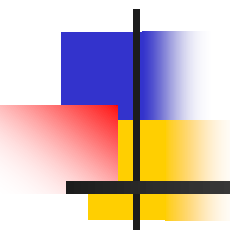


Surface Water Quality Standards



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Clean Water Act Requirements

Standards provide **limits** on the amount of pollutants that can be discharged and outline conditions of the water to ensure **protection of the designated uses**.

The protection must include **physical, chemical and biological integrity** of the waters.



Classifications and Standards go hand-in-hand!

Each **classification** carries with it an **associated set** of water quality **standards**

“Class C” and “SC” waters are “basic”

Additional protections apply to other classifications - **Water Supply, Trout waters, High Quality Waters, Shellfish**

Goals:

Protect Human Health

Protect Aquatic Life

Appropriate **toxicity data** are used to calculate protective levels for both human health & aquatic life

NO assessment of **cost** or **feasibility** of analytical determination is accounted for in the development.



Human Health Criterion

Level which does not represent a significant risk of adverse effect to the general public

- Consumption of **water** + consumption of **fish and shellfish**

“**Water Supply**” standards

- Consumption of **fish & shellfish**

“**Human Health**” standards



Carcinogens and Non-carcinogens

Surface water standards for **carcinogens** are calculated to a “one in a million” cancer risk level

Surface water standards for **non-carcinogens** are established using a “Reference Dose” – the concentration is predicted to be a “safe level” of exposure



Aquatic Life Criterion

- Based upon lab aquatic toxicity testing
- Organisms tested at varying ranges of concentrations to determine impacts
- Standard incorporates protection for a wide range of species and trophic levels in the receiving stream



Current Aquatic Life Standards expressed as “Chronic”

- Protection from cumulative effects of longer term exposures
 - reduced growth, reduced reproduction, lethality
- For permitting, chronic standards relate to the monthly/weekly average permit limit



Aquatic Life Standards can also be “Acute”

- Protection from short-term exposure to higher concentrations of the pollutant
 - Impact most often assessed is **lethality**
- Generally, exposure to this level **for one hour** should not cause death
- For Permitting – this is associated with the “daily maximum”



Triennial Review: Proposed Metals Revisions

- Acute standards will be proposed
 - Exceptions: Selenium and Mercury
- “max not to exceed” language to be removed from *aquatic life* standards
- Duration information will be added
 - 96 hour average – chronic
 - 1 hour average - acute



Review of National Criteria

- US EPA has published revisions to federal aquatic life criteria for several metals
- To date, North Carolina has **not** adopted those recommended changes
- Adoption of these modified criterion values will result in reduction in water quality standards



Dissolved Metals

- Current standards are “total” metals
- Dissolved metals better represent the bioavailable fraction
- Dissolved fraction varies in natural waters
- With the exception of Mercury and Selenium, DWQ will propose the use of dissolved metals standards
- This requires changes to ambient monitoring and permit writing



Hardness Dependent Metals

- Decreased water hardness is associated with increased aquatic toxicity for some metals
- Current numerical standards are based upon the use of a 50 mg/L hardness

