

A History of Irrigation Equipment Used in North Dakota



Irrigation Research Plots
near Karlsruhe, ND
1975 to 1985

Tom Scherer
NDSU Extension
Agricultural Engineer

The first recorded irrigation in North Dakota was in the 1870's in the Nesson Valley, 25 miles east of present day Williston, ND next to the Missouri River.

They irrigated oats for the horses at Fort Buford.



The first Buford-Trenton Irrigation Project, 1908 to 1924 used “wild” flood irrigation.

*HISTORICAL
HIGHLIGHT*



Irrigation provides agricultural stability even in below normal precipitation years, as evidenced by these photographs of the Harry W. Long irrigation project near Solen in Sioux County, 1938.

1939 - Tractor powered pump used to deliver water to the irrigation system.

Note the belt drive from tractor to pump.

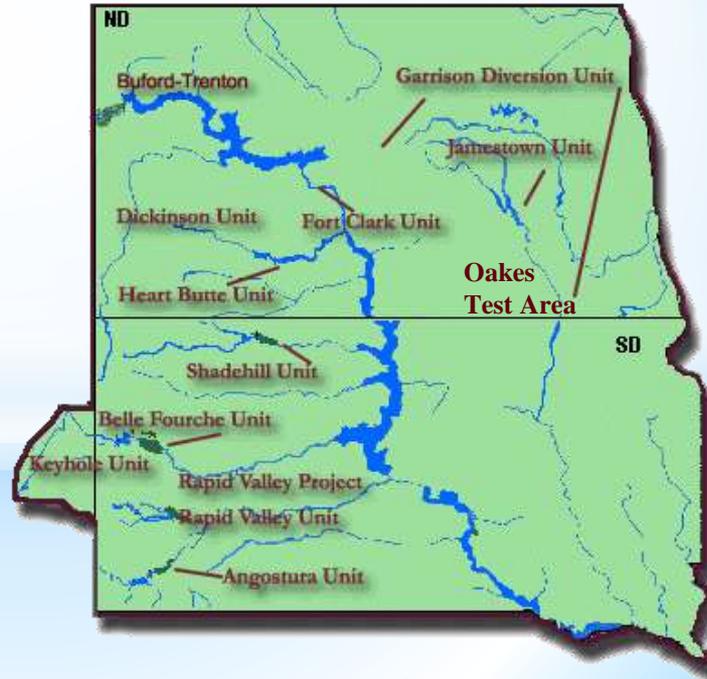


During World War II, many people had Victory Gardens. This one was located south of Bismarck. Note the motorized pump-jack supplying water to the sprinkler system



US Bureau of Reclamation: Dakotas Area Office Irrigation Project Areas

After World War II, the US Bureau of Reclamation built several irrigation projects in North and South Dakota. These used “gravity” or flood irrigation.



Many of the USBR irrigation projects were designed to use siphon tubes on furrow-irrigated row crops.



In the 1950's, many irrigators switched to "gated pipe" to supply water to the furrows. Gated pipe is still used in the Buford-Trenton, Lower Yellowstone and Heart River Irrigation Districts



