

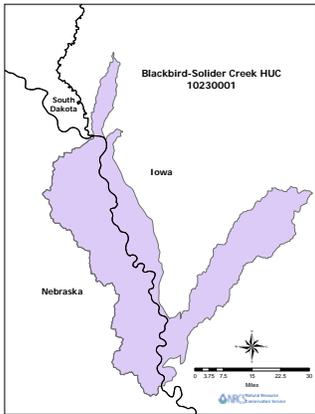
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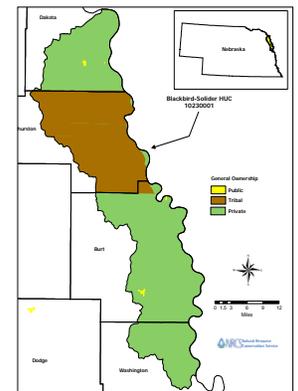
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### Introduction & Background



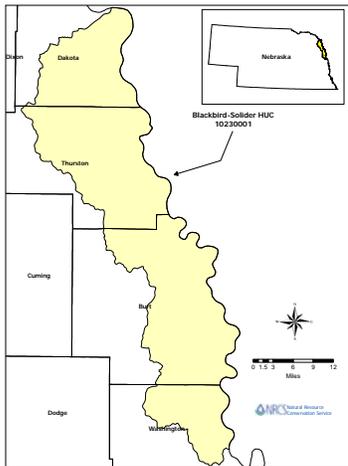
The Blackbird-Solider 8-Digit Hydrologic Unit Code (HUC) is located in Northeastern Nebraska and Northwestern Iowa. The sub-basin drains a surface area of 1,039,828 acres across the two states. Fifty-one percent, or 527,481 acres, of this HUC lies within the state of Iowa with forty-nine percent, or 512,347 acres, in Nebraska.

In Nebraska the Blackbird-Solider HUC covers the counties of Dakota, Thurston, Burt and Washington. The Nebraska portion of the HUC is bordered by the Missouri River on the eastern edge.



**Public/Private Lands Map**

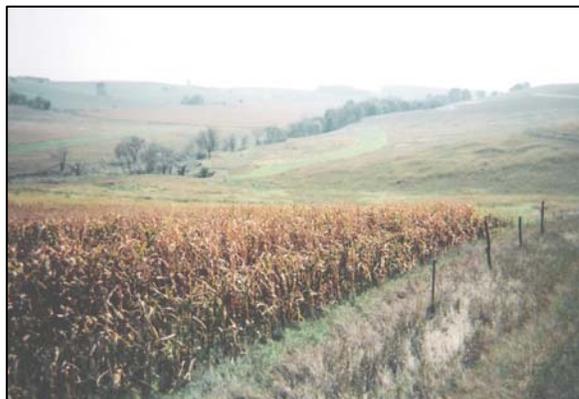
Approximately 33% of this HUC is Tribal land which contains roughly 21% of the farm ground within this HUC.



### Physical Description

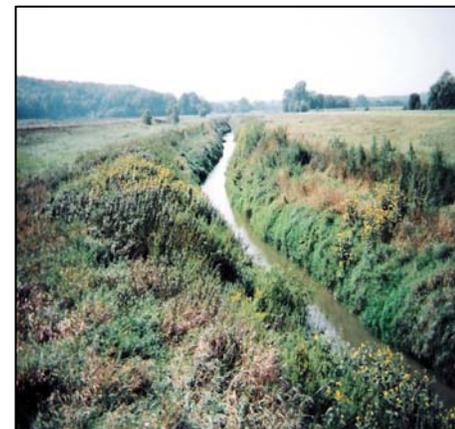
The Blackbird Solider HUC is comprised of several small sub watersheds that drain directly into the Missouri River. Two landscape features predominate in these sub watersheds, the Loess Hills-Missouri River Bluffs and Missouri River floodplain.

The bluffs area of the sub watersheds contain the headwaters of the tributaries. The headwaters area are highly-dissected, loess-covered, glacial till plains with short, steep slopes, and highly erodible loess soils that can generate significant amounts of sediment if cultivated without adequate conservation practices.

