

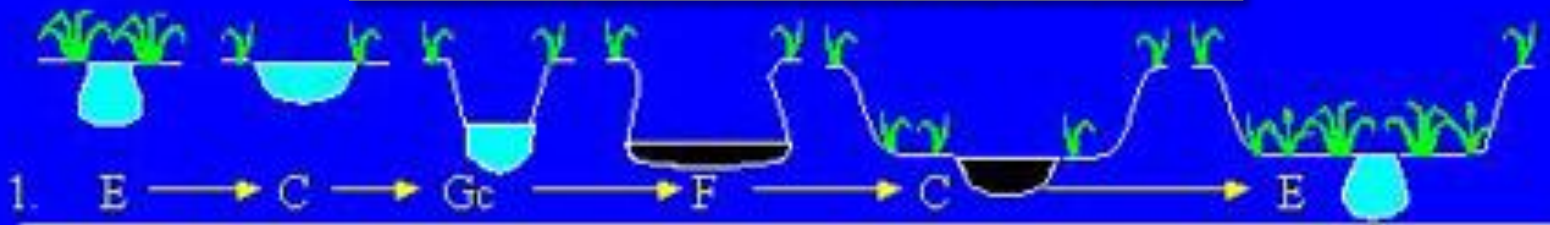
Self-forming streams *(Over-wide ditch)*

Restoration of lotic ecological function:

- By self-organization of a complex system
- Driven passively by energy and materials from the broader system
- Described by principles of ecological engineering combining:
 - Geomorphic channel evolution
 - Ecological succession

Dan Mecklenburg
Ecological Engineer,
Ohio Department of Natural Resources

Channel Evolution



Unintended Self-formed Streams



“Channelized Rivers”
By Andrew Brooks, 1988

University of Illinois
Rhoads & Herricks, 1996

Ohio State University
Ward & Mecklenburg, 2001

Ongoing Investigation of Self-forming Streams

Ohio Department of Natural Resources, Division of Soil and Water Resources



Background

1999 – Initiated previous study of unintended self-formed streams in ditches.

2005 – Started intentionally building self-forming streams. Now Tracking 48 projects:

- Mitigation work

- Small streams (median 0.75sq.mi.)

- Length about 1100 feet

Beem Ditch

Drainage area 0.45 sq.mi.



Target width \approx 10 times bankfull channel width

100% target (middle natural range, beltwidth)

50% target (good lower limit of natural)

30% target (minimum)

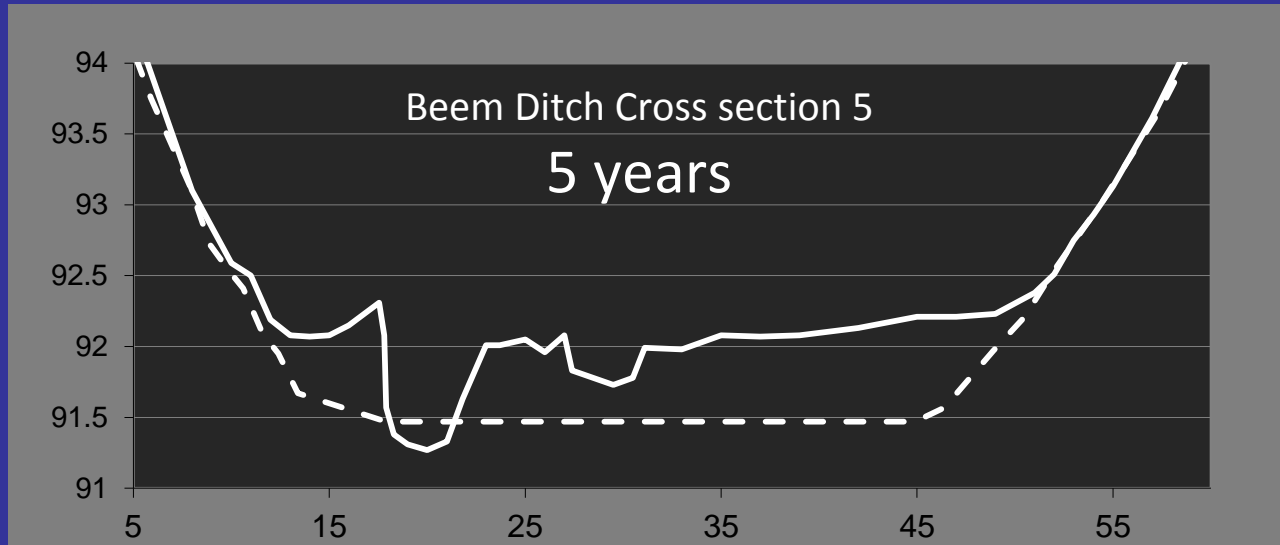
Beem Ditch

Drainage area 0.45 sq.mi.

