

Skagit County Monitoring Program Annual Report

Water Year 2025

October 2024 – September 2025

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October 2026

Acknowledgements

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Project Funding	Clean Water Fund by the citizens of Skagit County (2009 – 2025) Washington State Department of Ecology (2004 - 2008)

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This report is available online at
https://www.skagitcounty.net/Departments/PublicWorksCleanWater/WQmonitoring.htm



Table of Contents

Acknowledgements i
Table of Contents ii
Executive Summary 1
Introduction 2
Methods 3
Water Year 2025 Overview 6
Samish Bay Watershed 9
Padilla Bay Watershed 12
Middle Skagit Watershed 15
Nookachamps Watershed 18
Lower Skagit Watershed 21
Skagit River 24
References 27

Appendices:

Appendix A – Summary Statistics Water Years 2004 – 2025
Appendix B – Summary Statistics Water Year 2025
Appendix C – Seasonal Kendall's Results
Appendix D – Water Quality Standard Results

Executive Summary

The Skagit County Monitoring Program (SCMP) has collected 22 years of water quality data from water years 2004 to 2025. This report highlights the most recent data from water year 2025 and includes trend analysis on the full monitoring record. For the first time, it also includes trend analyses for *E. coli*, following five years of data collection.

Many Skagit County waterways continue to exceed Washington State water quality standards for temperature and/or dissolved oxygen. The state *E. coli* standard was met at approximately half of the monitored sites, with 21 of 39 sites (54%) meeting the standard.

Based on the Water Quality Index (WQI) for water year 2025, 8 sites (20%) were classified as high concern, 20 sites (50%) were moderate concern, and 12 sites (30%) were low concern. Five sites dropped from low to moderate concern in water year 2025 due to an early onset of warm temperatures, low dissolved oxygen, and high fecal coliform levels. There were also two high concern sites that moved up to the moderate concern category. Most, but not all, high concern sites are agricultural drainages with little summer flow that are not considered salmonid habitat.

Trend analyses of water temperature, dissolved oxygen, bacteria, nutrients, and other water quality indicators revealed a mix of improving, worsening, and stable conditions across the county. Of the trends evaluated over the 22-year monitoring record, 47% showed no significant change, 30% indicated improving water quality, and 18% indicated worsening conditions. Overall, improving trends outnumbered worsening trends by nearly two to one.

Most monitoring sites showed no significant long-term change in water temperature based on discrete measurements, while dissolved oxygen concentrations improved at 42% of sites. Long-term fecal coliform trends improved at 17% of sites, worsened at 36%, and remained unchanged at 47%. Improvements were most common in the Samish Bay and Nookachamps watersheds, while worsening trends were concentrated in the Lower Skagit watershed. Nitrogen concentrations generally improved across the county, whereas phosphorus concentrations worsened at several sites, particularly in western Skagit County.

This report also presents the first trend analysis of *E. coli* since monitoring began five years ago. Most sites (72%) showed no significant change over the five-year period, while the remaining 28% exhibited worsening *E. coli* concentrations.

Water quality improvements across the county reflect the ongoing efforts of residents, farmers, tribes, government agencies, and environmental organizations working together to protect local waterways. Although meaningful progress has been made, continued collaboration and stewardship is essential to address remaining water quality challenges and protect these resources for future generations.

Introduction

The Skagit County Monitoring Program (SCMP) has collected ambient water quality data in freshwater streams, rivers, and drainages across Skagit County since 2003. The goals of the SCMP are to assess current waterway conditions, analyze long term trends, and to help support other water quality projects in the county. This report focuses on SCMP data collected in water year 2025 (October 1st, 2024 – September 31st, 2025) and includes an analysis of the full monitoring dataset from 2003 to 2025.

The program currently monitors 40 sampling sites, which are visited biweekly on a north and south route through the county (Figure 1). The SCMP was initially started by Skagit County to evaluate the success of water protection measures required in agricultural areas. As a result, many sites are located in or surrounding agricultural zoning. Additional sites were selected to contribute data to various water clean-up efforts. Detailed information on site locations and revisions are available in the SCMP Backgrounds and Methods document (Skagit County, 2024).

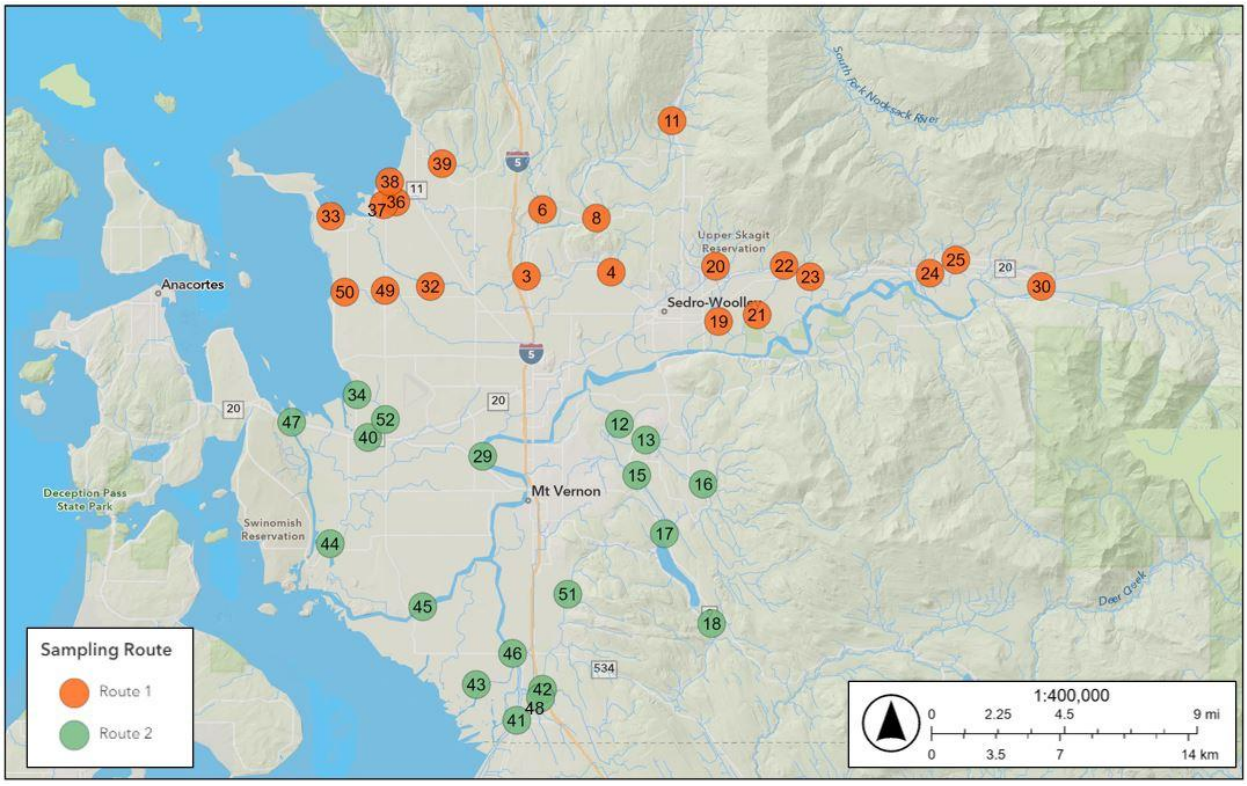


Figure 1. Ambient monitoring sites in the Skagit County Monitoring Program (SCMP).

Methods

Sampling and Data Collection

The SCMP uses standard water quality sampling and data collection methods, as outlined in the SCMP Quality Assurance Project Plan (QAPP; Skagit County, 2004) and the SCMP Background and Methods document (Skagit County, 2024).

At each site visit, dissolved oxygen (DO), temperature, conductivity, and salinity are measured *in situ* with a water quality probe, and turbidity and pH are measured with other instruments in the field. Water samples are collected for fecal coliform and *Escherichia coli* (*E. coli*) analysis at every site visit (Figure 2). On a quarterly basis, additional water samples are taken for nutrient analysis that include nitrate (NO_3^-), nitrite (NO_2^-), ammonia (NH_3), total Kjeldahl nitrogen (TKN), orthophosphate (OP), total phosphorus (TP), and total suspended solids (TSS).

All sampling trips were completed on schedule during water year 2025. Each station is visited at approximately the same time of day to minimize variations due to diurnal changes in water quality parameters. In 2025, the timing of site visits varied by no more than 2.5 hours.



Figure 2. Sampling upper Coal Creek at Highway 20.

During the summer, continuous temperature loggers are deployed at 24 of the monitoring sites to assess compliance with state temperature standards. Priority for logger deployment is based on factors such as fish presence and historical temperature data. Loggers are deployed from June through September and record temperature every 30 minutes.

In water year 2025, two loggers were lost. One was due to water damage at upper Hansen Creek and another washed-out at Big Ditch/Maddox Creek. Five other loggers, located at lower Hansen Creek, Colony Creek, lower and upper Carpenter Creek/Hill Ditch, and the North Fork Skagit River had incomplete or compromised datasets, preventing accurate determination of the highest 7-day average of the daily maximum temperatures (7-DADMax) required for state compliance.

