

Thurston County Water Resources Monitoring Report 2019-2021 Water Year



Chambers Creek in the Deschutes River Watershed
Photo Credit: Sarah Ashworth, Thurston County Public Health

Report Includes:

*Water Quality of
Streams In Thurston
County*

September 2022

Prepared by:

Thurston County Public Health and Social Services Department,
Environmental Health Division and Thurston County Community
Planning and Economic Development, Stormwater Program

In Cooperation With:

City of Olympia Public Works, Water Resources Program
City of Lacey Public Works, Water Resources Program
City of Tumwater Public Works Department



Introduction

The mission of Thurston County Environmental Health (TCEH) is to achieve the highest well-being for all the residents of Thurston County by protecting public health and environmental quality. To accomplish this mission, TCEH has monitored the ambient water quality of Thurston County streams since 1983. Ambient data is useful for assessing the water quality of streams, advising the public of health risks, and tracking pollution and trends. This report summarizes Thurston County's water quality data for the 2019 to 2020 and 2020 to 2021 Water Years (WY) (October 2019 to September 2021). This work was funded by Thurston County Community Planning and Economic Development (CPED).

TCEH monitored 35 stream sites located in 8 watersheds (shown in Figure 1) in Thurston County between October 2019 and September 2021. Streams sites are sampled one time each month throughout the year. Sampling methods and analysis are conducted in accordance with Standard Operating Procedures and Analysis Methods for Water Quality Monitoring (Thurston County Public Health and Social Services, 2009).

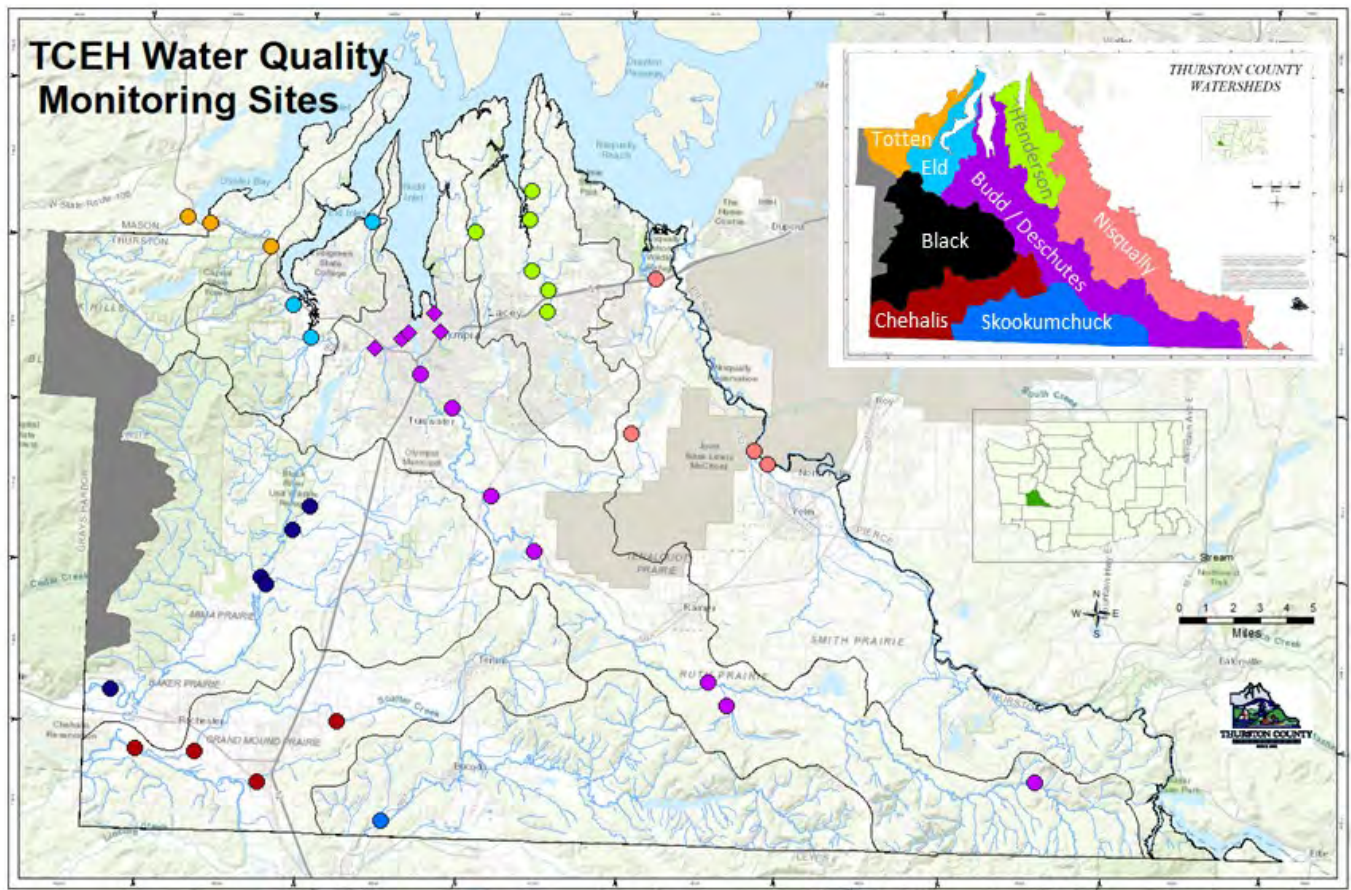


Figure 1. Map of Thurston County watersheds and TCEH water quality monitoring sites (colors differentiate watersheds).

Water Quality Index

The WQI is designed to rate general water quality relative to expected water quality. The Water Quality Index (WQI) combines seven measures of water quality:

- Four components measured (dissolved oxygen (DO), pH, temperature, and E Coli (EC) bacteria) are tied to the Water Quality Standards.
- Three measures (nitrogen, phosphorus, and turbidity) do not have numeric standards, but relate to general ecosystem function.

While E coli is tied to Water Quality Standards, the Department of Ecology has not incorporated this component into the current WQI metric. For the purposes of this report, bacterial standards met or failed will be shown by site on a map of each watershed.

Table 1. WQI scores and level of concern for impairment at TCEH ambient stream sites.

