NCASI Northern Regional Meeting

May 7-8, 2014
Wausau, Wisconsin

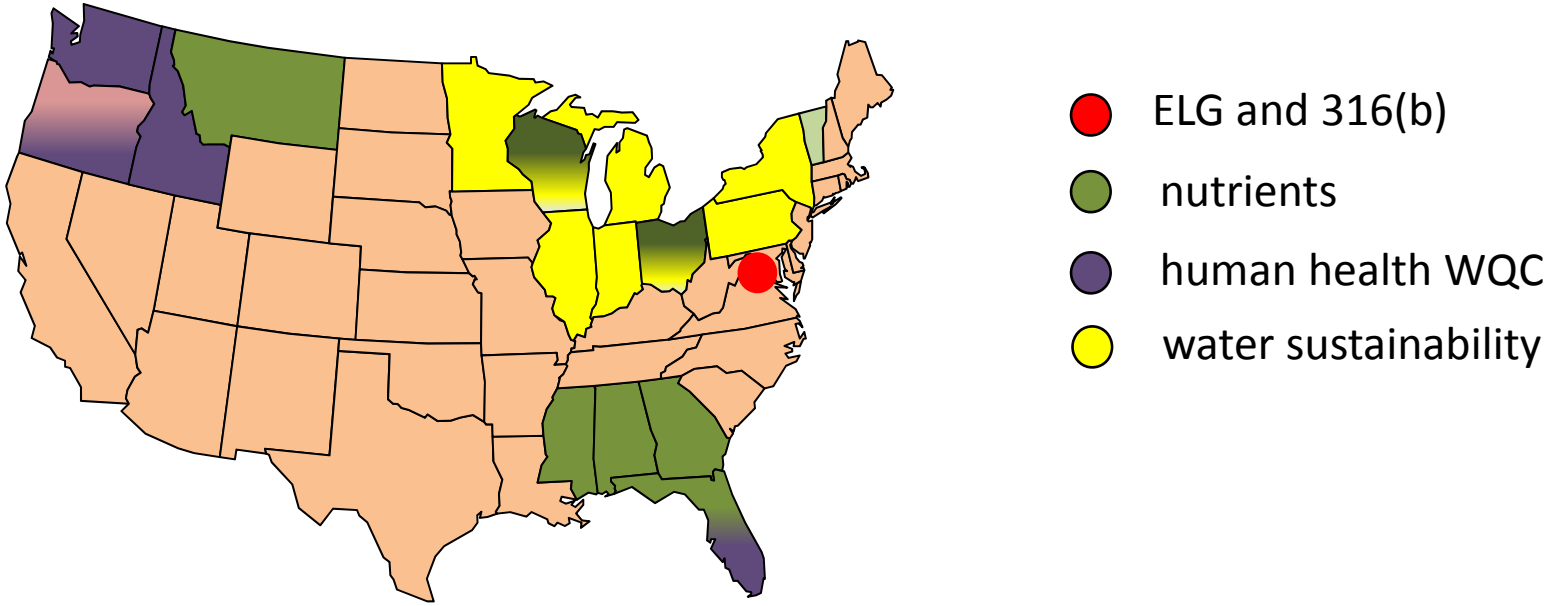
Water Quality Session

Paul Wiegand, Vice President Water Quality

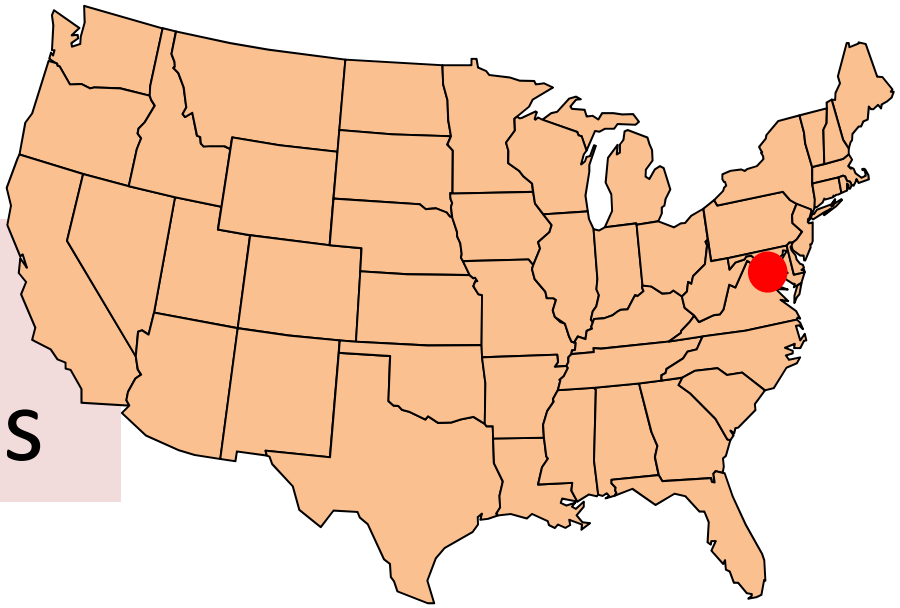
Water Developments

(regulatory and otherwise)

- effluent limitations guidelines
- 316(b) rules for cooling water intake structures
- numeric nutrient criteria
- human health water quality criteria
- water sustainability
- long-term receiving water study

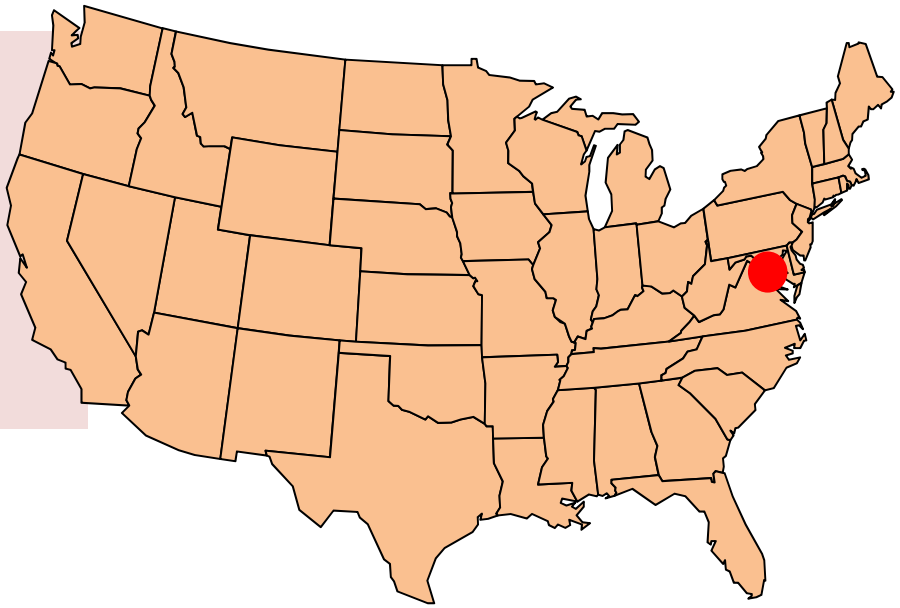


Effluent Limitations Guidelines



- EPA conducts an annual review and prepares ELG plans every 2 years
- Pulp and paper figures prominently because of TRI reports for:
  - dioxin and dioxin-like compounds (DDLC)
  - manganese and Mn-compounds
- and, in DMR reports for:
  - aluminum
- Preliminary 2012 ELG plan published August 2013
- NCASI and AF&PA continue to work with EPA as requested
- Little apparent EPA interest in pursuing ELG revisions at this time
- EPA signaled intention to consider pollutants associated with newly installed air pollution control devices

