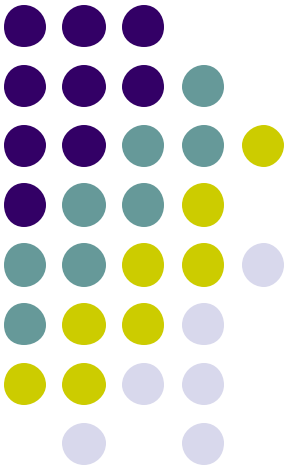
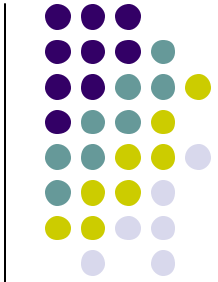
Water for the Red River Valley

The Garrison Diversion, Lake Agassiz Water Authority, and Metropolitan Concerns

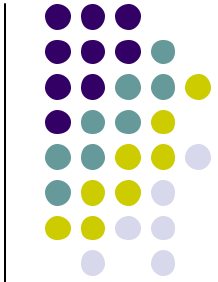


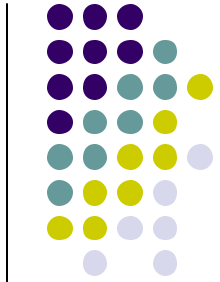
Topics



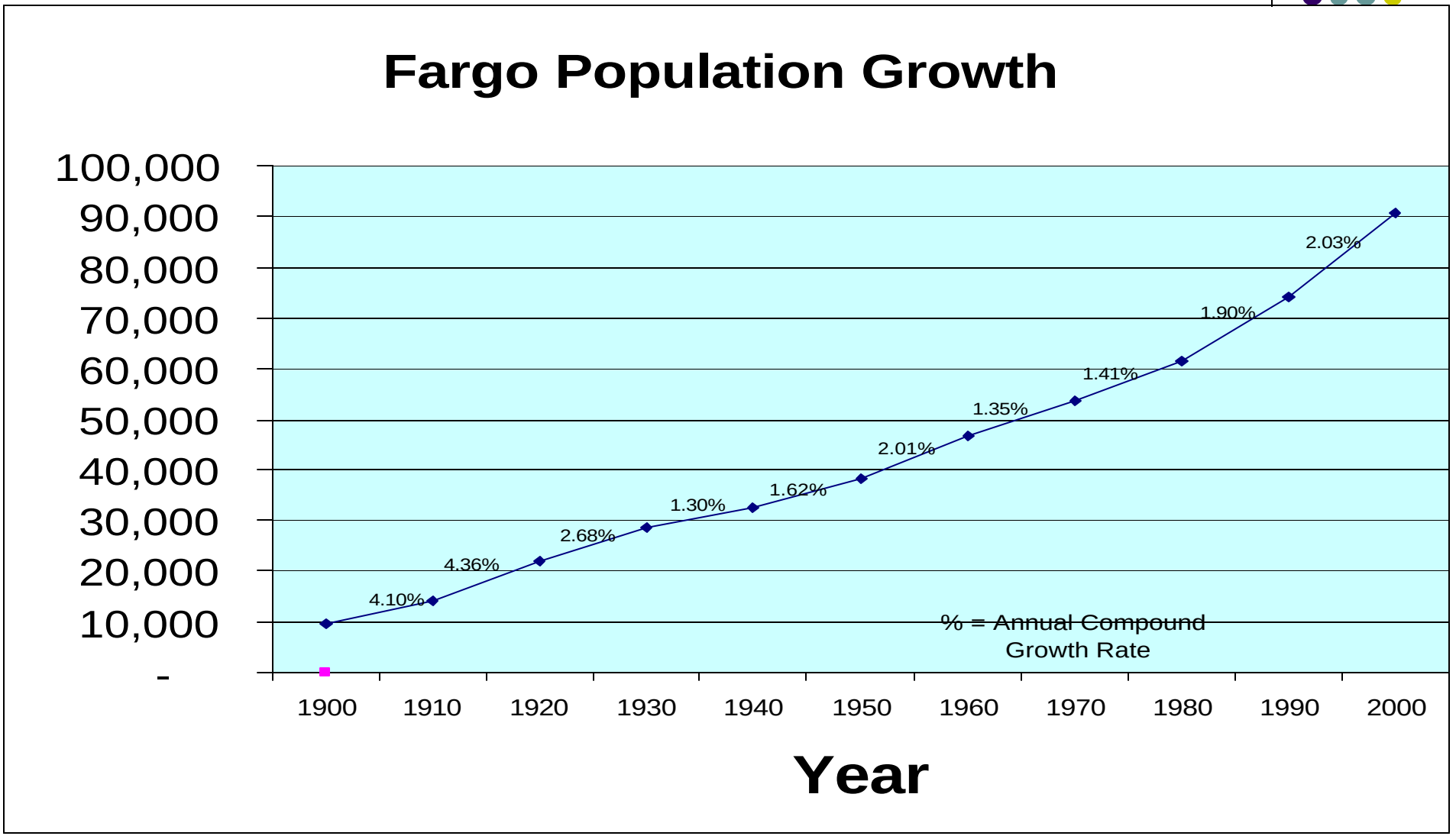
- 2050 population
- Water supply source
- Concerns
  - Quantity of water
  - Biota transfer
  - Irrigation
  - Population estimates
- Water Authority

