Justification for Water Quality Standards in the Quartz Valley Indian Reservation's 2023 Water Quality Control Plan

Prepared for the:

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SUMMARY

This document summarizes and provides justification for water quality standards in the Quartz Valley Indian Reservation's 2023 Water Quality Control Plan (WQCP). It is organized by pollutant. Table numbers correspond to those used in the 2023 WQCP. The figures included in this document do not appear in the 2023 WQCP, so are numbered according to their appearance herein.

DISCUSSION BY PARAMETER

Water Quality Criteria for Most Parameters

Most of the proposed water quality objectives are identical to those recommended by U.S. EPA in the 2016 Model WQS Template for Waters on Indian Reservations[1] which is based on a 2016 version of the U.S. EPA's National Recommended Water Quality Criteria tables for aquatic life[2], human health[3], and organoleptic effects[4]. Since the criteria those parameters have already been reviewed by U.S. EPA, it is not necessary to discuss them this document. The only parameters for which U.S. EPA has updated its National Recommended Water Quality Criteria since the 2016 Model WQS template are Cadmium (U.S. EPA 2016), microcystin, and cylindrospermopsin (U.S. EPA 2019, 2021), for which we reference the updated recommendations. We reviewed changes between the 2016 Model WQS Template and the February 2022 Model WQS Template and incorporated changes of substance (not every minor word change), including adding a Definitions section.

We made a few other modifications to U.S. EPA's National Recommended Water Quality Criteria tables and footnotes:

- Excluded all of the saltwater criteria for parameters because there is no saltwater on QVIR lands.
- Added footnotes n and o to the aquatic life criteria table (Table 5) to define Criteria Maximum Concentration (CMC) and Continuous Criteria Concentration (CCC)
- Added footnote k to human health criteria table (Table 9) to explain the meaning of "Water + Organism" and "Organism Only"
- Added footnote 7 to Table 17 (Design Flows) to explain how the harmonic mean flow differs from the arithmetic mean flow.
- Mercury and methylmercury (discussed below)

[1] https://www.epa.gov/wqs-tech/water-quality-standards-tools-tribes
[2] https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table
[3] https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table
[4] https://www.epa.gov/wqc/national-recommended-water-quality-criteria-organoleptic-effects

Methylmercury and mercury

Proposed objectives:

Excerpt from Table 5. Aquatic life criteria:

Compound	CAS Number	Freshwater	
		Criterion Maximum Concentration[n] (CMC) (µg/L)	Criterion Continuous Concentration[o] (CCC) (µg/L)
Mercury	7439976	Mercury criteria are set based on the more stringent Human Health Criteria (Table 9) rather than Aquatic Life Criteria	

Excerpt from Table 9. Human Health Criteria:

Pollutant	CAS Number	Water + Organism[k] (µg/L)	Organism Only[k] (µg/L)
Methylmercury[h]	22967926	N/A	0.*04 mg/kg*

h. Methylmercury "Organism Only" criteria are in units of mg/kg (µg/g) fish tissue and are based on the Tribal Subsistence (T-SUB) beneficial use from California Mercury Provisions (SWRCB 2017), not the USEPA Tribal/State Human Health Criteria Calculator. The average methylmercury concentrations shall not exceed 0.04 mg/kg fish tissue within a CALENDAR YEAR. The objective applies to the WET WEIGHT concentration in skinless fillet from a mixture of 70 percent TROPHIC LEVEL 3 fish and 30 percent TROPHIC LEVEL 4 fish as detailed in Attachment C of the California Mercury Provisions. The California Mercury Provisions also provide a table (Table 1 on page A-9 of SWRCB [2017]) with translated fish tissue-to-water column numbers meant to be used for reasonable potential analysis and development of effluent limitations for waterbodies with designated use of Tribal Subsistence Fishing (T-SUB), which QVIR adopts: 0.004 µg/L total mercury for flowing waterbodies (i.e., Shackleford Creek) and 0.001 µg/L total mercury for slow moving water bodies (i.e., wetlands).

k. The "Water + Organism" and "Organism Only" criteria are concentrations in water (units = µg/L), except for methylmercury which is concentration in fish/shellfish tissues (units = mg/kg). "Water + Organism" applies to waters designated for public drinking water supply, whereas "Organism Only" is for other waters designated as protection and propagation of fish, shellfish, and wildlife but not public drinking water supply.

