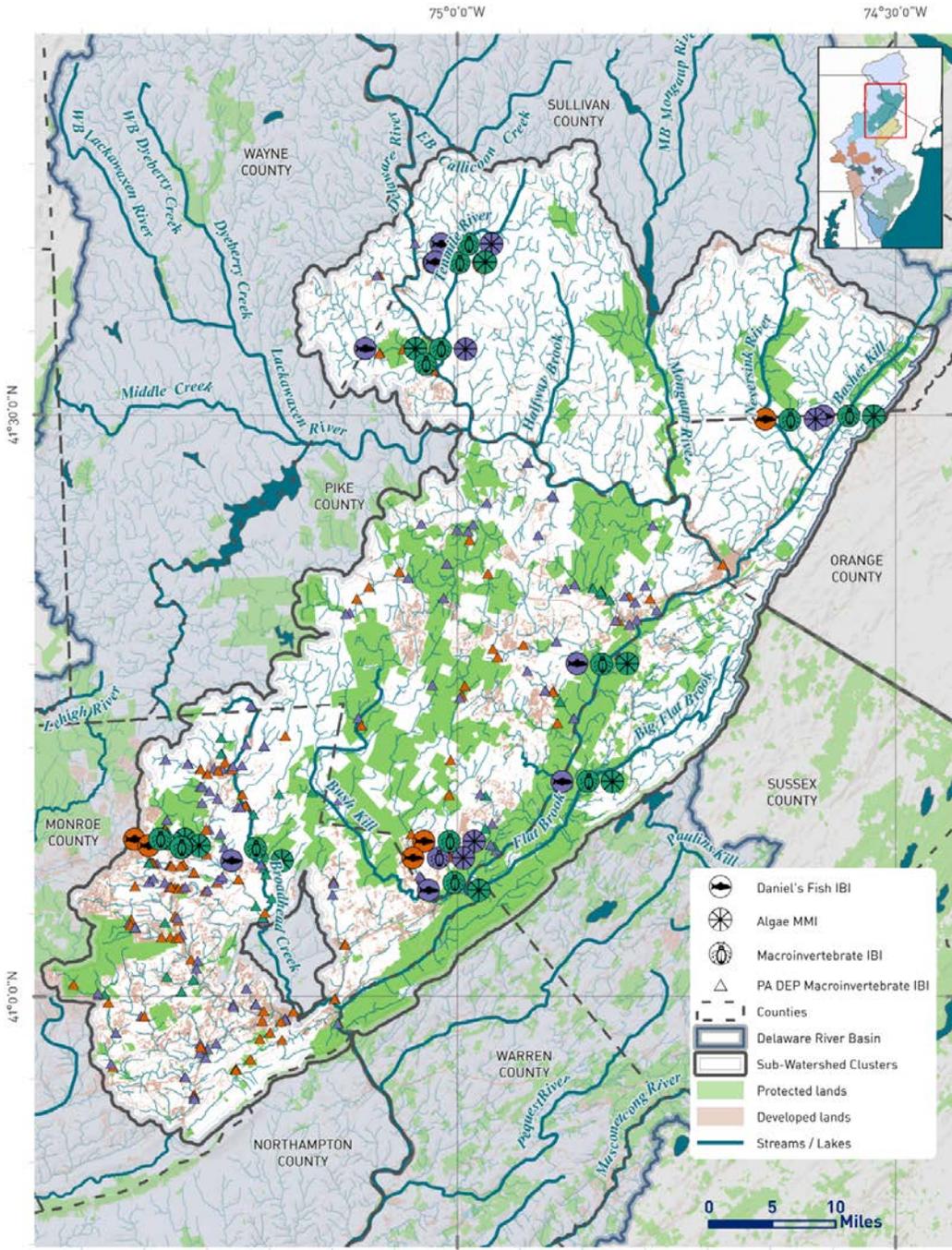


POCONOS AND KITTATINNY

Indices of Biological Integrity: An index of biological integrity (IBI) is a collection of metrics which describe the structure and function of an ecosystem based on its biota. Metric values are converted to scores and yield a total IBI score. These scores can be translated into easily-interpreted regional quality classifications.



Circle icons represent 2013-2014 DRWI sampling sites. Number of ANS/Stroud WRC sites = 17; Cluster Group sites = 12.

Multiple Indicators: Data collection includes chemical parameters as well as biota. Water chemistry alone can either over exaggerate or fail to detect changes from brief pollution events, but biota provide information on year-round water and habitat quality. Different biota respond differently to stressors. Analyzing data on multiple groups of biota tells a more complete story of ecosystem structure and function in relation to landscape variables and human activities.