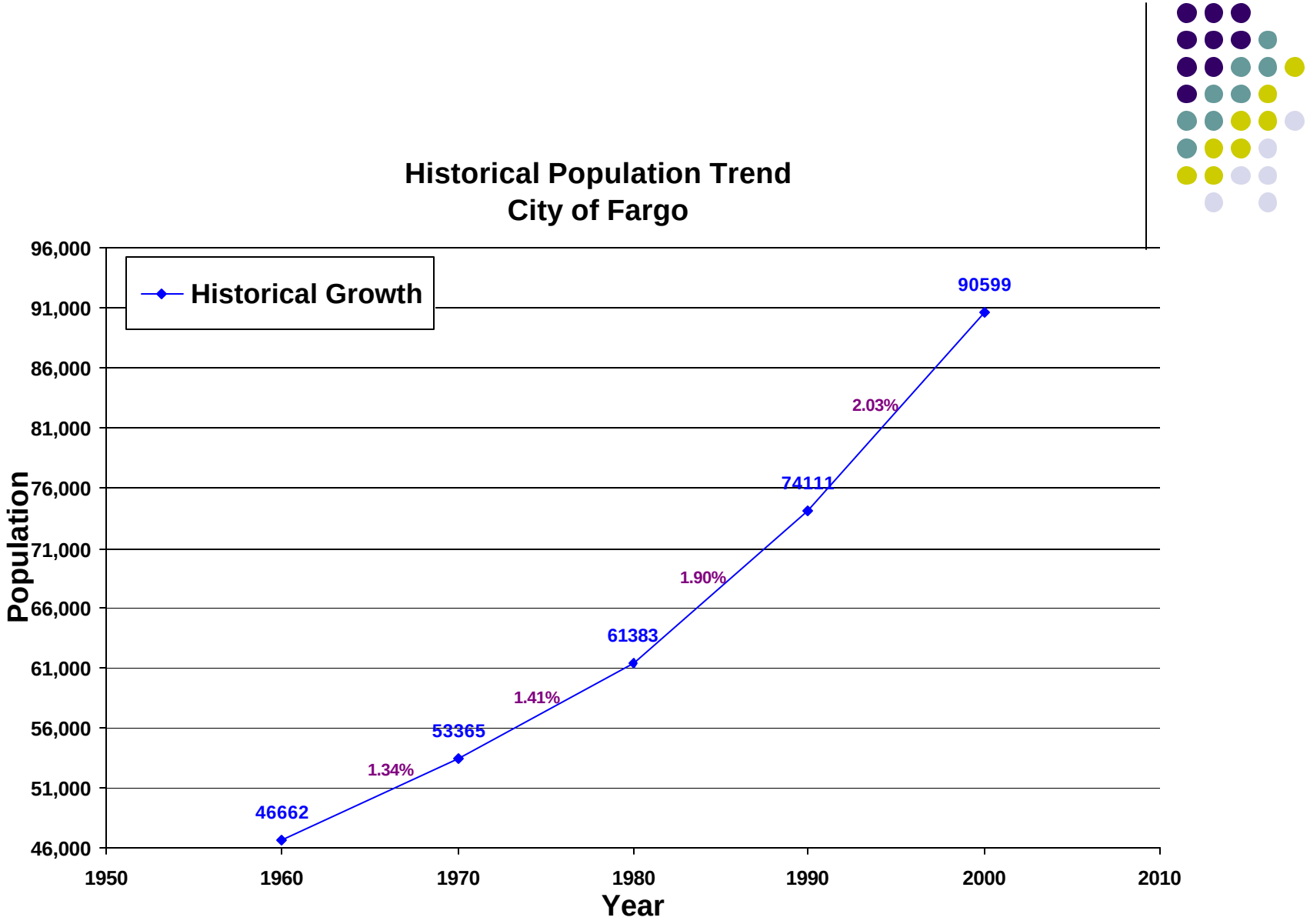
Population Growth

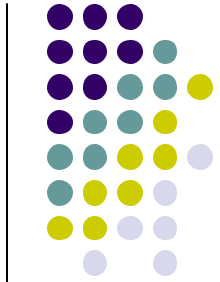




Year	Population	% Increase	Annual Compound Growth Rate
1900	9,589		
1910	14,331	49.45%	4.10
1920	21,961	53.24%	4.36
1930	28,619	30.32%	2.68
1940	32,580	13.84%	1.30
1950	38,256	17.42%	1.62
1960	46,662	21.97%	2.01
1970	53,365	14.37%	1.35
1980	61,383	15.02%	1.41
1990	74,111	20.74%	1.90
2000	90,599	22.25%	2.03


Fargo Population Growth
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
4.10%
4.36%
2.68%
1.30%
1.62%
2.01%
1.35%
1.41%
1.90%
2.03%
% = Annual Compound Growth Rate
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Year


Historical Population Trend
City of Fargo
Historical Growth
Population
Year
96,000
91,000
86,000
81,000
76,000
71,000
66,000
61,000
56,000
51,000
46,000
1950
1960
1970
1980
1990
2000
2010
46662
53365
61383
74111
90599
1.34%
1.41%
1.90%
2.03%