Justification:

On May 2, 2017, the California State Water Resources Control Board adopted "Part 2 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California—Tribal and Subsistence Fishing Beneficial Uses and Mercury Provisions" (Resolution 2017-0027). The mercury provisions were approved by EPA on July 14, 2017. The Resolution sets statewide mercury fish tissue criteria for the protection of aquatic life, wildlife and human health and creates new beneficial uses for tribal and subsistence fish consumption uses for California Regional Water Quality Control Boards to assign to waterbodies. Because QVIR waters are tributary to CA waters, and CA waters are tributary to QVIR waters, the QVIR is adopting the relevant portions of the mercury provisions. All QVIR surface waters are designated as Tribal Subsistence Fishing (T-SUB), so QVIR's criteria adopt the CA mercury provisions' T-SUB fish tissue concentrations (0.04 mg/kg) and translated fish tissue-to-water column values for flowing waterbodies (0.004 µg/L total mercury) and slow moving waterbodies (0.001 µg/L total mercury). These translated fish tissue-to-water column values are listed in Table 1 on page A-of the CA Mercury Provisions: https://www.waterboards.ca.gov/water_issues/programs/mercury/docs/hg_prov_final.pdf.

Since mercury criteria to protect the human health-based T-SUB designated use are more stringent than the criteria to protect aquatic life-based designated uses (i.e., WILD, MIGR, RARE, WARM, COLD), and all QVIR surface waters are designated as T-SUB, QVIR is not adopting aquatic life-based criteria for mercury because such criteria would have been superseded.

Fecal Indicator Bacteria Criteria to Protect Contact Recreational, Cultural, and Shellfish Uses

Proposed objectives:

(i) For all waters with the designated use specified in paragraph (b)(2) of this section (recreation in and on the water) and (b)(3) of this section (contact cultural use), as modified by paragraph (k) of this section,

(1) Culturable *E. coli* should not exceed a geometric mean (GM) of 25 colony forming units (cfu) per 100 milliliters (mL) or a statistical threshold value (STV) of 81 cfu/100 mL.

(a) Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

(b) *E. coli* should be measured using U.S. EPA Method 1603, or any other equivalent method that measures culturable *E. coli.*

(ii) At all areas where shellfish may be harvested for human consumption (SHELL), the fecal coliform concentration throughout the water column shall not exceed 43/100 mL for a 5-tube decimal dilution test or 49/100 mL when a three-tube decimal dilution test is used (National Shellfish Sanitation Program, Manual of Operation).

(iii) Beach Action Values are not legally part of water quality standards and are not to be used to determine whether a water body is impaired under the Clean Water Act, but rather are triggers, which can be used for public health advisory postings. QVIR will use a Beach Action Value of 47 cfu *E. coli*/100 mL. When an *E. coli* sample exceeds the BAV, QVIR's Tribal Environmental Protection Department will post a public health advisory, if deemed appropriate.

Justification:

The U.S. EPA's (2012) Recreational Water Quality Criteria provides guidance to states and tribes regarding setting bacterial standards to protect primary contact recreation use. The guidance provides two sets of recommended criteria, one based on estimated illness rate of

36/1,000 primary contact recreators and the other based on an estimated illness rate of 32/1,000 primary contact recreators. Many members of QVIR, including young children, use lakes and rivers for recreation, subsistence, and ceremonies throughout the year. Some individuals are immersed in water daily during summer months. At an illness rate of 32/1000, and a corresponding *E. coli* level of 100 cfu/100 mL, an individual who swims every summer day would be expected to become ill three times that summer. For a single individual, three bouts of gastrointestinal illness per summer due to water contact is unacceptable to QVIR. Therefore, QVIR is setting its criteria based on a lower illness rate.

