Water Year 2024 (Oct. 2023 – Sept. 2024) Island County Surface Water Quality Report

ISLAND COUNTY DEPARTMENT OF PUBLIC HEALTH
DIVISION OF NATURAL RESOURCES
SURFACE WATER QUALITY MONITORING PROGRAM

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INTRODUCTION

Island County is known for its exceptional scenery, abundant natural resources, and plentiful recreational opportunities. The county has a unique mix of shoreline with private and commercial shellfish areas, and private and public lakes and beaches. Water Resources Inventory Area (WRIA) 6 encompasses all islands and water within Island County's geographic boundary. Centrally located within the Salish Sea at the junction of Puget Sound and the Strait of Juan de Fuca and Georgia Straight, Whidbey and Camano Islands encompass more than 200 watersheds that contribute to surface water flow. Most of the watersheds are small and experience seasonal flow, but they all play an important role in local ecosystems with several watersheds having streams that demonstrate year-round flow. Monitoring the water quality of these watersheds is essential for protecting public health and community resources.

Island County's population is approximately 87,000 according to the 2020 census. Apart from those who live in three incorporated municipalities, most island residents live in rural settings or small, unincorporated communities. While only about 20% of U.S. homes are served by decentralized wastewater (onsite septic) systems (Ground Water 2022), the vast majority of Island County residents (more than 72%) utilize a septic system (*Onsite* n.d.). Although these systems can provide an effective means to treat wastewater, for many homeowners the systems are outdated or non-compliant. For more information visit this link: https://www.islandcountywa.gov/190/Onsite-Sewage-Septic-Systems.

The main goal of the Island County Surface Water Quality Monitoring Program (SWQMP) is to "protect human health and critical areas by monitoring water quality" by using local, state, and federal funding effectively and efficiently. Surface water quality resources are monitored throughout the year to produce consistent and high-quality data reports that can be used in evaluating habitat and impacts to human health. In the past, surface water data has been used in combination with the groundwater monitoring data; water quality monitoring efforts in recent times have been focused on regular monitoring of streams for non-point source pollution and coliform bacteria and are summarized in Source ID evaluations and Water Year annual reports. These water year reports can be used by outside agencies and other departments within Island County in their review of future development and projects, as well as in the evaluation of shellfish, salmon, and water recreational areas.

The U.S. Geological Survey (USGS) uses the term "water year" in reports that deal with surface-water supply. Water year is defined as the 12-month period beginning October 1st for any given year through September 30th of the following year. The water year is designated by the calendar year in which it ends, so the year ending September 30, 2024, is called the "2024" water year or WY2024 (Jian et al. 2022).

A water year is different than a calendar year because precipitation that happens at the end of a calendar year, perhaps as snowfall, often doesn't affect the level or flow of water in streams until the next spring or summer. Starting the water year a little earlier allows scientists to study how much water cycles through an area throughout a year. Locally, the water year impacts may be different from the USGS water year depending on ground conditions, such as Island County experiencing more rain than snow melt. Island County SWQ team is evaluating weather patterns and conditions to understand and possibly use a local water year in the future, but the convention is to use the nationwide standard water year from October to September.

During Water Year 2024, Island County SWQ staff increased our sampling sites and conducted routine surface water quality monitoring in more than 25 separate watersheds representing a range of land uses and ecological functions. Each sample site was sampled once per month, except when surface flow was not present or when additional samples

were required. Each site was assessed for temperature, pH, conductivity, dissolved oxygen, turbidity, *Escherichia coli* (*E. coli*) bacteria, and discharge.

This report provides descriptions of each sample site as well as site-specific results from WY2024. Results are presented in terms of annual and seasonal Geometric Means (explained below) for *E. coli*. The bacterium *E. coli* is a type of fecal coliform bacteria associated with feces from warm-blooded animals and is considered a more effective indicator of fecal pollution than fecal coliform. Changes to surface water quality standards from Washington State Department of Ecology (ECY) required a change in reporting from fecal coliform to *E. coli* starting in October of 2020 (Island County WY15/2021) to present day. SWQ staff have completed the transition to collecting *E. coli* data and will present in-depth analyses of the data once the state releases the standardized formulas.

Data analysis and reporting for the SWQMP involves the creation of the annual water quality report to be made available for State agency review and made easily accessible to the public by posting online and by presenting to the Board of Island County Commissioners. Annual reports include site monitoring data, summary statistics and description of any data collection issues. These reports are encouraged to be used by other departments and as part of the Adaptive Management Process. Data analysis also includes submitting data to the ECY Environmental Information Management database (EIM). EIM is an ECY run program that "contains environmental monitoring data collected by our scientists and partners." (*EIM* n.d.). This publicly accessible database contains historical data from 2006 forward that Island County SWQ staff submit annually.

Washington State Water Quality Assessment

The Federal Clean Water Act, adopted in 1972, requires all states to restore their waters to be "fishable and swimmable" (*Assessment* n.d.*;* Encyclopedia 2012). Washington State Department of Ecology's (ECY) Water Quality Assessment lists the water quality status for all water bodies in the state. This assessment meets the federal requirements for a report under Sections 303(d) and 305(b) of the Clean Water Act, which is submitted to the federal Environmental Protection Agency (EPA). The assessment divides waterbodies into 5 different categories based on impairment. These impairments may result from high bacteria levels, increased temperature, and/or low dissolved oxygen. Some impairments require a Total Maximum Daily Load (TMDL) plan, otherwise known as a water quality improvement project (ECY TMDL, n.d.). The most current assessment was finalized and approved by the EPA in December 2012, with the new assessment, including statewide data analysis through 2021, to be finalized sometime in 2024. Additional information about the State's assessment may be found at http://www.ecy.wa.gov/programs/wq/303d/index.html. The five categories are as follows:

- Category 1: meets standard for clean waters
- Category 2: waters of concern (some evidence of problems)
- Category 3: insufficient data
- Category 4A: impaired waterbodies that have an approved TMDL in place and are actively being implemented
- Category 4B: impaired water that has a pollution control program other than a TMDL
- Category 4C: impaired water that cannot be addressed through a TMDL plan (non-pollutant)
- Category 5: polluted waters that require a TMDL; traditionally known as the 303(d) list

Maxwelton Creek flows into Puget Sound at Maxwelton Beach within WRIA 6 and is associated with an important shellfish area. The stream has been classified as a Category 2 waterbody for Temperature, and a Category 5 for pH, Dissolved Oxygen and Bacteria levels (updated Oct-2024). The data, as presented in the Water Quality Atlas, is shown in the table below. This watershed has been selected as one of the main areas to be addressed with our reinstated Pollution Identification and Correction (PIC) program. Details about this program are included later in this report.

For more information on water quality in the state of Washington, visit the ECY Water Quality Atlas website: https://apps.ecology.wa.gov/ApprovedWQA/ApprovedPages/ApprovedSearch.aspx

For the table below, search parameters of County: Island and Location: Maxwelton Creek were used. To see the complete list of water quality in Island County surface waters, choose Island County as the search.

Listing ID	AU ID	Medium	Parameter	Category	Waterbody Name	WRIA
78081	17110019012649_001_001	Water	Dissolved Oxygen	5	MAXWELTON CREEK	6-Island
74717	17110019012649_001_001	Water	Bacteria - Fecal coliform	5	MAXWELTON CREEK	6-Island
73403	17110019012649_001_001	Water	Temperature	2	MAXWELTON CREEK	6-Island
71891	17110019012649_001_001	Water	pH	5	MAXWELTON CREEK	6-Island

Site Selection and Monitoring

Several types of monitoring can be utilized to evaluate surface water quality: Core, Reconnaissance, Effectiveness, and Source ID. Each of these types of monitoring was conducted based on area of need and data interpretation. Sample sites were chosen based on watershed prioritization which will be discussed in separate sections of this report.

Core and Rotational Monitoring Sites

The core monitoring sites are generally located at watershed pour points (the point where the surface water meets the Puget Sound). Core monitoring sites were established in 2006 during the development of the Surface Water Monitoring Program (SWQMP) for Island County and were chosen to represent watersheds that were predominantly developed, used for agricultural, or had natural land uses (Adamus & Eilers 2006). Rotational sites are randomly chosen on a three-year cycle; each site is sampled for one year, and again in three years. Table 1 outlines the sampling sites and their classification, and Figure 1 shows priority watersheds and sampling locations for WY2024. These sites have often moved upland over time in relation to private property, shoreline development, and tidal influences impacting access, as well as sediment load and salinity. Core and rotational sites are revised and updated with each newly submitted sampling plan. Efforts are made to include all major streams and at least one location in all major watersheds. Core sites are traditionally conducted at previously established baseline sites that have the most consistent flow throughout the year, as well as being related to sensitive resources such as susceptible aquifers, shellfish beds, swim beaches, and salmon habitat.

Reconnaissance Monitoring Sites

Reconnaissance monitoring is conducted in areas based on risk of degradation of valuable resources. These resources include anadromous fish habitat, pocket estuaries, wetlands, swim-beaches, and shellfish beds. Over time, the goal is to conduct monitoring in every watershed in Island County and ensure that Washington State water quality standards are being met (Adamus & Eilers 2006).

Reconnaissance monitoring is conducted to explore water quality outside of the regular core watersheds and identify areas with water quality impairments that may need further investigation. Reconnaissance monitoring occurs at sampling locations containing priority resources and follows an estimation of the current risk of pollution and availability of resources. Examples of reconnaissance monitoring from WY2024 include sites on Camano near Papa Jacks Rd and the Cavalero Boat Launch, and on Whidbey Island near the Swantown drainage, Bells Beach and Dave Mackie Park. More details on these sites will be featured in subsequent Reconnaissance sections of this report.

Effectiveness Monitoring Sites

Effectiveness monitoring is conducted to evaluate the impact of infrastructure modifications (i.e., implementation of Best Management Practices (BMPs), Island County Public Works projects, or a septic repair) on water quality. Monitoring is also conducted at potential future project areas where outdated culverts are scheduled to be replaced by fish passage culverts. In areas where there are opportunities to look at the impacts of restoration or development, the goal is to collect and evaluate water quality samples prior to and after changes have taken place. Effectiveness monitoring was intended to be used in coordination with other Island County departments: Public Works, Environmental Health, and other partners like local conservation districts to evaluate the effectiveness of a project. There are several projects currently being monitored: Race Road, Chapman Creek, and Kristoferson Creek culvert replacements, Keystone Farm restoration projects, Cornet Bay restoration projects, Crescent Harbor Land Trust salmon restoration, and the Ala Spit restoration.

Source Identification Monitoring Sites

Source ID monitoring is conducted when a sample site demonstrates exceedances in water quality conditions based on parameters set by Washington State Department of Ecology (ECY) and the Environmental Protection Agency (EPA).

Source ID is used to identify possible sources of pollution within a targeted watershed and usually a specific waterbody. This is accomplished by a process known as bracketing, where samples are progressively collected up a water body from a point of known contamination to determine potential point sources of bacteria. Additional *E. coli* samples are taken when an exceedance of 320 MPN/100 mL or higher and/or a 90-day *E. coli* Geometric Mean (Geomean) greater than 100 MPN/100 mL was reported.

While swim beaches are not regularly sampled as part of the SWQ monitoring plan, water quality and *E. coli* levels upstream of swim beaches are often documented. According to the ECY, "the geometric mean at swim beaches should not exceed 30 enterococci/100 mL, based on results from a minimum of five weekly samples and a maximum of 12 weekly samples. The statistical threshold value should not exceed 110 enterococci/100 mL, based on results from a minimum of five weekly samples and a maximum of 12 weekly samples. If either of these criteria is exceeded, a local health jurisdiction may consider issuing a permanent advisory at a particular beach" (*Swimming* n.d.*)*. The ECY issues a public swimming advisory when the *Enterococcus* levels exceed 104 enterococci/100 mL of water. Even though SWQ team members do not sample marine waters, upstream areas are highly important since they connect surface water with marine water and often contribute to sources of pollution that affect fish-bearing streams, shellfish growing areas, or marine water recreational use.

The goal for Source ID is to conduct monitoring in watersheds that, due to the number of coliform exceedances and the presence of valuable resources such as shellfish protection priority areas, swim beaches, and salmon habitat, are considered priority watersheds of concern. These watersheds include Maxwelton, contributing areas surrounding Maple Grove, and watersheds in the Holmes Harbor area. In the past, considerable time and resources have been spent identifying the source of contamination to determine if the coliform originated from wildlife, septic or sewer systems, and/or agriculture through approved Pollution Identification and Correction (PIC) programs.

This report focuses mainly on Core and Rotational monitoring results and provides descriptions of each site as well as site-specific results from WY2024. Results are presented in terms of Washington Water Quality Standards and include both annual and 90-day seasonal geomeans of *E. coli*, Maximum Temperature, and Minimum Dissolved Oxygen. Summaries of Reconnaissance, Source ID, and Effectiveness monitoring conducted during the water year are included in the discussion section of this report.

Table 1. List of Water Year 2024 Sample Site Types and Locations

Camano Island		Whidbey Island	
Core	Rotational	Core	Rotational
55a Carp Creek 69a Chapman Creek 74a Cavalero Creek KC1 Kristoferson Creek MG5 Maple Grove	45a N Camano at Nellie TC5 Barnum Point 48a Sunset Creek 81a Cama Beach State Park	13a Crescent Creek 58a Ebey's Reserve 71a Race Lagoon Creek 71b E Race Lagoon 5a Ala Spit 18a N Strawberry Point 23a Strawberry Pt at Stick 134a Freeland Park CB Hhab E Freeland Park MWA2- Maxwelton Creek 157a Scatchet Creek 149a Glendale Creek	37b Monroe's Landing 14a Green Road 177a Goss Creek 112a N Smuggler's Cove
Reconnaissance	Effectiveness	Reconnaissance	Effectiveness
75a Camano at Papa Jacks 85a Beaver Pond, Camano 188b Cavalero Boat Launch	47b Kristoferson at Canku 69a2 Chapman at Rowe 87a Comet/Breezy Pt	22a Swantown DM Dave Mackie Park 68a Harrington Lagoon 124 Saratoga Creek 103 Saratoga Rd FS Fox Spit Rd 159a Nichols Bells Beach	CB Cornet Bay

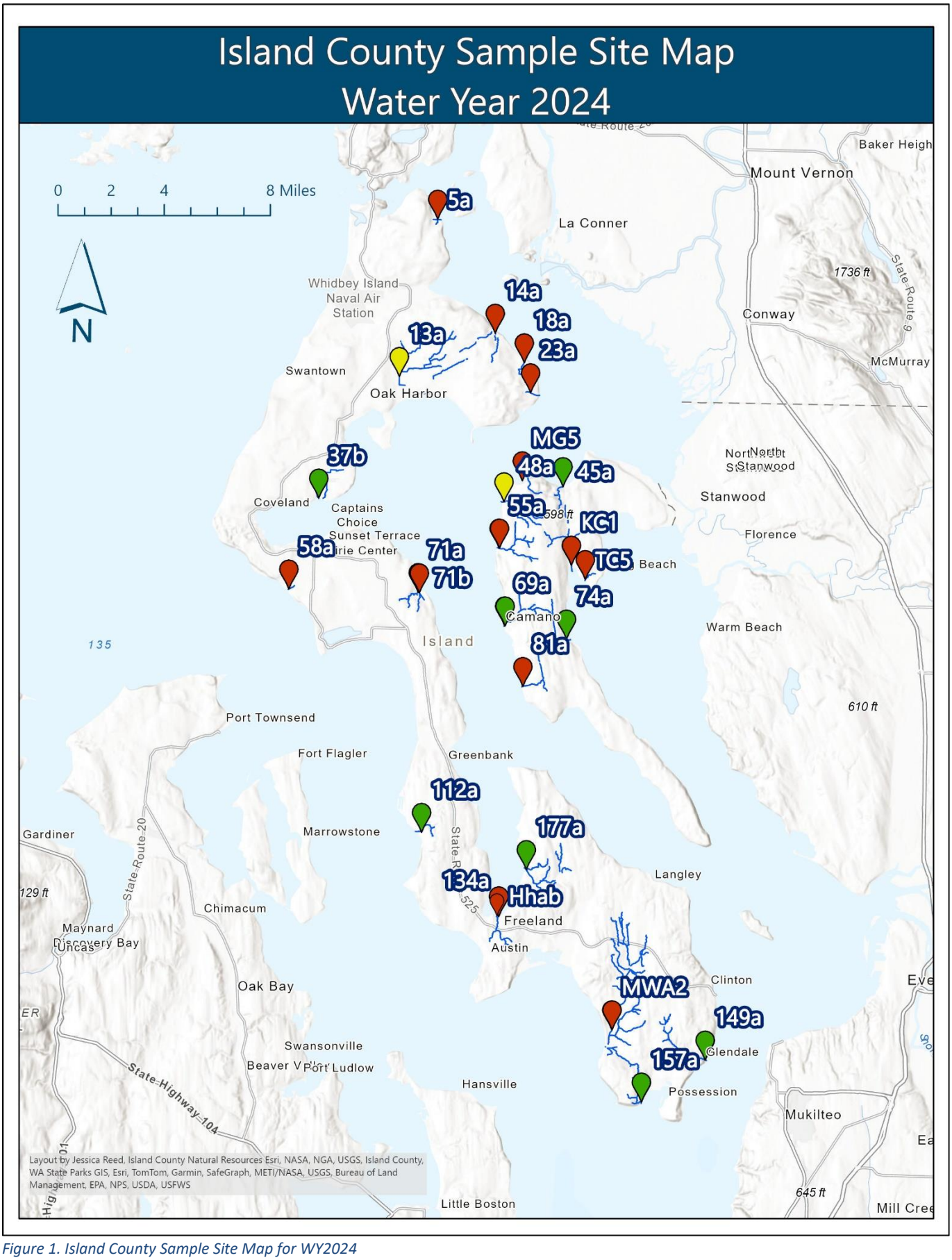


Figure 1. Island County Sample Site Map for WY2024

METHODS

Standard water quality monitoring methods are used in the Island County Surface Water Quality Monitoring Program (SWQMP). The methods are standardized sampling procedures based on guidance from Washington State Department of Ecology (ECY) and the EPA. A short summary of monitoring protocols follows; however, detailed procedures can be found in Island County SWQ Standard Operating Procedures (SOPs) or in the newly revised Island County SWQ Quality Assurance Project Plan (QAPP) update set to be approved in the upcoming year.

Each site in the SWQMP is sampled monthly for pH, temperature, conductivity, dissolved oxygen (DO), turbidity, salinity, *E. coli*., and characteristics of stream discharge. The sample routes are planned so that each site is visited at approximately the same time of day each month to minimize discrepancies in water quality data caused by diurnal variation. Data is collected on field data sheets as backup to the handheld sensor data that is uploaded electronically and checked for accuracy against the original data sheets.

The goal of the program is to generate reliable surface water quality data. Data analysis is conducted using reports from Microsoft Excel and SQL spreadsheets and quality control completed utilizing standard procedures related to accuracy, representativeness, and comparability.

Geometric Mean of *E. coli* and Washington State Water Quality Standard

A site's annual Geometric Mean (geomean or GM) is calculated by multiplying monthly *E. coli* levels (n) and setting that product to the 1/nth power. The GM is a measure of the central tendency of a series of data and has been used to report coliform levels (measured in colony forming units (CFU)/100 mL) at Island County water quality sample sites.

Beginning in 2020, Washington state switched the requirements of reporting from fecal coliform to *E. coli*. Because statewide percentiles have not yet been established, Water Quality Index (WQI) scores and *E. coli* Letter Grades cannot yet be determined. Once the state has published the curves and formulas for *E. coli*, Island County SWQ staff will review prior years' water quality data and submit a comprehensive report of WQI and Coliform Letter grades from Water Years 2020 to present.

In place of WQI or Letter Grades, Island County SWQ team is reporting trends of annual and seasonal GMs for water quality parameters including *E. coli*. These annual and seasonal guidelines have been adapted from guidelines used by neighboring Washington areas such as Jefferson, Kitsap, Skagit and King counties. Stream quality is then classified as either Good, Moderate or Poor based on meeting or failing the two parts of the Washington State Water Quality Standard for *E. coli*.

Washington State Water Quality Standards

The Washington State Department of Ecology (ECY) is required by the Clean Water Act to adopt water quality standards to provide protection from bacteria in water bodies sufficient for full-immersion swimming. The appropriate surface waters in Island County are assigned a designation for recreational use, to compare water quality monitoring results to these ECY surface water quality standards (See Table 2).

Table 2. Washington Water Quality Standards Designated Use (WAC 173-201A-200)

Designated Use	Parameter	Standard
Core summer Salmonid habitat	Temperature	7-day average of the daily maximum temperatures no greater than 16°C (60.8°F)
	Dissolved Oxygen (DO)	9.5 mg/L minimum*
	pH	Between 6.5 and 8.5
	Turbidity	Shall not exceed 5 NTU over background when background turbidity is 50 NTU or less
Salmonid spawning, rearing and migration	Temperature	7-day average of the daily maximum temperatures no greater than 17.5°C (63.5°F)
	Dissolved Oxygen (DO)	8.0 mg/L minimum*
	pH	Between 6.5 and 8.5
	Turbidity	Shall not exceed 5 NTU over background when background turbidity is 50 NTU or less
Primary Contact Recreation	*E. coli* (Most Probable Number MPN)	*E. coli* organism levels within an averaging period must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per 100 mL.

Washington ECY establishes standards for surface water quality. The state standard for *E. coli* contamination in primary contact recreation in freshwater is based on the geometric mean value (GMV) of the Most Probable Number (MPN) of *E. coli* bacteria identified in 100 milliliter (100 mL) water samples. Since bacterial concentrations can be highly variable, the geometric mean is useful for assessing trends in water quality and is more representative of overall fecal pollution in streams.

There are two parts to the State Water Quality Standard:

Part 1: *E. coli* organism levels within an averaging period must not exceed geomean of 100 MPN/100 mL
Part 2: No more than 10% of all samples collected shall exceed 320 MPN/100 mL

If 90-day geomean levels exceeded Part 1 of the state standard or if a high hit was observed, this triggered implementation of the Source Identification process that is described in later sections of this report. High hits refer to Part 2 of the state standard for *E. coli* and are any results exceeding the state threshold of 320 MPN/100 mL.

