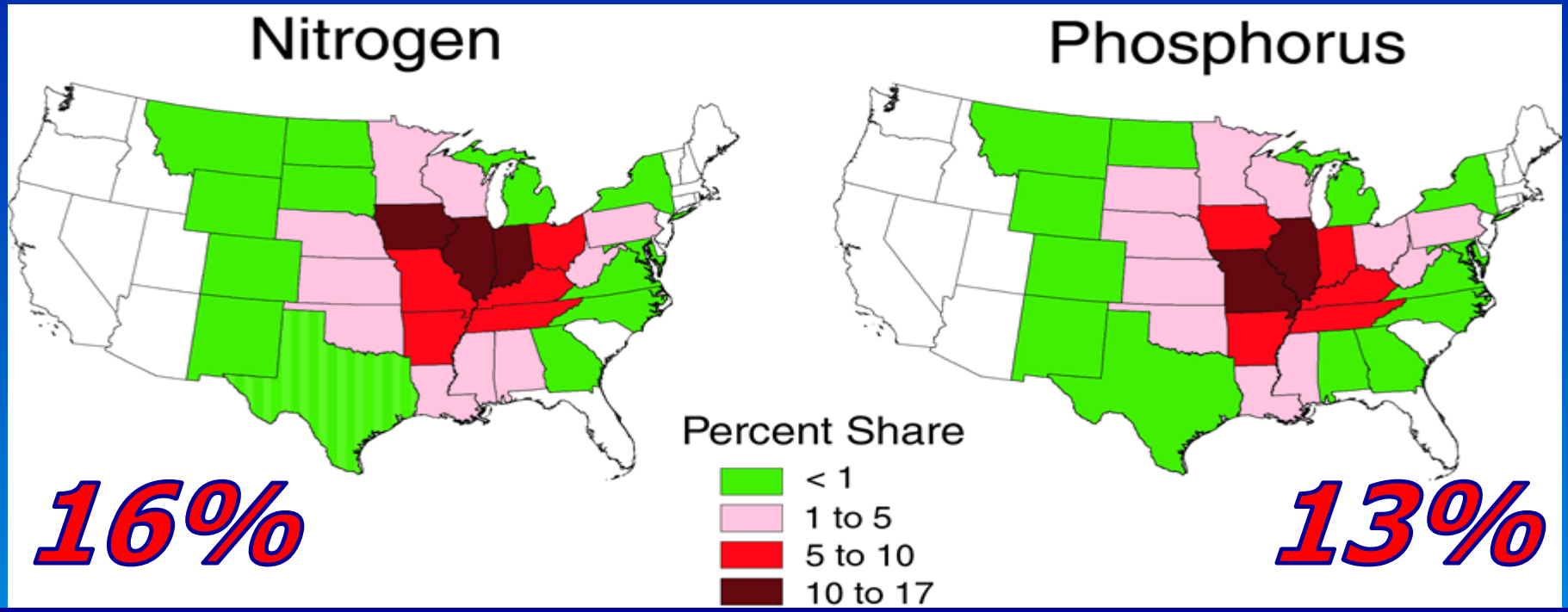
IEPA Nutrient Implementation Update From Point Source Sector

Rick Manner
Urbana & Champaign Sanitary District

November 18, 2015

Nutrient Delivery to the Gulf of Mexico

WE'RE #1 !



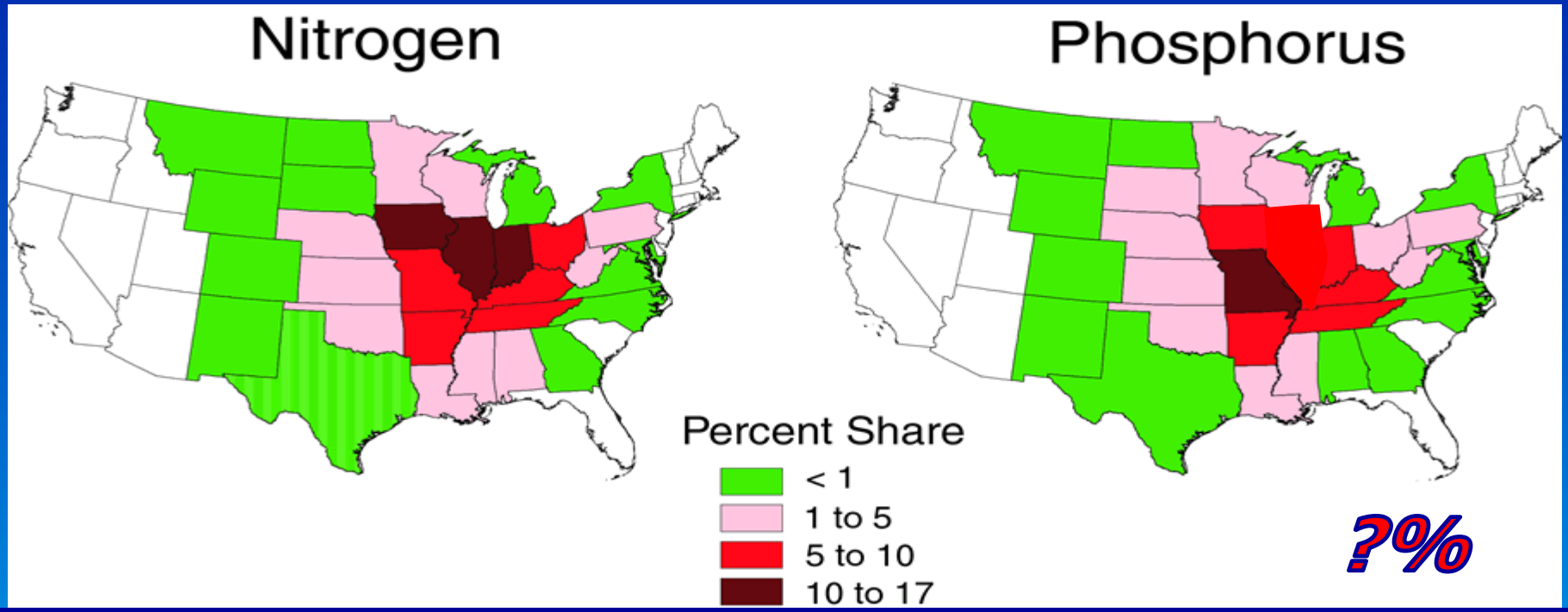
Illinois = **15%** of MS River population

Illinois = **16%** of US corn

Illinois = **14%** of US bean

Nutrient Delivery to the Gulf of Mexico

WE'RE #3 !



