

2023 | Raritan Headwaters Report Card

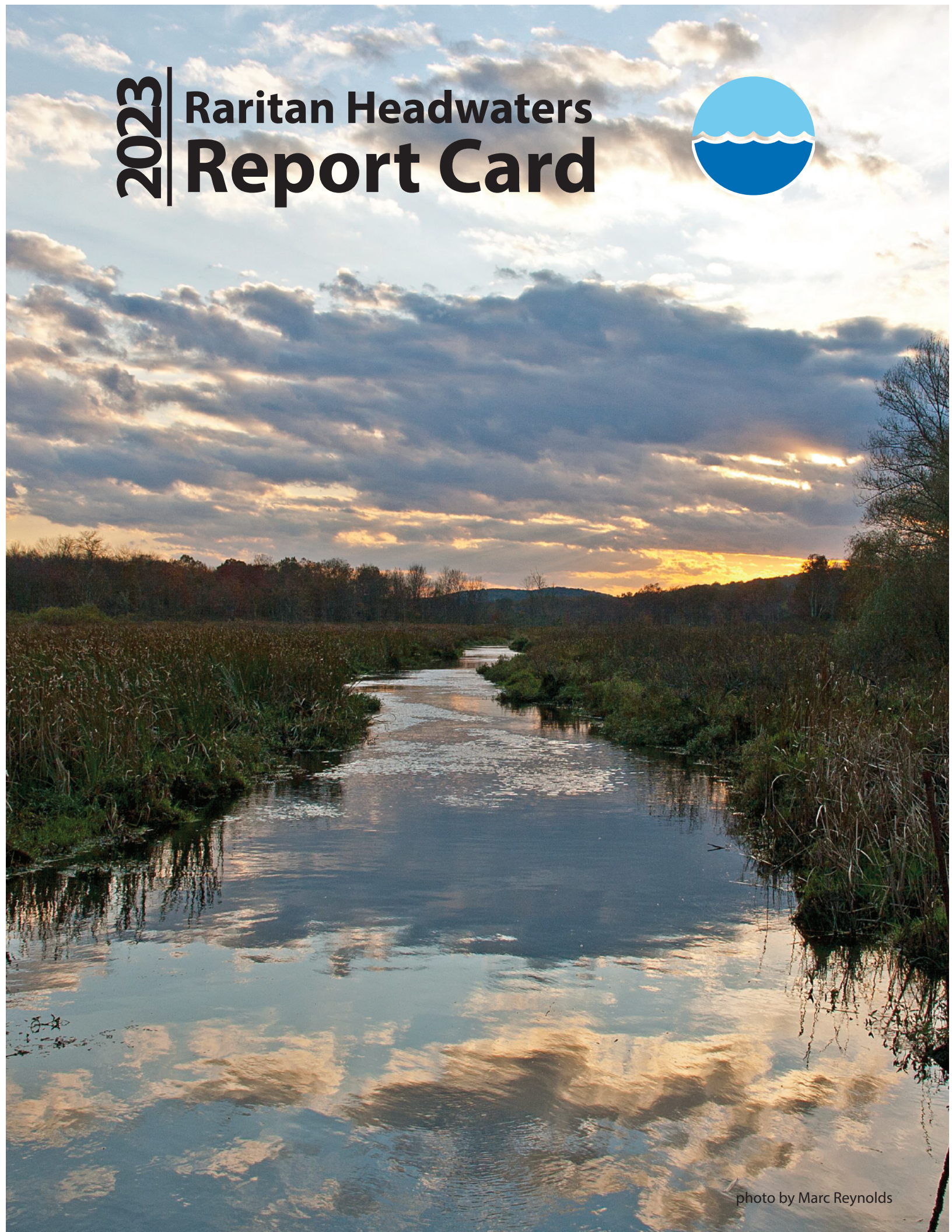


photo by Marc Reynolds



photo by Dallas Heatherington

Who is watching out for our streams and rivers?

For the past 25 years Raritan Headwaters has been collecting high quality data as part of its award-winning Stream Monitoring Program. With the help of our dedicated corps of over 100 trained citizen scientists, we are on the ground (and in the water) monitoring the health of our streams all year. This includes our annual biological, habitat, and baseline chemical monitoring in June, summer bacterial monitoring of impaired sites and swimming holes, quarterly seasonal chemical monitoring of our 2-year impaired sites, and response to environmental incidents affecting our waterways. Monitoring water is a big job and we need the help of citizens like you.

About RHA

RHA serves as the watchdog for the 470-square-mile North and South Branch Raritan watershed, a region covering 38 municipalities in New Jersey's Hunterdon, Somerset and Morris counties.

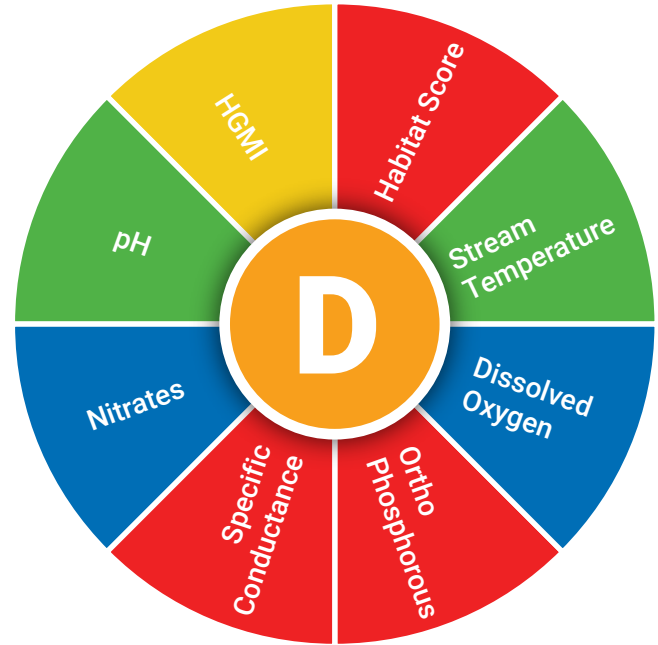
Throughout this beautiful region, countless pristine tributaries merge and flow into the North and South Branches of the Raritan River. Safeguarding these "headwaters" means clean, safe water for 300,000 watershed residents and 1.5 million New Jerseyans living downstream in more urban areas that depend on the water that comes from our rivers and reservoirs.

Raritan Headwaters is a member-supported 501(c)(3) nonprofit organization that operates under the guidance of a Board of Trustees. We have 20 staff members, joined by an Ameri-Corps watershed ambassador, nature educators, interns and a large and enthusiastic corps of volunteers.



The Health of the Watershed

RHA's stream monitoring data, gathered every June by a team of dedicated volunteers, forms the basis of this annual watershed report card. Based on combined grades for macroinvertebrates, habitat, and chemical parameters collected at our stream monitoring sites in June 2022, our watershed received a D. Is our water clean and safe? Yes and no – The map shows that some streams in the watershed are healthy while others are not. Also, most of our streams have temperatures and oxygen levels that support clean water and abundant cold water fish. However, phosphates (from fertilizers and wastewater), specific conductance (a measure of road salts), and habitat scores need a lot improvement. Because we are the headwaters of the Raritan River and the source of drinking water to 1.8 million people in New Jersey, our goal is to strive for an A or B in all areas.



Raritan Headwaters health scale



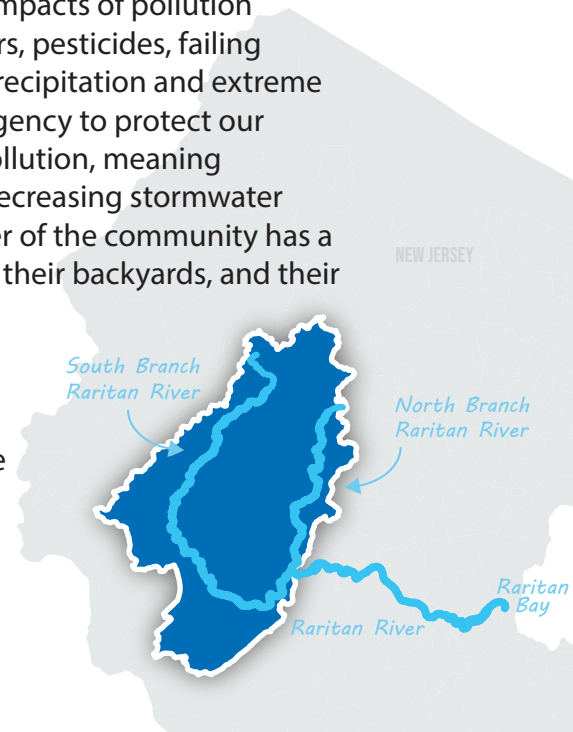
What caused this rating?

