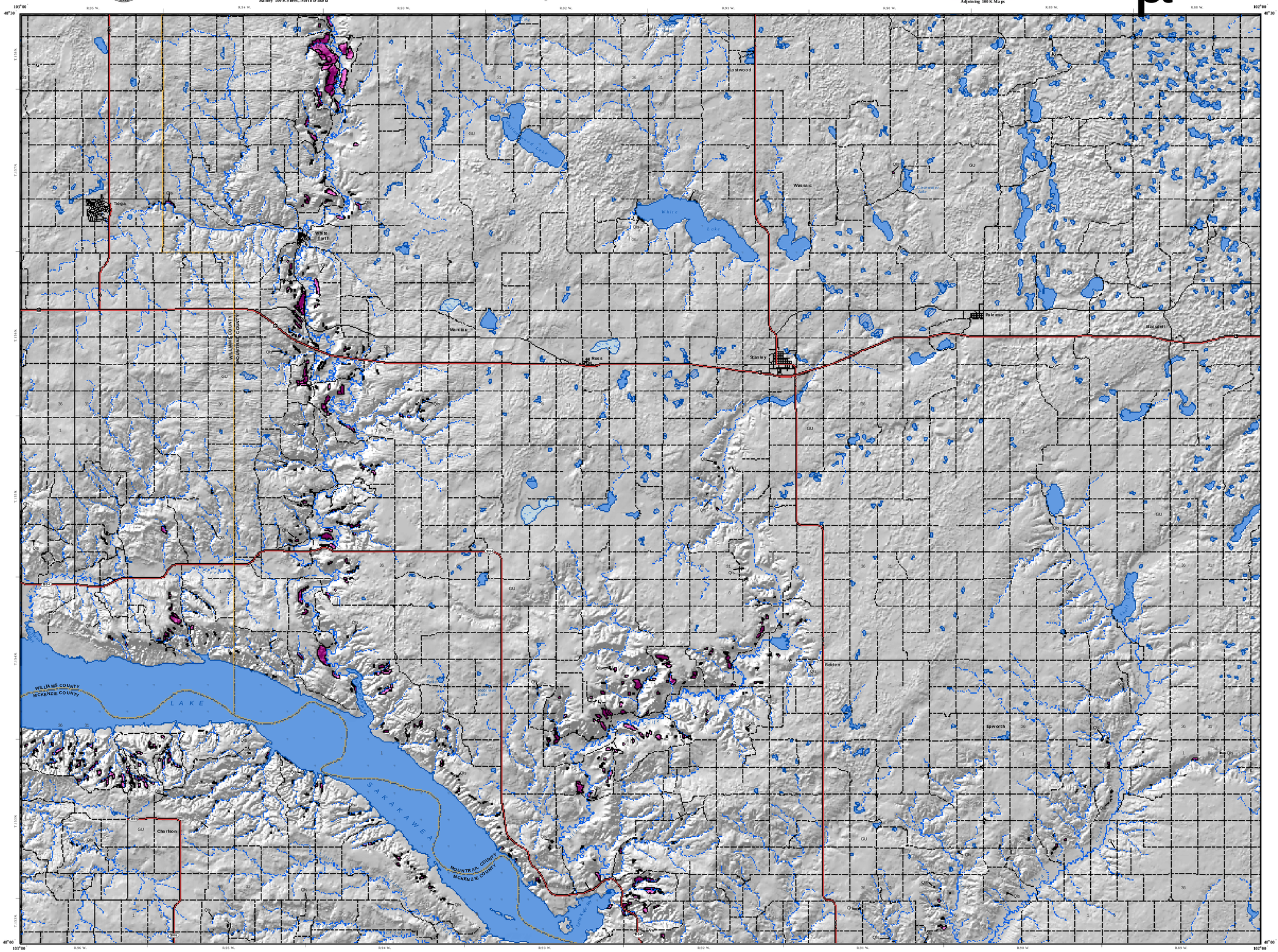
North Dakota Geological Survey
John P. Bluemle, State Geologist

Areas of Landslides
Stanley 100K Sheet, North Dakota

Crosby	Kenmare	Mohall
Williston		Minot
Watford City	Parshall	Garrison

Adjoining 100 K Maps



Edward C. Murphy
2004

General Information on Landslides

Landslides are masses of rocks that have tumbled or slid down a slope under their own weight. These geologic hazards can damage buildings, roads, railroad tracks, pipelines, transmission lines, and other types of infrastructure. Landslides are generally characterized in the field by steep, near-vertical slopes (the scarp) that are underlain by a mound of displaced rock (the body). The body of the slide may be relatively intact or it may be severely fragmented. Recent or relatively new landslides are generally characterized by a fresh (well-exposed rock) scarp and a sparsely vegetated body. Older slides are typically more difficult to identify in the field because the scarps may be covered with vegetation and the landslide bodies are often well-vegetated, covered by mature trees.