Illinois = **15%** of MS River population

Illinois = **16%** of US corn

Illinois = **14%** of US bean

What is Happening?

- Voluntary early action by numerous facilities
  - MWRDGC: chemical P, bio-P, sidestream treatment, N removal
    - 7 million population equivalents
  - Greater Peoria's incorporation of bio-P (2016)
    - 150,000 population, but starting at lower than normal P discharges
  - Fox River's West Plant start up BNR (2012)
    - 20,000 population
  - Fox River WRD: start up of sidestream treatment (2015)
    - Will ramp up in impact as bio-P is installed
  - UCSD SWP conversion from chem P to bio P (2006)
    - 50,000 population (5,000 ppy vs. 20,000 ppy)
  - UCSD's rerouting of 3 MGD from NEP to SWP (2016)
    - (3,000 ppy vs. 30,000 ppy)

What is Happening?

- Non-nutrient solution being activated in DuPage River and Salt Creek Watershed Group

- Illinois Environmental Utility
  - Regular discussions
  - White Paper
  - Attendees include:
    - IEPA, MWRDGC, Agricultural Water Institute, The Nature Conservancy, US Water Alliance, Greeley and Hansen, Illinois Farm Bureau, Illinois Corn Growers, IFCA, IERG, ADM, UIUC, Ingredion, Decatur, BNWRD, SD Decatur, Downers Grove SD, Greater Peoria SD, UCSD, and more…

What is Happening?

- Interim P Rule impacting new and expanded plants since 2006
  - IEPA can provide how many plants and how much of a reduction
  - Springfield's Silver Creek now removing ~100,000 lb/yr
  - Springfield's Sugar Creek soon to be reducing too
    - 150,000 population, $180 million in construction

- Fox River, Des Plaines River watershed groups
  - 1 mg/L limits being done, all will discharge less
    - Have been removing 50% of the P supplied by residents
    - Will be removing 80 to 95% of the P
    - 700,000 population
    - Cost?

What is Happening?

- Optimization plans now required
  - Should result in more reductions
- Feasibility plans now required
  - Should document diminishing returns for extreme limits

What is Happening?

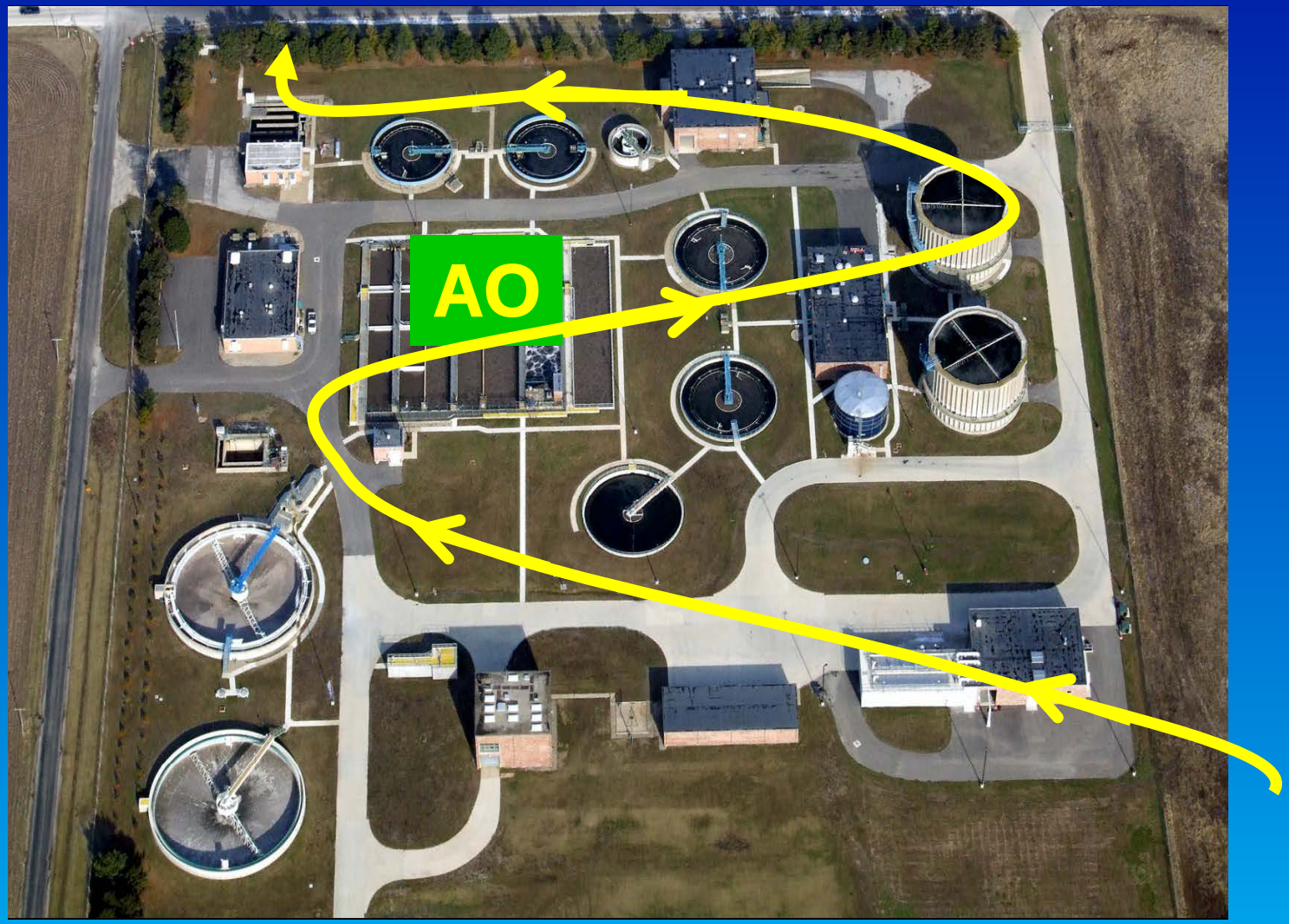
- Eventually can't go lower...
  - 6 mg/L in most domestic sewage = 50 ppd for 1 MGD = 18,000 ppy
  - 3 mg/L = 50% removal = 25 ppd step change = 25 ppd effluent
  - 1 mg/L = 83% removal = 16 ppd step change = 9 ppd effluent
  - 0.5 mg/L = 92% removal = 5 ppd step change = 4 ppd effluent
  - 0.3 mg/L = 95% removal = 3 ppd step change = 2 ppd effluent
  - 0.1 mg/L = 98% removal = 1 ppd step change = 1 ppd effluent
- "Rewarding" innovators with limits is a huge disincentive