Surface
irrigation
construction and
water delivery
systems in 1960

Irrigation Ditch on Contour



Irrigation Ditch Plow



Canvas Check Dam

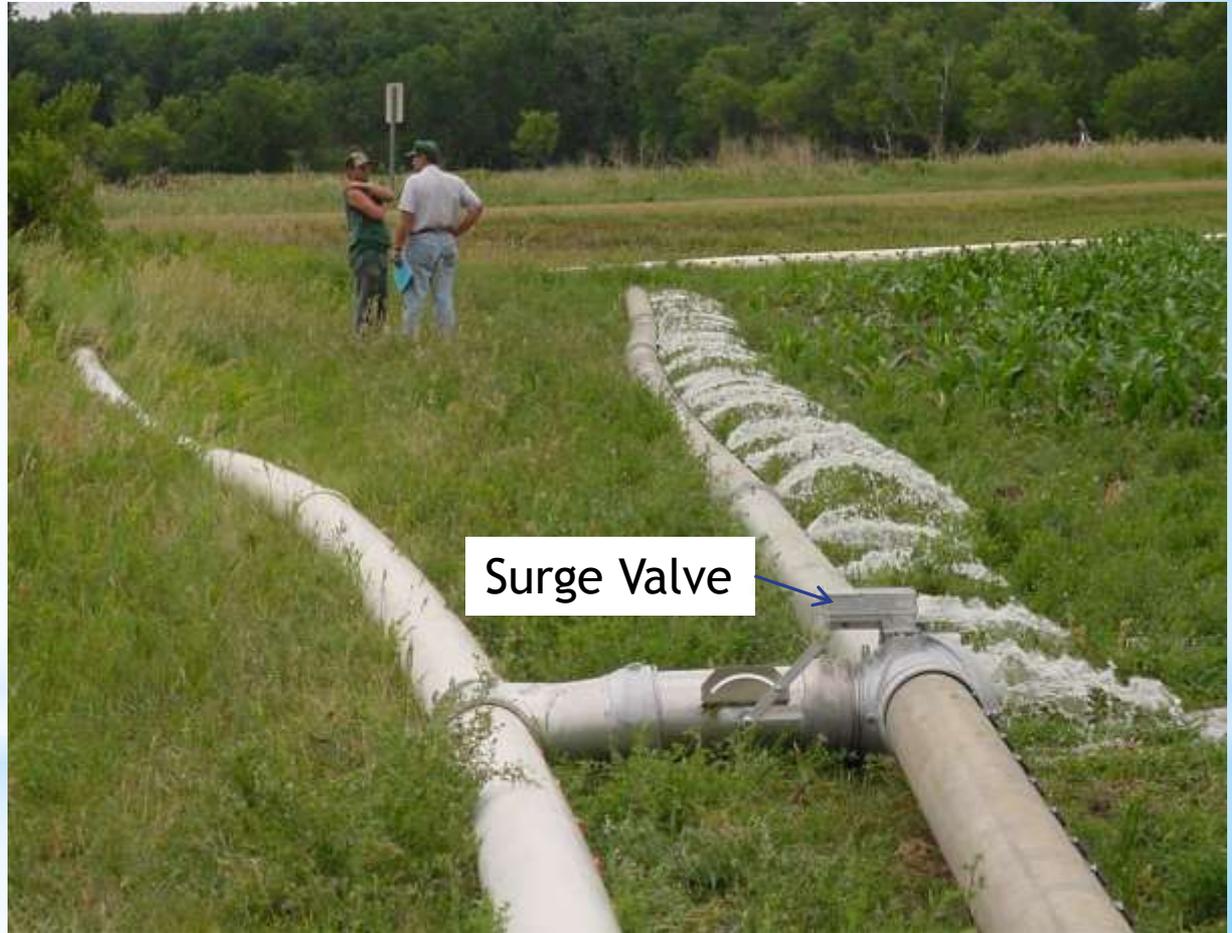


6-inch Diameter Siphon Tubes



Gated pipe irrigation systems are still in use in several irrigation projects.

This one is located in the Western Heart Irrigation District south of Mandan. Note the use of a “surge valve” for water control.





Solid set sprinkler system for alfalfa.