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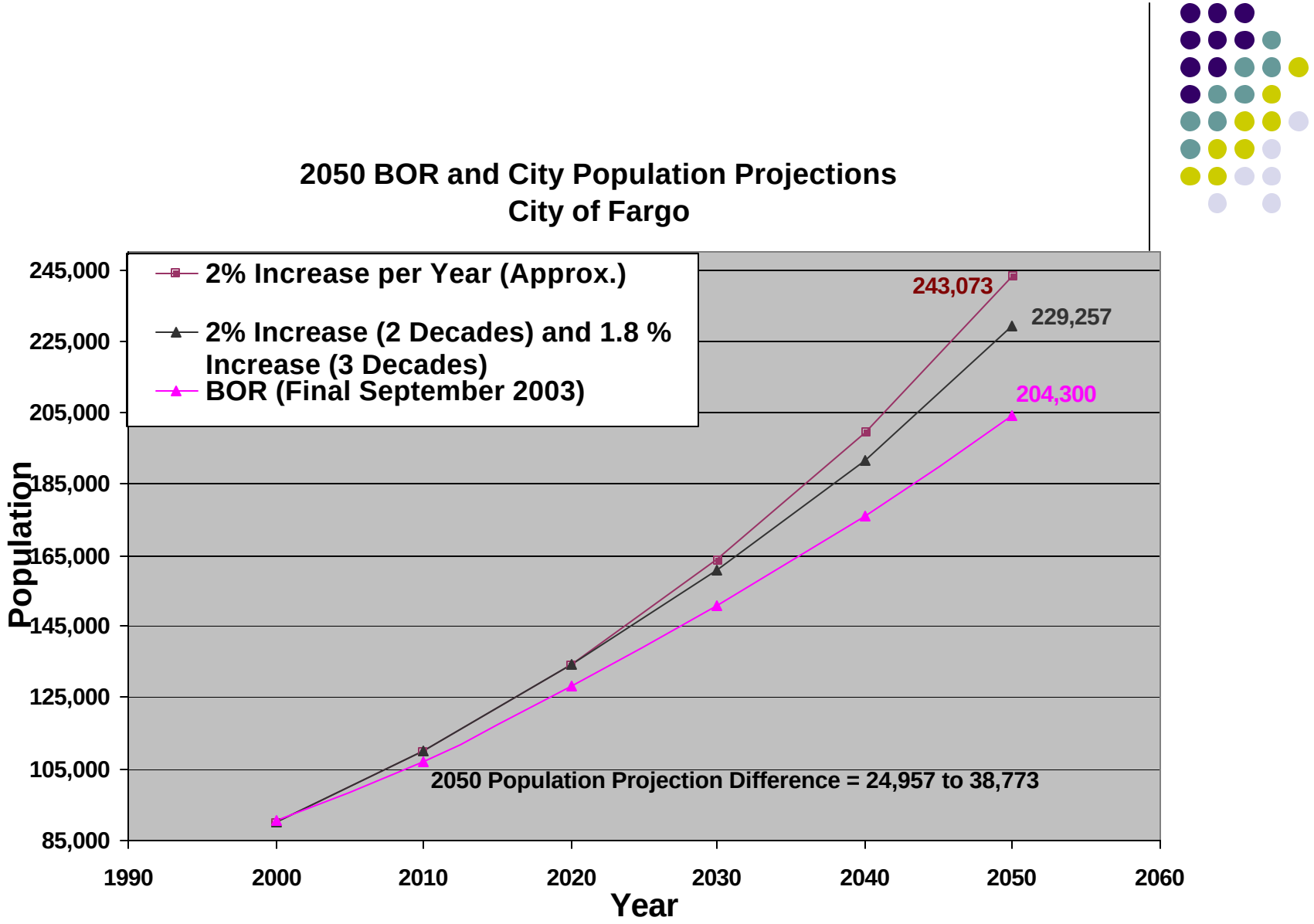
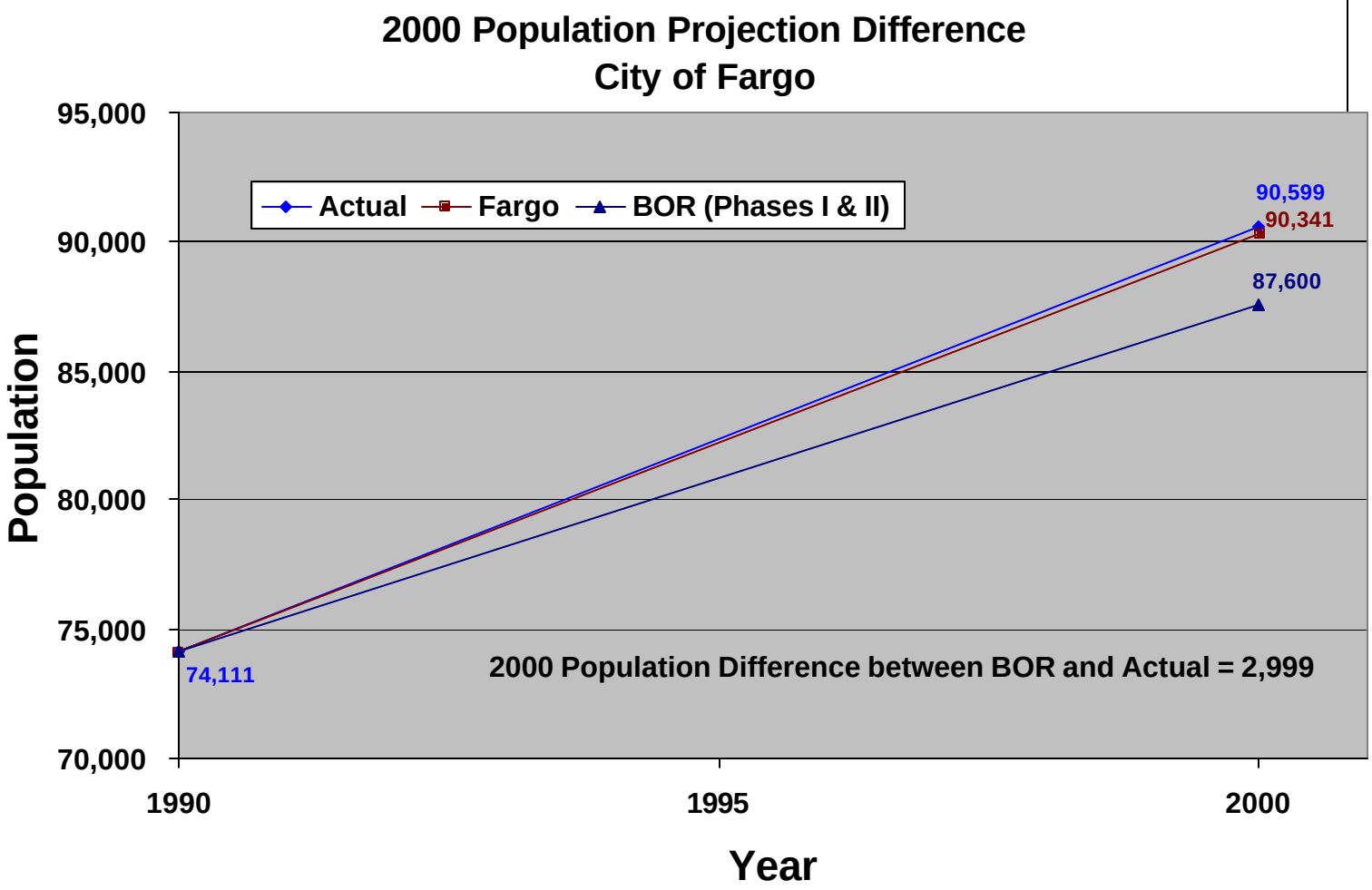
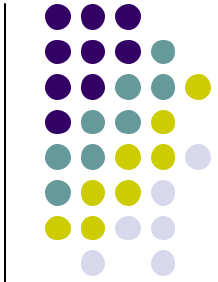
1980	61,383	15.02%	1.41
1990	74,111	20.74%	1.90
2000	90,599	22.25%	2.03
Future Projections			
2010	110,755	22.25%	2.03
2020	135,396	22.25%	2.03
2030	165,519	22.25%	2.03
2040	202,343	22.25%	2.03
2050	247,360	22.25%	2.03

