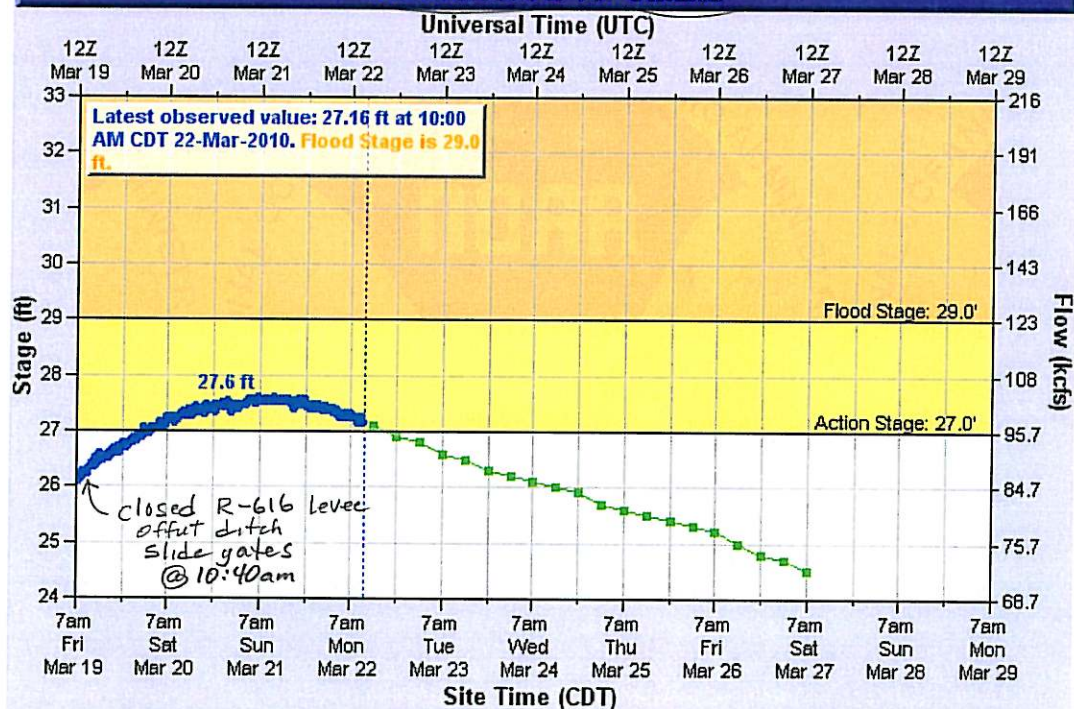
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Flood Warning Flood Advisory

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Missouri River AT Omaha



OMHN1 (plotting HGIRG) "Gage 0" Datum: 948.24'

Observations courtesy of the US Geological Survey

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Datum: N/A

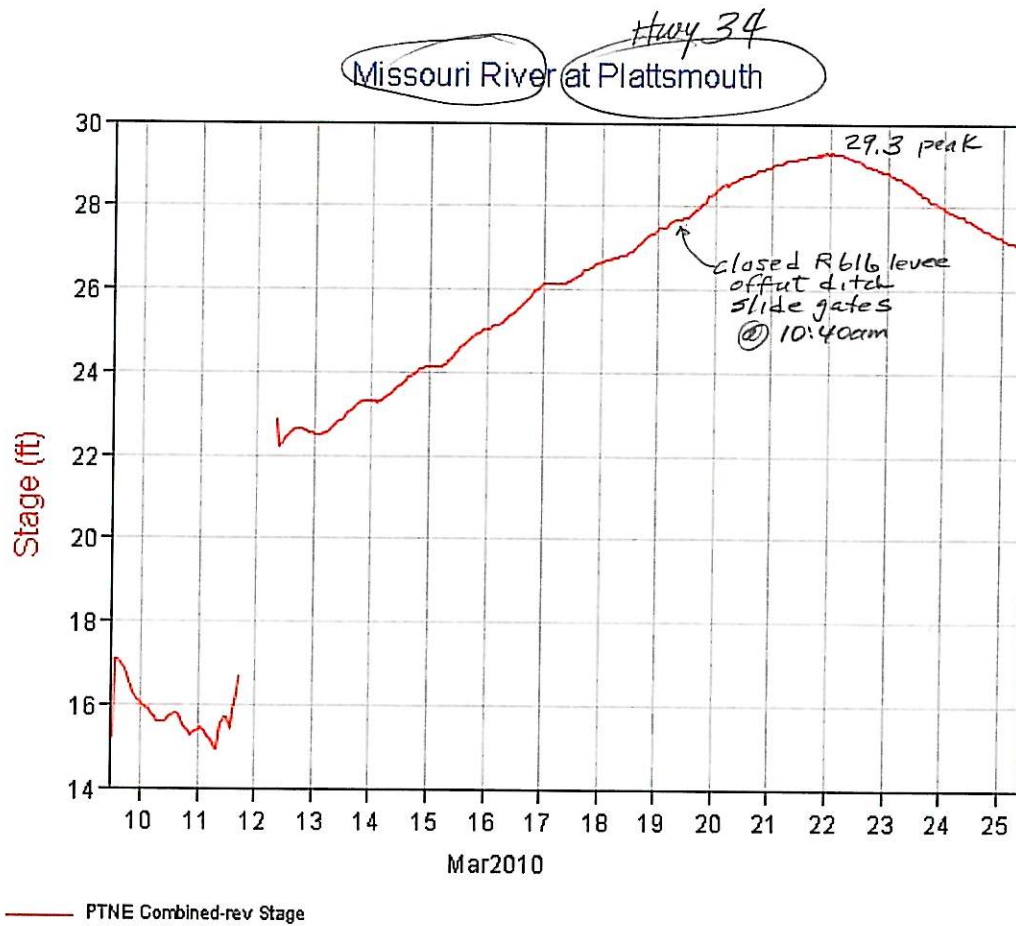
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NOTE: Gauge reading may be affected by ice.