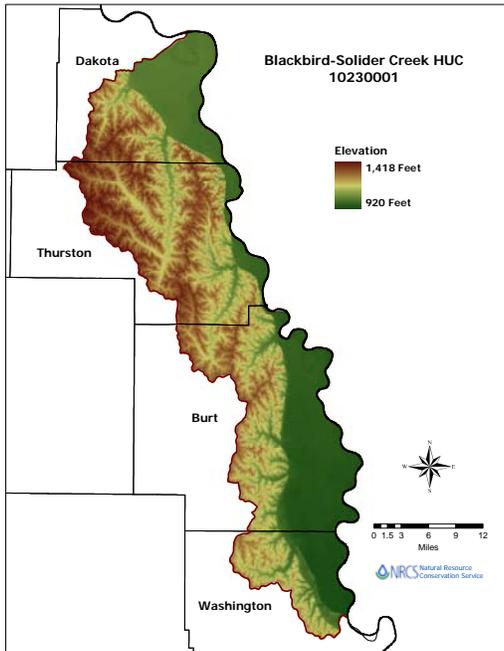


**Typical upland view**

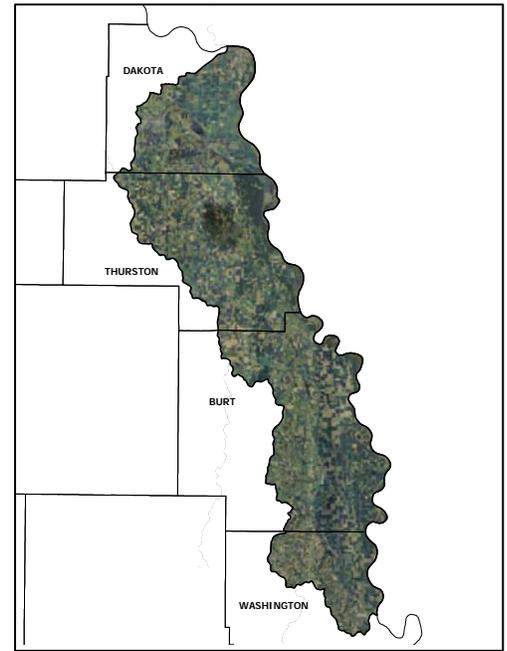
In contrast, the Missouri River floodplain is a comparatively flat expanse, which, because of poor drainage, has seen a history of tributary stream channelization to prevent flooding, improve drainage, and make these bottomlands better for cultivation.



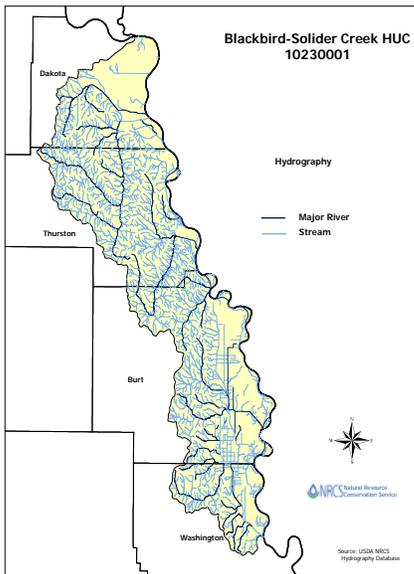
**Typical bottom view**



**Elevation Map**



**Ortho Photo Map**



**Hydrology Map**

## Hydrology

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There are approximately 1,722 miles of rivers and streams that drain this HUC in Nebraska with the Missouri River being the major river within the HUC. Due to the presence of the Missouri river, the eastern portion of this HUC consists of a generally flat terrain of the Missouri River flood plain. As you move westward within this HUC, you encounter bluffs that take you up to a gently rolling terrain. Elevations range from 920 ft along the Missouri river within the flood plain, to 1,418 ft within the bluffs and rolling hills to the west. The rolling hills are intricately dissected by the small streams and drainage systems.

## Census & Social Data

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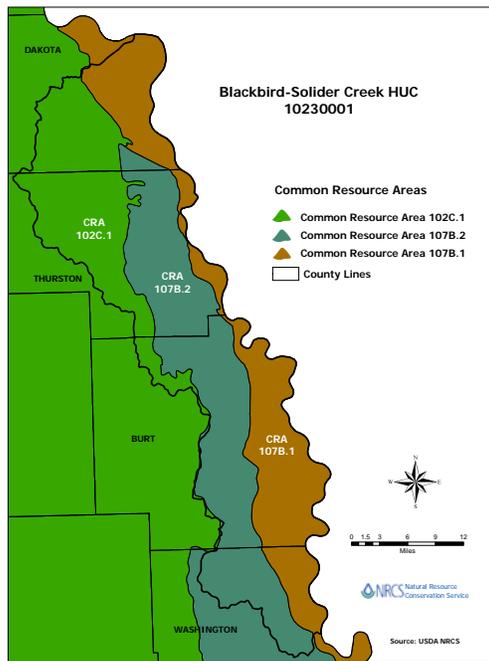
Farming is a major occupation within this HUC. In 2002 there were 1,003 farms within this HUC with 1,364 estimated operators. The majority of the farms are family owned farms that have been in operation for over 20 years. The total number of farms and average size of the farm has increased over the past 5 years. Farms average 455 acres each. Over 69% of the farms were operated by landowners whose primary occupation is farming. As is the trend throughout Nebraska, the average age of the principal operator has increased from 53.5 to 55 from 1997 to 2002. The estimated market value of the land and buildings is \$760,146 per farm with net cash earnings averaging \$26,226 per farm in 2002.

| NASS Statistics   | 1997   | 2002   |
|-------------------|--------|--------|
| Cattle & Calves   | 55,242 | 43,195 |
| Cattle on Feed    | NA     | 33,901 |
| Total hogs & pigs | 78,828 | 54,543 |

| NASS Statistics   | 1997      | 2002      |
|---|-----------|-----------|
| Land in Farms (Acres)   | 437,886   | 466,028   |
| Average size of Farm (Acres)                                      | 431       | 455       |
| Number of Farms   | 987       | 1,003     |
| Estimated Market Value (Land & Buildings) (Average Per Farm \$'s) | \$552,985 | \$760,146 |
| Government Payments (\$1,000)                                     | \$5,428   | \$7,205   |
| Net cash farm income of operation (Average per farm \$'s)         | \$35,477  | \$26,226  |

#### NASS Statistics

| Operator Characteristics             | 1997 | 2002 |
|--------------------------------------|------|------|
| Primary Occupation Farming           | 612  | 701  |
| Primary Occupation - Other           | 375  | 301  |
| Place of Residence - On Farm         | 648  | 740  |
| Place of Residence - Not on Farm     | 237  | 264  |
| Days worked off Farm - None          | 448  | 488  |
| Days worked off Farm - Any           | 461  | 514  |
| Average Years on Present Farm        | 22.7 | 24.2 |
| Average Age of Principal Operator    | 53.5 | 55   |
| Family or Individual Farms           | 796  | 871  |
| Partnership Farms                    | 92   | 60   |
| Corporation- Family Held             | 85   | 55   |
| Corporation - Other Than Family Held | 4    | >1   |



**Common Resource Map**

## Common Resource Areas

Common Resource Areas are areas that share common resource concerns, soil groups, hydrologic units, resource use, topography, other landscape features, and human use and treatment needs. CRA's are subdivisions of the current MLRA areas.