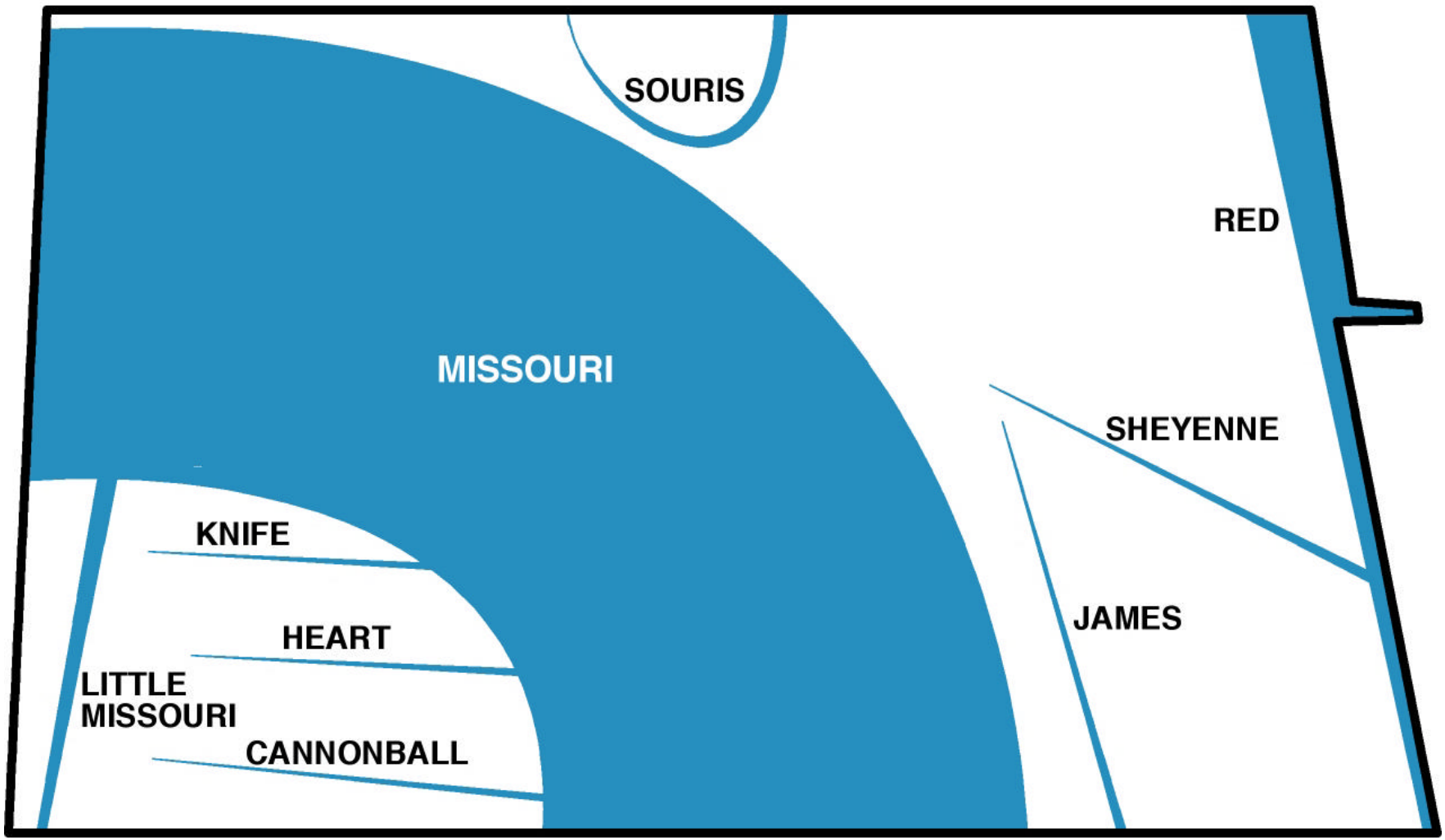

2050 BOR and City Population Projections
City of Fargo
2% Increase per Year (Approx.)
2% Increase (2 Decades) and 1.8 % Increase (3 Decades)
BOR (Final September 2003)
243,073
229,257
204,300
2050 Population Projection Difference = 24,957 to 38,773
Population
245,000
225,000
205,000
185,000
165,000
145,000
125,000
105,000
85,000
1990
2000
2010
2020
2030
2040
2050
2060
Year


2000 Population Projection Difference
City of Fargo
95,000
90,000
85,000
80,000
75,000
70,000
Population
Actual
Fargo
BOR (Phases I & II)
90,599
90,341
87,600
74,111
2000 Population Difference between BOR and Actual = 2,999
1990
1995
2000
Year

Water Supply Source



Average Discharge of Principal Rivers in North Dakota



History of the Garrison Diversion

1945 - Pick/Sloan Missouri Basin Program

- Dams and Hydropower structures constructed on Missouri River from Montana to Missouri
- Garrison Conservancy District established in North Dakota
- Land area the size of Rhode Island flooded in North Dakota
- 1.275 million acres pledged for irrigation in state

1965 - Garrison Diversion was reauthorized by Congress

- Water systems and Hydropower funded
- Municipal, Rural, and Industrial [MR&I] grant program developed in state
- Tribal water development funded
- 1,000,000 acres pledged for irrigation in state

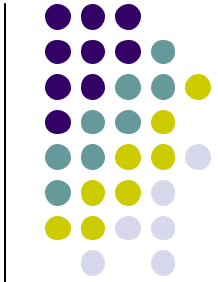
1986 - Garrison Diversion Reformulation Act

- MR&I refunded to $200 million
- Environmental Concerns addressed
- 100 cfs of water authorized for Eastern North Dakota
- 130,000 acres pledged for irrigation in state

2000 - Dakota Water Resource Act

- MR&I refunded to $200 million
- Tribal water funded to $200 million
- $200 million authorize for Eastern North Dakota water supply
- 75,000 acres pledged for irrigation in state

2000 DWRA Steps to Securing Water for Red River Valley



A requirement of the Dakota Water Resource Act before federal funds could be obligated for the Eastern North Dakota Water Supply project is the undertaking of a Needs and Options study and an Environmental Impact Statement analysis on the options.

