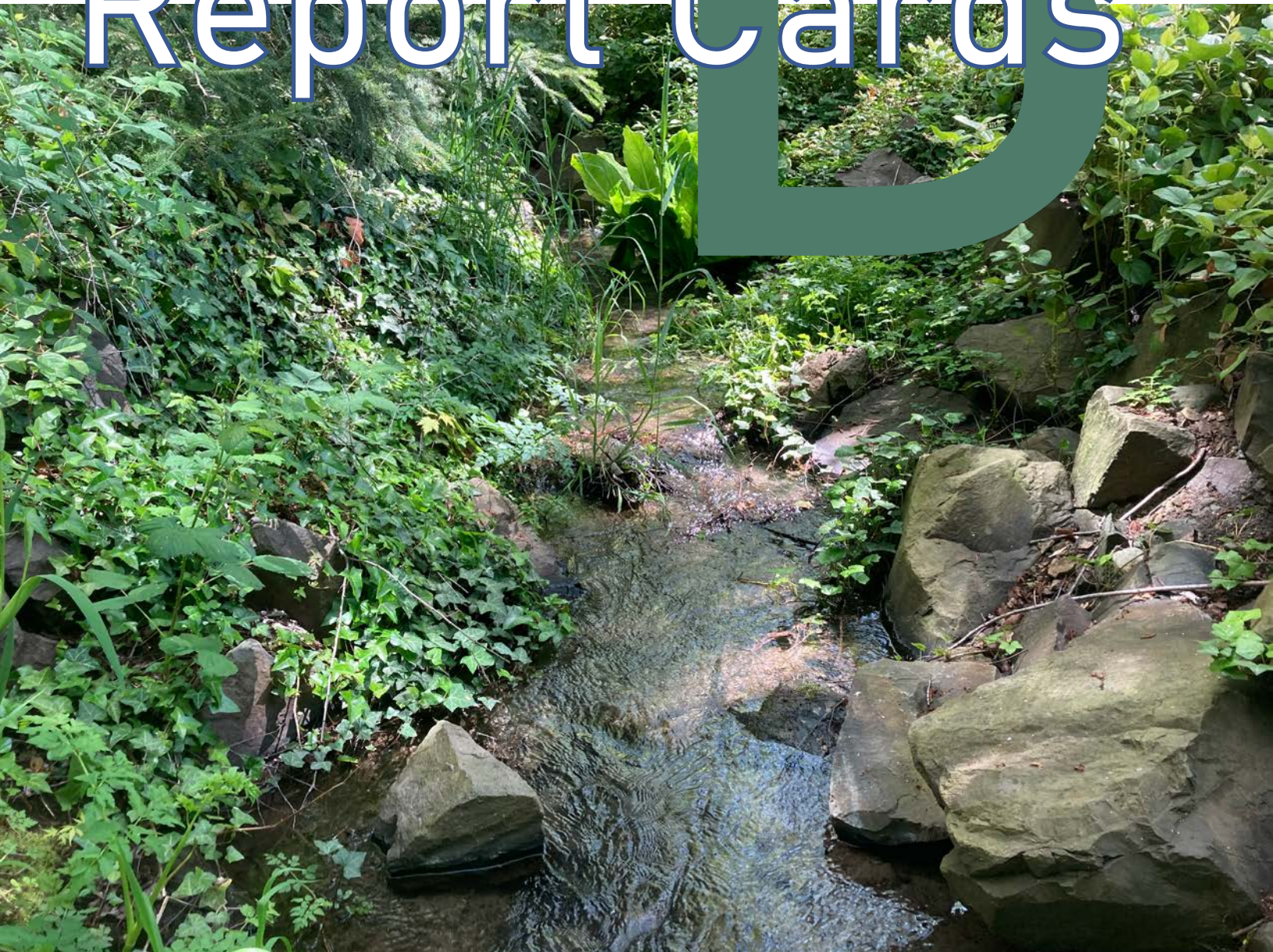


Watershed Report Cards





2022 KIRKLAND WATERSHED REPORT CARDS



Kirkland Public Works
Storm & Surface Water Division
kirklandwa.gov/stormwater



2021 Water Quality Scores

67 Holmes Point

83 Denny Creek

72 Juanita Creek

78 Champagne Creek

82 South Juanita Slope

74 Forbes Creek

84 Moss Bay/Everest Creek

78 Houghton Slope A

84 Carillon Creek

89 Houghton Slope B

85 Yarrow Creek

Legend

Water Quality Scores

- 0-40 - High Concern
- 41-80 - Moderate Concern
- 81-100 - Low concern

Creeks and streams

Lakes

Kirkland City Limits

Roads

Watershed boundaries

2022 Watershed Report Card

The creeks, lakes, and scenic water views in Kirkland help make it a great place to live, work, and play. Maintaining healthy water quality and habitat in these waterways is essential to the quality of life for the residents, businesses, and wildlife that call Kirkland home.



Kirkland's Watersheds




A **watershed** is the area of land that drains water to a specific creek or waterbody. The thick black lines on the map of Kirkland outlines the various watersheds in the city. Watersheds are also referred to as "basins" in these report cards.

Kirkland monitors the health of 12 watersheds, using physical, chemical, and biological factors. These report cards share the results of these monitoring efforts and data collected in 2021.

The conditions of a watershed are dynamic and can change at any time. The information in these report cards should only be used for general reference.