Watershed Prioritization for Sample Sites

Watershed prioritization is carried out annually by SWQ staff to determine the following water year's sample monitoring sites. The first step in prioritizing watersheds for annual monitoring is identifying all waterbodies with demonstrated water quality impairments. Water quality data from the previous two water years is used to rank these watersheds, and they are then assessed and further ranked based upon risk and value (contain important or sensitive resources) attributes. Core and rotational sites are sampled on a three-year rotation cycle and are chosen based on the following criteria:

- Monitoring data from SWQMP showing that the water body does not meet the Washington State Primary Contact Standard for *E. coli*
- Areas listed as conditionally approved or restricted for commercial shellfish harvest by the Washington State Department of Health (WADOH) and/or the Island County Public Health
- An ongoing or intermittent health advisory issued by WADOH or Island County Public Health for recreational shellfish harvest or swimming restrictions
- Island County Pollution Identification and Correction (PIC) program focus

These prioritized watersheds are then assigned water quality points based upon data pertaining to the following:

4 points: Stream fails Part 1 of Primary Contact Standard for *E. coli* during previous two water years.
3 points: Stream fails Part 1 of Primary Contact Standard for *E. coli* during previous two dry seasons (Apr-Sept).
2 points for each of the following:

- Stream fails Part 1 of Primary Contact Standard for *E. coli* during a storm event (>/=0.25 in.) during the previous two water years.
- Stream fails Part 1 of Primary Contact Standard for *E. coli* during previous two wet seasons (Oct-Mar).

1 point for each of the following:

- Stream fails Part 2 of the Primary Contact Standard for *E. coli* during the previous two water years.
- Stream fails Part 2 of the Primary Contact Standard for *E. coli* during the previous two wet seasons.
- Stream fails Part 2 of the Primary Contact Standard for *E. coli* during the previous two dry seasons.

Once water quality points are assigned to each site, special circumstances and other ranking considerations are applied. Each special circumstance applicable receive an additional point towards the ranking. These circumstances include, but are not limited to:

- WADOH Shellfish Classification Impairment
- Downgraded quality classification by WADOH
- "Threatened" list
- Salmon recovery priority areas
- DOH initial "prohibited" classification
- "Unclassified" based on WADOH shoreline survey data
- Health Advisory posting
- Total Maximum Daily Load (TMDL) Study (303d or 4B listed site)
- Onsite sewage system failures or violations
- Major land use changes

Prioritization requires coordination with other departments or partners to obtain or evaluate data outside the scope of the SWQMP. The resulting ranked list of sites are used as a tool for updating the Monitoring Plan annually (coinciding with the water year), including budget availability. If there are more priority sites than the program has capacity for, the higher priority sites are selected for sampling in the current water year, and the remaining sites are addressed as funding becomes available.

Salmon Recovery Priority Areas

Key watershed prioritizations are forage fish survey maps and salmon priority areas (See Figures 2a and 2b). These areas are often found at the pour points of watersheds and are of critical importance to juvenile salmon habitat and overall Puget Sound and Washington State salmon restoration efforts. Objective 3 of 2005 Salmon Recovery Plan is to restore/enhance critical rearing habitats for forage fish and juvenile salmon. Attention is given to these watersheds by way of reporting their contributions to salmon recovery and identifying connections between their health and possible sources of pollution found during Source ID and future Pollution Identification and Correction (PIC) investigations.

> "While WRIA 6 is not included as critical habitat for Puget Sound steelhead, the protection and restoration of nearshore habitat throughout Puget Sound, including WRIA 6, highlights the importance of a functional marine food web which includes forage fish recovery as a strategy for steelhead survival during their outmigration through Puget Sound (NMFS, 2018)." (Multi-Species Salmon Recovery Plan Update 2018).

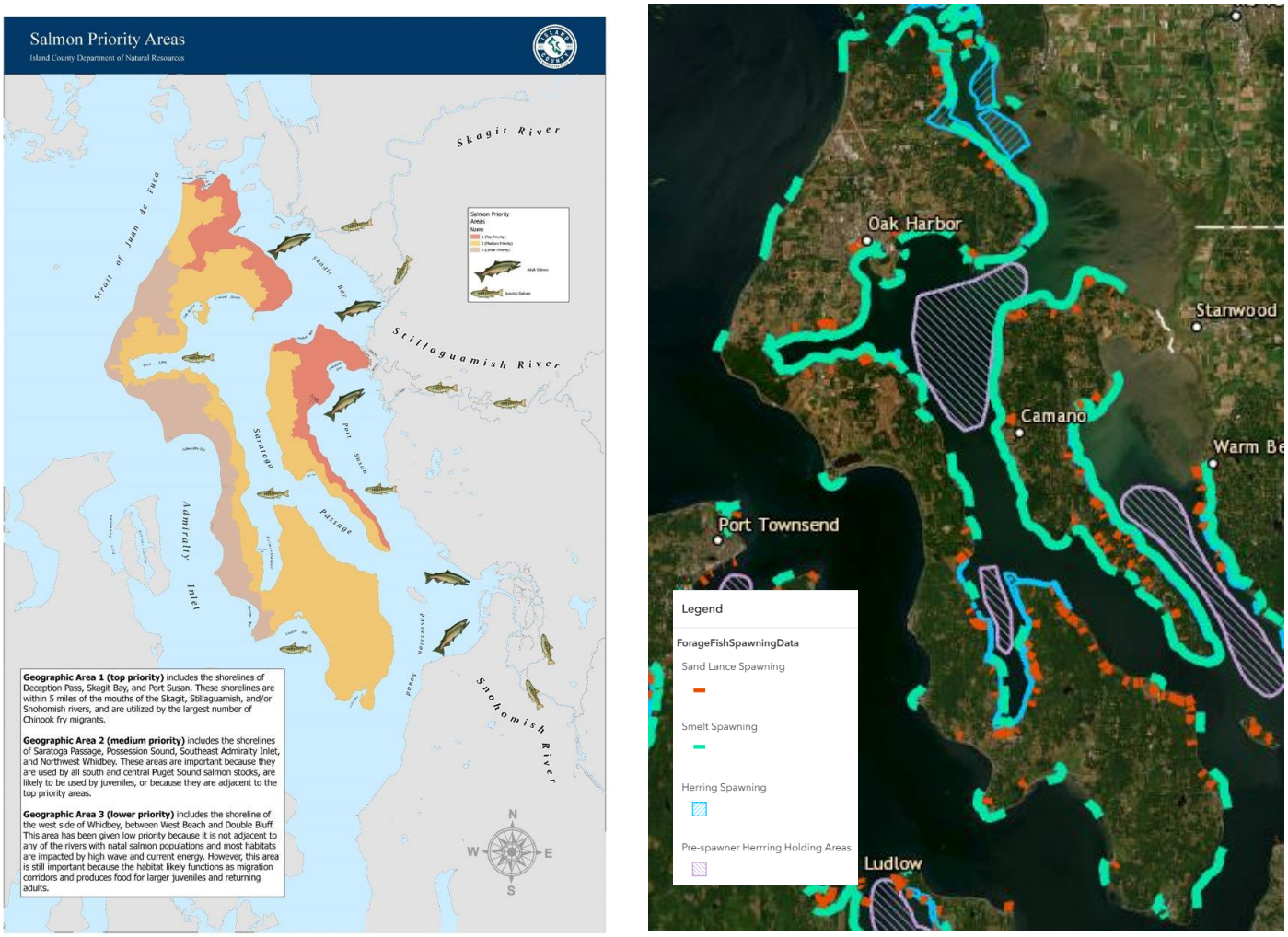


Figure 2a & 2b: a) Island County salmon priority area map; b) WDFW forage fish survey area map

RESULTS

Results for key data collected for WY2024 are listed below. Included are various tables displaying *E. coli* geomean data for the past 6 years, as well as exceedances. Additionally, there are tables highlighting overall stream health and parameters such as temperature, dissolved oxygen, and flow data.

Escherichia coli (*E. coli*)

Tables 3 and 4 show the past six years through WY2024 for annual and seasonal *E. coli* geomeans (MPN/100 mL) of core and rotational sampling sites. Due to a change in Washington state standards in WY2021, there was a change from reporting levels of fecal coliform to levels of *E. coli* starting in 2020; annual geomeans are reported in Fecal coliform for 2019 thru 2020, and *E. coli* for years 2021 to present. Seasonal (three-month) geomeans were calculated based on conditions observed during the water years. During Water Year 2024, several sample site locations had acceptable **annual** geomeans, but many had **seasonal** 90-day geomeans higher than 100 MPN/100 mL, causing them to fail Part 1 of the Water Quality Standard. As shown in Table 5, other sites showed exceedances of 320 MPN/100 mL for more than 10% of the samples, causing them to fail Part 2 of the standard.

Seasonal geomeans for Water Year 2024 (Table 6) showed definite trends during certain times of the year for select sites, and these will be discussed in each specific site's data summary. Four sites showed seasonal flow and were unable to be sampled every month in the water year due to dry, low flow or tidally influenced conditions, and are indicated. Sites with *E. coli* levels that repeatedly exceeded state water quality standards were bracketed for Source ID and referred to the Adaptive Management Action Team (AMAT). The results for these sites and their Source ID investigations will be discussed further in subsequent sections of this report.

Table 3. Trends in Annual Fecal coliform and E. coli Geomeans (GM) for Island County Sampling Sites
Trend data for the last six years. Cells shaded green met the state standard for Part 1 of Primary Contact Recreation.

Site Name	Site#	2019	2020	2021	2022	2023	2024	State Standard
Ebeys Landing	**58a**	FC 36	FC 112	43	77	218	45	**100**
Race Lagoon Creek*	**71a**	FC 2	NA	NA	102	14	32	**100**
E Race Lagoon*	**71b**	NA	NA	NA	284	7	89	**100**
Monroe's Landing*	**37b**	FC 480	NA	NA	NA	NA	58	**100**
Ala Spit	**5a**	NA	NA	NA	NA	71	67	**100**
Green Road*	**14a**	FC 30	NA	9	NA	35	56	**100**
N Strawberry Point*	**18a**	NA	NA	NA	NA	NA	149	**100**
Strawberry Point at Stick Pt	**23a**	NA	NA	NA	NA	159	66	**100**
Crescent Creek	**13a**	FC 53	FC 22	409	57	119	34	**100**
N Smuggler's Cove	**112a**	NA	NA	NA	NA	3	8	**100**
Glendale Creek	**149a**	FC 138	FC 106	35	88	31	42	**100**
Scatchet Creek	**157a**	FC 108	FC 133	41	99	56	25	**100**
Maxwelton Creek	**MWA2**	FC 32	FC 33	23	86	91	39	**100**
Goss Creek	**177a**	NA	NA	NA	NA	NA	11	**100**
E Freeland Park*	**Hhab**	FC 59	FC 85	177	121	35	43	**100**
Freeland Park Catch Basin*	**134a**	FC 47	NA	NA	19	6	15	**100**
N. Camano at Nellie	**45a**	NA	NA	14	NA	NA	14	**100**
Maple Grove	**MG5**	FC 1345	FC 12	NA	NA	697	252	**100**
Sunset Creek	**48a**	NA	NA	23	NA	NA	11	**100**
Carp Creek	**55a**	FC 111	FC 30	17	28	50	55	**100**
Chapman Creek	**69a**	FC 14	FC 15	25	49	26	48	**100**
Cama Beach State Park	**81a**	NA	NA	NA	31	NA	38	**100**
Cavalero Creek	**74a**	FC 38	FC 28	26	40	94	32	**100**
Kristoferson Creek*	**KC1**	FC 21	FC 23	14	37	32	88	**100**
Barnum Point*	**TC5**	NA	NA	NA	NA	40	74	**100**
***Seasonal Flow**		**NA = Not Assessed**				**FC = Fecal Coliform**		

Data Summary: In general, sites show overall trends of increasing annual geomeans for *E. coli* over the past five years, with several exceeding the state standard of 100 MPN/100mL throughout the year. Looking specifically at changes between WY2023 and WY2024, seven sites showed a decrease in *E. coli* levels from the previous year, while five others showed a 100-500% increase.

Table 4. Trends in Maximum Seasonal Fecal coliform and E. coli Geomeans (GM) for Island County Sampling Sites
Trend data for the last six years. Cells shaded green met Part 1 of the state standard for Primary Contact Recreation.

Site Name	Site#	2019	2020	2021	2022	2023	2024	State Standard
Ebeys Landing	58a	FC 588	FC 190	57	263	821	241	100
Race Lagoon Creek*	71a	FC 2	NA	NA	102	74	463	100
E Race Lagoon*	71b	NA	NA	NA	284	86	987	100
Monroe's Landing*	37b	NA	NA	NA	NA	NA	58	100
Ala Spit	5a	NA	NA	NA	NA	71	5033	100
Green Road*	14a	FC 30	NA	12	NA	35	1020	100
N Strawberry Point*	18a	NA	NA	NA	NA	5	2338	100
Strawberry Point at Stick Pt	23a	NA	NA	NA	NA	181	231	100
Crescent Creek	13a	FC 155	FC 49	502	119	395	160	100
N Smuggler's Cove	112a	NA	NA	NA	NA	6	16	100
Glendale Creek	149a	FC 244	FC 449	79	273	79	79	100
Scatchet Creek	157a	FC 398	FC 553	205	245	321	92	100
Maxwelton Creek	MWA2	FC 225	FC 150	151	461	463	292	100
Goss Creek	177a	NA	NA	NA	NA	5	37	100
E Freeland Park*	Hhab	FC 175	FC 882	1616	377	86	275	100
Freeland Park Catch Basin*	134a	FC 600	NA	NA	55	9	109	100
N. Camano at Nellie	45a	NA	NA	41	NA	31	44	100
Maple Grove	MG5	FC 8992	FC 12	NA	NA	1105	768	100
Sunset Creek	48a	NA	NA	33	NA	5	134	100
Carp Creek	55a	FC 210	FC 65	46	55	274	149	100
Chapman Creek	69a	FC 32	FC 75	38	178	122	97	100
Cama Beach State Park	81a	NA	NA	NA	22	38	429	100
Cavalero Creek	74a	FC 289	FC 143	64	120	193	54	100
Kristoferson Creek*	KC1	FC 51	FC 54	28	304	80	255	100
Barnum Point*	TC5	NA	NA	NA	NA	52	321	100

***Seasonal Flow/Intermittent Sampling** **FC= Fecal Coliform** **NA=Not Assessed**

Data Summary: The majority of sites showed trends of increasing maximum seasonal E. coli levels since 2019. There was a decrease in the number of sites showing acceptable maximum E. coli seasonal geomeans with fourteen sites meeting Part 1 of the state standard in WY2023 to only eight in WY2024. Of the seventeen sites that did not meet the standard during WY2024, eight showed seasonal geomean levels above the high hit designation of 320 MPN/100mL, an increase of 60% from WY2023.

Table 5. Trends in Percent Exceedances for Island County Sampling Sites

Trend data for the last six years. Cells shaded green met Part 2 of the state standard for Primary Contact Recreation, results shown in percent (%) of samples above 320 MPN/100mL.

Site Name	Site#	2019	2020	2021	2022	2023	2024	State Standard
Ebeys Landing	58a	18	38	0	39	43	13	<10
Race Lagoon Creek*	71a	0	NA	NA	33	0	17	<10
E Race Lagoon*	71b	NA	NA	NA	50	0	20	<10
Monroe's Landing*	37b	NA	NA	NA	NA	0	0	<10
Ala Spit	5a	NA	NA	NA	NA	50	25	<10
Green Road*	14a	NA	NA	0	NA	0	22	<10
N Strawberry Point*	18a	NA	NA	NA	NA	0	50	<10
Strawberry Point at Stick Pt	23a	NA	NA	NA	NA	25	23	<10
Crescent Creek*	13a	13	14	50	0	33	10	<10
N Smuggler's Cove	112a	NA	NA	NA	NA	0	0	<10
Glendale Creek	149a	20	30	0	14	0	7	<10
Scatchet Creek	157a	33	36	7	6	19	0	<10
Maxwelton Creek	MWA2	7	8	13	33	46	25	<10
Goss Creek	177a	NA	NA	NA	NA	0	0	<10
E Freeland Park*	Hhab	8	29	25	11	0	20	<10
Freeland Park Catch Basin*	134a	33	NA	NA	17	0	11	<10
N. Camano at Nellie	45a	NA	NA	0	NA	0	0	<10
Maple Grove	MG5	100	NA	NA	NA	64	42	<10
Sunset Creek	48a	NA	NA	0	NA	0	0	<10
Carp Creek	55a	32	0	0	0	22	14	<10
Chapman Creek	69a	0	0	17	0	5	6	<10
Cama Beach State Park	81a	NA	NA	NA	0	0	33	<10
Cavalero Creek	74a	14	7	0	0	18	0	<10
Kristoferson Creek*	KC1	4	0	0	0	0	11	<10
Barnum Point*	TC5	NA	NA	NA	NA	0	11	<10

***Seasonal Flow/Intermittent Sampling** **FC= Fecal Coliform** **NA=Not Assessed**

Data Summary: Over the past six years, sites showed an overall trend of 50% meeting Part 2 of the state standard (less than 10% of samples with E. coli levels over 320 MPN/100mL). In 2019, five of thirteen (38% of sites) met the standard, while during 2024, nine of twenty-five sites (36%) had less than 10% of samples above 320.

Table 6.Seasonal Geomeans (GM) and Number of Exceedances WY2024.

Cells shaded green met the state standard for Primary Contact Recreation. "# >STV" in Red indicates number of samples exceeding state threshold value of 320 MPN/mL during those time periods.

Site Name	Site#	Oct	Nov	Dec	Qtr1 GM	Jan	Feb	Mar	Qtr2 GM	# >STV	Apr	May	Jun	Qtr3 GM	Jul	Aug	Sep	Qtr4 GM	# >STV
Ebey's Landing	**58a**	284	31	5	**36**	NA	NA	NA	**NA**	**0**	NA	10	5794	**241**	NA	NA	5	**5**	**1**
Race Lagoon	**71a**	NA	5	NA	**5**	10	5	20	**10**	**0**	NA	292	733	**463**	NA	NA	NA	**NA**	**1**
Race Lagoon East	**71b**	NA	NA	NA	**NA**	31	10	135	**49**	**0**	NA	987	NA	**987**	NA	NA	NA	**NA**	**1**
Monroe's Landing	**37b**	NA	NA	NA	**NA**	20	NA	171	**58**	**0**	NA	NA	NA	**NA**	NA	NA	NA	**NA**	**NA**
Ala Spit	**5a**	20	20	20	**20**	5	5	5	**5**	**0**	NA	10209	1223	**5033**	36	368	157	**103**	**4**
Green Road	**14a**	NA	10	20	**14**	52	5	5	**11**	**0**	NA	298	1886	**1020**	NA	NA	20	**20**	**2**
Strawberry Point	**18a**	NA	62	355	**111**	10	41	5	**13**	**1**	NA	4884	1618	**2338**	NA	NA	NA	**149**	**3**
Strawberry Pt at Stick Pt	**23a**	24196	41	20	**141**	32	5	5	**13**	**1**	NA	41	1296	**231**	521	52	31	**94**	**2**
Crescent Creek	**13a**	NA	20	41	**29**	31	10	10	**13**	**0**	NA	64	134	**82**	160	NA	NA	**160**	**1**
North Smuggler's Cove	**112a**	5	7	5	**6**	10	5	5	**6**	**0**	5	5	51	**16**	5	10	5	**6**	**0**
Glendale Creek	**149a**	41	14	NA	**20**	5	61	10	**21**	**0**	5	75	1198	**77**	107	110	49	**79**	**1**
Scatchet Creek	**157a**	73	20	10	**24**	5	10	5	**6**	**0**	10	63	31	**27**	173	110	41	**92**	**0**
Maxwelton Creek	**MWA2**	130	20	7	**19**	5	10	5	**6**	0	5	122	173	**47**	1498	127	134	**292**	4
Goss Creek	**177a**	5	5	5	**5**	5	5	5	**5**	**0**	10	63	5	**11**	85	74	18	**37**	**0**
East Freeland Park	**Hhab**	NA	NA	NA	**NA**	NA	NA	NA	**NA**	**0**	5	293	7	**29**	275	NA	NA	**275**	**1**
Freeland Park Catchbasin	**134a**	NA	109	NA	**109**	5	10	231	**23**	**0**	5	368	5	**12**	5	NA	NA	**5**	**1**
N. Camano at Nellie	**45a**	5	10	7	**7**	41	5	5	**10**	**0**	31	63	5	**15**	NA	10	91	**44**	**0**
Maple Grove	**MG5**	5	103	NA	**38**	7270	63	988	**768**	**2**	86	528	594	**220**	182	1038	103	**348**	**6**
Sunset Drive	**48a**	NA	NA	134	**134**	10	5	5	**6**	**0**	10	5	5	**6**	10	5	41	**13**	**0**
Carp Creek	**55a**	52	121	10	**40**	41	5	5	**10**	**0**	10	122	2700	**149**	134	97	64	**85**	2
Chapman Creek	**69a**	61	31	5	**28**	41	20	31	**29**	**0**	5	10	364	**51**	132	52	187	**97**	**1**
Cama Beach State Park	**81a**	63	5	5	**9**	5	5	7	**6**	**0**	5	41	581	**49**	5794	393	41	**429**	**5**
Cavalero Creek	**74a**	120	5	10	**18**	30	86	10	**30**	**0**	41	10	75	**31**	54	97	30	**54**	**0**
Kristoferson Creek	**KC1**	NA	NA	NA	**NA**	20	108	25	**43**	**1**	62	73	906	**127**	NA	NA	255	**255**	**1**
Barnum Road	**TC5**	NA	NA	84	**84**	40	10	20	**24**	0	5794	76	NA	**321**	NA	NA	NA	**NA**	1

***Seasonal Flow/Intermittent Sampling** **FC= Fecal Coliform** **NA=Not Assessed**

Data Summary: The majority of exceedances during WY2024 for Part 1 (shown in white) and Part 2 (shown in red) of the state standard for E. coli occurred during Quarters 3 and 4 (April through September). Only 7 of 25 sites did not have high hits during these spring and summer months. Sites with exceedances were referred to Source Identification and will be discussed further in subsequent sections of this report.

Overall Water Quality Status

Table 7 details how Island County streams were evaluated for WY2024 based on whether they met all or part of the Washington State Water Quality Standard for *E. coli.* Streams received either a "Met" or "Failed" status for the standard and were categorized as follows:

- Met standards: Good. Stream had low bacteria levels and met both parts of the standard.
- Met one part of standard: Moderate. The stream had either periodic high bacteria levels or a 90-day seasonal geomean over 100.
- Failed both standards: Poor. Stream had high bacteria levels and failed both parts of the standard.

