

# Interbasin Transfer to Reduce Flooding: The Case of Devils Lake, North Dakota

Robert R. Hearne\*

Presented at the  
University Council on Water Resources Conference  
Santa Fe, NM, July 18, 2006

\* Department of Agribusiness and Applied Economics  
North Dakota State University  
P.O. Box 5636, Fargo, N.D., 58105, USA  
[robert.hearne@ndsu.edu](mailto:robert.hearne@ndsu.edu)

# Devils Lake Basin

**Sub-basin  
of Red  
River  
basin**



## **The Devils Lake Basin**

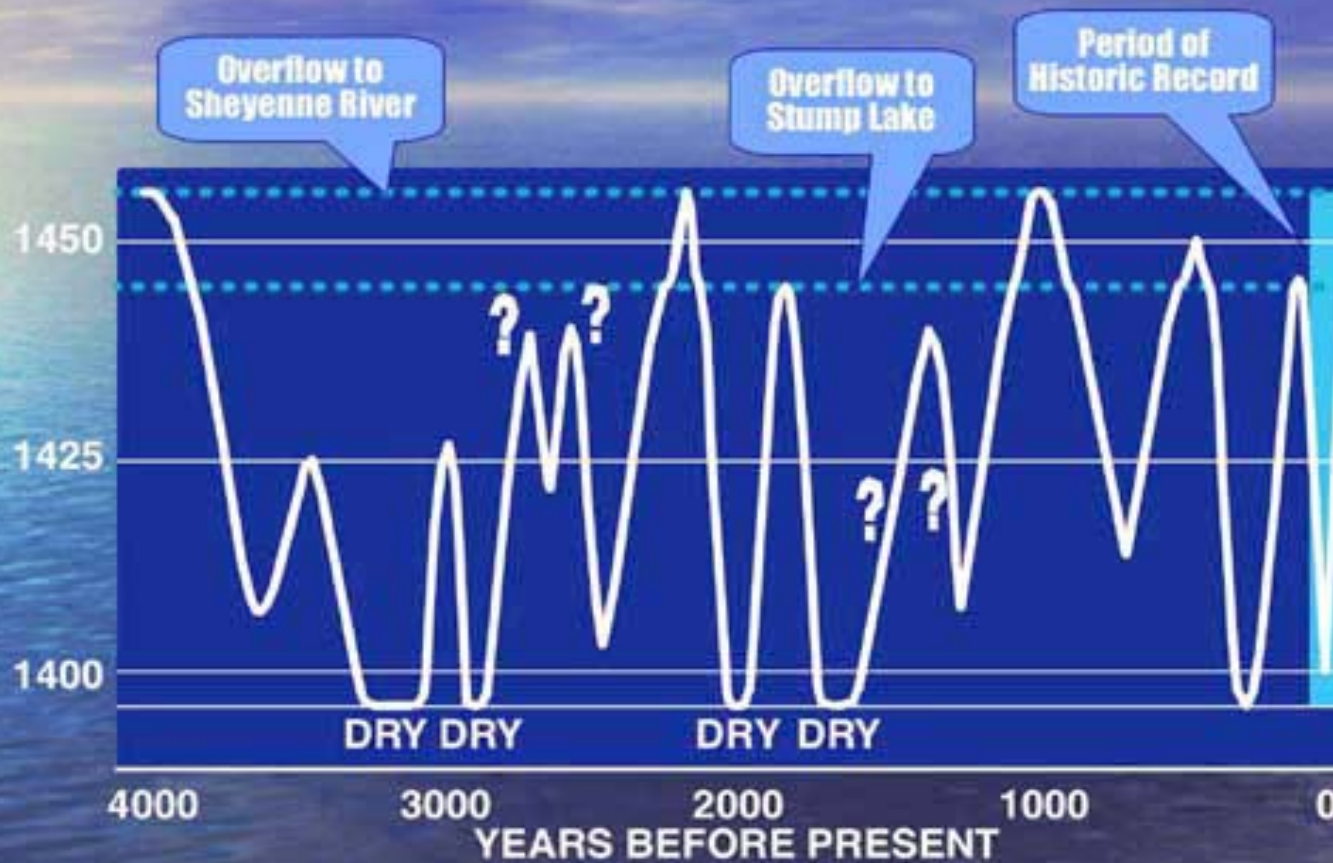
Devils Lake Basin is a 3810 square mile closed basin within the Red River of the North Basin.