Slopes fail for various reasons including the steepness or angle of the slope, rock type, bedding, and moisture content of the rocks. Most landslides in western North Dakota are rotational slumps that have a well defined head and toe. Typically, the displaced mass of rock and sediment slides down slope as a single unit and the beds tilt (rotate) back in the direction of the slope. The failed mass of rock is, however, almost never a cohesive unit; tension cracks generally cause the failed material to splinter into smaller portions. Successive landslides may occur at the same location. Over time, the accumulated material from multiple, adjacent landslides can cover an area that is several thousand feet wide and several miles long.

Landslides are most readily identifiable from the air. The landslides mapped on the Stanley Sheet were identified from a set of aerial photographs (1:20,000 scale) that were flown between June and September of 1958. It is unfortunate that these photographs were taken when leaves were on the trees because groves of leaf-bearing trees tend to obscure landslides, especially small ones. On the other hand, leaves can sometimes make it easier to identify these features. Trees and bushes are often aligned within very distinct parallel-, transverse-, and/or semi-circular-depressions that generally occur within the body of the landslide.

The Stanley Sheet

The topography throughout most of this area is typical of glaciated terrain, gentle to moderately rolling hills and the presence of numerous potholes. Glacial sediments are thin to absent in the badlands topography associated with the Missouri River Valley and the valleys of the major drainages, but may be several hundred feet thick in the uplands. Glacial cover is underlain by the Sentinel Butte or Bullion Creek Formations (Paleocene), which consist of alternating beds of claystone, siltstone, sandstone, mudstone, and lignite that were deposited in nonmarine environments.

Landslides are virtually nonexistent in the rolling glacial topography that dominates the area shown on this map. Instead, landslides are concentrated in four main areas: the badlands topography adjacent to Lake Sakakawea, the White Earth River Valley, the valley of the Little Knife River and, to a lesser degree, the valley of Shell Creek. The 888 landslides identified on this map sheet represent approximately one half of one percent of the total map area. Most of these landslides are 20 to 40 acres in size, but a handful of landslide complexes in the northern segment of the White Earth River Valley exceed 200 acres. Predictably, the poorly lithified strata tend to fail in the areas of highest topographic relief. Landslides are concentrated along the lower reaches of the White Earth and Little Knife rivers where relief is highest at 300 to 400 feet. Landslides are also prevalent throughout the middle and upper reaches of the White Earth River Valley where relief averages about 200 feet. Landslides are rare throughout the Shell Creek River Valley and in the middle to upper reaches of the Little Knife River Valley where relief is typically 100 feet. The highly sinuous nature of the White Earth River Valley contrasts sharply with the smooth, slightly sinuous Shell Creek River Valley and, to a lesser degree, with the Little Knife River Valley. This may account for the propensity for landslides in the White Earth River Valley.

UNIT DESCRIPTIONS

GU **Surface geology undifferentiated**

QUATERNARY

RECENT/PLEISTOCENE

Qs **Landslide**

A mass of sediment and/or rock that have slid or tumbled down slope. A pink area on the map my represent dozens of individual landslides.

Other Features

Water
Water - Intermittent
Marsh
River/Stream
Stream - Intermittent
E Section Corner
County Boundary
Federal Highway
State Highway
Paved Road
Unpaved Road

Geologic Symbols

Known contact between geologic units

The North Dakota Geological Survey compiled this map according to conventional cartographic standards, using what is thought to be the most reliable information available. The North Dakota Geological Survey does not guarantee freedom from errors or inaccuracies and disclaims any legal responsibility or liability for the reon. The text for the general information on landslides section was modified only slightly from the Parshall 100K landslide sheet.

Scale 1:100,000

0 1 2 3 4 Miles

Mercator Projection 1927 North American Datum
Standard parallel 47° 45' Central meridian 102° 30'

Shaded Relief - Vertical Exaggeration 9x

Cartographic Compilation: Elroy L. Kadrmas