Table 7. Water Quality Status of Island County Streams WY2024

Site Name	Site#	**Part 1** (Failed if GM averaging period >100)	**Part 2** (Failed if >10% of samples >320)	Water Quality Status
Ebeys Landing	**58a**	**Failed**	**Failed**	
Race Lagoon Creek*	**71a**	**Failed**	**Failed**	
E Race Lagoon*	**71b**	**Failed**	**Failed**	
Monroe's Landing*	**37b**	**Met**	**Met**	
Ala Spit	**5a**	**Failed**	**Failed**	
Green Rd	**14a**	**Failed**	**Failed**	
N Strawberry Point	**18a**	**Failed**	**Failed**	
Strawberry Pt @Stick Pt	**23a**	**Failed**	**Failed**	
Crescent Creek	**13a**	**Failed**	**Met**	
N Smuggler's Cove	**112a**	**Met**	**Met**	
Glendale Creek	**149a**	**Met**	**Met**	
Scatchet Creek	**157a**	**Met**	**Met**	
Maxwelton Creek	**MWA2**	**Failed**	**Failed**	
Goss Creek	**177a**	**Met**	**Met**	
E Freeland Park*	**Hhab**	**Failed**	**Failed**	
Freeland Park Catch Basin	**134a**	**Failed**	**Failed**	
N. Camano at Nellie	**45a**	**Met**	**Met**	
Maple Grove	**MG5**	**Failed**	**Failed**	
Sunset Creek	**48a**	**Failed**	**Met**	
Carp Creek	**55a**	**Failed**	**Failed**	
Chapman Creek	**69a**	**Met**	**Met**	
Cama Beach State Park	**81a**	**Failed**	**Failed**	
Cavalero Creek	**74a**	**Met**	**Met**	
Kristoferson Creek*	**KC1**	**Failed**	**Failed**	
Barnum Point	**TC5**	**Failed**	**Failed**	

Data Summary: Seven of the twenty-five Island County's streams sampled in WY2024 met the Washington State Water Quality standard for *E. coli*. Four streams met one part of the standard, while fifteen streams failed both parts of the standard and were categorized as *Poor*. Streams that repeatedly did not meet water quality standards were further investigated and referred to Source ID and Adaptive Management.

Table 8. Trends in Water Quality Status of Island County Streams
Six Year Trend in Water Quality: WY2019-WY2020 based on WQI, WY2021-WY204 based on State Standard for E. coli

Site Name	Site#	WY2019	WY2020	WY2021	WY2022	WY2023	WY2024
Ebeys Landing	58a	Poor	Moderate	Good	Poor	Poor	Poor
Race Lagoon Creek*	71a	Good	NA	NA	Poor	Good	Poor
E Race Lagoon*	71b	NA	NA	NA	Poor	Good	Poor
Monroe's Landing*	37b	NA	NA	NA	NA	NA	Good*
Ala Spit	5a	NA	NA	NA	NA	Moderate	Poor
Green Road	14a	NA	NA	Good	NA	Good	Poor
N Strawberry Point*	18a	NA	NA	NA	NA	Good	Poor
Strawberry Point at Stick Pt	23a	NA	NA	NA	NA	Poor	Poor
Crescent Creek	13a	Moderate	Good	Poor	Moderate	Poor	Moderate
N Smuggler's Cove	112a	NA	NA	NA	NA	Good	Good
Glendale Creek	149a	Moderate	Moderate	Good	Poor	Good	Good
Scatchet Creek	157a	Poor	Moderate	Moderate	Moderate	Poor	Good
Maxwelton Creek	MWA2	Moderate	Moderate	Poor	Poor	Poor	Poor
Goss Creek	177a	NA	NA	NA	NA	Good	Good
E Freeland Park*	Hhab	Moderate	Moderate	Poor	Poor	Good	Poor
Freeland Park Catch Basin*	134a	Moderate	NA	NA	Moderate	Good	Poor
N. Camano at Nellie	45a	NA	NA	Good	NA	Good	Good
Maple Grove	MG5	Poor	NA	NA	NA	Poor	Poor
Sunset Creek	48a	NA	NA	Good	NA	Good	Moderate
Carp Creek	55a	Poor	Good	Good	Good	Poor	Poor
Chapman Creek	69a	Good	Moderate	Moderate	Moderate	Moderate	Good
Cama Beach State Park	81a	NA	NA	NA	Good	Good	Poor
Cavalero Creek	74a	Moderate	Moderate	Good	Moderate	Poor	Good
Kristoferson Creek	KC1	Good	Good	Good	Moderate	Good	Poor
Barnum Point*	TC5	NA	NA	NA	NA	Good	Poor

***Seasonal Flow/Intermittent Sampling** **NA=Not Assessed**

Data Summary: The table above shows six-year water quality trends based on levels of fecal pollution for Island County streams. Ten of the streams are new or reinstated sites and have only been sampled one cycle over the last six years, and of those ten sites, seven showed Poor and three showed Good water quality. Of the remaining fifteen streams monitored this year, five showed improvements in water quality or a relatively consistent *Good* water quality. Seven streams showed a decrease in water quality moving from *Good*/*Moderate* to *Moderate*/*Poor*. Three streams experienced varying water quality levels.

Additional Parameters

Although not used to determine water quality status, other parameters are important in assessing overall stream health and demonstrating trends over time. These parameters are identified in the Puget Sound Salmon Recovery Plan and the Island County Salmon Recovery Plan update and are used by the SWQ team in the prioritization process for determining locations of sample sites.

Results below may not reflect the exact maximum or minimum condition experienced at sampling sites and are therefore not directly comparable to the state standard. Instead, they are shown as an indicator of relative conditions for each of the sample sites and are used to demonstrate trends over past years.

Temperature

Water temperature is a critical habitat component for fish (especially salmonids), amphibians, and invertebrates and extreme temperatures can stress aquatic species to the point of being lethal. Temperature also influences natural decomposition rates, the mobility of several pollutants, and the amount of dissolved oxygen in the water (as temperature increases, dissolved oxygen decreases). Water temperature fluctuates throughout the day and is primarily influenced by solar radiation and can also increase with the slowing of stream flow as water has more time to warm before it moves downstream. Streams with banks dominated by trees or tall shrubs tend to be cooler than those with banks covered in grass or short vegetation. Cooling can occur with shading, increased turbulence, or the influx of groundwater into the stream channel.

As many of Island County streams are designated as fish streams and provide important habitat for native fish species and juvenile salmon, state standards of a maximum temperature of 17.5 ˚C for salmonid spawning, rearing and migration have been applied. Table 9 shows results for annual maximum temperatures over the past six years at current sampling sites. Results are based on the recorded maximum temperatures recorded during the monthly sampling schedule to analyze trends. Although care was taken to visit the sites at approximately the same time each month from year to year, results do not necessarily show the highest temperature experienced at that site for that time period.

Table 9. Trends in Maximum surface water temperatures °C for Island County Sampling Sites
Recorded from monthly sampling. Cells shaded green meet the state standard for salmonid spawning, rearing and migration.

Site Name	Site#	WY2019	WY2020	WY2021	WY2022	WY2023	WY2024
Ebeys Landing	58a	16.49	8.52	8.49	12.8	17.61	13.03
Race Lagoon Creek*	71a	NA	NA	NA	13.11	13.33	13.32
E Race Lagoon*	71b	NA	NA	NA	12.44	6.67	10.94
Monroe's Landing*	37b	NA	NA	NA	NA	NA	10.46
Ala Spit	5a	NA	NA	NA	NA	17.34	16.42
Green Road	14a	NA	NA	9.6	NA	17.02	18.7
N Strawberry Point	18a	NA	NA	NA	NA	8.58	14.48
Strawberry Point at Stick Pt	23a	NA	NA	NA	NA	18.07	15.56
Crescent Creek	13a	11.75	8.57	9.96	15.21	12.72	13.69
N Smuggler's Cove	112a	NA	NA	NA	NA	12.06	12.44
Glendale Creek	149a	13.83	13.27	14.28	14.48	14.88	14.08
Scatchet Creek	157a	14.44	13.4	14.27	15.43	15.85	14.69
Maxwelton Creek	MWA2	15.98	15.78	16.64	17.13	17.31	16.4
Goss Creek	177a	NA	NA	NA	NA	7.8	15.71
E Freeland Park	Hhab	18.41	14.96	6.25	22.85	21.93	20.52
Freeland Park Catch Basin	134a	13.41	14.22	NA	12.09	20.36	16.44
N. Camano at Nellie	45a	NA	NA	11.72	NA	21.93	22.25
Maple Grove	MG5	NA	NA	NA	NA	19.2	15.17
Sunset Creek	48a	NA	NA	17.74	NA	19.89	18.27
Carp Creek	55a	13.1	10.43	11.29	15.41	21.31	17.31
Chapman Creek	69a	16.86	17.62	16.84	17.5	20.01	17.4
Cama Beach State Park	81a	NA	NA	NA	15.89	NA	16.14
Cavalero Creek	74a	16.55	12.57	13.63	17.23	22.25	15.75
Kristoferson Creek	KC1	15.29	12.66	15.88	17.01	7.1	17.25
Barnum Point	TC5	NA	NA	NA	NA	10.14	12.81

Data Summary: Trends in maximum surface water temperatures show that most Island County streams showed a decrease in the maximum temperatures from WY2023 to WY2024. Twenty-one streams met the standard and had maximum temperatures below 17.5 °C while four streams had temperatures that exceeded the standard. Although temperature was not used to determine water quality status for WY2024, in the future once E. coli curves and formulas are published, Island County staff will review prior years' data and calculate water quality indices (WQIs) for these streams.

Dissolved Oxygen

Dissolved oxygen (DO) is the amount of free oxygen available to fish and other aquatic organisms and can influence the mobility of several contaminants. Excessive loading of sewage or other organic material, reduced water turbulence, warmer temperatures, and high salinity reduce the availability of DO. Dissolved oxygen tends to fluctuate throughout the day with changes in air temperature and photosynthetic processes such as algal blooms.

Table 10 shows the results for Water Year 2024 annual mean and minimum DO for surface water at core samples sites while Table 11 lists the annual means for DO data collected over the past six years. Since many of Island County streams are designated as fish streams and can provide important habitat for juvenile salmon that are adapting to salt water and migrating to ocean waters, state minimum standards of 8.0 mg/L for salmonid rearing and migration have been applied.

Table 10. Minimum Dissolved Oxygen measurements for WY2024
Recorded from monthly sampling. Cells shaded green meet the state standard for salmonid spawning, rearing and migration.

Site Name	Site#	Minimum DO (mg/L)	Mean DO (mg/L)	Minimum Standard
Ebeys Landing	**58a**	9.16	10.94	**8.0**
Race Lagoon Creek*	**71a**	8.74	9.70	**8.0**
E Race Lagoon*	**71b**	10.39	10.96	**8.0**
Monroe's Landing*	**37b**	5.54	6.18	**8.0**
Ala Spit	**5a**	8.80	9.71	**8.0**
Green Road	**14a**	4.23	7.69	**8.0**
N Strawberry Point	**18a**	9.76	10.51	**8.0**
Strawberry Point at Stick Pt	**23a**	8.72	9.70	**8.0**
Crescent Creek	**13a**	6.44	9.23	**8.0**
N Smuggler's Cove	**112a**	10.29	10.89	**8.0**
Glendale Creek	**149a**	10.06	10.98	**8.0**
Scatchet Creek	**157a**	10.04	10.90	**8.0**
Maxwelton Creek	**MWA2**	8.76	10.07	**8.0**
Goss Creek	**177a**	8.75	9.86	**8.0**
E Freeland Park	**Hhab**	7.13	10.16	**8.0**
Freeland Park Catch Basin	**134a**	4.96	9.34	**8.0**
N. Camano at Nellie	**45a**	4.16	7.88	**8.0**
Maple Grove	**MG5**	8.46	9.87	**8.0**
Sunset Creek	**48a**	1.45	5.28	**8.0**
Carp Creek	**55a**	6.21	9.56	**8.0**
Chapman Creek	**69a**	9.22	10.60	**8.0**
Cama Beach State Park	**81a**	7.84	10.12	**8.0**
Cavalero Creek	**74a**	9.21	10.51	**8.0**
Kristoferson Creek	**KC1**	3.08	7.54	**8.0**
Barnum Point	**TC5**	9.12	10.05	**8.0**

Data Summary: Minimum Dissolved Oxygen (DO) measurements show that more than half of Island County streams met the standard and had minimum DO levels above the required minimum during WY2024. Fifteen streams met the standard and had DO levels above the minimum standard of 8 mg/L, while ten streams had DO levels that fell below the standard. Although DO was not used to determine water quality status for WY2024, in the future once E. coli curves and formulas are published, Island County staff will review prior years' data and calculate water quality indices (WQIs) for these streams.

Table 11. Trends in Annual Geomeans for Dissolved Oxygen for Island County Sampling Sites

Recorded from monthly sampling and calculated for yearly geomean. Cells shaded green met the state standard for salmonid spawning, rearing and migration.

Site Name	Site#	Dissolved Oxygen Geomeans (mg/L)						Minimum Standard
		WY2019	WY2020	WY2021	WY2022	WY2023	WY2024	
Ebeys Landing	58a	12.77	12.29	12.82	11.50	10.62	10.94	8.0
Race Lagoon Creek*	71a	NA	NA	NA	9.42	10.86	9.70	8.0
E Race Lagoon*	71b	NA	NA	NA	NA	11.99	10.96	8.0
Monroe's Landing*	37b	NA	NA	NA	NA	NA	6.18	8.0
Ala Spit	5a	NA	NA	NA	NA	9.03	9.71	8.0
Green Road	14a	NA	NA	10.93	NA	8.40	7.69	8.0
N Strawberry Point	18a	NA	NA	NA	NA	11.53	10.51	8.0
Strawberry Point at Stick Pt	23a	NA	NA	NA	NA	8.71	9.70	8.0
Crescent Creek	13a	11.38	10.28	11.44	10.02	9.70	9.23	8.0
N Smuggler's Cove	112a	NA	NA	NA	NA	10.75	10.89	8.0
Glendale Creek	149a	12.27	12.22	12.04	11.26	11.21	10.98	8.0
Scatchet Creek	157a	12.23	12.21	11.85	11.22	11.01	10.90	8.0
Maxwelton Creek	MWA2	11.34	11.12	10.89	10.02	10.11	10.07	8.0
Goss Creek	177a	NA	NA	NA	NA	10.45	9.86	8.0
E Freeland Park	Hhab	11.73	10.12	11.87	8.74	10.38	10.16	8.0
Freeland Park Catch Basin	134a	11.75	NA	NA	10.10	8.49	9.34	8.0
N. Camano at Nellie	45a	NA	NA	10.50	NA	10.94	7.88	8.0
Maple Grove	MG5	NA	NA	NA	NA	9.19	9.87	8.0
Sunset Creek	48a	NA	NA	8.98	NA	6.84	5.28	8.0
Carp Creek	55a	12.23	11.75	11.56	11.01	10.31	9.56	8.0
Chapman Creek	69a	11.97	12.07	11.61	10.72	10.85	10.60	8.0
Cama Beach State Park	81a	NA	NA	NA	9.01	NA	10.12	8.0
Cavalero Creek	74a	12.01	12.15	12.19	10.80	10.75	10.51	8.0
Kristoferson Creek	KC1	11.13	11.75	11.50	8.97	12.03	7.54	8.0
Barnum Point	TC5	NA	NA	NA	NA	10.48	10.05	8.0

Data Summary: Trends in minimum Dissolved Oxygen (DO) mg/L show that most Island County streams showed a slight decrease in minimum DO levels from WY2023 to WY2024. Twenty streams met the standard and had DO levels above the minimum standard of 8 mg/L, while five streams had DO levels that fell below the standard. Although DO was not used to determine water quality status for WY2024, in the future once E. coli curves and formulas are published, Island County staff will review prior years' data and calculate water quality indices (WQIs) for these streams.

Stream Discharge

Some of Island County streams are seasonal or intermittent, but there are many perennial and year-round streams that have a more consistent flow period. The source of the flow is from smaller upstream waters such as wetlands, or groundwater springs with supplemental runoff from rainfall or other precipitation. During dry periods, seasonal streams may not have flowing surface water, but they are still streams and are vital components of the local ecosystem.

According to the EPA, seasonal streams:

- are hydrologically and biologically connected to downstream waters and provide many of the same functions and values as rivers and larger streams.
- provide many upstream and downstream benefits; protection against floods, filter pollutants, recycle potentially harmful nutrients, and provide food and habitat for many types of fish and other creatures.
- play a critical role in maintaining the quality and supply of our drinking water, ensure a continual flow of water to surface waters, and help recharge underground aquifers.

Table 12 below shows the discharge for Island County streams for WY2024. Streams with seasonal flow or that could not be sampled for all twelve months are noted with an "*". In future reports, all available years of discharge data will be analyzed to determine trends due to the changing climate and its effect on stream flow.

Table 12. Monthly Stream Discharge (cfs) WY2024

**Maximum discharge highlighted in blue

Site Name	Site ID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Ebeys Landing	58a	0.01	0.01	0.01	0.66	0.22	0.35	0.10	0.94	0.80	0.00	0.00	0.02
Race Lagoon Creek*	71a	0.00	0.00	0.00	0.29	0.38	1.51	0.01	0.14	0.03	0.00	0.00	0.00
E Race Lagoon*	71b	0.00	0.00	0.00	0.29	0.13	0.81	0.01	0.21	0.00	0.00	0.00	0.00
Monroe's Landing*	37b	0.00	0.00	0.00	0.16	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
Ala Spit	5a	0.39	0.39	0.45	3.14	0.33	0.51	0.06	0.52	0.34	0.18	0.05	0.11
Green Road	14a	0.00	1.68	0.96	0.48	0.36	0.38	0.14	0.75	0.31	0.00	0.00	0.19
N Strawberry Point	18a	0.00	0.06	0.14	6.19	0.52	0.43	0.07	0.92	0.20	0.00	0.00	0.00
Strawberry Point at Stick Pt	23a	0.04	0.17	0.46	0.09	0.06	0.39	0.19	1.20	0.18	0.02	0.10	0.20
Crescent Creek	13a	0.00	3.53	1.10	16.28	7.22	7.17	0.35	1.62	0.14	0.14	0.00	0.00
N Smuggler's Cove	112a	0.45	0.80	1.22	0.59	1.19	1.16	0.49	0.70	0.36	1.40	1.00	0.79
Glendale Creek	149a	1.59	1.78	2.79	22.32	1.31	5.03	2.72	4.40	1.50	1.65	1.30	2.39
Scatchet Creek	157a	0.84	1.56	0.82	0.65	1.46	2.09	1.56	0.97	0.72	0.91	1.26	0.81
Maxwelton Creek	MWA2	3.89	8.28	9.41	16.16	6.19	8.21	3.39	6.05	2.45	1.17	1.40	1.64
Goss Creek	177a	0.01	0.02	0.07	1.00	0.32	0.44	0.25	0.31	0.06	0.05	0.10	0.01
E Freeland Park	Hhab	0.08	0.00	0.00	0.36	0.41	0.26	0.21	0.50	0.13	0.00	0.04	0.00
UFreeland Park Catch Basin	134a	0.00	0.00	0.00	0.65	0.41	0.69	0.39	0.30	0.02	0.00	0.00	0.00
N. Camano at Nellie	45a	0.40	1.91	1.28	0.70	0.40	0.19	0.14	0.81	0.22	0.00	0.14	0.13
Maple Grove	MG5	0.14	0.16	0.00	0.25	0.14	0.10	0.06	0.08	0.08	0.04	0.13	0.09
Sunset Creek	48a	0.00	0.00	0.31	0.35	1.33	0.56	0.78	0.88	0.17	0.08	0.01	0.05
Carp Creek	55a	0.03	0.08	1.04	8.59	0.64	2.11	0.30	10.40	0.38	0.13	0.33	0.03
Chapman Creek	69a	1.06	0.15	0.85	3.77	1.57	1.45	1.03	4.83	1.37	0.45	0.67	1.09
Cama Beach State Park	81a	0.02	0.01	0.03	1.05	0.63	0.51	0.10	1.56	0.04	0.00	0.00	0.01
Cavalero Creek	74a	0.30	0.63	1.60	2.97	1.17	0.47	0.37	1.70	0.10	0.22	0.29	0.20
Kristoferson Creek	KC1	0.00	0.00	0.00	6.05	1.89	1.94	0.84	6.18	0.75	0.00	0.00	0.07
Barnum Point	TC5	0.00	0.05	2.60	0.33	0.17	0.01	0.47	0.00	0.00	0.00	0.00	0.00

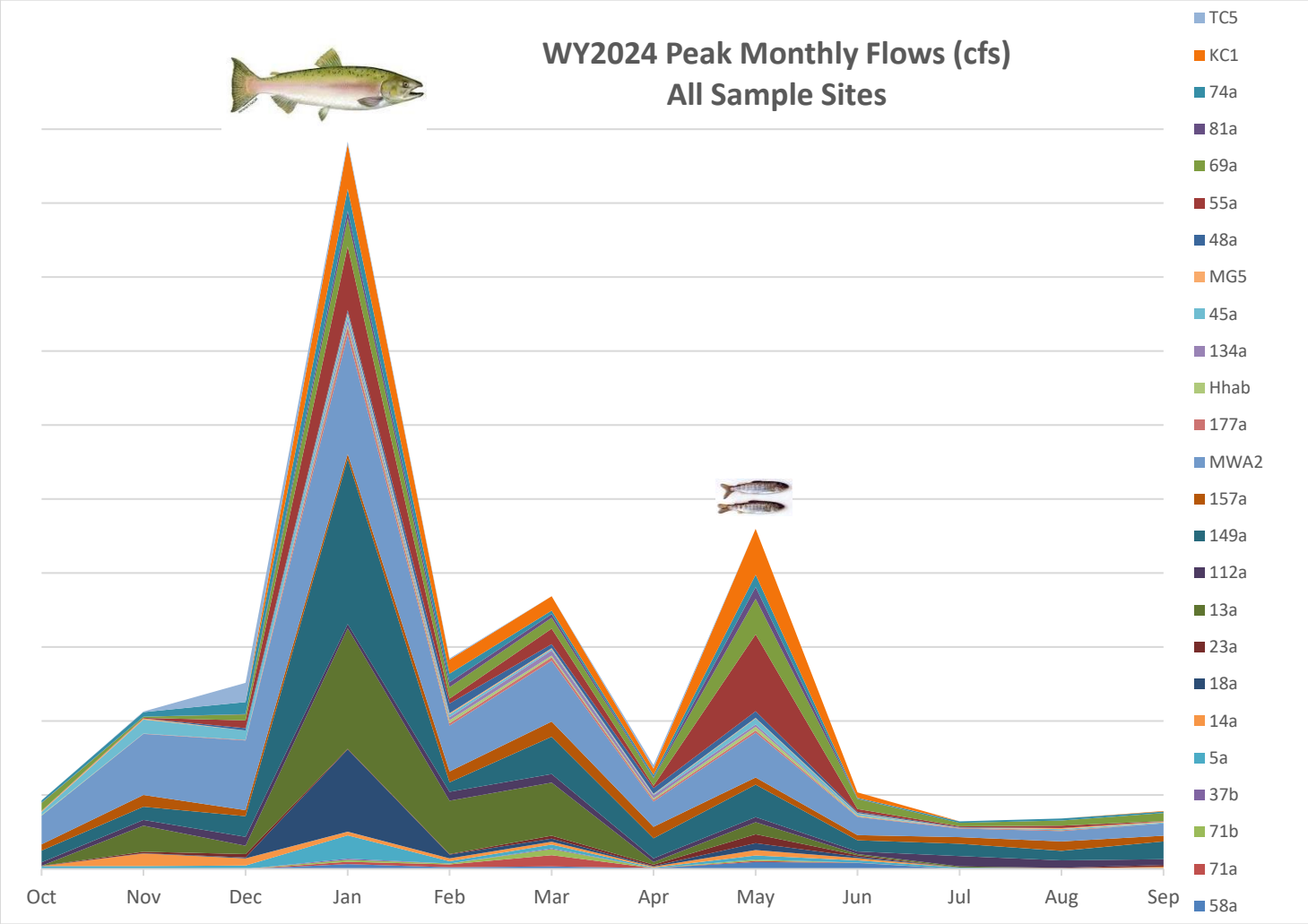


Figure 3 WY2024 Peak Flows

Data Summary: During WY2024, Island County streams showed several peaks of stream discharges. The largest peak occurred during the period from December to February, with smaller peaks seen during March and May. Peaks during December and January coincide with historical salmon spawning, with peaks experienced during May aligning with juvenile salmon migration. See the Salmon Recovery Technical and Citizen Committee (SRTCC) and Salmon Recovery Plan for more information.

