

# WORKING DRAFT: pH Criteria revisions for Crooked River and Trout Creek

## Background

DEQ is proposing to change the water quality standard for pH for the Crooked River and Trout Creek basins. The current criteria for these subbasins are the same as the pH criteria for waters in western Oregon and the Cascade Mountains. However, these two basins are more characteristic of the dryer climate and geology found in eastern Oregon, where the natural pH ranges are higher than those found in western Oregon.

## Scope of rulemaking

The rulemaking proposes to amend *OAR 340-041-0135, Basin Specific Criteria (Deschutes): Water Quality Standards for this Basin*, to correct the pH criteria for the Crooked River and Trout Creek subbasins to make them consistent with other eastern Oregon basins.

## Justification

The EQC adopted Oregon's current pH criteria in 1996. The pH criteria vary throughout the state, with a range of 6.5 – 8.5 in coastal and Cascade streams, and 6.5 – 9.0 or 7.0 – 9.0 in most central and eastern Oregon streams (Figure 1). Information presented at the time of adoption indicated that the higher pH range in eastern Oregon was because natural pH ranges in eastern Oregon basins was near or above the then-current high pH limit of 8.5<sup>1</sup>. At the time, DEQ presented and EQC adopted criteria for the Deschutes River Basin consistent with western Oregon and Cascades mountain basins. While much of the Deschutes watershed flow comes from the Cascade Mountains, a portion comes from areas characteristic of central and eastern Oregon. In particular, the Crooked River and Trout Creek subbasins do not originate in the Cascade Range and are more characteristic of central and eastern Oregon streams than other parts of the Deschutes basin.

The pH criterion for the John Day watershed, which borders the Crooked River and Trout Creek watershed to the east, ranges from 6.5 to 9.0, with an action level of 8.7 (see Option 1 in “Options Considered” section below.) DEQ is proposing to adopt the same criterion for the Crooked River and Trout Creek watersheds as the John Day watershed (Figure 2).

The similarities between the Crooked River and Trout Creek watersheds and other central and eastern Oregon watersheds is highlighted by EPA ecoregion maps, which account for ecology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. The Crooked River and Trout Creek watersheds are both primarily categorized in the John Day/Clarno Uplands Level IV ecoregion.<sup>2</sup> (Figures 3 and 4) This is the same ecoregion as the majority of the John Day River watershed. Soils in the Crooked River watershed have been characterized as having high amounts of exchangeable sodium, which results in soils with higher pH levels.<sup>3</sup> The Upper Crooked watershed contains high levels of bentonite, which forms in alkaline conditions; analysis of bentonite in these areas indicates high levels of exchangeable sodium.<sup>4</sup>

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<sup>1</sup> See chapter 2, Oregon Department of Environmental Quality. 1995. Final Issue Paper: pH, Hydrogen Ion Concentration. Portland, OR. 44 pp.

<sup>2</sup> <https://www.epa.gov/eco-research/ecoregions>. Visited January 4, 2022. See [https://gaftp.epa.gov/EPADDataCommons/ORD/Ecoregions/reg10/pnw\\_map.pdf](https://gaftp.epa.gov/EPADDataCommons/ORD/Ecoregions/reg10/pnw_map.pdf) for a copy of the map and legend.

<sup>3</sup> Mayko, R. W. and G. K. Smith. 1966. Soil Survey: Prineville, Oregon Area. Soil Conservation Service, in cooperation with Oregon Agricultural Experimental Station. U.S. Department of Agriculture. 1966. 95 pp.

<sup>4</sup> Gray, J.J., R.P. Geitgey, and G.L. Baxter. 1989. Bentonite in Oregon: Occurrences, Analyses, and Economic Potential. Special Paper 20. Oregon Department of Geology and Mineral Industries. Portland, OR. 36 pp.

