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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Point and
Non Point Source Management

Ionic Composition of Pennsylvania's Surface Waters and Chloride and Sulfate Toxicity Testing

July 15, 2014
Environmental Quality Board

Background

- Inorganic solids dissociate in water forming positive cations and negative anions
  - Major Cations: Calcium, Magnesium, Sodium
  - Major Anions: Bicarbonate, Chloride, Sulfate
- The mixture and concentrations of ions influence the toxic effects of individual species of ions
- Necessary to know the natural ionic composition to develop chloride and sulfate criteria

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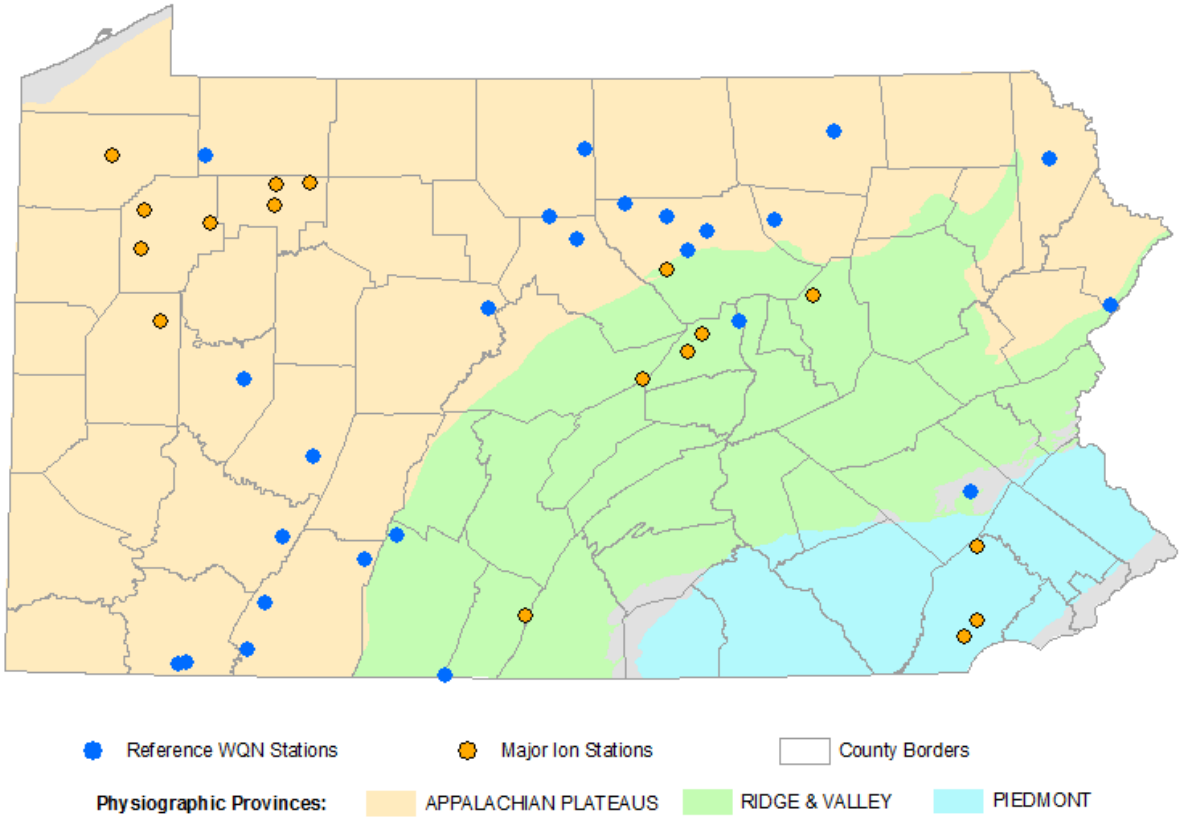
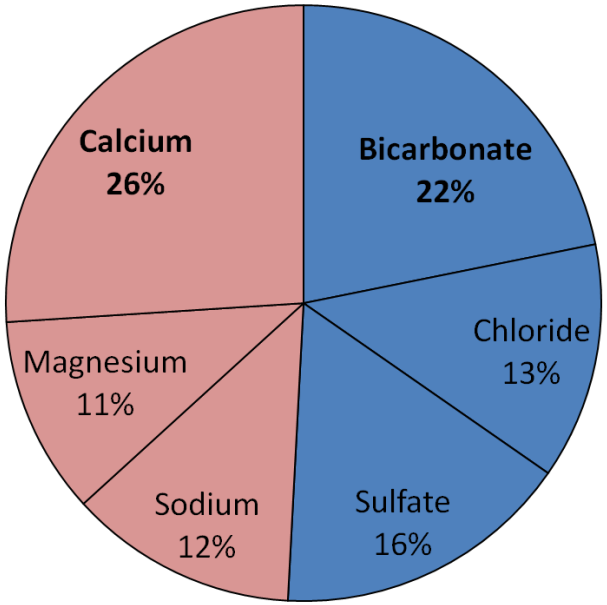
Ionic Composition of Typical Pa Streams