The recreational water quality objective set by the North Coast Regional Water Quality Control Board (NCRWCB 2018) in waters of California upstream and downstream of QVIR is based on fecal coliform, with the median concentration not to exceed 50 cfu fecal coliform/100 mL. The NCRWQCB's fecal coliform objective has been in place for decades and has a long history of acceptance by the public. If QVIR were to adopt an objective based on the U.S. EPA's recommended illness rate of 32/1000 recreators, Tribal members could potentially be subject to a substantially (i.e., 5x as described in the following paragraph) higher illness rate than they have been accustomed to under California's objectives for adjacent waters. QVIR agrees with U.S. EPA that *E. coli* is a more accurate indicator of human health risk than fecal coliform. The median ratio of *E. coli* to fecal coliform observed in QVIR's 160 paired bacterial monitoring samples from 2007-2014 is approximately 0.5:1 (Figure 1b), with some variation but no obvious shift in the relationship between the parameters at low values and high values (Figure 1a) (Genzoli et al. 2015). Multiplying the NCRWQCB's (2018) standard of 50 fecal coliform/100 mL by the observed 0.5 ratio yields an equivalent *E. coli* criteria of 25 cfu/100 mL. The expected illness rate for a geometric mean (GM) of 25 cfu *E. coli*/100 mL can be calculated from the equation provided in the U.S. EPA (2012) recreational water quality criteria, derived from analyses from the U.S. EPA (1986):

$$\text{Swimming-associated HCGI illness} = -11.74 + 9.397\ (\text{mean log10 E. coli/100 mL})$$

Mean log10 *E. coli* is the same as a geometric mean, 25 cfu *E. coli*/100 mL can be inserted into the above equation to yield an HCGI[5] illness rate of 1.4, which can then be multiplied by 4.5 to obtain an NGI[6] illness rate of 6.28, which can then be rounded to a final NGI illness rate of 6. An NGI illness rate of 6/1000 recreators is approximately 5x lower than the U.S. EPA's (2012) recommended NGI illness rate of 32/1000 recreators, and is acceptable to QVIR.

U.S. EPA (2012) recreational water quality criteria recommend setting a statistical threshold value (STV) in addition to a GM. The STV and GM are both derived from the same log-normal distribution, with the GM being the 50th percentile while the STV is the 90th percentile. For a normal distribution, the 90th percentile can be estimated from the mean and the standard deviation using the formula:

[5] U.S. EPA (1986) used "highly credible gastrointestinal illnesses" (HCGI) which were defined as "any one of the following unmistakable or combinations of symptoms [within eight to ten days of swimming]: (1) vomiting (2) diarrhea with fever or a disabling condition (remained home, remained in bed or sought medical advice because of symptoms), (3) stomachache or nausea accompanied by a fever."

[6] Following the convention of the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR), U.S. EPA (2012) used NEEAR-GI illness (NGI) which broadened the definition of illness in that diarrhea, stomachache, or nausea is included without requiring the occurrence of fever.

$$X=\mu+Z\sigma$$

Where X is the percentile, μ is the mean, Z is the Z-score corresponding the percentile (i.e., number of standard deviations from the mean), and σ is the standard deviation (WSDOE 2017). The Z-score for the 90th percentile is 1.282 (CDC 2009). The logged standard deviation from the pooled variance in the *E. coli* samples used to generate the 1986 recommended criteria (same dataset used for the 2012 recommended criteria) was 0.40 (U.S. EPA 1986, as cited in U.S. EPA 2012). Inserting the 25 cfu *E. coli* GM and inserting into the log form (base 10) of the equation above and then simplifying yields:

$$\log(X)= \log(25) + (1.282 * 0.4)$$
$$\log(X)=1.3979 + (0.5128)$$
$$\log(X)=1.9107$$

Raising 10 to 1.9107 power (i.e., anti-log) results in 81. This is QVIR's proposed STV.

U.S. EPA (2012) provides recommended Beach Action Values (BAV), which are not intended to be used as water quality standards but rather used as triggers for public health advisory postings. U.S. EPA (2012) recommends that the BAV be set at the 75th percentile of the same distribution used to set the GM and STV. Inserting the Z-score for the 75th percentile (0.674, CDC 2009) in place of the Z-score for the 90th percentile (1.282) into the equation above yields:

$$\log(X)= \log(25) + (0.674 * 0.4) = 1.6675$$

Raising 10 to the 1.6675 power (i.e., anti-log) results in 46.5, which can then be rounded to 47. This is QVIR's proposed BAV.

QVIR's proposed fecal coliform criteria for shellfish are identical to the fecal coliform criteria in the NCRWQCB (2018) Basin Plan.

