A History of Wetland Drainage... *How they pulled the plug*

*Draining the inlet swamp in Lee County, Illinois, 1888*

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When water stands in a field for any length of time it is a sure sign that the land needs drainage.

Figure 7. Farm Drainage. 1948.
Drainage was critical for the harvest of crops
Trying to farm wetland in the early 1900’s

Ayres and Coates (1928)
Farming in *Lands*

Ayres and Coates (1928)
Primehook Creek, Delaware-widening main ditch near the bay
A ditch eliminates standing water & lowers the elevation of groundwater
Where ditches should be placed to drain wetland
Diversion ditch
Lazo Marsh
Diversion ditch
Straightening & Channeling Streams
The writer has known of cases where a deep open drain has dried out marshes and swamps through which it passed, for a distance of more than one mile on each side of its banks. Allen Boyer McDaniel B. Drainage of Farm Lands. 1879
A large, swampy piece of land is a blot on the landscape, a source of ill health, and perhaps a calamity to the people in adjacent communities.

Allen Boyer McDaniel B. Drainage of Farm Lands. 1879
A majority of these straightened streams were once a series of connected wetlands. The water flowing in the channels once maintained wetlands on the surface.
Using World War I surplus dynamite
Moving a stream or digging a ditch will trigger head-cuts to form.

Internet image description:
- **Buttons**: a point on the ground.
- **Head-cut**: a cut in the ground that is moving uphill.
- **Head-cut is moving uphill**: indicating the direction of movement.
- **Base elevation of stream was lowered here**: a point where the base elevation has been lowered.
Head-cut is advancing upstream

Advancing head-cut leaves a deeper and wider channel behind

Narrow stream with low banks
Head-cuts have moved through this alluvial fan
Diverted stream has eroded down to bedrock
Head-cut destroys wet-meadow wetland example

Wet-Meadow Wetland

Year 1

Forest with many trees roots

Ditch/Stream

Road

Culvert

Uphill

Downhill

Head-cut
Year 22

Wet-Meadow Wetland

Head-cut

Dry Forest

Ditch/Stream

Road

Culvert
Problems with ditches
A ditch separates one field into two fields.
Beaver dam blocking drainage ditch
Beaver dam blocking diversion ditch
Ditch with head-cut and erosion
Dix River
Lincoln County, Kentucky
Bear Creek
Boyd County, Kentucky
Duncan, British Columbia
Rock Drains

Henry French 1903
Lost Creek
Carter County, Kentucky
Flat rock cover

Two rows of bricks

New York
002  Pattern Tile

One of two tiles imported by John Johnston from Scotland in 1835, as patterns to guide B.F. Whartenby, Waterloo, N.Y., in making tile. The other pattern tile is in the Weaver Collection at the Henry Ford Museum, Dearborn, Michigan.

Donated by Jennie Whartenby
Fig. 65.—OPENING THE DITCH AND LAYING THE TILES.
How tile drainage improves fields

Before

After

Elementary Agriculture by K.L. Hatch, pp. 64-65, 1907
Buried drain lines remove water from a wetland much like the hole in the bottom of a flower pot, only the field is much larger!
Heaths Digging Machine
1867
B.F. Whartenby Clay Tile Factory Waterloo, NY

Tiles made:
1838 = 3,000
1848 = 180,000
1849 = 840,000

By 1871 there were 10 factories manufacturing clay drain tile in Waterloo!
John Johnston Farm
72 miles of buried clay tiles installed on 320-acres
Farm and Residence of

John Johnston
1791–1880

Eminent farmer who here originated tile underdrainage in America in 1835 and thereby became an outstanding contributor to human welfare.

Honored by the American Society of Agricultural Engineers 1935

Erected by State Education Department
Mike Weaver
DRAIN TILE MUSEUM

Home of John Johnston
"Father of Tile Drainage in America"

FOR ADMISSION PROCEED TO ROSE HILL MANSION
4/10 MI. NORTH ON 96A
Before installation of buried clay tile

After installation
1,140 Factories manufacturing clay tile in US by 1882!
Wetland drainage techniques were advanced and shared.
Drainage Districts were formed to create the outlets needed for buried drain lines.

This straightened stream provides the deep outlet needed for buried drain lines.
Figure 2-2—Drainage rehabilitation work occurred during the Depression thanks in part to the Civilian Conservation Corps.
Surface inlet for buried drainage system
Surface inlet the day it rained
Surface inlet one day after rain
Surface inlet two-days after rain
Surface inlet three-days after rain
Irrigated land in the West and Southwest was drained using buried drain lines.
Filling of Wetlands

Vancouver Island, British Columbia
A major sign showing where wetlands have been leveled

The fields do not contain pits and mounds
This root mass was 4.5 meters high!
How can you tell where wetlands have been filled & drained?
Think of a fashion model, no one can naturally look this perfect

*Fields are retouched wetlands, just like glamour photos!*
Can you find the historic wetlands?
Buried clay tiles and plastic drain lines

Spring flow placed underground

Diversion ditch
Many wetland “creation” projects are actually wetland restoration projects, where someone has done an A+ job draining the wetland.
Greenbrier Inn
White Sulphur Springs, West Virginia
Greenbrier
White Sulphur Springs
on the
Chesapeake & Ohio R'y.

Harrison Phoebus
Proprietor
Hygeia Hotel Old Point Comfort, Va.

Lessee
W. Va.
Drain pipes
Shore of wetland

Trees growing in deepest part of wetland

Buried drain lines

Ditch

Pump
Diversion ditch at base of hill

Buried drain lines & leveled field

outlet

Straightened stream
Points to ponder about building wetlands on farmland
1) Someone has been there before you
2) Their living depended on growing crops off the land
3) They worked tirelessly to remove excess water from fields
4) These folks were every bit as smart as we are today!
Wetland and stream restoration projects should take action to disable historic drainage practices to be successful.
Attempting to build a wetland without addressing historic drainage is like trying to cure cancer with a Band-Aid.
Wetland Drainage, Restoration, and Repair

Thomas R. Biebighauser

Wetland Restoration and Construction: A Technical Guide

Thomas R. Biebighauser