What We Measure - Watershed Health Indicators

Water Quality Scores

	0-40 - High Concern
	41-80 - Moderate Concern
	81-100 - Low concern

Water quality is a measure of the chemical and physical characteristics of the water that affect stream health. The **Water Quality Index (WQI)** summarizes and presents water quality data as a number ranging from 1 to 100. A higher number indicates better overall water quality. The WQI Score results from a combination of index scores for the following indicators:

Dissolved Oxygen (DO) is the amount of oxygen dissolved in water. All aquatic plants and animals need dissolved oxygen to survive. Higher levels of dissolved oxygen indicate healthier streams. Low levels of DO are primarily caused by high water temperature and decomposing algae and plants in the water.

pH is a measure of how acid or alkaline the water is. In general, a balanced pH is optimal for salmon and other stream life. The pH level can be affected by polluted runoff, polluted precipitation, and decaying vegetation.

Temperature is a measure of intensity of heat. Water temperature can increase due to seasonal climate cycles, removal of streamside vegetation, eroding stream banks, and polluted runoff. Warm temperatures reduce the amount of dissolved oxygen in the water. This can impact the spawning, rearing, feeding, and migration behavior of salmon and other aquatic species.

Total Nitrogen and Total Phosphorus are the amount of nitrogen and phosphorus in water. These are essential nutrients for plant and animal life, but high levels of nitrogen and phosphorus cause excessive algae and plant growth. When these plants die and decompose, they consume large amounts of dissolved oxygen. Common sources of nitrogen and phosphorus are fertilizers and human and animal waste.

Total Suspended Solids (TSS) is the measure of particles that are suspended in the water. Materials like silt, decaying plants, industrial waste, and sewage contribute to TSS. Metals, pesticides and other nutrients and contaminants adhere to sediment particles. High TSS can block sunlight and reduce plant photosynthesis, cover spawning grounds, clog fish gills, and increase water temperature.

Turbidity is a measure of water clarity. Algae and suspended solids can increase turbidity, making the water cloudy. Particles suspended in the water increase water temperature and reduce dissolved oxygen. Heavy metals and other toxics can attach to the suspended materials. High turbidity can block sunlight and reduce plant photosynthesis and affect the food chain for fish.



Stream bugs live on the stream bottom. Most are insects such as mayfly and dragonfly larvae that live part of their life in the water, but it also includes things like aquatic snails and clams.

Samples are collected from multiple streams in Kirkland and then later identified. The information is used to assign the stream a health index score ranging from 10 to 50, with higher numbers indicating a healthier stream.



Basin Facts

Basin Area
105.7 acres



Open Stream

0.38 miles



Piped Stream

0.13 miles



Tree Cover

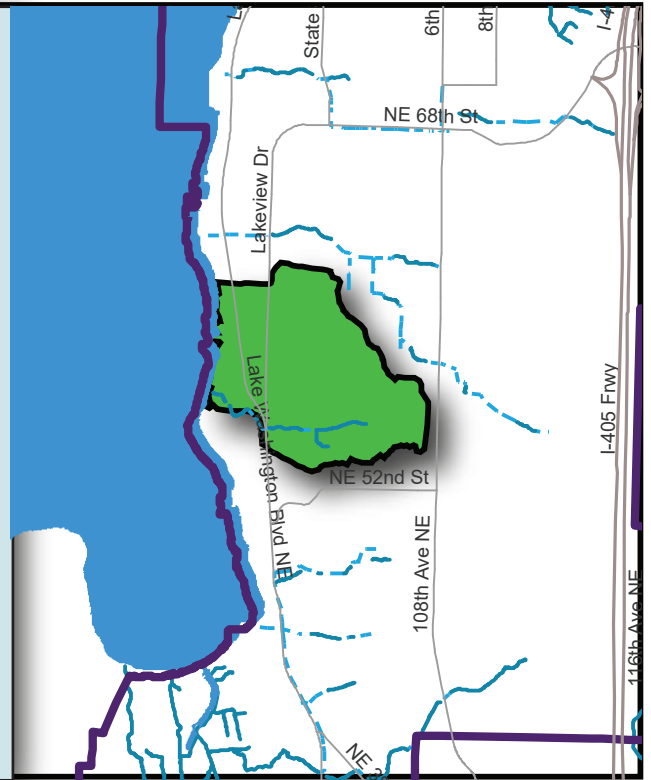
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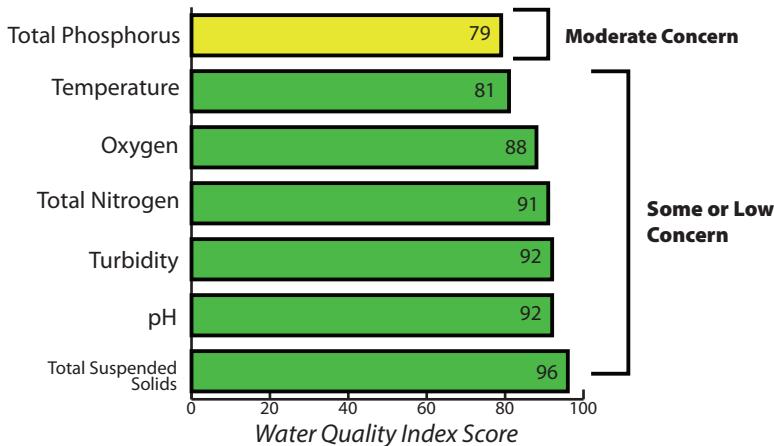
Impervious Area

41%

Water quality in Carillon Creek was in the **Some or Low Concern** category in 2021. High levels of phosphorus combined with high water temperatures are the primary reasons this basin did not score higher.



2021 Water Quality



How to Help Temperature and Phosphorus in Carillon Creek

- ☒ Scoop and throw away **pet waste** to reduce phosphorus runoff.
- ☒ **Plant a tree** - trees help lower water temperatures.
- ☒ If pressure washing, **use cold water only**. Avoid heated water and chemicals.