What Should Illinois Do?

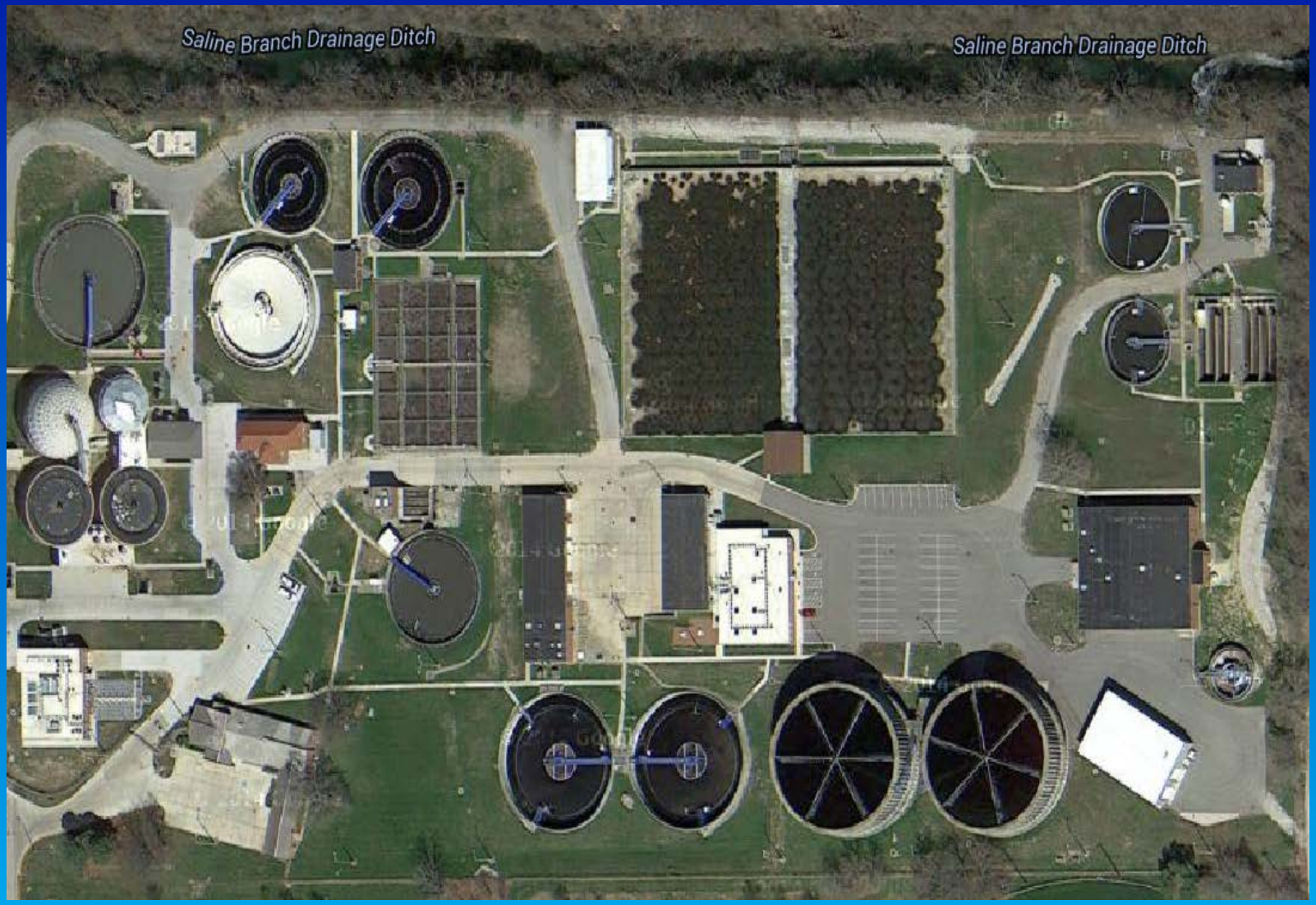
- Fixing local problems – those we can solve
- Projects suggested by data/watershed groups – not all N & P
- Our part in reducing Gulf Hypoxia – it's happening
  - Optimizing existing plants
- **In Ag-dominated areas** – no magic bullet yet
  - Continuing research and testing new ideas
  - Wetland treatment, cover crops, bioreactors in fields
  - Sangamon Nutrient Management Coalition
- Environmental Utility (???)
- Whatever works in other states