The full SCMP dataset from water years 2004 – 2025 is available upon request.

Data Quality

The SCMP operates under a Quality Assurance Project Plan (QAPP) approved by Washington State Department of Ecology (Ecology) that details quality control and assurance procedures (Skagit County 2004). Laboratory samples for bacteria and nutrients are analyzed by Eurofins-Edge Analytical of Burlington, WA, an Ecology-accredited laboratory.

Duplicate field samples are collected to assess the accuracy and precision of the analytical methods. In water year 2025, the fecal coliform and *E. coli* duplicate results had average relative standard deviations (RSD) of 46% and 44%, respectively. These results did not meet the quality control criteria of 33% RSD. Despite this, these RSDs are consistent with the average RSDs observed over the past 22 years of bacteria data collection. The nutrient duplicates analyzed for total phosphorus and nitrate met the 10% RSD quality control criteria. Orthophosphate was slightly above the criteria at 12% RSD, and therefore was accepted for analysis. The ammonia RSD was higher at 27%, however most samples and duplicates were concentrations lower than 0.10 mg/L, allowing for inflated RSDs. The ammonia data was also accepted for analysis based on this.

Data Analysis

Summary statistics for each parameter at all sites are available in *Appendix A and Appendix B*. These statistics offer a general overview of the current and historical water quality at each station.

To assess long-term trends, the Seasonal Kendall's Test was used. This statistical method detects trends in parameters that vary seasonally, such as temperature and DO. Detailed results from the Seasonal Kendall's test, including p-values and slopes, are in *Appendix C*. Trend analysis was not completed for sites added in water year 2022 (Sites 49, 50, 51, and 52) due to insufficient data of less than 5 years.

This report focuses on trends observed over the full monitoring dataset. For most parameters, this is 22 years. *E.* coli measurements started in water year 2021 and the dataset now has five years of data analyzed for this report. This is presented in the following tables. To provide additional context on changes throughout the county, the previous ten- and five-year periods were also analyzed for all the parameters but are not focused on in this report for simplicity. These results can be found in *Appendix C.*

For some parameters, statistics were analyzed using both monthly averages and individual results from each site visit. Monthly averages reduce the probability of autocorrelation and are displayed throughout this report when applicable, including the parameters temperature, dissolved oxygen, fecal coliform, turbidity, and *E. coli*. The trends using individual data points are also provided in *Appendix C* for comparison.

Improving and Worsening Water Quality Health

In this report, significant trends are classified as either improving or worsening water quality health. This classification was based on whether a trend was significant and the slope direction. The magnitude of change was not incorporated, although slopes can be found in Appendix C. For all parameters other than DO, increasing trends are classified as worsening water quality health and decreasing trends are considered improving. Water quality health for DO trends are classified as the opposite.

Water Quality Standards

Washington state has established water quality standards for multiple parameters measured in the SCMP (WAC 173-201A-200). These standards differ for each site depending on how the water is used, aquatic life, and the natural conditions of the site. The standards for each site are detailed in the SCMP Background and Methods document (Skagit County, 2024).

To determine temperature compliance, Washington State uses the highest 7-day average of the daily maximum water temperatures (7DADMax). Continuous temperature measurements over the warmest parts of the year are required to assess this standard.

For DO levels, Washington state determines compliance based on the minimum concentration recorded throughout the day. Although continuous DO measurements aren't collected in the SCMP, the discrete measurements collected can still indicate whether a site is likely to have met or not met the standard. This standard can be assessed by DO concentrations measured in mg/L or percent saturation.

The *E. coli* standard for Washington state has two components. The *E. coli* results within a sample period must have a geometric mean (geomean) below 100 MPN/100 mL. Additionally, no more than 10% of the samples can be greater than 320 MPN/100 mL.

The measurements used to determine compliance with water quality standards can be found in *Appendix D*.

Water Quality Index

The Water Quality Index (WQI) is a tool created by Ecology to assess water quality within Puget Sound streams. It combines various water quality measures, including temperature, DO, pH, turbidity, TSS, fecal coliform, and nutrients, and a single number from one to 100 is calculated by comparing them to state standards. A higher number indicates better water quality. We calculate the annual WQI using quarterly data (four site visits), as our nutrient data is collected at this frequency. The most ideal scenario would be to calculate the annual WQI scores from 12 data points instead of four, to capture the full variability between seasons and reduce the chance of skewed results. The annual WQI scores are categorized into one of three concern levels listed below:

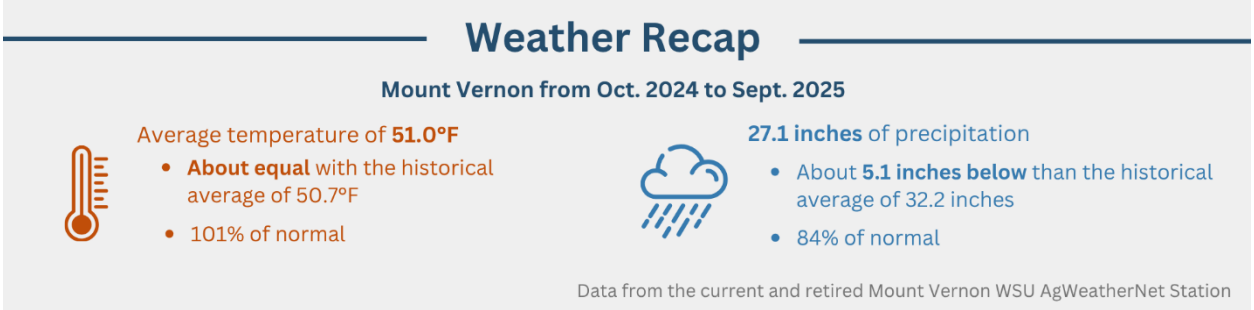
0 – 40 High Concern	41 – 80 Moderate Concern	81 – 100 Low Concern

Water Year 2025 Overview

Water Year Conditions

Changes in weather can affect water quality by altering streamflow and water temperature. Based on data from the WSU AgWeatherNet station in Mount Vernon, the average temperature during water year 2025 was near normal (51.0°F, 101% of average), while precipitation was below normal by about 5 inches (27.1 inches, 84% of average).

Most of the streams monitored in this program are rain-fed, so flows generally followed rainfall patterns, with typical winter peaks and lower flows during the summer dry period. Low precipitation and warmer than normal temperatures contributed to earlier low flows in many streams. Regional snowpack in the North Cascades was below normal due to a warm winter and early melt, which likely contributed to low summer flows in the Skagit River. Throughout water year 2025, drought levels in Skagit County ranged from normal/abnormally dry in the winter and transitioned to severe and moderate drought in late summer.



Water Quality Standards

Data collected during this project indicates that many streams and waterways across the County do not meet state standards for temperature, DO, or *E. coli*. No sites passed all three standards where assessed. Of the 19 sites where continuous temperature measurements were successfully measured, only three sites passed. These sites were upper Thomas Creek, the upper Samish River, and Mannser Creek. Five out of 39 sites (13%) met the state freshwater standard for DO all year, which were Friday, upper East Fork Nookachamps, Wiseman, Red Cabin, and upper Coal Creeks.

The *E. coli* state standard was passed at about half of the sites, with 21 out of 39 sites meeting the standard (54%). The sites on the Skagit River and in the Nookachamps watershed had the highest percentages of sites passing the *E. coli* standard (100% and 83%, respectively), while the Padilla watershed had the lowest (0%).

Waterways not meeting these conditions represent less than ideal conditions for recreation, salmonoid populations, and downstream shellfish resources. Most of the substandard water quality occurs in creeks that have low flow in the warmer months and in slow-moving agricultural sloughs. In some waterways, this may represent natural conditions rather than human-caused problems. More details about which sites met the standards can be found in the following watershed sections and *Appendix D*.

Water Quality Index

Based on WQI results in water year 2025, 9 sites in the SCMP fell into the high concern category (23%). Most, but not all, are agricultural drainages with low summer flow that are not considered salmonid habitat. The number of sites classified in this category has changed very little since 2009, ranging between 8 to 12 sites.

A total of 20 sites were classified in the moderate concern category (50%) and 11 were in the low concern (28%). Water year 2025 had a high number of sites that fell in the moderate concern category. Five sites dropped from low to moderate concern in water year 2025 due to an early onset of warm temperatures, low dissolved oxygen, and high fecal coliform levels. There were also two high concern sites that moved up to the moderate concern category.

Since about 2010, the watersheds in Skagit County have had generally consistent average WQI scores (Figure 3). In water year 2022, three new sites were added to Padilla Bay watershed, and one was dropped, which explains the fall in average WQI that year.