Principle economic activity is farming with wheat and barley as major crops.

At least twice in the last 4000 years water has spilled out of the basin and into the Sheyenne River which flows into the Red River which in turn flows into Lake Winnipeg and the Hudson Bay.

A few minor surface water connections, with as much as 15 cfs flow, between the Devils Lake and Red River basins have been recorder in the last twenty years.

# 4000 Years of Fluctuations



# The Devils Lake Basin

From 1993 until 2004 the lake has risen 25.5 feet and quadrupled in volume. This has caused \$500 million in damages to farms, towns and infrastructure.

Farms have been lost and some roads have needed to be used. Other roads are serving as dikes. The area's principle town, the City of Devils Lake (population 7,000), currently needs to be protected by levees (to 1460') in order to protect it from rising lake waters. Some houses/businesses are 16 feet below current lake levels.

# The Devils Lake Basin

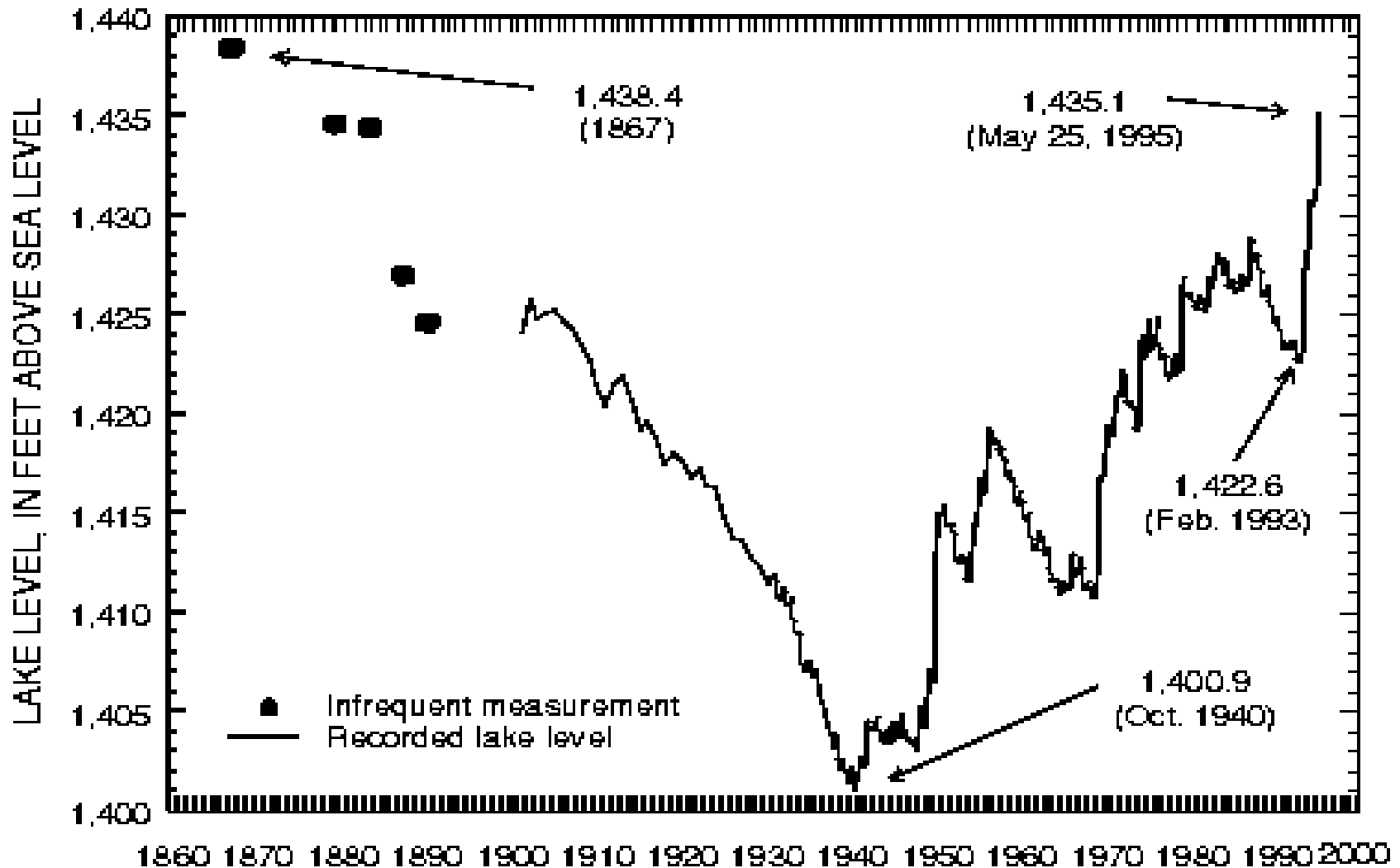
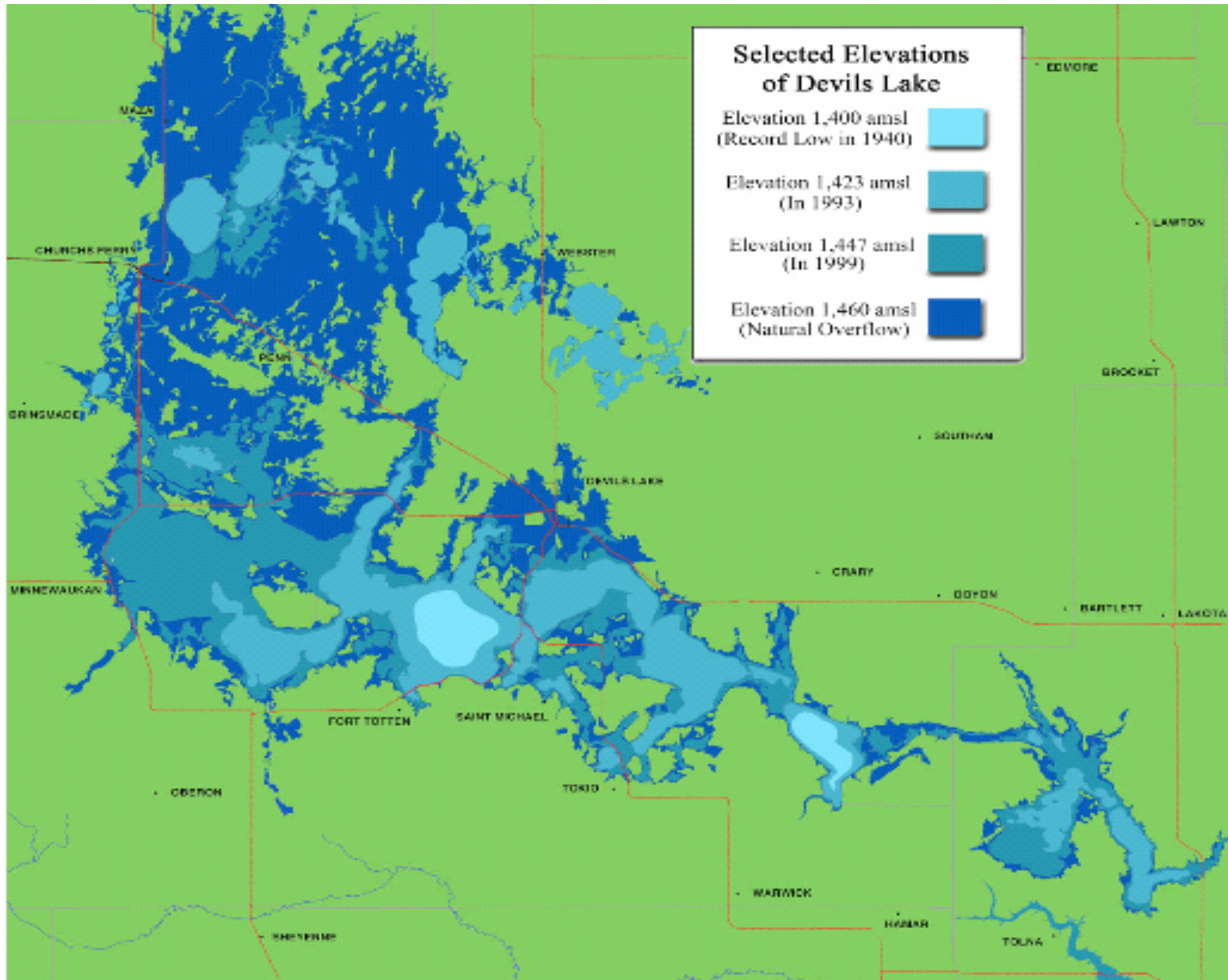