KEY
WQI Score: 80 or above - Low Concern for Impairment
WQI Score 40 to 79 - Moderate Concern for Impairment
WQI Score below 39 - High Concern for Impairment

Dissolved Oxygen

Dissolved oxygen (DO) is a major indicator of water quality. Aquatic life depends on an adequate level of oxygen dissolved in water to survive.

pH

pH is a measure of the acid balance of a solution and is defined as the negative logarithm of hydrogen ion concentration. In unpolluted waters, pH is controlled by dissolved chemical compounds (mineral and organic materials) and biological processes (photosynthesis, respiration, and decomposition). Atmospheric deposition and pollution also affect pH. The pH of surface water affects the solubility and availability of some nutrients and toxic metals.

Temperature

Water temperature affects many physical, chemical, and biological processes in aquatic systems.

E coli Bacteria

The concentration of E coli (EC) bacteria is used as an indicator of bacterial contamination of water bodies. The water quality standards for bacteria have two criteria: the geometric mean must not exceed 100 CFU/100mL and an upper limit value for no more than 10% of the samples to exceed 320. To calculate the central tendency of a sample distribution, the geometric mean is used because it tends to dampen the effect of very high or very low values.

Nutrients

Excess nutrients in surface waters can negatively affect public health and recreation. The Environmental Protection Agency (EPA) derived nutrient criteria for ecoregions across the country (EPA, 2000). These criteria, called the reference condition, represent the condition of surface waters

that are minimally impacted by human activities. TCEH samples collected from rivers and streams are analyzed for total phosphorus (TP) and nitrite+nitrate as nitrogen ($\text{NO}_2+\text{NO}_3\text{-N}$). The reference conditions concentration for the Puget Lowland ecoregion are:

- TP = 0.019 mg/L
- $\text{NO}_2+\text{NO}_3\text{-N}$ = 0.26 mg/L

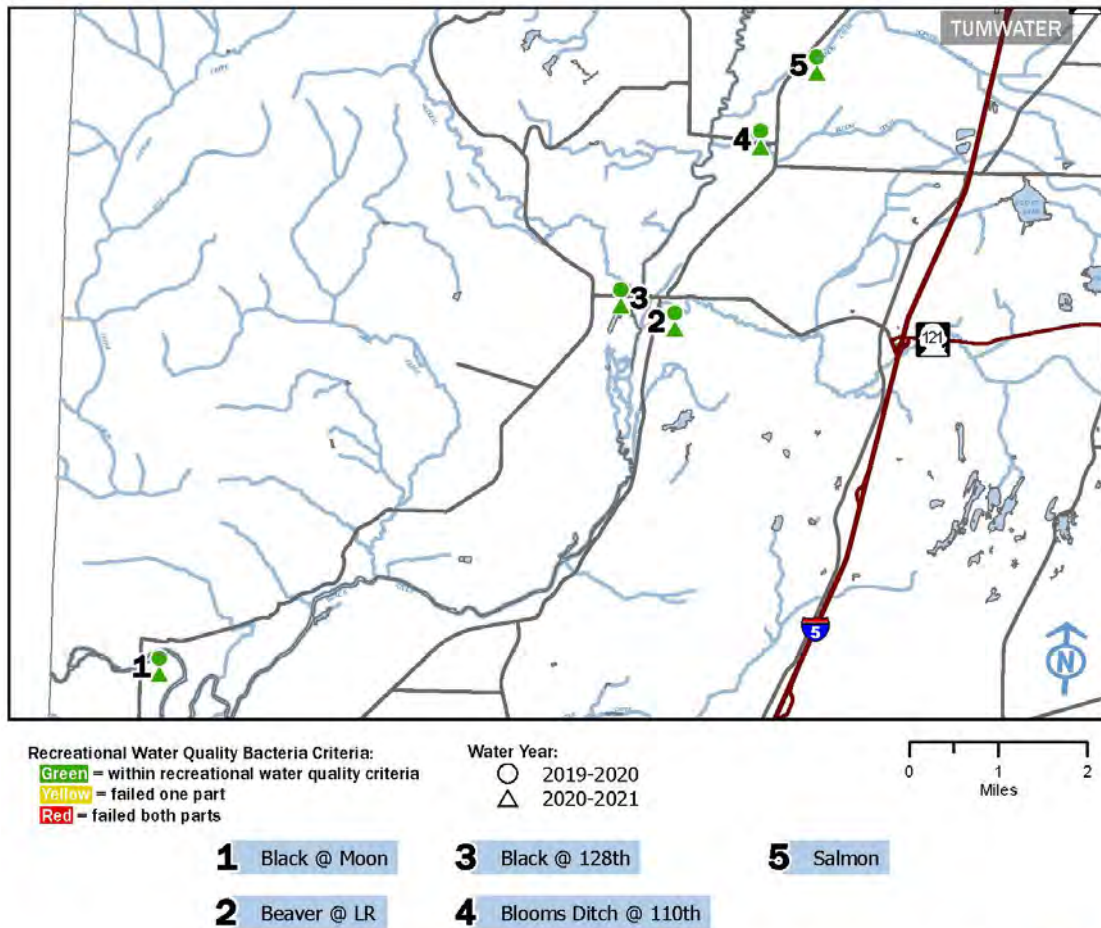
Turbidity

Suspended and dissolved materials in water cause light to be scattered rather than transmitted in straight lines. Turbidity measures the scattering of light and estimates the amount of suspended and dissolved materials such as silt, clay, finely divided organic and inorganic matter, chemicals, plankton, and other microscopic organisms. Excess suspended materials can prevent light penetration, interfere with fish activity, and once settled to the stream bottom, can smother eggs and invertebrate habitat.

Turbidity standards are based on nephelometric turbidity units (NTU) over background. The Washington State standard is the same for the three aquatic life uses, both freshwater and marine, at Thurston County water quality sites. The maximum turbidity criteria shall not exceed:

- 5 NTU over background, when the background is 50 NTU or less
- An increase of 10% when the background is more than 50 NTU

Black River Watershed



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Recreational Water Quality Bacteria Criteria:

- All five sites sampled within the Black River watershed were within recreational water quality criteria for both WYs sampled.