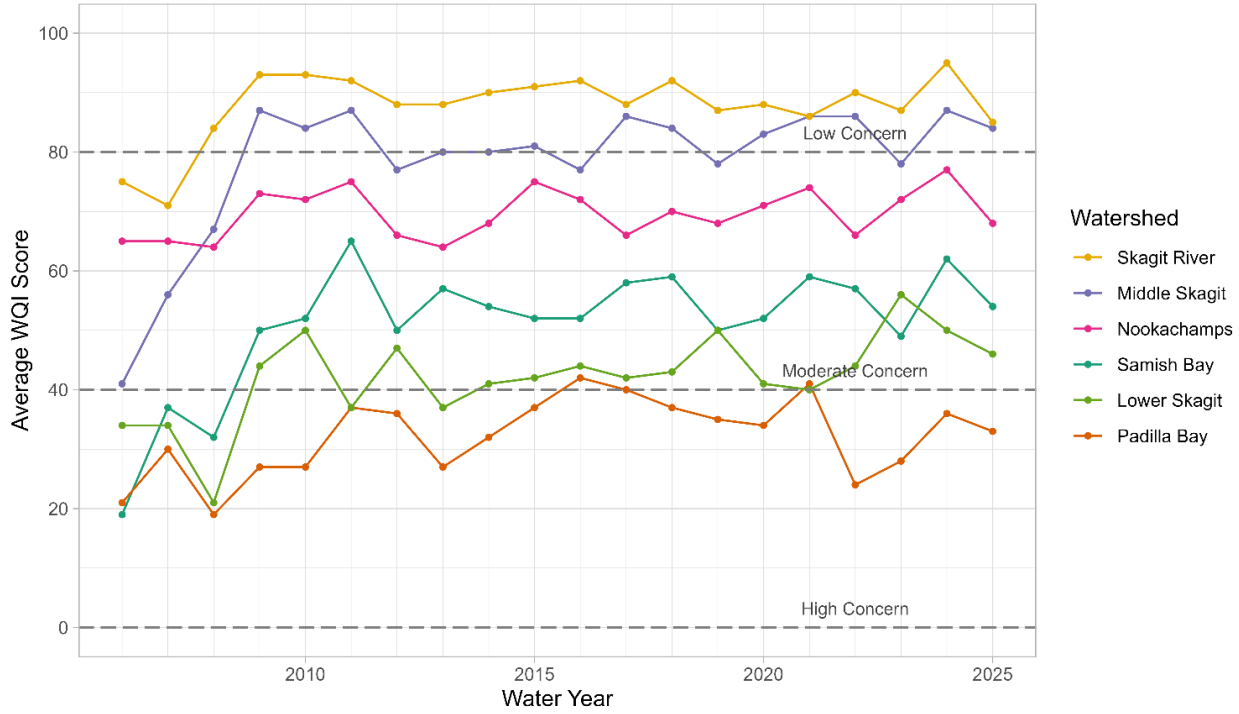


Figure 3. Average Water Quality Index (WQI) scores for each watershed from water year 2006 – 2025.

Trends

Over the past 22 years of monitoring, most sites and watersheds have experienced a mix of improving, worsening, and stable water quality conditions. Across all parameters evaluated, nearly half of the trends (49%) showed no significant change. Of the remaining trends, 32% indicated improving water quality and 19% indicated worsening conditions. It is important to note that no significant trend does not necessarily indicate good water quality; rather, it means conditions have remained relatively stable over the monitoring period. Every SCMP site experienced changes in at least four water quality parameters. While

the rate of change is generally not discussed in this report, the slopes of significant trends are provided in *Appendix C*.

Most sites showed no significant long-term change in water temperature (Figure 4). Of the 28% of sites with significant temperature trends, all showed warming conditions. These trends are based on discrete measurements, which may not capture the warmest temperatures throughout the day.

Dissolved oxygen concentrations improved at approximately 42% of SCMP sites over the 22-year monitoring period, while 14% of sites showed worsening dissolved oxygen levels. Sites with improving dissolved oxygen were distributed throughout Skagit County.

Approximately half of the SCMP sites showed no significant long-term change in fecal coliform concentrations. Of the remaining sites, 36% exhibited worsening fecal coliform levels and 17% were improving. Most improvements occurred in the upper Samish Bay and Nookachamps watersheds, whereas worsening trends were concentrated in the Lower Skagit watershed.

Nearly all significant trends in nitrogen concentrations were decreasing, indicating improving water quality. In contrast, all significant phosphorus trends showed increasing concentrations, indicating worsening conditions. Most sites with increasing total phosphorus concentrations were located in the western portion of the county.

With five years of monitoring data now available, *E. coli* trends were evaluated for the first time. Most sites (72%) showed no statistically significant change over the five-year period. The remaining 28% exhibited increasing *E. coli* concentrations, indicating worsening bacterial water quality.

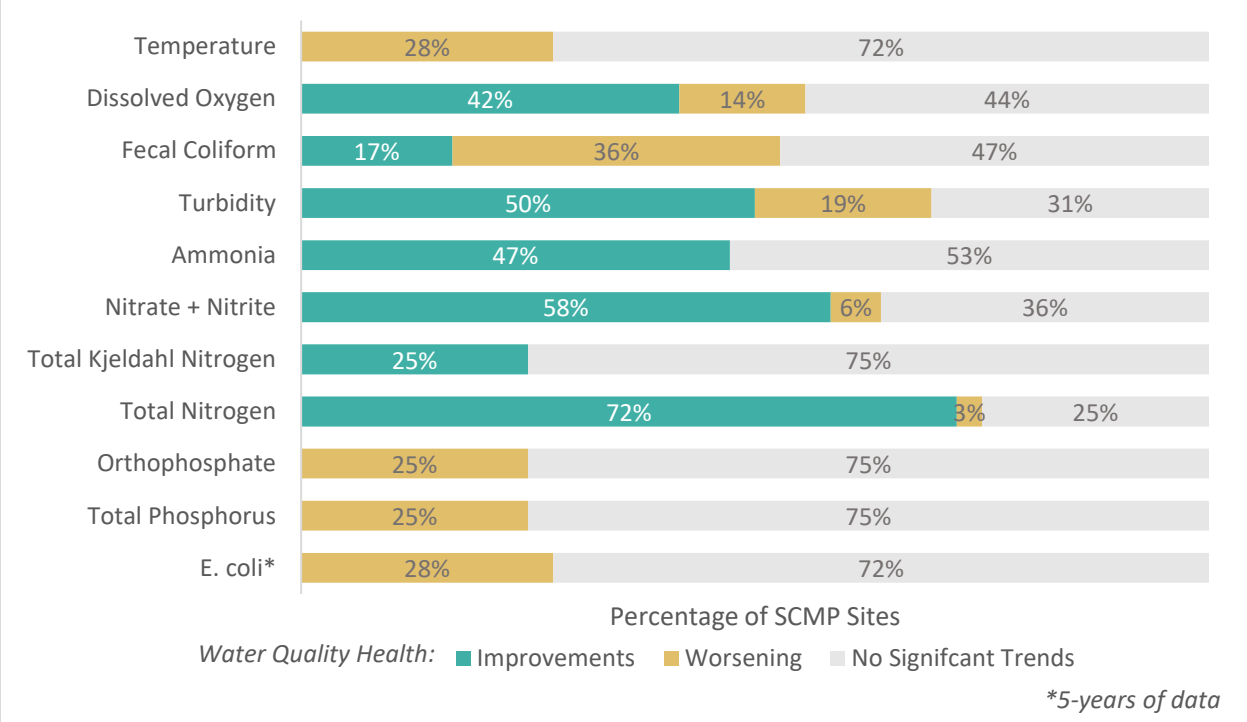


Figure 4. Percentage of sites with trends that show improving, worsening or no significant changes in water quality health.

Samish Bay Watershed

The Samish Bay watershed is in the northwestern portion of Skagit County and extends north into Whatcom County (Figure 5). The largest subbasins within the watershed are the Samish River and two of its tributaries, Friday, and Thomas Creeks. Other waterways, including Colony Creek, Oyster Creek, and several other drainages and sloughs, empty directly into Samish Bay. Most of the lower Samish watershed land is used for agriculture, such as crop farming and cattle operations. The upper watershed is dominated by rural residential uses, with small agriculture and natural resource practices throughout.



Data sources: Dewitz, 2023; ESRI, 2023; WSDA, 2023.