<u>Lead Agencies for the study and EIS</u>

- Bureau of Reclamation
- State of North Dakota [represented by Garrison Conservancy District]

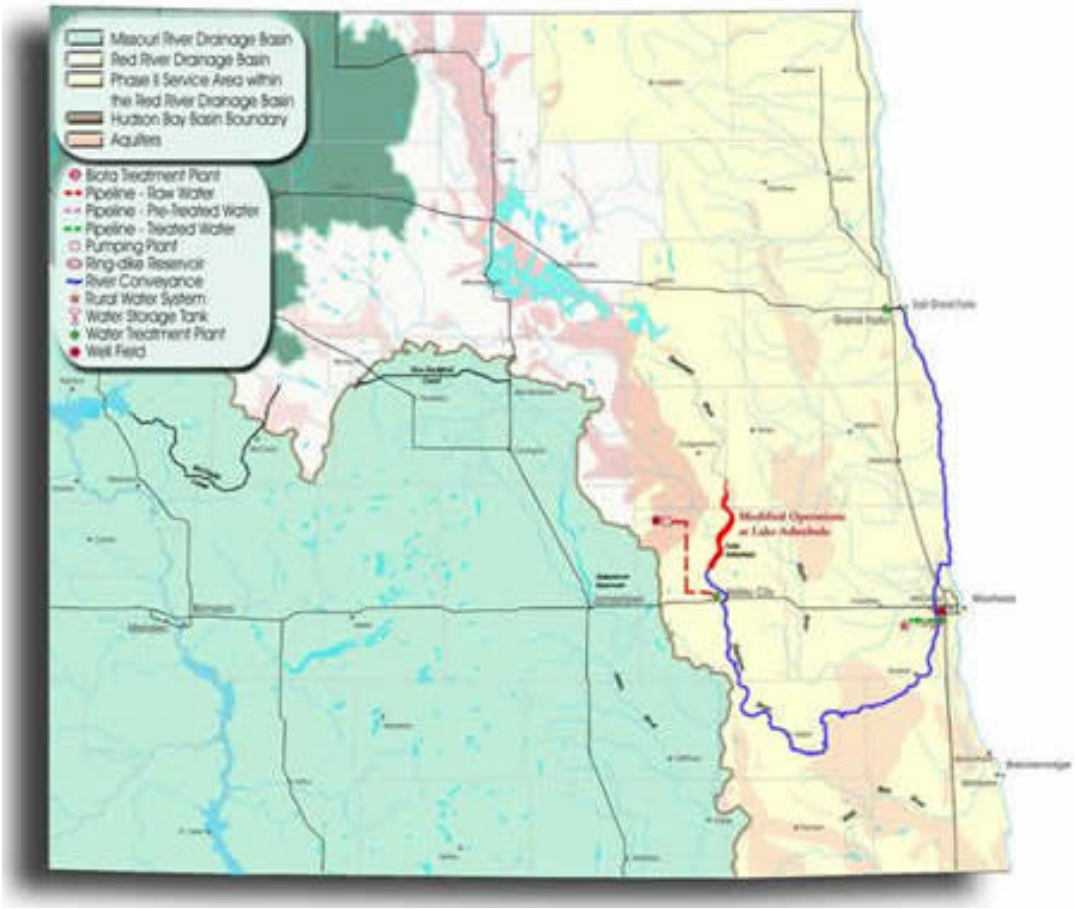
<u>Cooperating Agencies</u>

- Fargo, Moorhead
- State of ND
- Historical Society
- Game and Fish Dept.
- Health Dept.
- Water Commission
- State of Minnesota
  - Dept. of Natural Resources
- Federal Agencies
  - Federal Wildlife
  - BOR
  - Corp of Engineers

Needs & Options Study

Potential Solutions - No Action

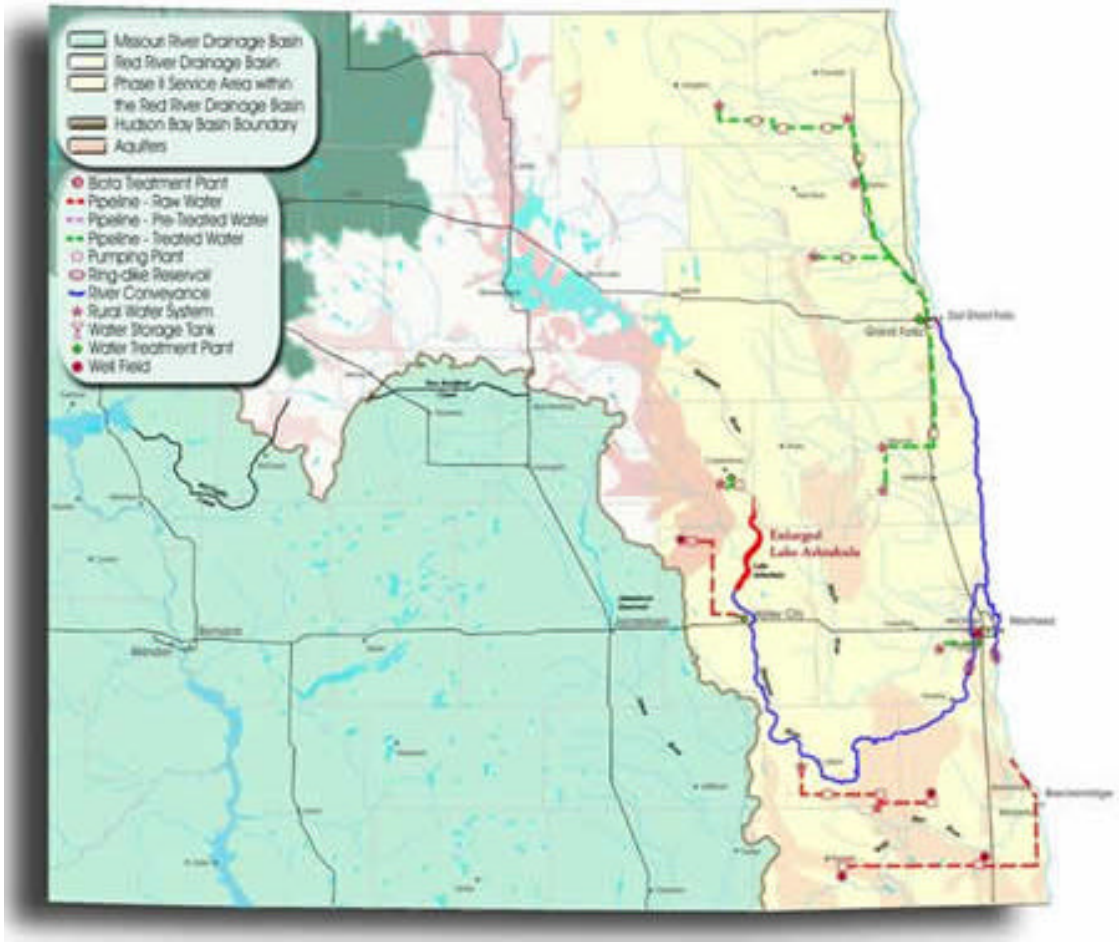
- Red River, Sheyenne River, and tributary conveyance
- Lake Ashtabula existing reservoir storage
- Lake Ashtabula operational plan modification
- Existing groundwater sources
- Water conservation measures
- Small towns connected into nearby rural water systems
- Rural water systems connected to larger bulk water systems
- Water treatment plants - rehabilitation or construction to meet Safe Drinking Water Act standards:
- Construct new water treatment plant to serve Cass Rural Water and West Fargo individually or collectively
- Add capacity to new Grand Forks Water Treatment Plant with potential to serve other regional water needs
- New in-basin water supplies:
- Construct aquifer storage and recovery system(s)
- Develop untapped groundwater sources
- Purchase existing surface water rights
- Purchase existing surface water irrigation rights
- Purchase existing groundwater rights
- Desalination of groundwater