Water Quality Index (WQI):

2019-2020 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Black @ Moon	78	77	77	50	100	93	77
Black @ 128th	35	74	69	56	100	82	51
Beaver @ LR	91	74	77	75	98	89	86
Blooms Ditch @ 110th	73	73	71	76	100	75	77
Salmon	31	71	69	80	100	87	58

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Black @ Moon	77	74	77	59	100	92	79
Black @ 128th	10	65	86	58	100	84	46
Beaver @ LR	89	73	84	77	100	96	85
Blooms Ditch @ 110th	84	60	66	80	100	95	79
Salmon	19	58	69	81	100	83	42

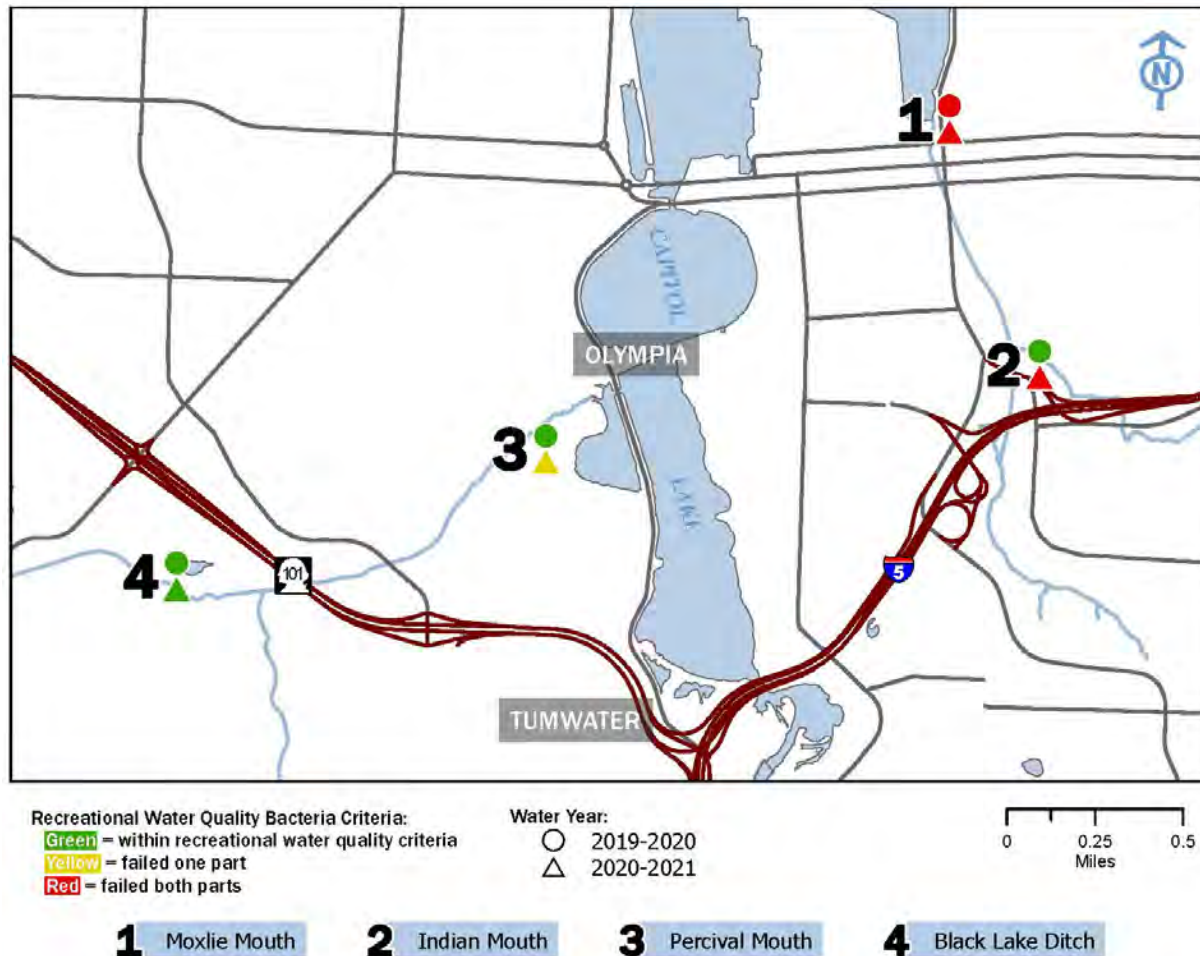
KEY

WQI Score: 80 or above - Low Concern for Impairment

WQI Score 40 to 79 - Moderate Concern for Impairment

WQI Score below 39 - High Concern for Impairment

Budd Inlet Watershed



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Recreational Water Quality Bacteria Criteria:

- One site (Moxlie Mouth) failed both parts of the water quality criteria in each water year sampled. This site is a stormwater outflow pipe.
- Indian Mouth and Percival mouth showed worse water quality for bacteria in the 2020-2021 season.
- Black Lake Ditch passed both water quality criteria in 2019-2021 sampling seasons.

Water Quality Index:

2019-2020 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Black Lake Ditch	33	78	79	60	100	88	47
Indian Mouth	90	93	64	81	100	83	88
Percival Mouth	75	95	81	64	100	93	78