Carillon Creek is a small creek west of 108th Ave NE that drains to Lake Washington. Water quality and the health of the creek is affected by land upstream, shown in green on the map.

Habitat conditions: Development downstream of Lake Washington Boulevard led to a restoration project on Carillon Creek that reopened channel that was previously piped. The open channel and planted native vegetation have improved fish and wildlife habitat. Cutthroat trout and coho salmon have been found in the lower section of Carillon Creek.

Challenges: Development has significantly increased hard surfaces (pavement and buildings) in the Carillon Creek basin. This impacts the creek's water quality, aquatic habitat, and potential for flooding.



Basin Facts

Basin Area
621 acres



Open Stream

1.8 miles



Piped Stream

0.2 miles



Tree Cover

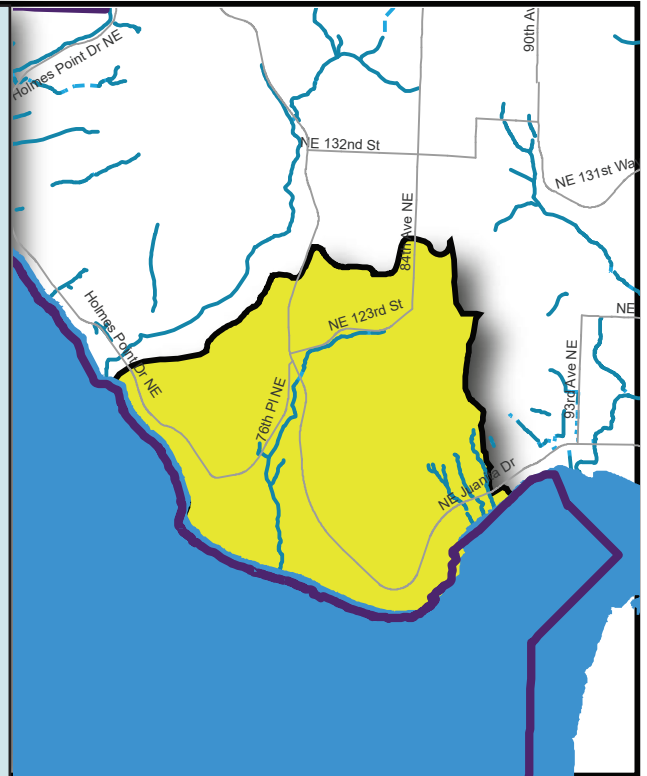
45%



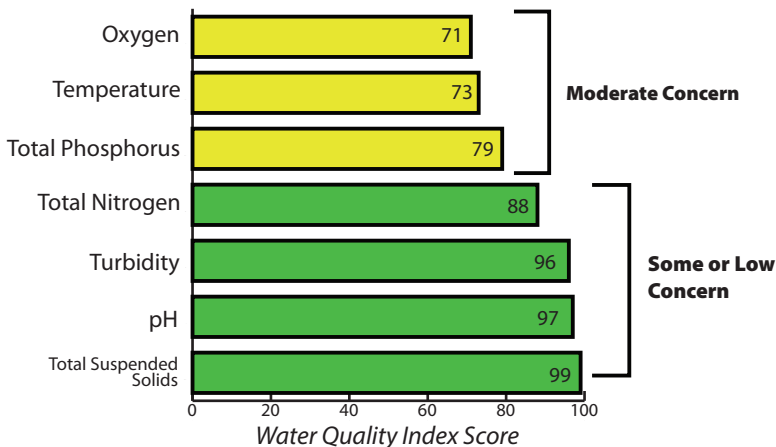
Impervious Area

32%

Water quality in Champagne Creek was in the **Moderate Concern** category in 2021. Low levels of oxygen combined with high water temperatures and high phosphorus levels are the primary contributors to a lower score.



2021 Water Quality



Stream Bugs

Score (10-50)



20

Poor

Monitoring stream bugs tells us about the biological health of a stream. Different bugs are more or less tolerant of water pollution, and their presence or absence can tell us a lot about the quality of the water.

Champagne Creek is a mid-sized basin in northern Kirkland that drains to Lake Washington. Water quality and creek health are affected by land upstream, shown in yellow on the map.

Habitat conditions: Most of Champagne Creek's open channel is in poor condition, but the lower and the middle sections of the creek have large, vegetated buffers. Cutthroat trout have been found in the downstream section of Champagne Creek.

Challenges: Most development in this basin occurred before regulations required flow control and water quality treatment, causing Champagne Creek to be "flashy" and leading to erosion problems along the creek.

How to Help Temperature and Phosphorus in Champagne Creek

- ☒ Scoop and throw away **pet waste** to reduce phosphorus runoff.
- ☒ **Plant a tree** - trees help lower water temperatures.
- ☒ If pressure washing, **use cold water only**. Avoid heated water and chemicals.

