Nothing Compares
NORTH CAROLINA

March 19, 2018

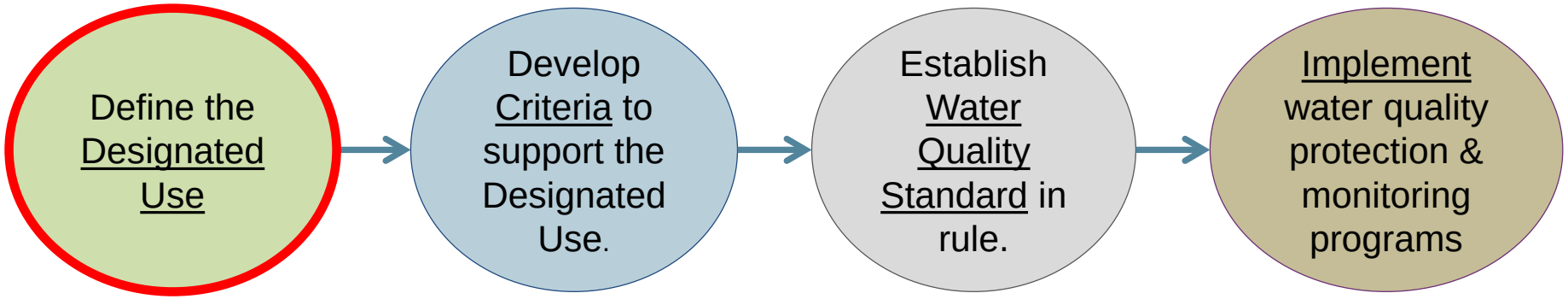
Overview of NC Surface & Ground Water Quality Standards

What are Water Quality Standards?

- State regulations or rules that serve to protect the surface & ground waters of the state from the deleterious effects of pollution.
- Waters are protected based on their designated “best uses”.
- Based on EPA guidance or other scientific data
- Expressed as a numeric value, a narrative statement or a combination of both.

	Groundwater Standards	Surface Water Standards
Federal Requirement	No	Yes
North Carolina Rule	15A NCAC 02L .0202	15A NCAC 02B .0200
Population	Human Adults	Human Adults/Children (WS) Aquatic Life/ Wildlife
Target use	Ingestion Household use	Ingestion Recreation Fish Consumption
Standard endpoints	Noncancer Cancer Aqueous taste and odor	Human Standards ▪ Noncancer ▪ Cancer ▪ Aqueous taste and odor Aquatic Standards

How are North Carolina's Water Standards Developed & Applied?