SAMPLE SITE SUMMARIES

The following sections summarize the results of surface water quality parameters monitored at all core and rotational sample sites for WY2024. The twenty-five monitored sites are organized by geographic area: North Whidbey (Figure 4), South Whidbey (Figure 5), and Camano Island (Figure 6). Additional information on conditions observed at Rotational, Effectiveness, and Source ID sites will be discussed in further sections of this report.

North Whidbey Area Results

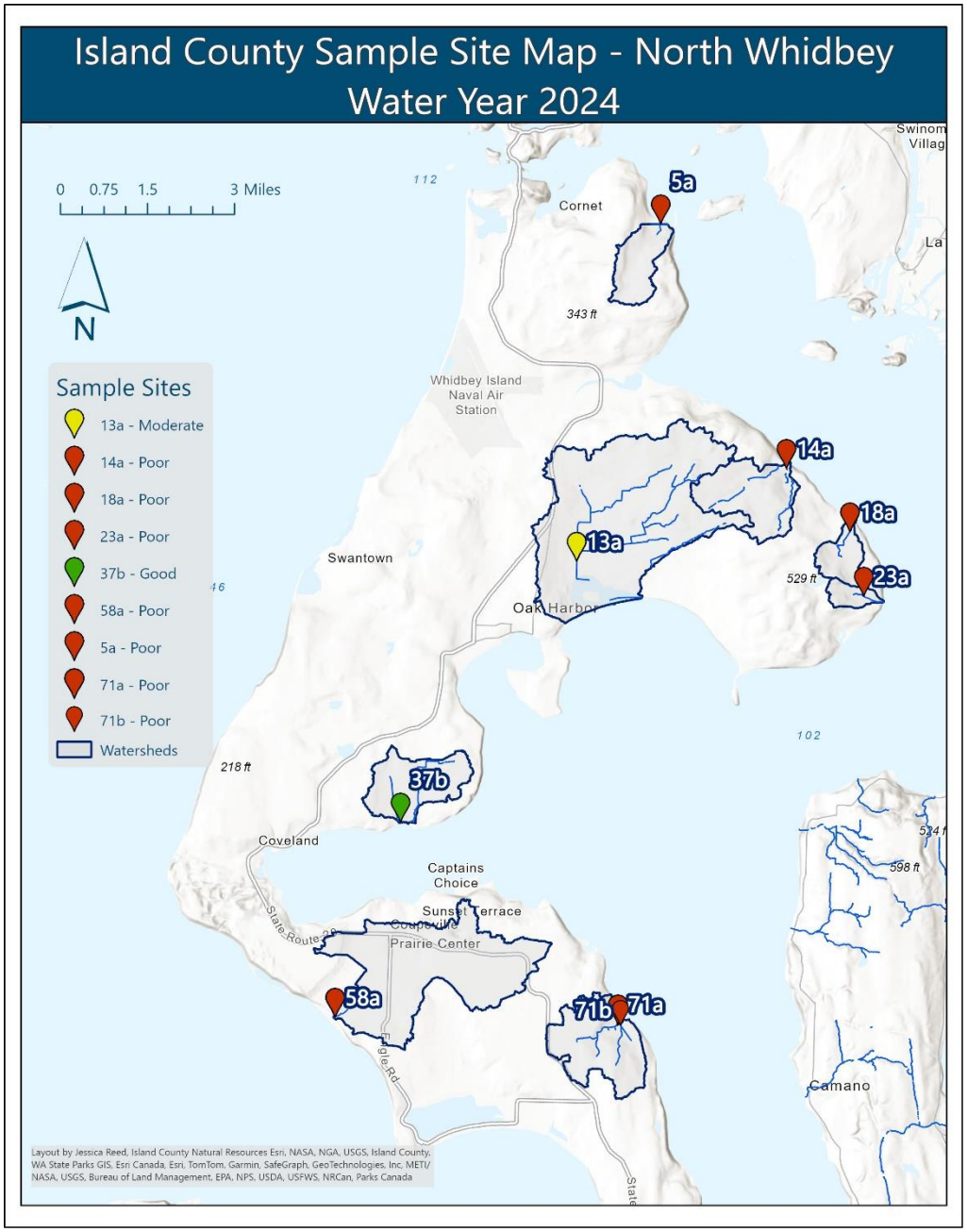


Figure 4. Location of North Whidbey samples sites and their water quality status

Figure 4 shows the location of North Whidbey samples sites and their water quality status.

Subsequent pages provide greater detail for each site within the North Whidbey area, including a brief description of the monitoring site.

- 58a Ebey's Landing
- 71a Race Lagoon Creek
- 71b E Race Lagoon
- 37b Monroe's Landing
- 5a Ala Spit
- 14a Green Road
- 18a N Strawberry Point
- 23a Strawberry Pt - Stick
- 13a Crescent Creek

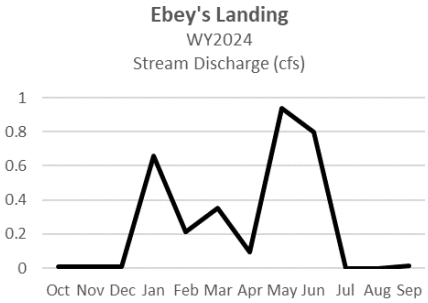
Stream Report Card 58a – Ebey's Landing

Site Description:
Ebey's Landing is a designated fish stream where surface waters are captured in roadside catch basins and field drain tiles then piped, subsurface, across agricultural fields before daylighting in a ravine where it forms a stream channel that outfalls on Ebey's Landing beach. The area immediately upstream of the sampling location is zoned for commercial agriculture and is currently being used for agriculture.

Ebey's Landing Summary Statistics

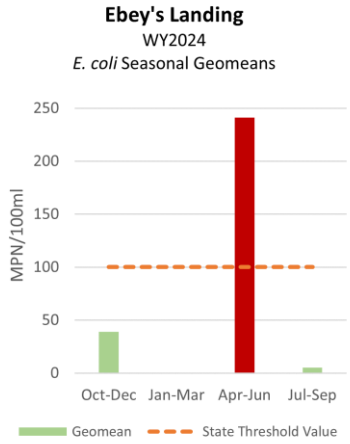
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Poor	Moderate	Good	Poor	Poor	Poor	
Pt 1: Max GM FC / *E. coli*	FC 588	FC 190	57	263	821	241	<100
Pt 2: % Exceedances	18	38	0	39	43	13	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (45 MPN/100 mL); however, seasonal geomeans exceeded standards April through June; 13% of samples exceeded 320 MPN/100 mL (1 out of 8 samples).
- Seasonal *E. coli* levels lower than previous year, 241 vs. 821, however site failed both parts of state standard with high hits observed in Quarter 3.
- Trends in maximum stream temperatures over WY2018-WY2024 ranged from 8.49 to 17.61; WY2024 max temperature was 13.03°C.
- Minimum Dissolved Oxygen met state standard: 9.16 mg/L, annual geomeans 2019 to 2024 met standard.
- Stream Flow: 10 of 12 months, Max discharge: 0.94 cfs, Min: 0.0 cfs



Sampling Summary:
Limited sampling due to tidal influence January-March with high conductivity levels (surface water became brackish) and stagnant conditions July and August. Source ID was initiated due to extreme high hit in June, 5794 MPN/100mL, but could not be completed due to stagnant /no flow conditions in early July and dry channels upstream. Once flow was again observed, low *E. coli* levels were recorded.

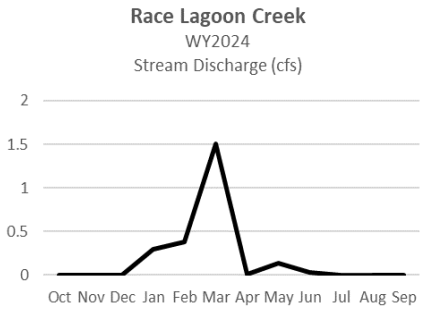
Stream Report Card 71a – Race Lagoon Creek

Site Description:
Race Lagoon Creek is a coastal fish stream that drains into Race Lagoon, which has been identified as important pocket estuary habitat for out-migrating salmon from the Skagit, Stillaguamish, and Snohomish Rivers. Pocket estuaries and small coastal streams such as these provide important feeding, resting, and refuge habitat as juvenile salmon transition from freshwater to saltwater habitat. Chinook smolt have been documented in the stream just above the sample site.

Race Lagoon Creek Summary Statistics

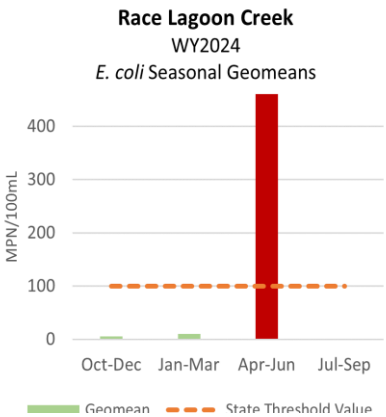
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Good	NA	NA	Poor	Good	Poor	
Pt 1: Max GM FC / *E. coli*	FC 2	NA	NA	102	74	463	<100
Pt 2: % Exceedances	0	NA	NA	33	0	17	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (32 MPN/100 mL); however seasonal geomeans exceeded standards April through June and 17% of samples exceeded 320 MPN/100 mL (1 out of 6 samples).
- *E. coli* levels higher than previous year, failed both Parts of state standard with high hits observed in Quarter 3.
- Maximum stream temperatures over WY2022-WY2024 consistent around 13°C; WY2024 max temp was 13.32°C, met state standard of 17.5 °C.
- Minimum and annual mean Dissolved Oxygen met state standard of 8.0 mg/L: Min 8.74 mg/L, and annual 9.70 mg/L.
- Stream Flow: January to June, Max discharge: 1.51 cfs, Min: 0.0 cfs



Sampling Summary:
Several high hits in May and June instigated bracketing upstream, however, a clear source could not be identified before stream flow decreased. Although this stream experiences dry conditions at times throughout the year, the current sampling site has historically provided habitat for juvenile salmon, and salmon restoration efforts including fish passage culvert replacements are being finalized.

Sampling Summary:
Repeated high hits in July instigated bracketing upstream, however, a clear source could not be identified before levels decreased. The current site has formerly tested high for fecal coliform and there is a history of

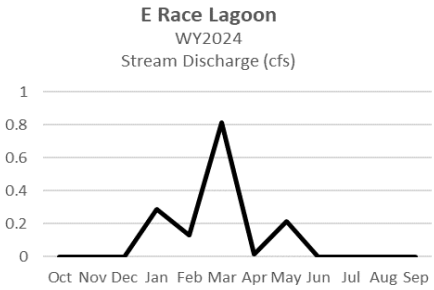
Stream Report Card 71b – E Race Lagoon

Site Description:
E Race Lagoon is the eastern channelized branch of a coastal fish stream that drains into Race Lagoon, identified as important pocket estuary habitat for out-migrating salmon from the Skagit, Stillaguamish, and Snohomish Rivers. Chinook smolt have been documented in the stream just above the sample site.

E Race Lagoon Summary Statistics

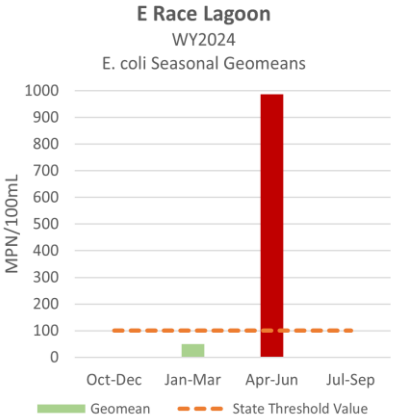
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	Poor	Good	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	284	7	987	<100
Pt 2: % Exceedances	NA	NA	NA	50	0	20	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (89 MPN/100 mL); however seasonal geomeans exceeded standards April through June and 20% of samples exceeded 320 MPN/100 mL (1 out of 5 samples).
- *E. coli* levels higher than previous year, failed both Parts of state standard with high hits observed in Quarter 3.
- Maximum stream temperatures over WY2022-WY2024 ranged from 6.67 to 12.44; WY2024 max temp was 10.94°C, met the state standard of 17.5°C.
- Minimum and Annual Mean Dissolved Oxygen met state standard of 8.0 mg/L: Min 10.39mg/L and mean 10.96 mg/L.
- Stream Flow: January to May, Max discharge: 0.81 cfs, Min: 0.0 cfs



Sampling Summary:
This stream was able to be sampled January to May and showed high hits in May that led to bracketing upstream, however, a clear pollution source could not be identified before stream flow decreased. Although this stream experiences dry conditions at times throughout the year, the current sampling site has historically provided habitat for juvenile salmon, and salmon restoration efforts including fish passage culvert replacements are being finalized.

Sampling Summary:
Repeated high hits in July instigated bracketing upstream, however, a clear source could not be identified before levels decreased. The current site has formerly tested high for fecal coliform and there is a history of

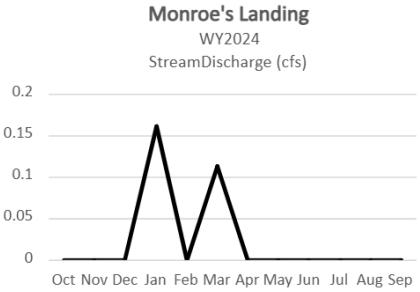
Stream Report Card: 37b Monroe's Landing

Site Description:
This is a designated fish stream site located on the north side of Scenic Heights Rd, just west of Monroe Landing that is the outlet of a large wetland area. Surrounding land uses are limited with the contributing area consist of a small commercial center, a very small alpaca farm, and few single-family residences.

Monroe's Landing Summary Statistics

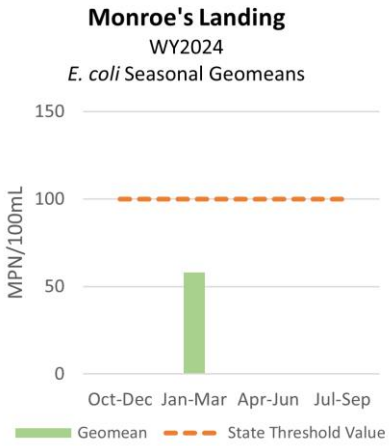
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	NA	Good	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	NA	58	<100
Pt 2: % Exceedances	NA	NA	NA	NA	NA	0	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Good based on *E. coli* data collected in WY2024.
- Annual and seasonal geomeans were below the state standard and 0% of samples exceeded 320 MPN/100 mL (0 out of 2 samples).
- WY2024 max temperature was 10.46°C, which met the state standard of 17.5°C.
- Minimum and Annual Dissolved Oxygen levels failed the state standard of 8.0 mg/L: 5.54 mg/L and mean of 6.18 mg/L.
- Stream Flow: Jan and Mar, Max discharge: 0.16 cfs, Min: 0.0 cfs



Sampling Summary:
This site is a historical wetland monitoring site. The outflow from the wetland showed either stagnant or dry conditions during much of WY2024. Stream was sampled twice in Quarter 2 with low *E. coli* levels recorded. In the future, additional testing of the wetland following revised wetland monitoring SOPs may be incorporated to determine overall health of the watershed. testing. Additionally, the area's rotational site may be moved to another nearby location across from Monroe's boat launch to allow for more consistent water quality.

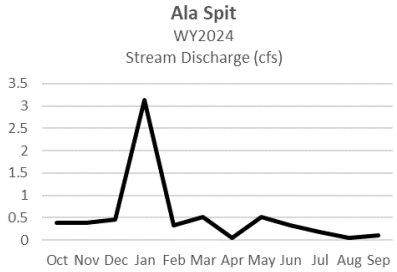
Stream Report Card: 5a Ala Spit

Site Description:
Ala Spit is designated as a non-fish stream that has been channelized through a pasture originating from upland wetlands. A narrow buffer (approx 2 ft) of willow and alder borders the stream passing across the pasture area from the south. After crossing E. Troxell Road through a culvert, the stream then flows through forest and field to the shoreline northwest of Ala Spit into a large estuary that is important habitat for juvenile salmon. Local land use includes agriculture and rural residential.

Ala Spit Summary Statistics

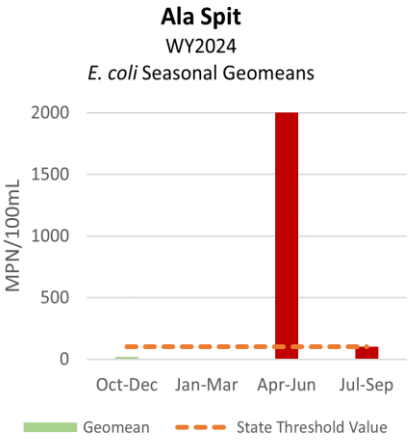
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Moderate	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	71	5033	<100
Pt 2: % Exceedances	NA	NA	NA	NA	50	25	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



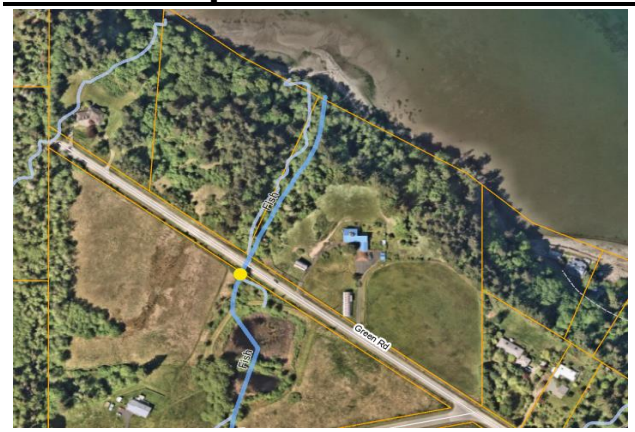
Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below state standard (67 MPN/100 mL); however seasonal geomeans exceeded standards April through September and 25% of samples exceeded 320 MPN/100 mL (4 out of 16 samples).
- *E. coli* levels much higher than previous year, failed both Parts of state standard with high hits observed in Quarter 3 and Quarter 4
- Maximum stream temperatures WY2023-WY2024 ranged from 16.42 to 17.34; WY2024 max temp was 16.42°C, met the state standard of 17.5°C.
- Minimum and Annual Dissolved Oxygen met state standard of 8.0 mg/L: Min of 8.88 mg/L and mean of 9.7 mg/L.
- Stream Flow: All 12 months, Max discharge: 3.14 cfs, Min: 0.05 cfs



Sampling Summary:
This site was a reconnaissance sampling site during WY2023 and was added to the Core sampling rotation for WY2024. Repeated high hits in May led to bracketing upstream, and letters were sent out to neighboring parcel owners encouraging them to have their septic systems inspected. This site is a prime example of the importance of Source ID and working with the Environmental Health Department. Through these collaborative efforts, a septic system failure was identified and is scheduled for repair. We will continue to monitor this area to address future issues that may arise.

Stream Report Card: 14a Green Rd

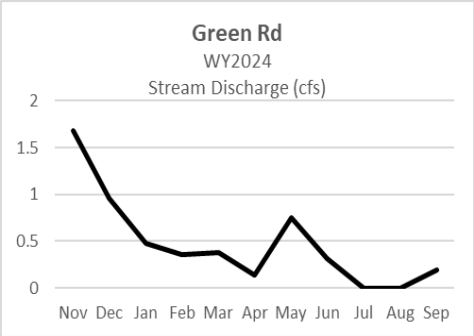


Site Description:
This sampling point is a seasonal designated fish stream which receives water from a series of large, ponded wetlands. The stream flows in a natural channel then passes under Green Rd to pour out into a catch basin that then travels to the shore. There are a series of artificial ponds above this stream. The nearest upstream house is 750 ft away and the site shows adjacent agriculture with open pastoral fields upstream.

Green Rd Summary Statistics

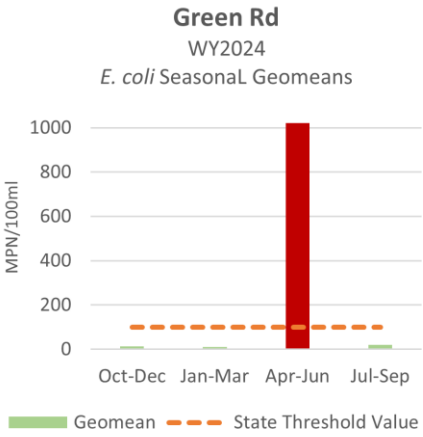
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Good	NA	Good	NA	Good	Poor	
Pt 1: Max GM FC / *E. coli*	FC 30	NA	12	NA	35	1020	<100
Pt 2: % Exceedances	0	NA	0	NA	0	22	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (56 MPN/100 mL); however seasonal geomeans exceeded standards April through June; 22% of samples exceeded 320 MPN/100 mL (2 out of 9 samples).
- *E. coli* levels much higher than previous year, failed both Parts of state standard with high hits observed in Quarter 3.
- Maximum stream temperatures from WY2019-WY2024 ranged from 9.6 to 18.7; WY2024 max temp was 18.7°C, failed state standard of 17.5°C.
- Both Minimum and annual Dissolved Oxygen were low and did not meet state standard of 8.0 mg/L. Min of 4.23 mg/L, mean of 7.69.
- Stream Flow: 9 months of year, Max discharge: 1.68 cfs, Min: 0. cfs



Sampling Summary:
Stream was able to be sampled 9 months of the year. One high hit in May and another extreme high hit in June instigated bracketing upstream, however, a clear source could not be identified due to decreased flow levels. Wetlands upstream of the sample site have historically been drained and/or diverted, so this site will be a prime area for wetland monitoring to determine the effects of human activity and climate change.

