

Nutrients: A High-profile Water Quality Issue

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CLEAN WATER ACT FRAMEWORK

1. Establish water quality standards to protect uses
2. Standards also used as basis for NPDES permit limits
3. Monitor and assess attainment
4. List waters not attaining uses
5. Develop TMDL to limit pollution

IMPACT OF NUTRIENTS ON LAKES, RIVERS AND STREAMS

- Algal blooms deplete oxygen, block sunlight, may produce toxins, taste/odor problems in drinking water
- Hypoxic zone in Gulf of Mexico – 5,000 sq. mi. – decomposing algae
- Nitrogen → nitrates in drinking water → dangerous for infants



PUBLIC WATER SUPPLIES

- 7 stream/river segments (83 miles) “not supporting” due to nitrate
North Fork, Vermilion River,
Salt Fork, Vermilion River,
Vermilion River (Illinois Basin)
- 3 lakes “not supporting” due to nitrate
Lake Bloomington
Lake Decatur
Lake Vermilion

PUBLIC WATER SUPPLIES CONT'D

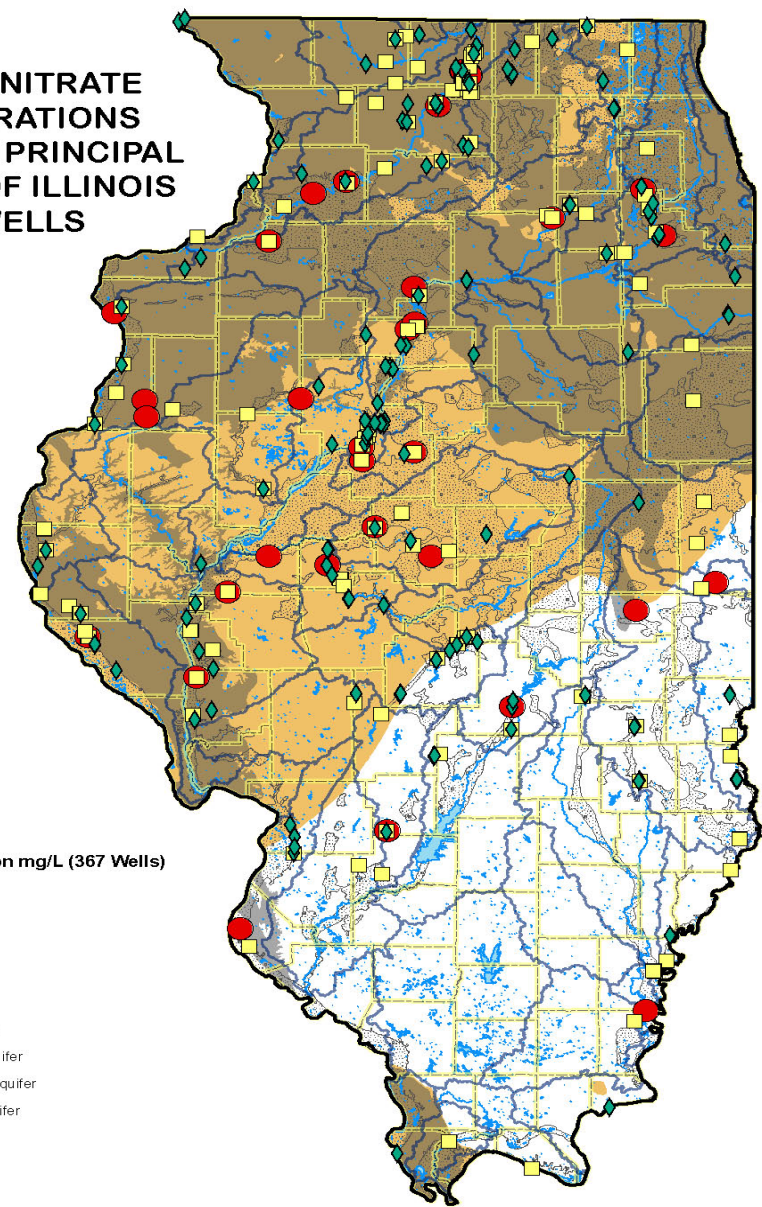
- 8% of community water supplies (CWS) wells have nitrate $>$ background but $<$ 10 mg/L
- 2% of CWS wells have nitrate $>$ 10 mg/L
- 10.5% of rural private wells have nitrate $>$ 10 mg/L