This report card tells us that we need to focus on protecting forests and riparian buffers, controlling stormwater by limiting impervious cover and installing green infrastructure, applying best management practices on farms, and increasing the resilience of our communities to climate change. Poorly-planned development and unwise policy decisions at the local and state level continue to threaten the region's waterways along with the cumulative impacts of pollution coming from irresponsible management of hazardous materials, fertilizers, pesticides, failing septic systems and other common sources. In the context of increased precipitation and extreme weather events due to climate change, there is a heightened sense of urgency to protect our streams. Most of our stream impairments are due to non-point source pollution, meaning pollution that comes from all of us, and can be effectively managed by decreasing stormwater runoff by capturing rainfall on site with rain gardens. Also, every member of the community has a part to play in protecting the watershed by what they do in their homes, their backyards, and their businesses.

Your help is needed

Many people take clean water for granted, but we know it takes vigilance and hard work to protect the water in our rivers, streams and homes. RHA is the watershed watchdog for the Upper Raritan River region.

And we can't do it alone. We need your help to ensure that everyone within our reach has access to safe, clean water that is swimmable, fishable and, above all, drinkable.






2023 Overall Watershed Health for the Raritan Headwaters Region



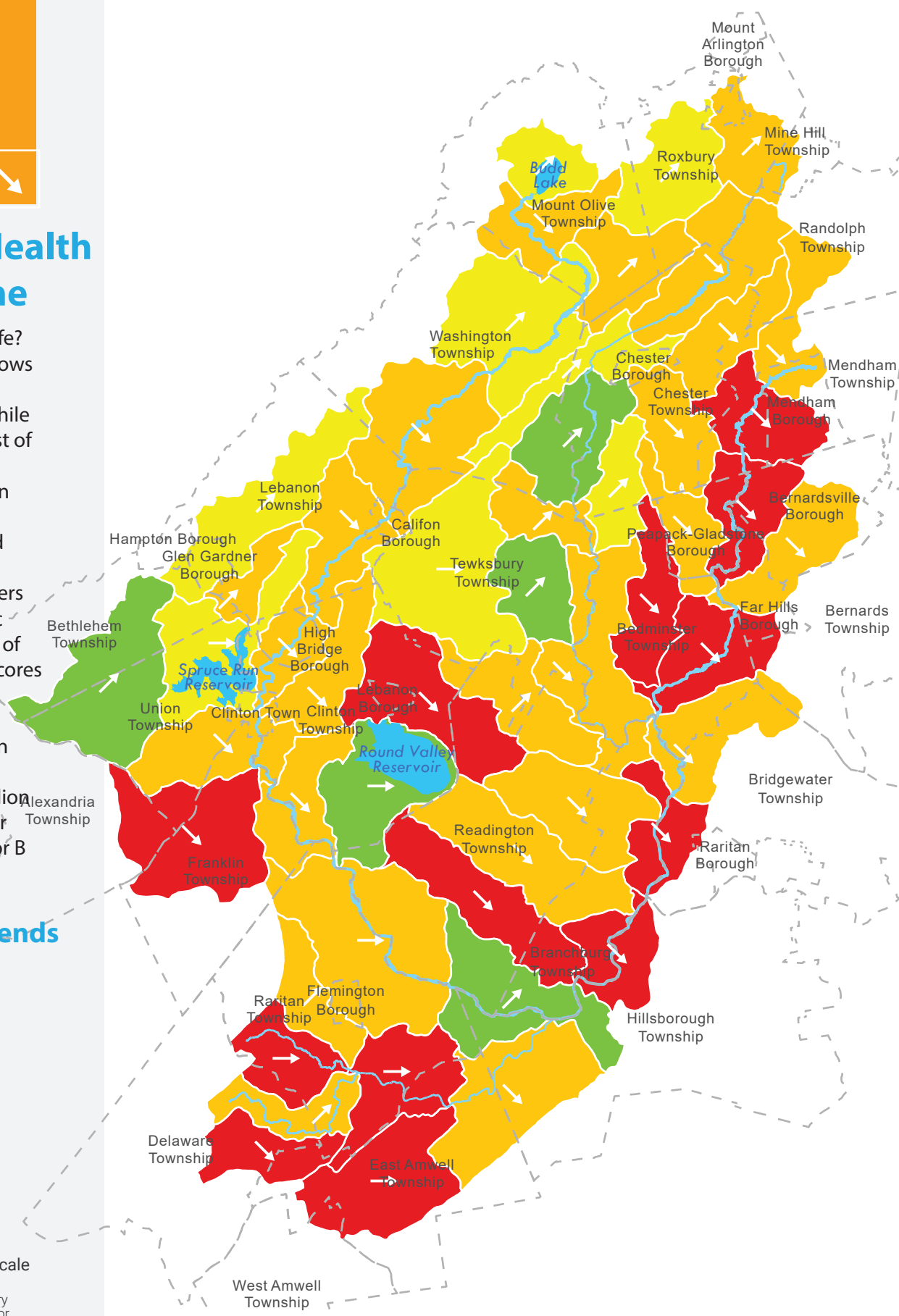
Watershed Health on the decline

Is our water clean and safe? Yes and no – The map shows that some streams in the watershed are healthy while others are not. Also, most of our streams have temperatures and oxygen levels that support clean water and abundant cold water fish. However, phosphates (from fertilizers and wastewater), specific conductance (a measure of road salts), and habitat scores need a lot improvement. Because we are the headwaters of the Raritan River and the source of drinking water to 1.8 million people in New Jersey, our goal is to strive for an A or B in all areas.

Subwatershed Trends 2022 vs 2023

-  Subwatersheds Improved (17)
-  Subwatersheds with no change (7)
-  Subwatersheds Declined (28)

Raritan Headwaters health scale



Indicators of the 2023 Watershed Health



HGMI

The High Gradient Macroinvertebrate Index (HGMI) reflects the biological integrity of the stream, which is sensitive to physical and chemical conditions. The Index is based on the composition of the benthic macroinvertebrate community, which contains many species of aquatic insects, mollusks and worms that vary greatly in their tolerance of poor water quality. They are used around the world to measure the overall health of streams and rivers.



Habitat

The visual habitat score is a metric of stream health that combines several parameters including stream flows, sinuosity, sediment deposition, embeddedness, frequency of riffles, bank stability and condition of riparian buffers. Urban and agricultural land use, combined with climate change have resulted in stormwater influxes that degrade habitat by scouring streambeds and causing bank erosion.



Stream Temperature

Healthy headwaters streams have colder temperatures. Many sensitive stream organisms require cold, oxygen rich water to survive. Shade from forested buffers is critical to maintaining cold water temperatures and protecting streams from rising global temperatures.



Dissolved Oxygen

Many sensitive species of stream organisms must have high dissolved oxygen concentrations in order to survive. Higher oxygen levels are maintained by the presence of riffles and lower temperatures afforded by forested streambanks. High nutrient levels can cause eutrophication and oxygen depletion.



Nitrates

Nitrate and phosphate are nutrients required by all organisms. However, high inputs of nutrients from sources such as fertilizers and septic systems can cause an overgrowth of plants, bacteria and algae resulting in eutrophication and oxygen depletion in rivers and lakes. Nitrates entering marine ecosystems are causing algal blooms and "dead zones" where fish and other life cannot survive.



Phosphates

Phosphate is a nutrient required by all living things, but too much phosphate causes an imbalance in freshwater ecosystems and can lead to an overgrowth of plants and depletion of oxygen; this is known as eutrophication. This can lead to harmful algal blooms (HABs) that produce toxins harmful to humans, fish and wildlife. Pollution from stormwater runoff, wastewater discharges, and septic systems, contribute significantly to the increased levels of phosphates that we see in our streams.