Classifications

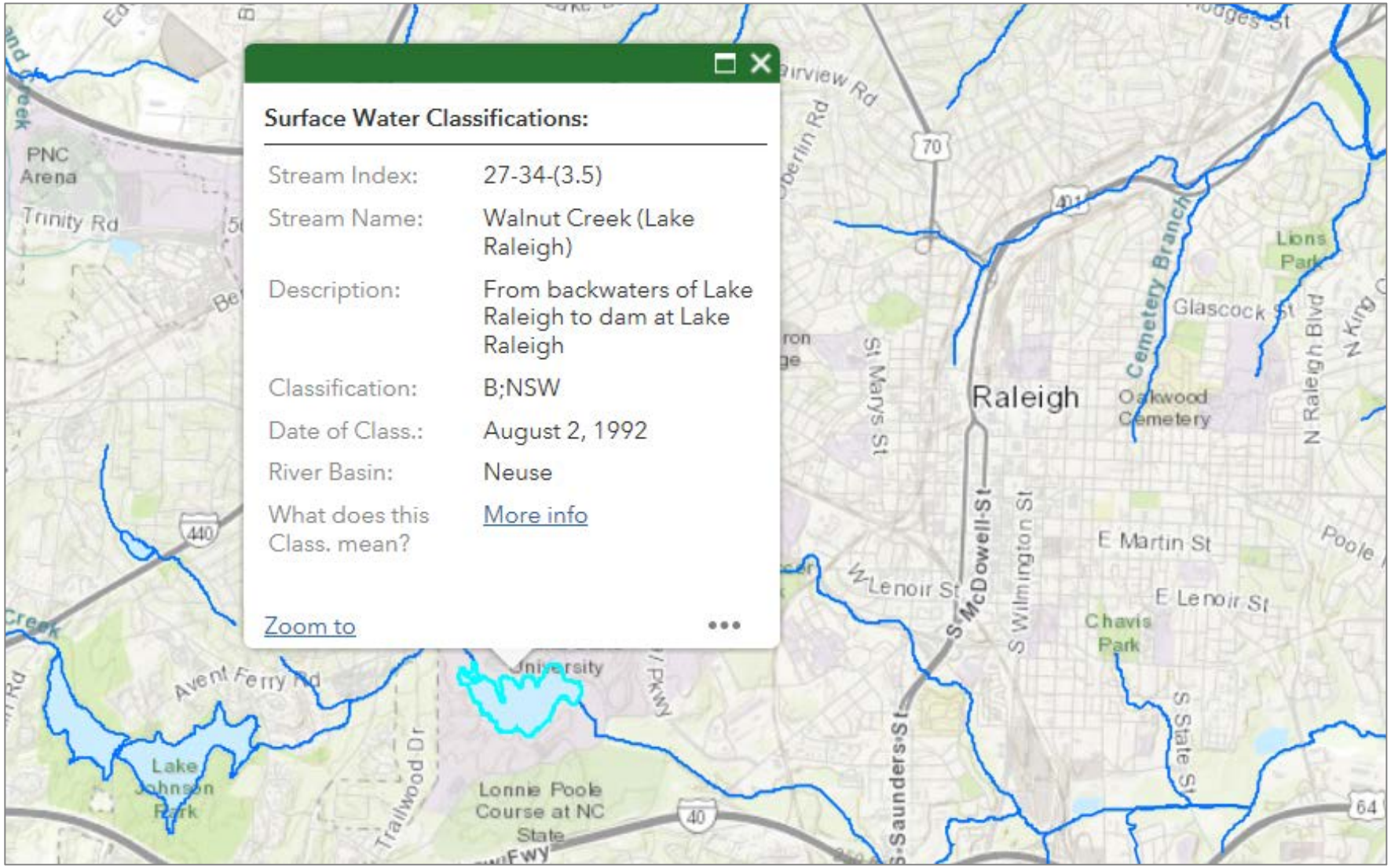
Surface waters

- Multiple classifications to describe a variety of uses
- 15A NCAC 02B .0200s
- Examples: Class C, Class WS (water supply)
- Health related: fish consumption, water supply (fish + water)

Groundwater

- Protect groundwater as a resource for human consumption
- 15A NCAC 02L .0202
- Examples: Class GA, GSA
- Health related: water consumption (does not consider cost or treatment)

Surface Water Classifications



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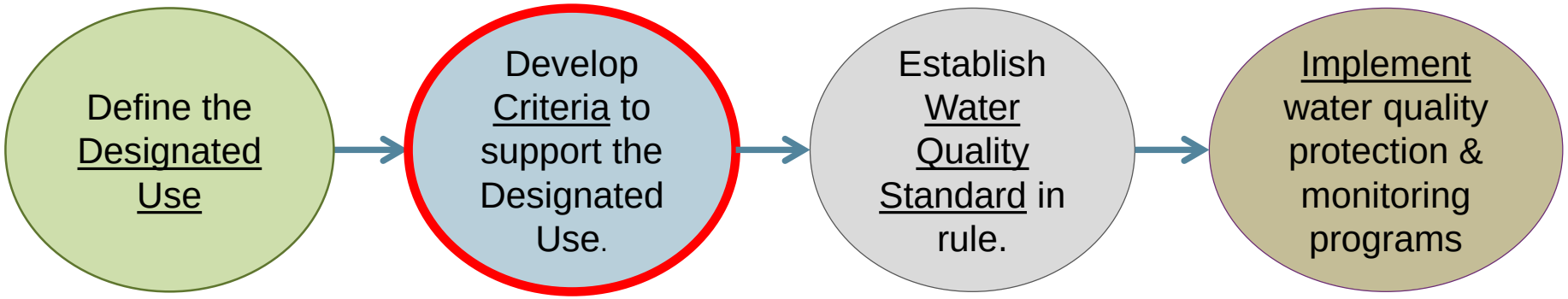

