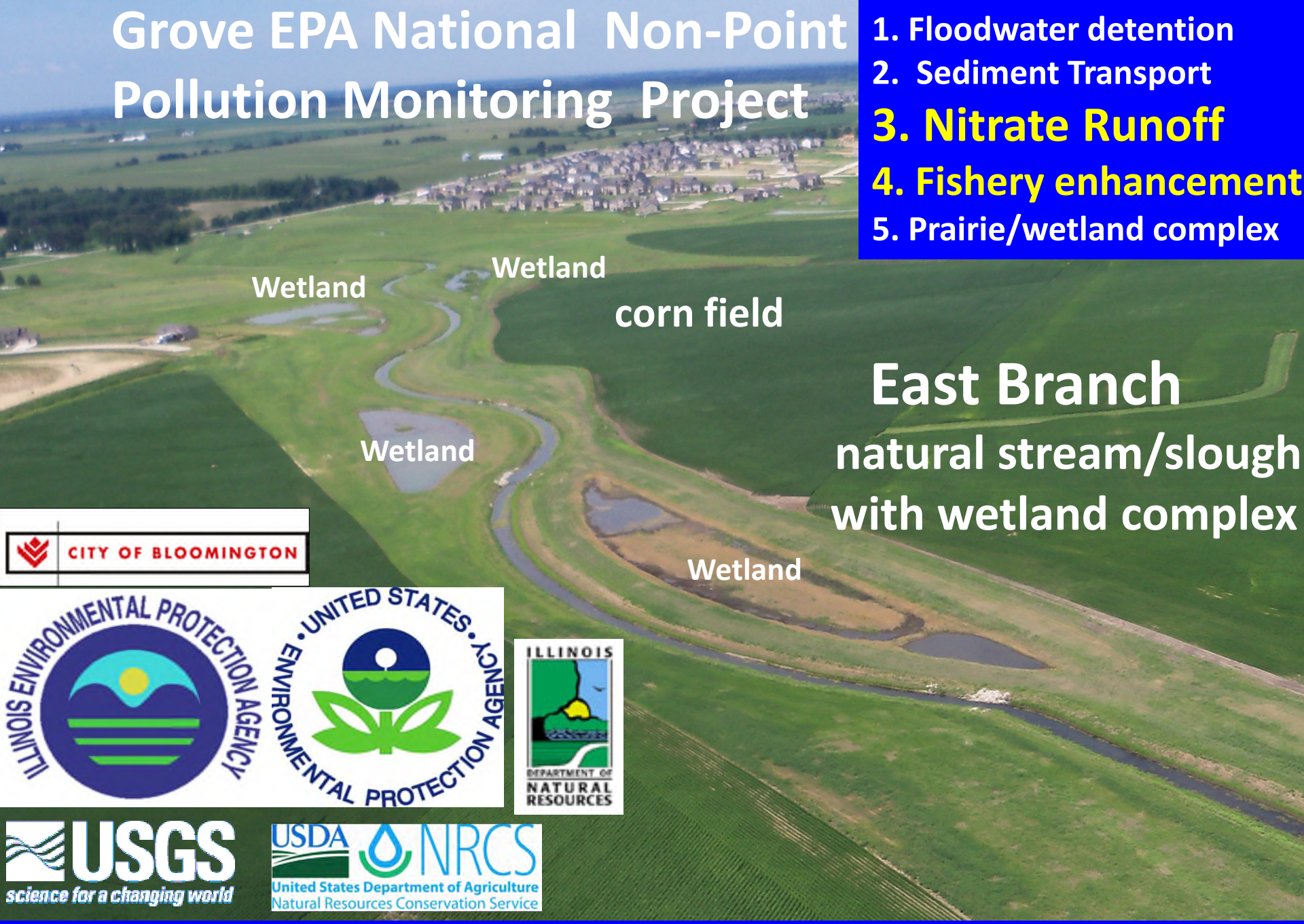
Grove EPA National Non-Point Pollution Monitoring Project