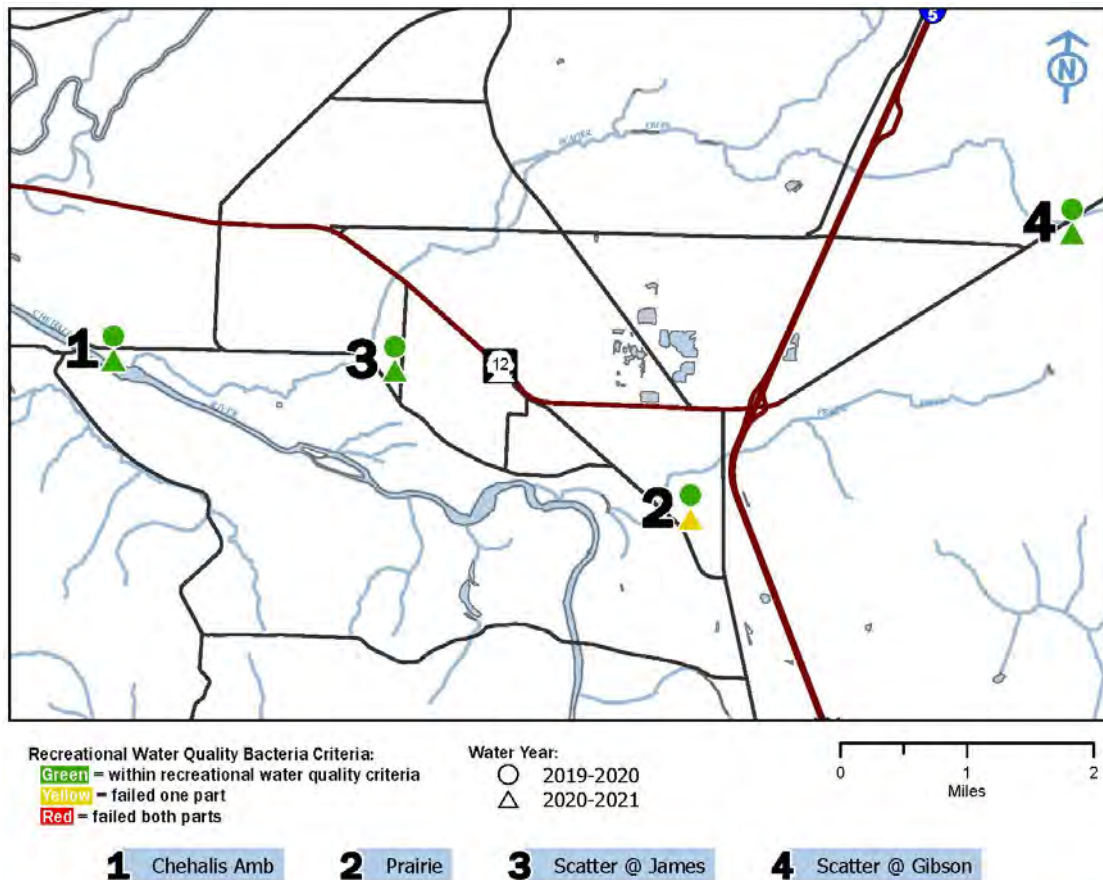
2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Black Lake Ditch	41	79	86	50	100	98	43
Indian Mouth	90	88	61	72	100	81	74
Percival Mouth	73	90	84	52	100	94	66

*Moxlie Mouth site is not sampled for these parameters and is not included in the WQI table.

KEY
WQI Score: 80 or above - Low Concern for Impairment
WQI Score 40 to 79 - Moderate Concern for Impairment
WQI Score below 39 - High Concern for Impairment

Chehalis River Watershed



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Recreational Water Quality Bacteria Criteria:

- Four sites sampled within the Chehalis River watershed were within recreational water quality criteria for both WYs sampled, while Prairie failed one part of the criteria in the 2020-2021 WY (shown in Figure ##).

Water Quality Index:

2019-2020 WY

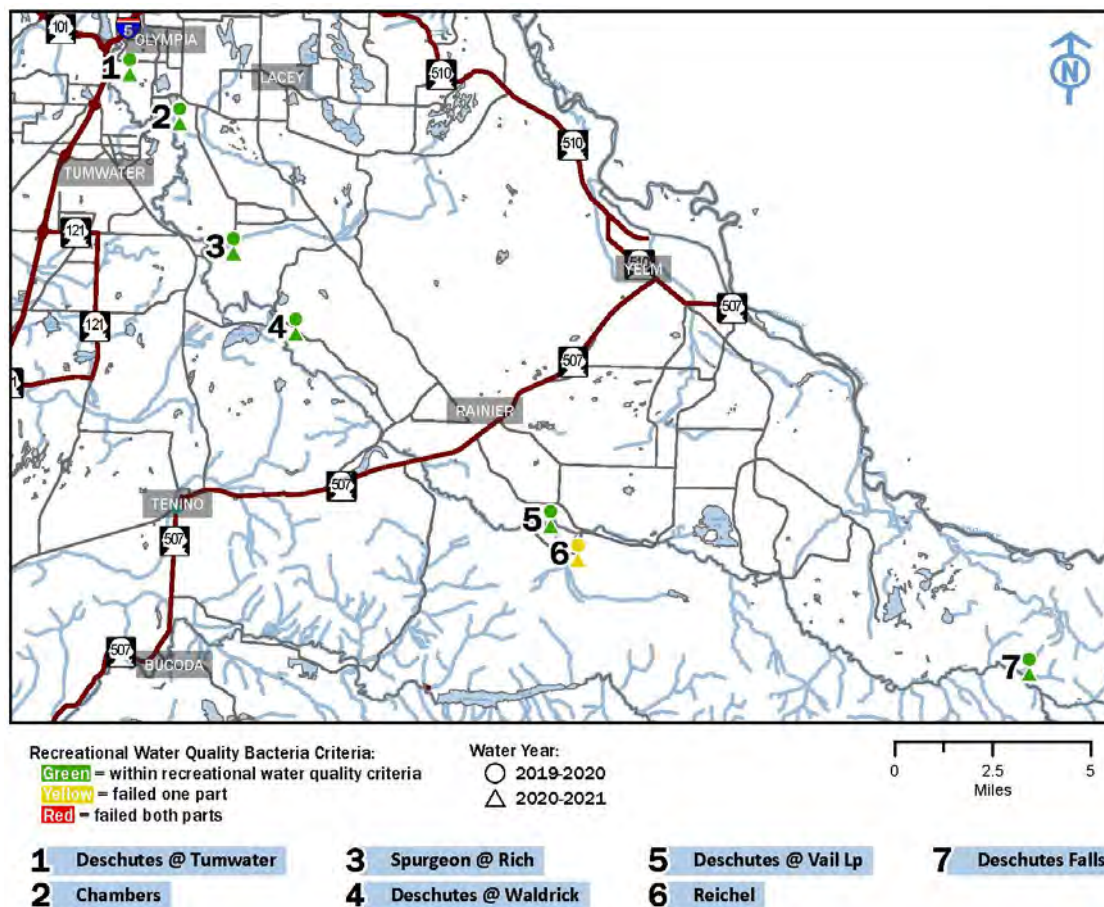
Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Chehalis Amb	92	86	74	50	100	83	75
Prairie*	91	66	73	72	98	85	79
Scatter @ Gibson*	52	81	84	79	100	97	76
Scatter @ James*	82	82	83	68	100	98	85

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Chehalis Amb	82	85	76	50	100	85	74
Prairie**	83	70	71	79	100	87	83
Scatter @ Gibson**	63	80	88	86	100	87	81
Scatter @ James**	89	86	88	79	100	87	90

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WQI Score below 39 - High Concern for Impairment

Deschutes River Watershed



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Recreational Water Quality Bacteria Criteria:

- Six sites sampled within the Deschutes River watershed were within recreational water quality criteria for both WYs sampled.
- One site (Reichel) failed one part of the water quality criteria.