Floodplain accretion:

0.7 in/yr

32 cu.yd./yr



Beem Ditch

Drainage area 0.45 sq.mi.

Floodplain accretion:

0.7 in/yr

32 cu.yd./yr



Columbia Street Ditch

Drainage Area: 0.34 sq.mi.

Floodplain accretion:

0.3 inches/yr.

62 cu.yd./yr



Fisher Run

Drainage area 2.54 sq.mi.

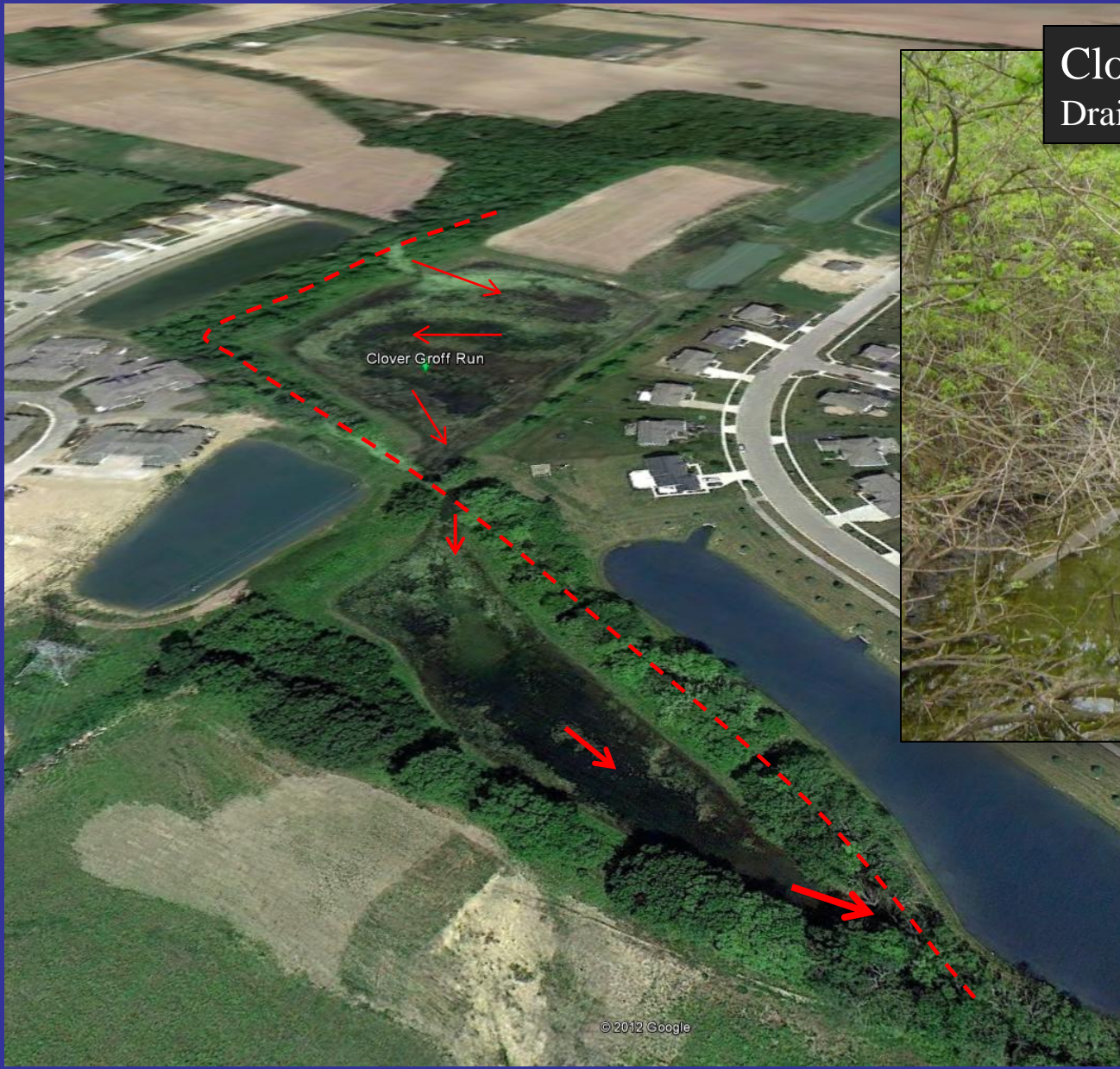


Fisher Run
Drainage area 2.54 sq.mi.



