



**North Dakota Legislative Management
Water-Related Topics Overview Committee
April 19, 2012**

Consulting Engineering • Land Surveying
West Fargo, ND • Fergus Falls, MN

North Dakota Wild Rice River Watershed Study

Joint Effort!

**Richland County Water Resource District
Southeast Cass Water Resource District**

Formation of Joint Board – WRD's Working Together!

Acknowledgements: Houston Engineering & Barr Engineering



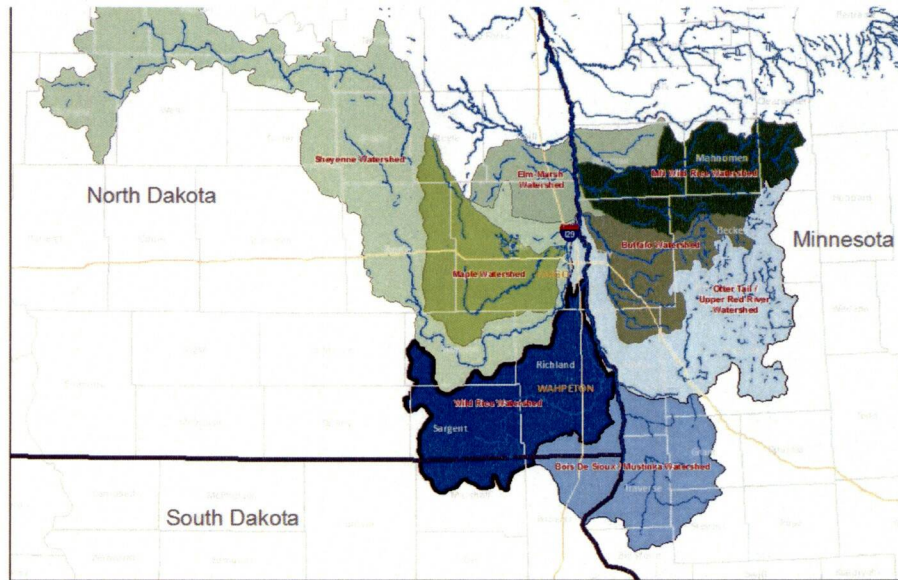
North Dakota Wild Rice River Watershed Study

- CONCLUSIONS
- BACKGROUND
- HISTORIC EVENTS
- RETENTION
- MODELING
- CONCLUSIONS

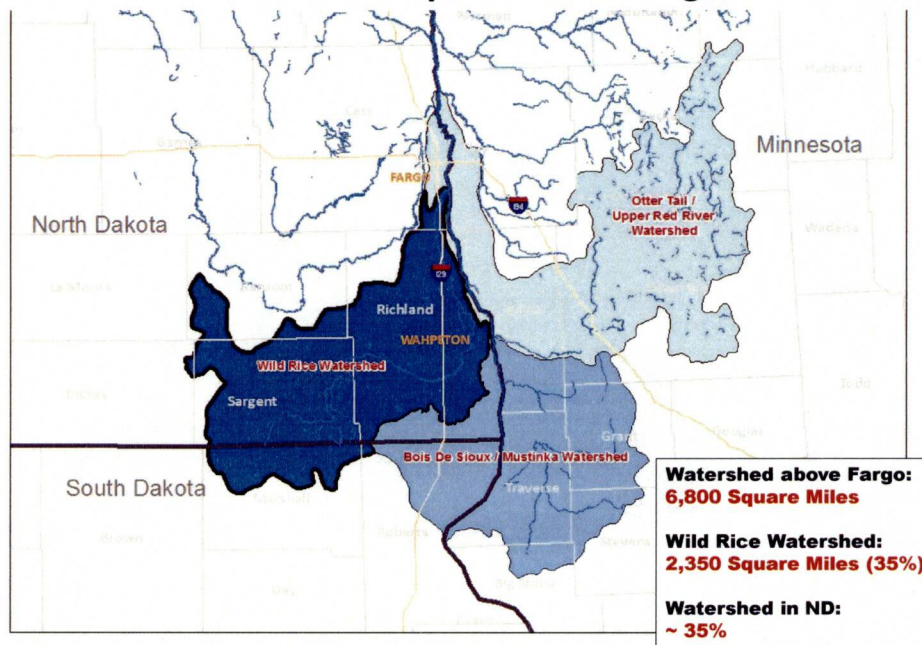
CONCLUSIONS

- The historic record of Wild Rice floods shows a repeating pattern of similarity. This includes 2009, 2010, and 2011. There is 1 exception.
- 1997 flood is significantly different; it is **not** typical.
- Modeling shows the **Upper** Wild Rice Watershed does **not** contribute to the Red River crest at Fargo. Timing!
- Wild Rice Retention modeling shows strong potential for local benefits within Richland County.
- Wild Rice Retention modeling shows minimal benefit to the Red River at Fargo.