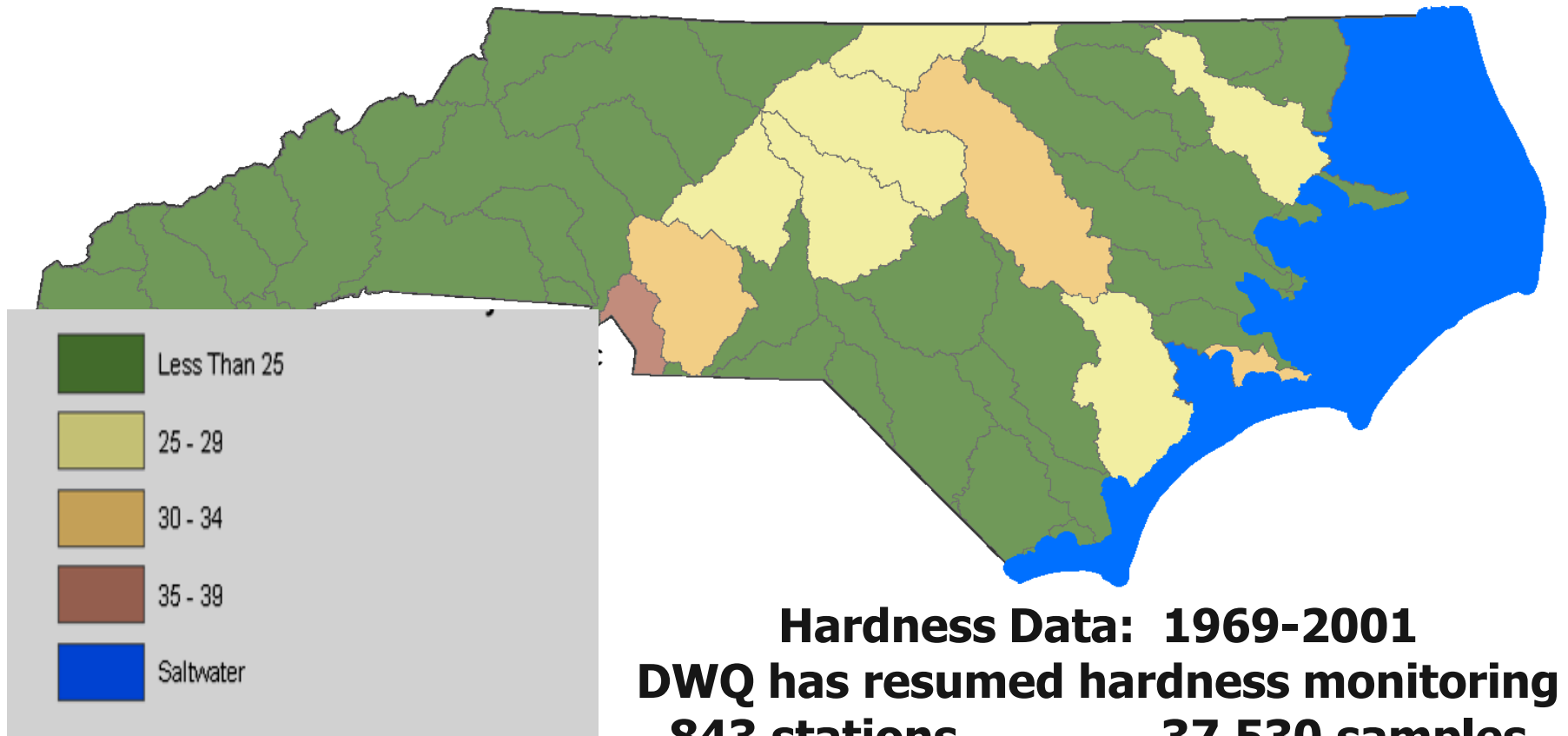


DWQ Staff has proposed:

- The use of a statewide default hardness of 25 mg/l in freshwaters
- Addition of *formulas* to the current regulations which may be used to calculate more localized criterion

10th percentile Hardness by HUC

Surface Water Hardness in North Carolina



Metal	Current Total Aquatic Life Standard (ug/L)	Proposed Dissolved Freshwater Standard (ug/L)	
	Chronic 50 mg/L Hardness	Chronic 25 mg/L	Acute 25 mg/L
Arsenic	50	150	340
Beryllium	6.5	6.5	65
Cadmium*	2 / 0.4 trout	0.15	0.82 / 0.51 trout
Chromium (total)	50	Proposed for removal	
Chromium III *	none	24	180
Chromium VI	none	11	16
Copper *	7 (AL)	2.7 (AL)	3.6 (AL)
Iron	1 mg/L (AL)	Proposed for removal	
Lead *	25	0.54	14
Nickel *	88	16	140
Silver *	0.06 (AL)	0.06 (AL)	0.30 (AL)
Zinc *	50 (AL)	36 (AL)	36 (AL)

Metal	Current Total Aquatic Life Standard (ug/L)	Proposed Dissolved Saltwater Standard (ug/L)	
	Chronic	Chronic	Acute
Arsenic	50	36	69
Cadmium	5	8.8	40
Chromium (total)	20	Proposed for removal	
Chromium III	none	none	none
Chromium VI	none	50	1100
Copper	3 (AL)	3.1 (AL)	4.8 (AL)
Lead	25	8.1	210
Nickel	8.3	8.2	74
Silver	0.1 (AL)	0.1 (AL)	1.9 (AL)
Zinc	86 (AL)	81 (AL)	90 (AL)



Proposed Chlorophyll a Criteria

- Fresh and Salt waters
 - Not greater than 10% of data shall exceed 40 ug/L
- Classified Trout waters
 - Not greater than 10% of data shall exceed 15 ug/L
- Mountains and Upper Piedmont waters
 - Not greater than 10% of data shall exceed 25 ug/L



Nutrient Criteria Development

- NC Nutrient Criteria Implementation Plan (NCIP) approved by EPA in September 2004
- Proposed to develop regionally-unique chlorophyll standards
- Would *not* establish N & P surface water quality standards unless correlations w chlorophyll a were established
- Correlations of TN/TP/Chlor are poor in NC



Nutrient Criteria Development

- DWQ drafted rules to establish nutrient “thresholds”
- Proposals to regulate TN and TP through NPDES permits were not well received
- DWQ will host a Nutrient Forum to engage stakeholders and obtain relevant information
- Matt Matthews – Surface Water Protection Section Chief will be organizing Forum



Emerging Contaminants (PPCPs): How do you control them?

Must have Reference Dose/Cancer Slope Factor/Bioaccumulation Rates to calculate

- Generally, these are *not* available
- EPA is working on toxicity studies
- When tox information becomes available- simple formulas can establish protective levels



Emerging Contaminants (PPCPs): How do you control them?

- Wastewater Treatment technologies ???
 - Activated carbon?
 - Feasibility ?
 - Expense?
- Analytical methods approved for wastewater and ambient waters – need to be developed



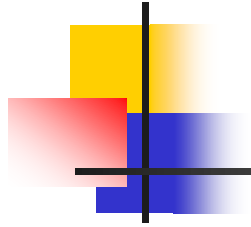
Development of Standards?

- **Not likely until Federal research is complete**
- Ongoing Research :
 - Office of Water
 - National Health and Environmental Effects Research Laboratory (NHEERL)
 - National Exposure Research Lab
 - Computational Toxicity
 - Exposure Research Program
 - Many others!



State activities

- Most activity focused on prevention of PPCPs entering the waters
- Multiple agencies involved:
 - DHHS
 - Agriculture
 - USGS
 - DWQ – DWM -DEH
 - Drug Enforcement Administration
 - USFW



Questions ?