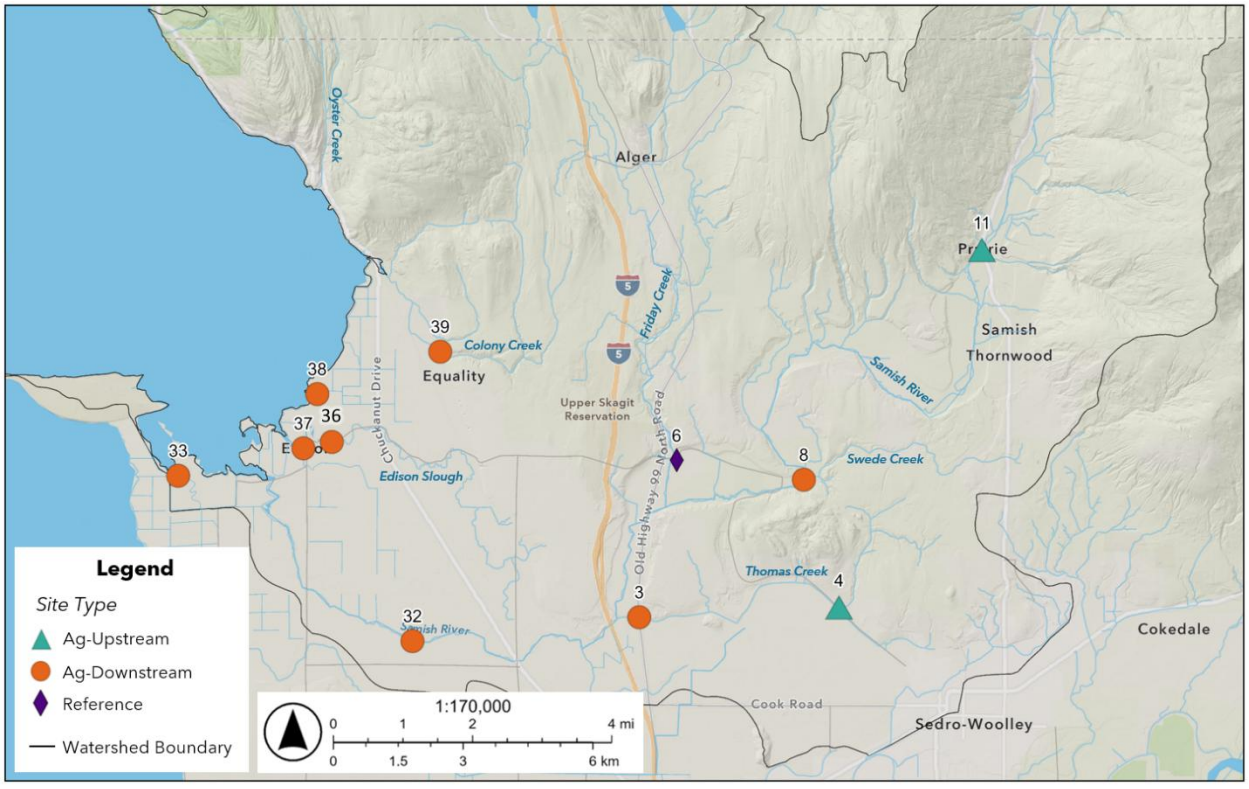


Figure 5. Monitoring sites in the Samish Bay watershed and the site type.

Current Conditions in WY2025 – Samish Bay Watershed

No sites in the Samish watershed met all three measured water quality standards in water year 2025 where measured (Table 1). Both the upper Samish River and upper Thomas Creek met the temperature standard. Friday Creek was the one site that met the dissolved oxygen. Overall, five out of the 11 sites in the watershed met the *E. coli* standard.

Based on WQI scores, three sites were ranked in the high concern category, which were the North and South Edison drainages, and the Alice Bay drainage. The lowest scoring sites in the watershed were tied between the North and South Edison Drainage with a score of 3. These sites also had the lowest scores out of all the sites this year. The highest WQI score in the watershed was found at Swede Creek with a score of 88. Friday Creek and the lower Samish River closely behind with scores of 84 and 83, respectively.

Table 1. Site compliance with state water quality standards and water quality index (WQI) scores in the Samish Bay watershed in water year 2025. Sites are organized upstream to downstream along the Samish River and then north to south for the remaining sites.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
11	Upper Samish River	✓	✗	✓	71
8	Swede Creek	✗	✗	✗	88
6	Friday Creek	✗	✓	✓	84
4	Upper Thomas Creek	✓	✗	✗	76
3	Lower Thomas Creek	✗	✗	✓	51
32	Lower Samish River	✗	✗	✓	83
39	Colony Creek	-*	✗	✗	73
38	North Edison Drainage	-	✗	✗	3
36	Edison Slough	-	✗	✗	50
37	South Edison Drainage	-	✗	✗	3
33	Alice Bay Drainage	-	✗	✓	11

*Incomplete dataset.
For further details see Appendix D.

Legend				
Water Quality Standards:	✓ Passed	✗ Failed	- Not measured	
WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)	

Long Term Trends – Samish Bay Watershed

Over the past 22 years, most trends in the Samish Bay watershed showed improvements in water quality (Table 2). Friday Creek and the lower Samish River were the two sites in the watershed with significantly warming temperatures. DO concentrations significantly improved at Friday Creek, upper Thomas Creek, and the lower Samish River. Improving fecal coliform trends were found in Swede, upper Thomas, and Colony Creeks, while the North and South Edison Drainages and Edison Slough had worsening fecal coliform. All the significant turbidity trends were improving.

Nitrogen concentrations improved at most of the sites other than drainages around Edison (Sites 37, 36, 38, 33). Significant phosphorus trends showed worsening water quality generally located in the lower portions of the watershed, with the exception of Swede Creek.

Four sites in the Samish Bay watershed had worsening *E. coli* levels over the past five years – the upper Samish River, Swede Creek, Friday Creek, and the South Edison Drainage.

Table 2. Trend analysis results for sites in the Samish Bay watershed. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are organized upstream to downstream along the Samish River and then north to south for the remaining sites.

Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
11	Upper Samish River	-	-	-	-	-	↘	-	-	-	↗
8	Swede Creek	-	-	↘	↘	↘	↘	-	-	-	↗
6	Friday Creek	↗	↗	-	↘	-	↘	-	-	-	↗
4	Upper Thomas Creek	-	↗	↘	↘	↘	↘	-	-	-	-
3	Lower Thomas Creek	-	-	-	-	↘	↘	↘	↗	↗	-
32	Lower Samish River	↗	↗		↘	↘	↘	-	-	-	-
39	Colony Creek	-	-	↘	-	↘	↘	↘	↗	-	-
38	North Edison Drainage	-	↘	↗	↘	-	↗	-	↗	↗	-
36	Edison Slough	-	-	↗	-	↘	-	↘	↗	-	-
37	South Edison Drainage	-	-	↗	↘	-	-	-	-	-	↗
33	Alice Bay Drainage	-	-	-	↘	↘	-	-	-	-	-

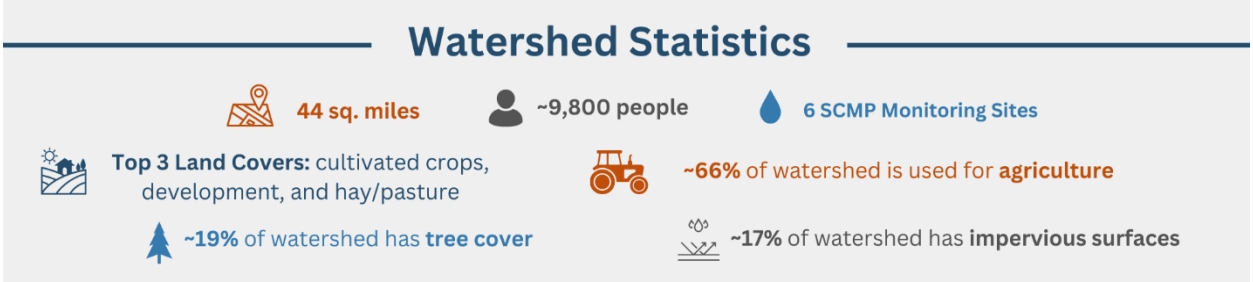
*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend				
	Water Quality Health:		Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

Padilla Bay Watershed

The Padilla Bay watershed is located directly south of the Samish Bay watershed in the northwest portion of Skagit County (Figure 5). Extensive diking and drainage has taken place in the watershed to make it suitable for settlement and agricultural development. The four major waterways in the Padilla Bay watershed are Joe Leary, No Name, Big Indian, and Little Indian Sloughs. Many agricultural and water management ditches flow into these sloughs. The watershed is primarily used for commercial agriculture, rural residences, and includes several large industrial areas including the Port of Skagit.

The marine reference site in the Swinomish Channel has also been included in this watershed as it exchanges with Padilla Bay. Data at this site is collected from surface water at a boat launch, so the bottom water and center of the channel could have differing results.



Data sources: Dewitz, 2023; ESRI, 2023; WSDA, 2023.