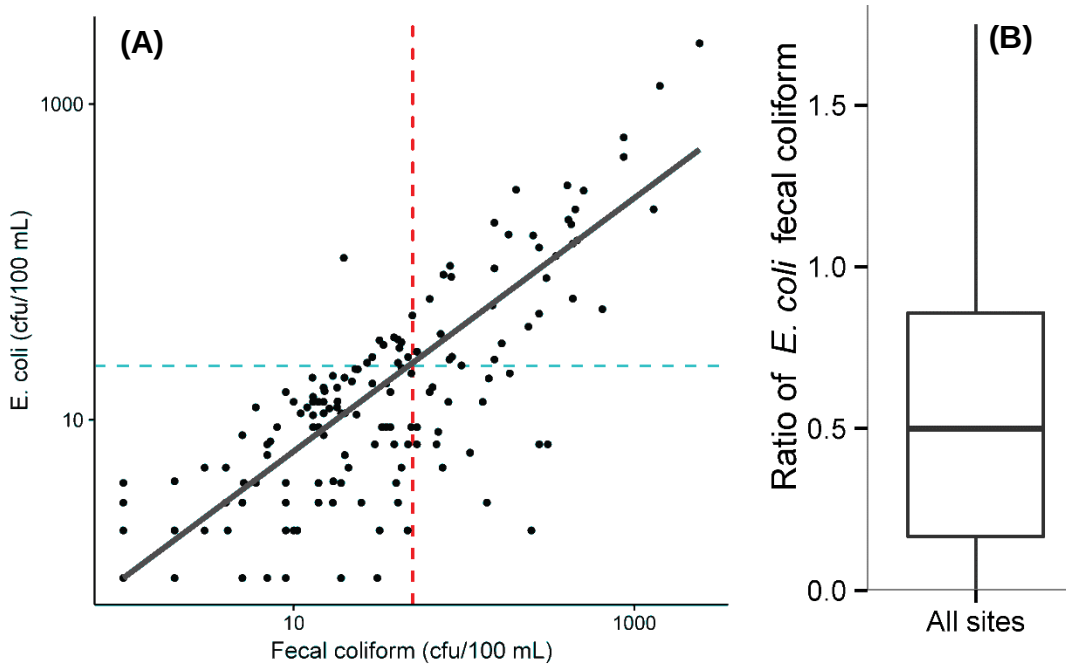

Figure 1. (A) *E. coli* vs. fecal coliform, and (B) ratio of *E. coli* to fecal coliform in QVIR's 160 paired bacterial monitoring samples within the reservation and upstream in U.S. Forest Service grazing allotments in 2007-2014 (Genzoli et al. 2015). In (A), the black line is the median regression, the dashed red line is the current NCRWQCB fecal coliform threshold, and the dashed blue line is QVIR's proposed *E. coli* threshold of 25 cfu/100 mL which coincides with where the fecal coliform threshold crossed the median linear regression. In (B), the horizontal line inside the box is the median, the top and bottom of the box are the 75th and 25th percentiles, and the whiskers extend to 1.5 times the interquartile range.

Cyanobacterial Toxins and Cyanobacteria Cell Density

Proposed objectives:

(5) *Cyanobacteria criteria to protect human health.* Concentrations of cyanobacteria (blue-green algae) cells and cyanobacterial toxins shall conform to the limits listed in **Error! Reference source not found.**. The table provides criteria that differ according to groups of designated uses:

(iv) Contact Cultural (CUL-1) and Contact Recreational (REC-1) Uses

(v) Shellfish Harvesting (SHELL, Fish Consumption (FC), Tribal Subsistence (T-SUB)

(vi) Drinking water (MUN)

Justification:
The Rationale for Proposed column in the table provides a summary of the justification. The criteria are based largely on those recommended by Kann (2014) in a technical memo prepared during revision of the Karuk Tribe's water quality standards (Karuk Tribe 2014) and also later adopted by the Yurok Tribe (YTEP 2016). In addition, the proposed criteria also include updates to account for new information that has become available since 2014. For example, the Minnesota Department of Public Health updated (MDPH 2015a, 2015b) their previous toxicology and drinking water guidance for microcystin (MDPH 2012a, 2012b), which revised the drinking water guidance upward from 0.04 µg/L to 0.1 µg/L. In addition, U.S. EPA issued recommended recreational water quality criteria for microcystin and cylindrospermopsin (2019, 2021), and also issued drinking water health advisories (HAs) for microcystin and cylindrospermopsin (U.S. EPA 2015a, 2015b, 2015c). However, the U.S. EPA drinking water HAs were for 10-day exposures, whereas the Minnesota drinking water guidance was for chronic exposure, therefore we recommend that QVIR use the Minnesota (MDPH 2015a, 2015b) values as water quality criteria since the Minnesota chronic exposure guidance value is more protective of public health.