Developing Surface Water Criteria

per 15A NCAC 02B .0208 based on the following statement:

"*the concentration of toxic substances shall not result in chronic toxicity.*"

Chronic toxicity (02B .0202) = *"any harmful effect…due to long-term exposure (relative to life cycle…) or exposure during a substantial portion of…a sensitive period of the life cycle"*

Developing Aquatic Life Criteria

"In the absence of direct chronic toxicity, the concentration…shall not exceed [that] *specified by the fraction of the lowest LC50 value that predicts a no effect chronic level (as determined by the use of acceptable acute/chronic ratios)."*

"If an acceptable acute/chronic ratio is not available, then that toxic substance shall not exceed one-one hundredth (0.01) of the lowest LC50 or if it is affirmatively demonstrated that a toxic substance has a half-life of less than 96 hours [it] *shall not exceed one-twentieth (0.05) of the lowest LC50."*

Developing Human Health Criteria

- Per 15A NCAC 02B .0208

- **Fish Consumption** protects for exposure through consumption of fish tissue.

- **Water Supply** protects for exposure through consumption of drinking water & consumption of fish tissue.

- Both consider non-cancer & cancer information

"An unacceptable health risk for cancer shall be considered to be more than one case of cancer per one million people exposed (10^{-6} risk level)."

Fish Consumption

Fish tissue consumption only (all waters)

Noncancer

$$WQS = (RfD\ x\ RSC) \times \frac{BW}{FCR\ x\ BCF}$$

Cancer

$$WQS = \frac{RL}{CPF} \times \frac{BW}{FCR\ x\ BCF}$$

RL = Risk Level = $1x10^{-6}$
WQS = Water Quality Standard

Toxicity benchmarks

RfD = Oral Reference Dose

CPF = Carcinogen Potency Factor or Cancer Slope Factor (CSF)

Exposure estimates

RSC = Relative Source Contribution

BW = Body Weight = 70 kg

FCR = Fish Consumption Rate = 17.5 g/person-day

BCF = Bioconcentration Factor or Bioaccumulation Factor (BAF), if available

Water Supply

Water + Fish consumption

Noncancer

$$WQS = RfD \times RSC \times \frac{BW}{WCR + (FCR\ x\ BCF)}$$

Cancer

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Toxicity benchmarks

RfD = Oral Reference Dose

CPF = Carcinogen Potency Factor or Cancer Slope Factor (CSF)

Exposure estimates

RSC = Relative Source Contribution

BW = Body Weight = 70 kg (adult) or 10 kg (child)

WCR = Water Consumption Rate = 2 L/day (adults) or 1 L/day (child)

FCR = Fish Consumption Rate = 17.5 g/person-day

BCF = Bioconcentration Factor or Bioaccumulation Factor (BAF), if available

Developing Groundwater Standards & IMACs

Established as the ***least*** of the following:

1. Non-cancer threshold concentration (RfD)
2. 1/ million cancer risk concentration (Cancer Slope Factor)
3. Aqueous Taste threshold
4. Aqueous Odor threshold
5. Federal Maximum Contaminant Level (MCL)
6. Federal Secondary Drinking Water Standard (Taste and Odor)

Developing Groundwater Standards & IMACs

Using the following references in order of preference:

1. EPA Integrated Risk Information System (IRIS)
2. EPA drinking water health advisories
3. Other EPA health risk assessment data
4. Other published health risk assessment data/published tox data

IMACs

What are IMACs?

Interim Maximum Allowable Concentrations (temporary standards).

How are chemicals chosen to receive IMACs?

Any person may petition the Director per the guidelines in 15A NCAC 02L .0202(c).

Are IMACs legally enforceable?

Yes, per 15A NCAC 02L .0202

Who establishes IMACs?

The Director of the DWR.

How are IMACs developed?

Follow the requirements for groundwater standards in consultation with DHHS & DWM.