Needs & Options Study

Potential Solutions – In Basin

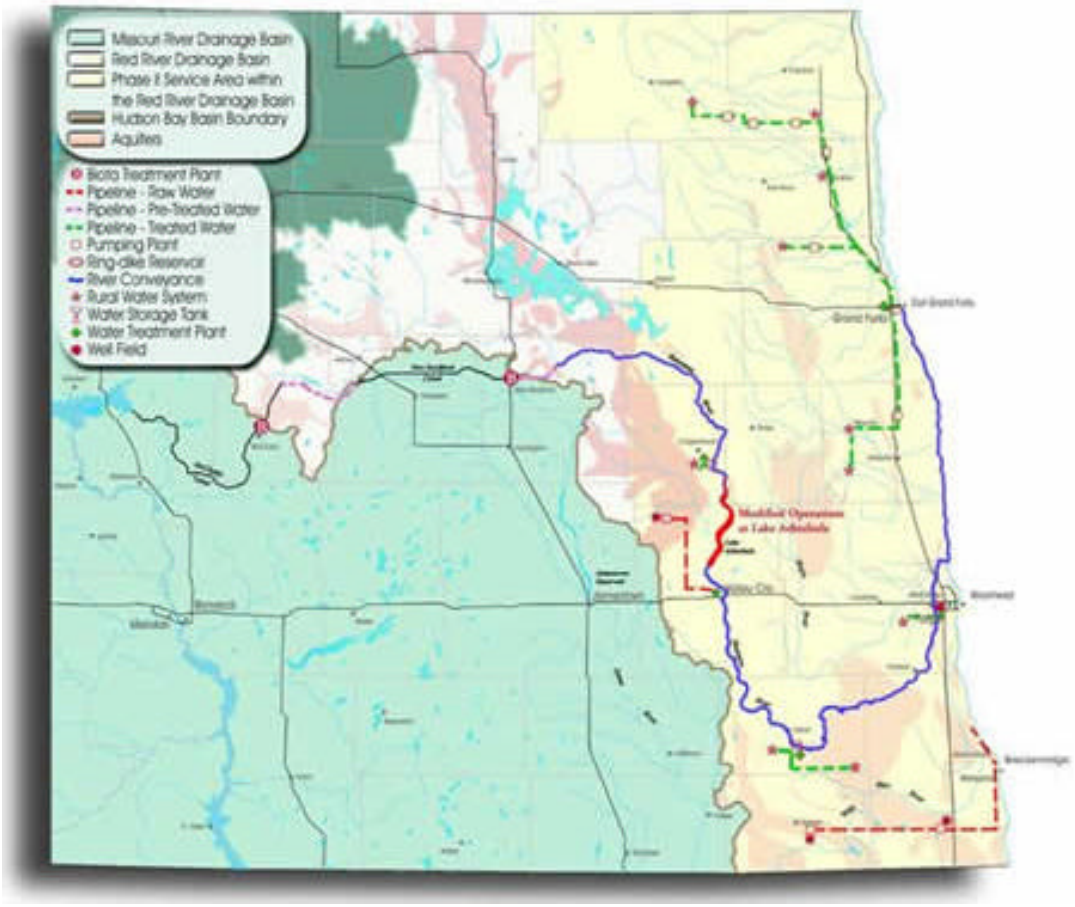
- Red River, Sheyenne River, and tributary conveyance
- Lake Ashtabula existing reservoir storage
- Lake Ashtabula operational plan modification
- Lake Ashtabula modification (105,000 acre-foot reservoir with a 5' surface raise)
- Existing groundwater sources
- Water conservation measures
- Water treatment plants - rehabilitation or construction to meet Safe Drinking Water Act standards:
- Construct new water treatment plant to serve Cass Rural Water and West Fargo individually or collectively
- Add capacity to new Grand Forks Water Treatment Plant with potential to serve other regional water needs
- West Fargo Aquifer storage and recovery
- Well field and pipeline conveyance system from Spiritwood Aquifer to Valley City
- Well field and pipeline conveyance system from Sheyenne Delta Aquifer to the Ransom-Sargent and Southeast rural water systems
- Well field and pipeline conveyance system from Spiritwood, Hankinson, Brightwood, Sonora, and Millnor Channel
- Aquifers to serve industry
- Surface water diversion for Dakota Water Users Rural Water System
- Northern rural water conveyance system from hub at newly constructed Grand Forks Water Treatment Plant
- Ring dikes for storage and to meet peaking requirements
- Desalination of groundwater



Needs & Options Study

Potential Solutions - Biota Treatment, Sheyenne River Import

- Red River, Sheyenne River, and tributary conveyance
- Lake Ashtabula existing reservoir storage
- Lake Ashtabula operational plan modification
- Existing groundwater sources
- Water conservation measures
- Biota water treatment plant
- Pipeline conveyance system from McClusky Canal to New Rockford Canal
- Pipeline spur from end of New Rockford Canal to Sheyenne River
- Water treatment plants - rehabilitation or construction to meet Safe Drinking Water Act standards:
  - Construct new water treatment plant to serve Cass Rural Water and West Fargo individually or collectively
  - Add capacity to new Grand Forks Water Treatment Plant with potential to serve other regional water needs
- West Fargo Aquifer storage and recovery
- Well field and pipeline conveyance system from Spiritwood Aquifer to Valley City
- Well field and pipeline conveyance system from Spiritwood, Hankinson, Brightwood, Sonora, and Millnor Channel
- Aquifers to serve industry
- Surface water diversion for Ransom-Sargent and Southeast rural water systems
- Surface water diversion for Dakota Water Users Rural Water System
- Northern rural water conveyance system from hub at newly constructed Grand Forks Water Treatment Plant