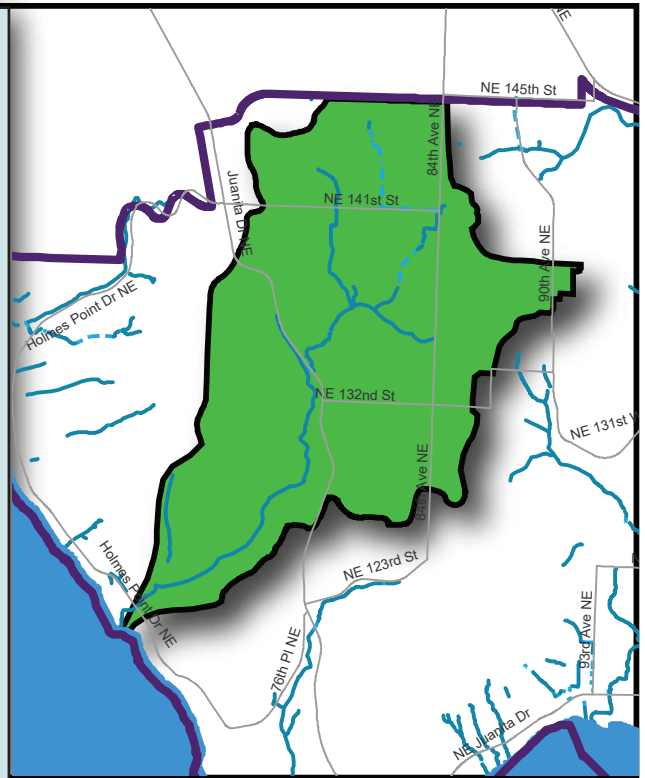
Basin Facts

Basin Area
811 acres

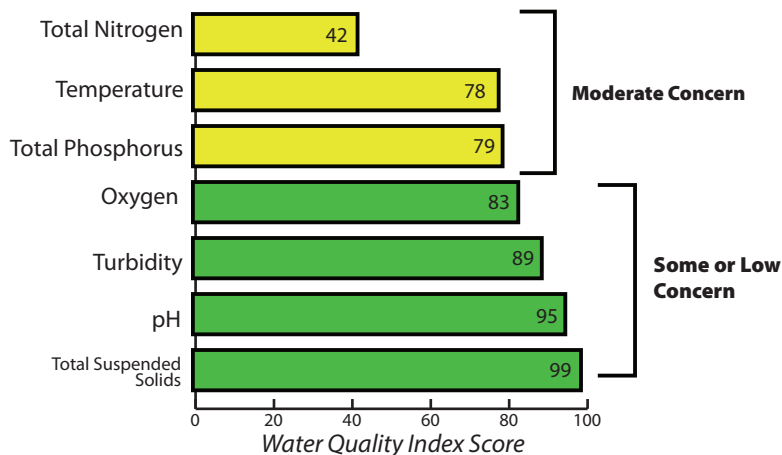
Open Stream 3.2 miles
Piped Stream 0.7 miles

Tree Cover 53%
Impervious Area 25%

Water quality in Denny Creek was in the **Some or Low Concern** category in 2021. High levels of nitrogen and phosphorus combined with high water temperatures are the primary reasons why Denny Creek did not score higher.



2021 Water Quality



Stream Bugs

Score (10-50)



28
Fair

Monitoring stream bugs tells us about the biological health of a stream. Different bugs are more or less tolerant of water pollution, and their presence or absence can tell us a lot about the quality of the water.

Denny Creek is in northern Kirkland and drains to Lake Washington. Water quality and the health of the creek is affected by land upstream, shown in green on the map.

Habitat conditions: This basin has the 2nd highest forest cover of any basin in Kirkland. This provides quality wildlife habitat and can help decrease the volume of runoff and contaminants entering Denny Creek and Lake Washington. Sockeye, cutthroat trout, juvenile coho, and sculpins have been found in the lower section and mouth of the creek.

Challenges: Development and urbanization of the upper section of Denny Creek has led to erosion in the stream channel.

How to Help Nitrogen, Temperature, and Phosphorus in Denny Creek

- ✓ Scoop and throw away **pet waste** to reduce phosphorus runoff.
- ✓ **Plant a tree** - trees help lower water temperatures.
- ✓ **Minimize fertilizer use** in your lawn and garden to reduce nitrogen runoff.