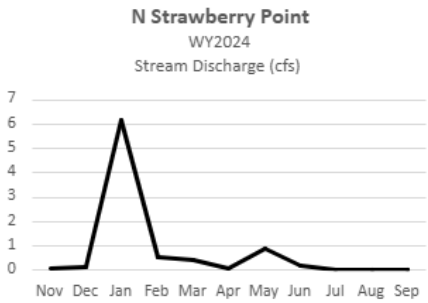
Stream Report Card: 18a N Strawberry Point

Site Description:
This site is a seasonal fish stream that passes through a culvert crossing about 700ft south of junction of Silver Lake Road and Green Road, on Strawberry Point Road. The site is formed from a series of seasonal wetlands above a pasture area that drain into a channeled stream that then flows down through a forested area to the shoreline. The shoreline mouth of the stream was included in recent research to provide evidence of juvenile salmon use of small seasonal streams.

N Strawberry Point Summary Statistics

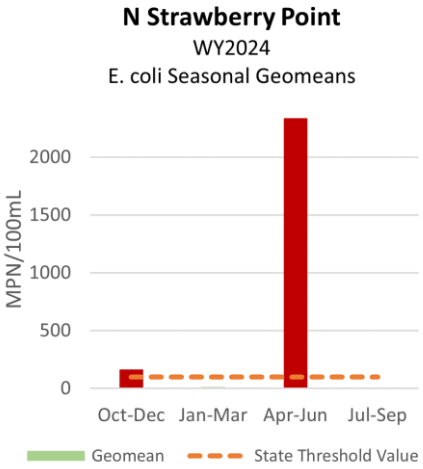
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Good	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	5	2338	<100
Pt 2: % Exceedances	NA	NA	NA	NA	0	50	<10

** WY2018-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Seasonal and annual geomeans were below the state standard. Seasonal geomeans exceeded standards October - December and April - June; 50% of samples exceeded 320 MPN/100 mL (4 out of 8 samples).
- *E. coli* levels much higher than previous year, failed both Parts of state standard with high hits observed in Quarter 1 and Quarter 3.
- Maximum stream temperatures in WY2023-WY2024 ranged from 8.58 to 14.48; WY2024 max temp was 14.48°C, met state standard of 17.5°C.
- Minimum and Annual Dissolved Oxygen met state standard of 8.0 mg/L: 9.76 and 10.51 mg/L, geomeans last two years show comparable levels.
- Stream Flow: 8 months of year, Max discharge: 11.14 cfs, Min: 0.0 cfs



Sampling Summary:
The site was on the Rotational cycle in previous water years but was determined to be of high enough value to add it to the yearly Core monitoring plan. This is a seasonal stream that was able to be sampled eight months of the year. A series of high hits in May and June led to bracketing upstream and by channel branch to determine the general direction of the pollution. It was clear that *E. coli* was being carried from the main channel that flows across the pasture area from the wetlands upstream, however, a clear source could not be identified before flow levels decreased.

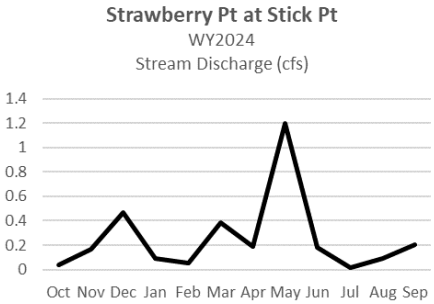
Stream Report Card: 23a Strawberry Pt @ Stick Pt

Site Description:
This year-round non-fish stream flows from a large, ponded area and through the Strawberry Point Preserve which includes a mix of forest, wetlands, and meadow before crossing in a culvert under Strawberry Point Road. After the culvert crossing, it has been heavily channelized and flows through a rural residential area with limited vegetative buffers to reach the shoreline.

Strawberry Point @ Stick Pt Summary Statistics

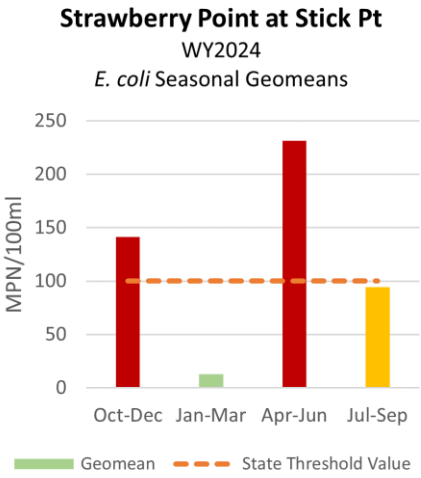
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Poor	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	181	231	<100
Pt 2: % Exceedances	NA	NA	NA	NA	25	23	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Poor based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (66 MPN/100 mL); however seasonal geomeans exceeded standards October-December and April- June; 23% of samples exceeded 320 MPN/100 mL (3 of 13 samples).
- *E. coli* levels slightly higher than previous year, failed both Parts of state standard with high hits observed in Quarter 1 and Quarter 3.
- Maximum stream temperatures in WY2023-WY2024 ranged from 15.56 to 18.07; 2024 max temp was 15.56°C, which met state standard of 17.5°C.
- Minimum and Annual Dissolved Oxygen met the state standard of 8.0 mg/L: Min of 8.72 and mean of 9.70 mg/L
- Stream Flow: All 12 months, Max discharge: 1.2 cfs, Min: 0.02 cfs



Sampling Summary:
An extremely high hit in October was determined to be caused by a deer carcass discovered above the sampling site. The levels quickly returned to normal indicating no additional contributing sources. An additional round of high hits in June and July (Quarter 3 and 4) caused the site to again fail Parts 1 and 2 of the state standard. Bracketing upstream could not be accomplished due to dry conditions upstream. This site has been added to core sampling cycle and will continue to be monitored closely.

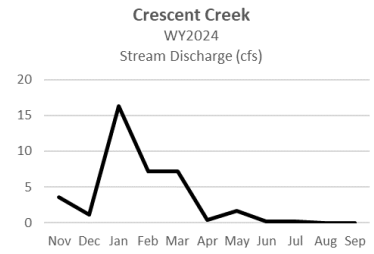
Stream Report Card: 13a Crescent Creek

Site Description:
Samples taken for the North Crescent Bay Crescent Creek site are pulled upstream from the main channel that flows under Crescent Harbor Road, west of the intersection with Hunt Road. Crescent Creek is a designated fish stream and has documented historical use by both adult and juvenile salmon. The area immediately upstream from the sampling site is zoned for rural commercial agricultural use. Proposals have been submitted for habitat restoration in this area and salmon restoration projects near the sample site are ongoing.

Crescent Creek Summary Statistics

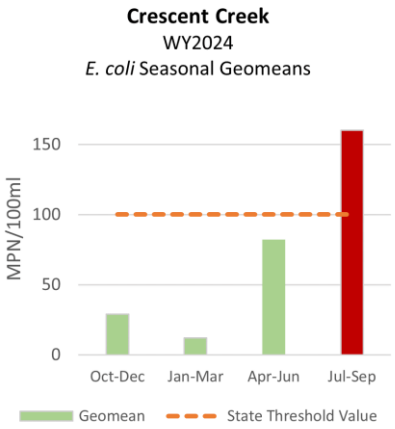
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	Good	Poor	Moderate	Poor	Moderate	
Pt 1: Max GM FC / *E. coli*	FC 155	FC 49	502	119	395	160	<100
Pt 2:% Exceedances	13	14	50	0	33	10	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:

- Water quality was Moderate based on *E. coli* data collected in WY2024.
- Annual geomean was below the state standard (34 MPN/100 mL); however seasonal geomeans exceeded standards July through September and 10% of samples exceeded 320 MPN/100 mL (1 out of 10 samples).
- *E. coli* levels lower than previous year, however still failed both Parts of state standard with high levels observed in Quarter 4.
- Maximum stream temperatures over WY2019-WY2024 ranged from 8.57 to 15.21 mg/L; WY2024 max temp was 13.69°C, which met standard of 17.5°C.
- Minimum Dissolved Oxygen below state standard of 8.0 mg/L: Min 6.44 mg/L, but annual geomean met the standard with 9.23 mg/L.
- Stream Flow: 9 months, Max discharge: 16.28 cfs, Min: 0.00 cfs



Sampling Summary:
During much of the year, this site showed low levels of E. coli. However, high hits in May through July required Source ID and bracketing upstream, but a clear source could not be identified before the stream became stagnant, dried up and prevented sampling. This site will be of prime interest for effectiveness monitoring to determine pre- and post-conditions as proposed restoration projects are completed upstream.

South Whidbey Area Results

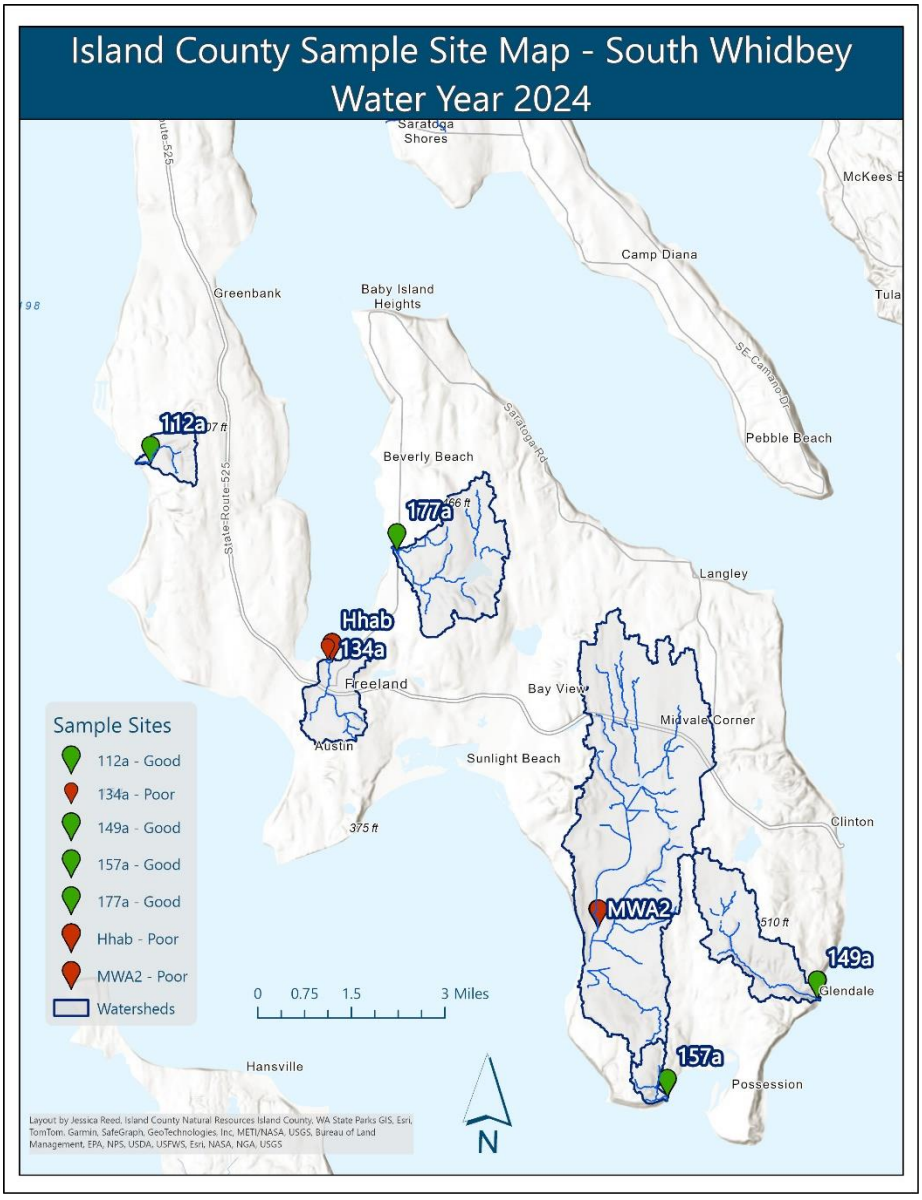


Figure 5. South Whidbey watersheds and sample sites and their water quality status

Figure 5 shows the location of South Whidbey samples sites and their water quality status.

Subsequent pages provide greater detail for each site within the South Whidbey area, including a brief description of the monitoring site.

- 112a N Smuggler's Cove
- 149a Glendale Creek
- 157a Scatchet Creek
- MWA2 Maxwelton Creek
- 177a Goss Creek
- Hhab E Freeland Park
- 134a Freeland Park Catch Basin

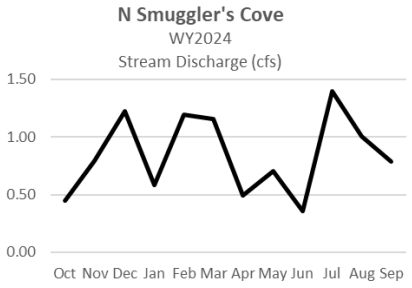
Stream Report Card: 112a N Smuggler's Cove

Site Description:
The sampling location for N Smuggler's Cove is located on a designated fish stream north of the South Whidbey State Park office just south of where Wilbert trail crosses Smuggler's Cove. The surrounding area upstream of the sampling location is a protected old-growth forest filled with lush undergrowth and is designated as one of the surface water quality program's natural baseline monitoring sites.

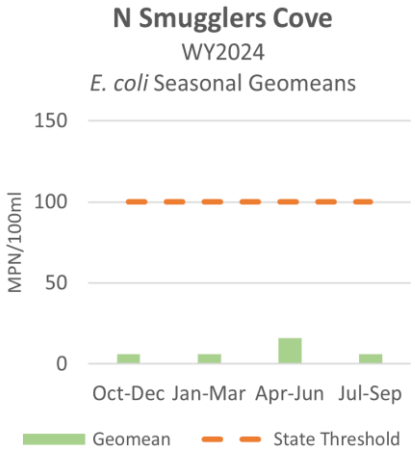
N Smuggler's Cove Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Good	Good	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	6	16	<100
Pt 2: % Exceedances	NA	NA	NA	NA	0	0	<10

** WY2019-WY2020, WQI used to evaluate water quality status, WY2021-WY2024 *E. coli* data used **



Key Takeaways:
- Water quality was Good based on data collected in WY2024.
- Annual and seasonal geomeans met the state standards for *E. coli*; 0% of samples exceeded the state limit of 320 (0 out of 13 samples).
- *E. coli* levels slightly higher than previous year (16 vs 6 MPN/100mL), but WY2024 levels still well below the state standard.
- Temperatures consistent over the past two years, ranged from 12.06 to 12.44°C, well below maximum temperature standard of 17.5°C.
- Dissolved Oxygen levels constant over past two years, minimum for 2024 met state standard of 8.0 mg/L: Min 10.89 mg/L, annual mean 10.89 mg/L.
- Stream Flow: all 12 months, Max discharge: 1.40 cfs, Min: 0.36 cfs



Sampling Summary:
This stream was able to be sampled year-round. Low levels of E. coli observed follow expected levels water quality given the surrounding natural conditions. Intermittent wetlands upstream along the Wilbert trail are thought to provide repeated opportunities for flowing water to slow and filter out contaminants.

Stream Report Card: 149a Glendale Creek

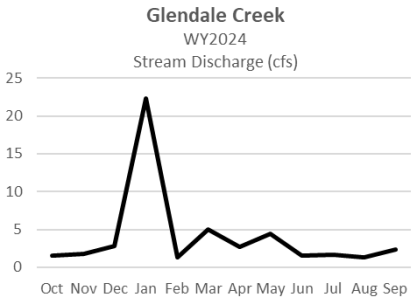
Site Description

The sample location for Glendale Creek is located above the second driveway crossing up from Humphrey Road. This is a historical salmon bearing stream that is immediately bordered by roads and houses at the pour point with little to no vegetative buffers. The area immediately upstream of the sampling location is zoned rural and designated for rural land use.

Glendale Creek Summary Statistics

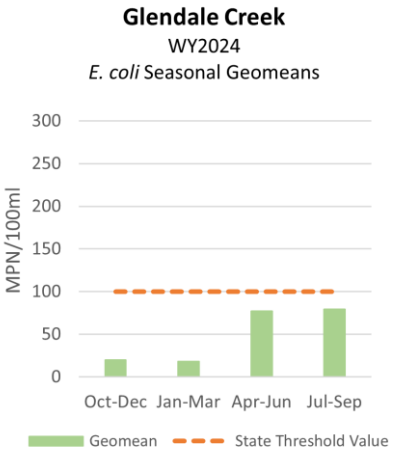
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	Moderate	Good	Poor	Good	Good	
Pt 1: Max GM FC / *E. coli*	FC 244	FC 449	79	273	79	79	<100
Pt 2: % Exceedances	20	30	0	14	0	7	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2023 only E. coli data used **



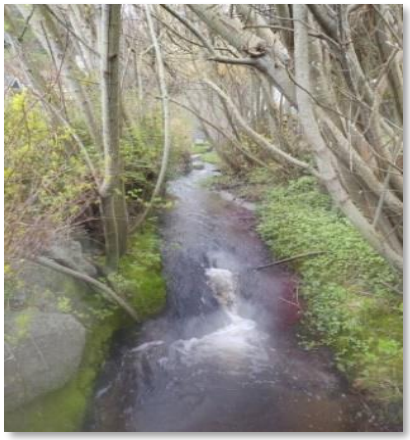
Key Takeaways:

- Water quality was Good based on data collected in WY2024.
- Annual and seasonal geomeans met the state standard (42 and 79 MPN/100 mL respectively); 7% of samples exceeded state high hit limit of 320 MPN/100 mL (1 out of 14 samples).
- *E. coli* levels comparable to previous year, WY2024 levels met both Parts 1 and 2 of the state standard.
- Temperatures consistent over past six years, WY2024 maximum temp of 14.88 met state standard of 17.5°C.
- Dissolved Oxygen levels constant over past five years, minimum for 2024 met state standard of 8.0 mg/L: Min of 9.61 mg/L.
- Stream Flow: all 12 months , Max discharge: 22.32 cfs, Min: 1.30 cfs



Sampling Summary:

The SWQ Team was able to consistently sample at this site except for one month when tidal conditions existed at the main site and the bracketing site just upstream was sampled instead. Single high hit of *E. coli* in June led to Source ID monitoring which revealed evidence of a nearby home that was experiencing septic issues and was being repaired. Subsequent samples did not show elevated *E. coli* levels, but the site will continue to be monitored closely.



Stream Report Card: 157a Scatchet Creek

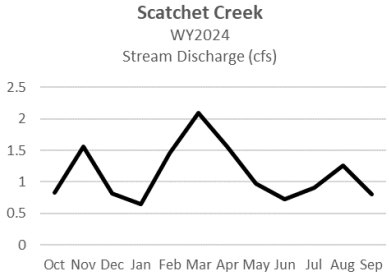
Site Description

This site location is a year-round designated fish stream that runs through the Scatchet Head Community Park. It then enters a culvert under Driftwood Road before draining into Puget Sound. The area immediately upstream of the sampling location is zoned rural and its designated use is rural land.

Scatchet Creek Summary Statistics

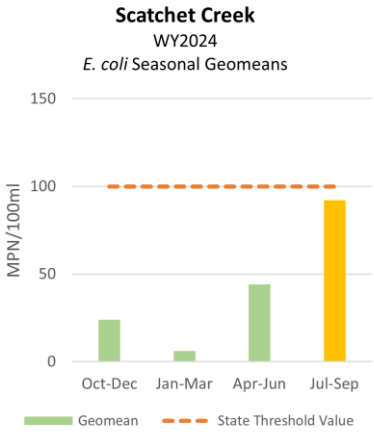
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Poor	Moderate	Moderate	Moderate	Poor	Good	
Pt 1: Max GM FC / *E. coli*	FC 398	FC 553	205	245	321	92	<100
Pt 2: % Exceedances	33	36	7	6	19	0	<10

** WY2018-WY2021, WQI used to evaluate water quality status, WY2022-WY2023 only E. coli data used **



Key Takeaways:

- Water quality was Good based on data collected in WY2024.
- Annual and Seasonal geomeans met the state standard and the zero percent of samples exceeded 320 MPN/100 mL (0 out of 11 samples).
- E. coli levels lower than previous year, (92 vs 321 MPN/100mL) WY2024 levels passed both Parts 1 and 2 of the state standards.
- Temperatures consistent over the years, maximum and annual geomean under state standard of 17.5°C: Max 15.85 °C
- Dissolved Oxygen over past years constant, WY2024 met minimum state standard of 8.0 mg/L: Min of 10.09 mg/L
- Stream Flow: All 12 months, Max discharge: 2.09 cfs, Min: 0.65 cfs



Sampling Summary:

Site showed relatively low levels of E. coli during WY2024. There were slightly elevated hits in July and August, but the 90-day geomeans did not exceed the state standard so Source ID was not required. The current site has formerly tested high for fecal coliform and there is a history of bracketing at sites upstream. This site has a history of septic challenges related to pumping of effluent to different parcels, and in the past dye tests have been performed in the community to identify possible sources of pollution. Although WY2024 showed acceptable levels, the site will continue to be included in the core sampling rotation and will be closely monitored to identify future issues in a timely manner.

Stream Report Card: MWA2 Maxwelton Creek

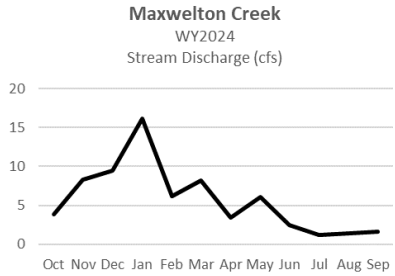
Site Description

This sampling location is a designated fish stream on the north side of French Road on Maxwelton Creek. The site has extensive riparian vegetation cover and year-round flow. The area immediately upstream of the sampling location is zoned rural and designated to be rural lands. Parcels zoned Rural Agriculture exist just north of where the stream passes under Maxwelton Road.