Rating	Daniels Fish IBI	PADEP Macro-invertebrate IBI	Algae MMI
Poor	0 – 35	0 – 45	0 – 3.33
Fair	35.1 – 46	45.1 – 74	3.34 – 6.66
Good	46.1 – 60	74.1 – 100	6.67 – 10

Notable Fish & Significance to IBI

Longnose Dace (*Rhinichthys cataractae*)
Insectivore, intermediate tolerance to non-specific stressors

American Eel (*Anguilla rostrata*)
Generalist feeder, intermediate tolerance to non-specific stressors

Tessellated Darter (*Etheostoma olmstedii*)
Insectivore, intermediate tolerance to non-specific stressors

Average Daniels Fish IBI Score:
37.87 (Fair)

Notable Algae & Significance to IBI

Achnanidium rivulare
Nutrient tolerant, neutral pH optimum, grazer and scour resistant

Cocconeis placentula
Moderate nutrient tolerance, grazer and scour resistant

Navicula recens
Nutrient tolerant, moderately grazer and scour resistant

Average Algae MMI Score:
6.57 (Fair)

Notable Macroinvertebrates & Significance to IBI

Midges: Chironomidae
Those present here range from pollution sensitive to pollution tolerant, collector-gatherers

Spring stoneflies: Nemouridae
Pollution intolerant, shredders

Small minnow mayflies: Baetidae
Pollution tolerant, collector-gatherers, very common

Average Macroinvertebrate IBI Score:
84.03 (Good)

POCONOS AND KITTATINNY

Cluster Organization

Partners: Brodhead Watershed Association*, Delaware Highlands Conservancy, East Stroudsburg University*, Natural Lands Trust, The Nature Conservancy, Pinchot Institute for Conservation*, Pocono Heritage Land Trust, Trust for Public Land. (*PKC monitoring partners)

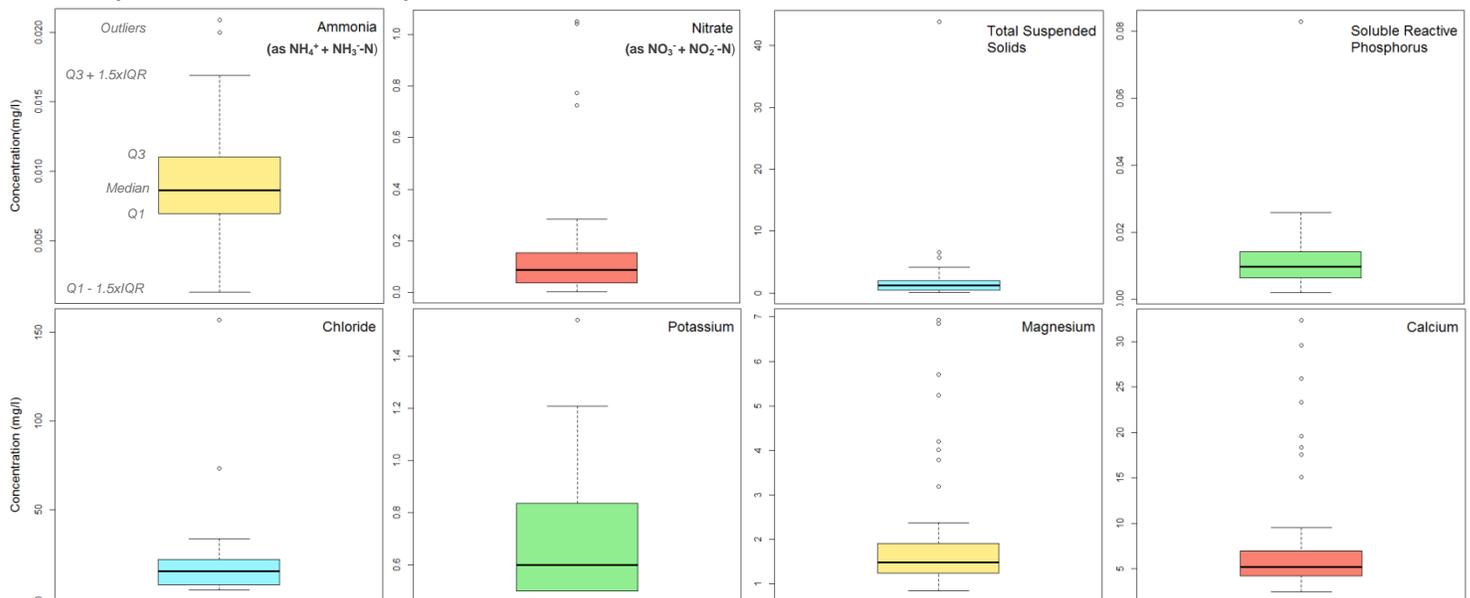
Strategy: Conserve high-quality waterways through targeted land protection strategies; assess the impact to water quality of residential, commercial and energy infrastructure development; improve land use regulations and funding mechanisms related to public agencies; increase regional awareness, support and collaboration regarding conservation and water protection issues.

