

Lake Sakakawea

10110101

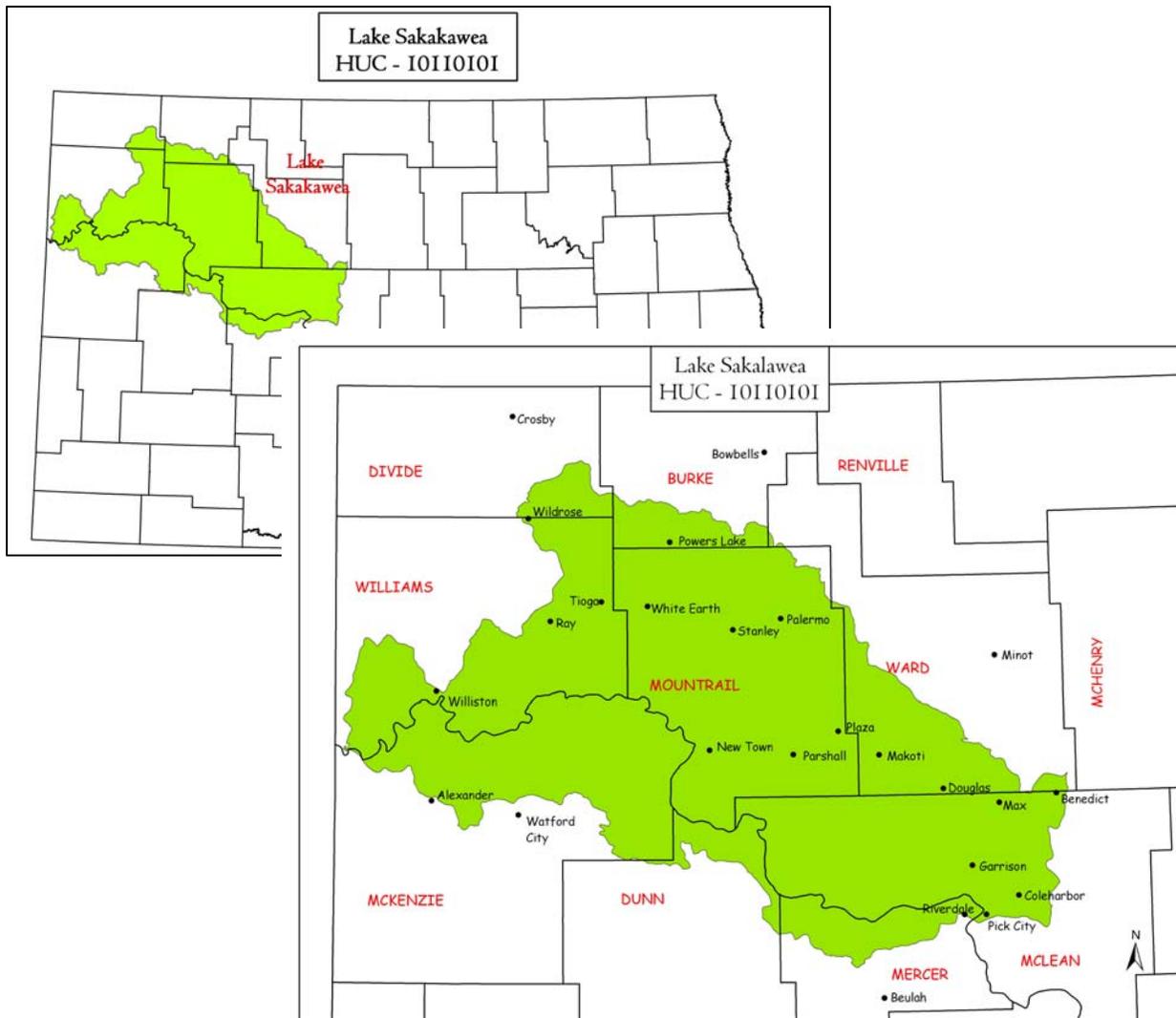
8-Digit Hydrologic Unit Profile

August 2008

Introduction

The Lake Sakakawea 8-Digit Hydrologic Unit Code (HUC) (10110101) sub-basin has approximately 4,184,000 acres in the entire sub-basin. This sub-basin is located within the Missouri Region and the Missouri-Little Missouri Sub-Region. The Lake Sakakawea sub-basin is covering parts of nine counties (Burke, Divide, Dunn, McKenzie, McLean, Mercer, Mountrail, Ward and Williams) in North Dakota. Of the 4,184,000 acres, Mountrail County contains 29%, McLean 19%, McKenzie 16%, Williams 16%, Ward 9%, Mercer 4%, Burke 3%, Divide 2%, and Dunn 2%.

There are approximately 2,396 farms in the sub-basin. The following map shows how the sub-basin is located within North Dakota.