Specific Conductance

Specific conductance is a measure of the ability of water to conduct a charge and closely reflects the concentration of dissolved salts and total suspended solids (TSS) in the water. Freshwater streams are characterized by low salinity and organisms are sensitive to high salinity levels. A major source of salt in streams is the application of road salt and industrial and municipal wastewater discharges.



pH

pH is the measure of acidity or alkalinity of a stream. Many aquatic organisms undergo physical stress if the pH level is not within a narrow range close to neutral (pH=7). pH can be negatively affected by factors such as agricultural runoff, industrial and municipal wastewater discharges, and acid rain.

Indicator

HGMI



Overall Watershed Grade

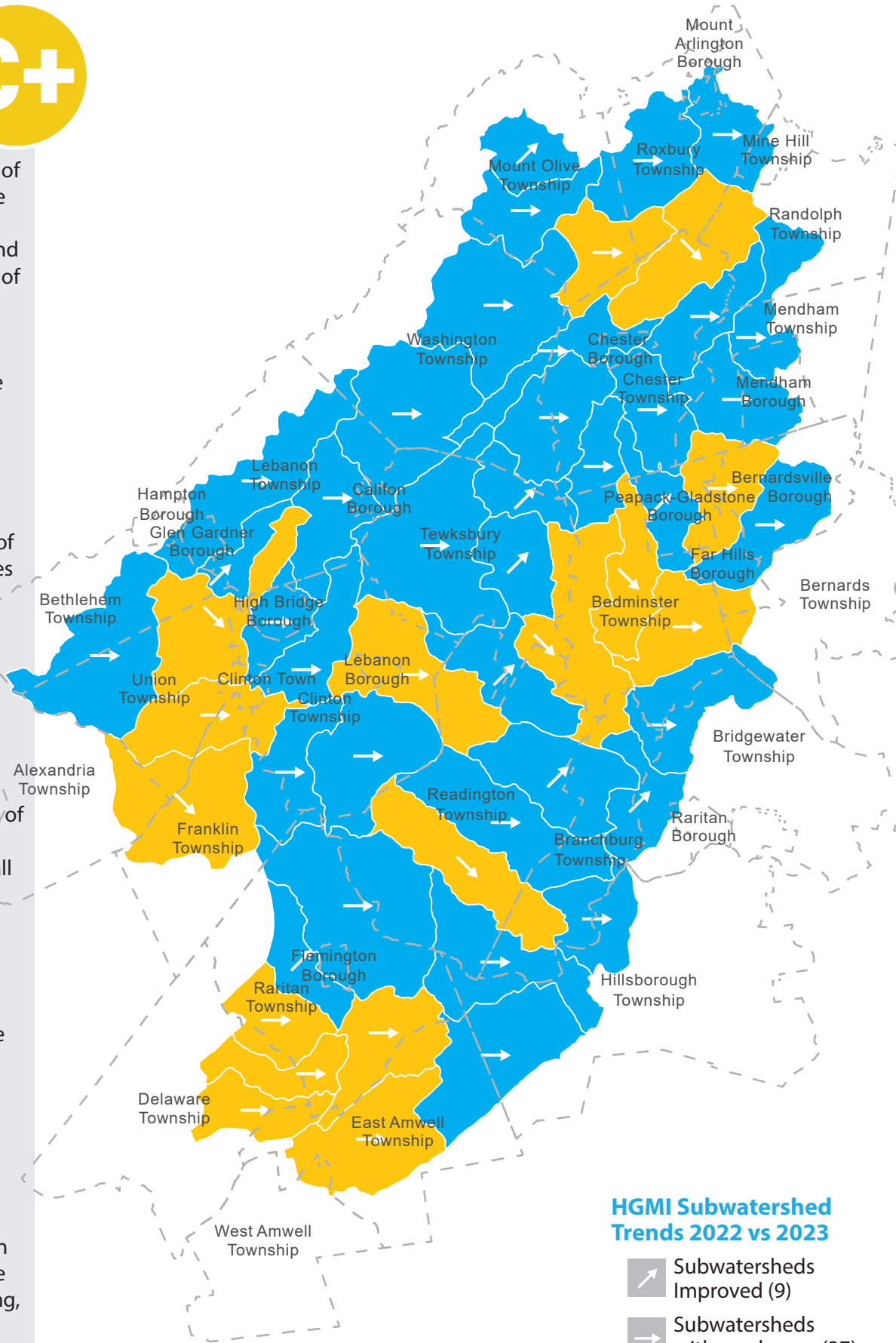
The organisms present in the stream are an umbrella indicator of the health of the stream. They are exposed to the conditions of the stream including water quality and habitat every day, all year. Some of them can tolerate pollution and poor habitat whereas others require optimal conditions. The High Gradient Macroinvertebrate Index (HGMI) is based on the composition of the benthic macroinvertebrate community, which contains many species of aquatic insects, mollusks and worms with different tolerances of poor water quality. Similar indices are used around the world to measure the overall health of streams and rivers.

Sources of impairment

Impaired water quality and impaired habitat directly impact HGMI. Stormwater runoff from urban and agricultural areas, loss of forest especially forested stream buffers, and climate change are all directly or indirectly causing a decrease in sensitive benthic macroinvertebrates.

Solutions

Restoration and protection of the watershed are key for this group. All the activities to protect and preserve forests and riparian buffers, control urban development and implement major stormwater BMPs in planning, retrofitting poorly planned development with green infrastructure, addressing climate change resilience in local planning, and addressing sources of pollutants will go a long way to protecting stream health.



HGMI Subwatershed Trends 2022 vs 2023

- Subwatersheds Improved (9)
- Subwatersheds with no change (37)
- Subwatersheds Declined (6)

Raritan Headwaters indicator colors



Indicator

HABITAT

Overall Watershed Grade



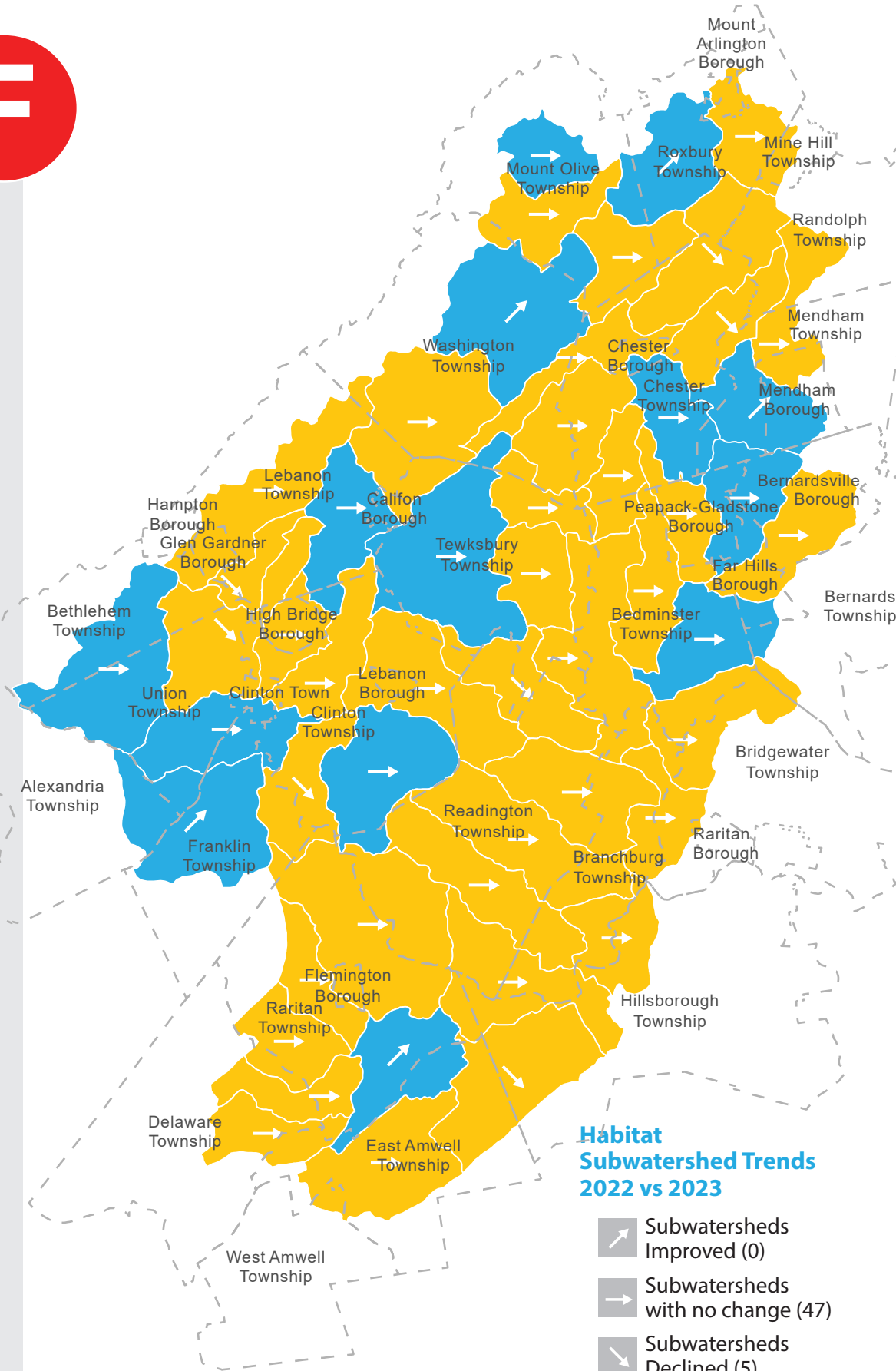
The visual habitat score is a metric of stream health that combines several parameters including stream flows, sinuosity, sediment deposition, embeddedness, frequency of riffles, bank stability and condition of riparian buffers