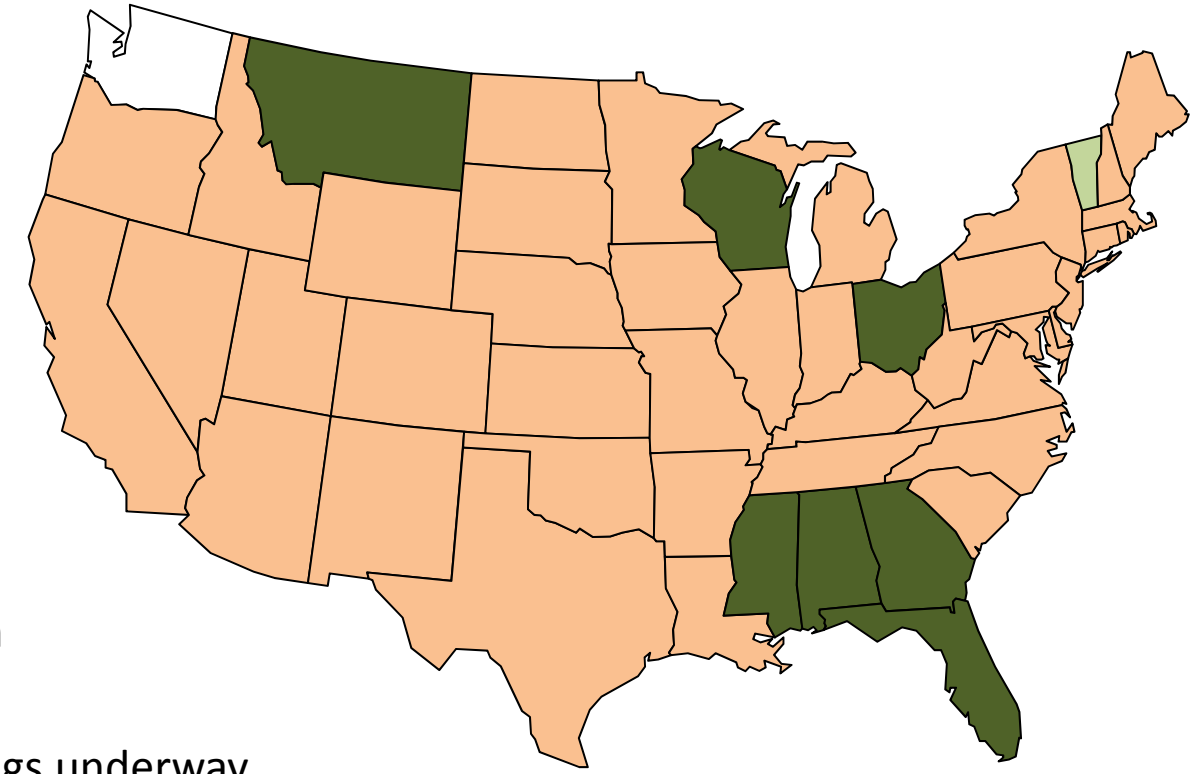
316(b) Cooling Water Intake Structure Rule



- Federal requirements for new and existing cooling water intake structures to protect all life stages of fish and shellfish
- EPA proposed rule issued April 20, 2011
- Rule summary in NCASI CC 11-017
- Final rule delayed – now May 16

Numeric Nutrient Criteria (NNC)

Significant state adoptions of numeric criteria for streams



Montana

- some NNC unachievable
- seeking implementation solutions, variance options
- considering limit of technology

Wisconsin

- total phosphorus criteria
- big non-point source issues
- seeking TMDL-based solutions
- new state-wide variance option

Ohio

- monthly advisory group meetings underway
- exploring combined criteria options

Mississippi

- considering using single TN/TP criteria or combined criteria with TN/TP "ranges"
- forest owner concerns

Alabama / Georgia (underway)

Florida

- TN and TP criteria for 5 eco-regions
- contains EPA-approved combined criteria
- EPA seeking to withdraw its rules

Numeric Nutrient Criteria (NNC)

NCASI research on NNC derivation methods that are less prone to misidentifying impaired/non-impaired waters

Journal publications

McLaughlin, D.B. 2014. **Maximizing the Accuracy of Field-Derived Numeric Nutrient Criteria in Water Quality Regulations.** Integrated Environmental Assessment and Management 10 (1): 133-137.

McLaughlin, D.B. 2012a. **Assessing the Predictive Performance of Risk-Based Water Quality Criteria Using Decision Error Estimates from ROC Analysis**. Integrated Environmental Assessment and Management. 8(4): 674-684.

McLaughlin, D.B. 2012b. **Estimating the Designated Use Attainment Decision Error Rates of USEPA's Proposed Numeric Total Phosphorus Criteria for Florida Colored Lakes**. Integrated Environmental Assessment and Management 8(1):167-174.