*Produced by
the Natural
Resources
Planning Staff
Bismarck, ND*

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Physical Description

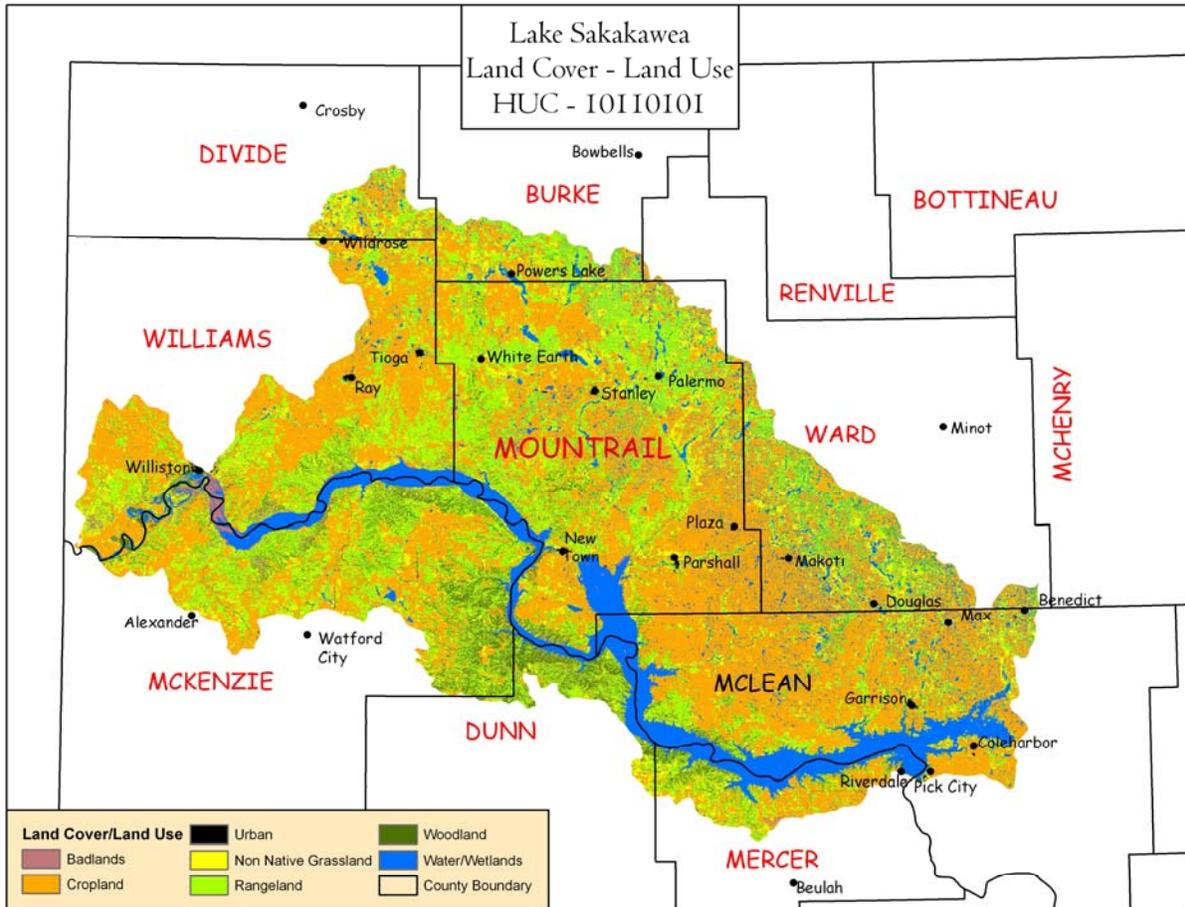
The following table and map show land use / land cover within the sub-basin.

Land Use/ Land Cover (<i>National Resources Inventory [NRI]</i>) ¹	Acres	Percent of HUC
Forestland	21,000	1%
Cropland	1,690,900	40%
Conservation Reserve Program (CRP) Land ² a	228,100	5%
Tame Grass/Hayland	134,300	3%
Pastureland	54,300	1%
Rangeland	1,355,300	32%
Urban/Farmstead/ Transportation Land	195,100	5%
Water/Wetlands	353,200	9%
Federal Lands	151,800	4%
North Dakota HUC Totals ^b	4,184,000	100%
<p><i>* Less than one percent of total acres. See below for special considerations. a: Estimate from Farm Service Agency records and include CRP/CREP. b: Totals may not add due to rounding and small unknown acreages.</i></p>		
Irrigated Land (<i>Farm Services Agency</i>) ³	24,000	<1%

Physical Description – Continued

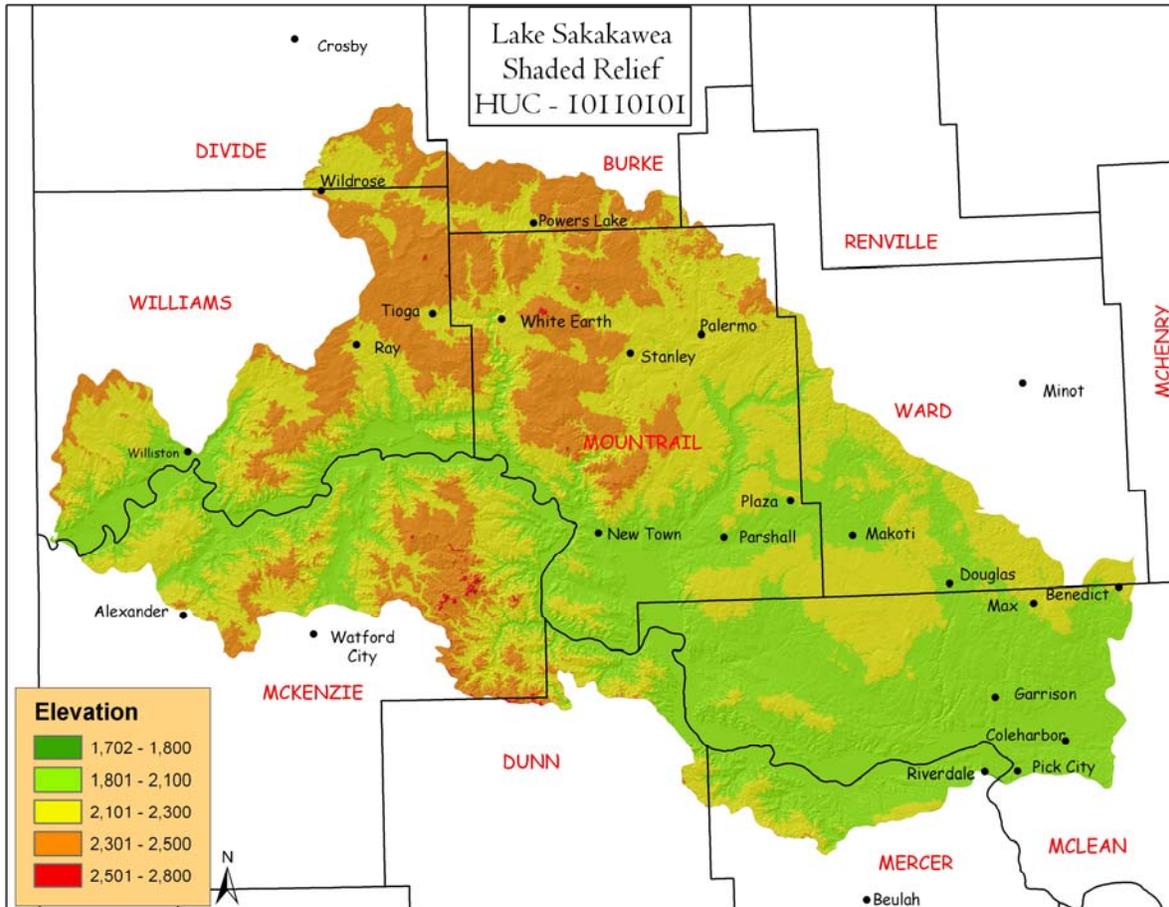
Land Use/Land Cover Map

The map below was developed from U.S. Geologic Survey's (USGS) ND Gap Analysis Program data.⁴