Sources of Impairment




Urban and agricultural land use, combined with climate change, have resulted in stormwater influxes that degrade habitat by scouring streambeds, causing bank erosion, and depositing sand that prevents organisms from accessing habitat between the rocks.

Solutions

Preservation and restoration of forests, especially along streams and rivers, is key for stream habitat integrity. Trees filter pollutants and sediments, absorb flood waters, provide leaves as a major food resource for stream organisms, stabilize banks, and shade the stream. Also, improving stormwater management by capturing precipitation and runoff from properties before it enters our streams, is critical to protecting habitat quality.



Habitat Subwatershed Trends 2022 vs 2023

-  Subwatersheds Improved (0)
-  Subwatersheds with no change (47)
-  Subwatersheds Declined (5)

Raritan Headwaters indicator colors



Indicator

STREAM TEMPERATURE

Overall Watershed Grade



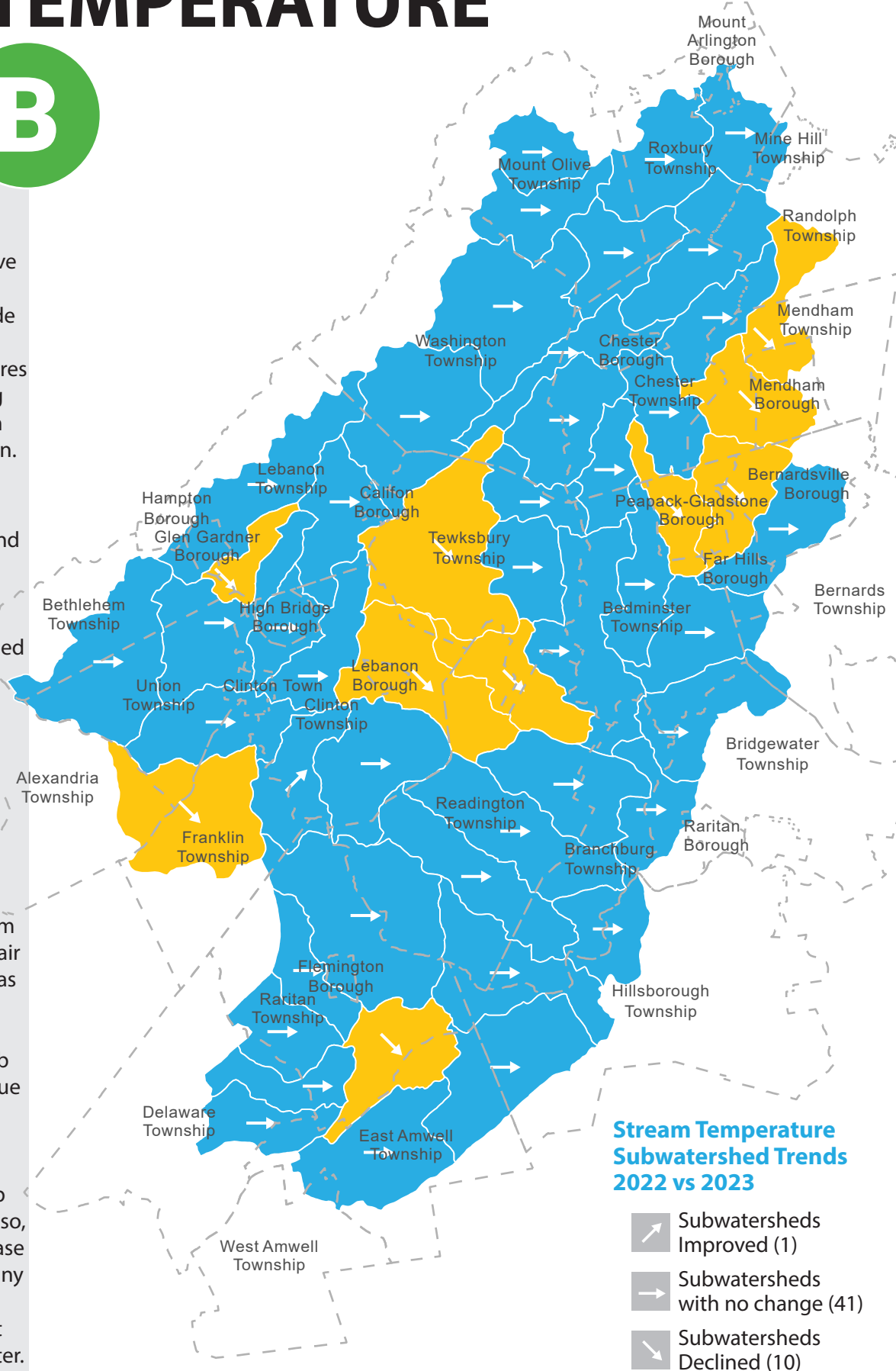
Healthy headwaters streams have colder temperatures. Many sensitive stream organisms require cold, oxygen rich water to survive. Shade from forested buffers is critical to maintaining cold water temperatures and protecting streams from rising global temperatures. Reduction in fossil fuel use is a longterm solution.

Sources of Impairment

Loss of streamside forest buffers and increased urban runoff bringing warm water to our streams are causing an increase in stream temperatures. Luckily our watershed is still maintaining cooler temperatures despite rising temperatures.

Solutions

There is concern that increasing global temperatures will result in increased temperatures and lower oxygen levels in streams of our region. Currently, our streams seem to be able to withstand the rise in air temperature due to greenhouse gas emissions over the past century. However, this may change depending upon our ability to curb carbon emissions. We must continue to protect and restore forests, especially riparian forests along streams – even shade trees along streets and parking lots will absorb heat and shade paved surfaces. Also, promote local ordinances to increase the use of green infrastructure in any new development to capture and filter polluted stormwater before it enters our streams and groundwater.