3ed growing season

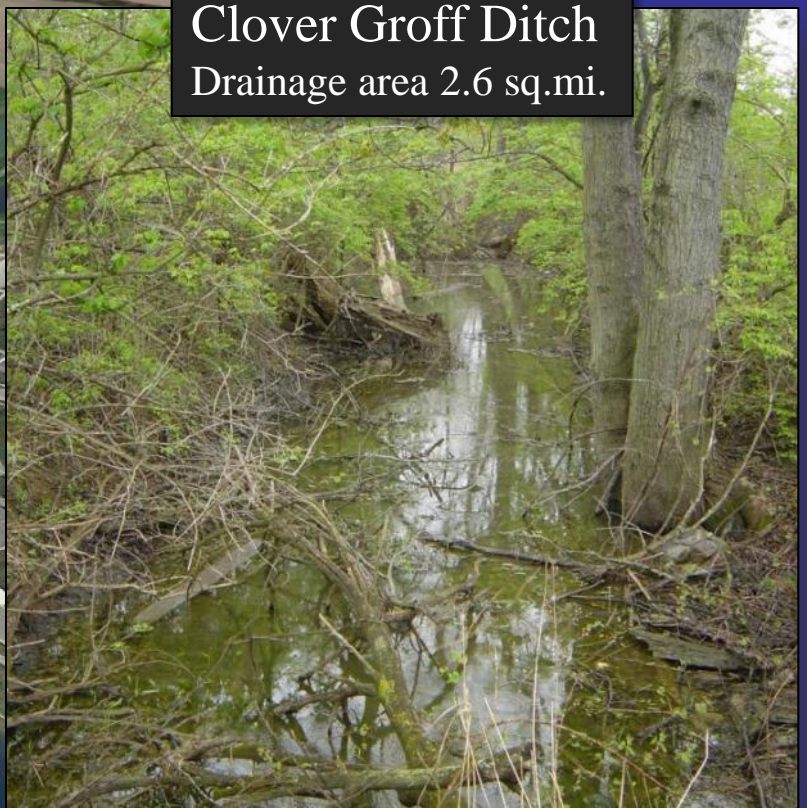




Clover Groff Run

© 2012 Google

Clover Groff Ditch
Drainage area 2.6 sq.mi.



Clover Groff Ditch

Drainage area 2.6 sq.mi.

Floodplain accretion:

0.5 inches/yr

243 cu.yd./yr



Tributary to Clear Creek



Tributary to Muddy Creek

Drainage area 0.5 sq.mi.

New length
0.6 miles



New 15 foot base width



Old 4 foot base width

Tributary to Muddy Creek

Drainage area 0.5 sq.mi.



Ecological Service

PROJECT REACH

3	floodplain ratio
1000	project length (ft)
1	drainage area (mi ²)
1	soil density (g/cm ³)
62.5	(lb/ft ³)
25	channel evolution (yrs)

SEDIMENT SINK

14,093	floodplain storage (ft ³)
881,537	(lbs)
35,261	(lbs/yr)

PHOSPHOROUS SINK

600	Phosphorous (ppm)
528.9	(lbs)
21.2	(lbs/yr)

DENITRIFICATION

Floodplain		Channel	
9200	surface area (ft ²)	4600	surface area (ft ²)
100	Inundation (days)	365	Inundation (days)
1	Denitrification (g/m ² /day)	1	Denitrification (g/m ² /day)
0.000205	(lb/ft ² /day)	0.000205	(lb/ft ² /day)
188	Nitrogen (lb/yr)	344	Nitrogen (lb/yr)
<u>Total Denitrification</u>			
532	(lb/yr)		



For info search Google maps for “self-forming streams”



dan.mecklenburg@dnr.state.oh.us