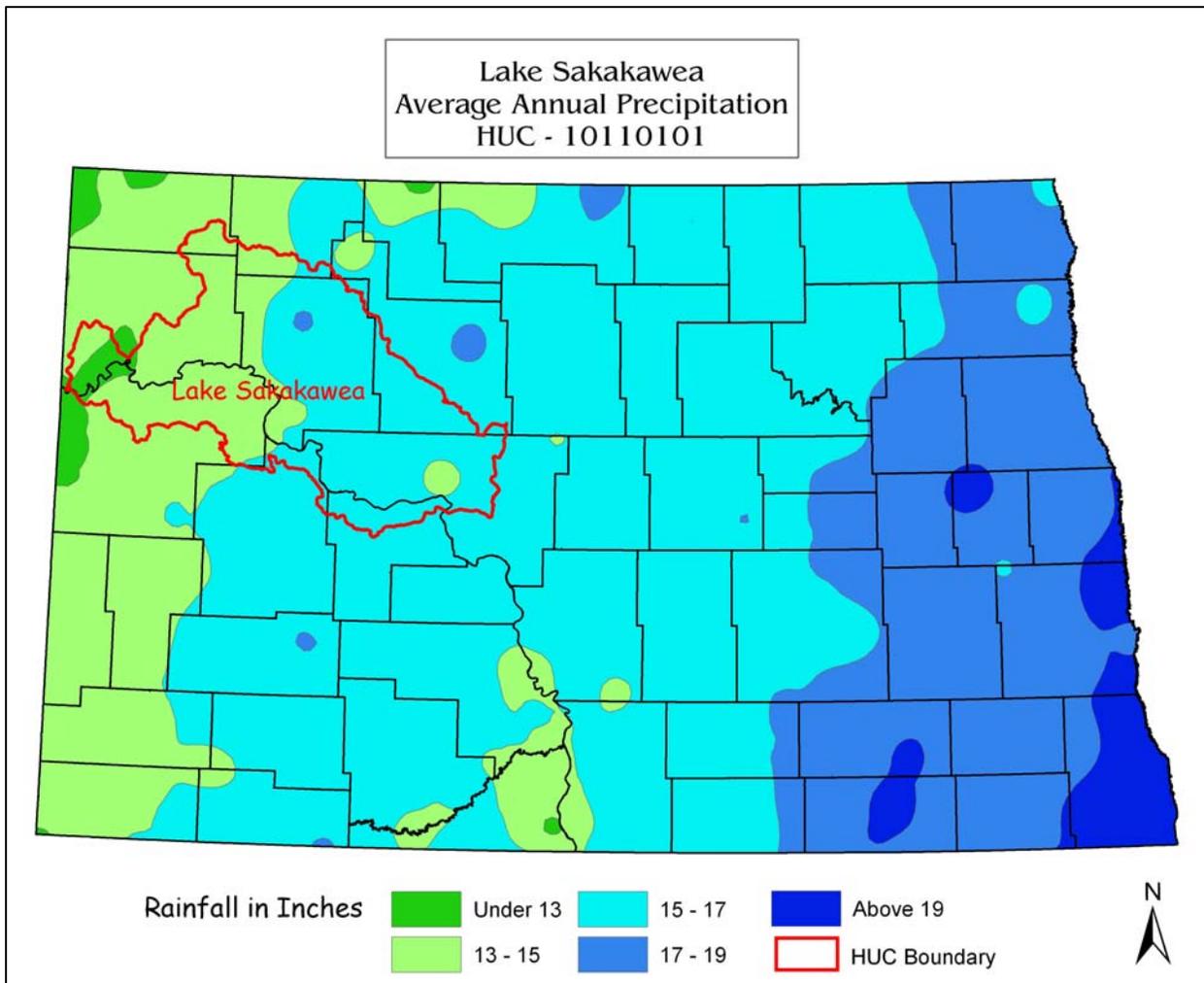
Physical Description – Continued

The sub-basin is part of the Missouri Region. All drainage patterns flow towards and into Lake Sakakawea ending at the Garrison Dam. Once released from the dam it flows south into the Missouri river. The following map shows the relief for the sub-basin.⁵