Water Quality Index:

2019-2020 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Chambers	85	86	82	73	81	94	84
Deschutes Falls	84	94	92	82	100	96	94
Deschutes @ Tumwater	93	91	78	68	100	91	82
Deschutes @ Vail Lp	82	88	82	69	100	92	84
Deschutes @ Waldrick	90	82	84	60	100	94	81
Reichel	22	83	36	73	98	83	55
Spurgeon @ Rich	84	89	87	64	100	99	82

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Chambers	78	83	74	73	95	86	81
Deschutes Falls	90	88	88	83	100	89	94
Deschutes @ Tumwater	94	85	67	66	100	76	81
Deschutes @ Vail Lp	89	86	70	70	100	77	84
Deschutes @ Waldrick	1	82	43	62	100	73	78
Reichel	6	80	49	73	100	84	37
Spurgeon @ Rich	86	91	85	1	100	96	66

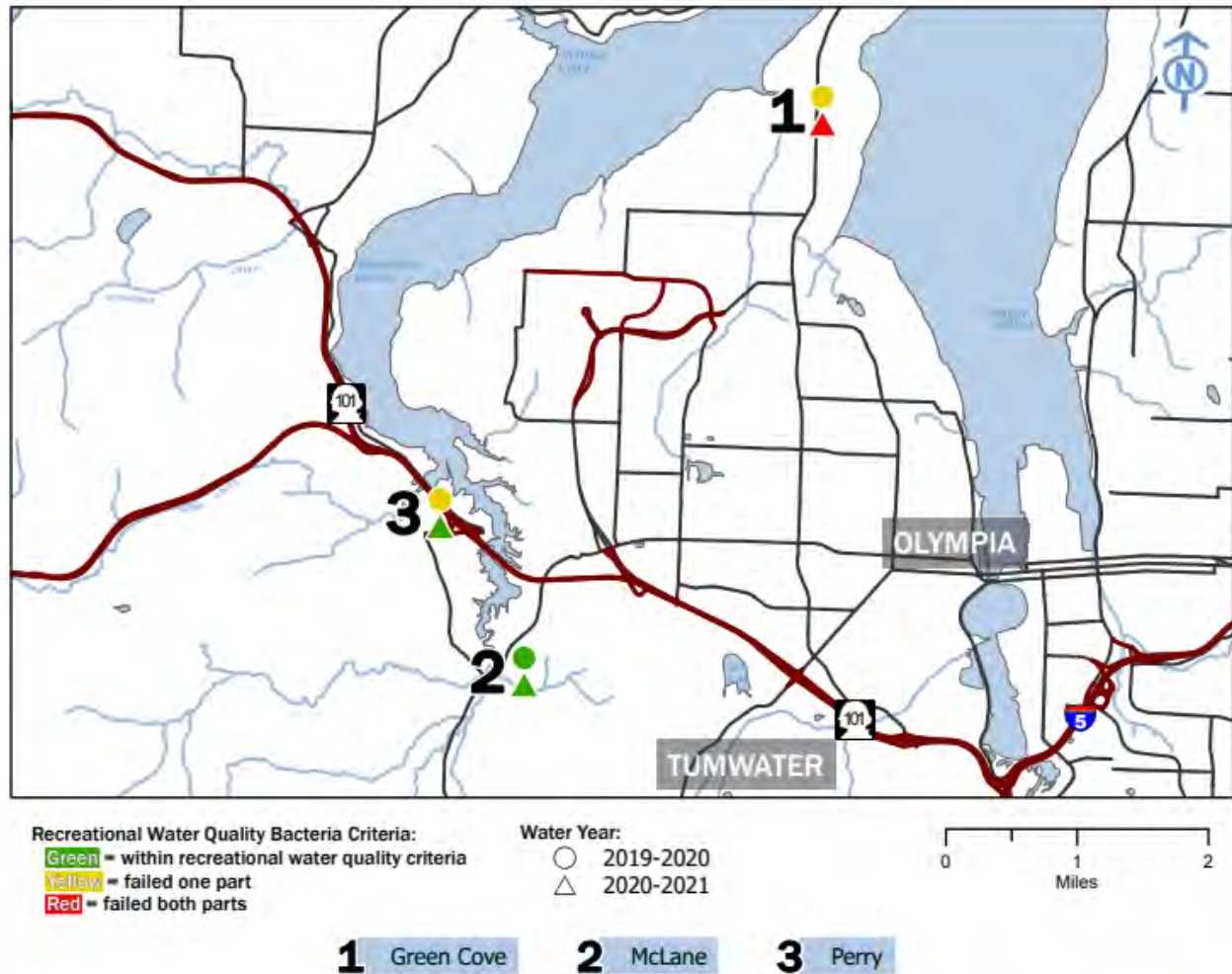
KEY

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WQI Score below 39 - High Concern for Impairment

Eld Inlet Watershed



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Recreational Water Quality Bacteria Criteria:

- One site (McLane) within the Eld Inlet watershed passed water quality criteria for both seasons sampled.
- Perry failed on one criterion during the 2019-2020 season.
- Green Cove failed both parts of the recreational water quality criteria during the 2020-2021 season, a degradation from the 2019-2020 season when it only failed one part.