Basin Facts

Basin Area
1,847 acres



Open Stream

11.2 miles



Piped Stream

2.9 miles



Tree Cover

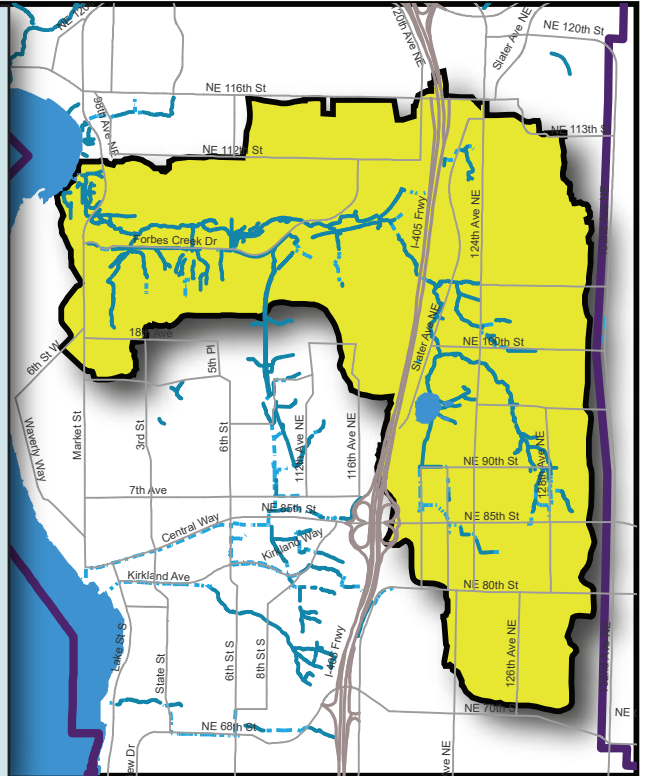
39.0%



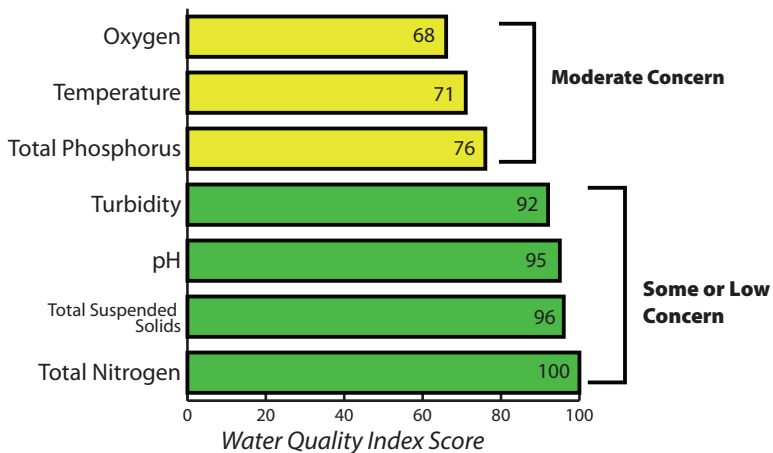
Impervious Area

39.0%

Water quality in Forbes Creek was in the **Moderate Concern** category in 2021. Low levels of oxygen combined with high water temperatures and high levels of phosphorus are the primary contributors to a lower score.



2021 Water Quality



Stream Bugs



Score (10-50) Long Term Trend

15

Very Poor



Slight Improvement

Monitoring stream bugs tells us about the biological health of a stream. Different bugs are more or less tolerant of water pollution, and their presence or absence can tell us a lot about the quality of the water.

Forbes Creek begins east of I-405 at Forbes Lake and eventually flows into Lake Washington. Water quality and the health of the creek is affected by land upstream, shown in yellow on the map.

Habitat conditions: Wetlands and open space line the sides of Forbes Creek at its mouth and extending upstream. I-405 creates a barrier to fish and wildlife movement.

Challenges: Development has significantly increased hard surfaces in the Forbes Creek basin. This impacts the creek's water quality, aquatic habitat, and potential for flooding.

How to Help Temperature and Phosphorus in Forbes Creek

- ☒ **Plant a tree** - trees help lower water temperatures.
- ☒ Pressure wash with **cold water only**. Avoid heated water and chemicals.
- ☒ Scoop and throw away **pet waste** to reduce phosphorus runoff.



Basin Facts

Basin Area in Kirkland
458 acres



Open Stream

2.4 miles



Piped Stream

0.5 miles



Tree Cover

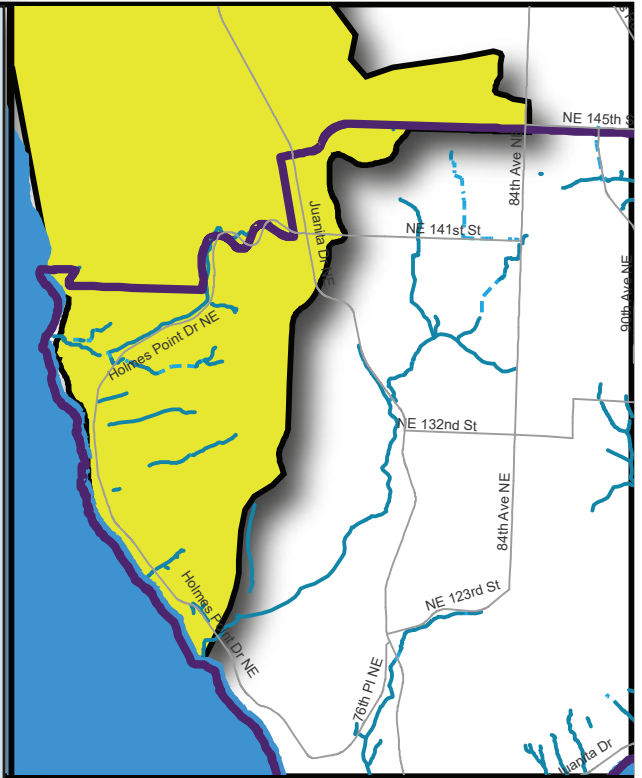
60%



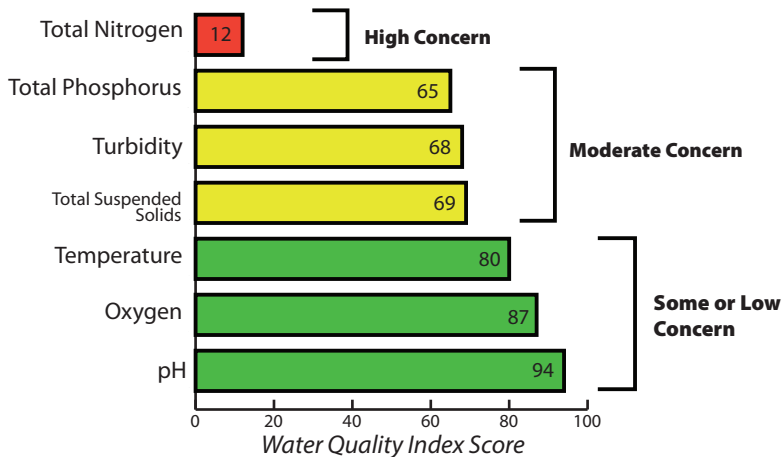
Impervious Area

23%

Water quality in Holmes Point was in the **Moderate Concern** category in 2021. High levels of nitrogen and phosphorus combined with very cloudy water with high amounts of suspended solids are the primary contributors to the low score in Holmes Point.



2021 Water Quality



How to Help Nitrogen, Phosphorus, and Sediment in Holmes Point

- ✓ Scoop and throw away **pet waste** to reduce phosphorus runoff.
- ✓ **Plant trees and native plants** - trees and plants help stabilize soil and reduce soil runoff.
- ✓ **Minimize fertilizer use** in your lawn and garden to reduce nitrogen runoff.