1. Floodwater detention
2. Sediment Transport
3. Nitrate Runoff
4. Fishery enhancement
5. Prairie/wetland complex



CITY OF BLOOMINGTON

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

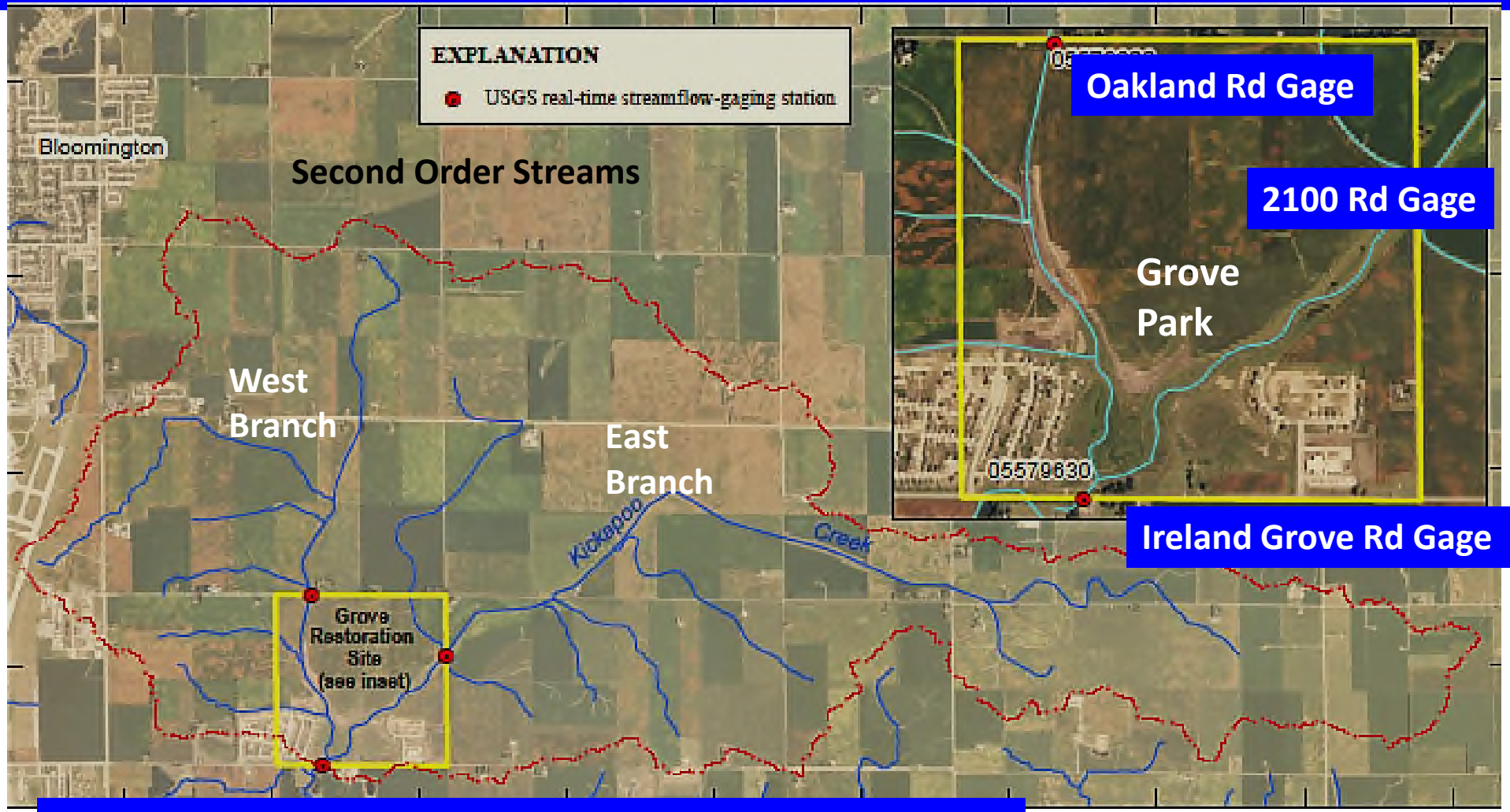
ILLINOIS DEPARTMENT OF NATURAL RESOURCES

USGS science for a changing world

USDA NRCS United States Department of Agriculture Natural Resources Conservation Service

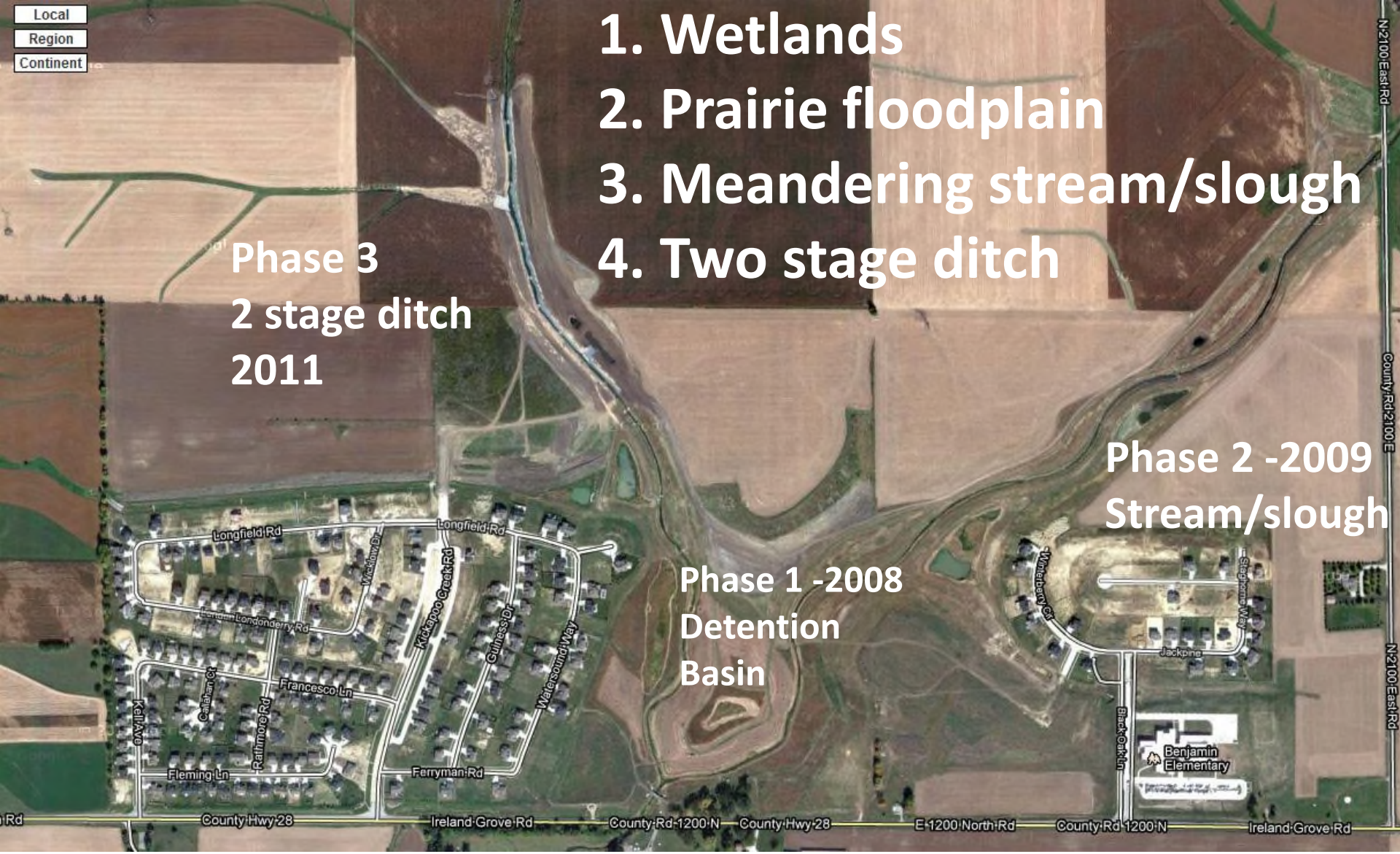
Grove Restorations are funded by city, state, and federal agencies

Oakland Rd Gage and 2100 Rd Gage measure sediment and nutrients moving into the Grove from West and East Branch drainage ditches



Ireland Grove Rd Gage measures what leaves the Grove

Before restoration at 2100 Rd , East Branch ditch revealed sedimentation, reed canary grass, and filiamentatious algae