Maxwelton Creek Summary Statistics

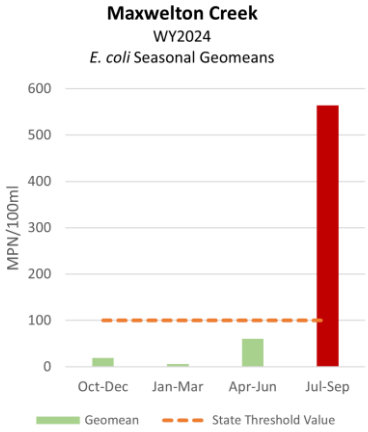
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	Moderate	Poor	Poor	Poor	Poor	
Pt 1: Max GM FC / E. coli	FC 225	FC 150	151	461	463	292	<100
Pt 2: % Exceedances	7	8	13	33	46	25	<10

** WY2018-WY2021, WQI used to evaluate water quality status, WY2022-WY2023 only E. coli data used **



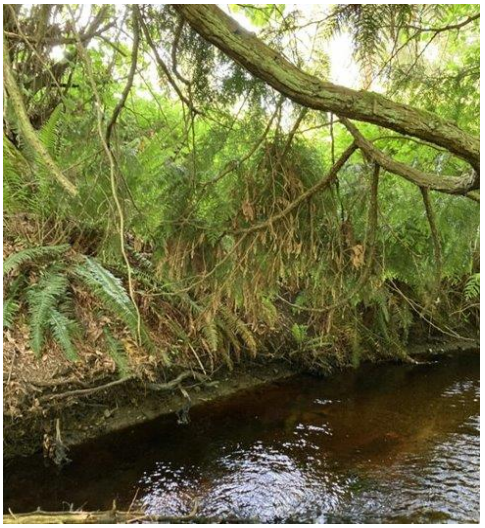
Key Takeaways:

- Water quality was Poor based on data collected in WY2024.
- Annual geomean below state standard (39 MPN/100 mL); however, seasonal geomeans exceeded state standards during Quarter 4. Twenty-five percent of samples exceeded 320 MPN/100 mL (4 out of 16 samples).
- E. coli levels slightly lower than previous year, (292 vs 463 MPN/100mL) but failed both Parts 1 and 2 of state standard, high hits during summer months.
- Temperatures consistent, maximum temperature recorded in 2024 close to but under standard of 17.5°C: Max temp 17.31 °C
- Minimum Dissolved Oxygen met standard of 8.0 mg/L: Min of 8.76 mg/L
- Stream flow: Year-round; Max discharge: 16.16 cfs, Min: 1.17 cfs



Sampling Summary:

Water quality slightly improved since WY2023, but seasonal geomeans still showed a distinct trend towards higher hits during the summer months. Repeated high hits instigated bracketing upstream and collaboration with AMAT and OSS enforcement who identified the surrounding parcels for septic compliance and sent outreach education letters to those property owners. The site has been included as a key area of focus for the reinstated PIC program because it pours out to a commercial shell fishing prohibited zone. It will continue to be a targeted area of the PIC program and of interest to the Department of Health shellfish program and possible TMDL proposals (Total Maximum Daily Load, a pollution mitigation plan by ECY).



Stream Report Card: 177a Goss Creek

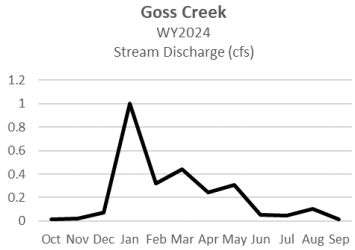
Site Description

This sampling location is on the east side of Harbor Rd on Goss Creek. The site is a designated fish stream that drains from Goss Lake and has extensive riparian vegetation cover and year-round flow. The area immediately upstream of the sampling location is zoned rural and designated to be rural lands.

Goss Creek Summary Statistics

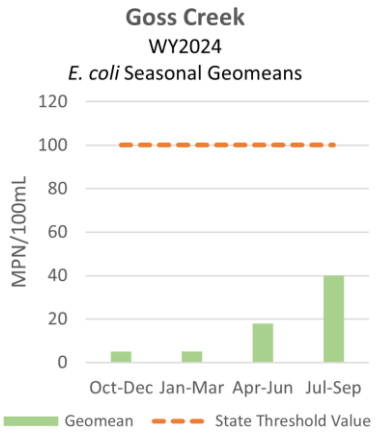
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Good	Good	
Pt 1: Max GM FC / E. coli	NA	NA	NA	NA	5	37	<100
Pt 2: % Exceedances	NA	NA	NA	NA	0	0	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used **



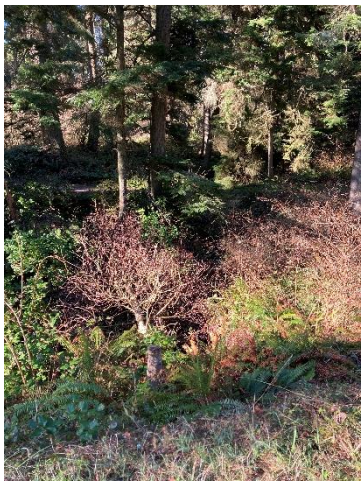
Key Takeaways:

- Water quality was Good based on data collected in WY2024.
- Annual and seasonal geomeans were below the state standard. The percentage of samples that exceeded the state limit of 320 MPN/100 mL was 0% (0 out of 12 samples).
- E. coli levels slightly higher than previous year (37 vs 5 MPN/mL), but still well below state thresholds and met both Parts 1 and 2 of the standard.
- Temperatures consistent, maximum temperature recorded 2024 under standard of 17.5°C: Max temp was 15.71°C
- Minimum Dissolved Oxygen met standard of 8.0 mg/L: Min of 8.75 mg/L
- Stream flowed year-round; Max discharge:1.00 cfs, Min: 0.01 cfs



Sampling Summary:

This site was originally chosen as an Effectiveness monitoring site due to proposed culvert replacements along Harbor Road. Water quality has been Good for the past two years; but site shows a distinct trend towards higher hits during the spring and summer months. Additionally, the site pours out to North Holmes Harbor; hence it may be reviewed as a potential supplementary targeted area for the PIC program.



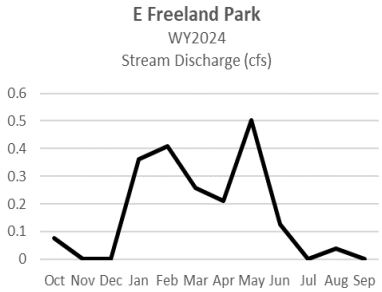
Stream Report Card: Hhab East Freeland Park

Site Description:
This sampling location is at the pour point of a tidally influenced stream at the east end of the parking lot of Freeland Park. The area immediately upstream from the sampling site is zoned for rural residential and designated to be an urban area.

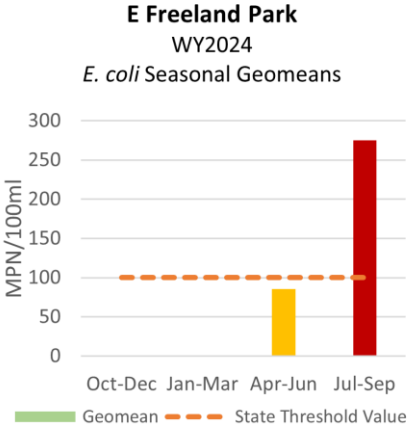
E Freeland Park Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	Moderate	Poor	Poor	Good	Poor	
Pt 1: Max GM FC / E. coli	FC 175	FC 418	1616	377	86	275	<100
Pt 2: % Exceedances	8	29	25	11	0	20	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Poor based on data collected in WY2024.
- Annual geomean below the state standard (43 MPN/100 mL); however seasonal geomeans exceeded state standards July - Sept. The percentage of samples that exceeded 320 MPN/100 mL was 20% (1 out of 5 samples).
- E. coli levels increased from previous year, but limited sampling due to tidal influence and low flow conditions may have affected results.
- Temperatures above state threshold are common, maximum temperature recorded in 2024 over the state standard of 17.5°C: Max temp of 20.52 ˚C.
- Dissolved Oxygen annual geomeans generally meet standards but WY2024 minimum DO fell below standard of 8.0 mg/L: Min of 7.13 mg/L
- Stream flow: 8 out of 12 months of the year but tidal conditions Oct – Dec and stagnant July and Sep. Max discharge: 0.36 cfs, Min: No flow



Sampling Summary:
The sampling at this site was limited with tidal influence and low flow conditions at the main site which led to multiple bracketing upstream. Site had issues with high salinity and tidal exchange October through February, and many samples exceeded conductivity ranges making them inviable for E. coli testing based on definitions of surface water vs. marine water. Data may not be representative of ambient water quality due to the inability to sample year-round. From available data, water quality decreased since WY2023 and seasonal *E. coli* geomeans showed higher hits during spring and summer months, May - July. This area is also the focus of Swim Beach sampling reported to ECY and the newly reinstated PIC program with more intensive monitoring and outreach with the goal to reopen shellfish beds.

Stream Report Card: 134a Freeland Catch Basin

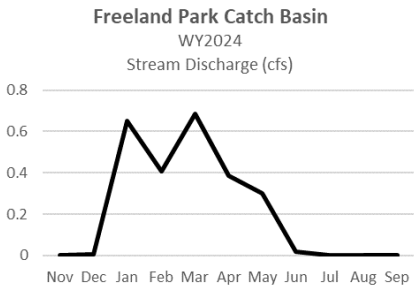
Site Description

This sampling site is at the stormwater catch basin outfall in Freeland Park. The area immediately upstream from the sampling site is zoned for rural residential and designated to be an urban area. The site is located near a beach and swim site called Freeland County Park which is placed under a swimming advisory due to high Enterococcus levels from Memorial Day to Labor Day.

Freeland Catch Basin Summary Statistics

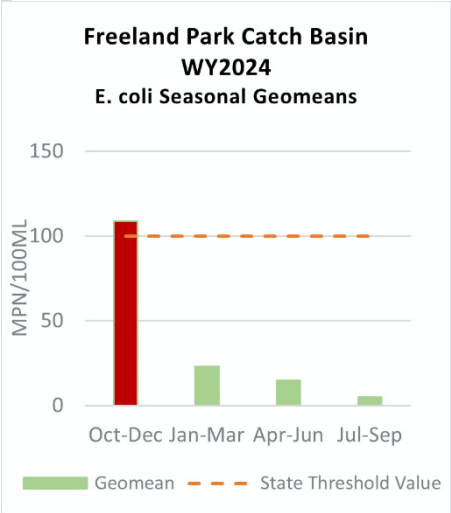
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	NA	NA	Moderate	Good	Poor	
Pt 1: Max GM FC / *E. coli*	FC 600	NA	NA	55	9	109	<100
Pt 2: % Exceedances	33	NA	NA	17	0	11	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:

- Water quality was Poor based on sample data collected in WY2024.
- Annual geomean was below the state standards (15 MPN/100 mL); however seasonal geomeans exceeded the state standard October through December. The percentage of samples that exceeded the state limit of 320 MPN/100 mL was 11% (1 out of 9 samples).
- E. coli levels increased from previous year, but limited sampling due to tidal influence and low flow conditions may have affected results.
- Temperatures mostly below state threshold, maximum temperature recorded in 2024 below standard of 17.5°C: Max temp of 16.44˚C.
- Dissolved Oxygen annual geomeans generally meet standard of 8.0 mg/L, but 2024 minimum DO fell below standard: 4.96 mg/L.
- Stream Flow: 6 out of 12 months, Max discharge: 0.69 cfs, Min: 0.0 cfs



Sampling Summary:

Water flowed from the catch basin during storm events but slowed down significantly in the dry season. Data for this location may not have been representative of ambient water quality due to the inability to collect samples year-round. The stream had issues with tidal conditions and intermittent flow. The seasonal geomeans showed high *E. coli* levels during Quarter 1. The site was able to be sampled 6 out of the 12 months and ran low DO levels in June and was deemed stagnant for July with renewed flow during August and then stagnant again in September.

Camano Island Results

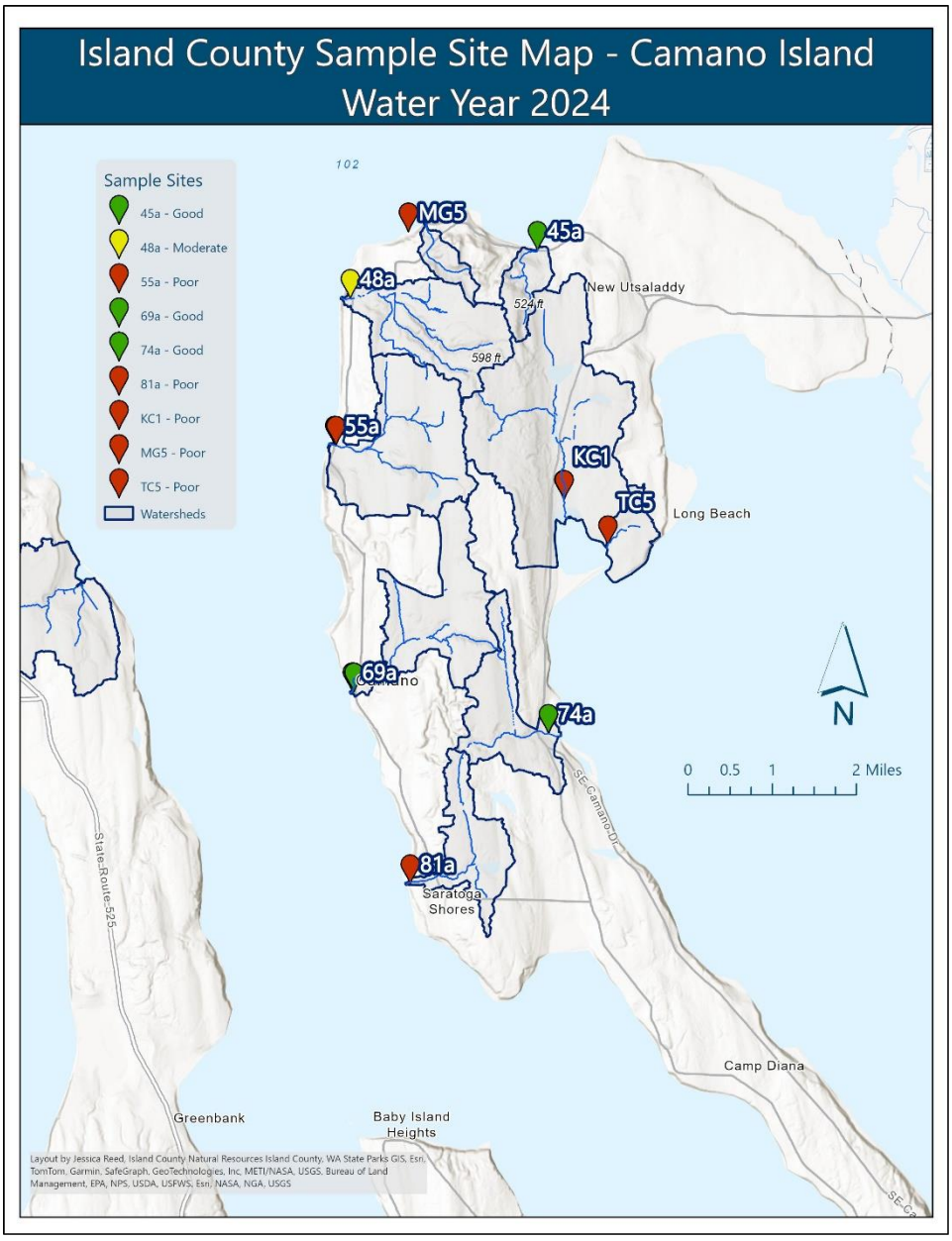


Figure 6. Camano Island watersheds and sample sites and their water quality status

Figure 6 shows the location of Camano Island samples sites and their water quality status.

Subsequent pages provide greater detail for each site within the Camano area, including a brief description of the monitoring site.

- 45a N. Camano @Nellie
- MG5 Maple Grove
- 48a Sunset Creek
- 55a Carp Creek
- 69a Chapman Creek
- 81a Cama Beach State Park
- 74a Cavalero Creek
- KC1 Kristoferson Creek
- TC5 Barnum Point

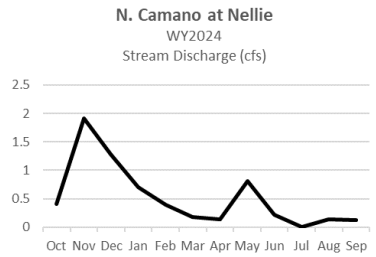
Stream Report Card: 45a N Camano @ Nellie

Site Description:
The sampling location is a designated fish stream at the outlet of a forested wetland. Water exits through a culvert passing under W North Camano Drive which then drains under houses to the Sound. This site is site is zoned for rural residential and designated to be an urban area.

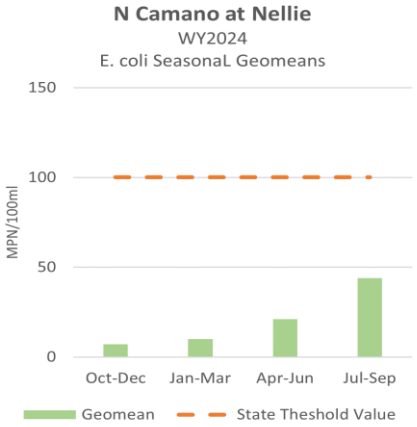
N Camano @ Nellie Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	Good	NA	Good	Good	
Pt 1: Max GM FC / *E. coli*	NA	NA	41	NA	31	44	<100
Pt 2: % Exceedances	NA	NA	0	NA	0	0	<10

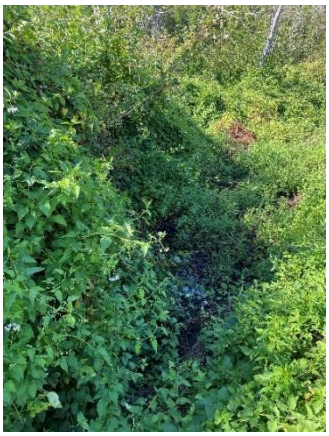
** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Good based on data collected in WY2024.
- Both Annual and Seasonal geomeans met the state standard, percentage of samples that exceeded 320 MPN/100 mL was 0% (0 of 13 samples).
- *E. coli* levels slightly higher than previous year (44 vs 31 MPN/100mL) but still well below the standard.
- Maximum temperature in WY2021 met standard, but max temps for last two years failed standard, WY2024 was 22.25˚C.
- Dissolved Oxygen minimum and annual geomean failed standard, WY2024 minimum DO was 4. 16 mg/L, annual was 7.88 mg/L.
- Stream flowed 11 months of year, Max discharge: 1.91 cfs, Min: 0.0 cfs



Sampling Summary:
Water from the upstream wetland flowed steadily most of the year even during the dry season. The seasonal geomeans showed low *E. coli* levels throughout the year. The site was able to be sampled 11 out of the 12 months except for July when it was deemed stagnant with seep conditions. Flow resumed for the remainder of Quarter 4.



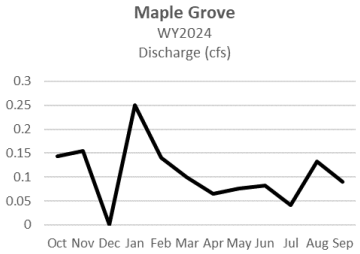
Stream Report Card: MG5 Maple Grove

Site Description:
This site is located at the outflow of stormwater culverts at Maple Grove Boat Launch. Wetlands and hillside seeps occur above the site and the area upstream is zoned RAID, or Residential Area of Intensive Development. This site has a history of fecal pollution and septic issues and has had funding allocated to connect homes to a communal septic system. Historically, the site has shown high E. coli levels and was chosen as on the of the PIC focus areas with the goal to conduct intensive Source ID investigation to identify and correct sources of fecal pollution and reopen shellfish beds.

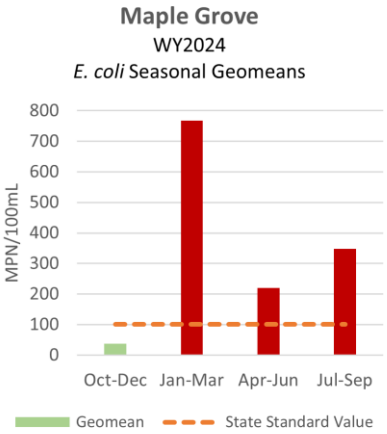
Maple Grove Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Poor	NA	NA	NA	Poor	Poor	
Pt 1: Max GM FC / *E. coli*	FC 8992	NA	NA	NA	1105	768	<100
Pt 2: % Exceedances	100	NA	NA	NA	64	42	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Poor based on data collected in WY2024.
- Annual and seasonal *E. coli* geomeans exceeded the state standard, high hits observed January through September. The percentage of samples that exceeded 320 MPN/100 mL was 42% (8 out of 19 samples).
- Temperatures for last two water years sampled varied, the maximum temp recorded in WY2024 was below state threshold: 15.17˚C.
- Dissolved Oxygen minimum and annual geomean met standard, WY2024 minimum of 8.46 mg/L, annual of 9.87 mg/L.
- Flowed 11 months of the year, Max discharge: 0.25 cfs, Min: 0.0 cfs



Sampling Summary:
Stream flow was present except for December when the channel was covered by gravel and beach wrack due to high tides. Seasonal geomeans showed high *E. coli* levels throughout Quarters 2, 3, and 4 with highest levels occurring January - March. SWQ staff conducted bracketing of the area and referred the results to the AMAT team. Coordination with EH led to intensive Source ID efforts, including parcel research and dye testing. These PIC efforts led to several homes being identified as contributing to the high E. coli levels and repairs were completed by property owners. Monitoring and PIC strategies are ongoing in this area.

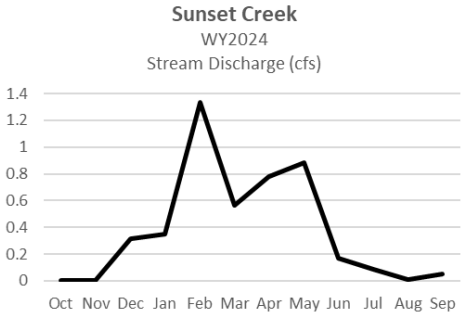
Stream Report Card: 48a Sunset Creek

Site Description:
Sunset Creek is a perennial fish stream that flows out of a series of ponds. Extensive vegetative buffers are present, and the area is forested on either side of the stream channel which is deep with loose substrate. Ponds and wetlands occur above the site and the area upstream is zoned Rural Land use. This stream was originally chosen in 2006 to provide baseline data as a natural watershed and continues to provide similar data for the current monitoring cycle.