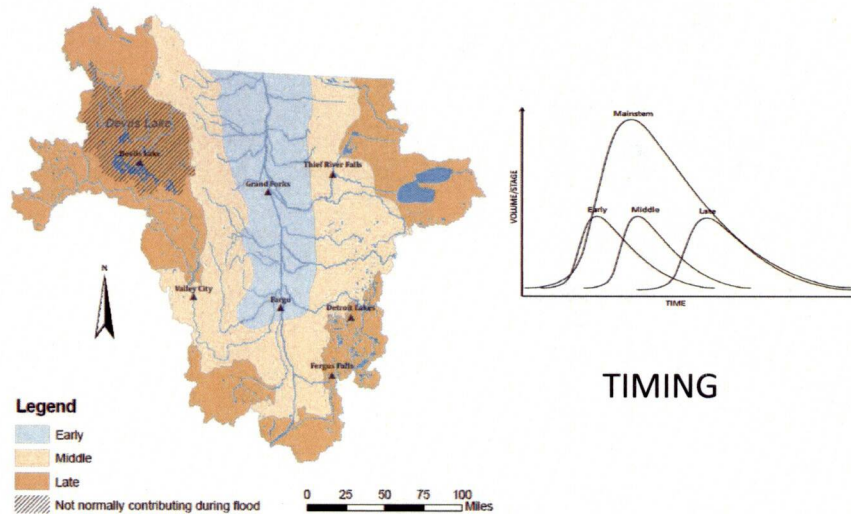
UPPER RED RIVER WATERSHED HEC-HMS MODEL LiDAR based Hydrologic Model



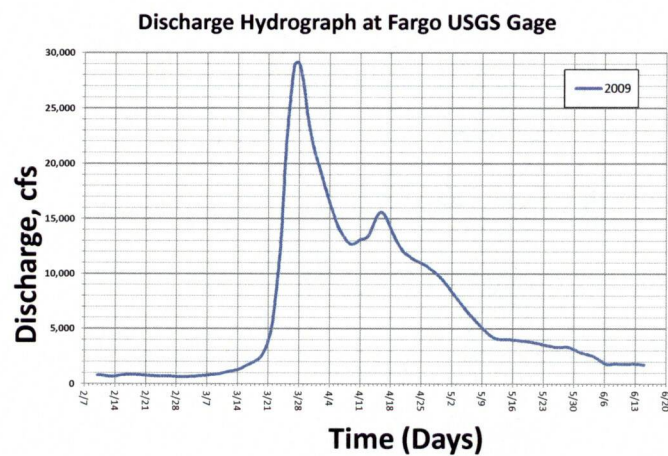
Watershed Upstream of Fargo

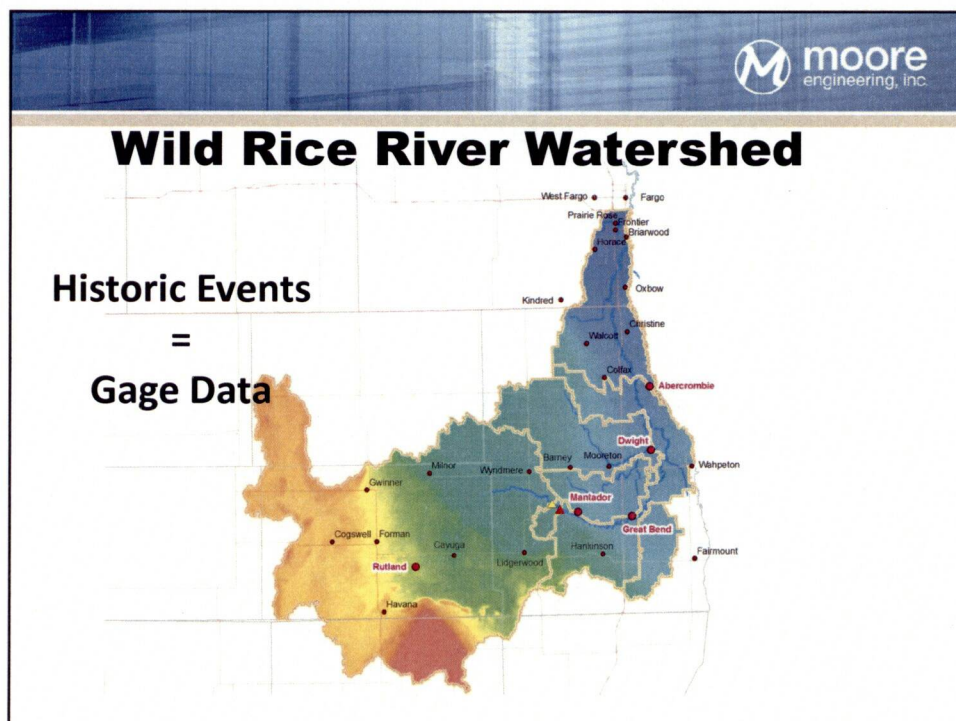
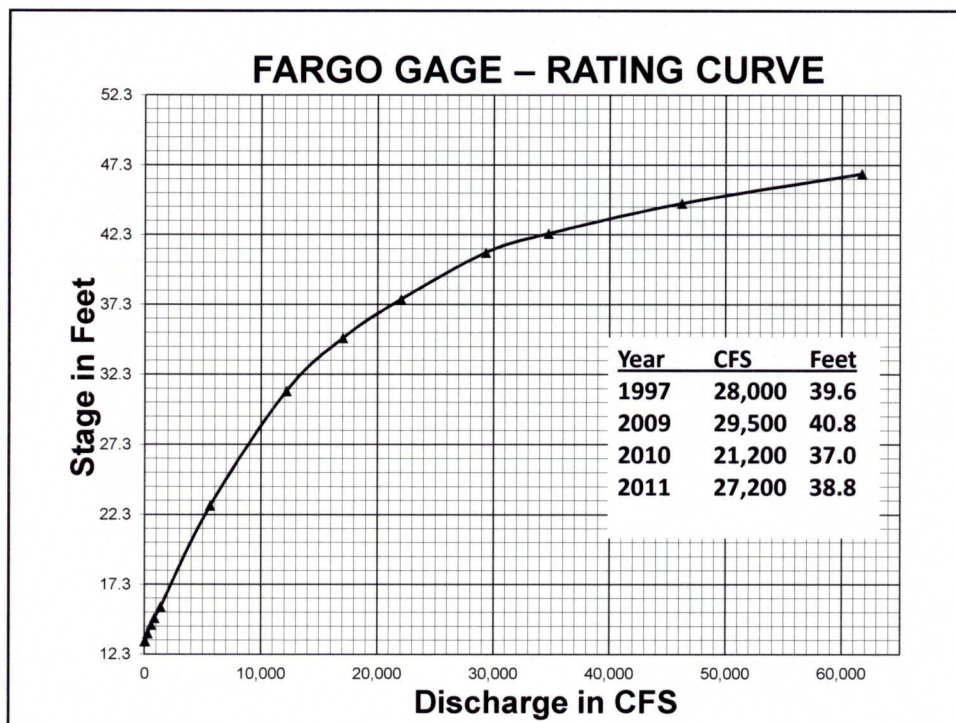