AVERAGE NITRATE CONCENTRATIONS RELATED TO PRINCIPAL AQUIFERS OF ILLINOIS CWS WELLS

Nitrate Concentration mg/L (367 Wells)

- ◆ 3 - 5 (46%)
- 5.1 - 10 (44%)
- > 10 (10%)

- Major River
- Lake
- NRCS 8-Digit HUC
- ▨ Sand & Gravel Aquifer
- Shallow Bedrock Aquifer
- Deep Bedrock Aquifer
- County Boundary



AQUATIC LIFE USE/AESTHETICS

- Phosphorus is listed as a contributing cause in 35% of impaired stream miles
- Of lake acres deemed impaired for aesthetic use:
 - 82% were impaired in part by total phosphorus
 - 81% were impaired in part by aquatic algae

GULF HYPOXIA

- Illinois is one of the largest contributors of nutrients to the Gulf of Mexico
- 1980-1997, University of Illinois researchers estimated load to Mississippi River from Illinois
 - 15% of total nitrogen load
 - 10% of total phosphorus load
- Other estimates higher (up to 19% of total nitrogen, 13% total phosphorus)
- 200,000 tons nitrogen
- 20,000 tons phosphorus

SOURCES CONTRIBUTING TO GULF

Statewide

Nitrogen Load

Phosphorus Load

Sewage effluent 16%

47%

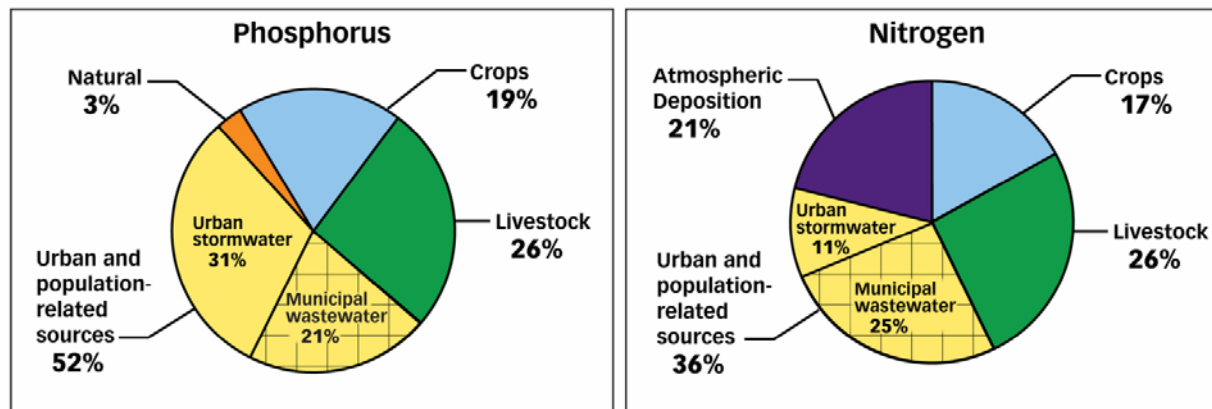
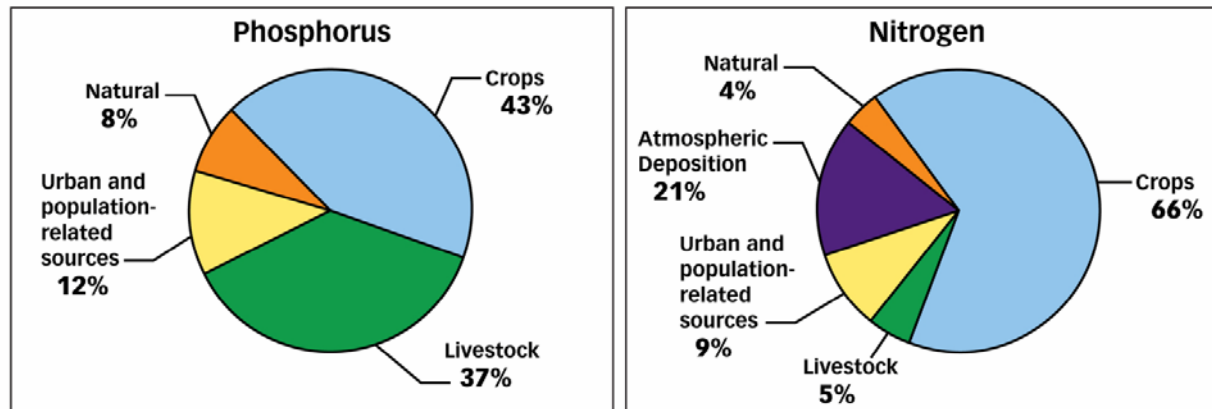
Non-point 84%
(primarily agriculture)