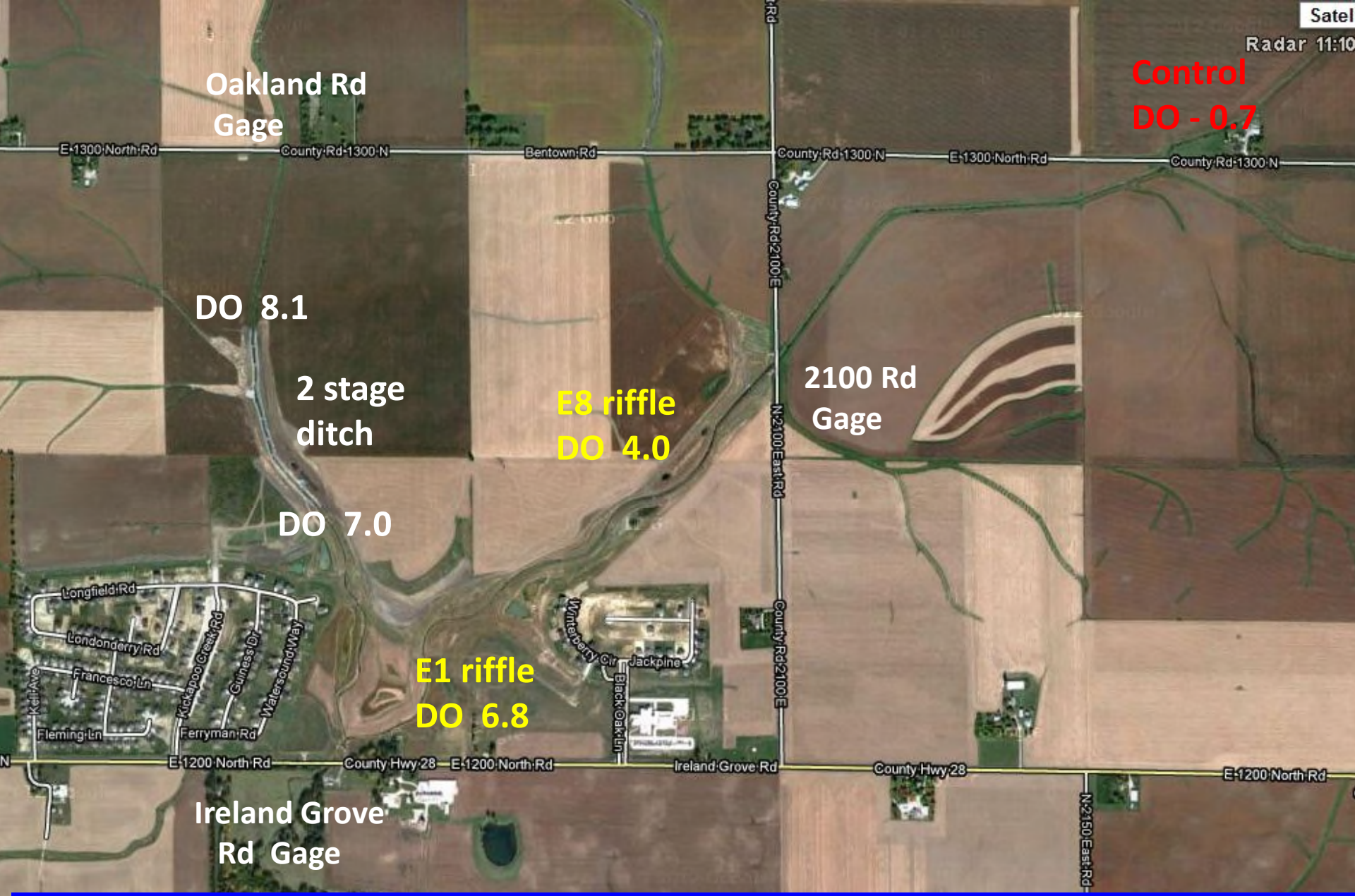


BMP's to improve water quality in the Grove restoration

Prairie and Wetlands are 4+ years old in Phase 1 and 2.

Tim Straub - stream/slough restoration on the East Branch


Sept 12, 2012
IEPA upstream control
East Branch , Oakland Rd
DO – 0.7 mg/l
Conductivity – 636 umhos/cm
Hydrogen sulfide odor
Black organic sediment
Animal waste



IEPA field staff monitored dissolved oxygen in the Grove after the severe drought in early September 2012

East Branch control and two restoration sites

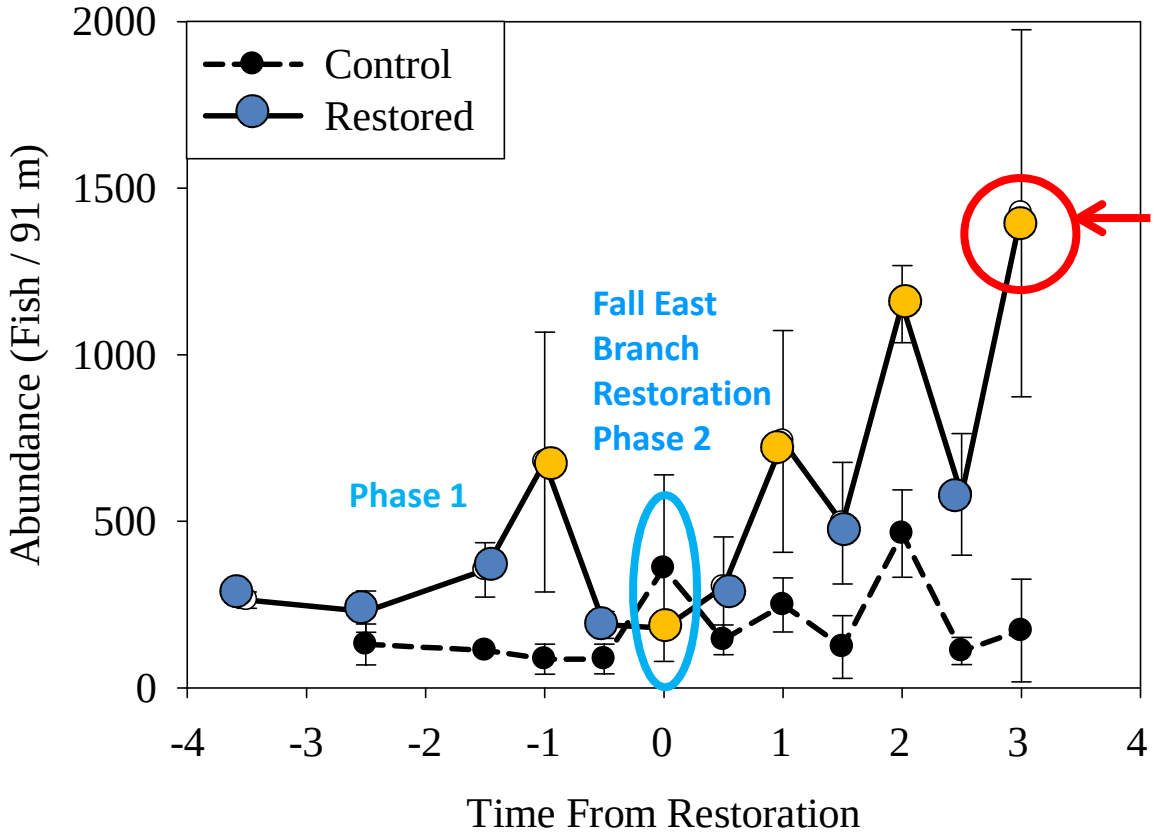
IEPA upstream control
DO – 0.7 mg/l
Hydrogen sulfide odor
Black organic sediment