Physical Description – Continued

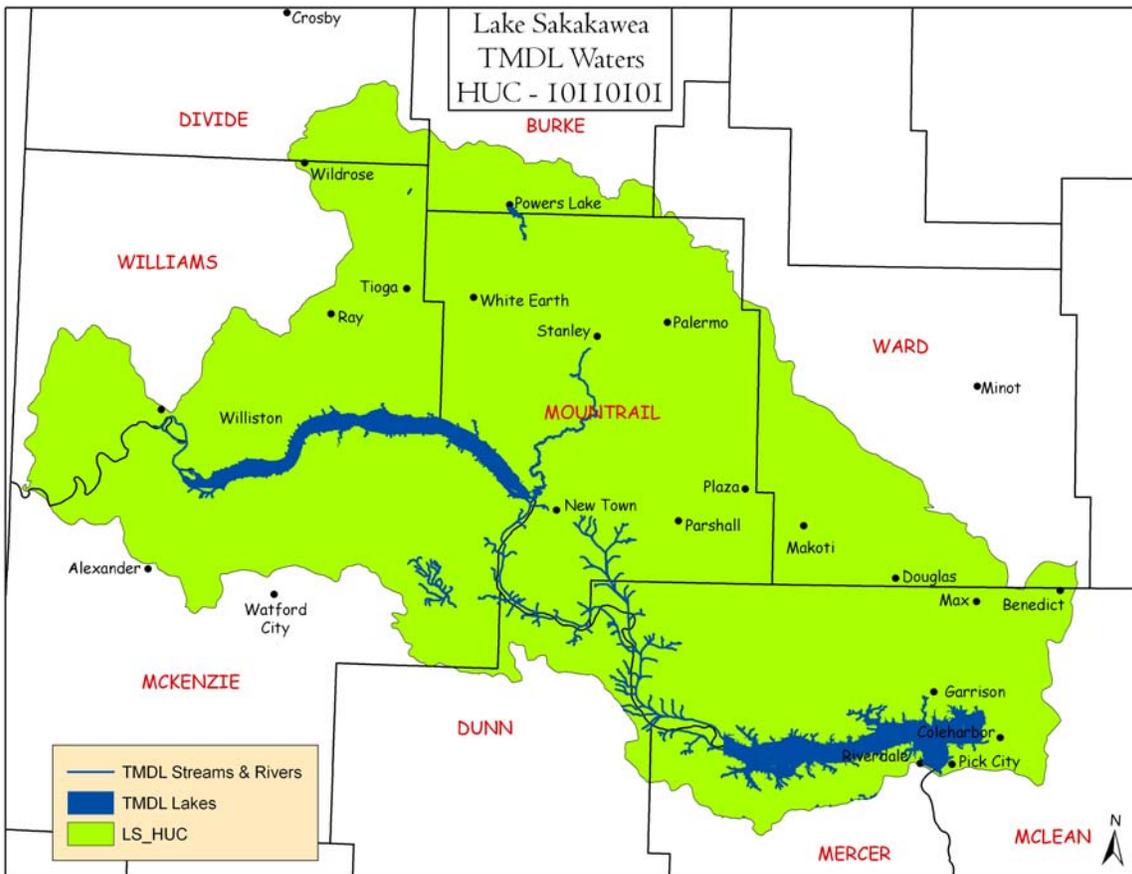
The following map is a plot of 1961-1990 annual average precipitation contours from National Oceanic and Atmospheric Administration (NOAA) Cooperative Stations and (where appropriate) USDA-NRCS Snowpack Telemetry (SNOTEL) Stations. Christopher Daly used the PRISM (**P**arameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel) model to generate the gridded estimates from which this map was derived: the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisberg and Nathaniel DeYoung. Funding was provided by USDA-NRCS National Water and Climate Center. (4/20/98)



Physical Description – Continued

The North Dakota Department of Health collects water quality data on major water bodies. The following table shows the total miles of streams and acres of lakes/reservoirs within the sub-basin and also the miles and acres with a water quality limitation. A map showing the Total Maximum Daily Load (TMDL) waters within the watershed follows the table. TMDL is the amount of a particular pollutant a stream, lake, estuary, or other waterbody can "handle" without violating State water quality standards.

		Units	Lake Sakakawea Sub-basin ⁶	Lake Sakakawea Impaired Water Quality (303d) ⁷	Percent Impaired* Lake Sakakawea
Water Quality Data <i>*Percent of Total Miles and acres in HUC</i>	Total – Major Water Bodies	No.	21	3	14.3
	Rivers/Streams	Miles	4,407.3	87.9	2.8
	Lakes/Reservoirs	Acres	391,469	369,236	99.7



Physical Description – Continued

The following two tables show feeding operations, permitted operations, and livestock numbers. The first table lists the number of animal feeding operations and animals as tracked by the North Dakota Department of Health. The second table shows livestock numbers for all cattle, beef cows, dairy cows, swine, and sheep and lambs. These livestock numbers were extrapolated from 2002 Agricultural Census county data to 8-digit HUC's.

Animal Feeding Facilities – North Dakota Department of Health Permit⁸					
Animal Type	Dairy	Beef	Swine	Other	Total
Number of Animal Feeding Operations	5	16	1	5	27
Number of Animals	2,259	5,462	640	2,603	10,964
Number of State Permitted Operations					19

Livestock Numbers (rounded to nearest 100)⁹					
	Cattle and Calves	Beef Cows	Dairy Cows	Hogs and Pigs	Sheep and Lambs
North Dakota	1,873,200	982,300	34,500	138,800	114,000
Lake Sakakawea	141,000	81,900	1,100	6,300	5,200
Lake Sakakawea as a percent of North Dakota	7.5%	8.3%	3.2%	4.5%	4.6%

Physical Description – Continued

Common Resource Areas (CRAs) are geographical areas where resource concerns, problems, or treatments are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information were used to determine the geographic boundaries. CRAs are subsets of Major Land Resource Areas. The following map¹⁰ shows the CRAs for Lake Sakakawea sub-basin. Descriptions of each CRA are included.

53A.1 - Northern Dark Brown

Glaciated Plains: The Northern Dark Brown Glaciated Plains are gently undulating low relief till plains with many knobs and temporary and seasonal wetlands. The soils are mainly medium textured, well drained, and have a frigid temperature regime. Most of this area is in farms and ranches. Average annual precipitation is 11.8 to 13.7 in. Average annual temperatures is 37.4 to 41 degrees F. Average freeze free period is 90 to 120 days.