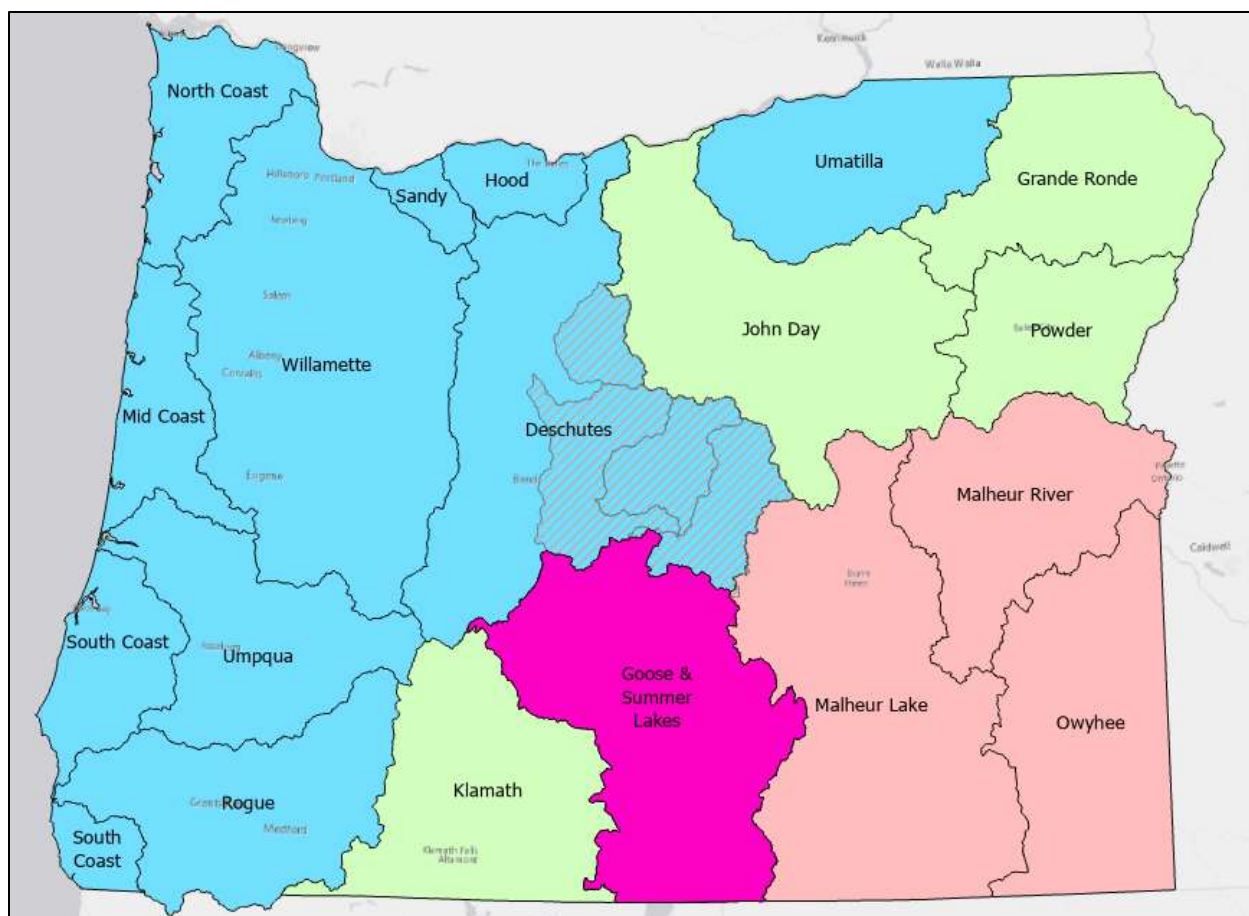


Figure 1. Current pH criteria by Oregon basin. 6.5-8.5 (blue), 6.5-9.0 (green), 7.0-9.0 (red), 7.5-9.5 (pink), area of proposed change (hatched). Note: The Crooked River basin includes the South Fork, Upper, and Lower Crooked River Basins.