White papers

Maximizing the Accuracy of Field-Derived Numeric Nutrient Criteria in Water Quality Regulations, NCASI White Paper, April 2013, Doug McLaughlin, NCASI Northern Regional Center

From Headwaters to River Mouth: Considering Stream Size and Watershed Placement in Numeric Nutrient Criteria Development, DRAFT – January 20, 2014, Dr. Erik Schilling, NCASI Sr. Research Scientist, Sustainable Forestry; Camille Flinders, NCASI Aquatic Biology Program Manager; Dr. Doug McLaughlin, NCASI Principal Scientist, Water Quality

Human Health Water Quality Criteria
(and Fish Consumption Rates)

Simplified Equation for Deriving Human Health Water Quality Criteria

HHWQC = health protection target * Substance Toxicity * Exposure Scenario

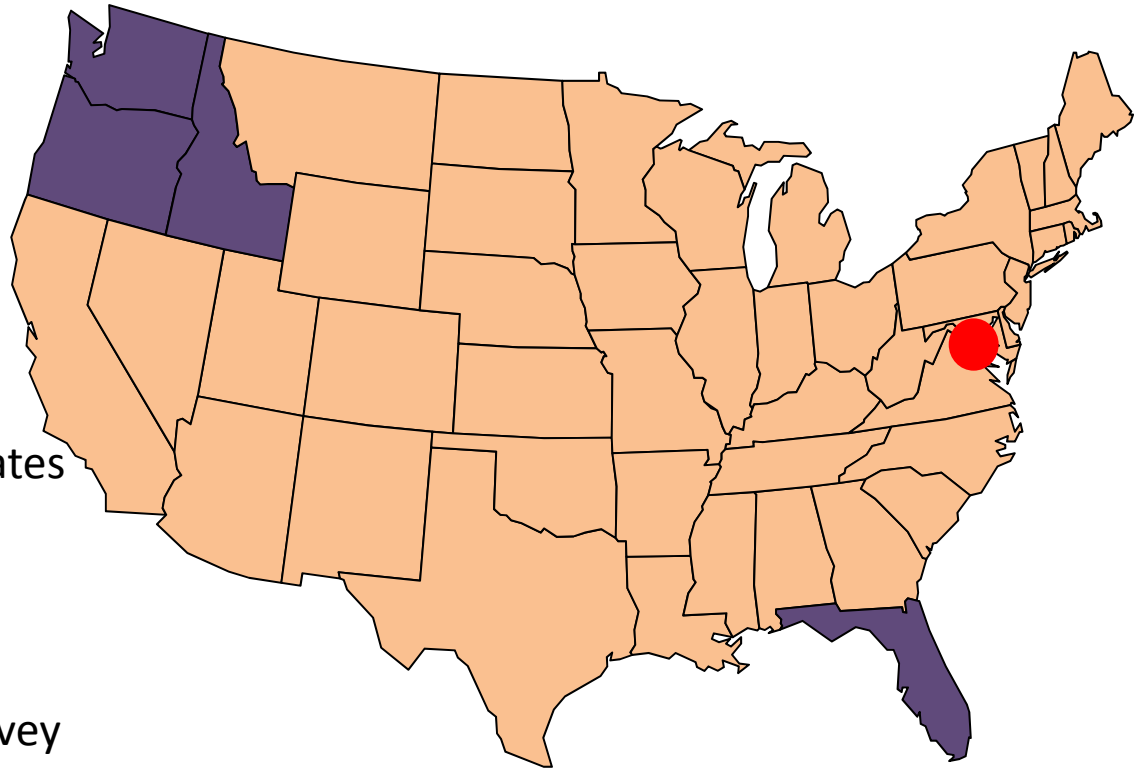
- excess cancer risk
- health quotient

- risk specific dose
- reference dose

- body weight
- drinking water intake
- **fish consumption rate**
- bioconcentration
- water column conc.
- cooking loss
- duration of exposure
- other exposures

Classification & Standards Unit

Human Health Criteria (HHWQC)



Oregon

- used conventional derivation but with 175 g/p/d fish consumption rate

Washington

- reconsidering fish consumption rates
- influenced by tribal interests
- very contentious

Idaho

- conducting fish consumption survey
- considering probabilistic derivation approach