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Water Quality Index:

2019-2020 WY

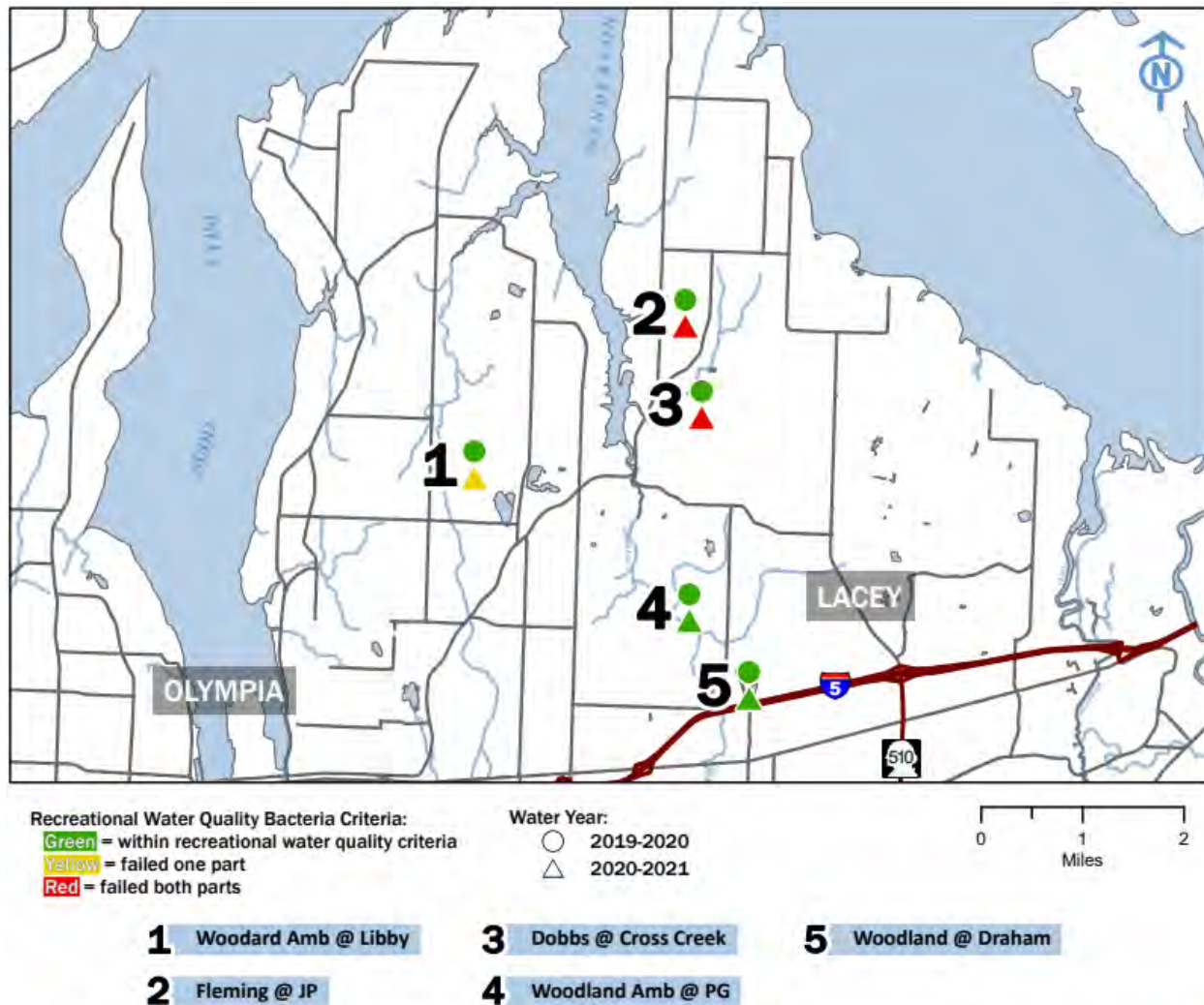
Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Green Cove	90	88	73	82	96	96	91
McLane	75	82	65	81	100	89	86
Perry	83	88	73	84	100	97	94

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Green Cove	89	87	74	76	97	96	89
McLane	80	81	77	76	100	91	85
Perry	86	87	74	80	100	93	91

KEY
WQI Score: 80 or above - Low Concern for Impairment
WQI Score 40 to 79 - Moderate Concern for Impairment
WQI Score below 39 - High Concern for Impairment

Henderson Inlet Watershed



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Recreational Water Quality Bacteria Criteria:

- Woodard Amb @ Libby failed on one criterion during the 2020-2021 season, showing slightly worse water quality than during the 2019-2020 sampling season.
- Fleming @ JP and Dobbs @ Cross Creek both showed significant degradation of water quality during the 2020-2021 season, failing both parts of the water quality criteria after passing in 2019-2020.
- Two sites (Woodland @ Draham and Woodland @ PG) within the Henderson Inlet watershed passed water quality criteria for both seasons sampled.

Water Quality Index:

2019-2020 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Dobbs @ Cross Creek	79	87	63	82	100	84	88
Fleming @ JP	48	81	61	85	100	82	76
Woodard Amb @ Libby	80	90	59	83	100	95	90
Woodland @ Draham	45	82	65	85	41	90	48
Woodland Amb @ PG	80	93	67	86	64	87	79

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Dobbs @ Cross Creek	81	60	41	82	100	69	73
Fleming @ JP	75	69	44	81	100	60	67
Woodard Amb @ Libby	73	80	55	63	100	89	75
Woodland @ Draham	63	83	66	77	41	94	64
Woodland Amb @ PG	81	92	70	77	74	92	80