- Goal is to measure the ionic composition of 125+ least impacted typical streams spread across the three major physiographic provinces.
- Approximately 30% of the collections were completed before they had to be suspended due to snow melt and road salting, then due to high stream flows; expect to resume sampling in July.
- Samples collected so far:

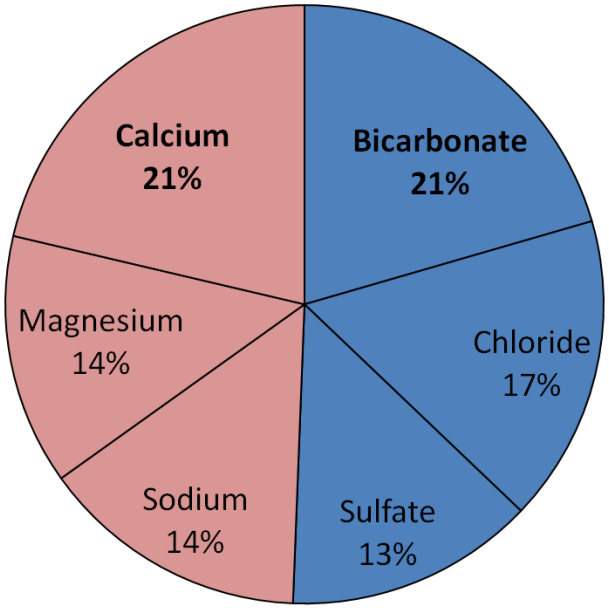


Appalachian Plateau Province

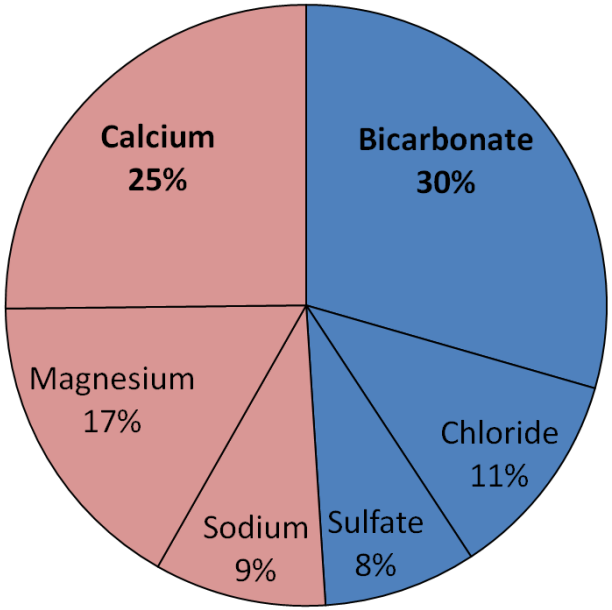


Calcium & Bicarbonate are the major ions in all 3 provinces.

Ridge and Valley Province



Piedmont Province



Chloride Toxicity Testing

Study being conducted by
Stroud Water Research Center

- Multiple species of sensitive Pennsylvania mayflies used in the acute and full life cycle chronic tests.

- Test water will be taken from Pennsylvania reference streams of typical ionic composition and varying hardness levels.

- Goal of the study is to provide suggestions for aquatic life acute and chronic chloride water quality criteria for Pennsylvania streams.

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Sulfate Toxicity Testing

Possible Future Studies to be conducted by
Stroud Water Research Center

- If the chloride testing is successful, the studies will be repeated the following year using sulfate instead of chloride.
- Goal of the study is to provide suggestions for aquatic life acute and chronic sulfate water quality criteria for Pennsylvania streams.

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NPDES Implementation

- DEP has updated NPDES permit applications to require up-front sample data for chloride, sulfate, molybdenum and 1,4-dioxane.
- DEP has begun to require monitoring for these parameters in selected NPDES permits.
- DEP is able to develop site-specific criteria for molybdenum and 1,4-dioxane, as needed, based on presently available science.

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Thank you.

Kelly Jean Heffner, Deputy Secretary
Office of Water Management