Florida

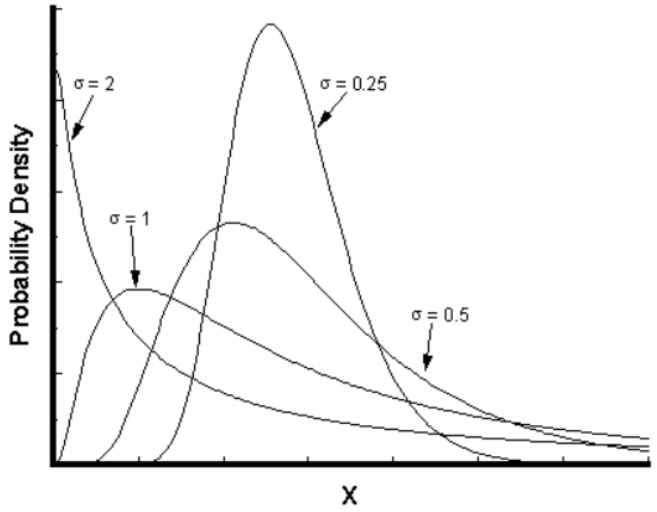
- first use of probabilistic approach to criteria development
- developed of RSC values for non-carcinogens

EPA

- considering revised guidance on HHWQC derivation

Steps in Probabilistic Criteria Development

1. select health protection target(s)
2. recognize variation in human behavior
   - body weight
   - drinking water intake
   - fish consumption rate
   - fish lipid concentration
   - water column concentration
   - cooking loss
   - duration of exposure



3. evaluate combinations of exposure conditions and draw resulting risk curve (i.e., Monte Carlo)
4. set criteria to achieve the health protection target

Human Health Water Quality Criteria

Tool for calculating HHWQC using a probabilistic approach is ***AVAILABLE***

Probabilistic Ambient Water Quality Criteria Calculator (PAWC

PAWQCC requires access to @RISK to derive probabilistic AWQC.
PAWQCC will function without @RISK, but the user will only be able to derive AWQC using the determ

Light blue shaded cells require input from the user.
Dark blue shaded cells contain @Risk functions defined by the user.
Gray shaded cells will automatically populate based on blue cell inputs.
Cells with underlined text, including section numbers, contain hyperlinks.

All parameters may be defined as point estimates or distributions, with the following exceptions (wh

- **Concentration in water (C_w)**
- **Target risk thresholds**
- **Species consumption rate (FCR_s)**

1

General exposure parameters
Define parameters below.

DI	ED	BW	AT_{nc}	AT_c
drinking water intake L/day	exposure duration years	body weight kg	averaging time (non-cancer) years	averaging time (cancer) years