Default Hydrograph

NOTE: Forecasts for the Missouri River at Omaha are issued routinely year-round.

[Return to Area Map](#)[← Upstream Gauge](#)[Downstream Gauge →](#)**Flood Categories (in feet)**
 Major Flood Stage: 40
 Moderate Flood Stage: 35
 Flood Stage: 29
 Action Stage: 27
Historical Crests
 (1) 0 ft on 04/01/1960
 (2) 40.20 ft on 04/18/1952
 (3) 36.65 ft on 04/25/1881




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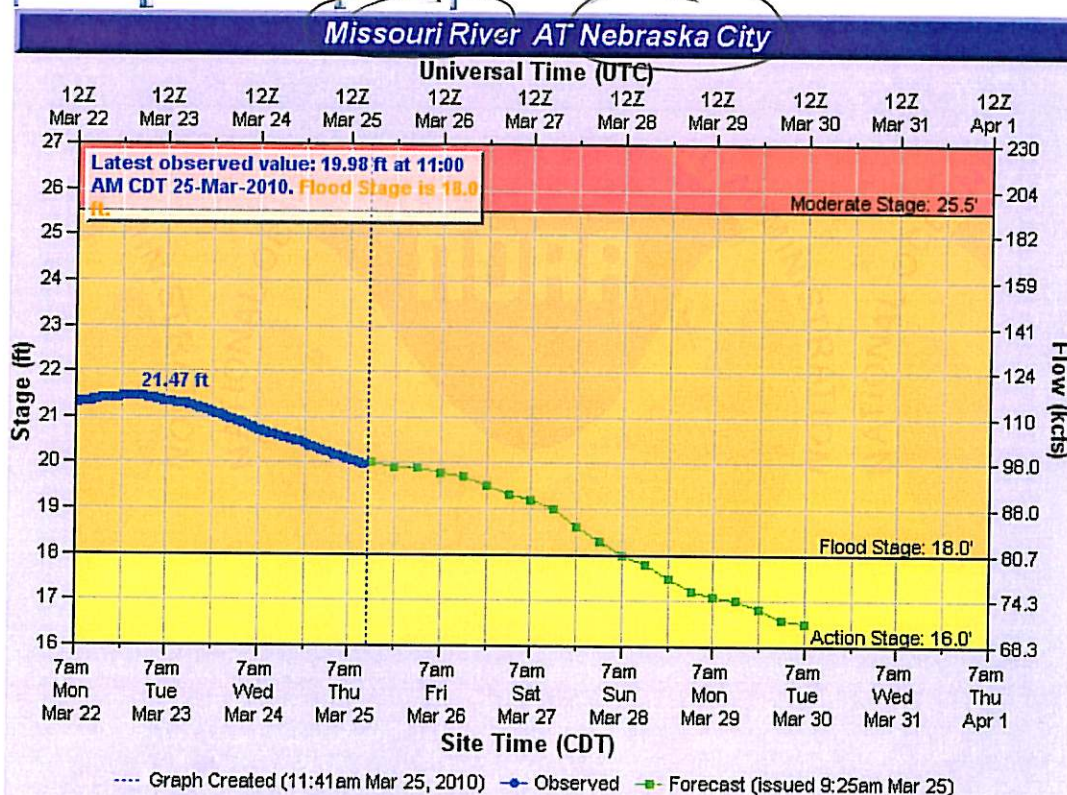
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Observations courtesy of the US Geological Survey

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XML

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Datum: N/A

Metadata

NOTE: Forecasts for the Missouri River at Nebraska City are issued routinely year-round.

Default Hydrograph

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← Upstream Gauge

Downstream Gauge →

Flood Categories (in feet)
 Major Flood Stage: 29.6
 Moderate Flood Stage: 25.5
 Flood Stage: 18
 Action Stage: 16

Historical Crests
 (1) 27.66 ft on 04/18/1952
 (2) 27.19 ft on 07/23/1993
 (3) 24.78 ft on 06/15/1984