QVIR's proposed recreational criterion of 4.0 µg/L for microcystin is lower than the U.S. EPA (2019, 2021) final recreational criterion for microcystin of 8.0 µg/L, the Hoopa Valley Tribe's microcystin criterion of 8.0 µg/L, and the 6.0 µg/L Tier II Danger postings level from the 2016 updates (CCHAB 2016) to California's Statewide Voluntary Guidance on CyanoHABs in Recreational Waters (SWRCB 2010). However, QVIR's proposed criterion matches that the Karuk Tribe's (2014) water quality criterion and the Yurok Tribe's (2016) Tier II posting Danger postings level. QVIR chooses more stringent criteria because members of QVIR and other local Tribes have unique and greater environmental exposures, as described by Middleton et al. (2019) in the following excerpts:

"…Tribal members may face additional exposures and adverse impacts (beyond those among the general population) through Tribal lifeways that include cultural and ceremonial activities as well as subsistence fishing, hunting, and gathering. Tribal members are integrally related to the environment in ways not typically accounted for in

most exposure evaluation models, which reflect exposures largely received in urban and suburban settings and do not consider the extent of Tribal environmental contact."

"...coupled with the Tribe's strong commercial and subsistence fisheries, high utilization due to economic reliance on other coastal and riverine resources, and extensive cultural programs and ceremonial activities, place the Yurok at severe risk of cumulative exposures from multiple contaminants.

"Therefore, while Tribal members face the same routine exposures as do members of mainstream American communities to industrial additives and contaminants in commercial products and foods, exposures to such contaminants may be increased through Tribal-specific activities."

The frequency and duration for QVIR's proposed cyanobacteria criteria for CUL-1 and REC-1 beneficial uses are variations of U.S. EPA (2019 and 2021) recommendations. Given the greater exposure of QVIR members, we deemed U.S. EPA's (2019 and 2021) recommendation that concentrations shall not be exceeded in "more than *three* 10-day periods per recreational season" to be too high and therefore chose "more than *two* 10-day periods per recreational season" to be more protective of QVIR members. In addition, U.S. EPA (2019 and 2021) recommendations allow states and authorized tribes flexibility to make a risk management decision in setting the number of years the pattern of exceedances can occur and not impair the recreational use. U.S. EPA (2021) mentions rolling 3-year or 5-year periods as examples of recurrence frequencies. Given the greater exposure of QVIR members, we recommend a rolling 10-year period. The full recommended frequency, duration, and recurrent frequency is: "concentrations shall not be exceeded in more than two 10-day periods per recreational season, for more than one recreational season, over a rolling 10-year period."

QVIR's proposed cyanobacteria criteria are measured as concentrations of toxins and cells in water column samples. In recent years, evidence has emerged of widespread benthic (i.e., living on the riverbed) cyanobacteria in the Klamath River (Genzoli and Kann 2020). These benthic cyanobacteria form mats that pose a public health risk through ingestion. However, sampling protocols are still being developed and we are not aware of any water quality criteria that have been established targeting benthic cyanobacteria. QVIR may revisit this issue in future triennial reviews.

Table 16. Cyanobacterial toxin and cell density criteria, associated public health posting levels, and drinking water health advisories. Frequency and duration CUL-1 and REC-1 water quality criteria: concentrations shall not be exceeded in more than two 10-day periods per recreational season, for more than one recreational season, over a rolling 10-year period.