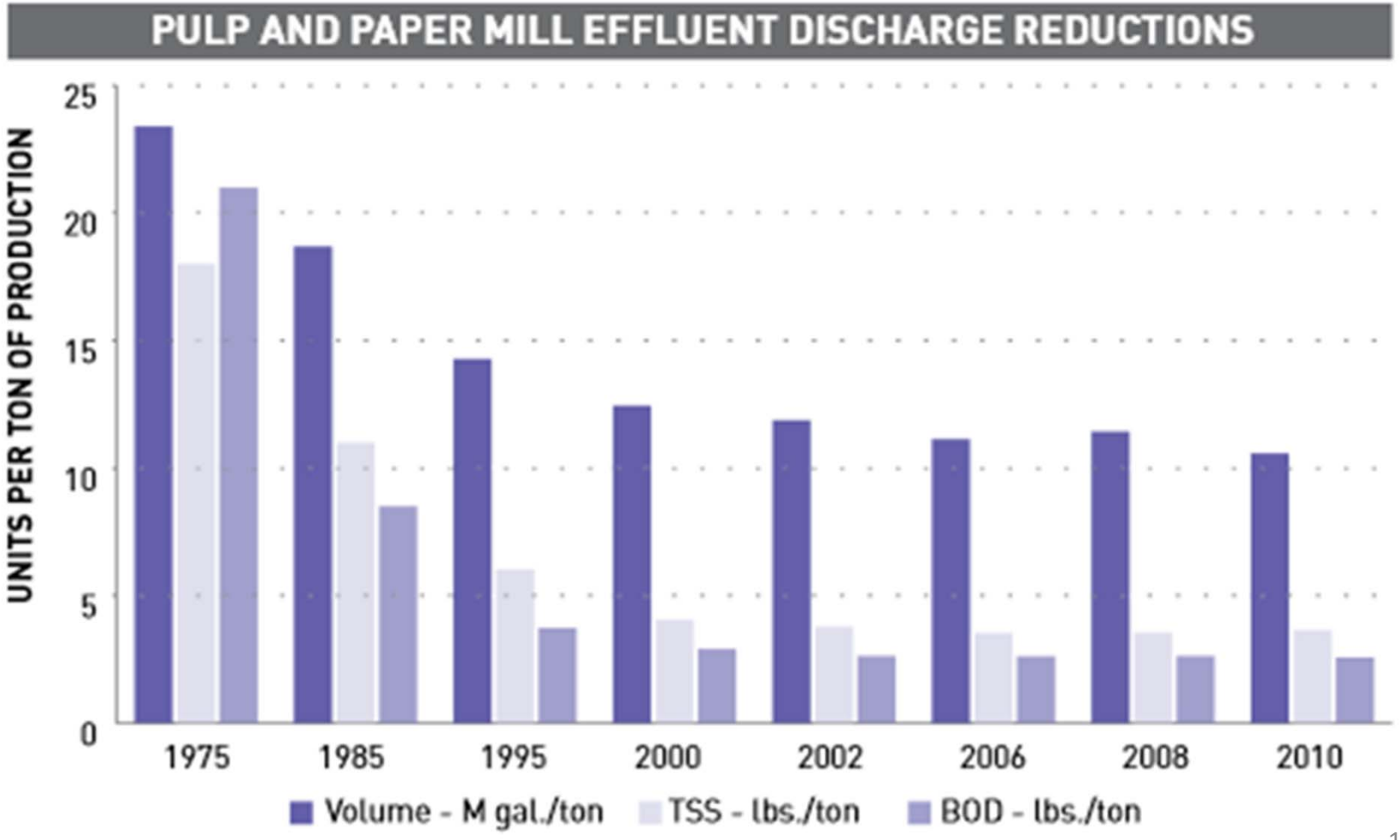
2

Fish intake parameters
Select the fish consumption rate (FCR) available for input.

FCR	CLF	LHF	Lipid
fish consumption rate kg/day	catch location factor unitless	life history factor unitless	fraction lipid kg lipid/ kg tissue

3

Water Sustainability



Water Sustainability Initiatives

Water Use Accounting

Water Footprint NETWORK

Life Cycle Initiative

ISO International Organization for Standardization

Business Risk Assessment Frameworks

THE WATER RISK FILTER

GEMI® Global Environmental Management Initiative
Business helping business improve environmental, health and safety performance, shareholder value and corporate citizenship.

Ceres

Global Water tool

GEMI® Local Water Tool™ (LWT)