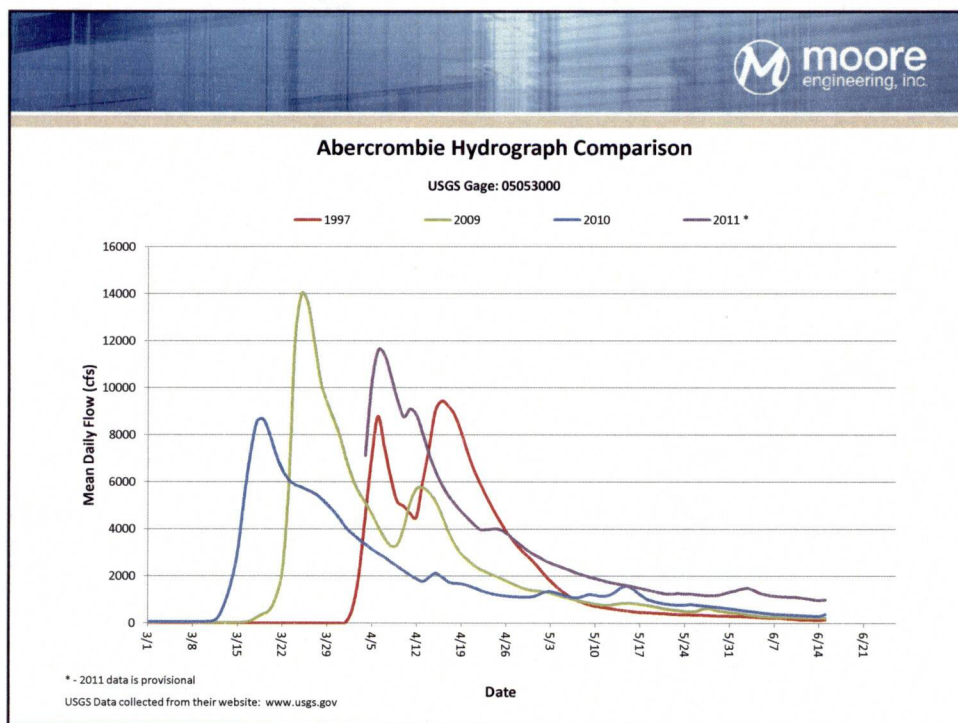
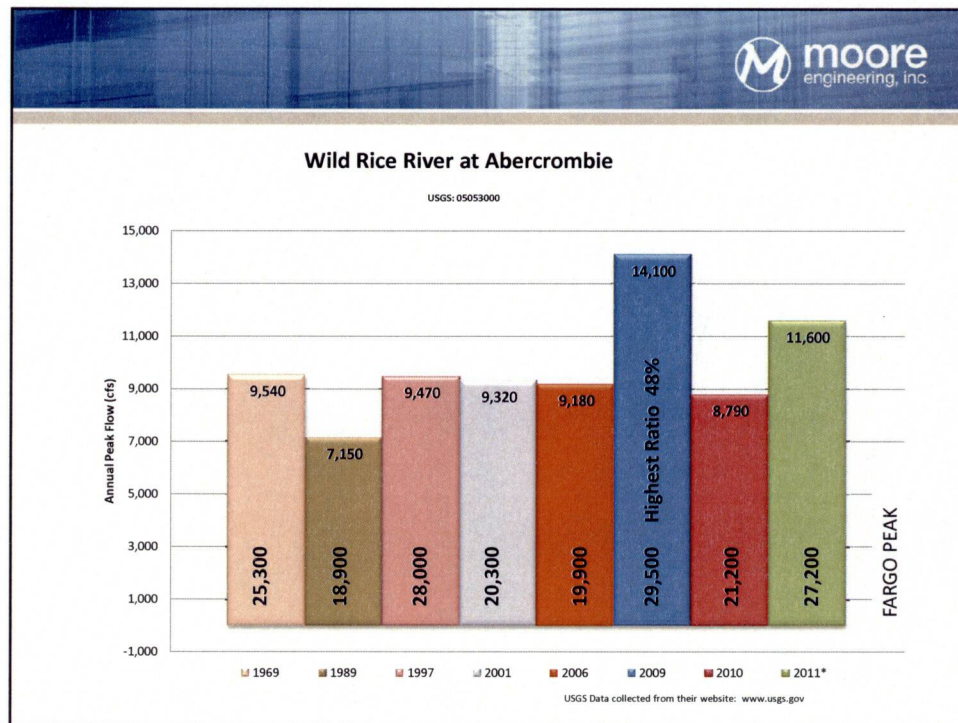
Early, Middle, and Late Water Concept