Monitoring Objectives: Ensure maintenance of high water quality in and evaluate the effects of protecting lands of high conservation value. Monitoring plan utilizes professional monitoring, aligns with county water quality monitoring programs, works with East Stroudsburg University to incorporate monitoring into the curriculum, and partners with other established volunteer monitoring efforts.

Habitat Assessment

In-stream habitat assessments are a composite of variables including flow type descriptions, particle size classifications and embeddedness estimations. These features interact to influence biotic communities. Reaches sampled in the Poconos-Kittatinny cluster were dominated by glide (42%; fast-flowing but not as choppy as a riffle) with nearly equal amounts of riffles (27%) and pools (29%; still or backflow) as the next most common flow types. Flow type is often reflected in both substrate particle size and how embedded particles are. Particle size and embeddedness then, in turn, partially determine the area of habitat available for fish, macroinvertebrates and algae within a reach. In the Poconos-Kittatinny cluster, the dominant particle sizes were cobble (38%) and then nearly equal representation of coarse gravel (15%), small boulders (12%) and sand (12%). The coarse gravel, cobbles, and boulders present were about 45% embedded (covered in fine sediment; high percentages can indicate erosion of upstream land). Overall this cluster was given a habitat grade of optimal.

Summary Of Water Chemistry Parameters



Box-and-whisker plots of chemical parameters in the Poconos and Kittatinny cluster.

There were 53 seasonal sampling events performed by the Academy of Natural Sciences and Stroud Water Research Center at 16 sites from 2013 to 2014. The Poconos and Kittatinny cluster is dominated by cold water, trout-producing streams. All samples met recommended nitrate criteria suitable for cold-water communities (<3.1 mg/L nitrate, Minnesota PCA). One summer sampling event on the Little Bushkill had a total suspended solids (TSS) concentration of 43.9 mg/L, far exceeding the maximum TSS recommended for cold water streams (25 mg/L, NJ DEP) and even exceeding the maximum concentration recommended for warm water (non-trout) streams (40 mg/L). The sampling site is in a campground, and captures developed areas (20%), forested land (62%) and ponds.

The highest concentration of soluble reactive phosphorus (SRP) was from a site on Tenmile River (0.83 mg/L SRP). This exceeds 0.05 mg/L SRP – a widely-referenced maximum concentration for suitability for aquatic life. This location is downstream of some farms (19%) but also drains forested areas (73%) and housing developments (4.2%), as well as lakes and ponds. Ammonia concentration and its effects on freshwater communities is highly variable; upper limits of concentrations suitable for aquatic life can range from 0.07 to 2.0 mg/L total ammonia (EPA) depending on temperature, pH and species. All sampling events in this cluster met the total ammonia criterion, with concentrations below 0.07 mg/L.

All sampling events in the cluster attained standards for aquatic life under chronic exposure to chloride (<230 mg/L, EPA). Yankee Run had the highest concentration, 157.1 mg/L Cl, at one summer sampling event. Tank Creek and Paradise Creek were 33.5 and 73.4 mg/L Cl respectively – among the highest in the cluster, but not outliers. Tank Creek and Yankee Run meet to form Paradise Creek, and sampling locations for each were situated around the confluence. The sampling areas were in forested preserves adjacent to housing developments and highways. High chloride concentrations can be related to urban land use via road salts and wastewater treatment plants. Weathering is the main source of calcium (from limestone), magnesium (from igneous rocks that include biotite and pyroxene), and potassium (from igneous and silicate rocks including feldspar) in freshwater streams. Their concentrations vary depending on rainwater and pollution as well as local geology, with ion concentrations in igneous geographies roughly half those of sedimentary landscapes. Downstream this variation becomes less notable than in headwaters, and ion concentrations increase overall (Allan and Castillo, 2007).