IEPA at E8 riffle/ pool
East Branch, 2100 Rd
DO – 4.0 mg/l

IEPA at E1 riffle/ pool
DO is 6. 8 mg/l

Even during 2012 drought, fall fish numbers are high in the upper East Branch fish survey pool below the E8 riffle

Fish abundance continues to increase after Phase 2 East Branch Restoration



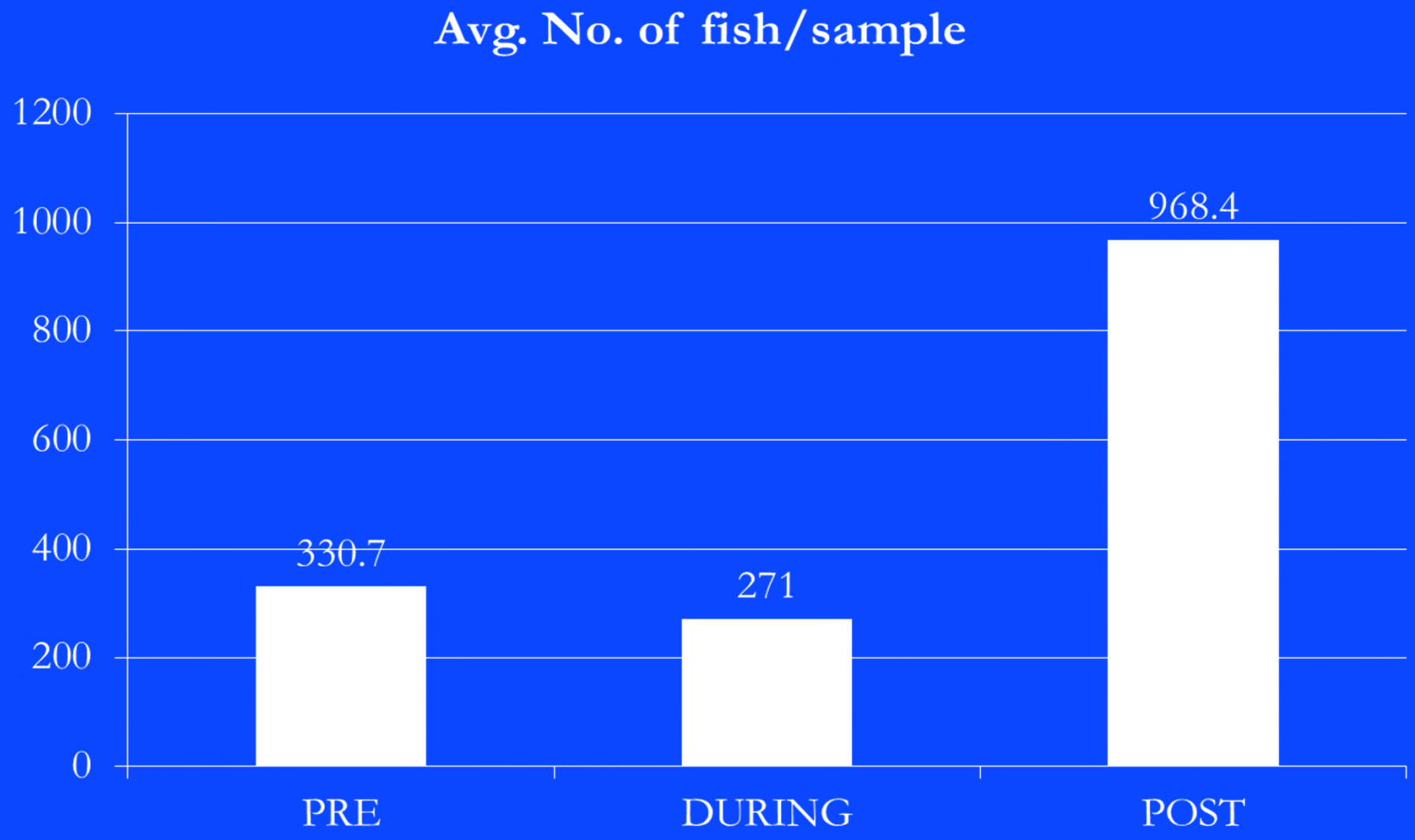
Fall 2012 drought

Fall samples are consistently higher than Spring samples

Initial dip in Fall Treatment abundance (with corresponding jump in Control abundance)

Significant increase in fish abundance

Before During After



The Drought of Aug 2012

East Branch Upstream Treatment Site

High flows scour deep hole

2012 drought did not affect fish in deeper pools

Pre: 12.5 species
303.7 fish

During: 10 species
56 fish

After: 17.8 species
1232.7 fish

In 2012 drought, E8 pool is deeper than staff are tall – stay on steep banks below E8 riffle