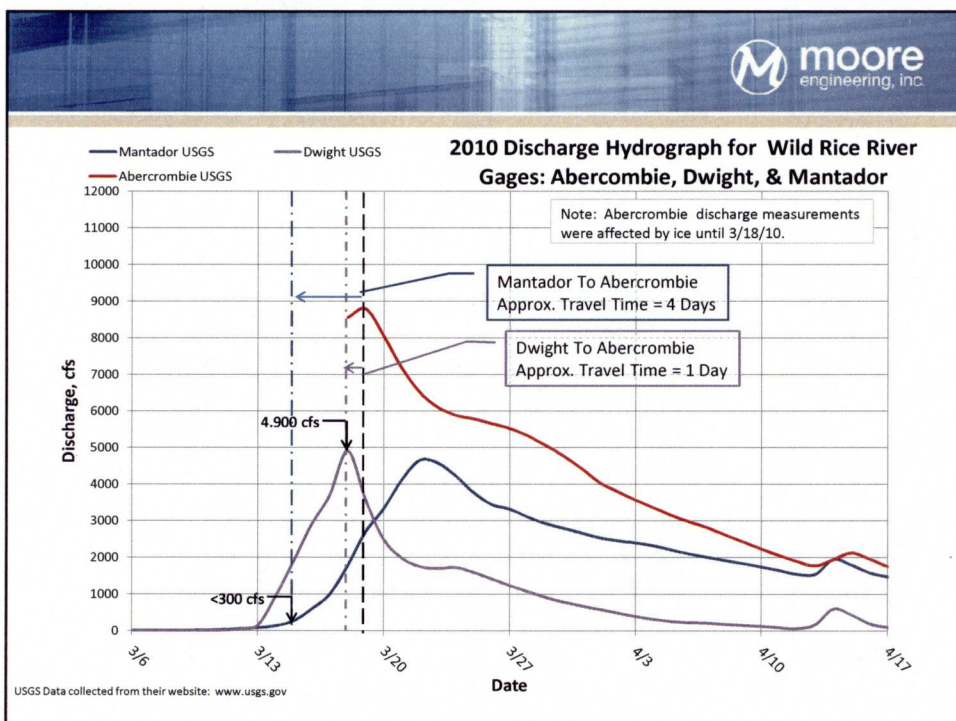
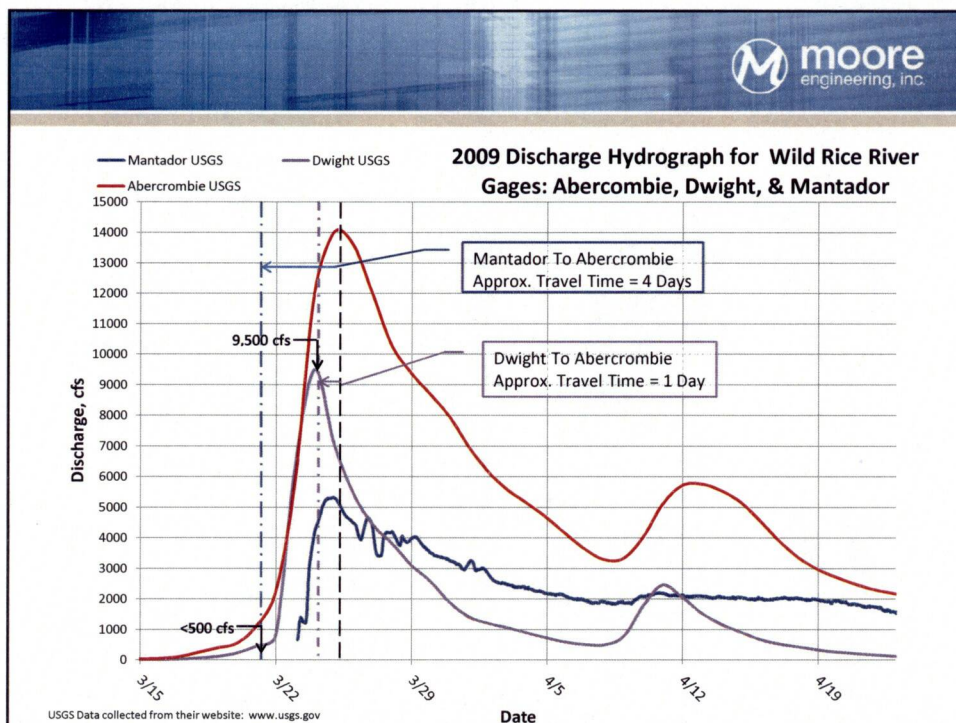