**102C.1 - Loess Uplands:** Gently undulating to steep soils with long smooth slopes and well defined drainage ways formed in loess mantled uplands. There are some exposures of bedrock. Soils are commonly well drained with some poorly drained upland waterways. Native vegetation was mixed tall and short grass prairie. The primary land use is cropland. Corn, soybeans, grain sorghum, alfalfa and oats are the major crops. Resource concerns are water and wind erosion, nutrient management and water quality.

**107B.1 - Missouri River Alluvial Land:** This area consists of the nearly level to gently sloping bottomland and channel of the Missouri River and the lower Grand River. Native vegetation was largely wet prairie and marshes, with narrow bands and isolated pockets of bottomland forest.

The Missouri River channel, which formerly meandered, has been stabilized, narrowed, and confined by levees. The major land use is cropland, with corn and soybeans being the major crop. Resource concerns are wind erosion, water management and water quality.

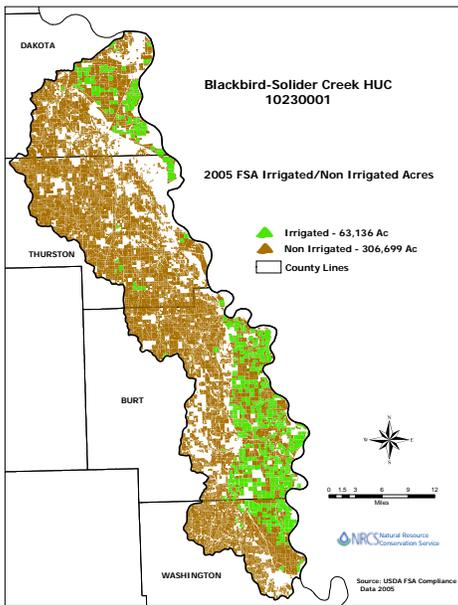
**107B.2 - Iowa Deep Loess Hills:** This area is nearly level to strongly sloping soils on ridge tops and moderately sloping to very steep soils on highly dissected side slopes. Native vegetation was nearly pure prairie with thin bands of timber in the valleys and ravines. Corn and soybeans are common crops. Livestock feed lots; swine and poultry operations are common in this area. Manure utilization is a major concern in the area. Resource concerns are soil erosion, nutrient management, water quality and soil quality.

## Land Use/Irrigation/Land Cover

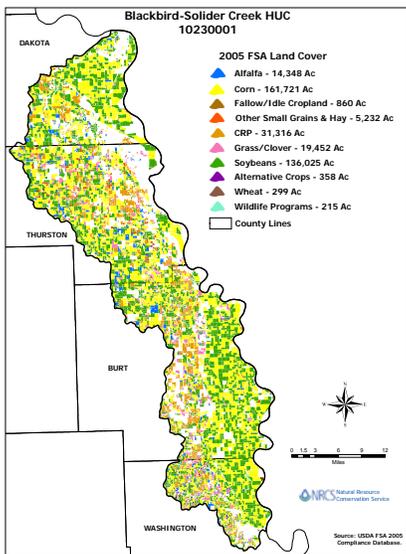
Over ninety percent of the acres within this HUC are used : [Back to Top](#)  
 464,192 acres in farm ground in 2005. Corn is the major crop grown with soybeans being a close second. In 2005, FSA recorded 161,721 acres planted in corn and 136,025 acres planted in soybeans.

Irrigation occurs on approximately 20% of the farm ground within this HUC based on FSA's 2005 field data. Of these acres 35,070 acres of corn were irrigated and 27,388 acres of soybeans were irrigated. Irrigation occurs mainly within the floodplain along the river. The upland fields are mainly dry land fields.

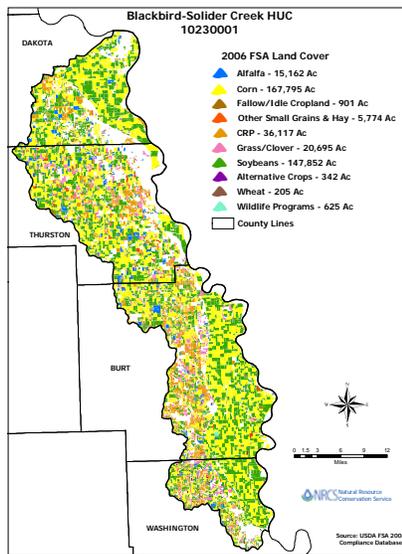
In 2006 FSA reported that 68,203 acres were irrigated. Of these irrigated acres, 37,651 acres of corn were irrigated and 29,484 acres of soybeans were irrigated. Both of these figures are an increase from the 2005 growing season. Other crops irrigated included alfalfa, grass, oats, wheat and sorghum.