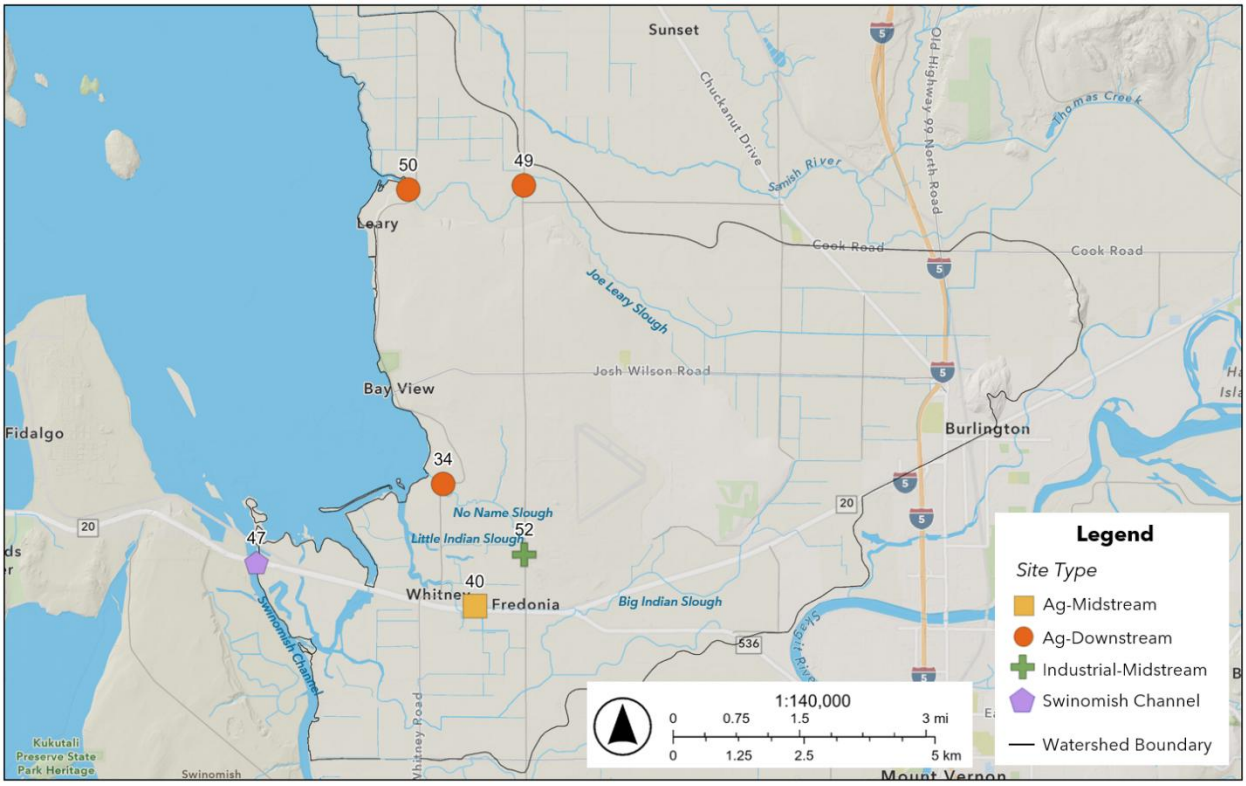


Figure 6. Monitoring sites in the Padilla Bay watershed and the site type.

Current Conditions in WY2025 – Padilla Bay Watershed

Table 3 outlines which sites met the state water quality standards of temperature, DO, and *E. coli,* and each site's WQI score in water year 2025. No continuous temperature loggers were deployed in the Padilla Bay watershed to assess temperature compliance. Based on the discrete temperature measurements collected throughout the water year, it is very unlikely that these waterways would pass the temperature standard. The sloughs that flow into Padilla Bay did not meet the state water quality standard for DO or *E. coli* in water year 2025.

Most of the waterways in the Padilla Bay watershed were ranked in the high concern category. Middle Joe Leary Slough had the lowest score of 3, which is tied as one of lowest scoring sites in Water Year 2025. The highest WQI score in the watershed, excluding the Swinomish Channel, was Big Indian Slough with a score 43. This is a relatively high score for Big Indian, with water year 2021 only being one point higher.

Because the Swinomish Channel is a marine site, it has different state standards than the freshwater sites. These standards are ranked on a scale from "fair" to "extraordinary" quality. The Swinomish Channel met the state water quality standard under the "excellent" category with a minimum DO concentration greater than 6.0 mg/L, but less than 8.0 mg/L. The WQI was created for freshwater sites, however, a WQI score was calculated for the Swinomish Channel site for reference and to identify changes. The Swinomish Channel had a WQI score of 69, which is similar to recent years.

Table 3. Site compliance with state water quality standards and water quality index (WQI) scores in the Padilla Bay watershed in water year 2025. The sites are organized from north to south.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
49	Middle Joe Leary Slough	-	✗	✗	3
50	Lower Joe Leary Slough	-	✗	✗	20
34	No Name Slough	-	✗	✗	22
52	Little Indian Slough	-	✗	✗	40
40	Big Indian Slough	-	✗	✗	43
47	Swinomish Channel	-	*Excellent*	-	69

For further details see Appendix D.

Legend	*Water Quality Standards:*	✓ Passed	✗ Failed	- Not measured
	WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)

Long Term Trends – Padilla Bay Watershed

Three sites in the Padilla Bay watershed were analyzed for trends: No Name Slough, Big Indian Slough, and the Swinomish Channel (Table 4). The sites on Little Indian and Joe Leary Sloughs have only been monitored for four water years, and additional data collection is needed to complete accurate trend analysis.

No Name Slough saw the greatest number of changes in the SCMP, however it had a combination of both improving and worsening water quality health. The improving parameters included DO, fecal coliform, turbidity, and nitrogen levels. The worsening parameters included temperature and phosphorus levels.

Big Indian Slough was found to have improvements in turbidity levels and nitrogen concentrations. However, the site had worsening trends for fecal coliform and phosphorus levels. Over the past 5 years, *E. coli* trends in Big Indian Slough were also found to be worsening.

Over the past 22 years, Swinomish Channel had four trends that indicate worsening water quality health, with increasing levels of temperature, fecal coliform, nitrate + nitrite, and orthophosphate. *E. coli* trends measured over the past 5 years, also had worsening levels. There was one trend that indicated improving water quality, which was declining concentrations of ammonia.

Table 4. Trend analysis results for sites in the Padilla watershed. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are generally organized from north to south.

Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
49	Middle Joe Leary Slough										
50	Lower Joe Leary Slough										
34	No Name Slough	↗	↗	↘	↘	↘	↘	↘	↗	↗	-
52	Little Indian Slough										
40	Big Indian Slough	-	-	↗	↘	↘	↘	↘	-	↗	↗
47	Swinomish Channel	↗	-	↗	-	↘	↗	-	↗	-	↗

*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend				
			Water Quality Health:	Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

Middle Skagit Watershed

The Middle Skagit watershed is located between Sedro Woolley and Concrete in central Skagit County (Figure 7). This watershed has many streams and tributaries that feed into the Skagit River. The SCMP monitoring sites are located north of the Skagit River at Red Cabin, Mannser, Wiseman, Coal, and Hansen Creeks. The upland area in the watershed has been managed for timber harvest, and the lowland area is dominated by small farms and rural residential development. Many of creeks in the lowlands have been modified by channelization.

Multiple streams in this watershed run dry in the summer, including Red Cabin and Wiseman Creeks. The lower reaches of Coal and Hansen Creeks also run dry during the summer. The following watershed statistics are based on the portion of the watershed north of the Skagit River.

Watershed Statistics

47 sq. miles | **~4,600 people** | **7 SCMP Monitoring Sites**

Top 3 Land Covers: forest, hay/pasture, and shrub/herbaceous vegetation

~19% of watershed is used for **agriculture**

~82% of watershed has **tree cover**

~7% of watershed has **impervious surfaces**

Data sources: Dewitz, 2023; ESRI, 2023; WSDA, 2023.