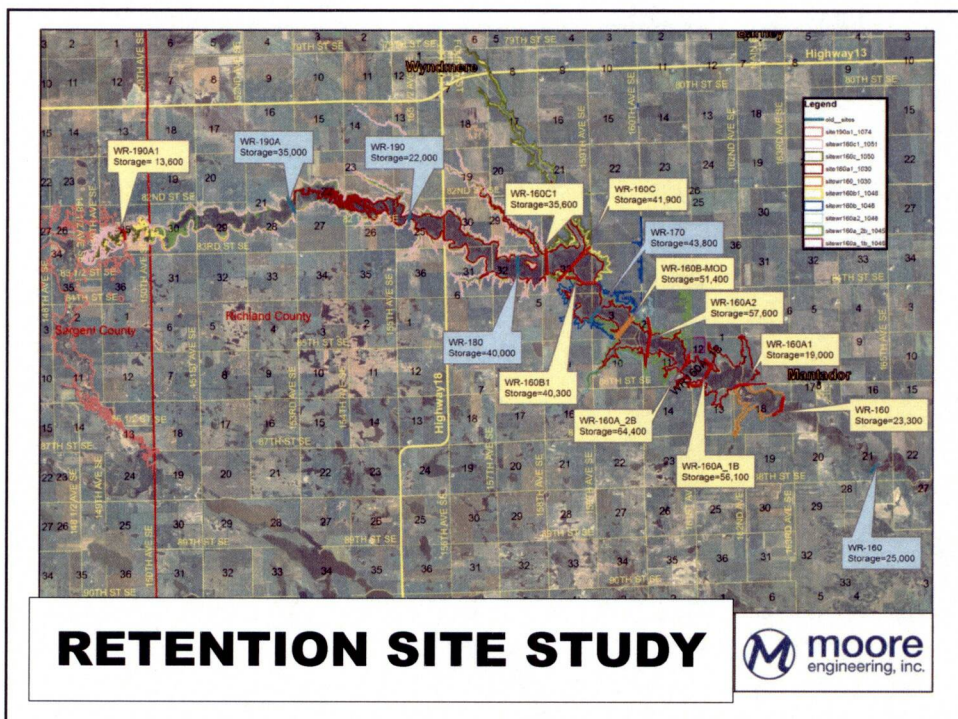
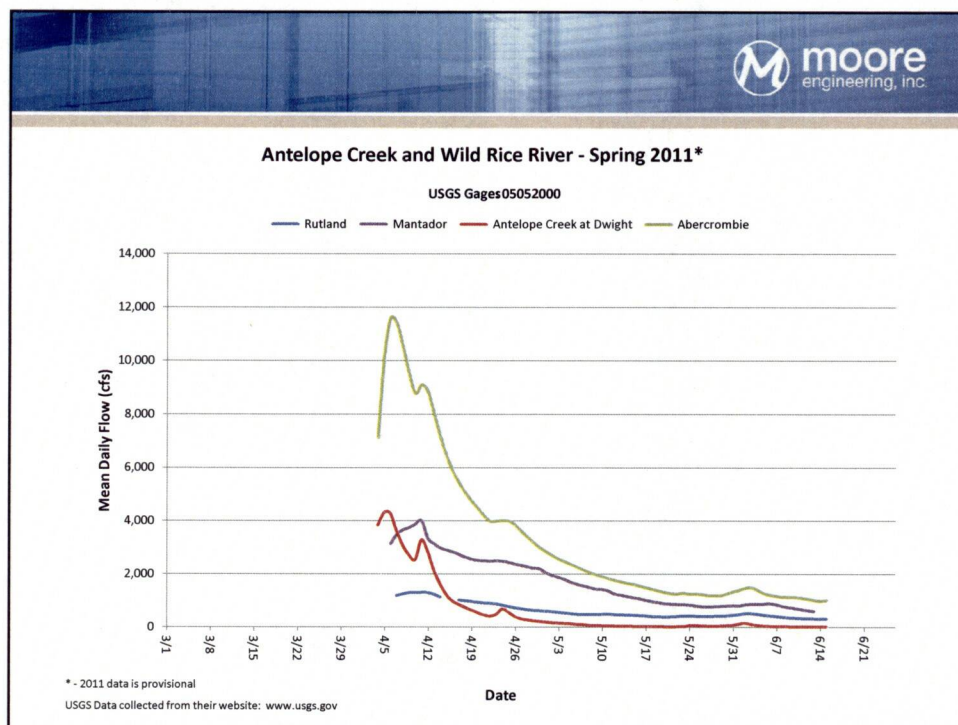
What is a Hydrograph?