Stream Temperature Subwatershed Trends 2022 vs 2023

- Subwatersheds Improved (1)
- Subwatersheds with no change (41)
- Subwatersheds Declined (10)

Raritan Headwaters indicator colors



Indicator

DISSOLVED OXYGEN

Overall Watershed Grade



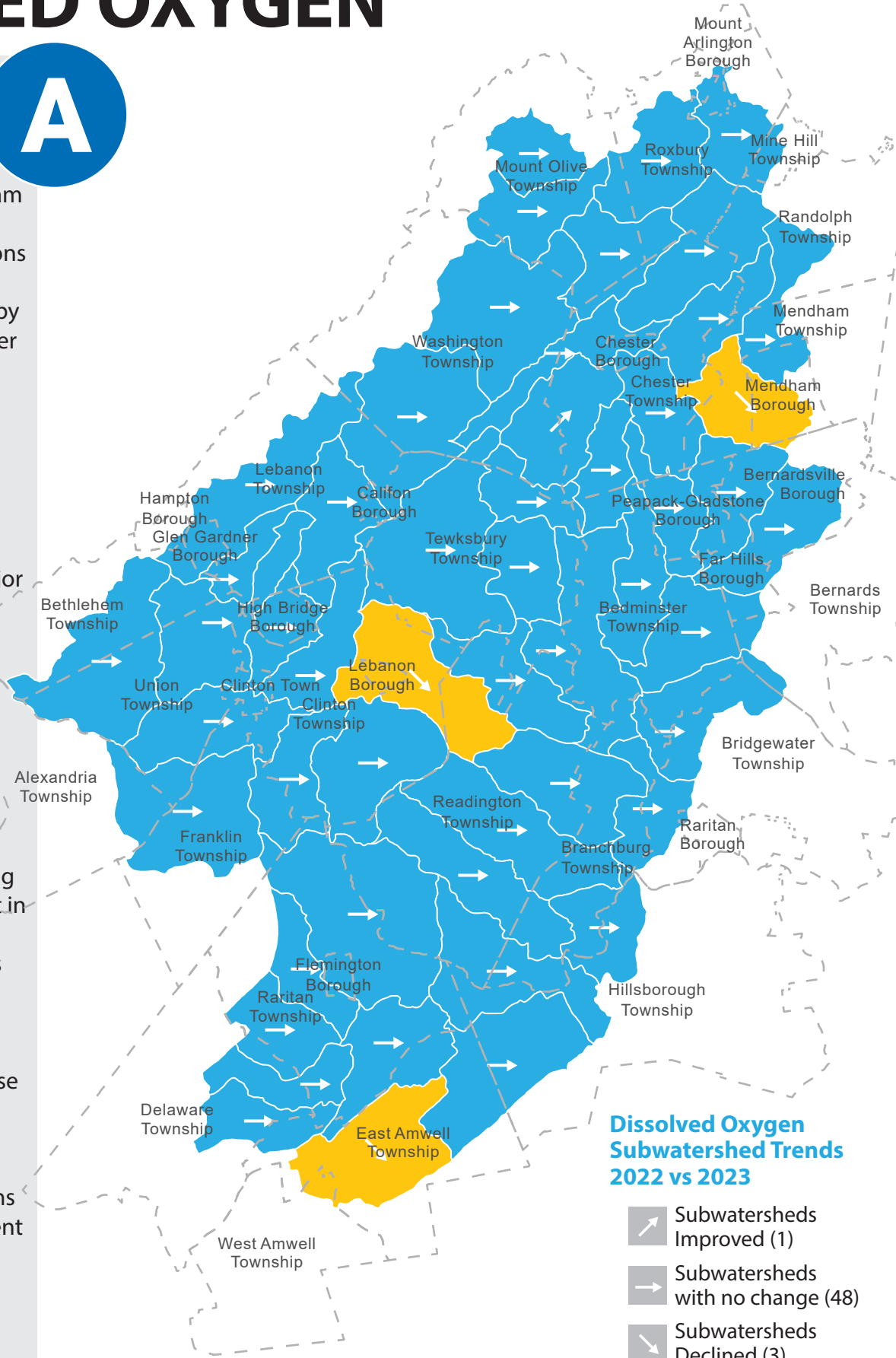
Many sensitive species of stream organisms must have high dissolved oxygen concentrations in order to survive. Higher oxygen levels are maintained by the presence of riffles and lower temperatures afforded by forested streambanks. High nutrient levels can cause eutrophication and oxygen depletion.

Sources of Impairment

Higher temperatures are a major source of low oxygen levels in our streams. Anything that causes higher stream temperatures such as stormwater runoff and loss of forested stream buffers will result in lower oxygen levels.

Solutions

There is concern that increasing global temperatures will result in increased temperatures and lower oxygen levels in streams of our region. Currently, our streams seem to be able to withstand the rise in air temperature due to greenhouse gas emissions over the past century. However, this may change depending upon our ability to curb carbon emissions and attention to climate resilient practices such as addressing stormwater runoff with better development practices, retrofitting old systems with green infrastructure and restoring forested riparian buffers.



Dissolved Oxygen Subwatershed Trends 2022 vs 2023

- Subwatersheds Improved (1)
- Subwatersheds with no change (48)
- Subwatersheds Declined (3)

Raritan Headwaters indicator colors



Indicator

NITRATES

Overall Watershed Grade



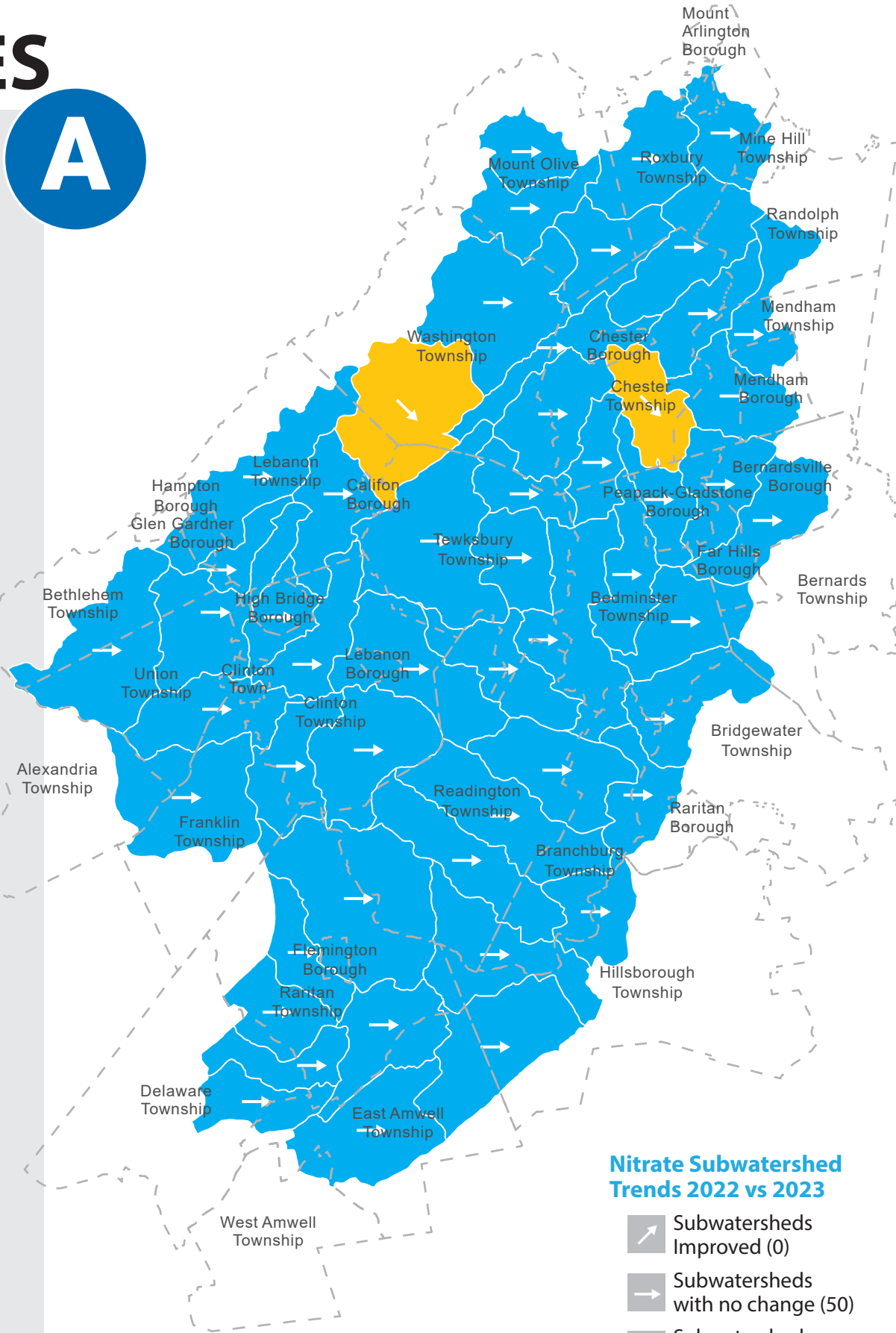
Nitrates and phosphates are nutrients required by all organisms. However, high inputs from sources such as fertilizers and septic systems can cause an overgrowth of plants, bacteria and algae resulting in eutrophication and oxygen depletion in rivers and lakes. Nitrates entering marine ecosystems are causing algal blooms and “dead zones” where fish and other life cannot survive.