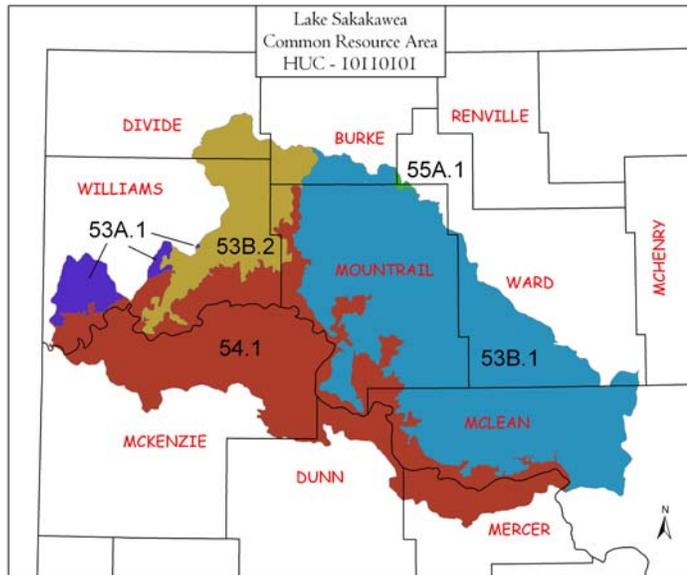
53B.1 - Central Dark Brown

Glaciated Plains: The Central Dark Brown Glaciated Plains are nearly level to rolling with steeper areas along rivers. Land use is a mosaic of cropland and rangeland. Soil textures are dominantly loamy in glacial till, sandy in outwash areas, and clayey in lacustrine areas. Most soils are moderately deep or deep, well drained or moderately well drained, and have a frigid temperature regime.

53B.2 - Central Dark Brown Dry Glaciated Plains: The Central Dark Brown Dry Glaciated Plains are nearly level to steep. This region marks a transition to drier conditions than the glaciated plains to the south. Land use is a mosaic of cropland and rangeland. Soil textures are dominantly loamy in glacial till, sandy in outwash areas, and clayey in lacustrine areas. Most soils are moderately deep or deep, well drained or moderately well drained, and have a frigid temperature regime.

54.1 - Rolling Soft Shale Plain: The Rolling Soft Shale Plain is a semiarid rolling plain with soils formed from shale, siltstone, and sandstone. Native grasses cover areas of steep or broken topography, while cultivated and forage crops dominate other parts of the landscape. Most soils are moderately deep and deep, well drained and moderately well drained, loamy and clayey and have a frigid temperature regime. The area was largely unaffected by glaciation and retains a moderately dissected stream drainage pattern.

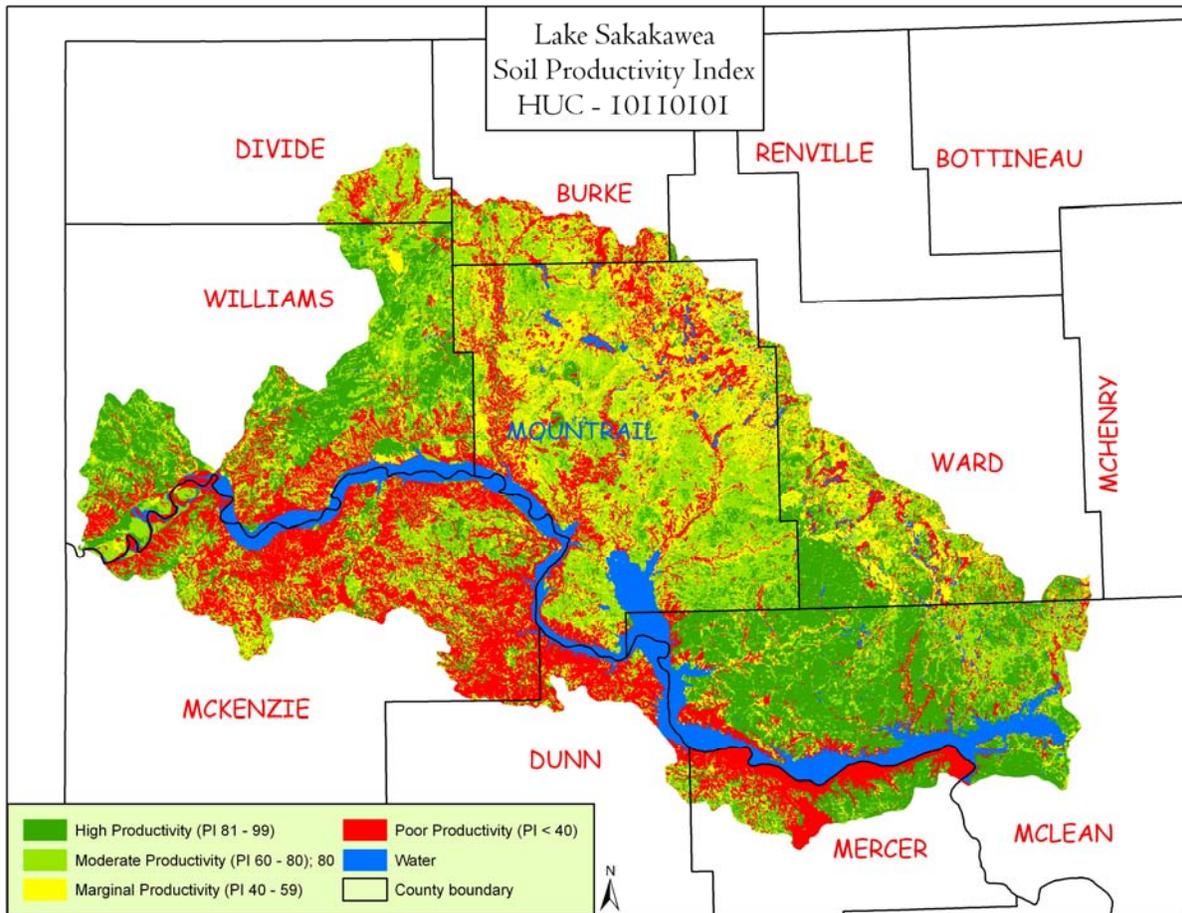
55A.1 - Northern Black Glaciated Drift Plain: The Northern Black Glaciated Drift Plain is a nearly level to undulating landscape composed of glacial till and lacustrine sediments. Temporary and seasonal wetlands are numerous throughout the area. Agriculture is limited by a very short growing season and the coldest January temperatures in Northern Plains.