53%

Urban stormwater important, not well
quantified

Relative Nutrient Source Contributions

Gulf of Mexico



Chesapeake Bay

NUTRIENT DISCHARGES TO SURFACE WATER

Point Sources: constant through year

Agricultural Watersheds: high discharge mid-January through June

Phosphorus - attached to sediment

Nitrogen - primarily tile drainage

Other Sporadic Sources: livestock operations, malfunctioning septic systems, urban stormwater

Phosphorus – most important in freshwater

Nitrogen – biggest impact on marine systems

NUMERICAL WATER QUALITY STANDARDS

- In 2000 USEPA established recommended numeric and nitrogen based on “reference conditions”
- Various numbers for different “eco-regions”
- States have 3 years to adopt federal standard or establish their own
- Illinois opted to establish its own
- Funded research through CFAR to establish cause-effect relationship
- Results indicated complex relationship between nitrogen/phosphorus → adverse effect
- No standards proposed yet – most states similar

PROPOSED STANDARDS VS. ILLINOIS NUTRIENT LEVELS

	P (mg/L)	N (mg/L)
USEPA National Criteria		
- Corn Belt Eco-region	0.076	2.18
- Southeast Forested Eco-region	0.037	0.69
Standards Proposed by Other States	0.04 – 0.1	1-3
Concentrations in Illinois Streams (mean)	0.38	5.2

CURRENT MANAGEMENT APPROACHES - ISSUES

- NPDES permits and TMDL load limits address only municipal and industrial sources
- Management of non-point source pollution – voluntary, incentive-based – no guaranteed reductions
- State and federal cost-share programs for NPS – federal not well-targeted for nutrients
- Collective status of BMP implementation in Illinois not known

SUSTAINED PRESSURE TO ADDRESS NUTRIENTS

- Hypoxia Action Plan
- USEPA/State Nutrient Innovations Task Group Report: “An Urgent Call to Action”
- Office of Inspector General findings – USEPA will identify states for federal promulgation of nutrient standards

SUSTAINED PRESSURE TO ADDRESS NUTRIENTS (CONT'D)

- Environmental Group petition/litigation:
 - secondary treatment
 - Mississippi River
 - Kansas
- USEPA Regions - actions

Regulation?

- IEPA does not have authority to regulate crop production practices or fertilizer application
- Wisconsin – required practices
- Virginia – baseline BMPs
- “Precision Regulation” – prohibit bad practices
- Conservation compliance

Conservation Practices Going Forward

- Well-understood practices are already available to reduce nutrient losses to water
 - conservation tillage
 - nutrient management plan implementation
 - cover crops
 - 4R for fertilizer – right source, right rate, right time, right place

Conservation Practices Cont'd

- Technical challenges to preventing nutrient losses
- tile drainage
- high flows
- Need to strengthen our technical/scientific provides network

What Does USEPA Expect?

- State commitments to develop numeric N&P standards – work plan, schedule
- Statewide assessments to identify priority watersheds
- Load reduction targets for priority watersheds (like a TMDL or hypoxia action goal)
- Ag BMP & source reduction measures (NMP in use by all)
- Accountability and verification
- Annual public reporting of progress

Business as Usual Won't Solve Water Quality Impacts of Nutrients

- Focus voluntary programs to get results
- Priority watersheds – impaired lakes, biggest contributors of N&P to Mississippi River
- Precision conservation – right practices in right places for maximum effect
- NMP Implementation by all is a fundamental step
- Illinois Nutrient Stewardship – Let's control our own future