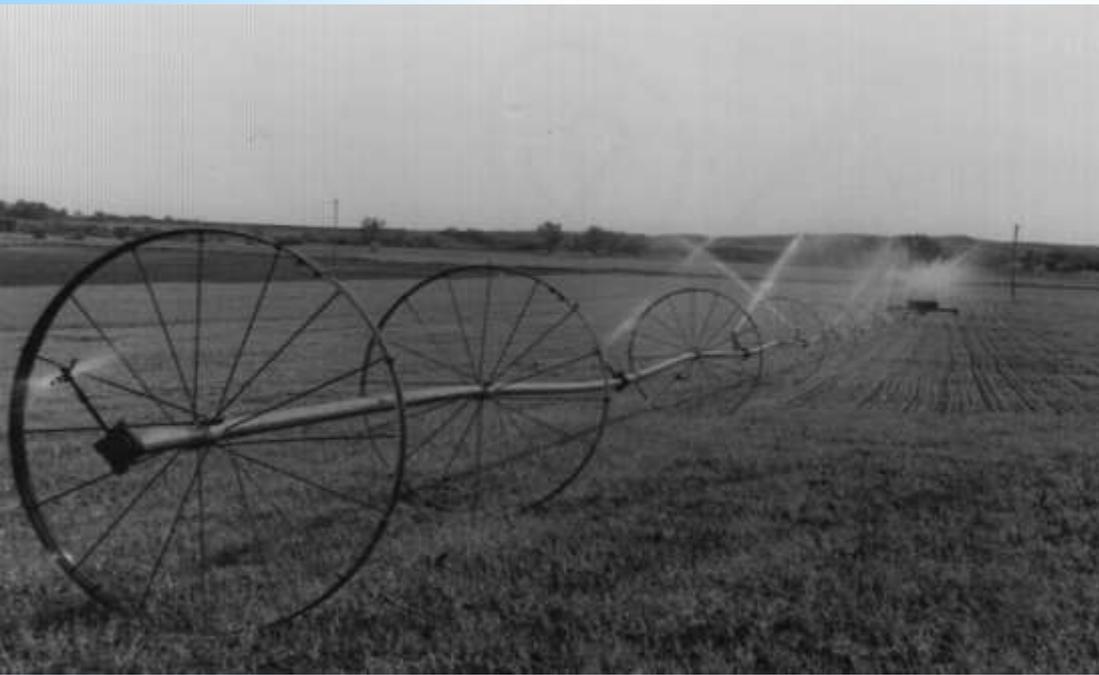


1960's solid-set sprinkler system in a "truck garden" for vegetable production

Related to the solid set sprinkler system was the “Tow-Line.”

During irrigation events, it was towed across the field in a zigzag pattern. Note the skids to keep it upright when being towed.





Starting the late 1940's, many irrigators used "wheel-roll" (sometimes called a "side-roll") irrigation units on low growing crops such as edible beans and alfalfa. These systems are still used in several Western states.



Although no longer used in North Dakota, during the 1950's to the late 1970's, traveling booms were used in several areas.



A cable pulled the boom through the field



Volume sprinklers (commonly called “Big Guns”) have been used from the 1950’s up to the present day. They can throw water from 150 to 300 feet depending on nozzle size, pressure at the sprinkler head and angle of throw.