Needs & Options Study

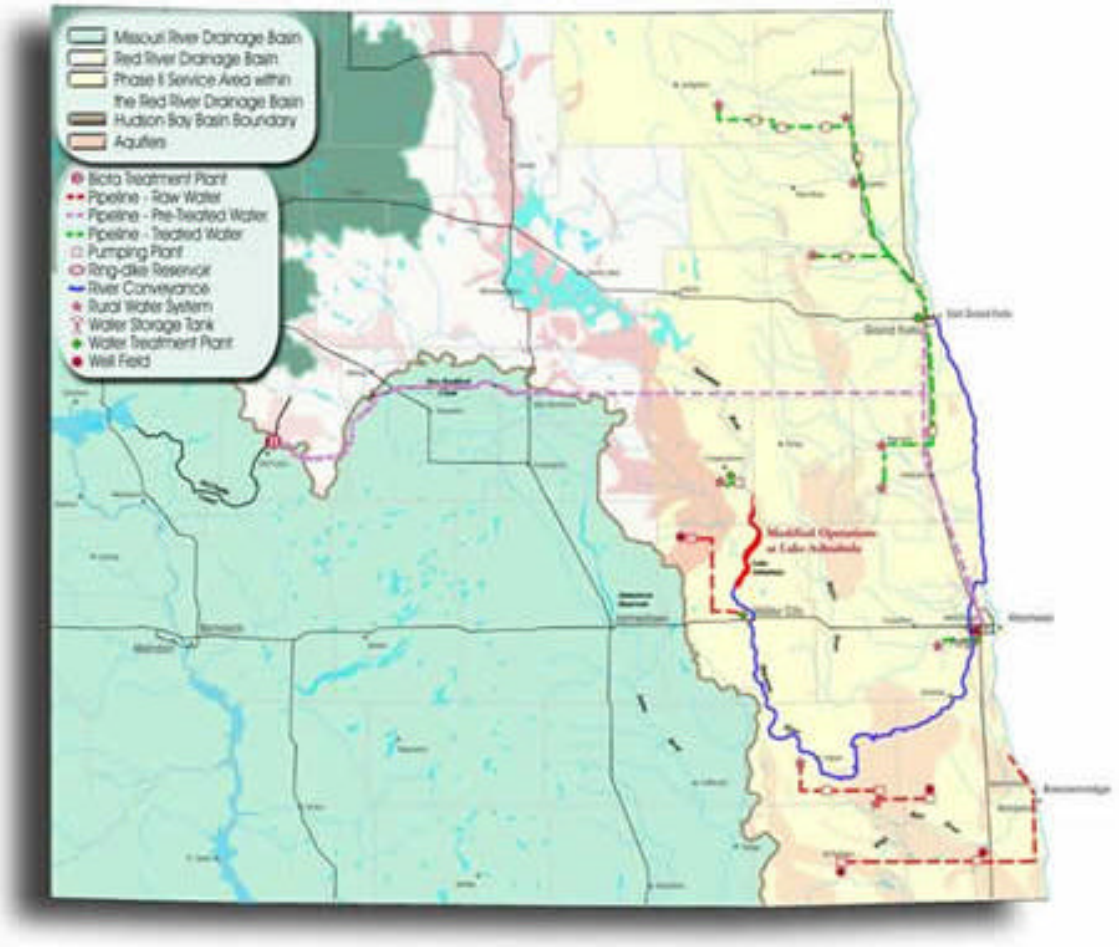
Potential Solutions - Safe Water Drinking Standards, Pipeline Transfer

- Red River , Sheyenne River, and tributary conveyance
- Lake Ashtabula existing reservoir storage
- Lake Ashtabula operational plan modification
- Existing groundwater sources
- Water conservation measures
- Biota water treatment plant
- Pipeline conveyance system from McClusky Canal to Fargo and Grand Forks
- Pipeline replacement of New Rockford Canal

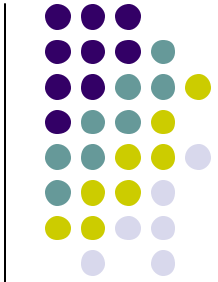
Water treatment plants - rehabilitation or construction to meet Safe Drinking Water Act standards:

- Construct new water treatment plant to serve Cass Rural Water and West Fargo individually or collectively
- Add capacity to new Grand Forks Water Treatment Plant with potential to serve other regional water needs