Holmes Point Creek and other stream channels in this basin drain to Lake Washington. Water quality and the health of these stream channels is affected by the land upstream, shown in yellow on the map.

Habitat conditions: Significant green space is found in the basin due to high forest coverage and Holmes Point Overlay Zone development restrictions. Most of the lower section of Holmes Point Creek is armored and flows through several yards with lawn extending to the edge of the creek. Many fish passage barriers are present in the creek.

Challenges: High landslide risk and an unstable stream channel leads to erosion and sedimentation problems in the creek. This causes impacts to habitat and can also lead to flooding problems within the basin.

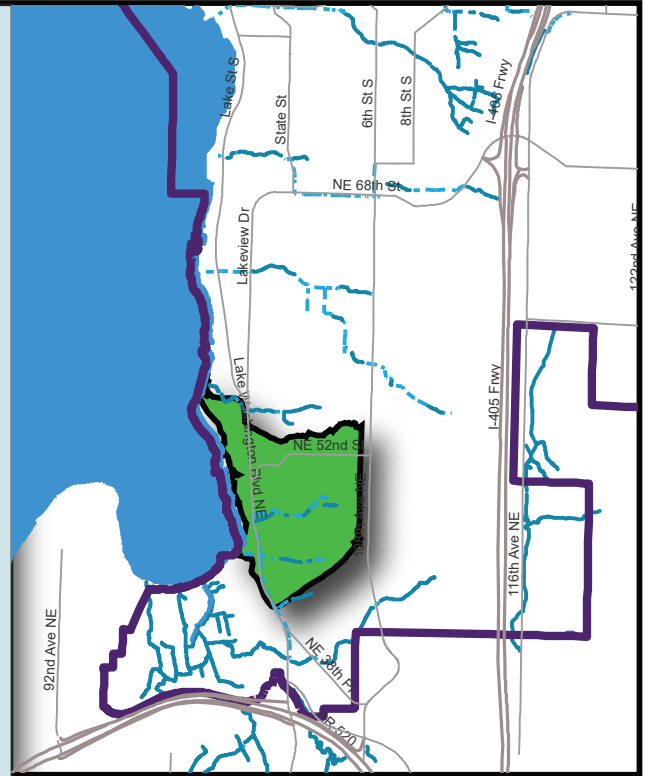
Basin Facts

Basin Area
134 acres

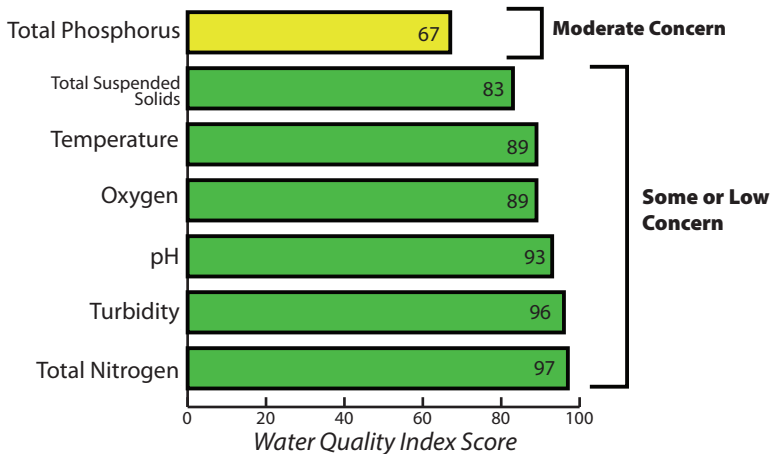
Open Stream 0.3 miles
Piped Stream 0.9 miles

Tree Cover 33%
Impervious Area 43%

Water quality in Houghton Slope B was in the **Some or Low Concern** category in 2021. A high level of phosphorus is the primary reason that Houghton Slope B did not score higher.



2021 Water Quality



Houghton Slope B has many stream channels in the basin that drain to Lake Washington. Water quality and the health of these stream channels is affected by the land upstream, shown in green on the map.

Habitat conditions: Houghton Slope B is one of the most developed basins in Kirkland. A high percentage of the stream channel is piped due to high average slope and erosion problems within the basin.

Challenges: Development has led to a significant increase in hard surfaces (pavement and buildings) in the Houghton Slope B basin. This impacts the creek's water quality, aquatic habitat, and potential for flooding.

How to Help Phosphorus in Houghton Slope B

- ☒ Scoop and throw away **pet waste** to reduce phosphorus runoff.