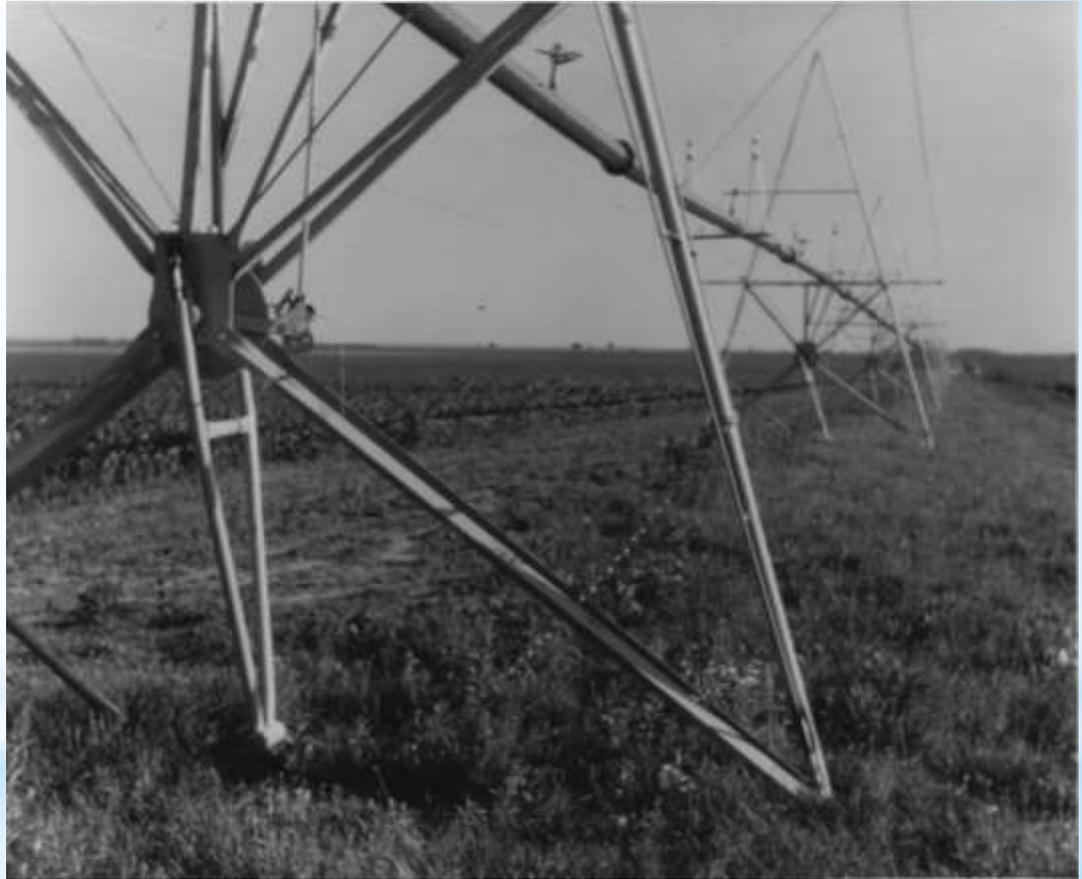
Frank Zybach, a Colorado farmer received a patent for a “central pivot irrigation system” in 1952.

Commercial production of “center pivots” began in the 1960’s. By 1970, there were at least 60 manufacturer’s scattered throughout the Midwest.



During the 1960's many experimental versions of the center pivot were developed. Most were powered by the water pressure in the delivery pipe.