UCSD Southwest Plant

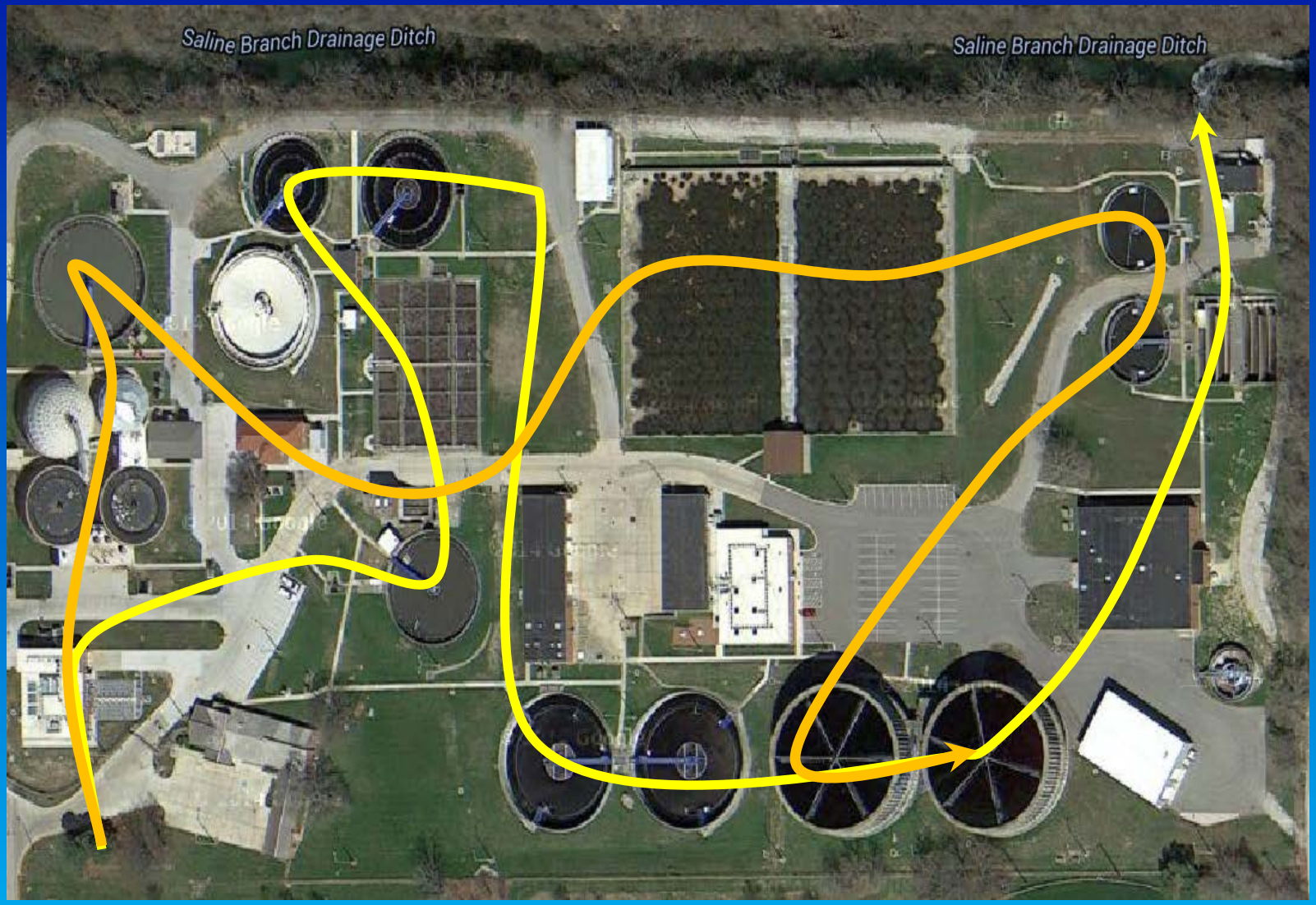
UCSD Southwest Plant



UCSD Northeast Plant



UCSD Northeast Plant



Other Facilities

- Bloomington Normal Water Reclamation District – North Plant
  - Trickling filters and nitrifying towers
  - Total N ~13 mg/L

- Greater Peoria Sanitary District
  - Rotating Biological Conactors
  - High alcohol waste influent
  - Total N ~13 mg/L
  - Total P ~1.3 mg/L

Side by Side Comparison

SW Plant		NE Plant
✓	Bio P at POTW	☐
✓	Modern POTW	☐
✓	POTW treats no sidestreams	☐
✓	Exceptional POTW compliance record	☐
✓	Storm sewers serve mostly light residential	☐
✓	Close to zero SSO events	☐
☐	Downstream trees and physical complexity	✓

CFAR Research

Operational Model

Light & Nutrients → Chlorophyll & O_2 respiration → Low Nighttime DO → Biotic impairment

Original theme:

Nutrients indirectly cause impairment

Find dose/response to decide limits

CFAR Research

Modifications to Original Model

Light & Nutrients → Chlorophyll & O_2 respiration → Low Nighttime DO → Biotic impairment