Figure 2. Historic water level for Devils Lake, 1867-1995.

# Devils Lake at Various Elevations



# The Devils Lake Basin



*Figure 2. Waves crashing over LIS Highway 281 in 2004. This highway has been rerouted to the west to prevent repeated problems with waves eroding the road.*

# The Devils Lake Basin



Figure 6. The Devils Lake lelee system, and the areas that it protects.

## **The Devils Lake Outlet: USACE Plan**

In 1997 the Army Corps of Engineers was authorized to study the feasibility and the environmental impacts of an outlet from Devils Lake to the Sheyenne River.

Construction was subject to assurances from the Secretary of State that the Boundary Waters Treaty would not be violated.

In April 2003 a Draft Planning Report and EIS was released for public comment.

A 22 mile 300 cfs diversion at Pelican Lake was chosen as the preferred alternative. Estimated project cost was nearly \$2000 million.

## **The Devils Lake Outlet: USACE Plan**

If the wet cycle were to continue additional damage estimates from increased flooding and environmental damage caused by overflow into the Sheyenne was estimated at \$900 million.

Given that the benefits of the outlet project would be subject to lake levels, the USACE estimated a 75% that the project would not be economically viable.

The estimated benefit cost ratio, incorporating probabilities of occurrence, was 0.19.

## **The Devils Lake Outlet**

All outlet/mitigation proposals that included the transfer of water from the Devils Lake sub-basin to the Red River and Hudson Bay Basin were opposed by both Minnesota and Manitoba.

The principle environmental concern was the potential for the transfer of fish pathogens, invasive species, and other harmful biota.

Also because Devils Lake has no natural outflow, water quality is considerably lower than that in the Sheyenne/Red. High levels of sulfates and suspended solids are a concern.