Soil Productivity ¹¹

The area immediately adjacent to and southwest of the Missouri River have soils that show a poor productivity index (PI). These poor PIs are caused by steepness and undesirable chemical and physical properties of the soil. The exception being the north side of Lake Sakakawea from about ten miles west of Garrison to the eastern boundary of the watershed. These soils have generally high to moderate soil productivity. The area of high productivity extends north of Garrison to Benedict, across to Max, Douglas, Makoti, Parshall, and back south to Lake Sakakawea. These soils are medium textured and nearly level to gently rolling. The northeastern border and central portion of the sub-basin have marginally to poorly productive soils because of undesirable chemical and physical.

The term "Productivity Index" used in this document reflects soil properties and the inherent production capacity of the soil to produce spring wheat.



Common Land Unit

The entire sub-basin has the common land unit digitized by Farm Services Agency (FSA).



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Resource Concerns

One of the goals of NRCS is to help quantify the types and amounts of resources that may be of concern in an area. This helps identify priority areas for the types and amounts of assistance provided to a particular watershed.

The following table shows the different projects, plans, studies, and assessments conducted within the sub-basin.

Watershed Projects, Plans, Studies and Assessments			
NRCS Watershed Projects		NRCS Watershed Plans, Studies & Assessments	
Name	Status	Name	Status
Shell Lake Watershed	Plan completed – no implementation	East Fork Shell Creek Flood Plain Management Study	Completed
Muskrat Lake Watershed	Completed 2006	McGregor Watershed and Stream Assessment	Completed 2004
NDDH TMDLs		Soil Conservation District Assessments and Studies	
Number Listed		Name	Status
Lakes/Reservoirs - 3	Streams – 2	McGregor Dam TMDL Assessment	Completed
		Powers Lake Watershed Restoration Action Strategy	Completed
EPA 319 Watershed Projects			
Name		Status	
Powers Lake Watershed		Active	

The most common resource concerns are associated with the Soil, Water, Air, Plants, Animals (SWAPA).

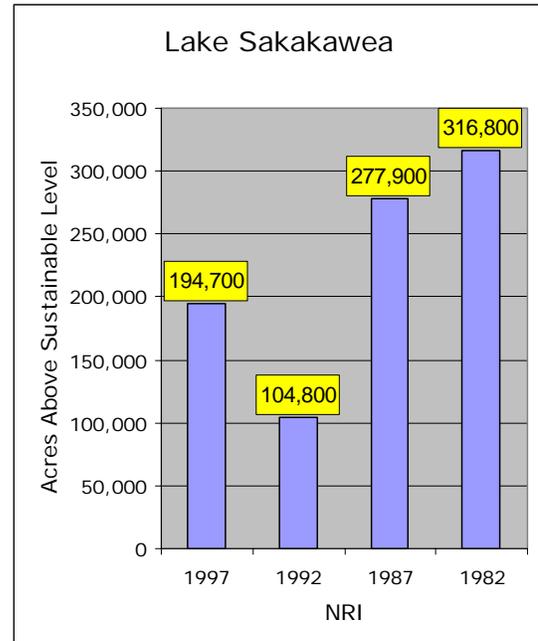
Soil

- The HEL cropland acreage experiencing erosion rates above sustainable levels decreased to 377,100 acres in 1997, as compared to 512,100 acres in 1972.
- Controlling erosion not only sustains the long-term productivity of the land, but also affects the amount of soil, pesticides, fertilizer, and other organic material that move into the basin's waters.
- NRI estimates indicate that there was a 26 percent reduction from 1987 to 1997 in the amount of Highly Erodible Land (HEL) being farmed.

Resource Concerns - Continued

Soil

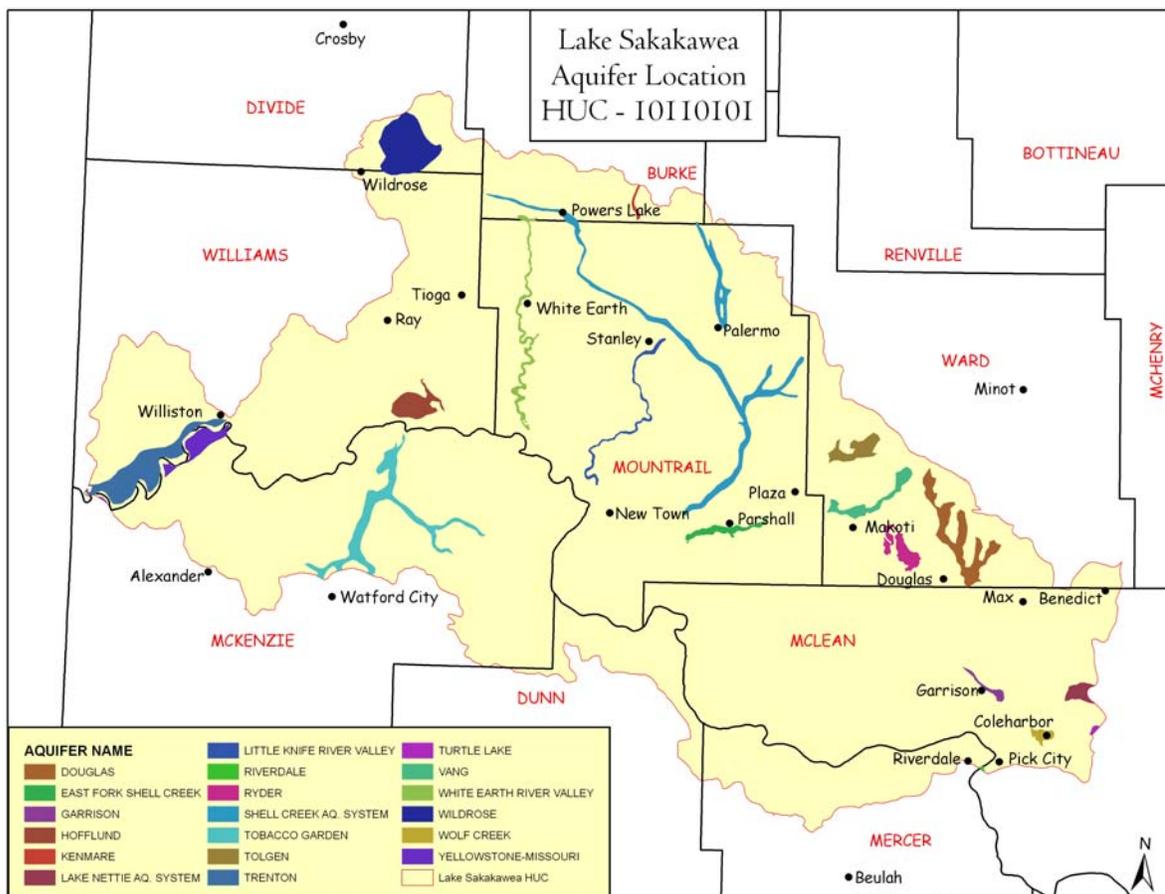
- Through NRCS programs many farmers and ranchers have applied conservation practices to reduce the effects of erosion. From 1982 to 1997, the average wind erosion rate reduced from 5.7 tons/acre/year to 2.8 tons/acre/year on all cultivated cropland. The average water erosion rate reduced from 2.9 tons/acre/year to 1.8 tons/acre/year on cultivated cropland.
- NRI estimates indicate 253,400 acres of the subbasin agricultural lands had wind erosion rates above a sustainable level in 1997.
- NRI also estimates indicate 105,500 acres of the subbasin agricultural lands had water erosion rates above a sustainable level in 1997.
- Conservation practices that can be used to address these soil erosion issues include grazing management, erosion control, nutrient and ag waste management, and riparian buffers.
- Sandy soils and irrigated soils still require conservation practices to control excessive soil erosion.
- Soil health, especially compaction on silty and clayey soils and organic matter on sandy soils.
- Soil erosion and low organic matter remain resource concerns.
- Windbreak plantings, reduced tillage systems, and improved cropping systems are still needed.