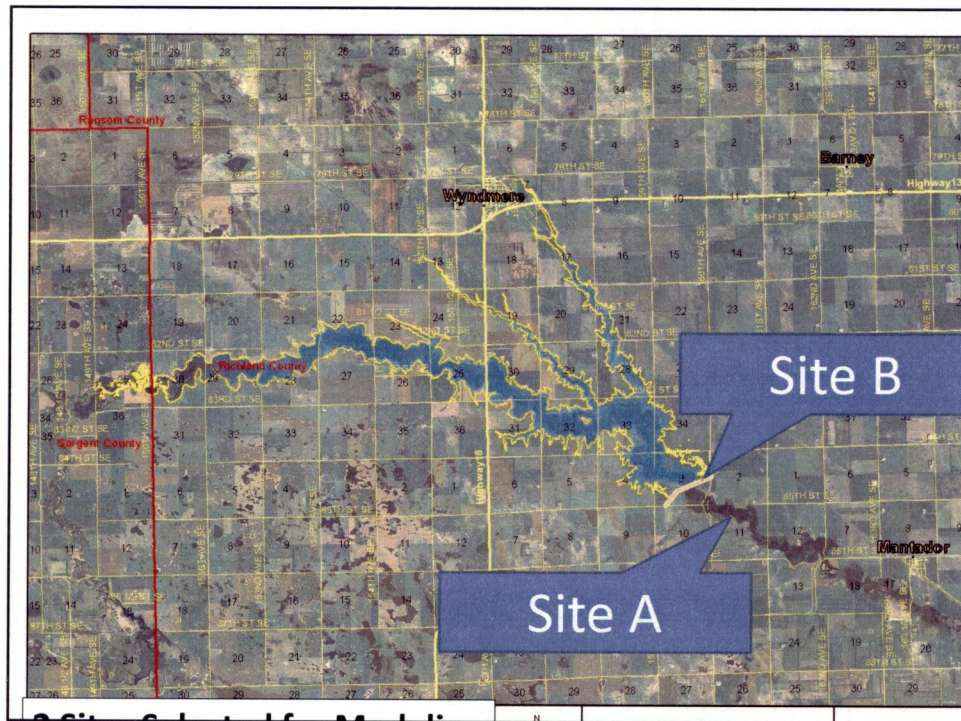
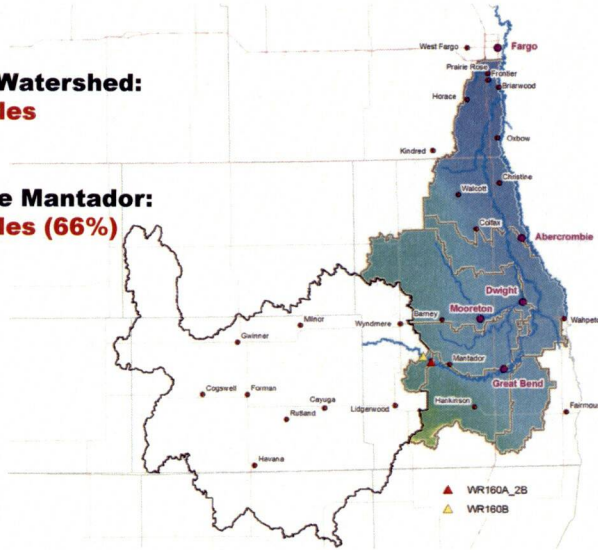


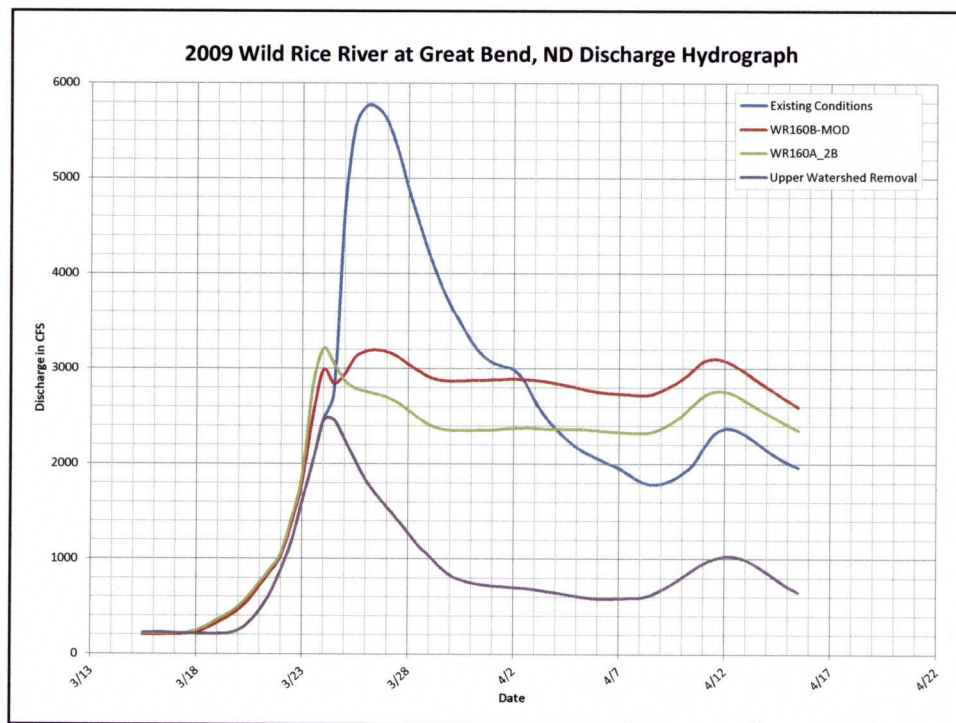
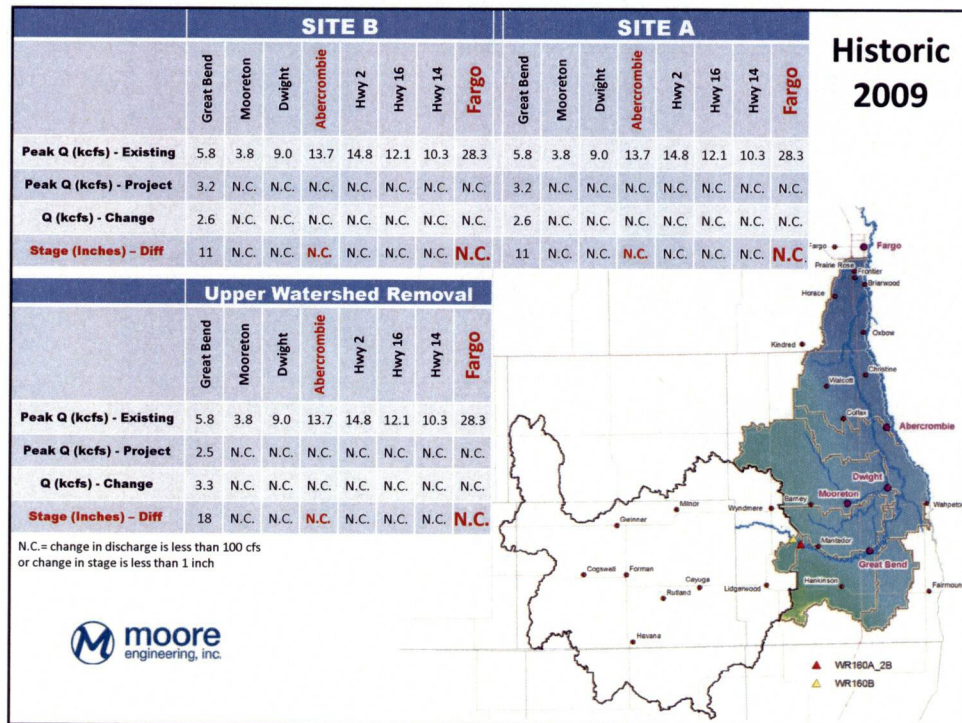