# **The Devils Lake Outlet**

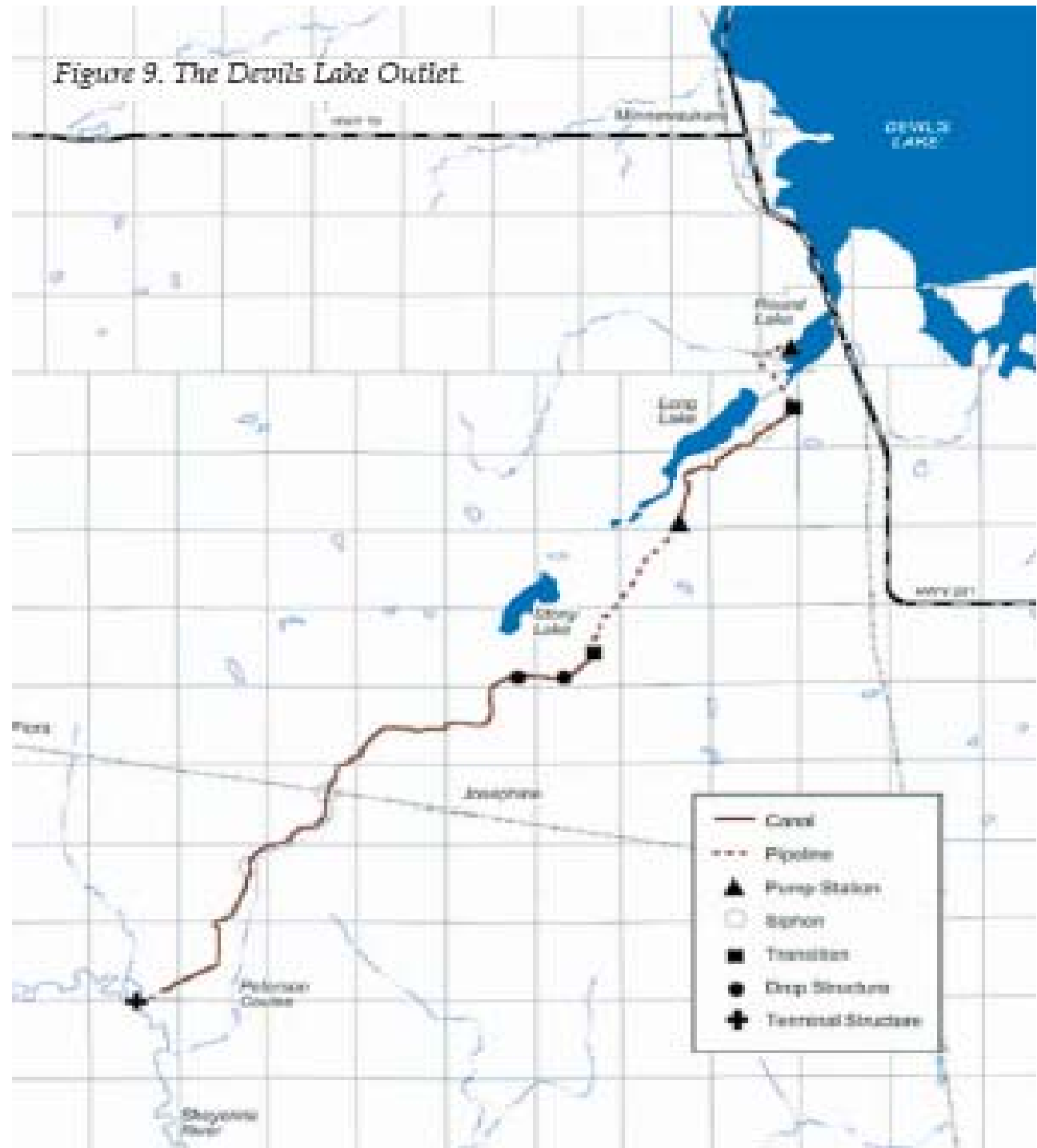
Instead of waiting for the approval/authorization required for the UACE outlet project the State of North Dakota has constructed its own emergency outlet, constructed and operated by the ND State Water Commission.

The 14 mile state outlet has a 100 cfs capacity (expandable) with a \$28 million construction cost.

Because Federal funds were not used the State has not conducted a full EIS process.

The outlet was constructed despite the opposition of Manitoba, Minnesota, and Canada and local interest groups (The Friends of the Sheyenne).

# The Devils Lake State Outlet



# **The International Joint Commission**

The International Joint Commission (IJC) is a binational mediation organization established by the Boundary Waters Treaty of 1909. General success of the treaty and boundary waters have facilitated commerce, regional development, and pollution reduction. The IJC has also initiated research into boundary air pollution.

Three US and three Canadian commissioners form the commission. These commissioners are supposed to act impartially and not represent their governments.

The IJC has established over 20 local basin boards of experts to study issues, including the International Red River Board

# The International Joint Commission

The IJC acts in two principle ways:

- 1) IJC approval is needed for work that impacts water levels (quantity and quality) on either side of the boundary;
- 2) The IJC reports on matters of dispute or difference between the two nations, when a reference is brought by both nations.

Although one nation can submit a reference for dispute resolution this is very rare.

## **The International Joint Commission**

In 2002 the State Department requested a joint referral from Canada to assess the USACE outlet proposal. Canada refused stating that the EIS was still under review and requesting a broader reference to consider other interbasin transfers such as the transfer of Missouri River water to the Red River Basin.

After construction of the ND outlet was initiated Canada requested a joint referral from the US on the ND State outlet. The US refused.

The US position is that damage must occur first before the treaty is violated (Canadian Embassy).