Resource Concerns - Continued

Water

- **Aquifers**¹² - There are nineteen glacial drift aquifers (Douglas, East Fork Shell Creek, Garrison, Hofflund, Kenmare, Lake Nettie Aquifer System, Little Knife River Valley, Riverdale, Ryder, Shell Creek Aquifer System, Tobacco Garden, Tolgen, Trenton, Turtle Lake, Vang, White Earth River Valley, Wildrose, Wolf Creek, Yellowstone-Missouri) underlying the Lake Sakakawea sub-basin.

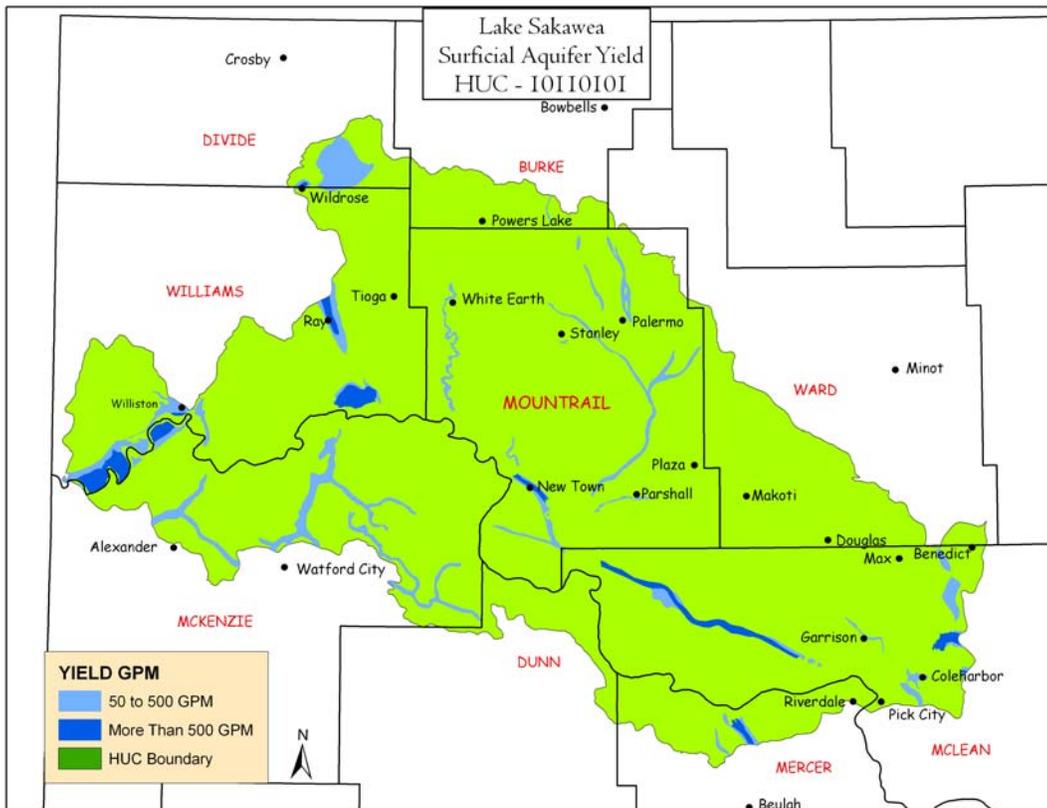


- **Wellhead Protection Areas**¹³ – Nine protection areas are located in the sub-basin. They are designated to protect the municipal water supply for the cities of Benedict, Powers Lake, Ross, Plaza, New Town, Ray/Tioga, Wildrose, Makoti, and Ryder.
- There are seven **Surface Water – Dependent Public Water Systems** within the HUC. All seven systems obtain their water from intake systems located on Lake Sakakawea.

Resource Concerns - Continued

Water - Continued

- Aquifers–Surficial** – The map below is a summary of the major glacial-drift aquifers and their potential Gallon Per Minute (GPM) yield as described in the county ground water reports. These aquifers are considered to have the greatest potential for yielding significant quantities of water for municipal, industrial, and agricultural purposes.