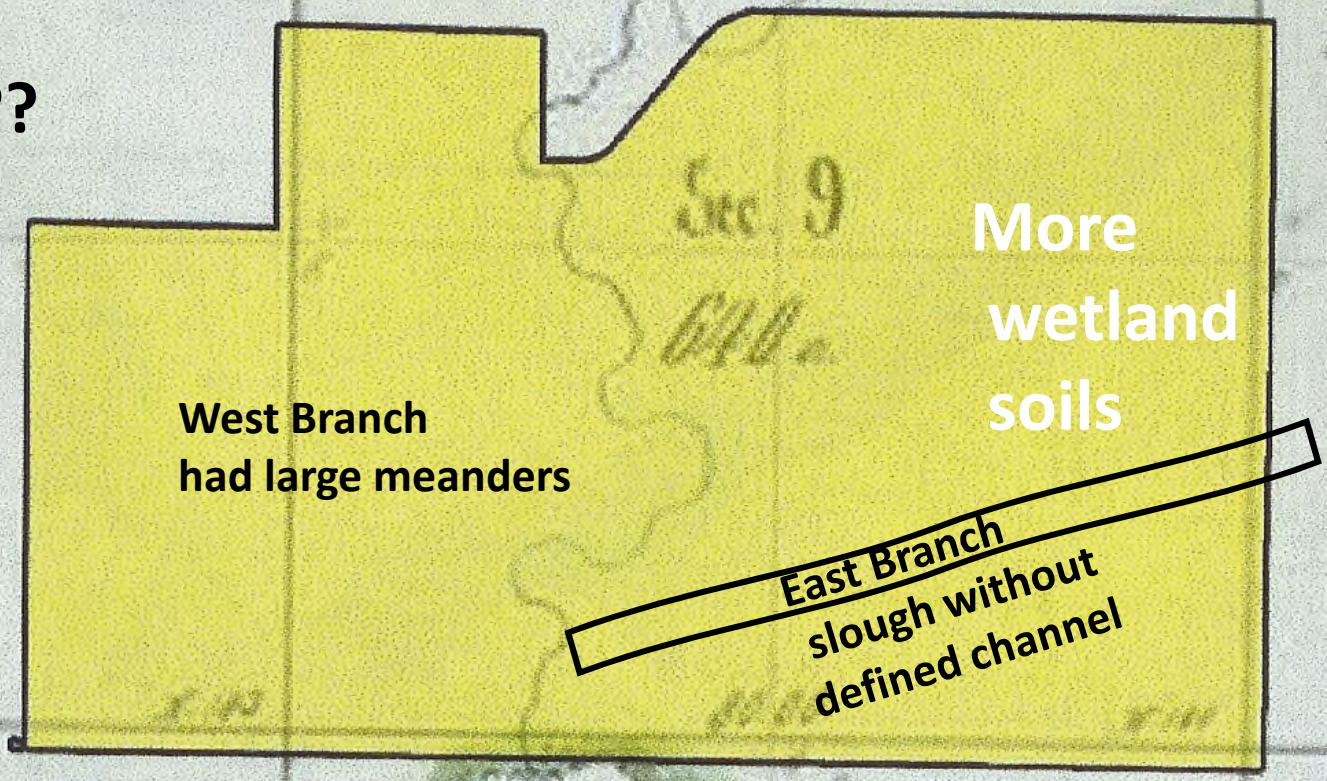

The aquatic vegetation in the Grove prairie slough improved water quality and provided plentiful forage

Stream flow through narrow leaf pondweed increases DO, increases fish forage, and reduces NO_3 in the East Branch during normal stream flows


11.0
Oakland Rd
Phase 3
2 stage ditch
constructed Sept 2011
W17
10.8
2100 Rd
8.4
W12
10.7
8.4 -6.7 = 1.7 mg/l NO3
20 % reduction
E8
7.6
W7
10.7
Phase 2
Nov 2009
E4
7.0
Phase 1
Nov 2008
W1
10.0
05579630
E1 6.7
Ireland Grove Rd

Why is the Grove Restoration so effective for nitrate reduction in the East Branch flows??