Sources of Impairment

Pollution from stormwater runoff, industrial and wastewater discharges, and septic systems, farms, and wild animals such as geese contribute significantly to the increased levels of nitrates and phosphates that we see in our streams.

Solutions

There are many things we can all do to help control the amount of nitrates and phosphates entering our streams by managing what we put on the land. By limiting fertilizer applications, removing dog waste and picking up leaf piles from roads and storm drains in the fall, we can minimize nutrient levels in our aquifers and waterways. Also, proper municipal control on placement and maintenance of septic systems and upgrades to wastewater treatment plants are needed.



Raritan Headwaters indicator colors



Indicator

Phosphate

Overall Watershed Grade



Like nitrate, phosphate is a nutrient required by all living things. However, too much phosphate causes an imbalance in freshwater ecosystems and can lead to an overgrowth of plants and depletion of oxygen; a process known as eutrophication.

Sources of Impairment





Pollution from stormwater runoff, industrial and wastewater discharges, septic systems, farms, and even wild animals such as geese contribute significantly to the increased levels of phosphates that we see in our streams.

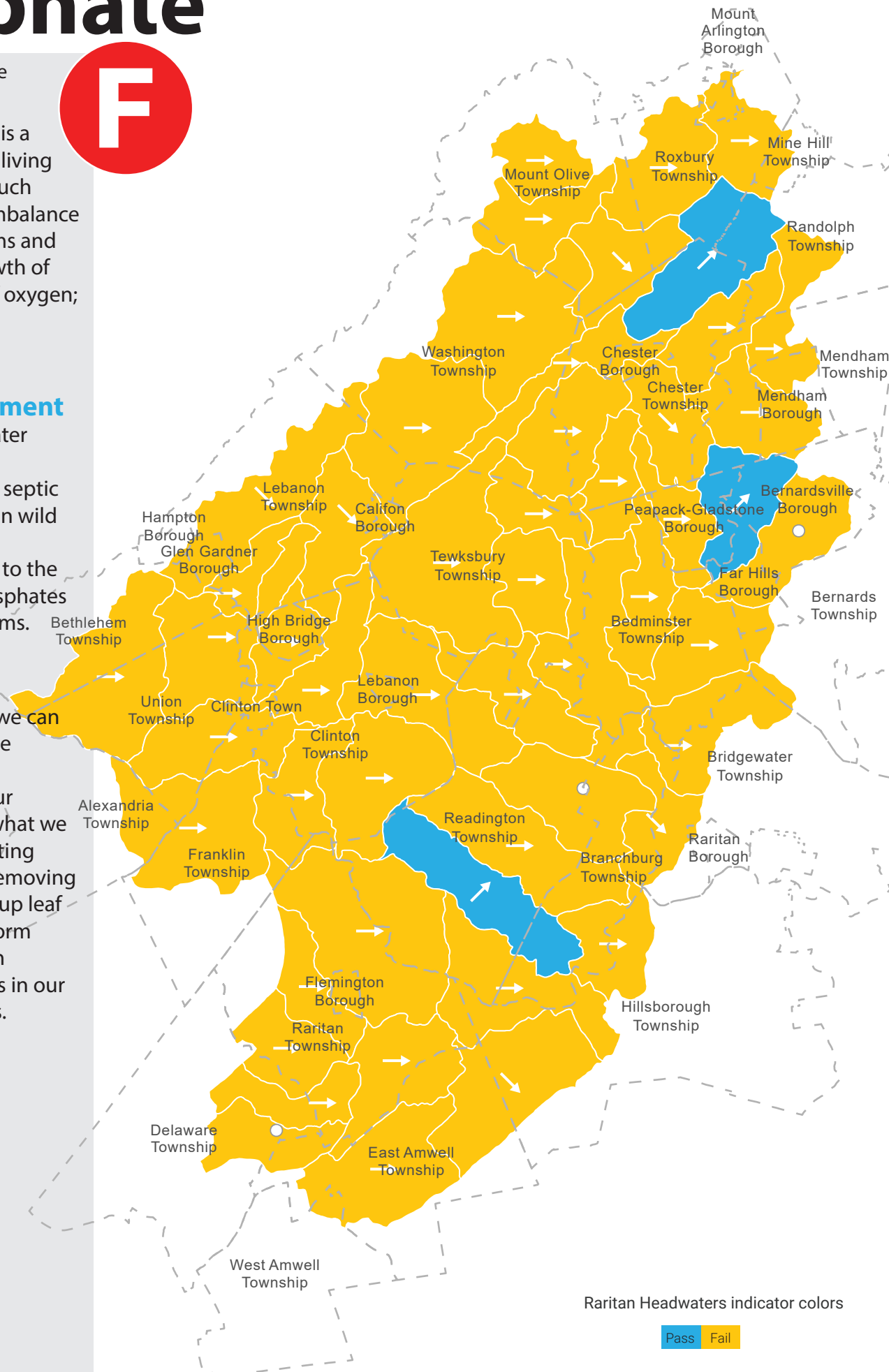
Solutions

There are many things we can all do to help control the amount of nitrates and phosphates entering our streams by managing what we put on the land. By limiting fertilizer applications, removing dog waste and picking up leaf piles from roads and storm drains in the fall, we can minimize nutrient levels in our aquifers and waterways.

Phosphate

Trends 2022 vs 2023

-  Subwatersheds Improved (3)
-  Subwatersheds with no change (40)
-  Subwatersheds Declined (6)
-  N/A - No Data in 2020 (3)



Raritan Headwaters indicator colors



Indicator

SPECIFIC CONDUCTANCE

Overall Watershed Grade



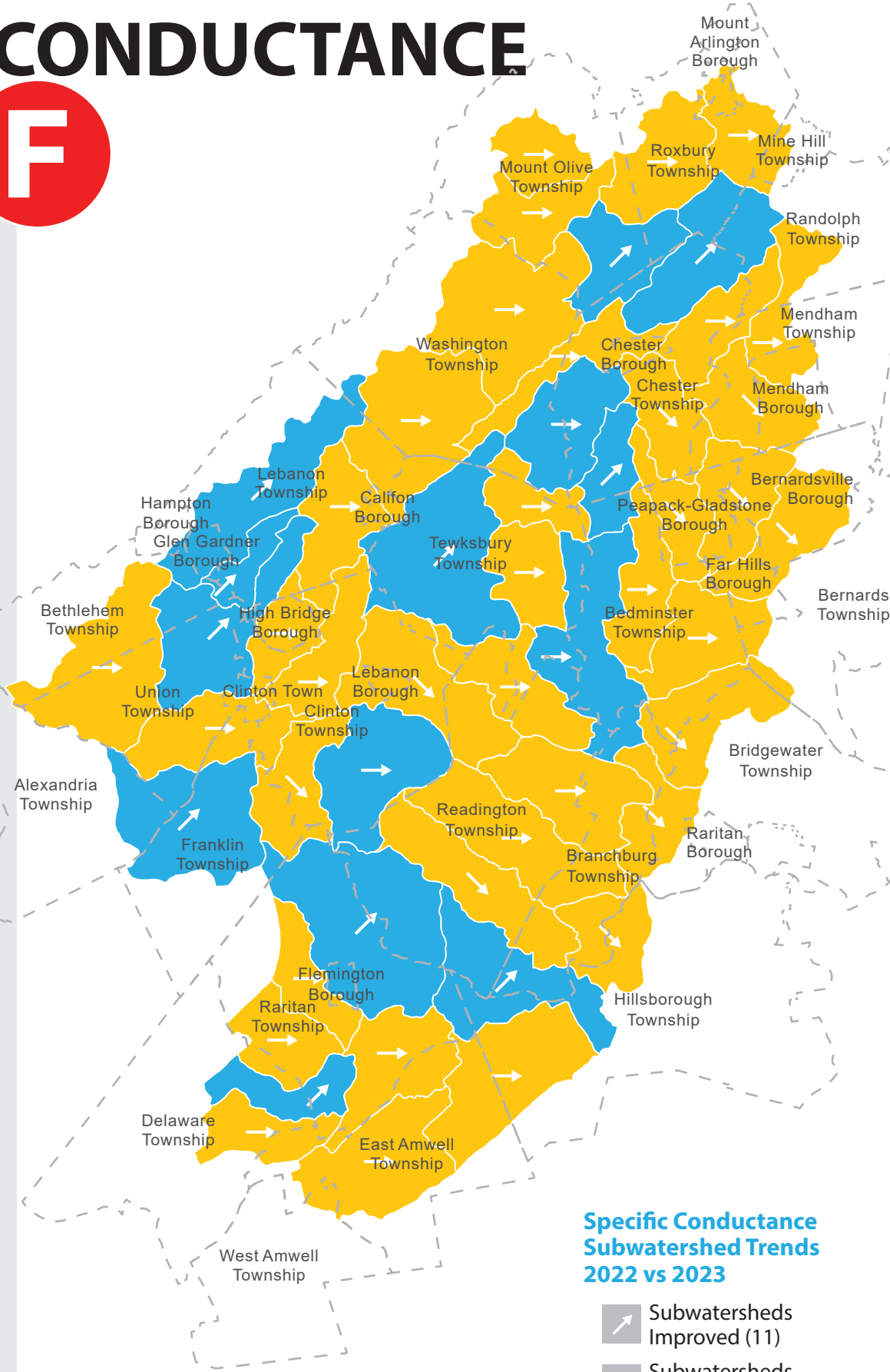
Specific conductance is a measure of the ability of water to conduct a charge and closely reflects the concentration of dissolved salts and total suspended solids (TSS) in the water. Freshwater streams are characterized by low salinity and organisms are sensitive to high salinity levels.

