The Oxbow
FROM THE NORTH DAKOTA STATE WATER COMMISSION

Trends In North Dakota Field Water Management

With a climate that often seems to swing wildly from epic droughts to record floods, water management in North Dakota has been a regular challenge since at least statehood. In the Red River Valley, with its flat terrain and thick clay soils, drainage is a tool that has been regularly used to remove excess water from agricultural lands.

The Red River Valley contains hundreds of miles of ditches, and large numbers of wetland drains designed to move water as quickly as possible off of agricultural land. Large-scale surface drainage became feasible at the beginning of the last century with the application of steam, and then combustion engine powered earth moving equipment.

Those efforts proved successful. Prior to European settlement, the Red River Valley was known for prairie grass tall enough to hide a person on horseback, with clouds of mosquitoes that darkened the skies. Today, drainage has helped the Red River Valley to become one of the best, if not the best, agricultural production region in the entire world.

However, while surface drainage proved very effective at removing excess water from cropland, it is still limited to draining surface water. High water table, coupled with the clay soils of the Red River Valley can cause ground water impacts that a surface drain is not effective at controlling.

Subsurface (tile) drainage is a technology that has been used in the eastern United States since the 1800s, and worldwide since the Roman Empire. Today, "tile" (Figure 1) is perforated polyethylene tubing, which is buried in a field, generally at a depth of three to four feet. The tile takes in surrounding ground water that is saturating the soils, and transports it away from the field. The water is then discharged into a waterbody such as

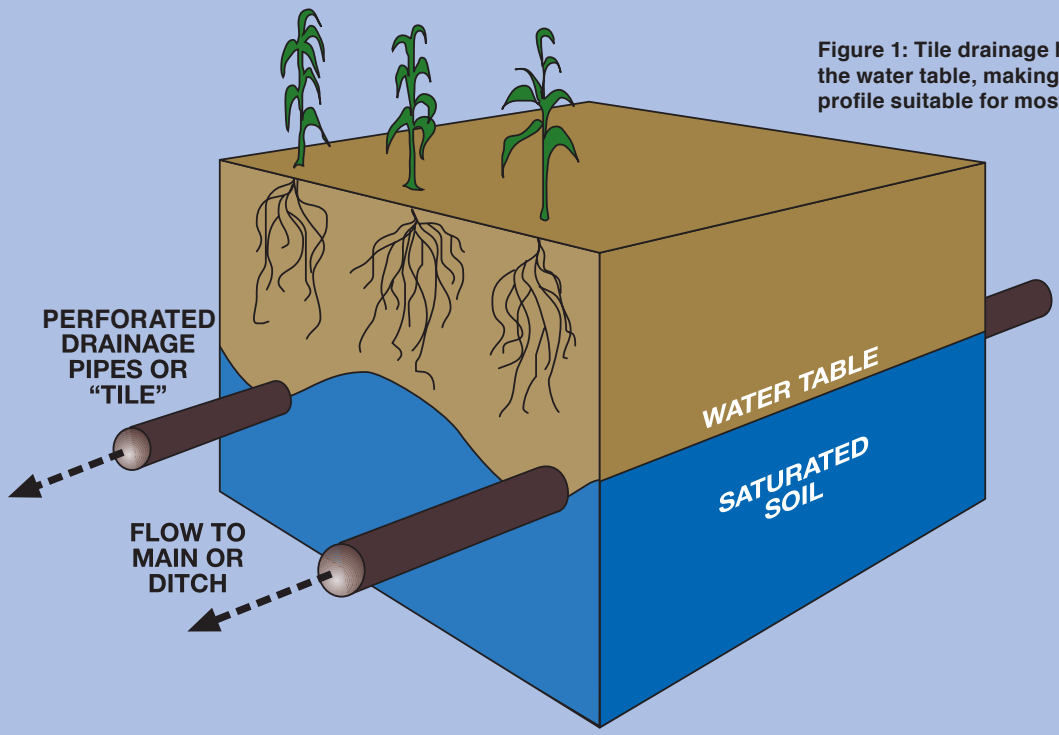

Figure 1: Tile drainage lowers the water table, making the soil profile suitable for most crops.