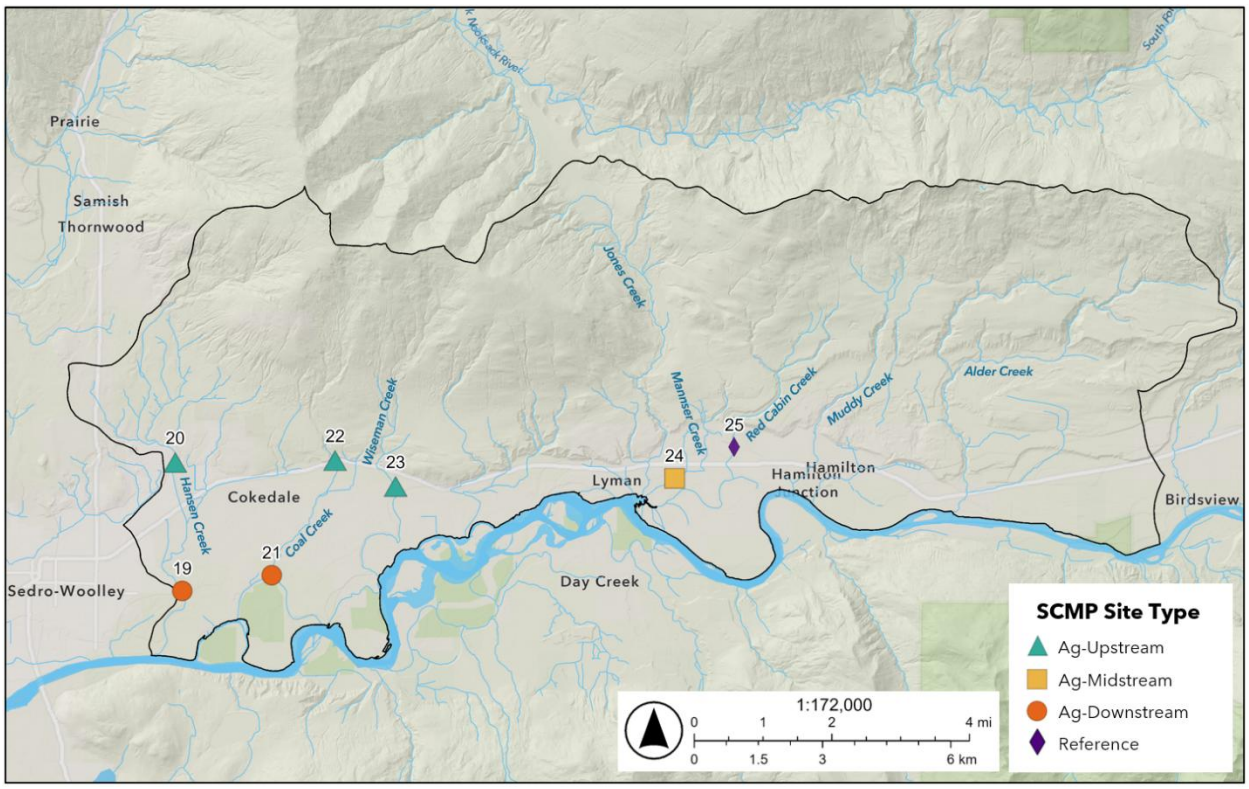


Figure 7. Monitoring sites in the Middle Skagit watershed north of the Skagit River, and the site type.

Current Conditions in WY2025 – Middle Skagit Watershed

All the sites in the Middle Skagit watershed were assessed for DO and *E. coli* compliance, and a subset of three sites were successfully tested for temperature compliance (Table 5). Mannser Creek passed the temperature standard, while both upper and lower Coal Creek failed. Three sites – Red Cabin, Wiseman, and Upper Coal Creek - passed the DO standard. Most sites passed the *E. coli* standard. Those that failed were lower Coal and upper Hansen Creeks.

Based on WQI scores in water year 2025, three sites in the Middle Skagit were ranked in the low concern category – Red Cabin, Wiseman, and Upper Coal Creeks. These sites all had WQI scores greater than 90. Red Cabin Creek had a WQI score of 98, which is the highest score in the SCMP this water year. The remaining four sites were ranked as moderate concern, with scores ranging from 72 to 80. While ranked as moderate concern, Mannser Creek had its highest WQI score since the start of the program, with a score of 73.

Table 5. Site compliance with state water quality standards and water quality index (WQI) scores in the Middle Skagit watershed in water year 2025. The sites are generally organized from east to west.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
25	Red Cabin Creek	-	✓	✓	98
24	Mannser Creek	✓	✗	✓	73
23	Wiseman Creek	-	✓	✓	96
22	Upper Coal Creek	✗	✓	✓	92
21	Lower Coal Creek	✗	✗	✗	72
20	Upper Hansen Creek	-*	✗	✗	80
19	Lower Hansen Creek	-*	✗	✓	76

* Unable to retrieve logger or incomplete dataset.
For further details see Appendix D.

Legend				
Water Quality Standards:	✓ Passed	✗ Failed	- Not measured	
WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)	

Long Term Trends – Middle Skagit Watershed

The sites monitored in the Middle Skagit watershed had a mixture of both improving and worsening water quality health over the past 22 years (Table 6). Water temperature significantly warmed at Mannser, upper Coal, and lower Hansen Creeks. Improvements in DO concentrations were found at Red Cabin, Wiseman, and upper Hansen Creek, while lower Hansen Creek saw worsening DO. Interestingly, DO concentrations increased at Mannser Creek, despite the inverse relationship between temperature and oxygen. The only significant fecal coliform trend in the watershed was at Wiseman Creek with worsening levels. Turbidity was found to be improving at all sites other than Red Cabin and Mannser Creeks which were worsening. Nitrate + nitrite was the only nutrient parameter to have significant trends, with improvements found at all sites other than Mannser Creek.

Upper Coal Creek was found to be the one site with a significant *E. coli* trend over the past 5 years. This trend indicated worsening *E. coli* levels.

Table 6. Trend analysis results for sites in the Middle Skagit watershed. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are generally organized from east to west.

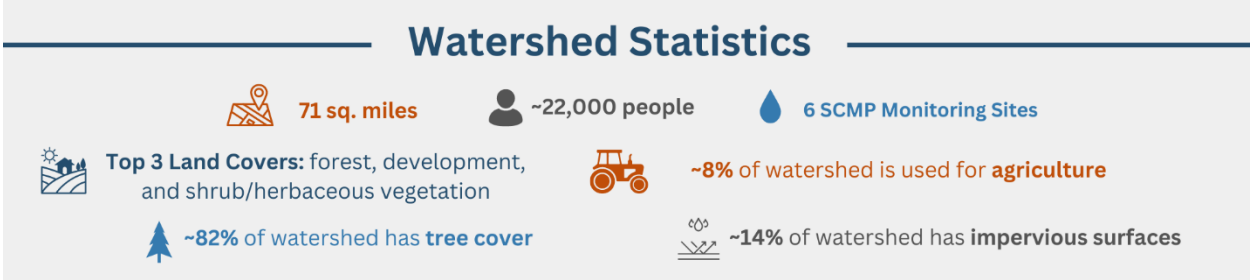
Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
25	Red Cabin Creek	-	↗	-	↗	-	↘	-	-	-	-
24	Mannser Creek	↗	↗	-	↗	-	-	-	-	-	-
23	Wiseman Creek	-	↗	↗	↘	-	↘	-	-	-	-
22	Upper Coal Creek	↗	-	-	↘	-	↘	-	-	-	↗
21	Lower Coal Creek	-	-	-	↘	-	↘	-	-	-	-
20	Upper Hansen Creek	-	↗	-	↘	-	↘	-	-	-	-
19	Lower Hansen Creek	↗	↘	-	↘	-	↘	-	-	-	-

*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend				
	Water Quality Health:		Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

Nookachamps Watershed

The Nookachamps watershed is a main tributary of the lower Skagit River that is located east of Mount Vernon (Figure 8). Nookachamps Creek branches into two main subbasins: the mainstem Nookachamps Creek that routes through Big Lake, and the East Fork Nookachamps Creek that flows further east. The upland areas in the watershed are managed for timber harvest and the lowland areas in the valley are primarily used by small farms and residential development. Most of the downstream sections of both creeks have been channelized, which has resulted in wide, shallow channels with sparse riparian vegetation. This watershed is an important salmon-producing tributary of the lower Skagit River.



Data sources: Dewitz, 2023; ESRI, 2023; WSDA, 2023.

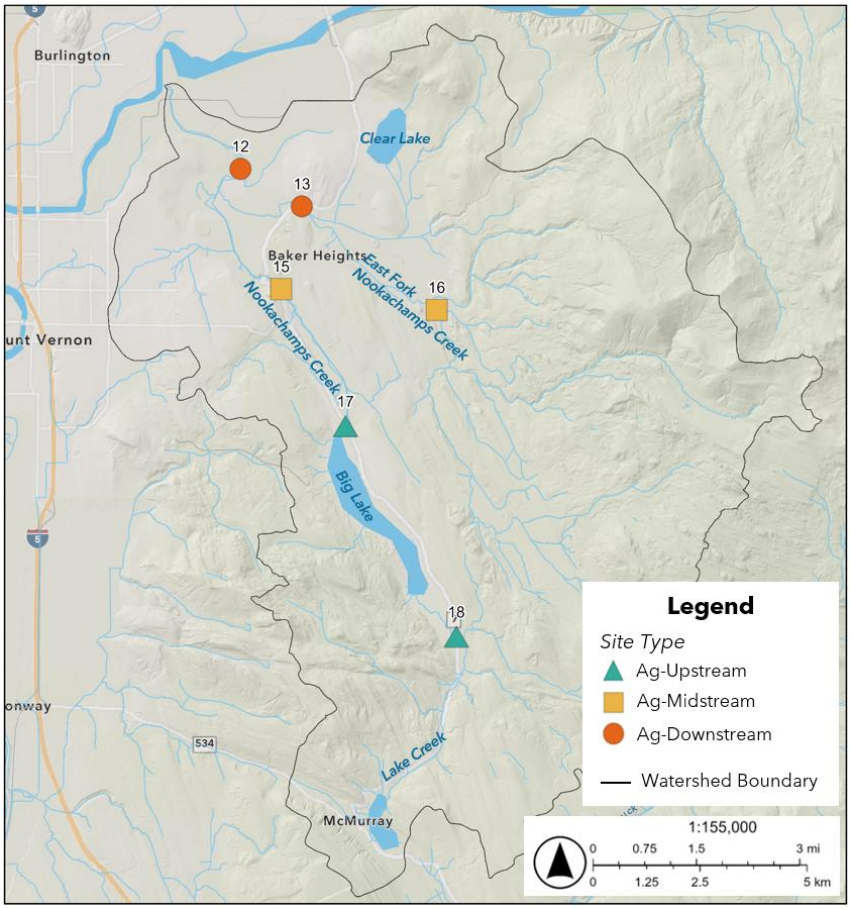


Figure 8. Monitoring sites in the Nookachamps watershed and the site type.