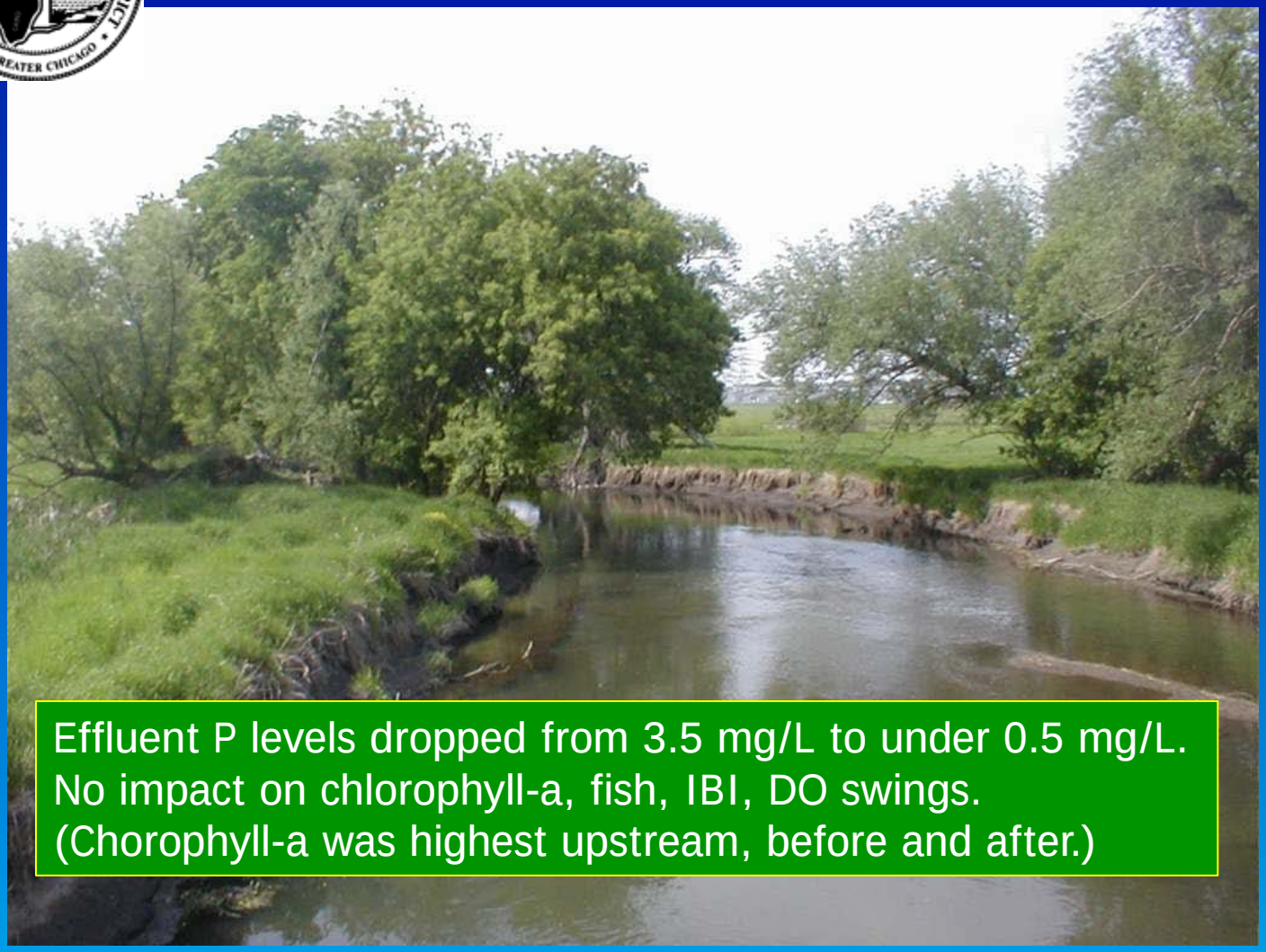
Light & Substrate appear more important than nutrients

(Nutrients generally not limiting)

Diel range in DO more consistently affected than the DO minima

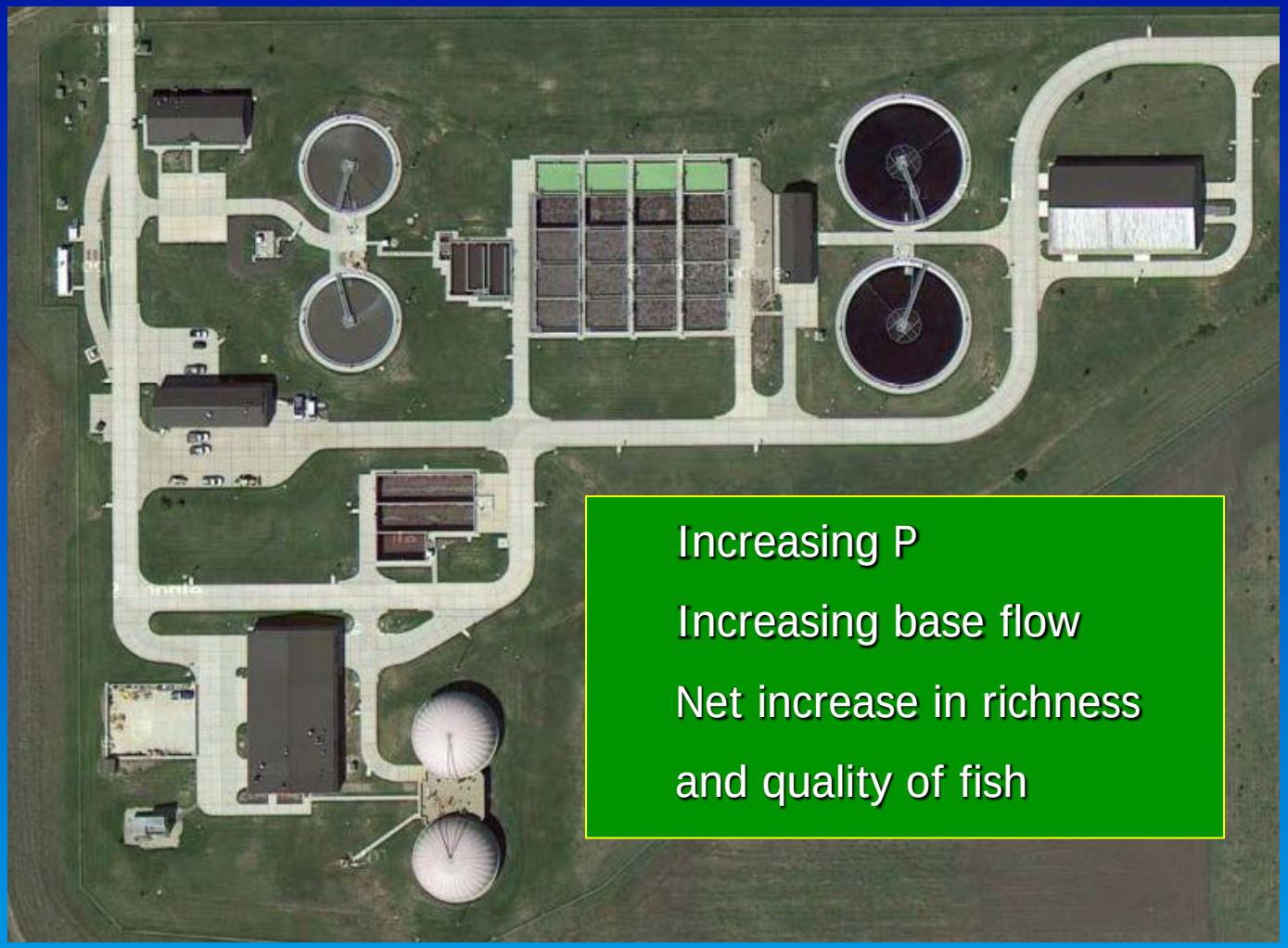
Physical habitat appears to play a much large role than nutrients

MWRDGC Egan Plant - Study



Effluent P levels dropped from 3.5 mg/L to under 0.5 mg/L.
No impact on chlorophyll-a, fish, IBI, DO swings.
(Chorophyll-a was highest upstream, before and after.)