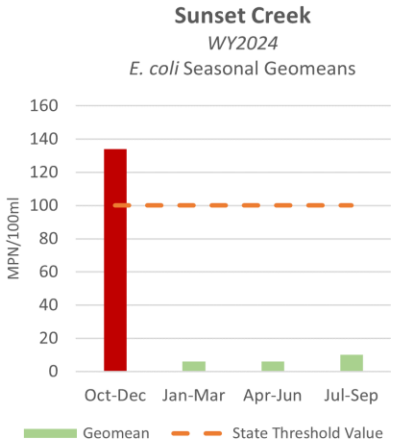
Sunset Creek Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	Good	NA	Good	Moderate	
Pt 1: Max GM FC / *E. coli*	NA	NA	33	NA	5	134	<100
Pt 2: % Exceedances	NA	NA	0	NA	0	0	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Moderate based on data collected in WY2024.
- Annual geomean was below the state standard (14 MPN/100 mL); however, seasonal geomeans exceeded the state standard October - December. Zero percent exceeded the 320 MPN/100mL (0 of 13 samples).
- Maximum *E. coli* levels higher than previous year, (134 vs 5 MPN/100mL), high hits during July to Sept. Failed Part 1 of standard.
- Maximum temperatures for last three years sampled were above state threshold, max temp recorded in WY2024 was 18.27˚C.
- Dissolved Oxygen minimum and annual geomean failed standard, WY2024 minimum DO was 1.45 mg/L, annual of 5.28 mg/L
- Stream flowed 10 of 12 months, Max discharge: 1.33 cfs, Min: 0.0 cfs



Sampling Summary:
The stream exhibited stagnant conditions during October and November, but the site experienced a substantial increase in flow at the onset of the wet season. Flow was continuous the remainder of the year, and the site was able to be sampled 10 out of the 12 months. Decreased DO levels were observed in Quarter 3 and 4 corresponding to lower stream discharge. Recent beaver activity including lodge building was evident in the pond above the site.

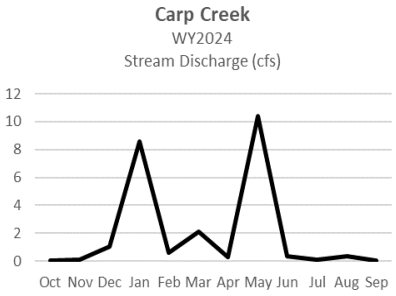
Stream Report Card: 55a Carp Creek

Site Description
The sampling site for Carp Creek is located at the junction of two streams that flow into ditches near Sunset and Olympic Road. One stream is feed from mostly wetlands and the other is feed from Carp Lake and other wetlands. Carp Lake drains through mostly privately owned forested lands to developed waterfront properties.

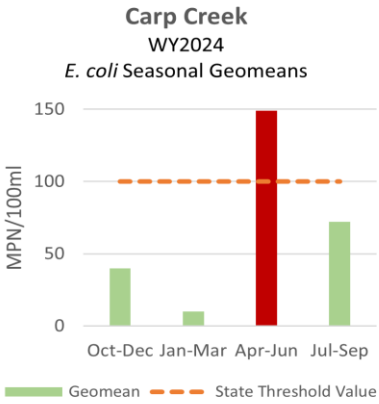
Carp Creek Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Poor	Good	Good	Good	Poor	Poor	
Pt 1: Max GM FC / *E. coli*	FC 210	FC 65	46	55	274	149	<100
Pt 2: % Exceedances	32	0	0	0	22	14	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Poor based on data collected in WY2024.
- Annual geomean was below the state standard (55 MPN/100 mL); however seasonal geomeans exceeded the state standard April through June). Fourteen percent of samples exceeded 320 MPN/100 mL (2 of 14 samples).
- E. coli levels higher than previous year, (149 vs 274 MPN/100mL) but still exceeded Parts 1 and 2 of standard, high hits occurred June and August.
- Temperature trends for six years below state threshold except for WY2023; maximum temperature recorded in WY2024 just under standard: 17.31˚C
- Dissolved Oxygen annual geomean of 9.56 mg/L met state standard, but WY2024 minimum DO that was recorded failed standard: 6.21 mg/L.
- Stream flowed 12 out of 12 months, Max Discharge: 10.4 cfs, Min: 0.03 cfs



Sampling Summary:
This stream flowed consistently throughout the year with lower flows seen in summer and fall months. Higher E. coli levels were seen in Quarter 3, and SWQ staff bracketed the stream several times due to repeated high hits. Parcel searches were conducted, and the results were referred to AMAT and EH. Historically this site has shown higher hits of fecal coliform throughout the year, but WY2024 showed the majority of high hits April through September. Water quality has been Poor since WY2022 and monitoring and Source ID efforts will continue.

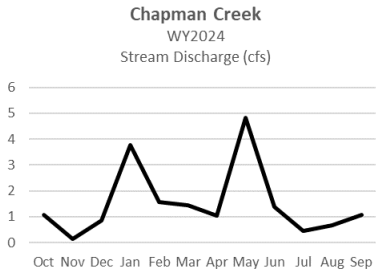
Stream Report Card: 69a Chapman Creek

Site Description
This sampling site is located on the upstream (east) side of Sandy Beach Road, just before the stream flows in culverts into Saratoga Passage. The designated land use upstream from the sampling site is zoned for rural residential.

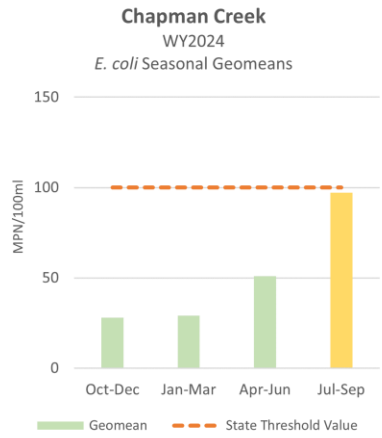
Chapman Creek Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Good	Moderate	Moderate	Moderate	Moderate	Good	
Pt 1: Max GM FC / *E. coli*	FC 32	FC 75	38	178	122	97	<100
Pt 2: % Exceedances	0	0	17	0	5	6	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Good based on data collected in WY2024.
- Max Seasonal Geomean (97 MPN/100mL) just below the state standard. Six percent of samples exceeded the state limit (1 of 16 samples).
- Annual E. coli levels slightly higher than previous year, (48 for WY2024 vs 26 for WY 2023) but site still met both Parts of standard.
- Temperatures varied over last six years, mainly just at or below state threshold, maximum temp recorded in WY2024 met standard: 17.4˚C.
- Dissolved Oxygen minimum and annual geomean met standard for WY2024; minimum DO of 9.22 mg/L, annual was 10.60 mg/L.
- Stream flowed year-round, Max discharge: 4.83 cfs, Min: 0.15 cfs



Sampling Summary:
The annual geomean was 48 MPN/100 mL which is well under the state limit of 100 MPN/100 mL but the seasonal geomeans during July-September approached state standards. A single high hit recorded at the end of June and 90-day geomeans above the state standard led to bracketing upstream; however, no additional high hits were reported, nor could a clear source of fecal pollution be identified. The SWQ team worked with AMAT and Environmental Health at this site to attempt to identify the origin of the through Source ID and parcel research.

Stream Report Card: 81a Cama Beach State Park

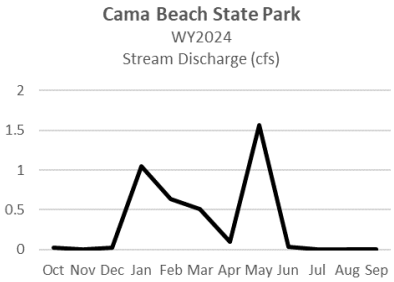
Site Description

This site is located on a designated fish stream within Cama Beach State Park behind the beach cabins. The area upstream is primarily native habitat and stream buffers are well-vegetated with native plants and trees. The stream is seasonal and has varying flow in the drier summer months.

Cama Beach State Park Summary Statistics

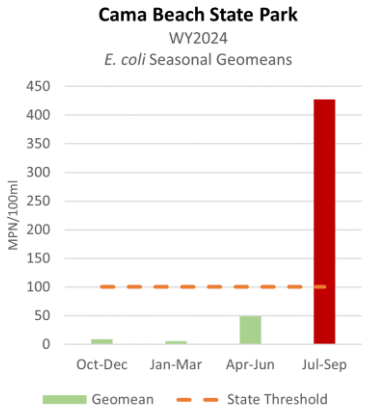
Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	Good	Good	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	22	NA	429	<100
Pt 2: % Exceedances	NA	NA	NA	NA	0	33	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:

- Water quality was Poor based on data collected in WY2024.
- Annual geomean met state standard (38 MPN/100 mL), but seasonal geomean exceeded the standard July to September (429 MPN/100mL). Thirty three percent of samples exceeded the state limit (5 of 15 samples).
- E. coli levels higher than previous year sampled (429 vs 22 MPN/100mL), several high hits during Quarter 4. Failed Parts 1 and 2 of standard.
- Temperatures below state threshold for last two water years sampled, maximum temperature recorded in WY2024 was 16.14˚C.
- Dissolved Oxygen annual geomean of 10.12 mg/L met standard, but WY2024 minimum DO failed standard: 7.84 mg/L.
- Stream flowed 10 out of 12 months, Max discharge: 1.56 cfs, Min: 0.0 cfs



Sampling Summary:

The site was able to be sampled 10 out of the 12 months. Water flowed during the wet season but slowed in the dry season, eventually to become stagnant and ponded. Source ID was conducted with dry conditions upstream pointing to the source of fecal pollution. SWQ staff collaborated with state park officials who limited access to the stream and worked towards septic repairs.

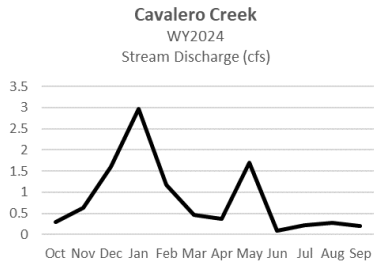
Stream Report Card: 74a Cavalero Creek

Site Description
This perennial stream begins as a series of ponds then drops into a forested ravine between dense developments with two road crossings before discharging into Port Susan. The area immediately upstream from the sampling site is zoned for rural residential and designated to be an urban area.

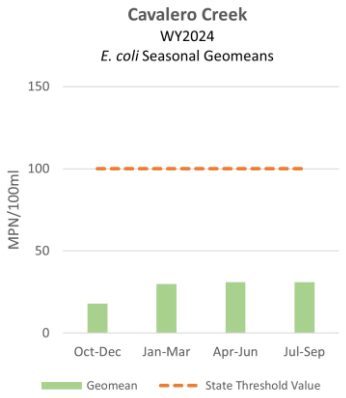
Cavalero Creek Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Moderate	Moderate	Good	Moderate	Poor	Good	
Pt 1: Max GM FC / *E. coli*	FC 289	FC 143	64	120	193	54	<100
Pt 2: % Exceedances	14	7	0	0	18	0	<10

** WY2019-WY2021, WQI used to evaluate water quality status, WY2022-WY2024 only E. coli data used



Key Takeaways:
- Water quality was Good based on data collected in the WY2024.
- Both annual and seasonal geomeans met state standards; zero percent of samples exceeded the state limit of 320 MPN/100 mL (0 out of 12 samples).
- Maximum E. coli levels lower than previous year, (54 vs 193 MPN/100mL), site met Parts 1 and 2 of standard.
- Temperatures below state threshold, maximum temperature recorded in WY2024 was 15.75˚C.
- Dissolved Oxygen minimum and annual geomean both met standard, WY2024 minimum DO: 9.21 mg/L, annual: 10.51 mg/L.
- Stream flowed all year, Max discharge: 2.39 cfs, Min: 0.03 cfs



Sampling Summary:
Water quality has improved since WY2023. For WY2024, this site met both parts of the state standard for E. coli with no high hits recorded. Cavalero Creek is a fish bearing stream and passes through one of the newer fish passage box culverts installed in the summer of 2021. This stream flowed throughout the year and was consistently sampled. The Cavalero watershed and boat launch area are part of a proposed metals testing pilot program, data will be shared upon review.

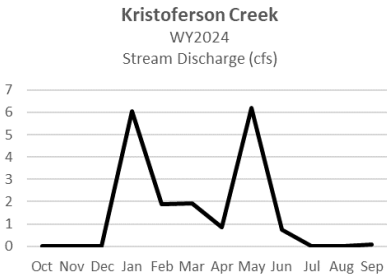
Stream Report Card: KC1 Kristoferson Creek

Site Description

This site is a seasonal stream on the north side of Russell Road at Kristoferson Creek main stem culvert. It has a long history of restoration and is considered a priority fish-bearing stream. The designated land use upstream from the sampling site is mixed use, zoned rural, and designated for agriculture and light manufacturing.

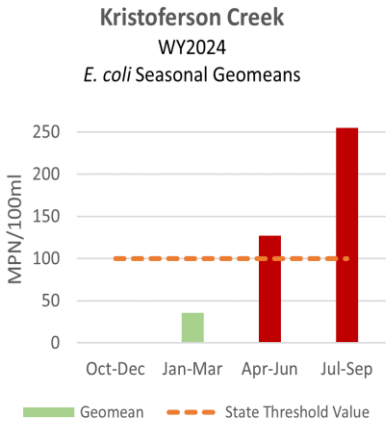
Kristoferson Creek Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	Good	Good	Good	Moderate	Good	Poor	
Pt 1: Max GM FC / *E. coli*	FC 51	FC 54	28	304	80	255	<100
Pt 2: % Exceedances	4	0	0	0	0	11	<10



Key Takeaways:

- Water quality was Poor based on data collected in WY2024.
- Seasonal geomeans exceeded the state standard April through September. The percentage of samples that exceeded the state limit of 320 MPN/100 mL was 11% (1 of 9 samples).
- Five months of the year this stream was low flowing, stagnant or dry.
- E. coli levels comparable to previous year, met both parts of standard.
- Max temperatures for last six year below state threshold of 17.5˚C, maximum temperature recorded in 2024 just under standard: 17.25 ˚C
- Dissolved Oxygen met state standard of 8.0 mg/L, 2024 minimum DO was 11.49 mg/L
- Stream flowed 7 out of 12 months. Max discharge: 7.13 cfs, Min: Dry



Sampling Summary:

The stream had seasonal flow and water samples were able to be collected 7 out of 12 months due to ponding and dry conditions. SWQ team was able to collect water quality samples at the main site from January to June, and again when flow resumed in September. Stream conditions at the main site necessitated bracketing upstream to sites above the restoration area as well as nearby culverts. A high hit in June led to Source ID and bracketing to identify possible causes of fecal pollution, but dry conditions prevented additional sampling until stream flow resumed.

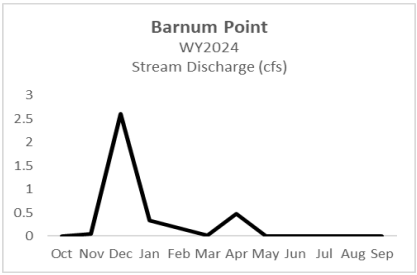
Stream Report Card: TC5 Barnum Point

Site Description

This site is the outpour of a seasonal designated fish stream on the northeast side of Triangle Cove. The site passes through a series of wetlands before crossing Barnum Road in Watershed 67. The stream flows from an area with blackberries, then into native forest. Roadside ditches and farm ponds contribute. The designated land use upstream from the sampling site is mixed use, zoned rural, and designated for agriculture.

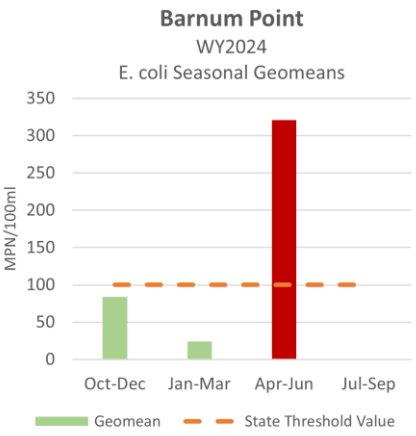
Barnum Point Summary Statistics

Six Year Trends	2019	2020	2021	2022	2023	2024	State Standard
Water Quality Status	NA	NA	NA	NA	Good	Poor	
Pt 1: Max GM FC / *E. coli*	NA	NA	NA	NA	52	321	<100
Pt 2: % Exceedances	NA	NA	NA	NA	0	11	<10



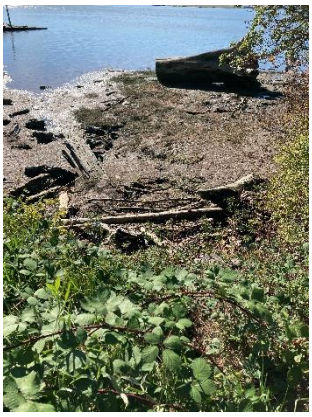
Key Takeaways:

- Water quality was Poor based on data collected in WY2024.
- Annual geomean was below state standard (74 MPN/100 mL); however seasonal geomeans exceeded state standard April - June. Eleven percent of samples exceeded the state limit of 320 MPN/100mL (1 of 9 samples).
- Seasonal *E. coli* levels higher than previous year, (321 vs 52 MPN/100mL); high hits during Quarter 3 meant that site failed Parts 1 and 2 of standard.
- Temperatures for the last two years met state threshold of 17.5˚C, maximum temperature recorded in 2024 was 12.81˚C
- Dissolved Oxygen met standard of 8.0mg/L, WY2024 minimum DO was 9.12 mg/L.
- Stream flowed 5 months of year, Max discharge: 2.60 cfs, Min: 0.0 cfs



Sampling Summary:

Stream flowed from November to April during wet season storm events then slowed and became stagnant and then dry during Quarter 4. Data for this location may not have been representative of ambient water quality due to the inability to collect samples year-round.



DISCUSSION

Data Collection and EIM Submission

The primary objectives of Island County's Surface Water Quality Monitoring Program (SWQMP) are to collect reliable surface water quality data, identify areas where water quality standards are being exceeded and identify the sources of those exceedances, and to collaborate with other departments and outside agencies to mitigate the source of exceedances with the Adaptive Management Action Team (AMAT).

Collaboration includes working with the Department of Ecology (ECY) and submitting our data to the Environmental Information Management (EIM) database. This involves extensive review and research to eliminate gaps in the data, include weather and tidal conditions, as well as conduct data correction and alignment with EIM standards of submittal. The EIM data uploads also include monthly updates to the newly revamped SQL database. The EIM upload was created in coordination with the Island County IT department to format requests for downloading reports from the SQL database. Standard Operating Procedures (SOPs) for data submission were developed for more effective EIM data transfer. ECY is developing protocols for the transfer to the national water quality EPA database, WQX. "The Water Quality Exchange (WQX) is the mechanism for data partners to submit water monitoring data to EPA. The Water Quality Portal (WQP) is the mechanism for anyone, including the public, to retrieve water monitoring data from EPA (EPA 2024).

In addition to data collection for core and rotational monitoring, the SWQMP staff performs reconnaissance, source identification, and effectiveness water quality monitoring, and coordinates public outreach activities. The following activities were carried out during WY2024.

Reconnaissance Monitoring

Reconnaissance monitoring was intended to explore water quality outside of the regular core watershed sample sites, identify areas with water quality impairments that may need further investigation, and check for watersheds that may have experienced a land use change. Reconnaissance monitoring occurred at sampling locations selected based on the presence of priority resources and estimation of current pollution risk, identified in the Adamus & Eilers (2006) report. Water quality staff used results to determine whether a site merited the addition to core or rotational sample sites or required a source identification investigation.

- During WY2024, the SWQ team investigated complaints of onsite septic failures on both Camano and Whidbey Islands in support of Island County's OSS Program and addressing the results with AMAT.
- Based on a request from the state, reconnaissance monitoring was conducted in the Swantown drainage, a designated fish stream with agricultural uses upstream that outpours into Swantown Lake. Initial high E. coli results necessitated the implementation of source ID protocols with bracketing of the stream, but levels quickly fell to acceptable amounts. This site may be added to the rotational cycle to monitor whether BMPs are adequately protecting water quality.
- Other reconnaissance areas on Whidbey Island included sites near Fox Spit, Bells Beach and Dave Mackie Park where property owners had submitted concerns about water quality and septic systems.
- Sites on Camano included a stream near Papa Jacks Rd and the Cavalero Boat Launch. The Papa Jacks site showed high levels of E. coli and Source ID was conducted with inconclusive results. Cavalero Boart Launch will be added to the storm event metals testing rotation.
- Monitoring often revealed impairments that were shared with Adaptive Management and addressed by the Island County Onsite Septic (OSS) team.
- Reconnaissance monitoring will continue in the future in concurrence with the Pollution Identification and Correction (PIC) program, with grant funding from the State awarded until the year 2027. The goals of the PIC program are outlined in more detail in the Adaptive Management section of this report.

Effectiveness Monitoring

Effectiveness water quality monitoring was used during WY2024 following completion of Island County projects, corrective action and/or adaptive management to ensure that methods put in place to restore and/or protect Island County critical areas and natural resources remain protective. Data collected was utilized by other departments and external partners to assist with their goals and objectives. Monitoring pre/post projects completion allowed for the analysis of water quality parameters that may have been impacted by the work. During WY2024, SWQ staff monitored conditions several culvert replacements along with a number of restoration areas.

There are several culvert replacement projects currently being monitored: Race Road, Chapman Creek, and Kristoferson Creek culvert replacements. Race Road is still in the development phase, so we will continue to track the progress. Picturs from From left to right: Chapman Creek, Kristoferson Creek




Restoration areas such as the Keystone Farm restoration, Cornet Bay restoration, Crescent Harbor Land Trust salmon restoration, and the Ala Spit restoration were monitored to determine the effect of restoration on water quality. Restoration is a multi-year process, and it is still early in the process for most of these sites. Data will continue to be collected to monitor the overall effects of restoration to determine next steps.



From left to right: Cornet Bay, Crescent Creek, and Keystone Restoration areas.

Source Identification

Source Identification (Source ID) water quality monitoring was initiated when monitoring trends indicated areas with repeated exceedances of water quality standards that rose above the Statistical Threshold Value (STV) for *E. coli* (Figure 6). Source ID narrowed down possible sources of pollution through:

- Monitoring intensification, which involves increasing the number and locations of monitoring points upstream and downstream from the original sample point (a process known as "bracketing"), until geographic pinpointing of the pollution source(s) is/are achieved;
- Increasing the frequency and/or timing of monitoring at the original sample point to pinpoint the activity in that location that may be influencing sample results.

Once the bracketing process has narrowed down the likely area to a section of a waterbody, the AMAT works to determine if the cause is natural, such as driven by wildlife, or if it is likely human caused, such as a failing septic system. Nearby parcels are investigated for current septic inspection compliance, and if needed, a courtesy letter is sent out to those parcels to remind the landowner to bring septic systems up to date. In WY2024, letters were sent out to communities near Maxwelton Creek, Cultus Creek, and surrounding the Maple Grove boat launch in response to sustained high levels of fecal bacteria. While there were other areas that were identified as having increased *E. coli* levels and were undergoing source identification, the actual cause was unable to be determined before the levels dropped.

Beginning in WY2024, the SWQ team began using a new method to detect *E. coli* in source identification investigations quicker than in previous years. This method uses R-Cards, a product designed to detect *E. coli* colonies within 15-24 hours rather than waiting multiple weeks for official lab results. Using this method, the SWQ team was able to bracket multiple locations in one day, and from those results better gauge where bracketing was needed and to use that info to go out again to resample and bracket again. Once high hits were detected with R-cards, an official lab sample was also collected for a more accurate colony count and subsequent follow up actions as necessary.