# The Agreement

In August 2005 upon completion of the ND State outlet project and upon imminent utilization, a joint press statement announced an agreement between the United States, Canada, North Dakota, Minnesota, and Manitoba. This was an unsigned signal of cooperation. This accord stipulated that North Dakota install a filter at the diversion to protect downstream areas from biota transfer before outlet operation. A more advanced filtration system will be installed later. In addition an rapid bioassessment would assess the risks of biological contamination from Devils Lake into the Red River.

# The Agreement

In August 2005 upon completion of the ND State outlet project and upon imminent utilization, a joint press statement announced an agreement between the United States, Canada, North Dakota, Minnesota, and Manitoba. This was an unsigned signal of cooperation. This accord stipulated that North Dakota install a filter at the diversion to protect downstream areas from biota transfer before outlet operation. A more advanced filtration system will be installed later. In addition an rapid bioassessment would assess the risks of biological contamination from Devils Lake into the Red River.

# The Agreement

After the released agreement, a sand and gravel filter was established at the outlet.

In September 2005 a report on fish pathogens in Devils Lake was released. No viral fish pathogens were detected. Fish health was good. Certain bacteria, pathogens, and parasites were encountered, but these were considered to be common to other North American waters.

A permanent filter, designed to address biota transfer is being designed.

# Recent Developments

The outlet was operated with a flow of 50 cfs for a short trial period in late 2005.

The State Department of Health permit restricts operation

- 1) to the period May – November
- 2) when lake levels are above 1445 feet amsl
- 3) when downstream sulfate concentrations exceed 300mg/l
- 4) when total suspended solids concentrations exceed 100 mg/l

## **Recent Developments**

In 2006 sulfate levels in the Sheyenne River exceeded 300 mg/l without Devils Lake water. High water tables had increased sulfate concentrations. Thus the outlet has not operated in 2006.

Given that the ambient water quality standard for the Sheyenne is 450 mg/l the ND State Water Commission is seeking a modification of its water quality permit to allow for outlet operation up to 450 mg/l standard.

The TSS standard would also be relaxed and the outlet could operate at any month as long as the Sheyenne is not ice covered.