BNWRD New Plant Siting



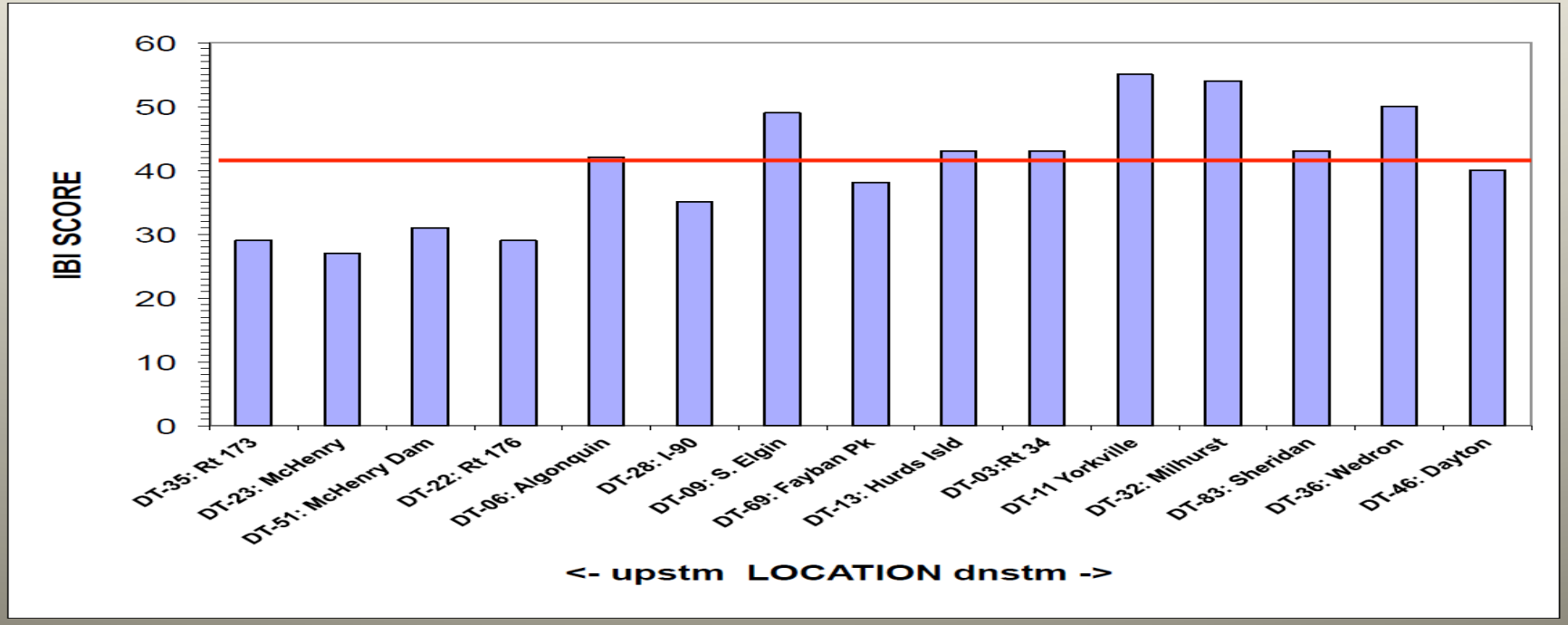
Increasing P

Increasing base flow

Net increase in richness and quality of fish

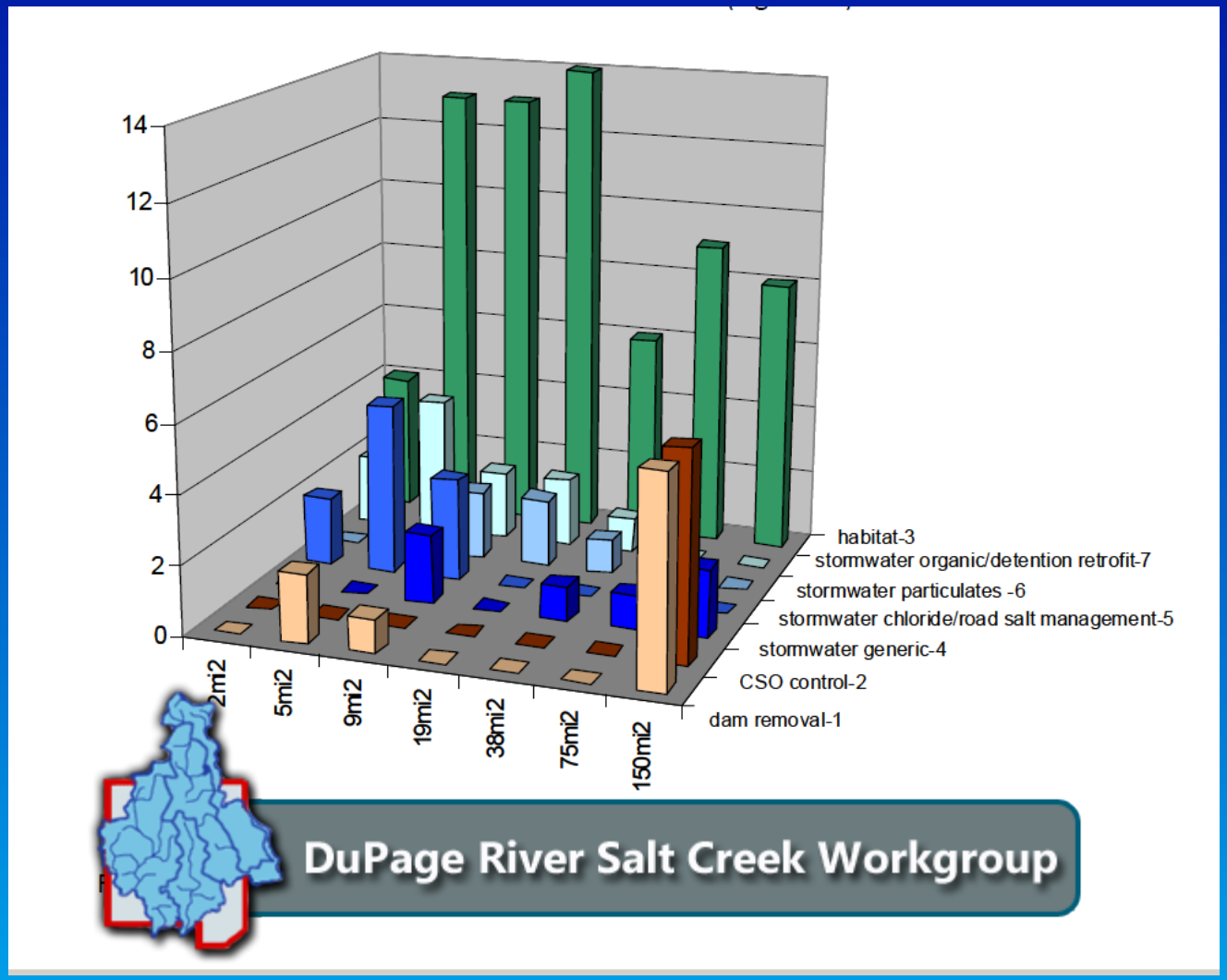
URBANA & CHAMPAIGN
SANITARY DISTRICT

Fox River Study Group