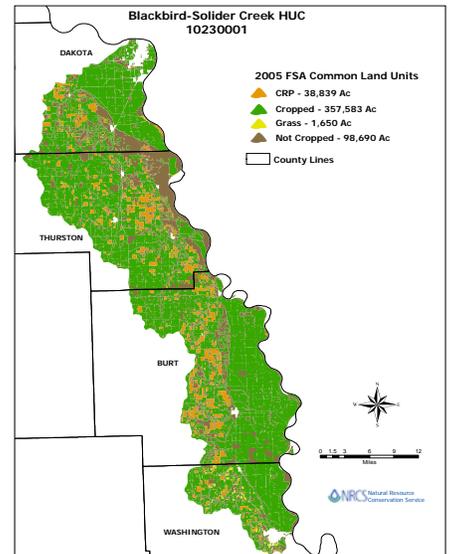
**Irrigated/Non Irrigated Acres**



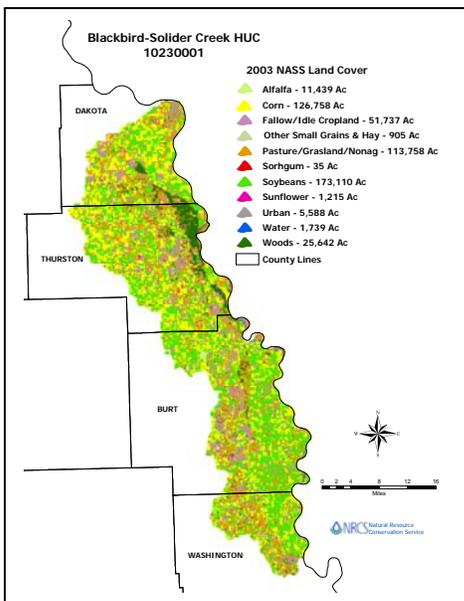
**2005 FSA Crop Cover**



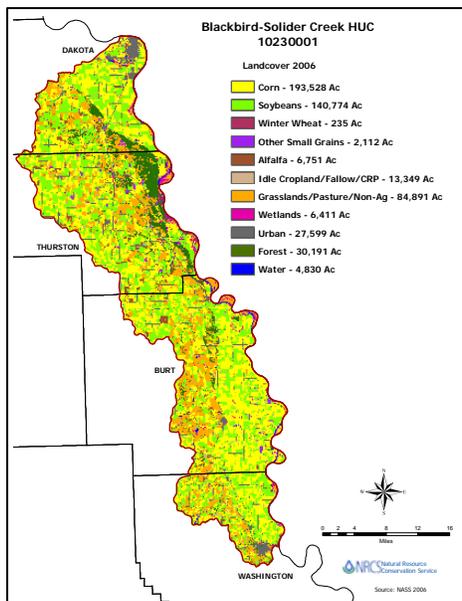
**2006 FSA Crop Cover**



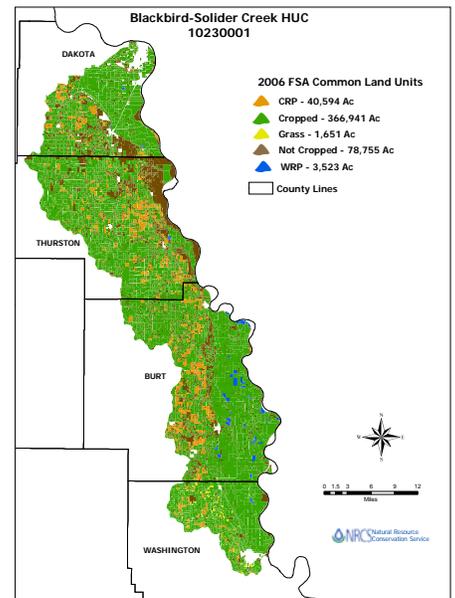
**2005 FSA Field Boundary Map**



**NASS 2003 Land Cover Map**



**NASS 2006 Land Cover Map**



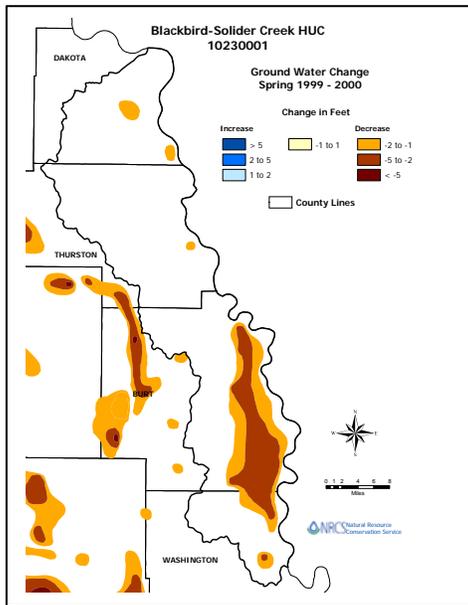
**2006 FSA Field Boundary Map**

## Resource Concerns

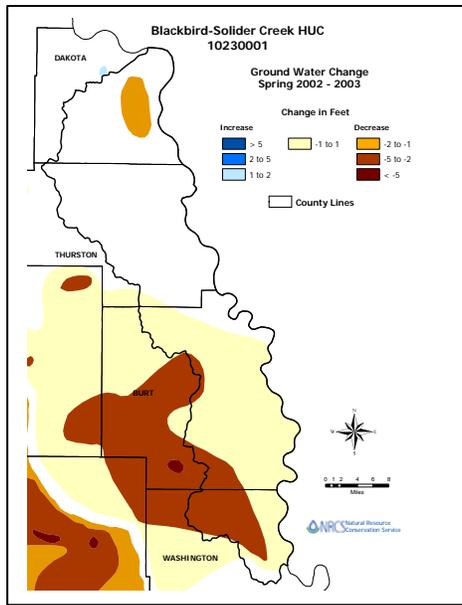
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Resource concerns within this HUC center on impacts on soil, water, agriculture, air quality, plants, animal and human resources. Of major concern is the erosion and sedimentation occurring within the tributaries of this HUC. Channelization and straightening of tributary streams on the Missouri River floodplain has resulted in channel incision and headcutting progressing upstream into the watershed headwaters. According to the Nebraska Department of Roads, many bridges in this area are undermining and will be subject to failure in the future. Channelization and stream downcutting have undoubtedly increased sediment delivery ratios and the amount of sediment delivered to the Missouri River due to elimination of connectivity between streams and floodplain sediment storage locations. Similarly, elimination of these floodplain buffers more readily allows sediment eroded from upland fields to be delivered to the stream system. The 810 mi<sup>2</sup> of HUC 10230001 in Nebraska is estimated to contribute about 2.7 million tons of sediment annually to the Missouri River, or approximately 5.2 tons/acre/year.

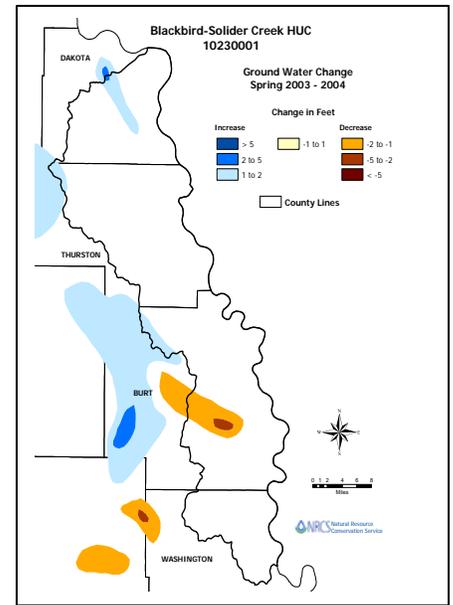
Water conservation and use has become an important issue to agriculture and Nebraska in recent years due to the continuing drought. The University of Nebraska has been monitoring the water levels within the aquifers since the late 1990's. The maps below show the changes in water levels from 1999 to 2006.