Source Identification Success: Maple Grove

During the previous water year, monitoring was reinstated at Maple Grove area on Camano Island and continued into the current WY2024. Maple Grove is a prime example of the importance of AMAT and the adaptive management process. The Maple Grove boat launch on Camano Island is surrounded by residential and vacation homes, many of which are many decades old. Some of these homes have old and/or failing septic systems which can allow fecal pollution to reach the nearby marine waters. Water quality samples taken at Maple Grove boat launch during WY2024 again showed exceedances of *E. coli* levels nearly all year. In following standard procedures, the SWQ team bracketed up the waterway at several other sample sites in the vicinity but were unable to pinpoint the exact source of pollution. The OSS team with Public Health conducted dye testing at an owner's request which led to identification of a failing system that was pouring fecal matter directly onto the beach. The team simultaneously sent letters out to residents advising them to bring septic inspections up to date as they may also be contributing to the problem. In response, many residents called the County and discussed options and received helpful information on how to address their systems. With recent funding for reinstatement of the Island County PIC program, there will be better tools and resources, including outreach events and ongoing Source ID investigations, to be able to more effectively pinpoint the source of pollution in this area as exceedances are ongoing.

Figure 7 outlines the decision process for conducting source ID investigation, including reference to High hits, 90-day geomeans and R-cards.

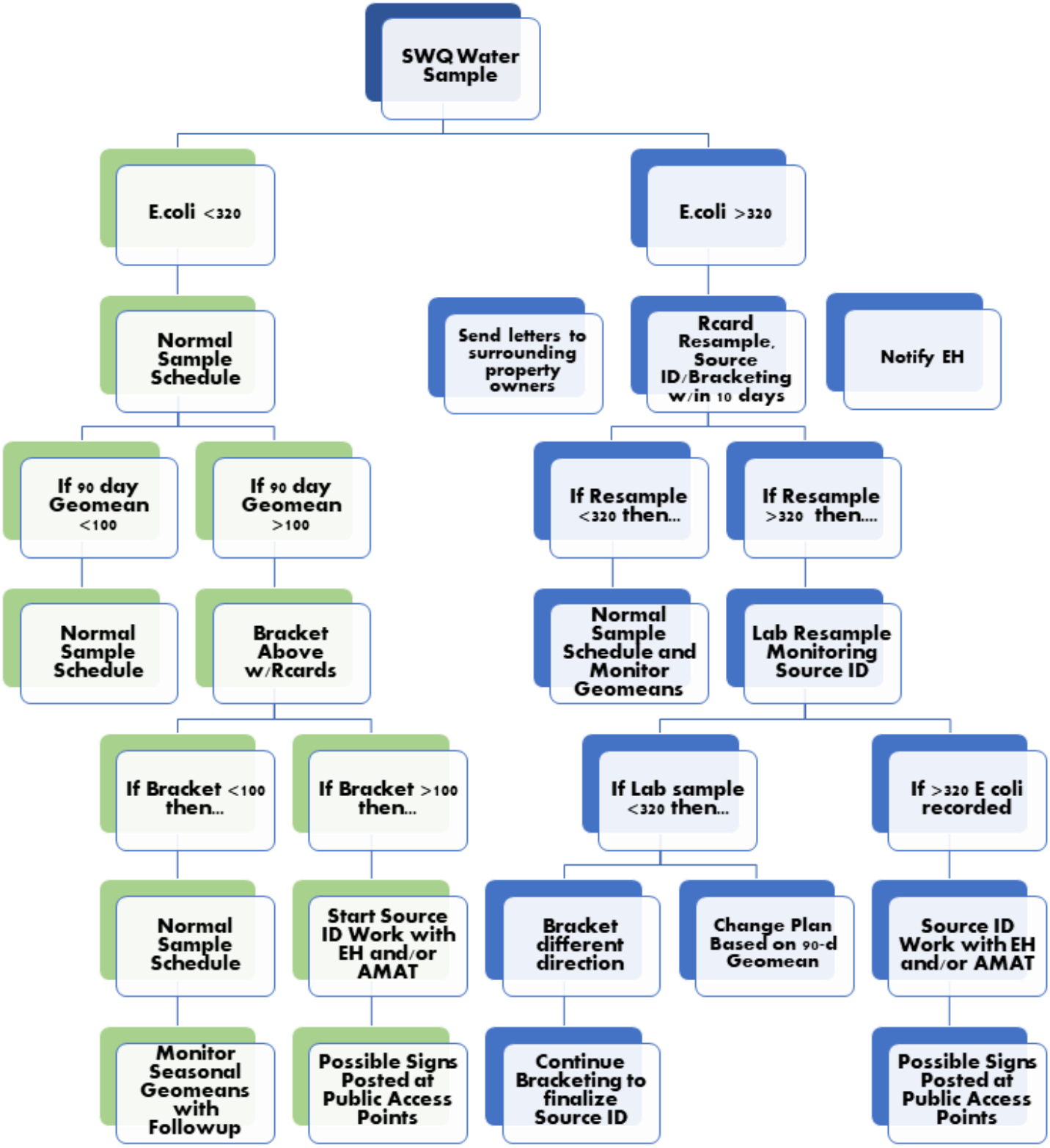


Figure 7. Island County Source ID bracketing decision tree

Adaptive Management

The Adaptive Management Action Team (AMAT) is a vital piece of the SWQMP, composed of several other county departments, that meets regularly to discuss water quality impairment data to inform and direct prioritization of areas of overlapping concerns and potential Island County code violations. Education and outreach are a vital piece of the AMAT and provides community members with resources which help them address Federal, State, and Local Critical Areas Ordinance (CAO) violations. The Island County AMAT includes Island County Surface Water Quality (SWQ) staff, Island County Environmental Health Onsite Septic (OSS) team, Whidbey Island Conservation District staff, Island County Public Works staff, and Island County Planning & Community Development Department staff.

During WY2024, a number of continued exceedances of water quality standards were recorded at several sites across Island County, so a Source ID bracketing process was initiated for each. In addition to Source ID, reporting and sharing of information related to each specific site was implemented with a plan for determining next steps and corrections by an interdepartmental coordination and communication process. These steps can include sending letters out to residents around sites with repeated exceedances to have their septic systems inspected, educational materials sent out to provide information on septic providers and Island County Code, and investigating alternative sources of pollution that may not be related to homeowner septic violations. Occasionally property owners can utilize outside funding sources to assist the community in achieving full septic compliance.

The SWQ team has collaborated with the OSS team to investigate complaints of onsite septic failures on both Camano and Whidbey Islands. Bracketing as part of Source ID investigations resulted in notification letters sent to neighboring property owners from the OSS team for septic compliance. Resources were shared monthly amongst team members to come up with a plan to provide additional resources and education to community members.

Source Identification Monitoring and Pollution Identification and Correction (PIC) Support

The Pollution Identification and Correction (PIC) program is a program identified in the Puget Sound Action Agenda as an essential component in restoring and protecting the many shellfish beds in the region. Implemented by many local governments, the program aims to focus pollution identification efforts in targeted areas that have significant impacts on shellfish beds. Grant funding was secured for PIC during WY2024 and was used to focus on the shellfish growing areas of Maple Grove on Camano Island, the Freeland Park region of Holmes Harbor, and the Dave Mackie Memorial Park area of the Maxwelton watershed.

The goals of the PIC program are to use water quality data to identify areas of fecal pollution and then collaborate with other departments to facilitate corrective action(s) to be taken. These include education, outreach, and any other corrective actions deemed necessary based on partnering departmental procedures. The program is used in tandem with guidance from Washington Department of Health and Washington Department of Ecology to find practical and tangible solutions to pollution problems in our county.

Shellfish

The Growth Management Act of Washington, RCW 36.70A outlines the goals of the Monitoring Plan to ensure that critical areas are protected from impacts and to protect Island County ground water resources and surface water resources. Swim beaches and shellfish harvesting areas are important to Island County's recreation opportunities and economy.

WADOH is interested in water quality in Island County for the following Growing Areas on Whidbey Island: Southwest Whidbey, Possession Sound, Holmes Harbor, and Penn Cove. According to WADOH this review will document any changes in pollution sources, new freshwater quality data, and recent onsite sewage system evaluations that may impact safe shellfish harvest.

Shellfish Success Stories: Penn Cove / Freeland areas reopened

According to the Island County Shellfish Harvesting Coordinator, "For shellfish, Penn Cove from Long Point to Strawberry Point was opened to the harvest of butter and varnish clams after the long biotoxin closure. Additionally, there were the parcels in Holmes Harbor that were opened back up after ongoing bacterial pollution closures."

Onsite Septic Systems

Island County SWQ team works carefully with the OSS team and regularly meet to share information on surface water quality locations that are receiving higher counts of *E. coli* in surface water to compare if they are near septic systems in need of maintenance. Both teams work cooperatively and share information in both directions, receiving lists of code violation cases in septic failures as well as communicating higher hits in sampling information. This relationship is critical and helps the OSS team make decisions on prioritizing septic repair permits in areas that are impacting habitat or a threat to human health. The prioritization of repair permits has not only helped affect changes in water quality but also becomes important for when the State Department of Health requests our data in relationship to shellfish growing areas.

Salmon Recovery

Island County shorelines provide critical shoreline rearing and resting areas that juvenile salmon headed to the ocean first use when coming from the Skagit, Snohomish, and Stillaguamish Rivers. Using the habitat are three species listed as threatened per the Endangered Species Act (Chinook, bull trout, and Hood Canal summer chum), as well as other salmon species and the prey they eat in the Island County watershed. Water Resource Inventory Area (WRIA) 6, which encompasses all of Island County, contains 213 miles of shoreline and 30.3 miles of fish bearing streams.

The following information is taken from the Multi Species Salmon Recovery Plan Update of 2019 (Pucci 2019):

> "It is well known that during the lifetime of salmon, the highest mortality often occurs when they are juveniles. Of major concern is that stage when they are transitioning from their home rivers and estuaries to feed and grow in the ocean (Quinn 2005). The watersheds of WRIA 6 in Island County are comprised of streams that are too small to support much salmon spawning. This means that the marine nearshore habitats, pocket estuaries, and the small streams themselves provide vital transition habitat for out-migrating juveniles from the large rivers draining to the Whidbey Basin (Zackey et al., 2015).
>
> "Because changes in the nearshore marine environment are implicated in the status of imperiled fish populations, the WRIA 6 salmon recovery strategies are focused on protecting the diverse marine nearshore and estuarine habitats near three major rivers - the Skagit, Stillaguamish and Snohomish. The central location of WRIA 6 in the Salish Sea, at the junction of Puget Sound, the Strait of Juan de Fuca and Georgia Strait, places it on the migration corridors used by most Puget Sound juvenile and adult salmon and trout populations.
>
> "As these fish move to and from their respective natal streams and rivers, nearshore and coastal estuaries in WRIA 6 provide critical feeding areas and/or shelter from wave energy and predators. Many spawning beaches and eelgrass beds are used by forage fish – surf smelt, sand lance and herring – which salmonids feed on or rely on as a buffer prey for predators. Eelgrass beds provide refuge to juvenile salmonids from both predators and high-energy marine environments. Sheltered beaches, bays, and lagoons also provide resting areas for adult salmonids. In addition to marine habitats, freshwater and tidally influenced streams in WRIA 6 provide valuable stream habitat for juvenile fish to rest in during their early marine out-migrations. Anadromous fish need these areas to adapt to salt water after rearing in freshwater in these coastal streams (Beamer et al. 2013; Zackey et al., 2015)."

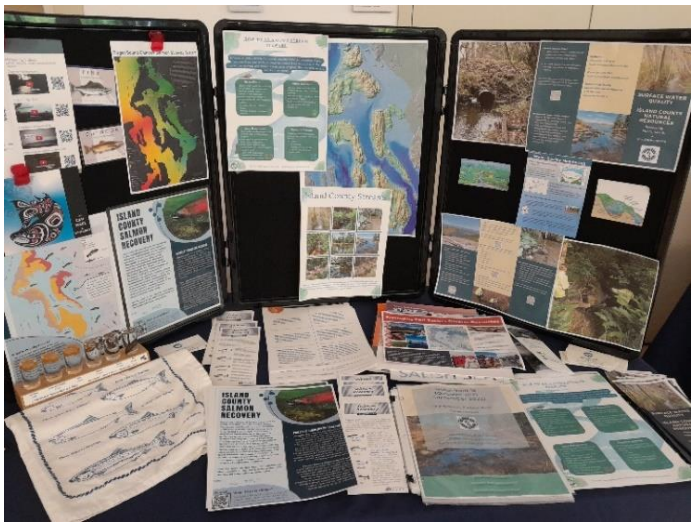
Island County Salmon Recovery Plan strategies will continue to center on prioritizing the protection of functional lower stream mouths and their pocket estuaries that are critical to resting, feeding, and refuge for migrating salmon. These areas and other important shorelines provide spawning and rearing areas for juvenile forage fish (Pacific herring, surf

smelt, and Pacific sand lance), which serve as an important prey source for salmon as they migrate through Island waters on their way to the ocean.

Outreach and Education

The Surface Water Quality Monitoring Program (SWQMP) prioritizes education and outreach as a vital part of our program to protect and improve water quality in Island County. Outreach and education events were again provided in WY2024. The SWQ team alongside our EH team participated in many local events including informational tables at the Penn Cove Water Festival, Island County Fair, Whidbey 101 and Camano 101 to highlight water quality and pollution prevention methods. The teams introduced themselves to property owners and invited residents to feel free to stop and ask questions if they see Island County staff conducting water sampling in their neighborhoods.

In addition to showcasing our work at local events, SWQ staff also participated in outreach and education for younger community members. SWQ team has worked with local schools to educate the younger population about surface water runoff in an engaging manner, and this past year also saw continued outreach initiative implemented for local school districts. The SWQ team visited classrooms to present watershed and wetland models and hands-on activities related to stream health. Future classroom visits and field trips to sample sites will bring a working knowledge of the Surface Water Quality Program and research opportunities to local students.



CONCLUSION

Clean water and watershed health provide benefits to not only the environment and the local tourist based economy, but also to human health, livestock and wildlife health, and overall community health. These benefits are achieved through the guidance of plans such as the Puget Sound Salmon Recovery Plan, local shoreline master plans, and critical areas ordinances. Water Resource Inventory Area (WRIA) 6 is composed of Whidbey, Camano, and other smaller islands like Smith, Minor, Deception, Strawberry, Ben Ure, and Baby Island that hold unique ecosystems that require unique approaches to management to maintain the health benefits we all enjoy. WRIA 6 is unusual in that it lies solely within the boundaries of one county and contains no large river systems, and has a hard boundary line limiting growth, unlike many of our neighboring WRIAs. This has led to a lack of understanding on the importance of seasonal streams such as the ones discussed in this report that may not contain flowing water all year round. This resulted in confusion or misinterpretation on the documented existence of streams, especially their channels and outlets, as well as how fish and other species utilize these systems. Because of the nature and importance of our seasonal streams and associated watersheds, there must be a constant reference to existing documentation and an emphasis on both current and historical monitoring of all aspects of water quality, especially stream flow trends.

Water Year 2024 marked a decrease in water quality status for several Island County streams. This decrease could have been due to several reasons, including increased development, lower flows caused by decreased rainfall and higher summer temperatures, and old or malfunctioning septic systems. Although the SWQ team was unable to do a detailed analysis of land uses compared to stream quality, studies have been conducted on the effects of land uses and how they impact overall stream health. A 2023 study by Lee et. al. highlights how important it is to consider a watershed scale approach to planning in order to minimize impacts to water quality. This same study points out that both water quality and biological diversity decreased in response to increased urban areas and agricultural uses. Urban development increases impervious surfaces, thereby increasing runoff from streets and driveways into waterways. This runoff can hold pollutants such as oils and chemicals from cars and equipment, but can also hold biological contaminants. In most areas of Island County, septic systems are utilized, but not always inspected or maintained. Faulty septic systems and inadequate drain field protections can allow untreated wastewater potentially carrying pathogens such as *E. coli*, household cleaning products, or other harmful chemicals to be released directly into the groundwater and or surface water (EPA). Agricultural practices have the potential to emit excess nitrogen and phosphorus concentrations, sediments from runoff, and animal waste, some of which can be mitigated by riparian buffers and best management practices designed to limit impacts to bordering streams.

Year to year Island County will continue to see fluctuations in surface water quality, precipitation amounts, and low flow conditions due to changes in climate. These fluctuations could have positive or negative impacts on our community, so it is vitally important to look at the long-range scope of water quality improvements and understand that increasing pressures through climate change and population density will create new challenges that will require collaboration between Island County departments and outside agencies. No matter if watersheds improve, remain the same, or decrease in water quality, the Island County Surface Water Quality Team is committed to utilizing the best available science to monitor streams and incorporate the adaptive management process outlined in this report into Water Year 2025 and beyond to provide continuous improvement of water quality in all our streams.

The water quality goals of the Island County Surface Water Quality Monitoring Plan remain the same: to continue to be focused on preventative and remedial actions to ensure that public health and critical areas are protected from negative impacts, and to protect Island County's ground water and surface water resources. By preserving and improving ecosystem conditions in streams, local swim beaches, estuarine salmon habitat, and shellfish harvesting areas, benefits will be felt by all of Island County through ecotourism and recreational opportunities, the enjoyment of green spaces and clean beaches, the recharge of our groundwater aquifers, and the natural beauty that draws us here.

GLOSSARY

Acronyms

AMAT Adaptive Management Action Team

BMP's Best Management Practices

CAO Critical Areas Ordinance

CEC's Contaminants of Emerging Concern

CFU Coliform Forming Units

DNR Department of Natural Resources

E. coli Escherichia coli

ECY Washington State Department of Ecology

EIM Environmental Informational Management System

EPA Environmental Protection Agency

GM Geometric Mean

GMV Geometric Mean Value

IC Island County

MPN Most Probable Number

OSS Onsite Septic

PIC Pollution Identification and Correction

SOP Standard Operating Procedure

Source ID Source Identification

STV Standard Threshold Value

SQL Database Structured query language relational database

SWQ Surface Water Quality

SWQMP Surface Water Quality Monitoring Plan

TMDL Total Maximum Daily Load

USGS U.S Geological Survey

WAC Washington Administrative Code

WADOH Washington State Department of Health

WQI Water Quality Index

WQP The Water Quality Portal (WQP)

WQX Water Quality Exchange (WQX)

WY Water Year

Definitions

Ambient Background or away from point sources of contamination. Surrounding environmental condition.

Anadromous Migrating up rivers from the sea to breed in fresh water.

Aquifers An aquifer is a body of porous rock or sediment saturated with groundwater. Groundwater enters an aquifer as precipitation seeps through the soil. It can move through the aquifer and resurface through springs and wells.

Best Management Practices Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Contaminants of Emerging Concern Contaminants of Emerging Concern (CECs) are chemicals and toxics that have been found in waterbodies that may cause ecological or human health impacts and are not currently regulated

Coliform bacteria A group of bacteria predominantly inhabiting the intestines of humans or other warm-blooded animals, but also occasionally found elsewhere. Used as an indicator of human fecal contamination.

Conditionally approved shellfish Area When it meets Approved criteria some of the time but does not during predictable periods. During these periods the area is closed.

Conductivity A measure of the ability of water to pass an electrical current. This parameter indicates the quantity of dissolved substances (salts) present in the water.

Conservation Easement An easement restricting a landowner to land uses that are compatible with long-term conservation and environmental values.

Discharge The volume of water in a stream passing a given point at a given moment in time and is determined by measuring the stream channel cross-sectional area and the water's mean velocity at the selected site

Dissolved oxygen The concentration of dissolved oxygen (mg/L) in a water sample.

Dye Testing Using dye to Identify if a septic system is working properly.

E. coli A bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

Enterococci A subgroup of the fecal streptococci that includes S. faecalis, S. faecium, S. gallinarum, and S. avium. The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10 degrees C and 45 degrees C.

Fecal Coliform That portion of the coliform group of bacteria which is present in intestinal tracts and feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within 24 hours at 44.5 plus or minus 0.2 degrees Celsius. Fecal coliform bacteria are “indicator” organisms that suggest the possible presence of disease-causing organisms. Concentrations are measured in colony forming units per 100 milliliters of water (cfu/100 mL).

Geometric Mean A mathematical expression of the central tendency (an average) of multiple sample values.

Harmful Algae Blooms When colonies of algae grow out of control and produce toxic or harmful effects on people, fish, shellfish, marine mammals and birds.

Non-point source pollution Pollution that enters any waters of the state from any dispersed land-based or water-based activities, including but not limited to atmospheric deposition, surface-water runoff from agricultural lands, urban areas, or forest lands, subsurface or underground sources, or discharges from boats or marine vessels not otherwise regulated under the NPDES program. Generally, any unconfined and diffuse source of contamination. Legally, any source of water pollution that does not meet the legal definition of “point source” in section 502(14) of the Clean Water Act.

Noxious Weeds Noxious weeds are invasive, non-native plants that threaten agricultural crops, local ecosystems, or fish & wildlife habitats.

Perennial Stream Flowing throughout the year.

pH A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is neutral. Since the pH scale is logarithmic, a water sample with a pH of 8 is ten times more basic than one with a pH of 7.

Pocket estuaries Protected estuaries and lagoons within which there is too little wave action to form beaches.

Pollution Contamination or other alteration of the physical, chemical, or biological properties of any waters of the state. This includes change in temperature, taste, color, turbidity, or odor of the waters. It also includes discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state. This definition assumes that these changes will, or are likely to, create a nuisance or render such waters harmful, detrimental, or injurious to (1) public health, safety, or welfare, or (2) domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or (3) livestock, wild animals, birds, fish, or other aquatic life.

Pour Point The point on the surface at which water flows out of an area. It is the lowest point along the boundary of a watershed.

Restricted Shellfish Area Water quality does not meet standards for an Approved classification, but the sanitary survey indicates a limited degree of pollution from non-human sources. Shellfish harvested from Restricted growing areas cannot be marketed directly. They must be relayed (transplanted) to Approved growing areas for a specified amount of time, allowing shellfish to naturally cleanse themselves of contaminants before they are harvested for market.

Salinity The relative concentration of dissolved salts, usually sodium chloride, in each water.

Septic system Septic System is an on-site system designed to treat and dispose of sewage.

Shellfish beds Shallow and deep-water habitats with substrates consisting of mollusk shells. [EPA Habitat Categories/Habitat Protection at http://www.epa.gov/owow_keep/estuaries/pivot/habitat/habtype.htm]

Statistical Threshold Value STV is a measure of variability of your water quality distribution, derived as a model-based calculation approximating the 90th percentile using the lognormal distribution.

Surface Water All water naturally open to the atmosphere, such as rivers, lakes, reservoirs, ponds, streams, estuaries, and springs.

Turbidity A measure of water clarity. High levels of turbidity can have a negative impact on aquatic life.

Wetlands An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

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