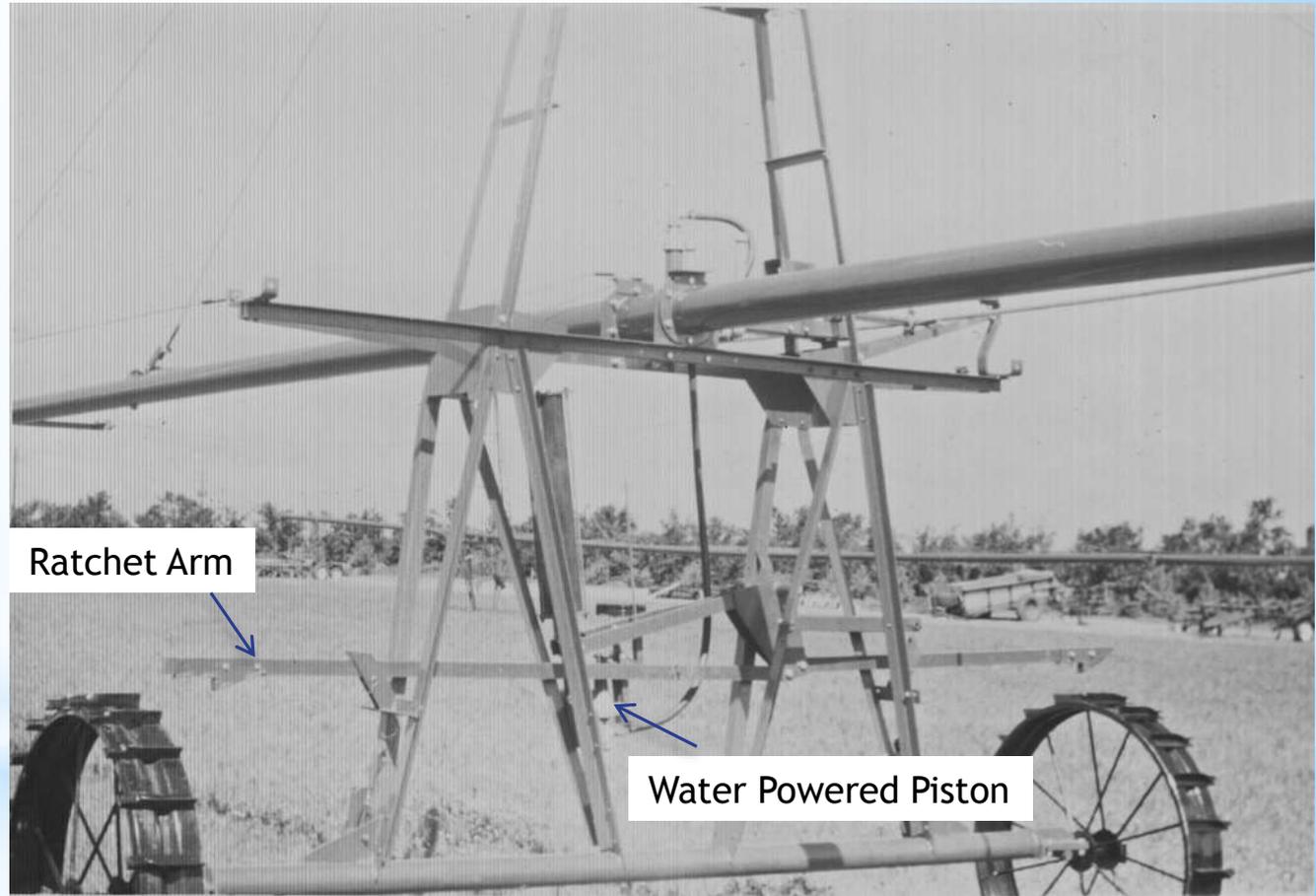
This design featured a “walking foot.” Note the lack of wheels on the tower. It moved by lifting the whole tower forward with the “foot.”





This center pivot design used high towers with cables to support the delivery pipe. The tower was moved using a water-driven gearbox that turned the chain.

This water driven center pivot, used a piston to move the tower by pulling on the wheels with a ratchet. In the picture the pivot is in transport mode to move from field to field but notice the lugs on the wheels and the ratchet arm.



Note the tracked drive wheels on this high pressure center pivot. The tracks prevented the center pivot from getting stuck in muddy areas of the field. Deep wheel tracks and stuck pivots still cause problems.



Another development in the 1970's was the "lateral move" (sometimes called a linear move) irrigation system. It uses the same structural design as a center pivot, but all the towers move in unison across the field. This is a modern, low-pressure system located in the Nesson Valley east of Williston, ND.