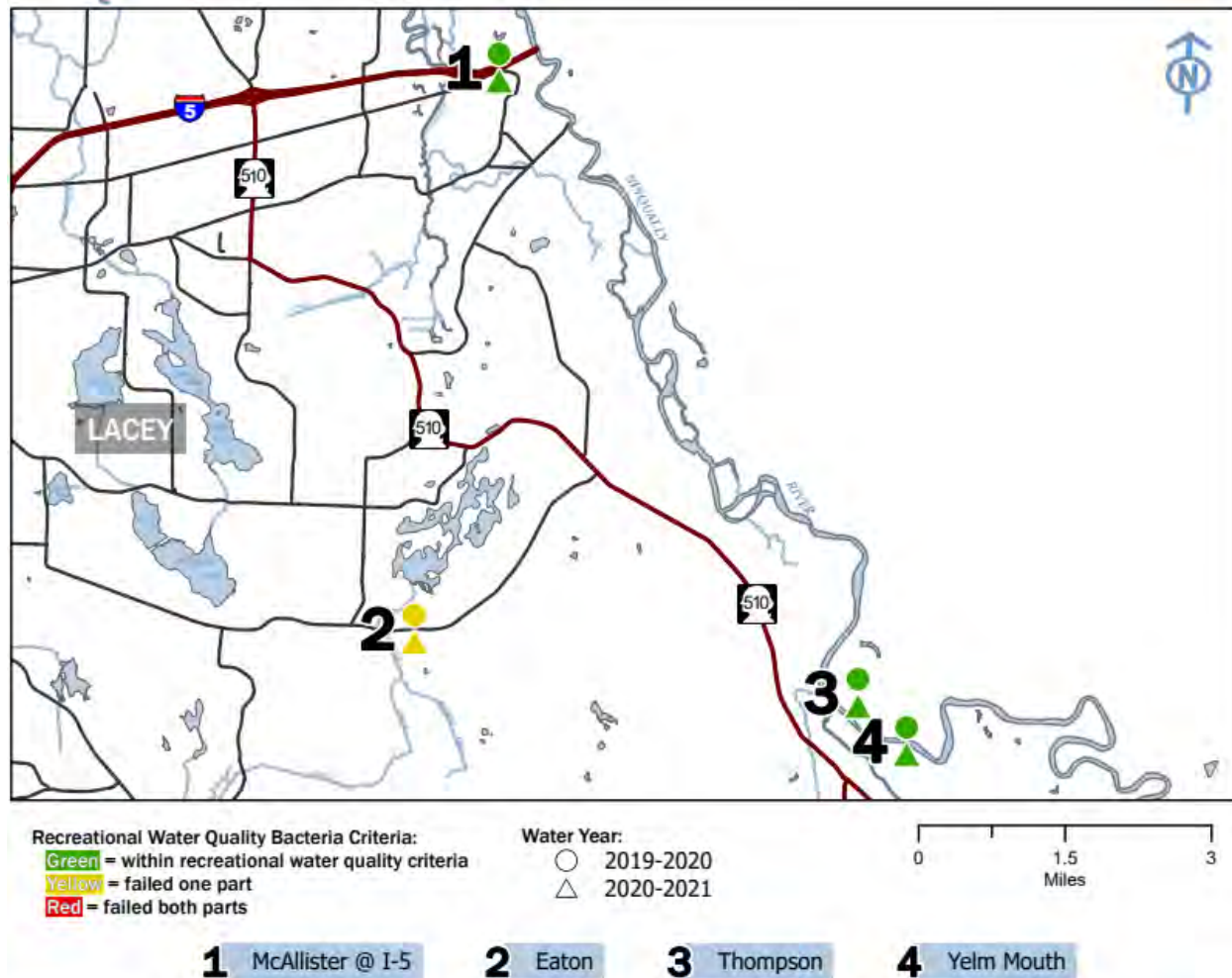
KEY

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WQI Score below 39 - High Concern for Impairment

Nisqually River Watershed



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Recreational Water Quality Bacteria Criteria:

- Three sites sampled within the Nisqually River watershed were within recreational water quality criteria for both WYs sampled.
- One site (Eaton) failed one part of the water quality criteria for both sampling seasons.

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Water Quality Index:

2019-2020 WY

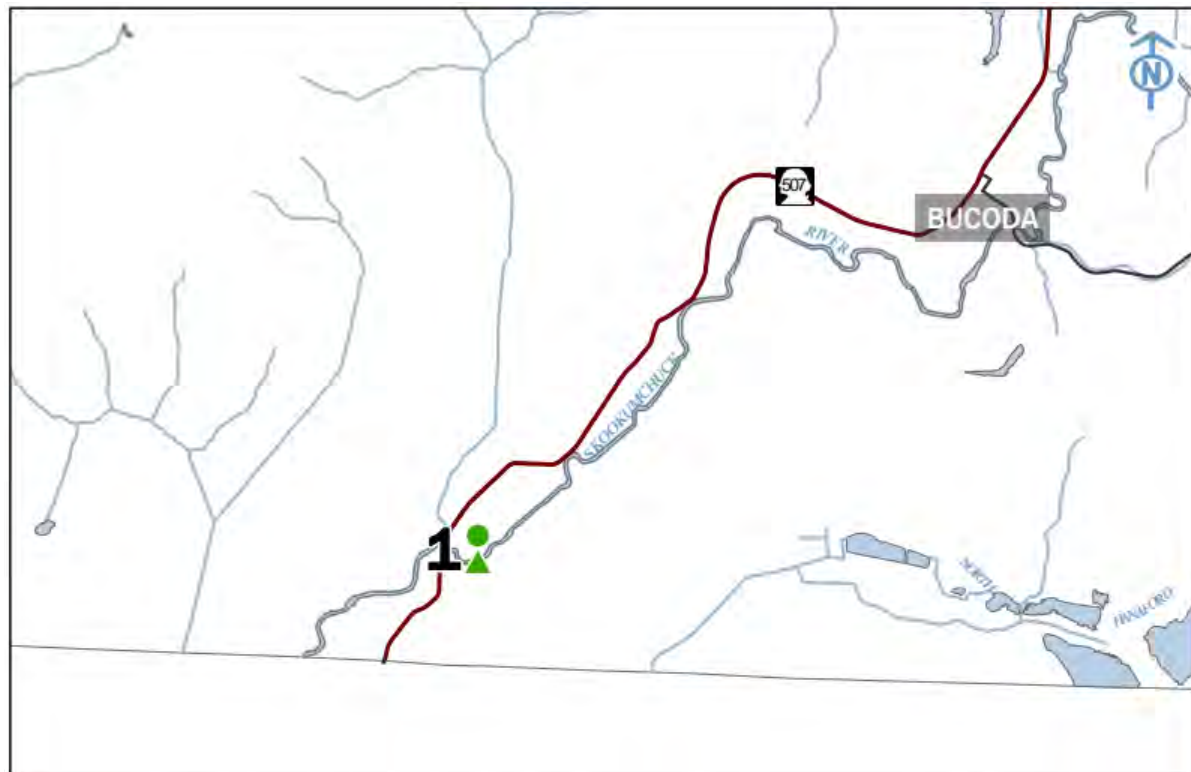
Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Eaton	76	85	60	87	100	93	85
Thompson	86	79	78	92	32	100	82
Yelm Mouth	83	95	90	84	7	100	94