Parameter	Designated Uses	Proposed Water Quality Criterion, Public Health Posting Level, or Health Advisory		Rationale
***Microcystis aeruginosa* cell density**	Drinking water (MUN)	Health advisory[1]	Below detection	The Minnesota (2015a, 2015b) Heinze-based short-term non-cancer "Health Based Value" of 0.1 µg/L essentially does not allow for the detection of any cells
	Contact Cultural (CUL-1) Contact Recreational (REC-1)	Level 1 Public Health Posting[2]	1,000 cells/mL	Cell density corresponding to toxin levels associated with OEHHA (2012) "Action Level"
		Water Quality Criterion and Level 2 Public Health Posting[3]	5,000 cells/mL	Cell density corresponding to toxin levels associated with 5x OEHHA (2012) "Action Level"
Total microcystin toxin concentration[4]	Drinking water (MUN)	Health advisory[1]	0.1 µg/L total microcystins[4]	Minnesota (2015a, 2015b) Heinze-based short-term non-cancer "Health Based Value" of 0.1 µg/L.
	Contact Cultural (CUL-1) Contact Recreational (REC-1)	Level 1 Public Health Posting[2]	0.8 µg/L total microcystin.	OEHHA (2012) "Action Level"
		Water Quality Criterion and Level 2 Public Health Posting[3]	4.0 µg/L total microcystin	5x OEHHA (2012) "Action Level"
Total potentially toxigenic blue-green algal species[5]	Contact Cultural (CUL-1) Contact Recreational (REC-1)	Water Quality Criterion	100,000 cells/mL or Cyanobacterial scums	WHO/SWRCB guidelines
Cylindrospermopsin	Drinking water (MUN)	Health advisory[1]	0.7 µg/L	U.S. EPA (2015a)
	Contact Cultural (CUL-1) Contact Recreational (REC-1)	Level 1 Public Health Posting[7]	1 ug/L	CCHAB (2016) Caution Action Trigger
		Water Quality Criterion and Level 2 Public Health Posting[8]	15 µg/L	U.S EPA (2019, 2021). CCHAB (2016) Danger Tier II is similar but higher (17 µg/L).
Anatoxin-a	Contact Cultural (CUL-1) Contact Recreational (REC-1)	Level 1 Public Health Posting[7]	Detection[9]	CCHAB (2016)
		Water Quality Criterion and Level 2 Public Health Posting[8]	90 µg/L	OEHHA (2012) "Action Level"
Cyanotoxins in Fish & Shellfish	Shellfish Harvesting, Fish Consumption (SHELL, FC, T-SUB)	Water Quality Criterion	10 ng/g microcystins, <5000 ng/g anatoxin, <4 ng/g cylindrospermopsin (wet weight)	OEHHA (2012) "Action Level"

Footnotes to Table 16

[1] For treated water, testing for drinking water health advisories should be conducted at entry point into water distribution system. For water that is directly used for drinking water without treatment, including groundwater wells used for water supply, then testing for drinking water health advisories should be conducted on raw water.

[2] The water quality criteria are set at the Level 2 Health Advisory Danger, but the Level 1 Health Advisory Warning are also included in this table for informational and management purposes. The Level 1 Health Advisory Warning posting will include: Avoid contact with or use of river water because public health advisory thresholds for blue-green algae (*Microcystis aeruginosa*) cell counts or associated toxins were exceeded during recent public health monitoring.

[3] The Level 2 Health Advisory Danger posting will include: Water is unsafe for contact or use and poses a high risk of potential health impacts due to levels of *Microcystis aeruginosa* cell counts or associated toxins recently detected at 5x the Public Health advisory thresholds.

[4] Value based on the older WHO studies, and although OEHHA (2012) did not evaluate drinking water "action levels", the Minnesota Department of Health (2015a, 2015b) utilized the Heinze-based lowest-observed-adverse-effect level (LOAEL) of 0.05 mg/kg/day, converted that to a human equivalent dose of 0.012 mg/kg/day, and utilized an uncertainty factor of 300 to arrive at a short-term non-cancer "Health Based Value" of 0.1 μg/L.

[5] While there are numerous congeners of microcystin (e.g., microcystin-LA, RR, and YR) the most extensive toxicological information is available for the microcystin-LR congener. However, the literature indicates that most of these congeners appear to have similar toxicological effects (OEHHA 2012). Therefore, the toxicity criteria apply to the total of all microcystin congeners (if measured separately the concentration of the various congeners is summed), or if ELISA methodology is used then the reported value is already assumed to represent the total.

[6] Includes: *Dolichospermum (formerly known as Anabaena), Microcystis*, *Planktothrix, Gloeotrichia* and *Oscillatoria*

[7] The water quality criteria are set at the Level 2 Health Advisory Danger, but the Level 1 Health Advisory Warning are also included in this table for informational and management purposes. The Level 1 Health Advisory Warning posting will include: Avoid contact with or use of river water because public health advisory thresholds for toxins associated with blue-green algae were exceeded during recent public health monitoring.

[8] The Level 2 Health Advisory Danger posting will include: Water is unsafe for contact or use and poses a high risk of potential health impacts due to high levels of toxins associated with blue-green algae being exceeded during recent public health monitoring.

[9] Must use an analytical method that detects ≤ 1μg/L Anatoxin-a.