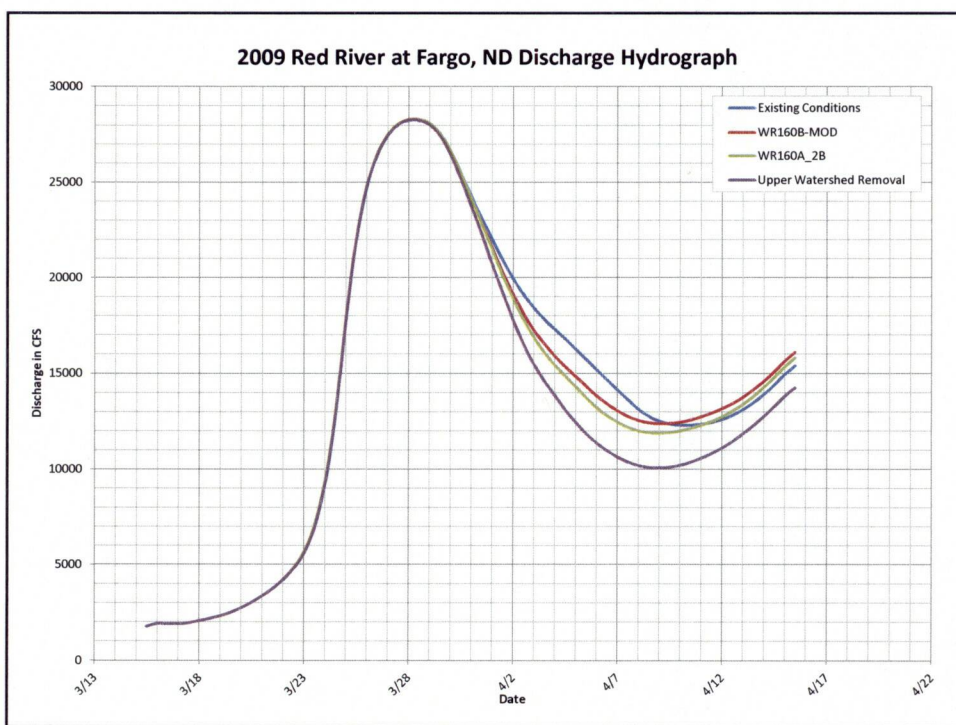
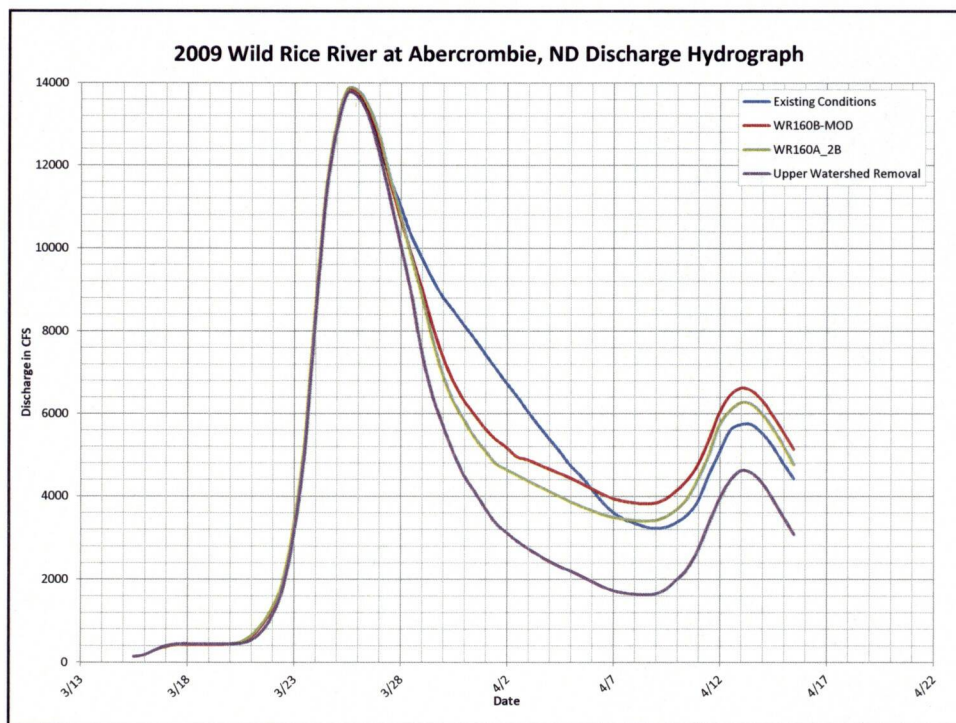
RETENTION LOCATION SELECTED MANTADOR, ND