AQUEDUCT Measuring and Mapping Water Risk

Reporting and Disclosure Protocols

CDP Water Disclosure

Global Reporting Initiative™

Standard and Certification Frameworks

ALLIANCE FOR WATER STEWARDSHIP

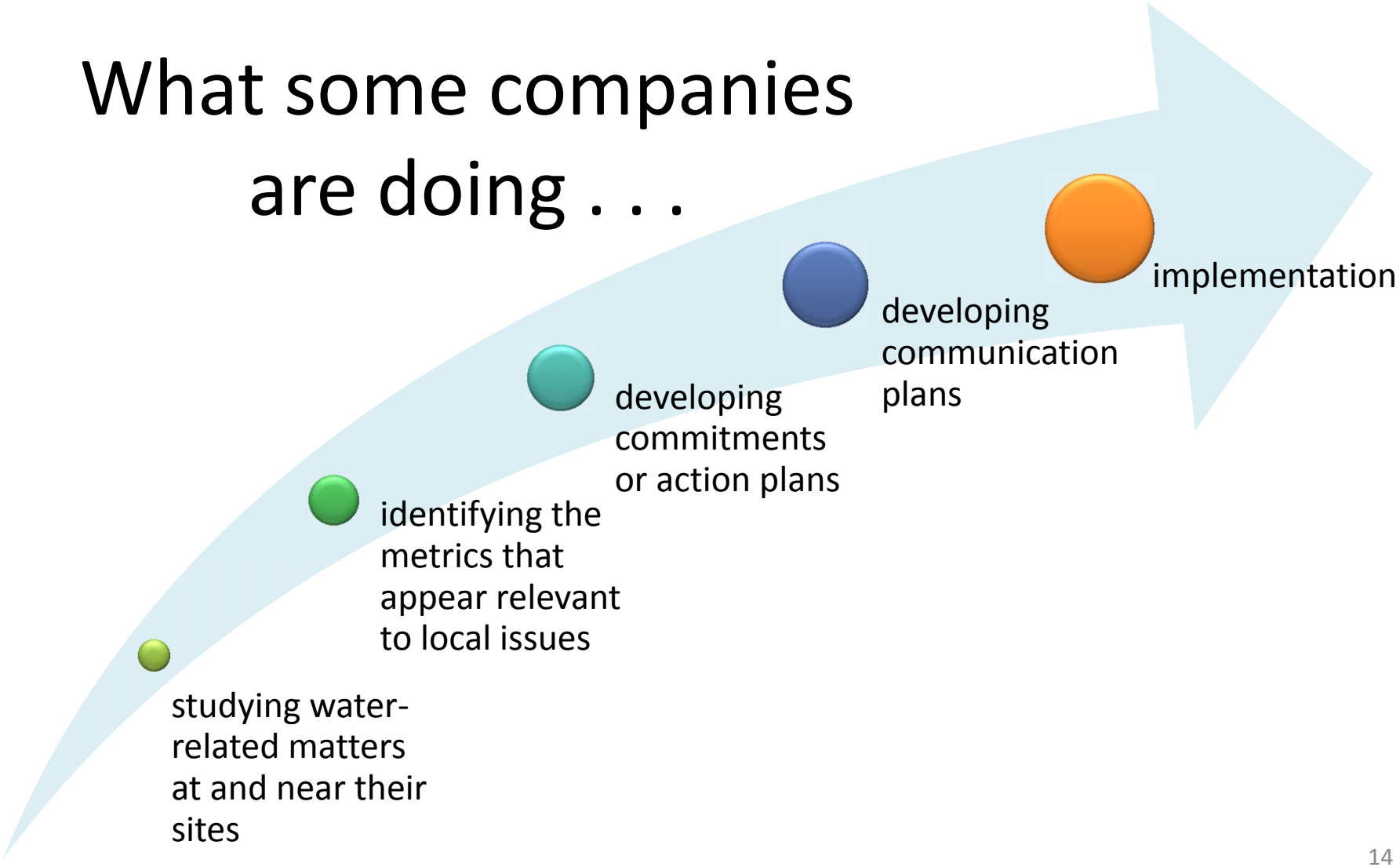
EWP The Voice of Water

Water Sustainability
Local Impacts Assessment

Indicators	Metrics
Withdrawal amounts	Total volume withdrawn, total volume consumed, water transfer, peak/average/**seasonal use**
Withdrawal source characterization	Sources under **stress**, amount of renewable water
Withdrawal impact & available supply	Relative to total **available supply**, effect on **ecosystem services**, effect on **human services**
Discharge amounts	Total volume discharged to receiving body
Discharge quality	Regulated pollutant load, non-regulated pollutant load
Discharge impact	**Eutrophication** potential, effect on ecosystem, effect on **downstream human uses**
Recycling/reuse (?)	Internal/external recycling and reuse
Equitable and transparent governance	water resource management strategy (use & disclosure), permits and other consents (withdrawals and discharges)
Benefits	**Economic and social benefits**

Water Sustainability

What some companies are doing . . .