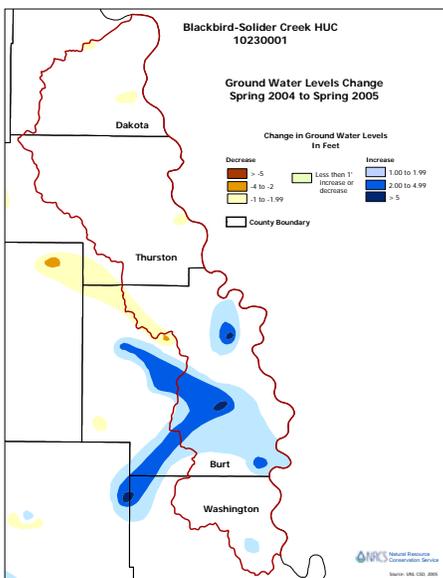
**Ground Water Change Map 1999 - 2000**



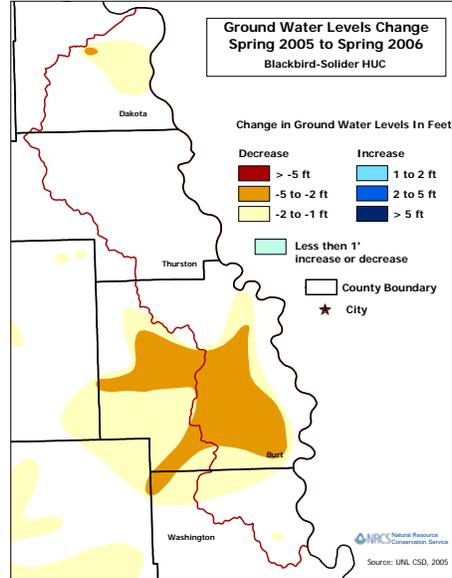
**Ground Water Change Map 2002 - 2003**



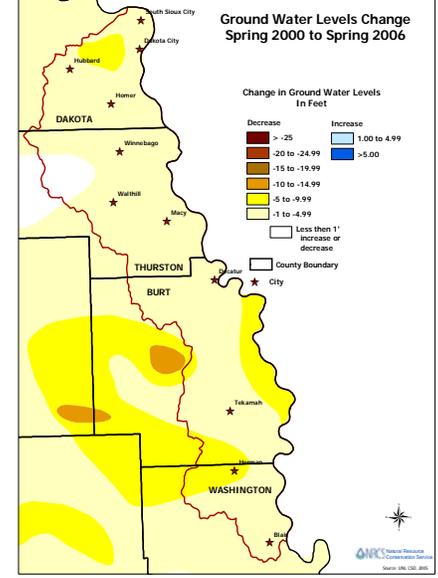
**Ground Water Change Map 2003 - 2004**



**Ground Water Change Map 2004 - 2005**

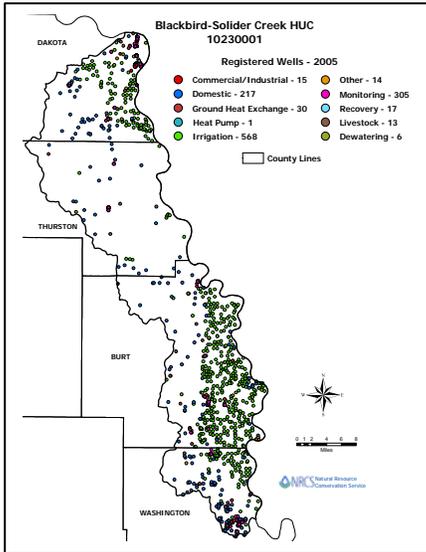


**Ground Water Change Map 2005 - 2006**



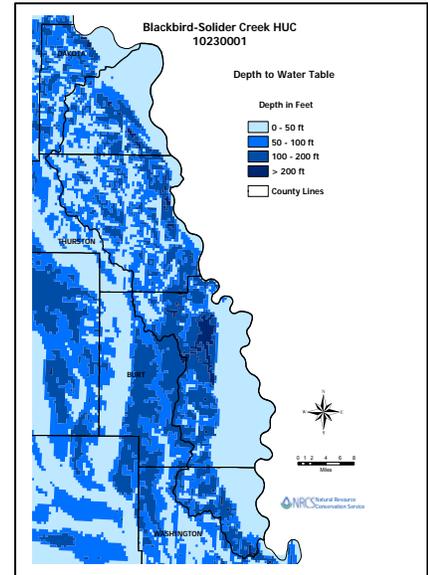
**Ground Water Change 2000 - 2006**

## Resource Concerns Cont'd



**Registered Wells - 2005**

Irrigation is a major part of the agricultural production within this HUC. Fields located in the river bottoms rely upon irrigation during the dry periods of the growing season. Registered well records thru 2005 do indicate that the majority of the wells within this HUC are irrigation wells. They also mainly occur along the river bottom area where water table depths are closer to the surface.



**Depth to Water Table**

## Conservation Assistance/Progress

Blackbird-Solider HUC lies within the Nebraska Loess Hills RC&D and is serviced by their office in Oakland. Conservation assistance is provided by four NRCS service centers within the HUC. Resource concerns center around erosion control but also include water management, wildlife and wetlands.

Conservation progress is reflected in the following table. Conservation efforts have focused mainly on row crops and the reduction in erosion, as indicated by the acres under Tillage & Residue Management as well as the implementation of terraces within the HUC.

| PRMS Data                              | 1999  | 2000  | 2001   | 2002   | 2003   | 2004    | 2005    | 2006    |
|--|-------|-------|--------|--------|--------|---------|---------|---------|
| Total Systems Planned (Acres)          | 1,128 | 6,872 | 10,164 | 15,381 | 9,530  | 42,306  | 20,558  | 25,569  |
| Total Systems Apppied (Acres)          | 1,100 | 6,787 | 10,448 | 14,989 | 16,584 | 38,561  | 14,476  | 15,139  |
| <b>Conservation Treatments Applied</b> |       |       |        |        |        |         |         |         |
| Buffer Strips (Acres)                  | 2     | 64    | 23     | 18     | 0      | 19      | 0       | 4       |