Current Conditions in WY2025 – Nookachamps Watershed

No sites in the Nookachamps watershed met the temperature standard in water year 2025 (Table 7). The upper East Fork Nookachamps was one site that met the dissolved oxygen standard. All sites except the lower Nookachamps site passed the *E. coli* standard.

In the Nookachamps watershed, the furthest upstream sites, Lake Creek and upper East Fork Nookachamps, had the highest WQI scores and were ranked in the low concern category. The four other sites in the watershed were in the moderate concern category, with WQI scores ranging from 48 - 64. The lower East Fork Nookachamps had the lowest score of 48, which is the lowest score it's had in the program. No sites were ranked in the high concern category.

Table 7. Site compliance with state water quality standards and water quality index (WQI) scores in the Nookachamps watershed in water year 2025. The sites are generally organized from upstream to downstream.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
18	Lake Creek	✗	✗	✓	92
17	Upper Nookachamps Creek	✗	✗	✓	64
15	Middle Nookachamps Creek	✗	✗	✓	49
16	Upper East Fork Nookachamps Creek	✗	✓	✓	92
13	Lower East Fork Nookachamps Creek	✗	✗	✓	48
12	Lower Nookachamps Creek	✗	✗	✗	63

For further details see Appendix D.

Legend				
Water Quality Standards:	✓ Passed	✗ Failed	- Not measured	
WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)	

Long Term Trends – Nookachamps Watershed

Most of the Nookachamps watershed exhibited a mixture of improving and worsening water quality health (Table 8). The two East Fork Nookachamps sites had significant warming trends over the past 22 years. Dissolved oxygen (DO) conditions worsened at the lower East Fork Nookachamps and lower Nookachamps Creek sites but improved farther upstream at the middle Nookachamps Creek and Lake Creek sites. Fecal coliform concentrations also improved at Lake Creek and middle Nookachamps Creek. In contrast, turbidity showed worsening trends at Lake Creek and upper Nookachamps Creek. Nitrogen concentrations improved across all monitoring sites, while phosphorus concentrations worsened at the middle and lower Nookachamps Creek sites.

Table 8. Trend analysis results for sites in the Nookachamps watershed. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are generally organized from upstream to downstream.

Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
18	Lake Creek	-	↗	↘	↗	-	↘	-	-	-	-
17	Upper Nookachamps Creek	-	-	-	↗	↘	-	-	-	-	-
15	Middle Nookachamps Creek	-	-	↘	-	↘	-	↘	↗	↗	-
16	Upper East Fork Nookachamps Creek	↗	↗	-	-	-	↘	-	-	-	-
13	Lower East Fork Nookachamps Creek	↗	↘	-	-	↘	↘	-	-	-	-
12	Lower Nookachamps Creek	-	↘	-	-	↘	↘	↘	↗	-	-

*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend				
	Water Quality Health:		Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

Lower Skagit Watershed

The Lower Skagit watershed is a combination of the streams, drainages, and sloughs that flow into the Skagit River or Skagit Bay in southwest Skagit County (Figure 9). The main waterways monitored in the SCMP include Carpenter Creek (Hill Ditch), Fisher Creek, Wiley Slough, and Maddox Creek/Slough (Big Ditch). We also monitor Sulivan Slough, a drainage that flows into Swinomish Channel and Skagit Bay near La Conner. The upper portions of Carpenter and Fisher Creeks drain the hills located to the east and southeast of the low-lying Skagit plain. The creeks and drainages in the Skagit plain are often channelized and diked with little riparian vegetation. Most of the Lower Skagit watershed is used for commercial agriculture and rural residential development.

Watershed Statistics

- **83 sq. miles**
- **~18,700 people**
- **6 SCMP Monitoring Sites**
- **Top 3 Land Covers:** cultivated crops, forest, and development
- **~48%** of watershed is used for **agriculture**
- **~38%** of watershed has **tree cover**
- **~15%** of watershed has **impervious surfaces**

Data sources: Dewitz, 2023; ESRI, 2023; WSDA, 2023.

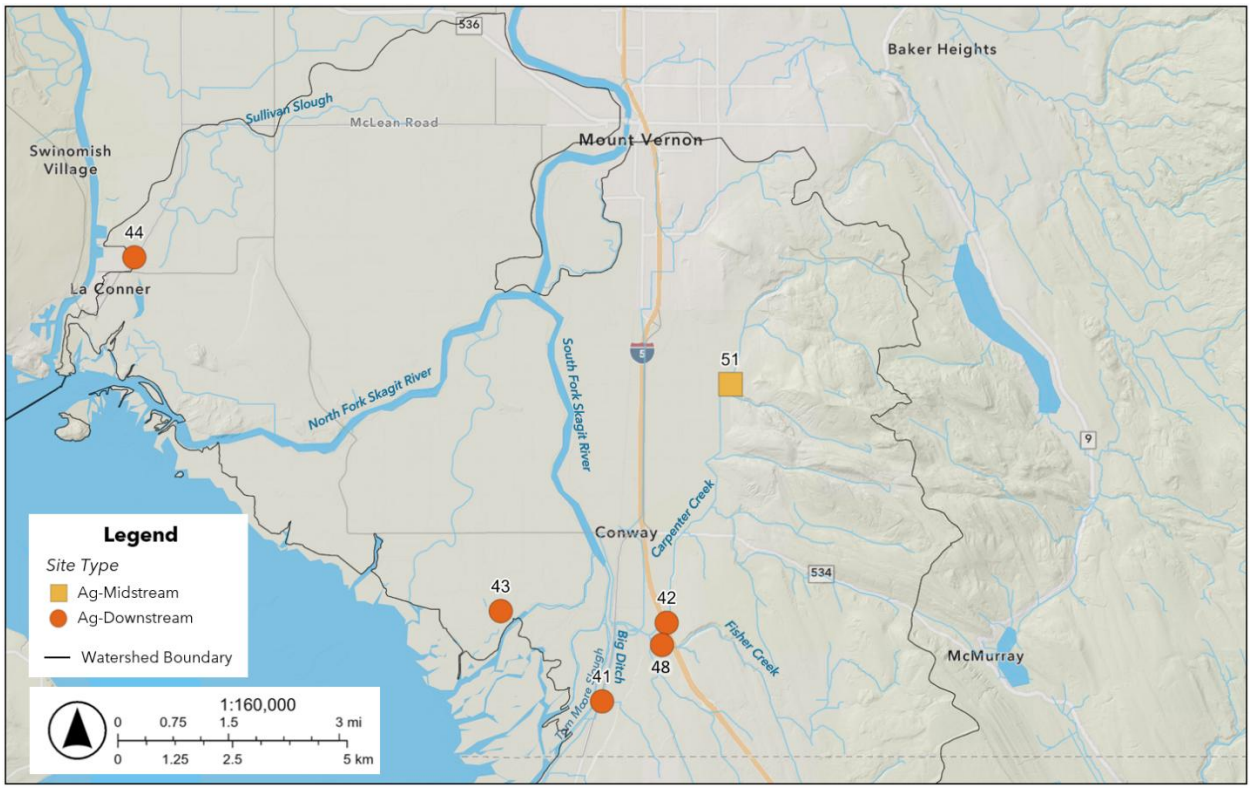


Figure 9. Monitoring sites in the Lower Skagit watershed and the site type.

Current Conditions in WY2025 – Lower Skagit Watershed

None of the Lower Skagit watershed sites met DO state standard in water year 2025 (Table 9. Site compliance with state water quality standards and water quality index (WQI) scores in the Lower Skagit watershed in water year 2025. The sites are generally organized from north to south.). Upper Carpenter and Fisher Creeks, the two sites where the temperature standard was successfully assessed, did not meet the temperature standard either. Fisher Creek and lower Carpenter Creek were the only sites that met the *E.* coli standard this year.

The Lower Skagit watershed WQI scores ranged from moderate to high concern in water year 2025. The highest WQI score in the Lower Skagit watershed was Fisher Creek with a score of 78. The lowest scoring sites were Sullivan Slough and Maddox Creek/Big Ditch with scores of 25 and 21, respectively.

Table 9. Site compliance with state water quality standards and water quality index (WQI) scores in the Lower Skagit watershed in water year 2025. The sites are generally organized from north to south.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
51	Upper Carpenter Creek	✗	✗	✗	61
42	Lower Carpenter Creek/Hill Ditch	-*	✗	✓	62
48	Fisher Creek	✗	✗	✓	78
43	Wiley Slough	-	✗	✗	43
44	Sullivan Slough	-	✗	✗	25
41	Maddox Creek/Big Ditch	-*	✗	✗	21

* Incomplete dataset.
For further details see Appendix D.