Basin Facts

Basin Area
4,389 acres



Open Stream

14.1 miles



Piped Stream

5.6 miles



Tree Cover

35%



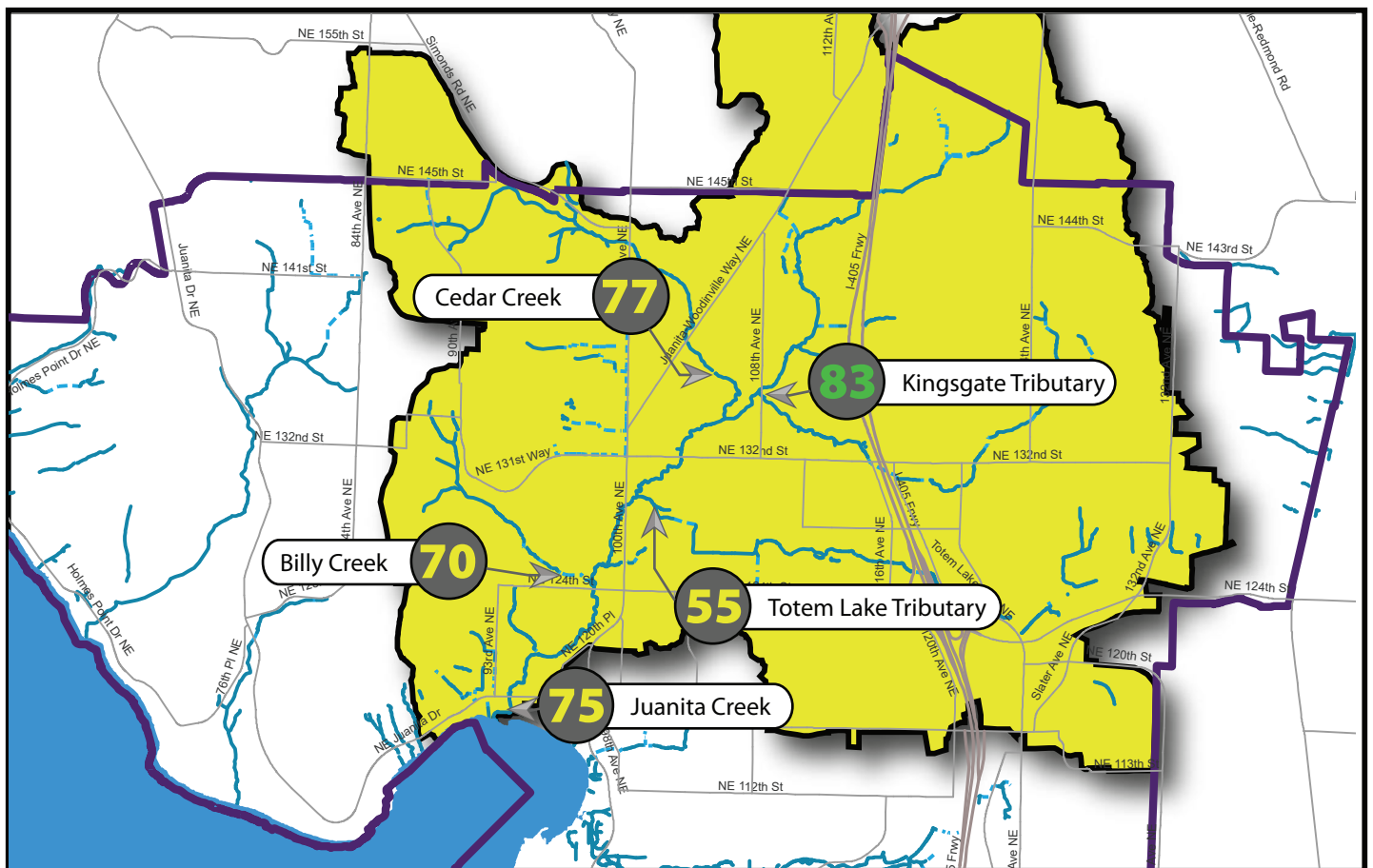
Impervious Area

43%

Water quality in Juanita Creek was in the **Moderate Concern** category in 2021. Water quality samples were collected from five different sites throughout the basin.

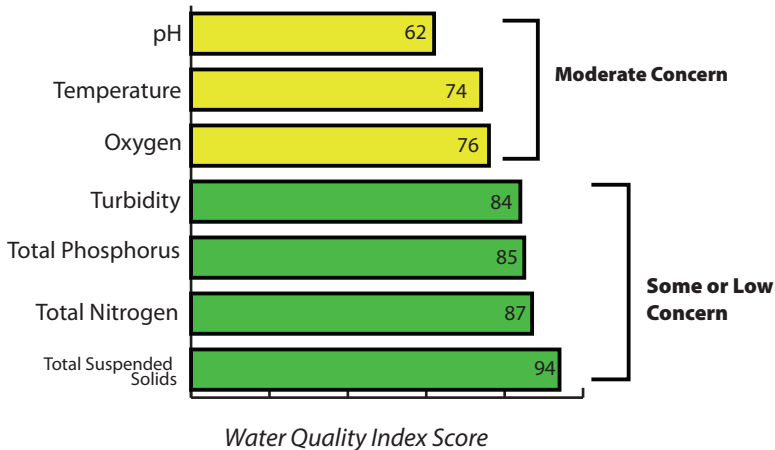
Overall, low levels of oxygen combined with high temperatures were common contributors to low scores. In addition, high levels of nitrogen and phosphorus in the Billy Creek tributary and generally low water quality scores in the Totem Lake tributary were worth note. The Kingsgate Tributary had the highest water quality scores in the Juanita Basin.

Juanita Creek is listed on the Environmental Protection Agency's (EPA) list of impaired water bodies for dissolved oxygen, temperature, and bacteria. Learn more about water quality in 2021 on the next page.

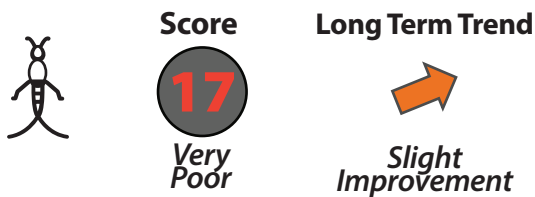


2021 Water Quality

**Based on Juanita Creek sampling site*



Stream Bugs



Monitoring stream bugs tells us about the biological health of a stream. Different bugs are more or less tolerant of water pollution, and their presence or absence can tell us a lot about the quality of the water.

Notable Scores at Other Sites

Billy Creek



Cedar Creek



Kingsgate Tributary



Totem Lake Tributary



Juanita Creek is the largest basin in Kirkland. Juanita Creek drains to Lake Washington. Water quality and the health of the creek is affected by the land upstream, shown in yellow on the map.