Wild Rice River Watershed:
2,350 Square Miles

Watershed above Mantador:
1,540 Square Miles (66%)



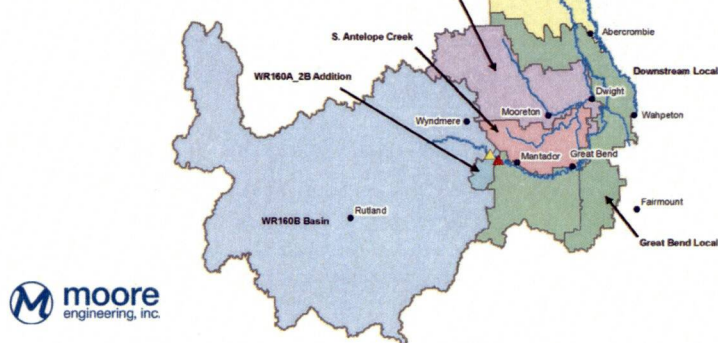




2009 HEC-RAS MODELING

Sensitivity Analysis -

removing sub-watersheds from the model



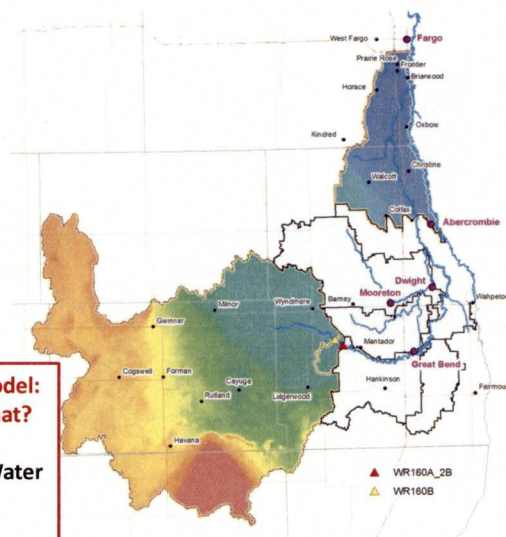
2009 FLOOD SENSITIVITY ANALYSIS

2009 FARGO ANALYSIS:

Scenario	CFS	FEET
Fargo Existing:	28,300	40.6
Upper Removal:	28,300	40.6
Mid Removal:	26,200	39.7
Lower Removal:	27,200	40.1
Entire Removal:	22,300	37.8
2010 Actual	21,200	37.0

**Entire Removal of Wild Rice from the Model:
300,000 AC-FT of Water...How much is that?**

1 Township (36 Sections)	= 13.0' of Water
2 Townships (72 Sections)	= 6.5'
5 Townships (180 Sections)	= 2.5'
13 Townships (468 Sections)	= 1.0'



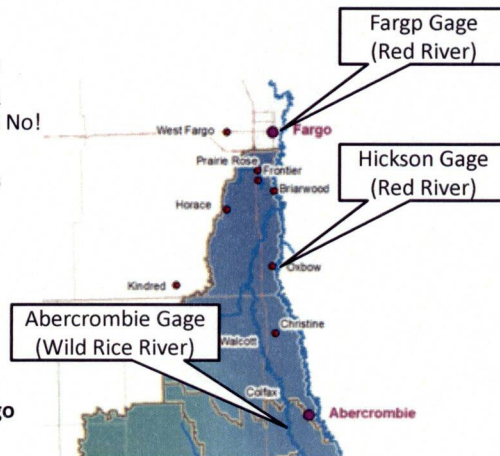
2009 Flood Flows

Wild Rice @ Abercrombie 14,100 cfs
 Red River @ Hickson 23,700 cfs
 Combined Flow at Fargo??? 37,800 cfs No!

Actual Flow at Fargo 29,500 cfs

WHY?

Natural storage (ponding) south of Fargo reduced the flood peak.



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