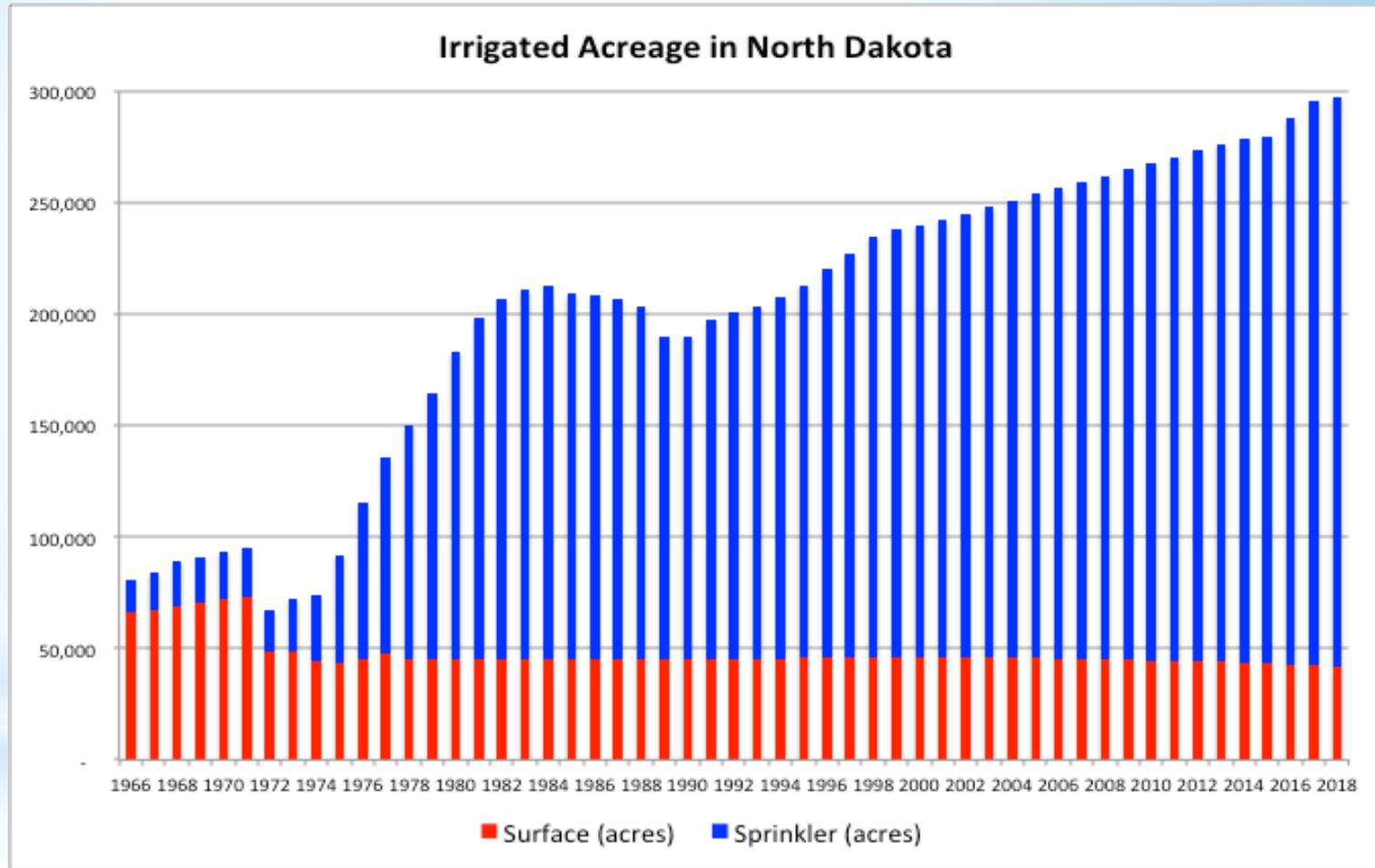


Modern center pivots are now being used for “precision application of water.” This management option (shown above) changes the application amount by varying the speed of the center pivot.

Another method of variable rate irrigation, is to manage the amount of applied water using “zone control” of sprinklers. The applied amount can be changed at different locations in the field.



Currently, center pivots are used on almost all the sprinkler irrigated land in ND. Surface irrigation is still used in the areas developed during the 1940 - 1950's.



Major Irrigated Crops in ND (2018 Farm Service Agency Report)

Crop	Irrigated Acres	Dryland Acres
Corn	110,300	2.96 million
Soybean	70,400	6.75 million
Small Grains	33,500	8.29 million
Potatoes	28,300	45,800
Dry Edible Beans	16,000	602,200
Alfalfa	17,400	464,600
Sugarbeets	11,500	190,000