Dissolved Oxygen

Proposed objectives:

Dissolved oxygen (DO) concentrations shall conform to the following aquatic life requirements:

Table 2. Dissolved Oxygen Aquatic Life Criteria for Fresh Waters

Beneficial Use	Daily Minimum Objective (mg/L)	7-Day Moving Average Objective (mg/L)[7]
Warm Freshwater Habitat (WARM)	5.0	6.0
Cold Freshwater Habitat (COLD)	6.0	8.0
Spawning, Reproduction, and/or Early Development (SPWN)[8]	9.0	11.0

[7] A 7-day moving average is calculated by taking the average of each set of seven consecutive daily averages.

[8] Water quality objectives designed to protect SPWN-designated waters apply to all fresh waters designated in Table 1 as SPWN in those reaches and during those periods of time when spawning, egg incubation, and larval development are occurring or have historically occurred. The period of spawning, egg incubation, and emergence generally occur between the dates of September 15 and June 4.

Justification:
The proposed dissolved oxygen objectives are similar to the dissolved objectives adopted by the North Coast Regional Water Quality Control Board (NCRWQCB)(and approved by U.S. EPA on April 24, 2017), the regulatory authority adjacent to QVIR. The only difference between NCRWQCB's DO criteria and QVIR's proposed DO criteria is that NCRWQCB included a natural conditions clause for developing site-specific DO objectives that QVIR deemed unnecessary. If site-specific DO objectives become needed later, QVIR will develop them during a future triennial review.

Specific Conductance, pH, Hardness, and Boron

Proposed objectives:

The water quality objectives for surface water streams and groundwater for specific conductance, pH, hardness, and boron in Table 4 shall apply

Table 4 Specific Water Quality Objectives for Reservation waterbodies

Waterbody	Specific Conductance (micromhos) @ 25 °C		Hydrogen Ion (pH units)		Hardness (mg/L as $CaCO_3$)	Boron (mg/L as B)	
	90% Upper Limit[1]	50% Upper Limit[2]	Max	Min	50% Upper Limit[2]	90% Upper Limit[1]	50% Upper Limit[2]
All Streams	400	275	8.5	7	120	0.2	0.1
Groundwaters[3]	500	250	8.0	7	120	0.1	0.1

[1]90% upper and lower limits represent the 90 percentile values for a calendar year. 90% or more of the values must be less than or equal to an upper limit and greater than or equal to a lower limit.

[2]50% upper and lower limits represent the 50 percentile values of the monthly means for a calendar year. 50% or more of the monthly means must be less than or equal to an upper limit and greater than or equal to a lower limit.

[3]Value may vary depending on the aquifer being sampled. This value is the result of sampling over time, and as pumped, from more than one aquifer.

Justification:
The proposed objectives for specific conductance, pH, hardness, and boron are identical to the objectives for streams and groundwater in the Scott Valley Hydrologic Area in the North Coast Regional Water Quality Control Board's Basin Plan (NCRWQCB 2018), the regulatory authority adjacent to QVIR.

Nutrients and Organic Matter

Proposed objectives:

Nutrients and organic matter shall conform to those limits listed in Table 3.

Table 3 Nutrient and Organic Matter Objectives for Tribal waterbodies.

Parameter	Dry season: May – Oct	Wet season: Nov – Apr
Total Phosphorus (TP)	0.028 mg/L	0.019 mg/L
Total Nitrogen (TN)	0.310 mg/L	0.325 mg/L
5-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	4 mg/L	3 mg/L

Justification:
Excessive levels of nutrients and organic matter have been identified as causing deleterious effects to water quality and aquatic ecosystems in the Klamath Basin, including the Scott River (NCRWQCB 2010). The proposed criteria are based on the NCRWQCB (2010) Total Maximum Daily Loads (TMDLs) for the Klamath River and its tributaries. The values in Table 3 above were extracted from the Scott River values in NCRWQCB (2010) Tables 5.15 and 5.16.

Drinking Water Criteria

Proposed objectives:

(i) In no case shall waters designated for use as domestic or municipal supply (MUN) contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCL) and secondary maximum contaminant levels (SMCL) in Table 10, Table 11, Table 12, Table 13, Table 14, and Table 15.

(ii) In no case shall groundwaters designated for use as Municipal and Domestic Supply (MUN) contain detectable levels of *E. coli* (i.e., 0 cfu/100 mL or 0 mpn/100 mL).