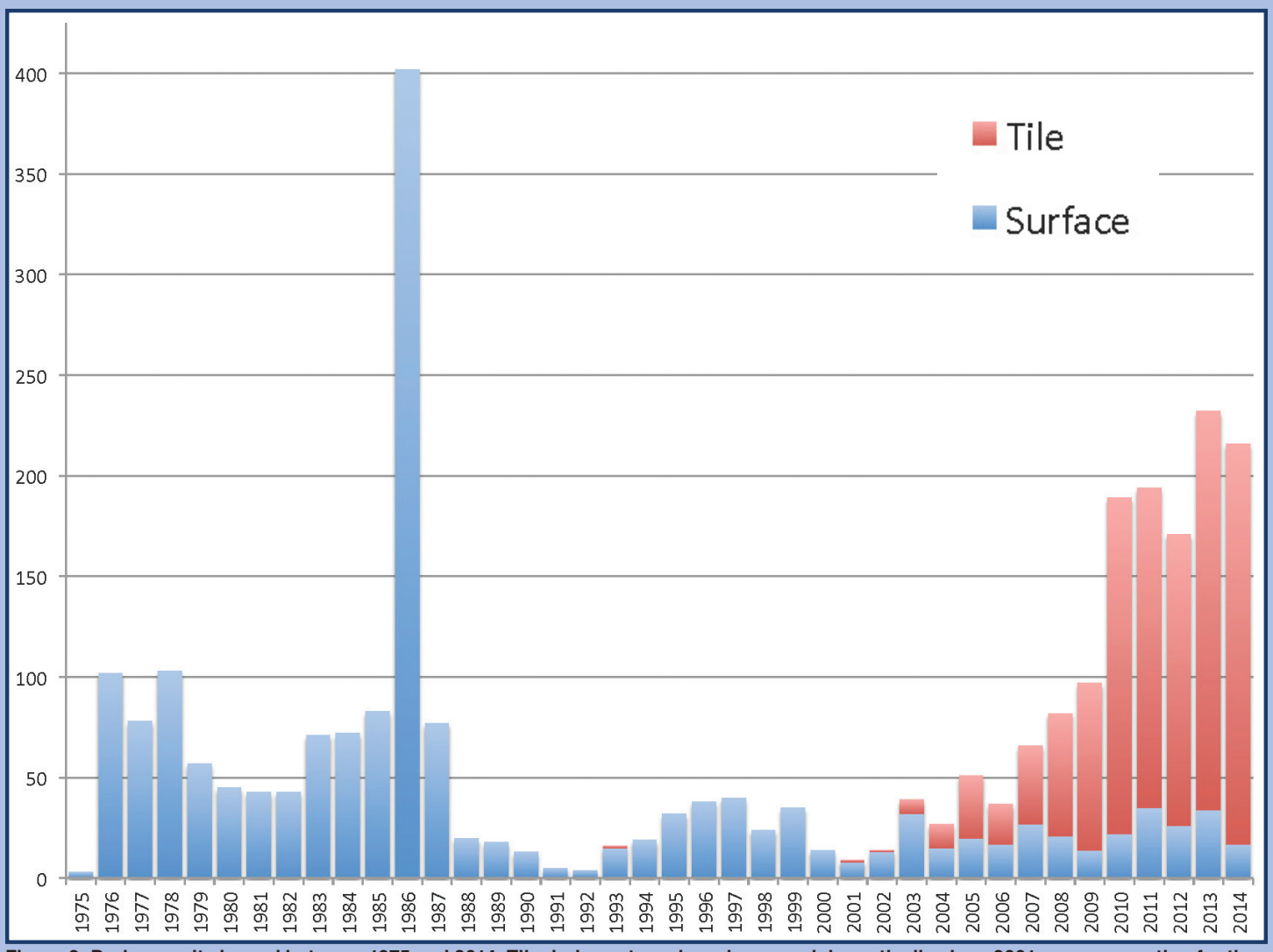

Figure 2: Drain permits issued between 1975 and 2014. Tile drain systems have increased dramatically since 2001, now accounting for the majority of permits issued.

a large wetland, lake, ditch, or into a natural watercourse such as a stream or river.

Tile drainage can help a landowner farm land that might have been impacted by high ground water levels, or standing surface water. It is called "tile" drainage because up until the 1970s, most drain pipes were made from short, cylindrical sections of concrete or clay called "tile."

The Office of the State Engineer (OSE) was created in 1905, and has had regulatory responsibility for drains since that time. Permitted drains varied between 50 and 100 annually up until 1985, (Figure 2), with a significant spike in 1986, after the passage of the 1985 Farm Bill, which included the Swampbuster provision intended to reduce wetland drainage.

From the mid-1990s to present, the OSE processed an average of 25 surface drainage permits annually. Beginning in the early 2000s, the incidents of tile drainage began to increase rapidly.

In 2011, the North Dakota Legislature passed a bill that changed how drain tile was regulated in the state. The primary role of the OSE in terms of drainage has been in determining whether proposed projects are of statewide or interdistrict significance. Prior to the law change, the OSE processed applications to install tile drain in the same way that it processed applications for surface drains, with projects that drained, filled, or pumped an area that had a watershed (contributing drainage area) of more than 80 acres, requiring a permit.