| Erosion Control (Acres)                | 2,490 | 7,761 | 11,500 | 8,380  | 3,386  | 0       | 8,517   |         |
| Field Borders (Feet)                   |       | 3     | 24,581 | 13,000 | 3,000  | 0       | 21,488  | 1,555   |
| Filter Strips (Acres)                  | 110   | 70    | 236    | 271    | 147    | 171     | 46      | 63      |
| Grassed Waterways (Acres)              | 0     | 9     | 20     | 25     | 27     | 2,618   | 47      | 13      |
| Nutrient Management Systems (Acres)    | 103   | 1,008 | 1,814  | 935    | 1,928  | 250     | 298     | 1,587   |
| Pest Management Systems (Acres)        | 103   | 1,779 | 4,989  | 4,439  | 2,281  | 2,926   | 673     | 3,808   |
| Prescribed Grazing (Acres)             | 103   | 465   | 202    | 1,899  | 764    | 462     | 1,334   | 671     |
| Tillage & Residue Management (Acres)   | 0     | 359   | 732    | 1,581  | 3,101  | 14,508  | 4,956   | 14,039  |
| Tree & Shrub Establishment (Acres)     | 12    | 96    | 252    | 25     | 133    | 15      | 0       |         |
| Waste Management Systems (Numbers)     | 0     | 0     | 0      | 0      | 2      | 435     | 298     | 1       |
| Wetlands Created or Restored (Acres)   | 0     | 0     | 0      | 117    | 63     | 0       | 144     | 331     |
| Wildlife Habitat Management (Acres)    | 28    | 3,966 | 10,220 | 7,145  | 2,806  | 0       | 1,732   | 341     |
| Irrigation Water Management (Acres)    | NA    | NA    | NA     | 0      | 0      | 0       | 133     | 120     |
| Windbreaks & Shelter Belts (Feet)      | NA    | NA    | NA     | 2,101  | 26,060 | 6,800   | 21,200  | 1,235   |
| Terraces (Feet)                        | NA    | NA    | NA     | NA     | NA     | 151,946 | 127,612 | 130,187 |
| Fence (Feet)                           | NA    | NA    | NA     | NA     | NA     | 17,835  | 7,946   |         |
| Conservation Crop Rotation (Acres)     | NA    | NA    | NA     | NA     | NA     | 9,310   | 8,269   | 9,621   |

Several local, state and federal agencies provide services and assistance to the producers, land owners and residents of this HUC. These are:

**NRCS:** NRCS currently has four field offices that serve the producers and communities within this HUC. They are located at South Sioux City, Walthill, Tekamah & Blair.