Legend				
Water Quality Standards:	✓ Passed	✗ Failed	- Not measured	
WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)	

Long Term Trends – Lower Skagit Watershed

Both improving and worsening water quality health was observed in the Lower Skagit watershed (Table 10). Upper Carpenter Creek has only been monitored for four water years, and additional data collection is needed to complete accurate trend analysis.

Fisher Creek was the one site in the Lower Skagit watershed that had a significant temperature trend, which was warming over the past 22 years. Lower Carpenter Creek, Fisher Creek, and Maddox Creek/Big Ditch had improving DO trends, while Sullivan Slough had a worsening DO trend.

Most of the sites in the Lower Skagit watershed had worsening fecal coliform levels, except for Fisher Creek. Turbidity worsened for lower Carpenter Creek/Hill Ditch, Wiley Slough and Maddox Creek/Big Ditch. Nitrogen concentrations were improving at lower Carpenter Creek, Fisher Creek, and Maddox Creek/Big Ditch. Phosphorus concentrations were worsening at most of the sites in the watershed.

Over the past 5 years, Maddox Creek/Big Ditch had worsening *E. coli* concentrations.

Table 10. Trend analysis results for sites in the Middle Skagit watershed. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are generally organized from north to south.

Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
51	Upper Carpenter Creek										
42	Lower Carpenter Creek/Hill Ditch	-	↗	↗	↗	↘	↘	↘	-	-	-
48	Fisher Creek	↗	↗	-	-	↘	↘	↘	-	↗	-
43	Wiley Slough	-	-	↗	↗	-	-	-	-	↗	-
41	Maddox Creek/ Big Ditch	-	↗	↗	↗	↘	-	-	↗	↗	↗
44	Sullivan Slough	-	↘	↗	-	-	-	-	-	↗	-

*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend					
	Water Quality Health:			Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

Skagit River

The Skagit River is the largest river flowing into Puget Sound, supplying about one-third of its fresh water. The river originates in British Columbia, flows across the border into Ross Lake, and continues westward through Skagit County for a total length of 150 miles. The Skagit River watershed encompasses the sub-basins Middle Skagit, Nookachamps, and Lower Skagit focused on in this report. The river supports many wildlife and their habitats, including wild populations of all five salmon species (Chinook, coho, pink, sockeye, and chum) and three species of anadromous trout (bull, steelhead, and cutthroat).

The SCMP monitors four sites on the Skagit River, ranging as far upstream as Hamilton to downstream locations in the North and South Forks (Figure 10). The Skagit River data collected in the SCMP is not a comprehensive analysis of the river's health but can be used as indicators for further investigation. The water quality data and samples are collected from the banks of the river at the surface, so the thalweg and deeper depths could have differing results than those we recorded.

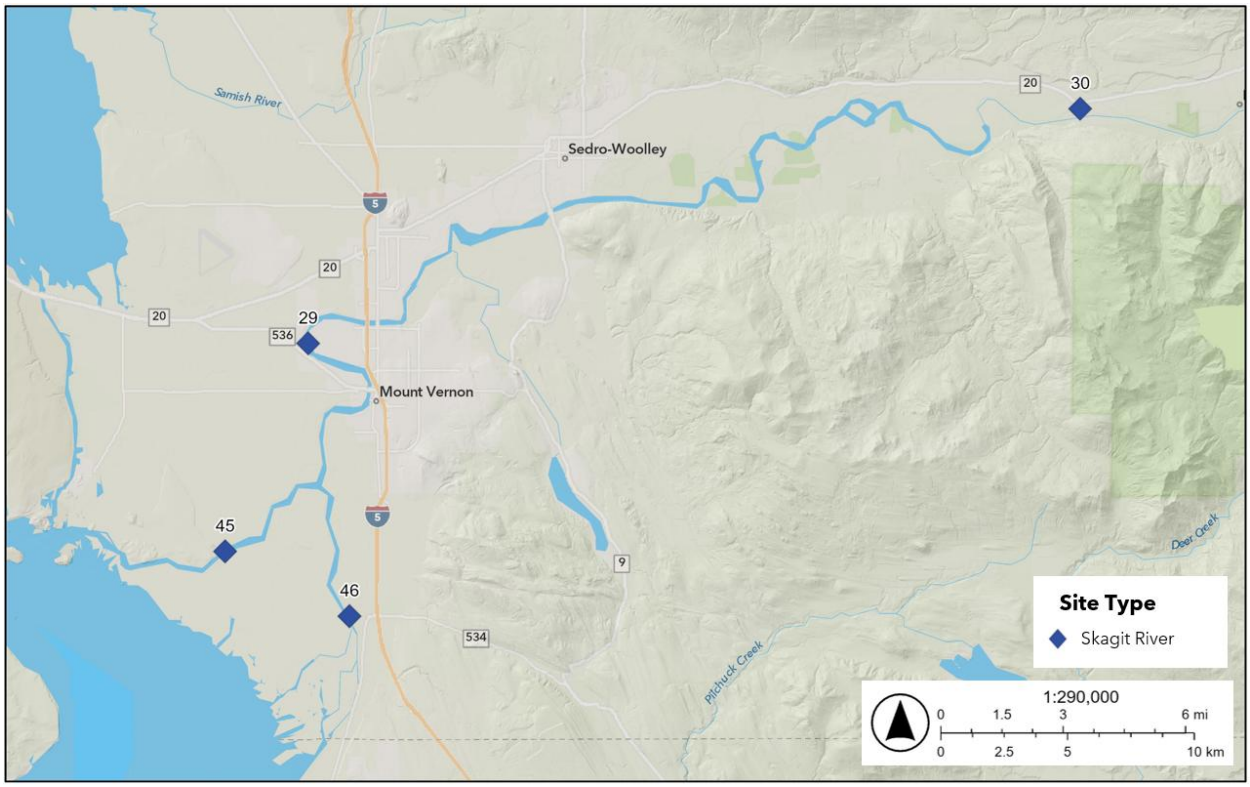


Figure 10. Monitoring sites on the Skagit River.

Current Conditions in WY2025 – Skagit River

In water year 2025, there were two sites on the Skagit River where temperature compliance was assessed – the Skagit River near Hamilton and on the North Fork. Neither met the state temperature standards (Table 11). None of the Skagit River sites met the state DO standard, while all the sites met the *E. coli* state standard.

In water year 2025, the Skagit River site near Hamilton was categorized as moderate concern based on WQI score of 78. This is a relatively low score for the site. The three other sites were categorized in the low concern category based on WQI scores, ranging from 84 – 88.

Table 11. Site compliance with state water quality standards and water quality index (WQI) scores on the Skagit River in water year 2025. The sites are organized from upriver to downriver.

Site	Waterbody	Temperature Standard (7DADMax)	Dissolved Oxygen Standard	*E. coli* Standard	WQI Score
30	Skagit River near Hamilton	✗	✗	✓	78
29	Skagit River near Mount Vernon	-	✗	✓	88
45	North Fork Skagit River	✗	✗	✓	84
46	South Fork Skagit River	-	✗	✓	88

For further details see Appendix D.

Legend				
Water Quality Standards:	✓ Passed	✗ Failed	- Not measured	
WQI Scores:	High Concern (0 – 40)	Moderate Concern (41 – 80)	Low Concern (81 – 100)	

Long Term Trends – Skagit River

The Skagit River sites exhibited relatively few significant trends, indicating little overall change in water quality over the past 22 years (Table 12). Based on discrete monitoring data, no significant changes were found in temperature, nitrogen, or phosphorus concentrations at any of the Skagit River sites. Improving turbidity levels were found at all the Skagit River sites and DO concentrations improved at the Mount Vernon and the South Fork sites. Fecal coliform levels were found to be worsening at the Hamilton, Mount Vernon, and the South Fork sites. Over the past 5 years, *E. coli* levels were also found to be worsening at Mount Vernon and North Fork sites.

Table 12. Trend analysis results for sites on the Skagit River. Trends were evaluated over the past 22 years for all parameters except *E. coli*, which was assessed over the past 5 years. Sites are organized from upriver to downriver.

Site	Waterbody	Temp.	DO	FC	Turb.	Amm-onia	Nitrate + Nitrite	TKN	Ortho-phos.	Total Phos.	EC*
30	Skagit River near Hamilton	-	-	↗	↘	-	-	-	-	-	-
29	Skagit River near Mount Vernon	-	↗	↗	↘	-	-	-	-	-	↗
45	North Fork Skagit River	-	-	-	↘	-	-	-	-	-	↗
46	South Fork Skagit River	-	↗	↗	↘	-	-	-	-	-	-

*Past 5 years of data analyzed.
Temp. = Temperature, DO = Dissolved oxygen (mg/L), FC = Fecal coliform, Turb. = Turbidity, TKN = Total Kjeldahl Nitrogen, Ortho-Phos. = Orthophosphate, Total Phos. = Total phosphorus, EC = *E. coli*. For further details see Appendix C.

Legend				
	Water Quality Health:		Improving	Worsening
	Trends:	↗ Increasing	↘ Decreasing	- Not significant	No stats run

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