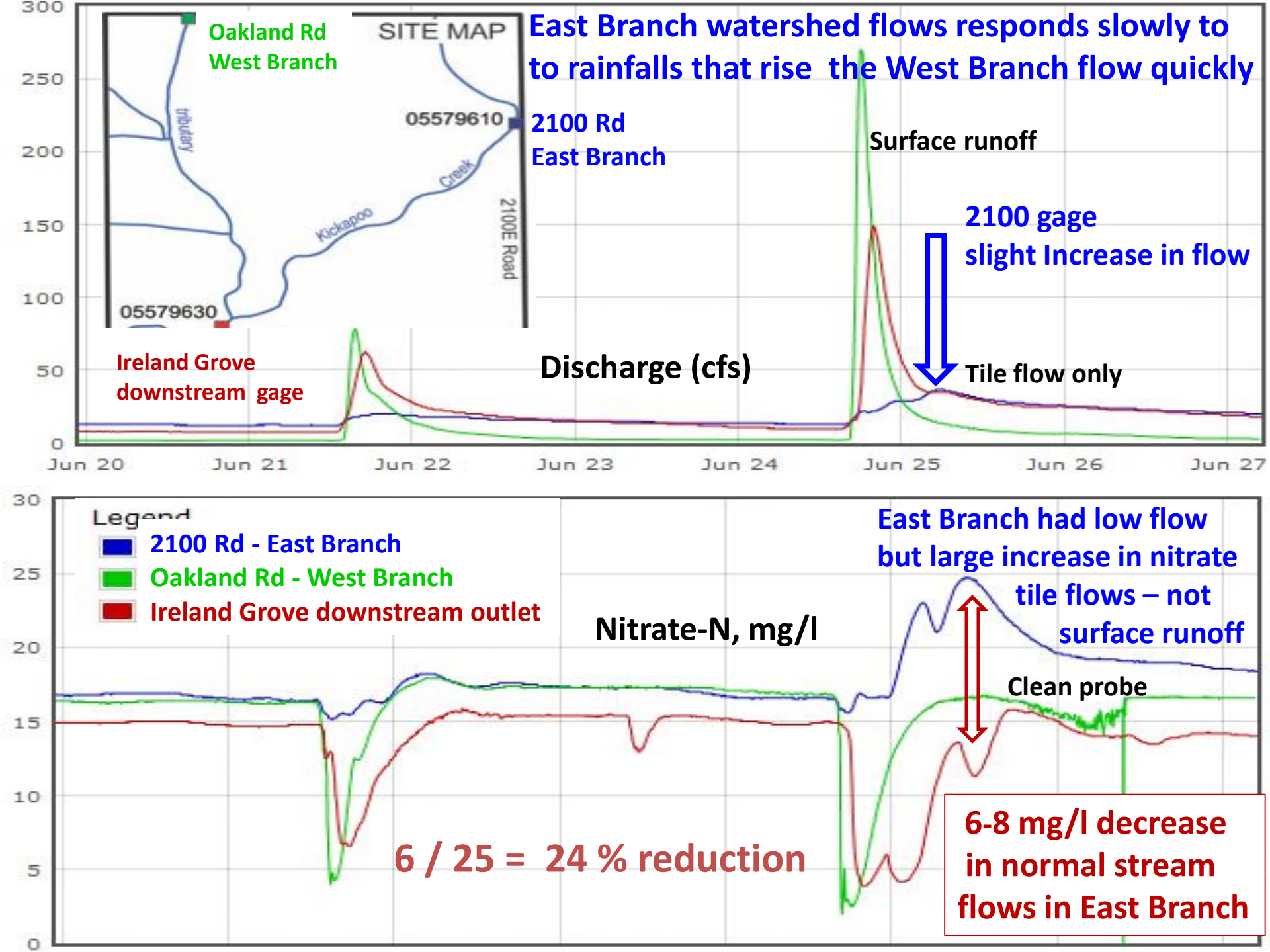
Grove streams in the 1800's

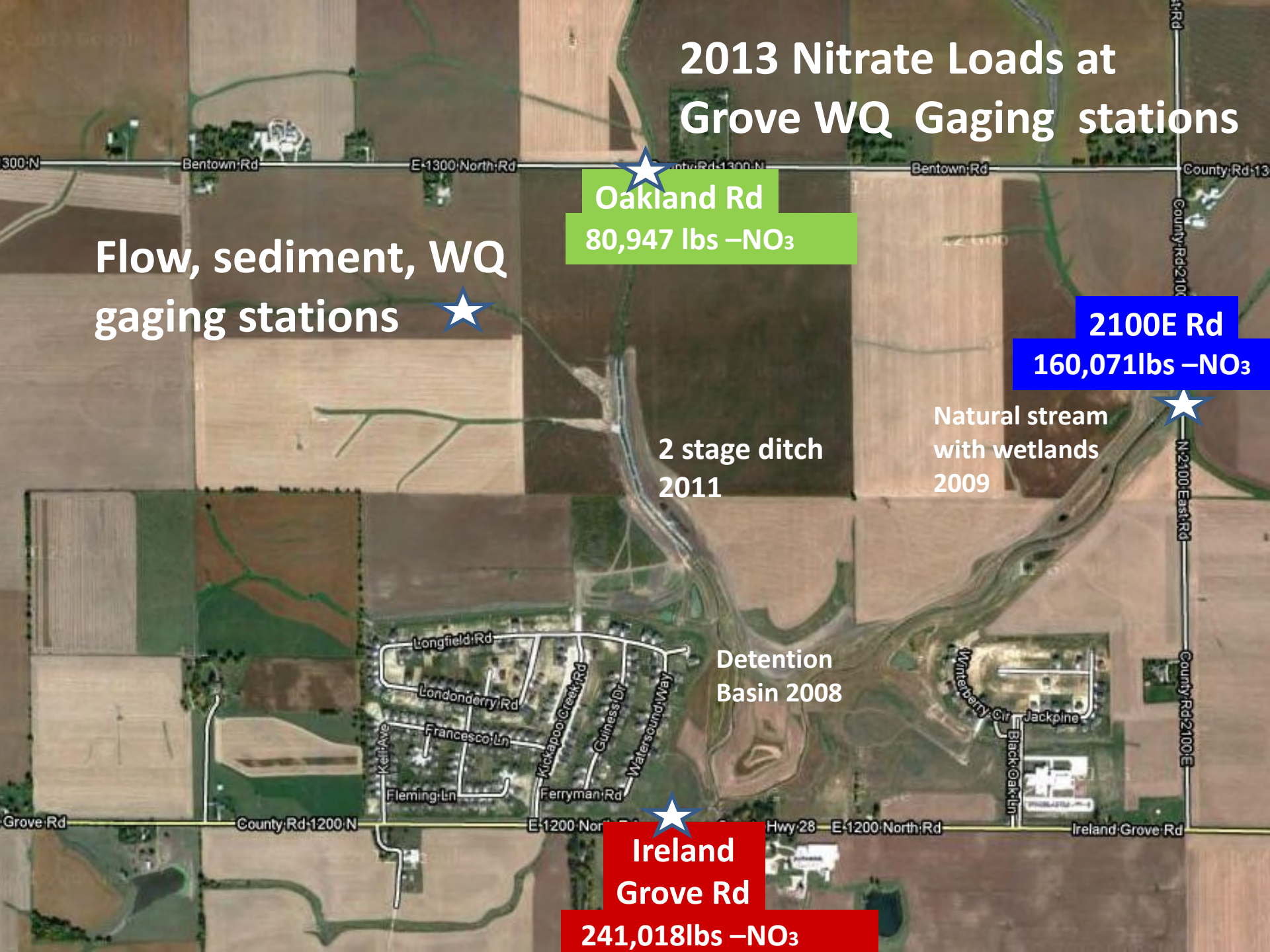


The Grove Housing Development Area

The larger East Branch existed as a slough while the steeper West Branch had large stream meanders