**Omaha Indian Tribe:** As mentioned before, over 33% of this HUC is contained within both the Omaha and Winnebago Indian Nation.

**Winnebago Indian Nation:** As previously mentioned, this HUC is within both the Omaha and Winnebago Indian Nation.

**Papio Missouri Natural Resources District:** The HUC is primarily within jurisdiction of the Papio Missouri River Natural Resources District (PMRNRD). NRDs in Nebraska are synonymous with Soil and Conservation District in most states. The district provides coordination among counties within its boundary on natural resources issues.

**Loess Hills Resources Conservation District Council (RC&D):** The Loess Hills RC&Ds is instrumental in community development, facilitating meetings and developing partnerships.

**Bureau of Indian Affairs (BIA):** Thirty three percent of the HUC is on tribal land.

**US Army Corps of Engineers:** The HUC is within the Missouri River basin which also is within the US Army Corps of Engineers administrative jurisdiction.

**US Fish and Wildlife Service:**

### Current Conservation Projects

**Blackbird-Soldier Creek Rapid Watershed Assessment:** The primary objective of this project is to assist the Omaha Indian Nation (reservation) to identify natural resource concerns and impediments within the Nebraska portion of the selected Hydrologic Unit (HU), that impact areas of soil, water, agriculture air quality, plants, animal and human resources. The Rapid Watershed Assent (RWA) will be conducted throughout HUC 10 23001, and with particular focus on the Indian lands. Approximately 33 percent of this HU in Nebraska is made up of tribal lands belonging to the Omaha and Winnebago Indian Nation. The primary sponsor of the RWA is the Omaha Indian Nation. The HU is known to be highly susceptible to wind and water erosion. The RWA area is located along the Loess (wind blown) Uplands and Missouri River Bluffs of Nebraska. These soils are commonly referred to by locals as sugar soils and are extremely erosive when wet, and easily wind blown when dry and not protected.

Project planning phase will be for 11 months; July 2006 to June 2007 and Project implementation phase will be for 5 years, 2007 to 2011

**Specific project objectives are:** To identify significant erosion problems, to develop a pilot process incorporating new technologies (e.g. digital elevations models, geographic information systems,) for identifying and targeting watershed erosion problems, and evaluate the potential for implementing stream corridor restoration methods for erosion and sediment control to augment or replace existing traditional structural conservation practices.

**Names and affiliations of project partners and collaborators:** 1) Nebraska NRCS, 2) Omaha Indian Tribe, 3) Papio-Missouri River Natural Resources District, 4) Loess Hill Resource Conservation & Development Council, 5) Bureau of Indian Affairs, 6) Army Corps of Engineers, 7) Nebraska Fish and Wildlife Service, 8) Nebraska Department of Roads, 9) Winnebago Indian Reservation, 10) USDA Farm Service Agency.

**Project Objectives:** The primary goal of this project would be to reduce sediment production in an area highly susceptible to erosion contained within a HU that feeds directly into the Missouri River. In addition to this primary project purpose, the project would also be used as a test bed for integrating new technologies into a holistic approach to planning. Three specific objectives of the project are presented below.

***Objective 1:*** To identify the types and locations of sediment sources in several sub watersheds where erosion and sediment control would provide local watershed benefits and would result in improvements in water quality in HUC 1023001, the main stem Missouri River.

*Objective 2:* To develop a pilot process incorporating new computer technologies for identifying and targeting watershed erosion problems and selecting programs to address these problems within HUC 1023001.

*Objective 3:* To evaluate the potential for implementing buffer protection/creation and stream corridor restoration methods for erosion and sediment control in lieu of traditional PL-566 grade stabilization methods.

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## **Bibliography**

**National Ag Statistics Census Data 1997 & 2002 Tables** - Source: The Census of Agriculture was conducted by the Census Bureau, Department of Commerce beginning with the 1840 census through the 1992 census. In 1997, the responsibility for the Census of Agriculture was transferred to the National Agricultural Statistics Service (NASS), USDA. The [Census of Agriculture](http://www.nass.usda.gov) is conducted every five years and, by definition, is a complete accounting of the crops and livestock produced on all farms and ranches for the Census year and the inventories of livestock on all farms. The Census also collects information concerning operator characteristics, demographics, and income and expenses. For the 1997 Census, a response was received from almost 90 percent of the farm operators. A sample of the non-respondents was selected and interviewed and their data was expanded to represent this group. The Census information includes data for most commodities produced on U.S. farms and is published by State and county. The data are also summarized by operator/farm characteristics (operator age, etc., and acres in farm, etc.), to the county level. <http://www.nass.usda.gov>.