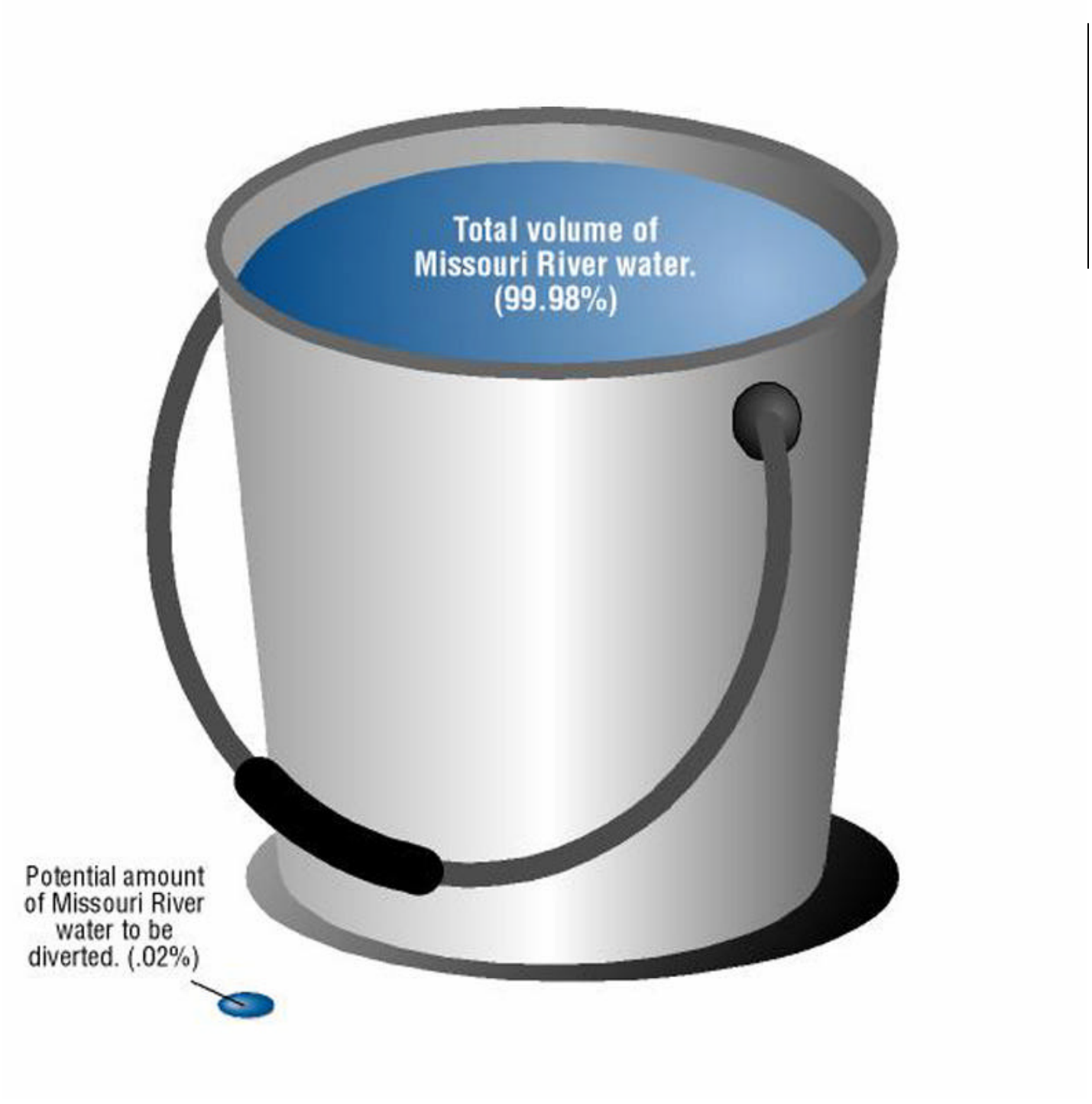
- West Fargo Aquifer storage and recovery
- Well field and pipeline conveyance system from Spiritwood Aquifer to Valley City
- Well field and pipeline conveyance system from Sheyenne Delta Aquifer to the Ransom-Sargent and Southeast rural water systems
- Well field and pipeline conveyance system from Spiritwood, Hankinson, Brightwood, Sonora, and Millnor Channel Aquifers to serve industry
- Surface water diversion for Dakota Water Users Rural Water System
- Northern rural water conveyance system from hub at newly constructed Grand Forks Water Treatment Plant



Concerns



- Quantity of Water
- Biota Transfer
- Irrigation
- Population Estimates


Total volume of
Missouri River water.
(99.98%)
Potential amount
of Missouri River
water to be
diverted. (.02%)

Needs & Options Study and EIS:

Concerns, Decisions & Timelines

Operating assumptions and water use assumptions

- Emergency Supply
- Supplemental Water source
- Daily water source

Needs & Study Options and draft EIS due to be completed in December 2005.

- Environmental community and Canadian government are concerned about biota transfer from Missouri River watershed to Hudson Bay watershed.
- Use of Missouri river water to irrigate land is also a concern for some environmental groups.
- Funding issues will influence final decision.
  - Federal financial involvement requires state and users to reimburse government. However, addressing biota transfer issue is federal responsibility.
  - Is a pipe line to Eastern North Dakota a biota transfer issue or a delivery of water issue?
  - Treatment of Missouri river water at headworks of pipeline to Safe Drinking Water Act standards

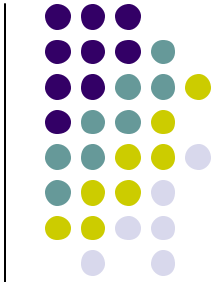
Local Perspective on Need for DWRA Implementation

2050 Municipal Population Projections

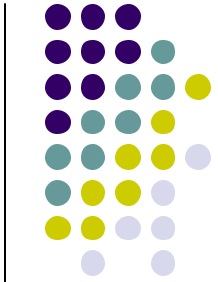
		Source of Population Projections				
		Reclamation	**Northwest Economics Associates**		**Water Users [1]**	**Reclamation**
Municipality	2000 Census	Draft 2050 Population Project (May 2003)	Cohort Comp. Zero Migration	Cohort Comp. Trend Migration	2050 Population Estimate	Reclamation Revised Population Estimates in Response to Comments (August 2003)
Fargo	90,599	167,420	106,386	190,743	243,073	207,100
West Fargo	14,940	27,610	17,343	26,632	34,705	34,400
Moorhead	32,177	35,360	41,758	32,895	58,421	44,200
ND Total	205,450	319,500	231,837	323,969	431,452	380,380
MN Total	43,237	45,400	53,697	43,619	75,641	56,540
Grand Total	248,687	364,900	285,534	367,588	507,093	436,920

[1] Water user population projections were provided by Steve Burian, acting as an engineering representative for the Eastern Dakota Water Users organization in Advanced Engineering and Environmental Services, Inc. letter dated July 18, 2003.

Water Authority

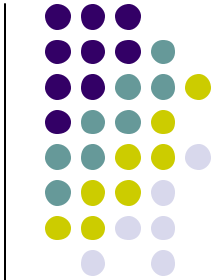


Lake Agassiz Water Authority



- Created during the 2003 legislative session the North Dakota legislature
- 13 eastern most ND counties are members (MN communities are ex-officio members)
- LAWA 9-member board made up of representatives from 5 rural water systems and 4 cities.
- General responsibility of this Authority is to establish policies for the delivery and distribution of water to eastern North Dakota and to develop a cost sharing plan for the reimbursable cost of any project.

Who does what under DWRA?



Federal Government

- Responsible for administration and completion of Options and Needs Study and Environmental Impact Statement
- Assist State of North Dakota in development of project if deemed feasible
- Monitor any project developed

State of ND

- Partnering with BOR to complete Options and Needs Study and EIS.
- Implement and construct water project to Eastern North Dakota
- Participate in cost sharing of project
- Operate and manage treatment and delivery system
- Coordinate with LAWA

Local Govt & LAWA

- Identify most feasible method to treat and delivery water to local entities in a cost effective manner.
- Develop policies on cost sharing of a Eastern North Dakota water project
- Consider options to manage a water treatment and delivery system for Eastern North Dakota water option.