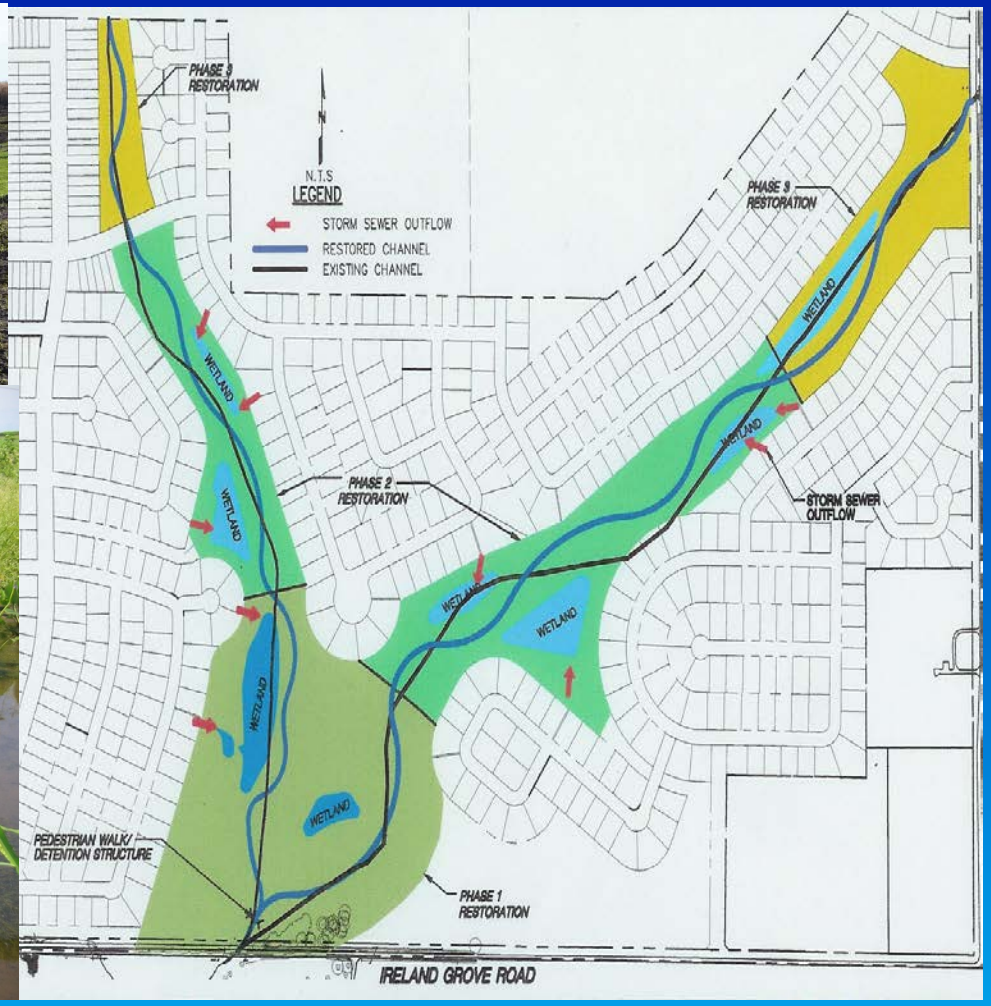
URBANA & CHAMPAIGN
SANITARY DISTRICT

DuPage River Salt Creek Workgroup

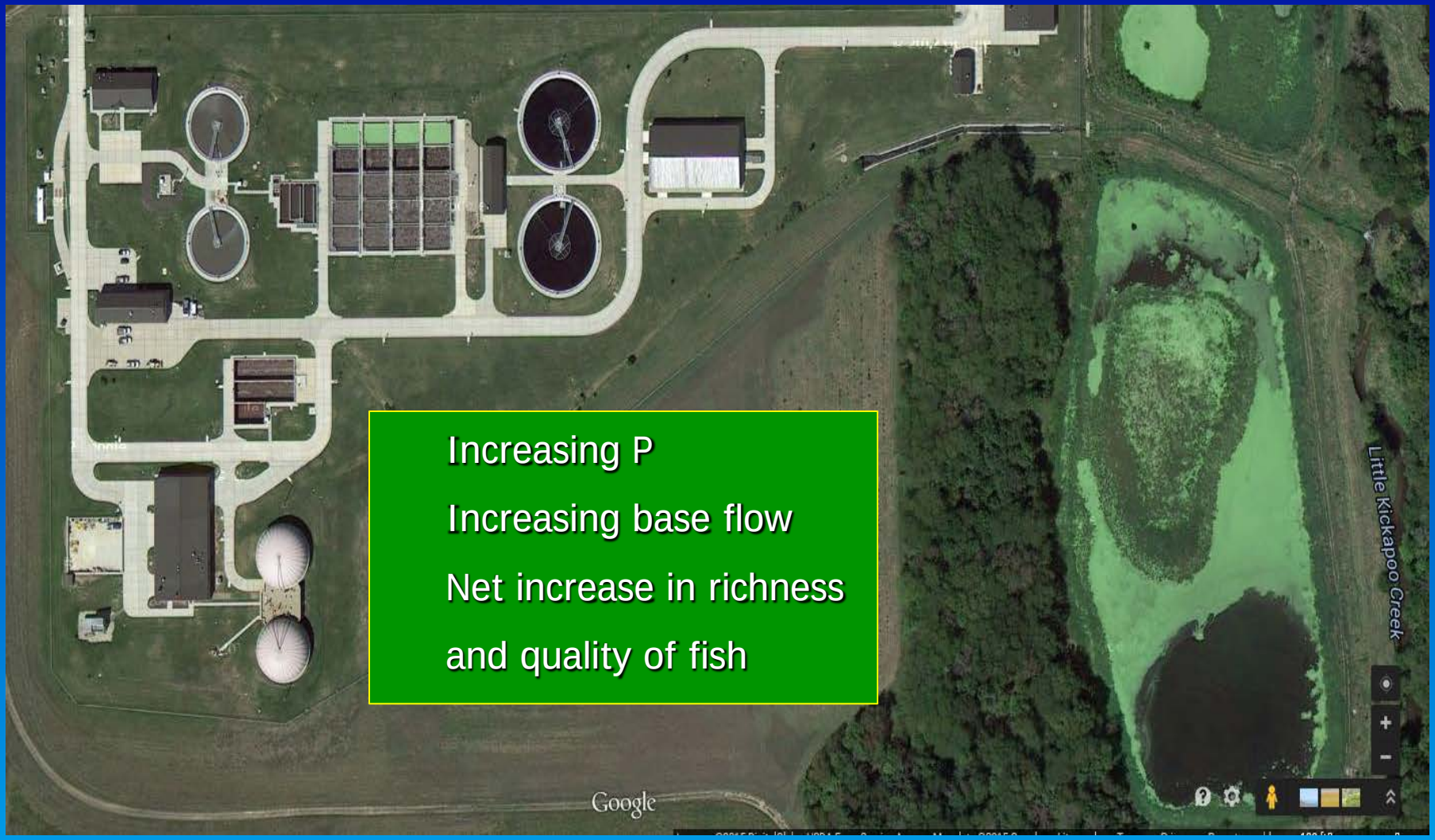


URBANA & CHAMPAIGN
SANITARY DISTRICT

Recreating Complexity



BNWRD New Plant Siting