**Ground Water Change Maps** - Source: University of Nebraska Conservation & Survey Division. <http://www.csd.unl.edu>.

**NASS 2003 Cropland Map** - Source: USDA NASS 1:100,000 scale 2003 Cropland Data Layer. The USDA-NASS 2003 Nebraska Cropland Data Layer (CDL) is a raster, geo-referenced, categorized land cover data layer produced using satellite imagery from the Thematic Mapper (TM) instrument on Landsat 5 and the Enhanced Thematic Mapper (ETM+) on Landsat 7. The imagery was collected between the dates of April 11, 2003 and September 5, 2003. The approximate scale is 1:100,000 with a ground resolution of 30 meters by 30 meters. The Nebraska CDL is aggregated to 11 standardized categories for display purposes with the emphasis being agricultural land cover.

This is part of an annual series in which several states are categorized annually based on the extensive field observations collected during the annual NASS June Agricultural Survey. However, no farmer reported data is included or derivable on the Cropland Data Layer CD-ROM.

The Nebraska CDL is part of a joint research project with the Farm Service Agency (FSA).

<http://www.nass.usda.gov/research/Cropland/metadata>.

**Depth to Water Table Map** - Source: University of Nebraska Conservation & Survey Division. The data is based on 1x2 degree USGS quads that were converted to a digital elevation model (DEM) and concurrent mapping of the elevation of the water table in the early 1980's. The nominal vertical accuracy is 50 feet, or about 16 meters. Horizontal accuracy doesn't exceed 100 meters. The Conservation and Survey Division has produced this product using what is thought to be the most reliable information available or reproduced the material as provided. The detail and precision of the interpretations made are according to accepted professional standards and are dependant upon the techniques, hardware, and/or software utilized. <http://www.csd.unl.edu>.

**Registered Wells Map** – Source: Current Nebraska Statues require that all new water wells be registered with the Nebraska Department of Natural Resources within 60 days of completion of the well construction, except test holes and dewatering wells to be used less than 90 days or domestic or livestock wells completed prior to September 9, 1993, and soil vapor monitoring wells. Failure to register a water well is a class IV misdemeanor. The well contractor or the well owner shall complete the appropriate well registration form and file water well information with the Department, including name and address of owner, legal description of well, intended use, completion date, pumping rate, diameter of depth of well, dimension of excavated hole, description and depth of geological materials encountered, gravel pack

and other information. The well records are available at the Nebraska Department of Natural Resources. The processed water well information is also made available to public over the Internet. <http://dnrdata.dnr.ne.gov/wellssql/>.

**Elevation Map** – Source: Nebraska Department of Natural Resources in work-share agreement with the U.S. Geological Survey. Digitntains a series of elevations ordered from south to north with the order of the columns from west to east. The DEM is formatted as one ASCII header record (A- record), followed by a series of profile records (B-records) each of which include a short B-record header followed by a series of ASCII integer elevations per each profile. The last physical record of the DEM is an accuracy record (C-record). 7.5-minute DEM (10- by 10-m data spacing, cast on Universal Transverse Mercator (UTM) projection). Provides coverage in 7.5- by 7.5-minute blocks. Each product provides the same coverage as a standard USGS 7.5-minute quadrangle without over edge. DEM's can be used as source data for digital orthophotos, and, as layers in geographic information systems, for earth science analysis. DEM's can also serve as tools for volumetric analysis, for site location of towers, or for drainage basin delineation. These data were collected as part of the National Mapping Program. <http://dnr.ne.gov/databank/dem.html>.

**Ortho Map** – Source: A digital ortho-photograph is a digital image of an aerial photograph with image distortion removed, and corrected for aircraft pitch, yaw and altitude, landscape relief, and camera lens (optic correction) orientation. These DOQs are developed from 1999 NAPP flight coverage flown under the National Aerial Photography Program. The aerial photographs are exposed using 10-inch wide film at 20,000 feet above land surface, with 6 inch focal length camera, resulting in 1:40,000 scale image. The digital (scanned) image is rectified to orthographic projections by processing each image pixel through photogrammetric equations derived from photo-identifiable GPS ground control points, camera calibration from orientation parameters, and the digital elevation model data base. The finished product is a spatially accurate image with identifiable features represented in their true planimetric positions. This digital image is a GIS product which can be overlaid and manipulated like any other coverage or layer, and offers significant flexibility. The National Mapping Standards for primary digital orthophotoquad (DOQ) require a 1-meter ground resolution for quarter-quadrangle (3.75-minutes of latitude by 3.75-minutes of longitude) image cast on the Universal Transverse Mercator Projection (UTM) on the North American Datum of 1983 (NAD83) and mapped to 1:12,000 scale. The geographic extent of the DOQ is equivalent to a quarter-quad plus the overedge of 100 meters beyond the extremes of the primary and secondary corner points. The overage is included to facilitate tonal matching for mosaicking and for the placement of the NAD83 and secondary datum corner ticks. The normal orientation of data is by lines (rows) and samples (columns). Each line contains a series of pixels ordered from west to east with the order of the lines from north to south. The standard, archived digital orthophoto is formatted as four ASCII header records, followed by a series of 8-bit binary image data records. The radiometric image brightness values are stored as 256 gray levels ranging from 0 to 255. The metadata provided in the digital orthophoto contain a wide range of descriptive information including format source information, production instrumentation and dates, and data to assist with displaying and georeferencing the image. <http://datagateway.nrcs.usda.gov/>.