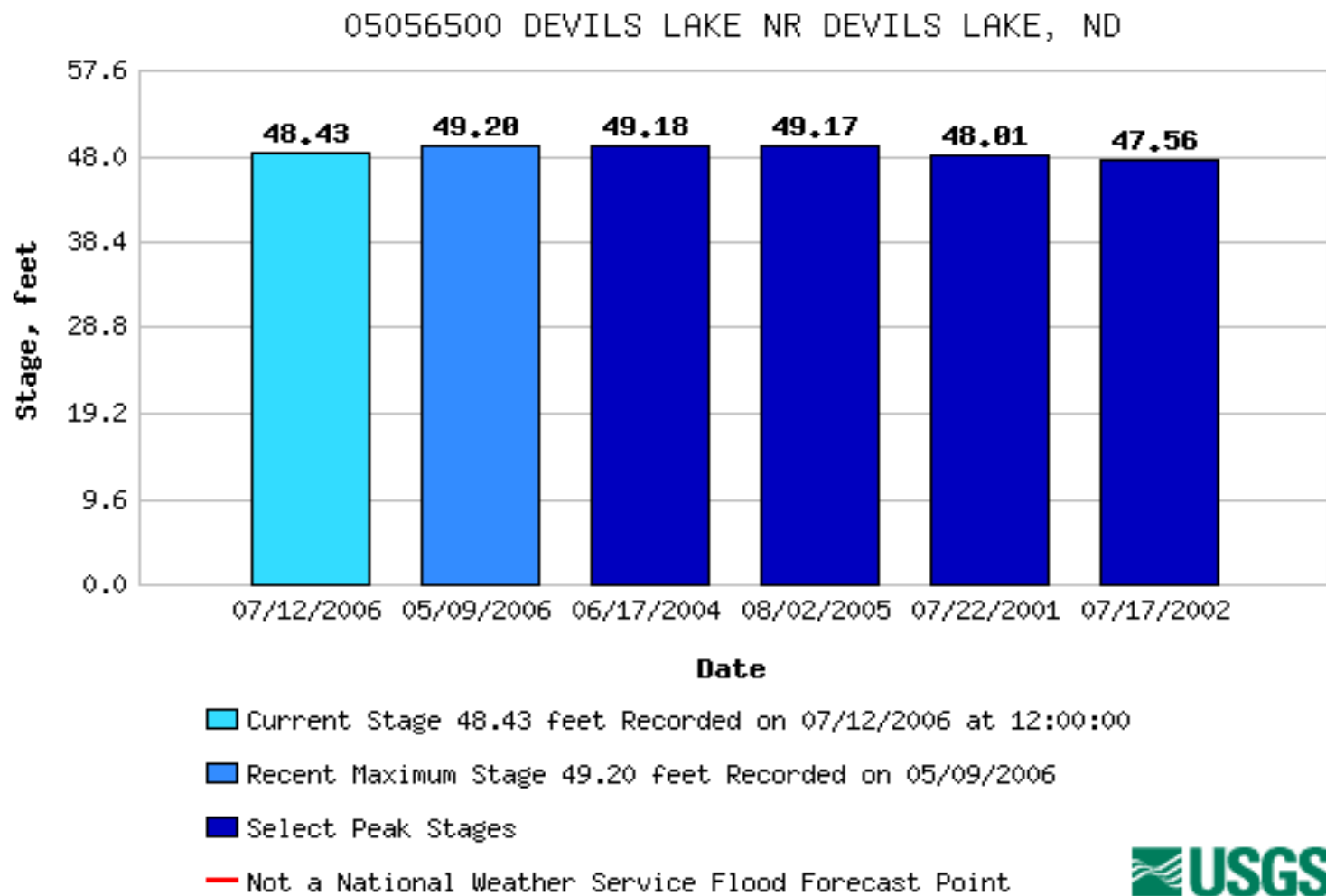
Public consultation for the revised permit is ongoing.

## Recent Developments

In April 2005 water in Devils Lake reached 1446.5 feet amsl and began spilling into Stump Lake a smaller lake within the Devils Lake Basin, at the rate of 200 cfs. Within two years Stump Lake will reach the level of Devils Lake and both will rise together if the wet cycle continues. Devils Lake levels reached a peak in May 2006 and have subsided in the last two months.

Flowing unabated from May to November at 100cfs, the ND State outlet will only reduce lake levels at a rate of 1 inch per year. The most important determinant of lake level is the climate.

# The Devils Lake Water Levels



## **Recent Developments**

In what many consider to be a countermove, Manitoba has constructed a 26 mile road on the north side of the US-Canada border which functions as a dike and prolongs overland spring flooding in Pembina Co ND.

Mitigating impacts of the border road/dike was part of the August 2005 US-Canada agreement

# Observations

The Red River is an international river and cooperation between Manitoba, North Dakota, and Minnesota will continue on many issues. The Red River Basin Commission and other international cooperative agencies demonstrate continued support/success.

Disputes between Manitoba and North Dakota concerning interbasin transfer will continue as a proposal to transfer water from the Missouri River to the Red River Basin proceeds through public comment and possible approval.

US – Canadian cooperation will continue despite local disputes.

# Observations

The IJC like many mediation bodies requires all parties to be willing to submit to arbitration/mediation. Although this hampers IJC activity it protects the legitimacy of the arbitration process.

The unilateral action by North Dakota defies the spirit of international cooperation and the US Environmental Protection Act which requires a EIS for certain projects. North Dakota's environmental lobby is weak and external controls to protect interstate and international waterways have not functioned.

# Observations

Despite “decentralized water management, with international waters the Federal government needs to be involved. The White House Council on Environmental Quality has become involved with the project since the August 2005 agreement.

# Observations

Canada maintains an absolutistic attitude against interbasin transfer. Studies on current fish pathogens and the capabilities of filtration systems are not trusted. The role of science and engineering are not trusted.

Natural/climatic events will have a greater weight on the outcome to the Devils Lake flooding than will engineering and policy.