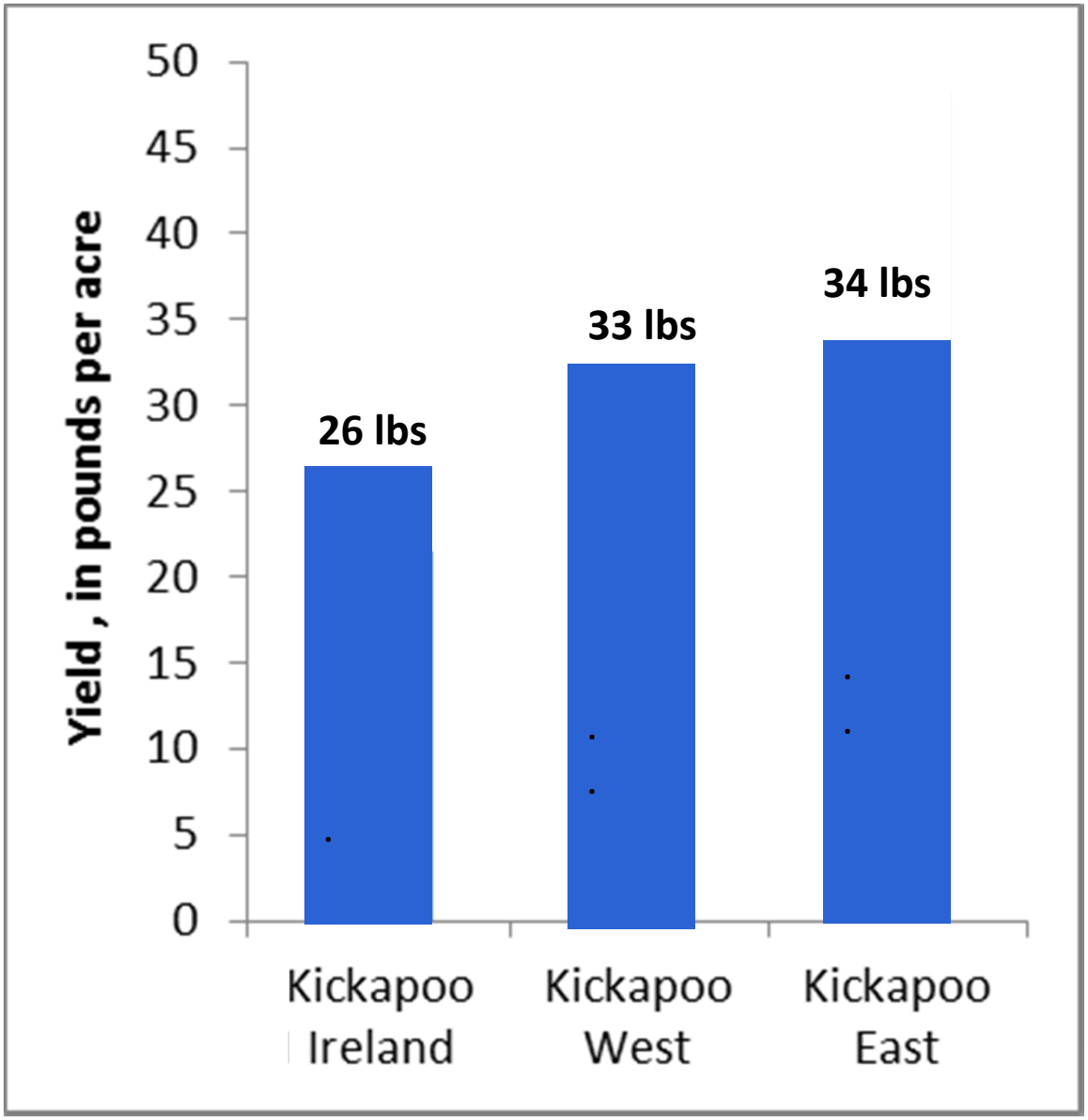

Quick and Intense Rain Storm
1.64 inches in one hour


SITE MAP
Oakland Rd
West Branch
05579610
2100 Rd
East Branch
05579630
Ireland Grove
downstream gage
Kickapoo
Creek
Tributary
2100E Road
East Branch watershed flows responds slowly to
to rainfalls that rise the West Branch flow quickly
Surface runoff
2100 gage
slight Increase in flow
Tile flow only
Discharge (cfs)
300
250
200
150
100
50
0
Jun 20
Jun 21
Jun 22
Jun 23
Jun 24
Jun 25
Jun 26
Jun 27
Legend
2100 Rd - East Branch
Oakland Rd - West Branch
Ireland Grove downstream outlet
Nitrate-N, mg/l
East Branch had low flow
but large increase in nitrate
tile flows – not
surface runoff
Clean probe
6 / 25 = 24 % reduction
6-8 mg/l decrease
in normal stream
flows in East Branch
30
25
20
15
10
5
0


2013 Nitrate Loads at Grove WQ Gaging stations
Oakland Rd
80,947 lbs –NO3
Flow, sediment, WQ gaging stations
2100E Rd
160,071lbs –NO3
Natural stream with wetlands 2009
2 stage ditch 2011
Detention Basin 2008
Ireland Grove Rd
241,018lbs –NO3
Bentown Rd
E 1300 North Rd
County Rd 2100 E
Longfield Rd
Londonderry Rd
Francesco Ln
Fleming Ln
Ferryman Rd
Kickapoo Creek Rd
Guinness Dr
Watersound Way
Keil Ave
Winterberry Cir
Jackpine
Black Oak Ln
Grove Rd
County Rd 1200 N
E 1200 North Rd
Ireland Grove Rd

2013 Nitrate Yield per Acre For Grove Gages

East Branch and West Branch nitrate yields are mainly from tile inputs during low stream flows



At low flows, Incoming Nitrate Load is 320,400 lbs.
Outgoing Nitate Load is 221,000 lbs so that
79,400 lbs nitrate uptake - @ 24.8 percent removed.