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Eaton	84	75	71	81	100	95	86
Thompson	90	85	90	91	29	86	87
Yelm Mouth	1	93	87	83	22	100	70

KEY
WQI Score: 80 or above - Low Concern for Impairment
WQI Score 40 to 79 - Moderate Concern for Impairment
WQI Score below 39 - High Concern for Impairment

Skookumchuck River Watershed



Recreational Water Quality Bacteria Criteria:
Green = within recreational water quality criteria
Yellow = failed one part
Red = failed both parts

Water Year:
○ 2019-2020
△ 2020-2021

0 0.5 1
Mile

1 Skookumchuck

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Recreational Water Quality Bacteria Criteria:

- The one site sampled in the Skookumchuck River watershed pass both parts of the water quality criteria both water years.

Water Quality Index:

2019-2020 WY

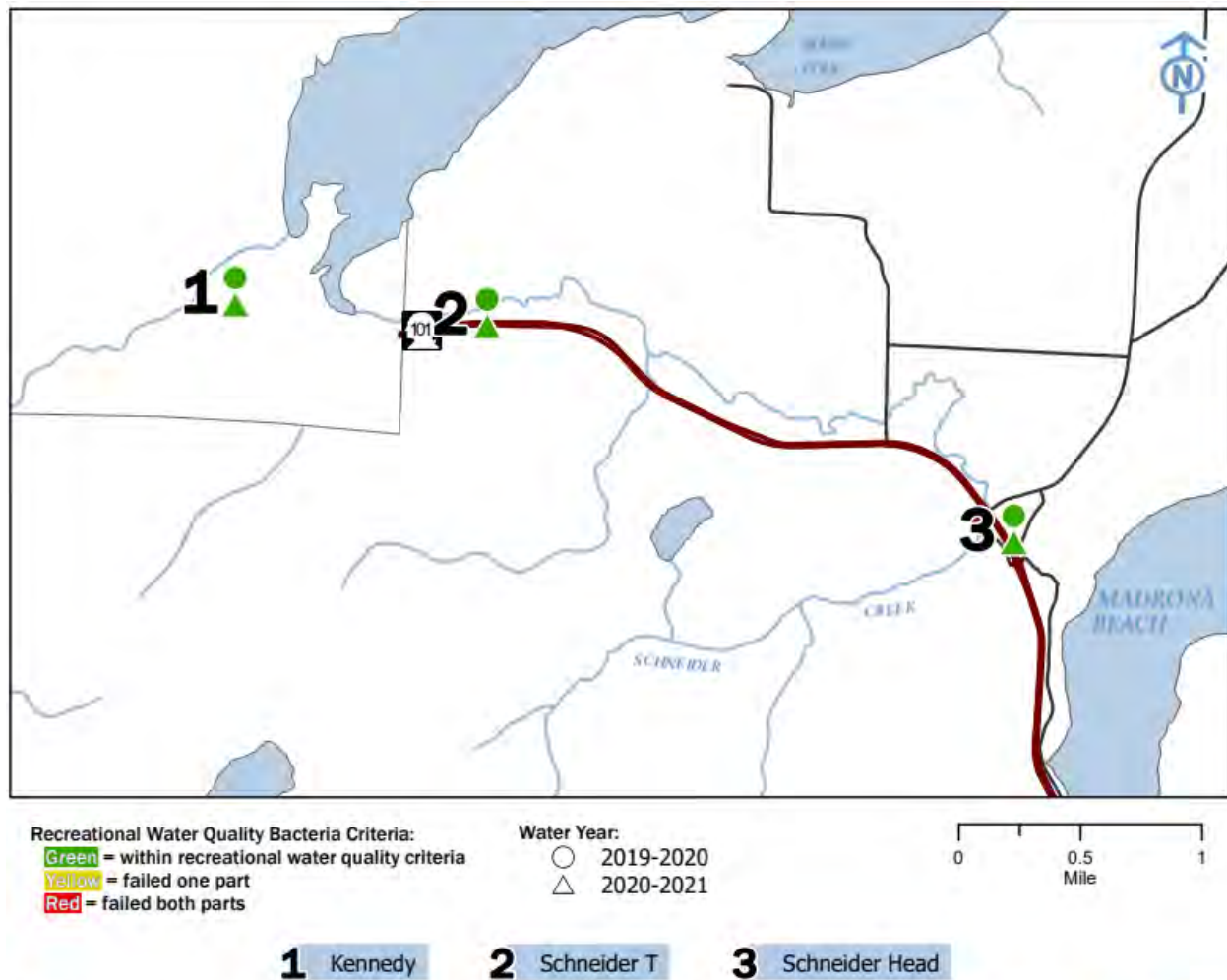
Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Skook	85	87	66	68	100	71	76

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Skook	79	86	80	66	100	76	73

KEY
WQI Score: 80 or above - Low Concern for Impairment
WQI Score 40 to 79 - Moderate Concern for Impairment
WQI Score below 39 - High Concern for Impairment

Totten Inlet Watershed



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Recreational Water Quality Bacteria Criteria:

- All three sites sampled within the Totten Inlet watershed were within recreational water quality criteria for both WYs sampled.

Water Quality Index:

2019-2020 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Kennedy	69	86	78	80	100	95	86
Schneider Head	53	79	83	78	100	88	71
Schneider T	60	83	75	76	100	84	78

2020-2021 WY

Site	DO	pH	TP	Temp	NOx*	Turb	Overall Score (WQI)
Kennedy	78	84	78	80	100	91	83
Schneider Head	11	78	88	71	100	80	49
Schneider T	68	76	78	79	100	87	75

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WQI Score below 39 - High Concern for Impairment