Sources of Impairment




A major source of salts and suspended solids in streams is the application of road salt as part of winter de-icing and industrial and wastewater discharge.

Solutions

Road salt application in winter is part of deicing to protect lives; but we can do better in our management of road salt applications including planning the timing and extent of road salt, changing to more eco-friendly de-icing solutions, and investment in well-calibrated equipment. Upgrades to municipal wastewater treatment facilities can help address discharges of salts and suspended solids into streams.



Specific Conductance Subwatershed Trends 2022 vs 2023

-  Subwatersheds Improved (11)
-  Subwatersheds with no change (30)
-  Subwatersheds Declined (11)

Raritan Headwaters indicator colors



pH

Overall Watershed Grade



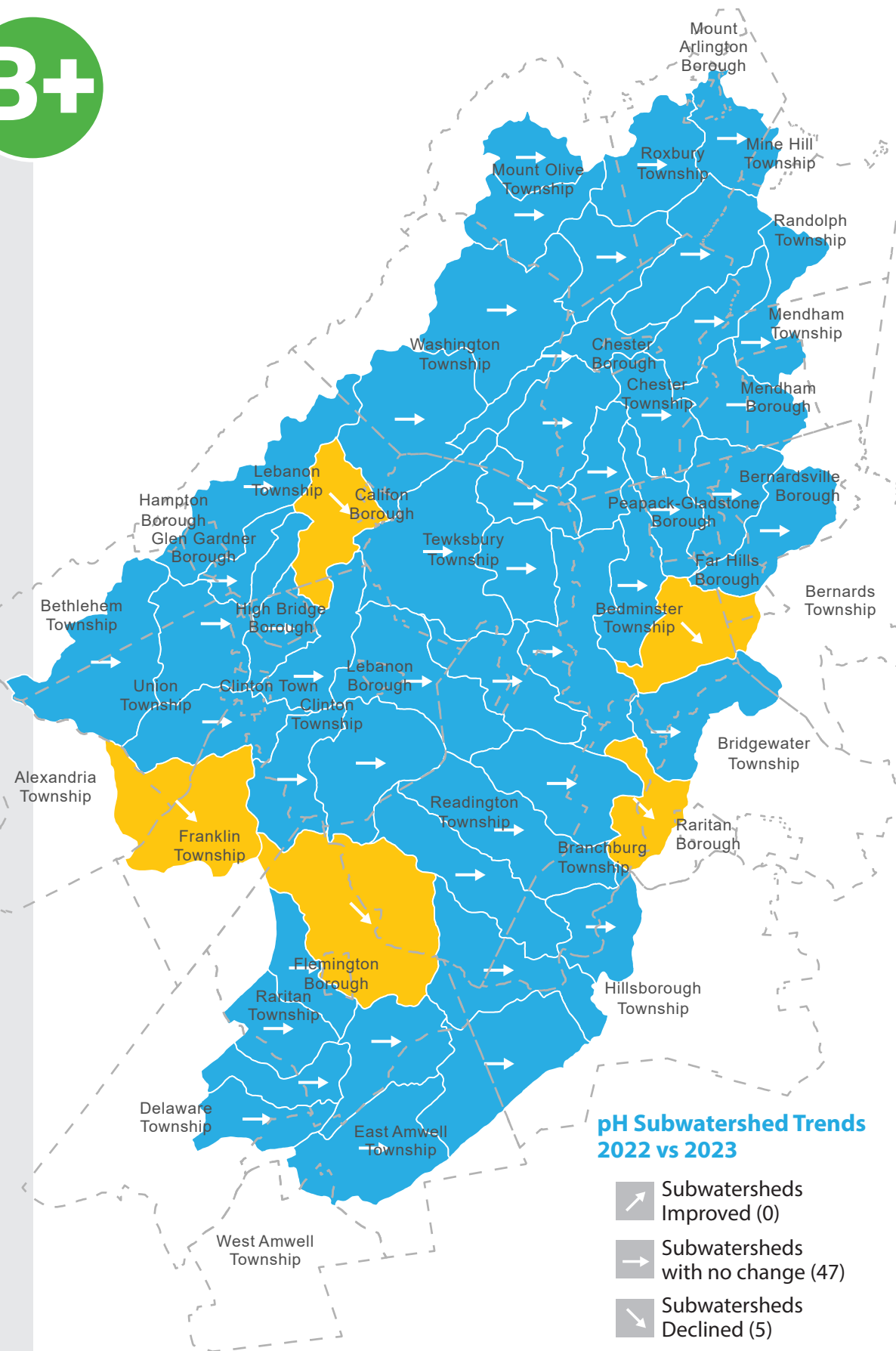
pH is the measure of the amount of hydrogen ions and allows us to assess whether a stream is too acidic or too basic. Many aquatic organisms in our streams undergo physical stress if the pH level is not within a narrow range close to neutral (pH=7); nearly all the streams in the Upper Raritan are achieving this. The pH of a freshwater stream varies naturally depending on geological factors such as bedrock, vegetation and soil type.

Sources of Impairment

Human activities can impact pH in many ways by altering the chemistry and temperature of water. The DEP identifies nutrients (e.g., nitrates and phosphates) as a major target for addressing low pH found in streams in other areas of the state. Humans can impact pH through industrial and wastewater discharge, urban and agricultural stormwater runoff, and acid rain. as the main cause of increased pH in our region.

Solutions

Controlling stormwater runoff, protecting forests in the watershed especially in floodplains, upgrades to wastewater treatment plants, septic maintenance and river friendly practices to reduce nutrients are some of the ways we can influence pH levels.