Groundwater Standards & IMACs

Water consumption

Noncancer

$$GWQS/IMAC = \frac{RfD \times BW \times RSC}{WCR}$$

Cancer

$$GWQS/IMAC = \frac{RL \times BW}{CPF \times WCR}$$

RL = Risk Level = $1x10^{-6}$

GWQS = Groundwater Quality Standard

IMAC = Interim Maximum Allowable Concentration

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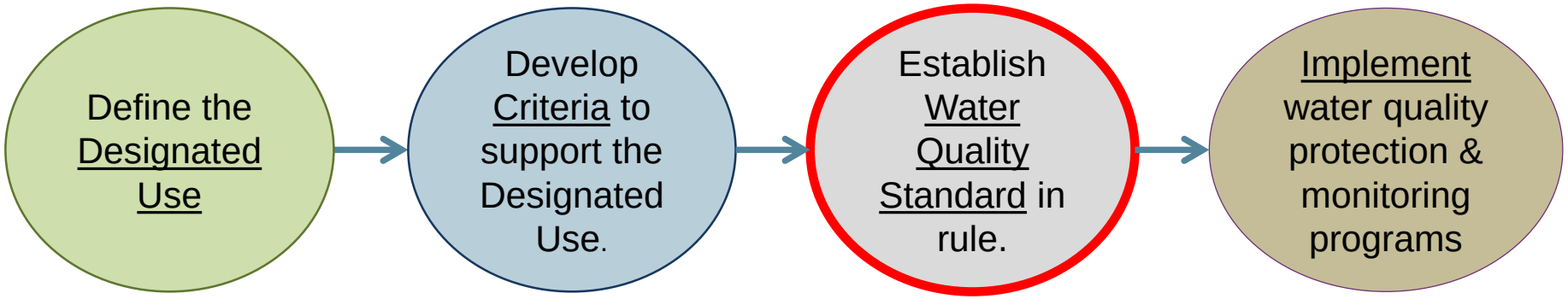

Surface Water Triennial Review Process

Development

- Staff review available guidance & literature and develop Triennial Review package
- Staff present TR to Environmental Commissions (WRC/EMC)

State Approval

- EMC approval
- RRC approval
- NC Attorney General sign off

Federal Approval

- EPA Clean Water Act review
- Endangered Species Act review
- NC notified of approval/disapproval of Triennial Review

Groundwater Triennial Review Process

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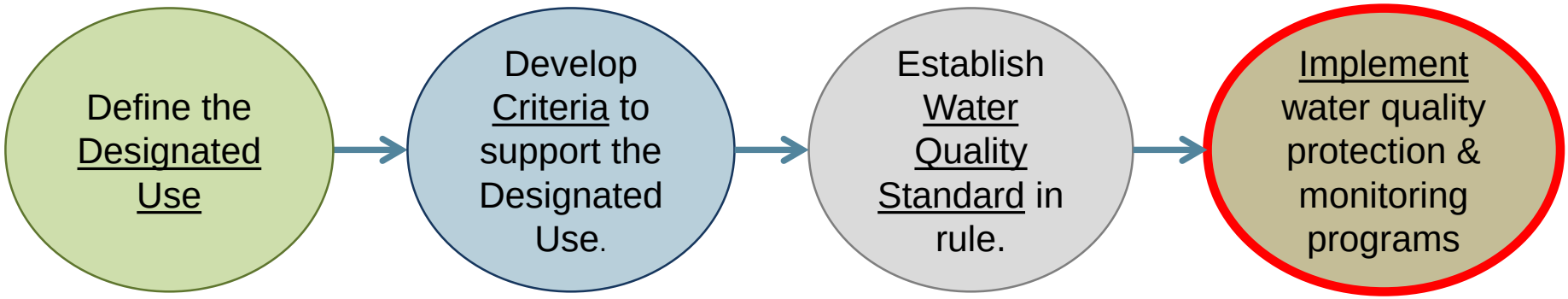

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DWR Classifications, Standards & Rules Review website:

https://deq.nc.gov/about/divisions/water-resources/planning/classification-standards