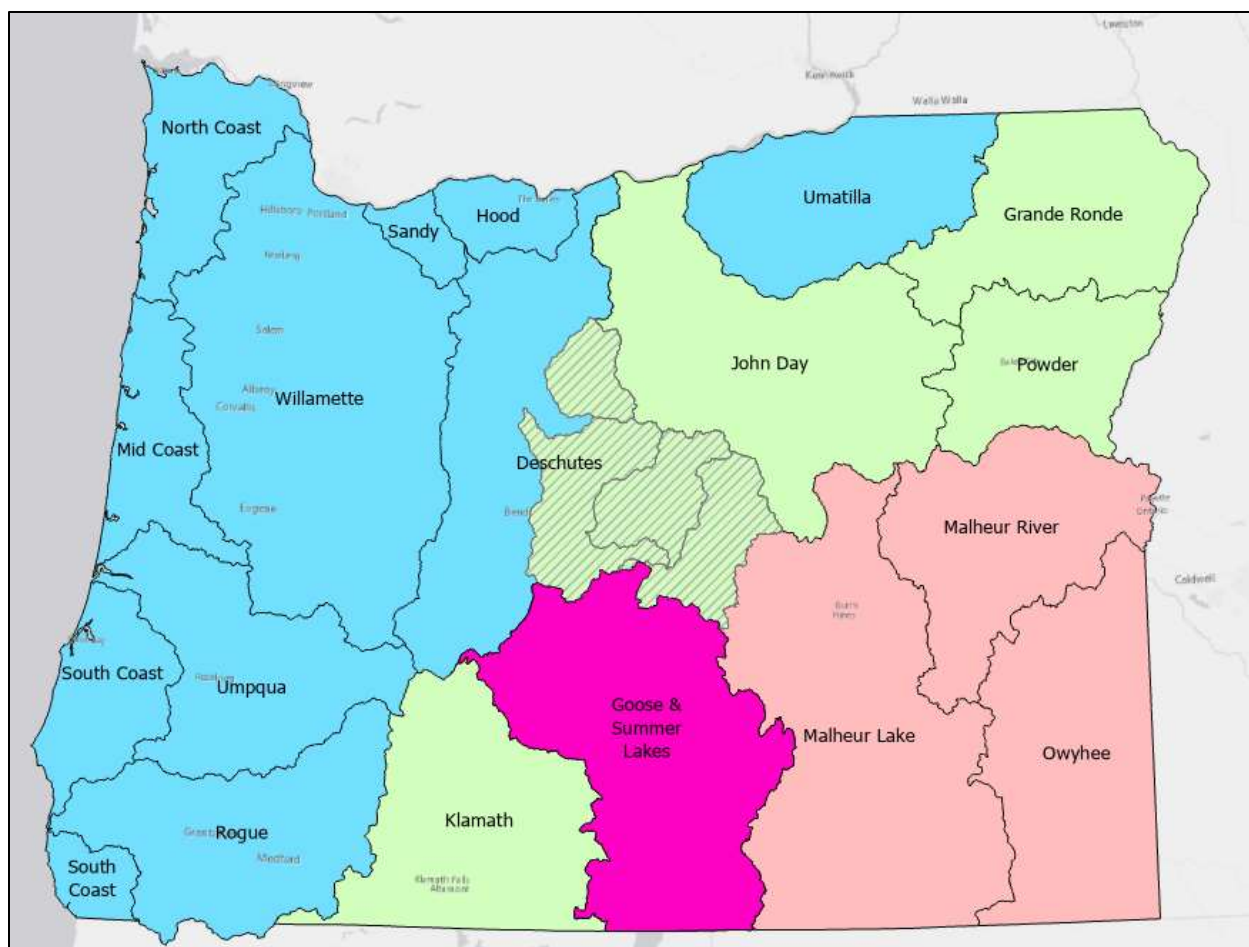


Figure 2. Proposed Changes to pH Criteria. 6.5-8.5 (blue), 6.5-9.0 (green), 7.0-9.0 (red), 7.5-9.5 (pink), area of proposed change (hatched).