- Two reservoirs on the 303(d) listed in hydrologic unit code 010110101 are listed for dissolved oxygen, two are listed for nutrient/eutrophication biological indicators, and two listed for sedimentation/siltation.
- Conservation practices that can be used to address these water quality issues include grazing management, erosion control, nutrient and Ag waste management, and riparian buffers.
- Lack of adequate riparian buffer width and health are impacting water quality and stream health.
- Spring flooding happening nearly every year effects transportation, infrastructure and crop seeding dates.



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Resource Concerns - Continued

Water - Continued

- Water erosion from occasional summer flooding impacts crop production.
- Water conservation and water quality (potential for pesticide and nutrient contamination) are issues on irrigated cropland.

Air

- Visibility is reduced during winter months from blowing snow.
- Increased wind speeds due to tree/shelterbelt removal.
- Several coal fired electrical generating plants and one coal gasification plant are located within or within near proximity of the sub basin.

Plants

- Major concerns are with controlling invasive weeds and maintaining good rangeland and hayland condition.
- Direct seeding of corn and soybeans has been successful in some locations.
- Conventional tillage systems are still utilized, especially with canola, corn, dry beans, and sun flowers.
- Noxious weeds and poor range condition are reducing productivity for livestock and wildlife.
- Season long grazing on or near water courses are a concern.
- The private, non-industrial forestland is associated with small woodlots or rural home sites and forested riparian areas which are not actively managed for timber production.

Animals

- Animals that are threatened and endangered can be seen in the following table of threatened and endangered species.

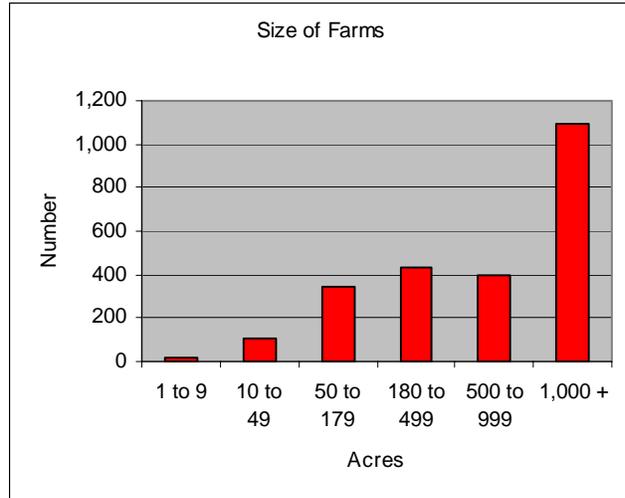
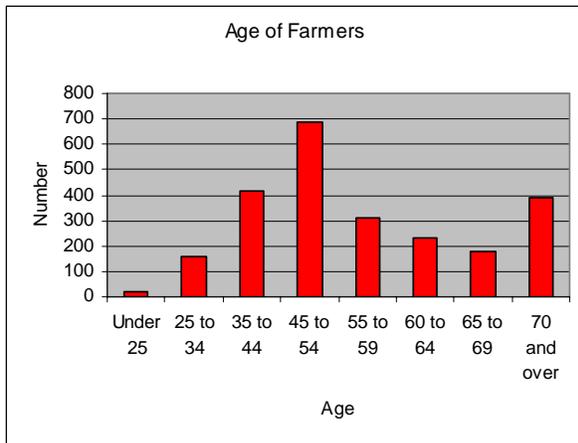
Federally Listed Threatened And Endangered Species			
Species Category	Threatened	Endangered	Candidate
Mammals	None	Black-footed Ferret Gray Wolf	None
Birds	Piping Plover	Whooping Crane Interior Least Tern	None
Fish	None	Pallid Sturgeon	None
Invertebrates	None	None	Dakota Skipper
Plants	None	None	None
Critical Habitat – Piping Plover			

Census and Social Data¹⁴

Number of Farms: 2,396

Number of Operators:

- Average Age: 54
- Full-Time Operators: 73%
- Part-Time Operators: 27%



Limited Resource and Beginning Farmer

Approximately 8.0 percent of the operators are minority producers. Limited Resource Farmers are also estimated at 8.8 percent. Although rather low percentages, these facts point to the potential need for special technical assistance targeted to reach people who (1) may lack experience with government farm programs, (2) have good stewardship intentions but lack management skills, and (3) lack the time to visit an NRCS field office and seek assistance.

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References

- ¹ USDA-NRCS, NRI data.
- ² USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
- ³ USDA-Farm Services Agency, Common Land Unit GIS data layer, 2005.
- ⁴ USDI-US Geologic Services, ND GAP analysis data, 2005.
- ⁵ USDA-NRCS, Natural Resources Planning Staff, 30 meter Relief Data GIS data layer, 2002.
- ⁶ ND Department of Health, Environmental Health Section, Water Quality Division, National Hydrography GIS layers, June 2006.
- ⁷ ND Department of Health, Environmental Health Section, Water Quality Division, List of Section 303(d) TMDL Waters for the Red River Basin in North Dakota, 2006.
- ⁸ ND Department of Health, Environmental Health Section, Water Quality Division, Animal Feeding Operations Program data, 2006.
- ⁹ 2002 Census of Agriculture, North Dakota, State and County Data Volume 1, Geographic Area Series Part 34, U.S. Department of Agriculture, National Agricultural Statistics Service, June 2004. (County data was prorated to HUC by the percent of a HUC in a county.)
- ¹⁰ USDA-NRCS, Natural Resources Planning Staff, Common Resource Area GIS data layer, 2004.
- ¹¹ USDA-NRCS, Natural Resources Planning Staff, Soils Productivity GIS data layer, 2006.
- ¹² ND Department of Health, Environmental Health Section, Water Quality Division, Ambient Ground Water Monitoring Program data, 1997.
- ¹³ ND Department of Health, Environmental Health Section, Water Quality Division, Source Water Protection Program data, 2003.
- ¹⁴ 2002 Census of Agriculture, North Dakota, State and County Data Volume 1, Geographic Area Series Part 34, U.S. Department of Agriculture, National Agricultural Statistics Service, June 2004. (County data was prorated to HUC by the percent of a HUC in a county.)