rock
chute

Phase 3 prairie
and one wetland

wetland

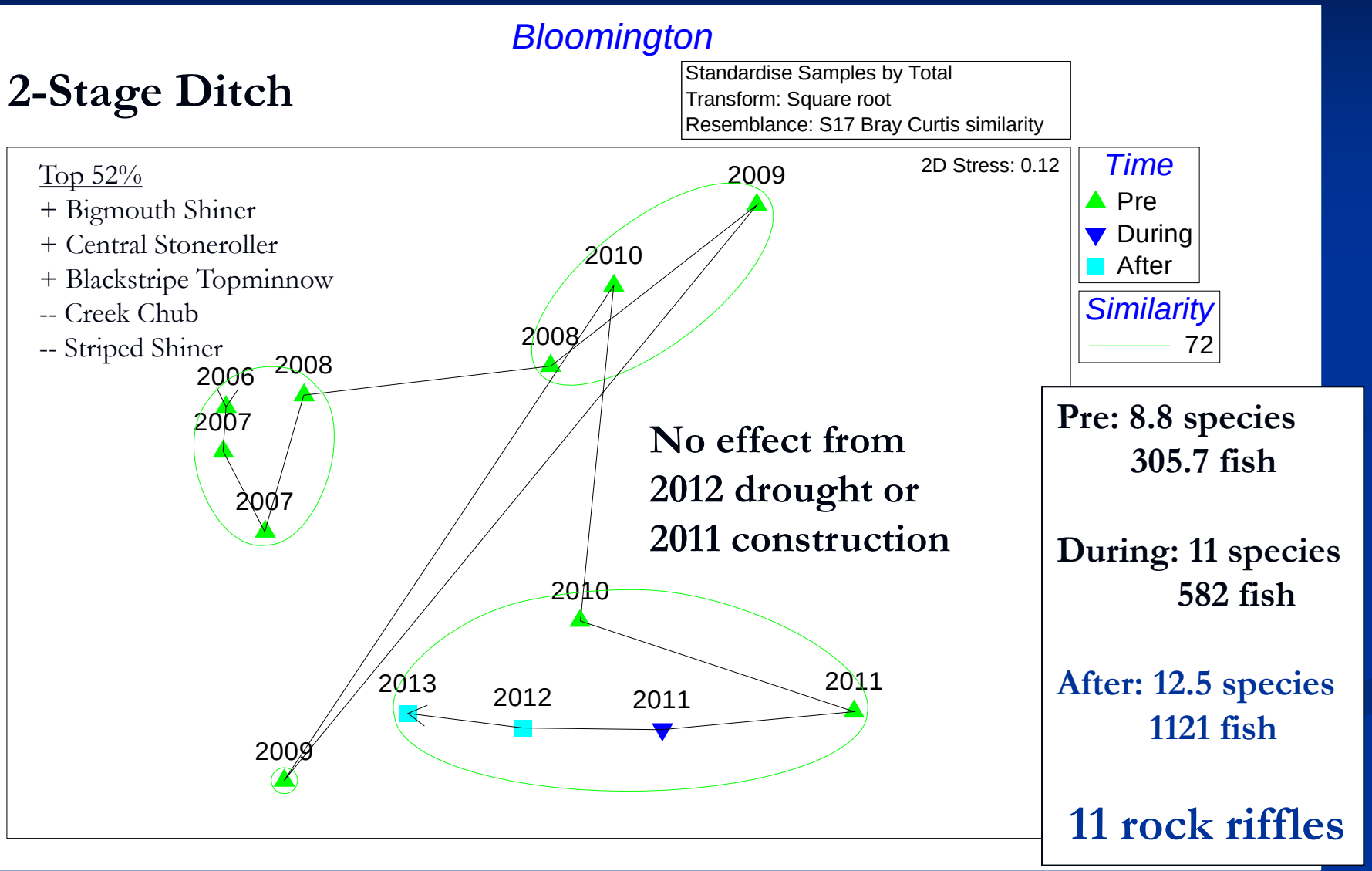
floodplain

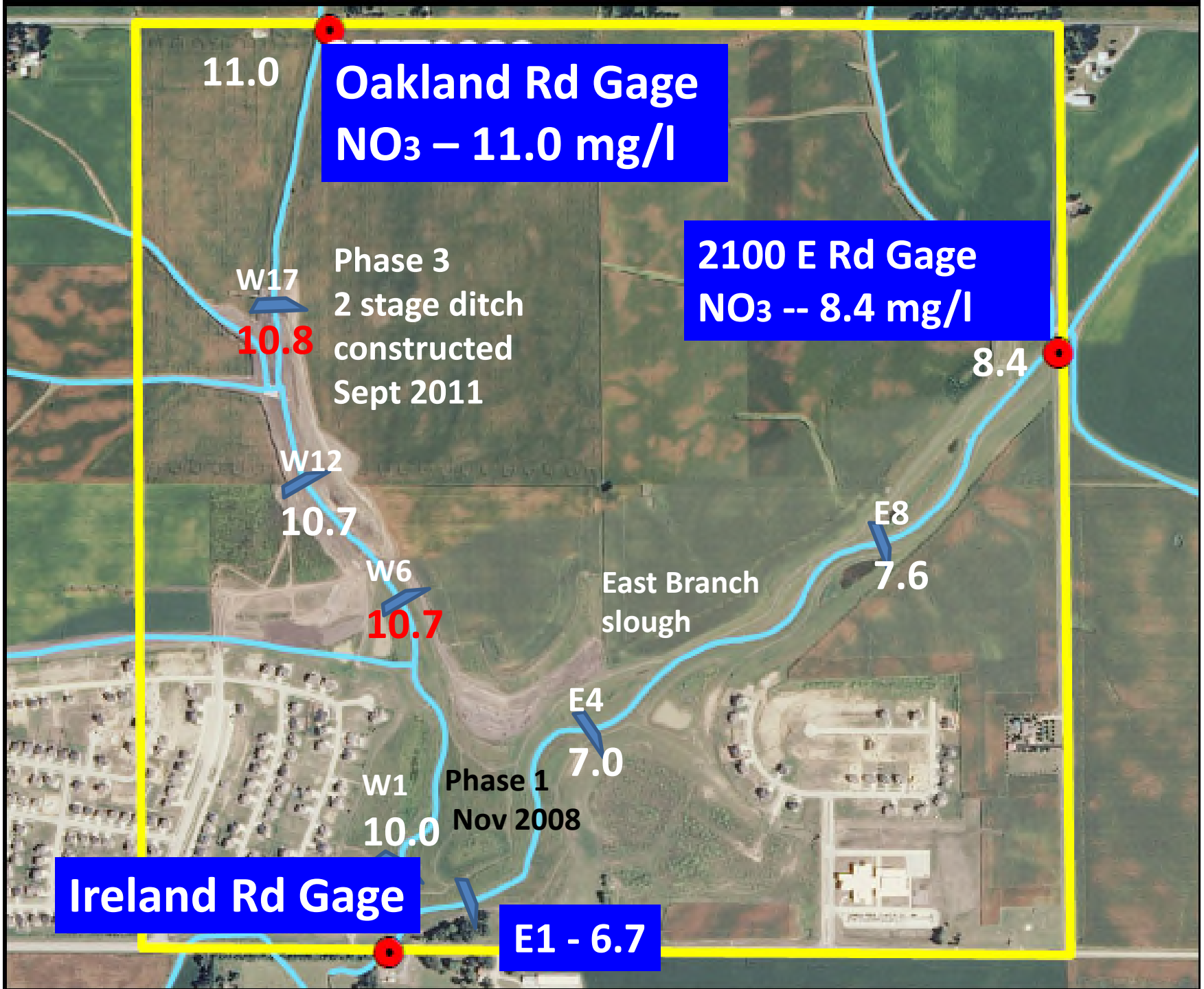
Phase 3 -Two Stage Ditch with 11 rock riffles


Rock chute
Floodplain and sediment bench
October 2010
East wetland
Rowcrop fields adjacent to the lower end of the Grove two stage ditch


Two stage ditch
2012

West Branch --- Two Stage Ditch




11.0
Oakland Rd Gage
NO3 – 11.0 mg/l
Phase 3
2 stage ditch
constructed
Sept 2011
W17
10.8
2100 E Rd Gage
NO3 -- 8.4 mg/l
8.4
W12
10.7
E8
7.6
W6
10.7
East Branch
slough
E4
7.0
W1
10.0
Phase 1
Nov 2008
Ireland Rd Gage
E1 - 6.7


Narrow leaf pondweed has had slow growth in the two stage ditch.

W10 fish riffle pool -- Two stage ditch
Too much shade In narrow original channel