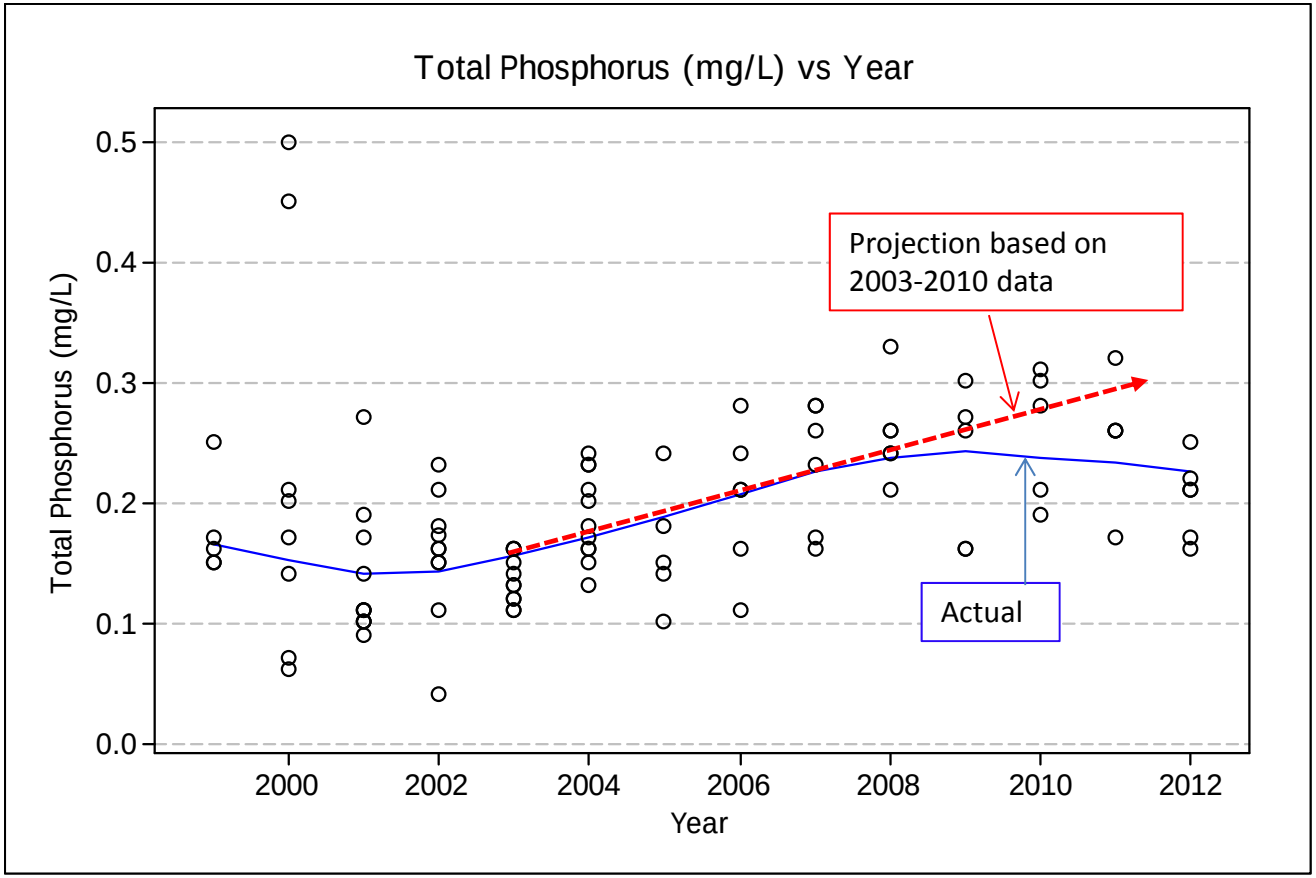
NCASI
Long-term Receiving Water Study

- Examines in-stream patters in algae, macro invertebrates & fish at 4 receiving streams:
  - Codorus Cr., PA
  - Leaf R., MS
  - McKenzie & Willamette R., OR
- Multiple sites above (2-3) and below (3-4) of discharge with samples collected multiple times/yr. since 1998
- 17th year of anticipated 20 year study
- Design allows naturally-occurring spatial and temporal variation to be distinguished from effluent effects

NCASI
Long-term Receiving Water Study

Overall Finding: Effluents are compatible with healthy aquatic ecosystems

Leaf River TP, New Augusta Bridge, 1999-2012



NCASI
Long-term Receiving Water Study

- Some recent communications
  - January 29, 2014 - EPA's Mid-Continent Ecology Division—National Health and Ecological Effects Research Laboratory (Duluth, MN)
  - April 21 - Oregon State University Fish and Wildlife Monday Morning Meeting