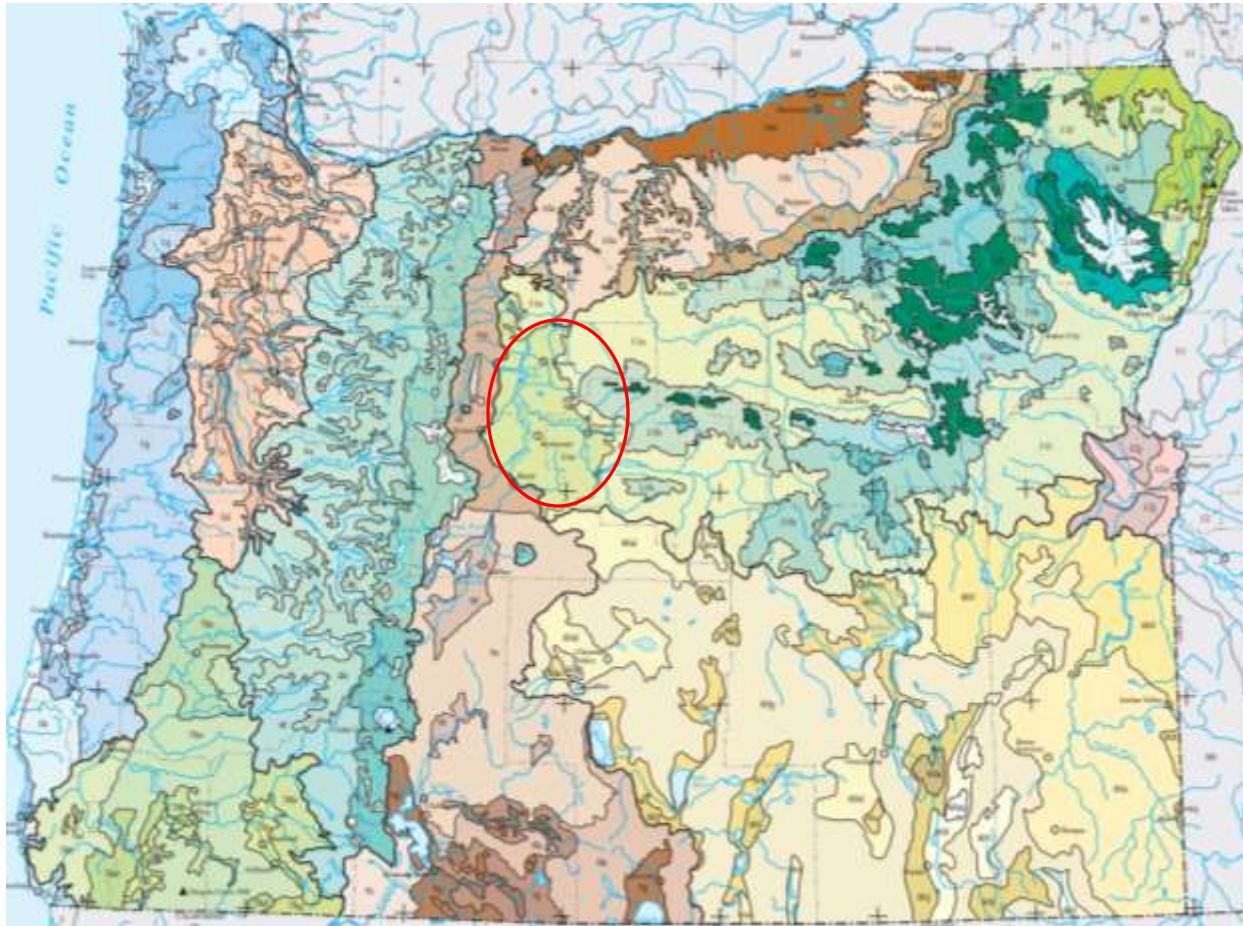


Figure 3. Eco-region map of Oregon highlighting difference between Western Oregon and Cascades eco-systems and eastern Oregon ecosystems. Note Crooked River and Trout Creek subbasins (circled) are part of John Day/Clarno Uplands Ecoregion (11a & b on map), <https://www.epa.gov/eco-research/ecoregions>