[The proposed Tables are not included here due to their length, please refer to the 2023 WQCP].

Justification:
The proposed objectives in (i) are similar to those in the EPA-approved NCRWQCB (2018) Basin Plan. Instead of including tables of specific values, the Basin Plan incorporates Title 22 of the California Code of Regulations by reference and states that the incorporation by reference is prospective, meaning that any future changes to Title 22 are automatically incorporated. For sovereignty reasons, we elected to extract the current (July 1, 2022) version relevant tables from Title 22 and insert them into WQCP instead of using the Basin Plan's strategy of prospective incorporation. Specific sources for the tables are:

- Table 10. Maximum Contaminant Levels for Inorganic Chemicals, derived from Title 22 of the California Code of Regulations, Section 64431, accessed July 1, 2022 from:

https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/IA7B3800D18654ABD9E2D24A445A66CB9?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

- Table 11. Maximum Contaminant Levels for Volatile Organic Chemicals (VOCs), derived from Title 22 of the California Code of Regulations, Section 64444, accessed July 1, 2022 from: https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/IA7B3800D18654ABD9E2D24A445A66CB9?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)
- Table 12. Maximum Contaminant Levels for Non-Volatile Synthetic Organic Chemicals (SOCs), Title 22 of the California Code of Regulations, Section 64431, accessed July 1, 2022 from: https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/IA7B3800D18654ABD9E2D24A445A66CB9?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)
- Table 13. Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Levels" (part 1), Title 22 of the California Code of Regulations, Section 64449, accessed July 1, 2022 from: https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/I2260318DFFF045529B9496276F3A8573?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)
- Table 14. Secondary Maximum Contaminant Levels "Consumer Acceptance Contaminant Levels" (part 2), Title 22 of the California Code of Regulations, Section 64449, accessed July 1, 2022 from: https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/I2260318DFFF045529B9496276F3A8573?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)
- Table 15. Radionuclide Maximum Containment Levels (MCLs), Title 22 of the California Code of Regulations, Sections 64442 and 64443, accessed July 1, 2022 from: https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/IB93A33F77D104879A1E78D4A415DBBF6?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default) and https://web.archive.org/web/*/https://govt.westlaw.com/calregs/Document/I29898BC27579472F89C1ABEB9C3E842A?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

We acknowledge that there is substantial overlap in parameters (values are sometimes the same and sometimes different) between these tables and the other portions of the QVIR WQCP, in particular the Human Health Criteria section (which is based largely on U.S. EPA's National Recommended Water Quality Criteria), but for the sake of ease of future updates to the WQCP, we decided to keep the tables separate so they can be replaced in their entirety during future updates, rather than try to blend them together with the Human Health Criteria. Section (d)(10) of the WQCP includes language to address this overlap: "If multiple numeric water quality criteria are presented for the same parameter, then the more stringent criteria shall apply."

The proposed *E. coli* drinking water criteria in (ii) for groundwaters with a designated use of MUN are designed to protect human health. As noted in section (a) of the QVIR WQCP "QVIR recognizes that groundwater is not considered Waters of the U.S. for CWA regulatory purposes. Surface water and groundwater are strongly connected in Quartz Valley (Tolley et al. 2019). QVIR will regulate groundwater quality using its own legal authorities outside the CWA."

Water Temperature

Proposed objectives:

> Temperature criteria:
> (i) The natural receiving water temperatures shall not be anthropogenically altered unless it can be demonstrated to the satisfaction of the QVIR Tribal Environmental Protection Department that such alteration in temperature does not adversely affect beneficial uses.
>
> (ii) At no time or place shall the temperature of any cold freshwater habitat (COLD) water be increased by more than 2.8°C above natural receiving water temperature.
>
> (iii) For all waterbodies, the seven-day average of daily maximum (7DADM) ambient water temperatures shall not exceed 16°C, year-round. These objectives are for ambient water temperatures that represent the main portion of flow and therefore cannot be solely met by presence of localized cold water refugia. In addition, in all flowing waterbodies during the September-June period of salmonid spawning and incubation, 7DADM temperatures shall not exceed 13°C (55°F).

Justification:
The proposed criteria (i) and (ii) are based on the NCRWCB (2018) Basin Plan, with the word "anthropogenically" added. The proposed criteria in (iii) are based on U.S. EPA's (2003) Region 10 guidance to states and tribes for establishing temperature water quality standards in the Pacific Northwest.

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