pH Subwatershed Trends 2022 vs 2023

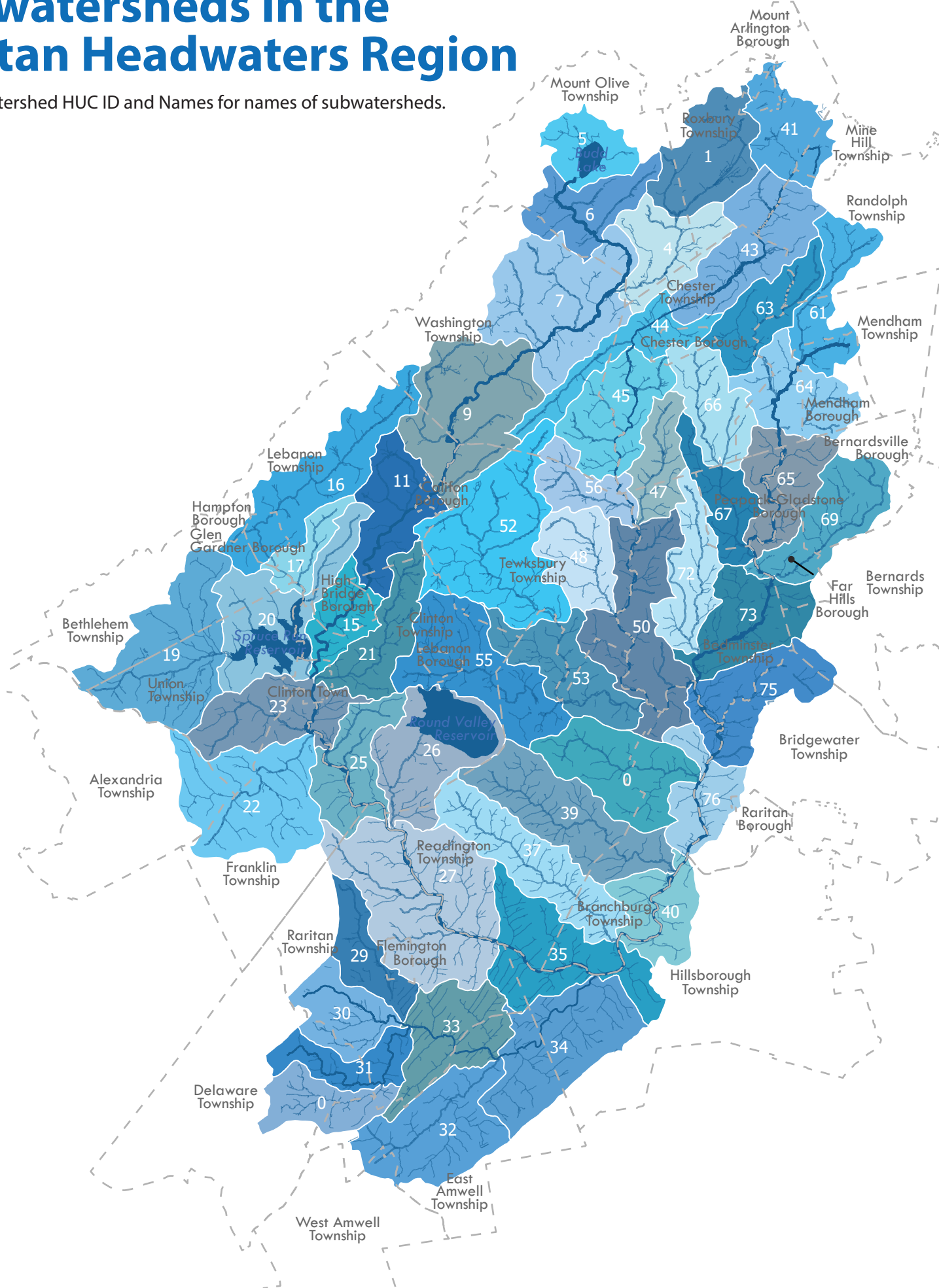
- Subwatersheds Improved (0)
- Subwatersheds with no change (47)
- Subwatersheds Declined (5)

Raritan Headwaters indicator colors



Subwatersheds in the Raritan Headwaters Region

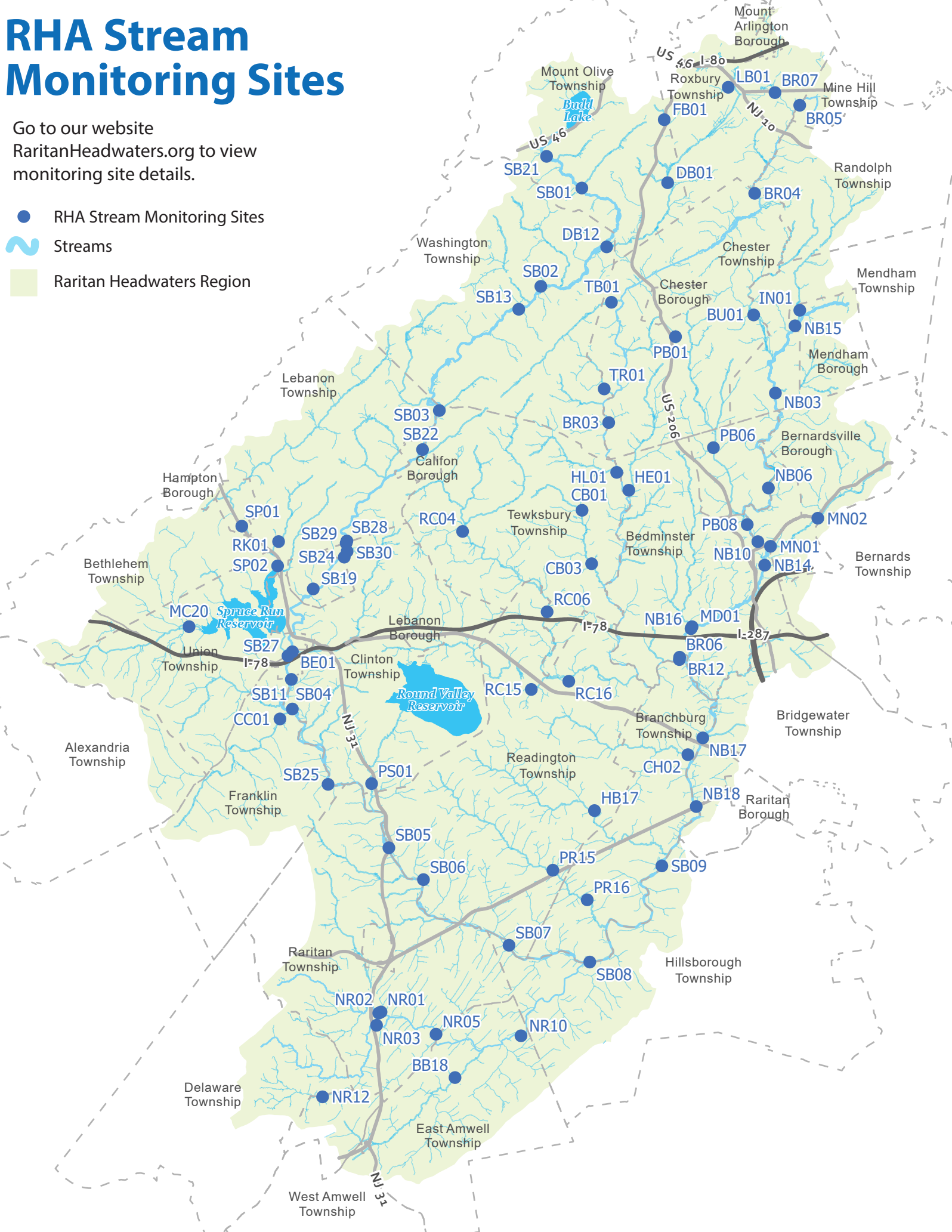
See Subwatershed HUC ID and Names for names of subwatersheds.



RHA Stream Monitoring Sites

Go to our website
RaritanHeadwaters.org to view
monitoring site details.

- RHA Stream Monitoring Sites
- ~ Streams
- Raritan Headwaters Region



How you can get involved!

Join us in our vision that every person within our reach has access to safe, clean water that is swimmable, fishable and, above all, drinkable. Donate to our work, raise your voice on an issue, attend an event, join our network of volunteers—all ways you can help protect clean water. Every action taken, big or small, makes a difference.

- Donate
- Participate
- Advocate
- Educate
- Investigate
- Facilitate

Go to our website to learn more about how you can get involved.

www.RaritanHeadwaters.org



Thank you to our 2022 Stream Monitors!

Robert Becker	Douglas Falcone	son	Nancy Martinez	Roy Rittman
Thomas Bluj	Robert Falcone	Dallas Hetherington	Susan Masinda	Lee Schwocho
Sue & Chelsea Browne	Theodora Falcone	Bob Hornby	Karen Mastro	Emilie Stander
George Cassa	Matthew Finlay	Kathy Klink	Karen Mittleman	Alan Stultz
Greg Cosentino	Roberta Geist	Kathryn Koch	Rebecca Nadolny	Deidre Supple
Raymond Croot	Joanne George	Robert Kohrs	Mario Orlandi	John Thomas
James Daly	Susan Goldstein	Ed Kolibas	Jackie Parrinello	Jackie Vitiello
Robert Delpizzo	Paul Gordon	Arnold Kushnick	Debi Post	Yuwei (Cindy) Wang
Richard Endris	Tracy Gordon	Brian Lynch	Stewart Pravda	Wang
	Jonathan Heller	Patricia Madlinger-Heller	Arabella Quane	David Wang-Iverson
	Neil Hendrick-		Morgan Ramsby	
			Michael Ricketts	