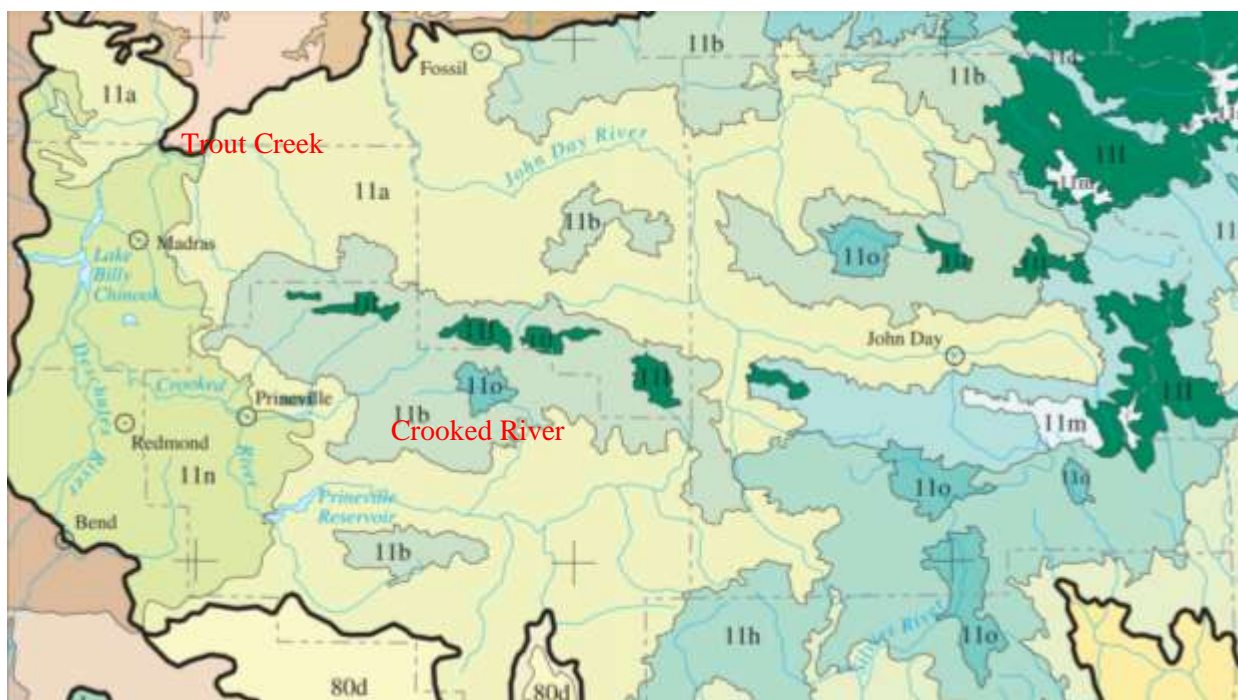


Figure 4. Zoomed-in ecoregion map highlighting ecoregions of Trout Creek and Crooked River basins within the John Day/Clarno Uplands Ecoregion. <https://www.epa.gov/eco-research/ecoregions>

## Options considered

### Option 1 (preferred) – Change pH criteria for the Crooked River and Trout Creek using the same language as other eastern Oregon criteria

The pH criteria for the John Day and other eastern Oregon basins all state the same language:

“pH values may not fall outside the following range: 6.5-9.0. When greater than 25 percent of ambient measurements taken between June and September are greater than pH 8.7, and as resources are available according to priorities set by the Department, the Department will determine whether the values higher than 8.7 are anthropogenic or natural in origin.”

The criteria for these basins includes 8.7 as an action level.<sup>5</sup> The action level provides additional protection (through a TMDL or similar study) to the beneficial use if pH values are consistently measured in the high portion of the acceptable range of pH levels, but do not exceed 9.

### Option 2 – Change pH criteria for the Crooked River and Trout Creek without an action level

DEQ could also amend the criteria so that the acceptable maximum pH is extended from 8.5 to 9.0, without including the action level. The action level triggers the type of study done as part of a TMDL, which would be triggered if some reaches exceed 9.0 and are listed as impaired for pH. It is unlikely that some measurement locations would consistently exceed 8.7 but none would exceed 9.0. Therefore, the action level is unlikely to be needed.

<sup>5</sup> See Issue Paper, page 36 (3-2).

## Impact of rulemaking

### *Water quality assessment*

The rulemaking will primarily impact water quality assessment of pH in the Crooked River and Trout Creek watersheds. Water quality assessments would only be impacted if pH measured in these watersheds fell in the range between 8.5 and 9.0. Under the previous criteria, pH's in this range would exceed the criteria and thus would result in an impairment listing. Under the new criteria, pH's in this range would be acceptable, or, if they were in the range above 8.7 and less than 9.0, might result in further DEQ investigation.

Five waters are listed as impaired for pH in the Crooked River Basin based on the 2022 Integrated Report. No waters are impaired in the Trout Creek Basin. If the upper limit of the pH criteria was revised to 9.0, Table 1 indicates potential impacts to these listings, based on data in the 2022 integrated report.

*Table 1. Potential impact of pH criteria change to water quality impairments for pH in Crooked River Basin*

| <b>Waterbody/Segment</b>   | <b>2022 Category</b>          | <b>Potential impact of proposed revision to pH standard</b>             |
|--|-------------------------------|---|
| Crooked River/ Dry Creek to Lone Pine Creek  | 5 (Impaired)                  | Delisting, or might trigger action level of 8.7                         |
| Crooked River/Lone Pine Creek to Opal Springs  | 5 (Impaired)                  | Delisting, or might trigger action level of 8.7                         |
| Horse Heaven Creek/ Bonnieview Dam to confluence with Crooked River                    | No data                       | n/a; additional data is needed  |
| North Fork Crooked River/ confluence with Johnson Creek and Howard Creek to Deep Creek | 3 (Insufficient information); | n/a; additional data is needed  |
| South Fork Crooked River/ confluence with Crooked River to Twelvemile Creek            | 5 (Impaired)                  | 2 impaired (based on earlier data ; new data would be needed to delist) |

### *NPDES permit*

The only NPDES permit that discharges into the watersheds affected by this rulemaking is the City of Prineville Wastewater Treatment Facility, which discharges to the Crooked River. The facility has permit limits for pH ranging from 6.0 to 9.0. DEQ does not expect these limits to change due to this rulemaking.