Habitat conditions: Juanita Creek is one of the most confined creeks due to residential development along its banks. Vegetation along the creek is primarily landscaping, grass, shrubs, and invasive species such as Himalayan blackberry and Japanese knotweed. Juanita Creek has a large variety of fish and wildlife present throughout the corridor. Small numbers of cutthroat trout, coho, sockeye, chinook and kokanee salmon have been observed. Beavers are at work throughout the creek and its tributaries. Ducks and other waterfowl are present in the creek.

Challenges: Development has led to a significant increase in hard surfaces (pavement and buildings) in the Juanita Creek basin. This impacts the creek's water quality, aquatic habitat, and potential for flooding. Urbanization of this basin and loss of native vegetation have caused erosion and instability of the stream bank.

How to Help in Juanita Creek

Nitrogen

- ✓ **Minimize fertilizer use** in your lawn and garden to reduce nitrogen runoff.

Phosphorus

- ✓ Scoop and throw away **pet waste** to reduce phosphorus runoff.

Temperature

- ✓ **Plant a tree** - trees help lower water temperatures.

pH

- ✓ **Only rain down the drain.** Do not rinse dirty wash water, dry wall waste, cement, or paint down storm drains or to streets.



Basin Facts

Basin Area in Kirkland
579 acres



Open Stream

6.8 miles



Piped Stream

0.9 miles



Tree Cover

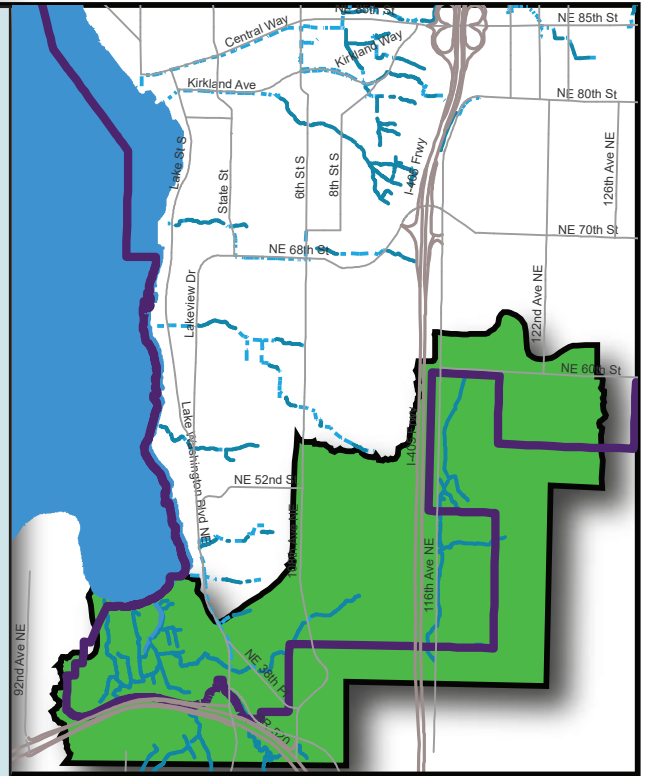
50%



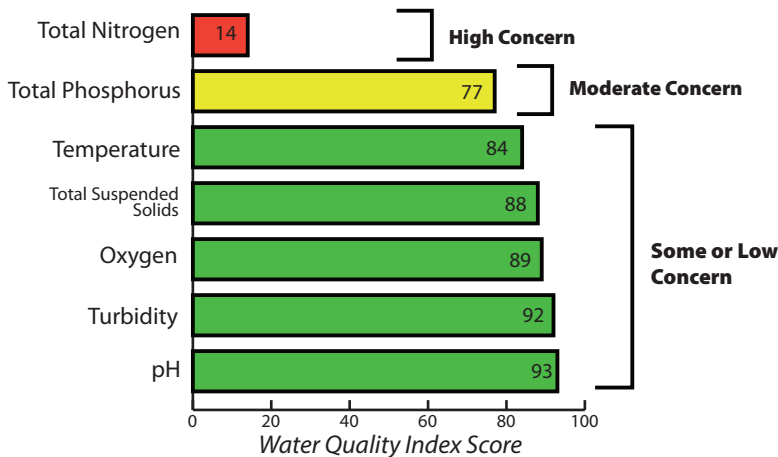
Impervious Area

28%

Water quality in Yarrow Creek was in the **Some or Low Concern** category in 2021. High levels of nitrogen and phosphorus are the primary reasons why Yarrow Creek did not score higher.



2021 Water Quality



Stream Bugs

Score (0-50)

Long Term Trend



20

Poor



Slight Improvement

Monitoring stream bugs tells us about the biological health of a stream. Different bugs are more or less tolerant of water pollution, and their presence or absence can tell us a lot about the quality of the water.

Cochran Springs Creek and **Yarrow Creek** are in this basin and drain to Yarrow Bay in Lake Washington. Water quality and the health of these stream channels is affected by land upstream, shown in green on the map.

Habitat conditions: A near-continuous greenbelt connects Yarrow Creek with Cochran Springs Creek. This allows wildlife to move freely between a variety of upland stream and wildlife habitat. A large wetland complex at the mouth of Yarrow Creek filters contaminants, stores flood waters during storm events, and is home to many fish and wildlife species. Coho salmon and cutthroat trout have been found in Yarrow Creek.

Challenges: Development has led to a significant increase in pavement and buildings in the Yarrow Creek basin. This impacts the creeks' water quality, aquatic habitat, and potential for flooding.

How to Help Nitrogen and Phosphorus in Yarrow Creek

- ☒ Scoop and throw away **pet waste** to reduce phosphorus runoff.
- ☒ **Minimize fertilizer use** in your lawn and garden to reduce nitrogen runoff.