After the 2011 law change, county water resource districts (WRD) were given primary authority over tile drainage. Those projects having a drain tile footprint of 80 acres or greater, were required to obtain a permit from the WRD in which the project resided. If the project is determined by the WRD to be of statewide significance, that permit is forwarded to the OSE for review. Although the OSE no longer reviews drain tile permits not of statewide

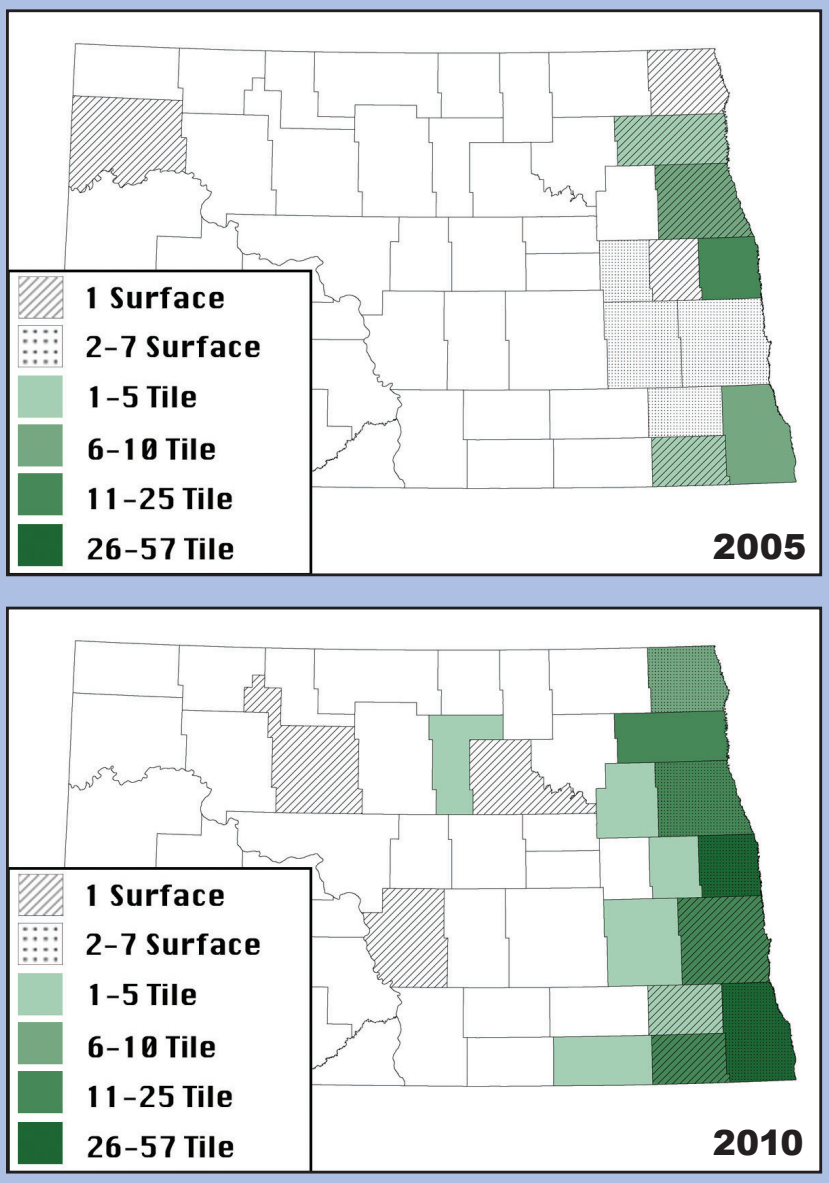

Figure 3: A comparison of surface and drain tile permits approved in 2005, 2010, and 2014.

significance, WRDs are still required to report those approved permits to the OSE.

In recent years, tile drain permits have become increasingly common; quickly outnumbering new surface drain permits. Since the law was changed in 2011, the number of tile drain permits has increased from around 125 annually, to around 200. An important caveat is that the number of tile drain permits may not account for the total number of tile drain projects, due to the law only requiring permits for those projects with a tile drain footprint of 80 acres or greater from a WRD. Although a 79 acre footprint of drain tile has the potential to drain significantly more land than 79 acres, tile drain projects of 79 acres or less do not require a permit from a WRD, and thus are not currently being tracked.

Tile drainage started in those counties adjacent to the Red River (Figure 3). In recent years, WRDs in counties further west have begun to see projects as well, presumably as higher crop prices have made it cost effective for agricultural producers to install tile drains on their land.

If current trends continue, tile drainage will continue to be popular and widespread in North Dakota for the foreseeable future.

Tile drain installation in Cass County in 2007.

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