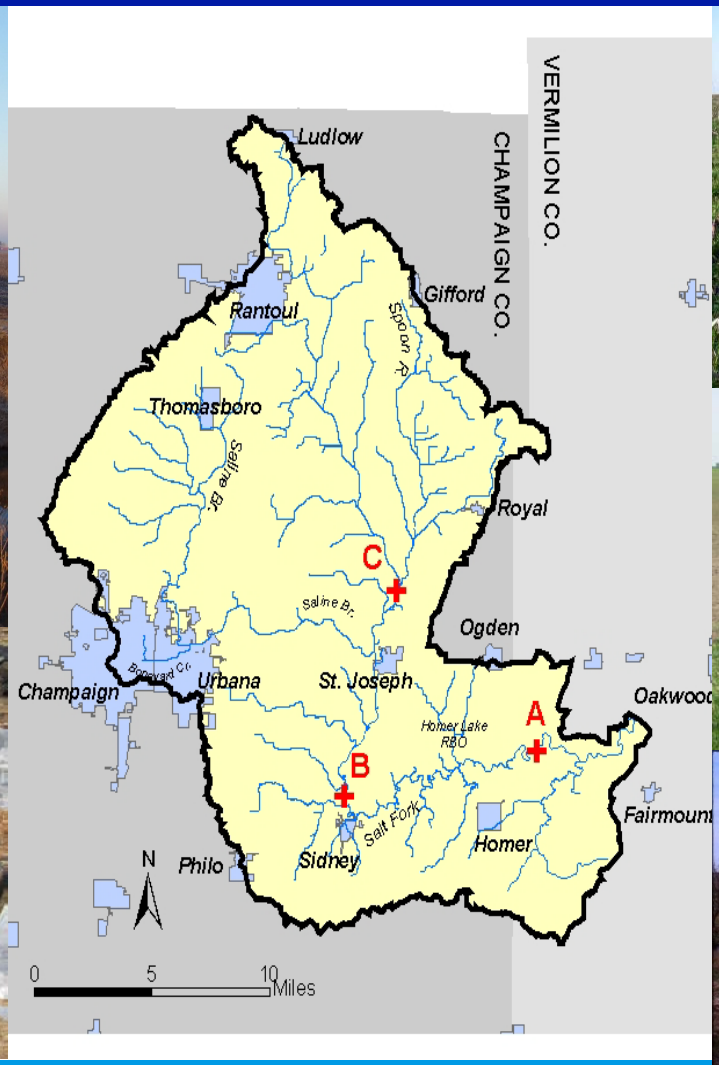
Increasing P

Increasing base flow

Net increase in richness and quality of fish

URBANA & CHAMPAIGN
SANITARY DISTRICT

Salt Fork Watershed Implementation Committee



URBANA & CHAMPAIGN
SANITARY DISTRICT