Attachment

Review and Summary of Comments on Listings 49044 (DO), 49047 (DO), and 51515 (pH)

Review of Listing 49044 - Dissolved Oxygen
Columbia River – Wintler Park to Willamette River confluence

Data evaluated from Ecology's Environmental Information Management (EIM) database:
Submitting Organizations:

Columbia Riverkeeper, Hood River OR (CRK)
WA Dept. of Ecology Environmental Assessment Program Freshwater Monitoring Unit (EAP)

Columbia River Sample Locations:

28A100	Wintler Park end of jetty (EAP)
CR-SW-WP	Wintler Park end of jetty (CRK)
CR-SW-VWREC	East end of the Water Resource Education Center's beach (CRK)
LASSAR35564	Marine Park boat launch, end of dock (CRK)
CR-SW-I5	Just east of I-5 Bridge (CRK)

Study ID: CRK-06 (data used in water quality assessment collected in 2006 CRK)
Study Purpose – Trained volunteers aim to characterize baseline water quality conditions of select Columbia River tributaries and sub-tributaries. Dissolve oxygen, pH, turbidity, conductivity and temperature are measured along the shoreline of the Columbia River.

Study ID: CRK1-06 (data used in water quality assessment collected in 2007-2010 CRK)
Study Purpose – Trained volunteers aim to characterize shoreline ambient conditions (dissolved oxygen, pH, conductivity, temperature and turbidity) in fish rearing habitats where seasonal aquatic plant growth has been observed in the Columbia River between Vancouver and Lyle, WA.

Study ID: AMS001E (2002/2003 and 2006/2007 at 28A100/Wintler EAP)
Study Purpose – To collect long-term water quality data from a state-wide network of stations. Thirteen conventional constituents are measured monthly at 82 stations (rotating basis).

Comments to Ecology
The basis for listing this segment of the Columbia River as impaired by low concentrations of dissolved oxygen (DO) relies on two studies undertaken by the volunteers. All excursions from DO water quality standards between 2007 and 2010 (CRK1-06) were identified through a study of shoreline ambient conditions where seasonal aquatic plant growth has been noted (see CRK1-06 Purpose). These edge riverine ecosystems are highly responsive to plant growth and die-off, increased water temperature, and low flow with significant diurnal and seasonal changes in dissolved oxygen. Without additional documentation regarding environmental variables at the monitoring sites, we believe that data from this study should not be utilized to determine impairment for dissolved oxygen in this main stem segment of the Columbia River.

In 2006, Chapter 2 of Water Quality Program Policy 1-11 was established to ensure the collection of credible and scientifically defensible water quality data. Section 7 of that document identifies the information that should be submitted to Ecology to demonstrate that quality assurance objectives were

met to ensure data is reliable and useful as intended. Documentation related to the implementation of a Quality Assurance Project Plan should include complete field notes, instrument accuracy and calibration, and data validation. Studies CRK-06 and CRK1-06 provided data on DO concentrations at multiple locations along the lower Columbia River basin that we are unable to validate through information provided through the Water Quality Assessment web portal. Dissolved oxygen concentrations reported in 2006 under study CRK-06 were less than the 8.0 mg/L standard, but the slight deviation might be attributed to the placement, calibration, precision and accuracy of sampling equipment. Sensors should be deployed in locations that are well-mixed (representative of cross-section conditions), off the streambed, and away from tributary sources. We do not have evidence that sampling locations from the volunteer studies have been vetted as representative of this stream reach.

Ecology's River and Stream Water Quality Monitoring Program also collected water quality data at 28A100 – Wintler Park under study AMS001E. From 10/30/2002 – 9/23/2003, 0 of 12 sample values showed an excursion of the 8.0 mg/L criterion for dissolved oxygen. Again from 10/16/2006 – 9/24/2007, 0 of 12 sample values failed to meet the state standard. Based on the data available for review, we request that Ecology reevaluate Listing 49044 and remove this segment of the Columbia River from the 303(d) list for dissolved oxygen.

We are requesting that Ecology provide the supporting documentation for all measurements of dissolved oxygen for Listing 49044 including field logs, calibration records, site sampling photo records, the study QAPP, and any other pertinent records.

Review of Listing 51515 - pH
Columbia River – Willamette River confluence to Lewis River confluence

Data evaluated from Ecology's Environmental Information Management (EIM) database:
Submitting Organizations:
Columbia Riverkeeper, Hood River OR (CRK)

Columbia River Sample Locations:

CR-SW-RNWR	Columbia River shoreline at south of Ridgefield National Wildlife Refuge (CRK)
CR-SW-FB	Columbia River shoreline at Frenchman's Bar beach (CRK)
CR-SWTRIB-EVFC	East Vancouver Lake Flushing Channel (CRK)

Study ID: CRK-06 (data used in water quality assessment collected in 2006 and 2008 by CRK)
Study Purpose – Trained volunteers aim to characterize baseline water quality conditions of select Columbia River tributaries and sub-tributaries. Dissolve oxygen, pH, turbidity, conductivity and temperature are measured in the Columbia River shoreline areas and Vancouver Flushing Channel.

Comments to Ecology
The basis for listing this segment of the Columbia River as impaired by elevated pH values is based on two instrument measurements taken in the drainage water from the East Vancouver Lake Flushing Channel (EVFC) and not from the actual Columbia River. These two pH results were collected in 2006 and 2008 in sampling studies undertaken by volunteers, and these two pH excursions represent the water quality of the Vancouver Lake water and not the Columbia River. Vancouver Lake is a shallow water body subject to seasonal aquatic plant growths, which contribute to large changes in pH and dissolved oxygen values. These pH data values from the East Vancouver Lake Flushing Channel (EVFC) need to be removed from the Columbia River data evaluation. All other pH values measured at

Frenchman's Bar and along the Ridgefield National Wildlife Refuge were within the 6.5 to 8.5 pH criteria range. Listing 51515 should not be listed under any category since there are no reported values in the Columbia River that exceed the pH criteria.

Review of Listing 49047 - Dissolved Oxygen
Columbia River – Willamette River confluence to Lewis River confluence

Data evaluated from Ecology's Environmental Information Management (EIM) database:
Submitting Organizations:
Columbia Riverkeeper, Hood River OR (CRK)

Columbia River Sample Locations:

CR-SW-RNWR	Columbia River shoreline at south of Ridgefield National Wildlife Refuge (CRK)
CR-SW-FB	Columbia River shoreline at Frenchman's Bar beach (CRK)
CR-SWTRIB-EVFC	East Vancouver Lake Flushing Channel (CRK)

Study ID: CRK-06 (data used in water quality assessment collected in 2006 by CRK)
Study Purpose – Trained volunteers aim to characterize baseline water quality conditions of select Columbia River tributaries and sub-tributaries. Dissolve oxygen, pH, turbidity, conductivity and temperature are measured along the shoreline of the Columbia River and in the Vancouver Lake Flushing Channel.

Study ID: CRK1-06 (data used in water quality assessment collected in 2007-2009 CRK)
Study Purpose – Trained volunteers aim to characterize shoreline ambient conditions (dissolved oxygen, pH, conductivity, temperature and turbidity) in fish rearing habitats where seasonal aquatic plant growth has been observed in the Columbia River between Vancouver and Lyle, WA.

Comments to Ecology
The basis for listing this segment of the Columbia River as impaired by low concentrations of dissolved oxygen (DO) relies on two river shoreline sampling studies undertaken by volunteers. All excursions from DO water quality standards between 2007 and 2009 (CRK1-06) were identified through a study of shoreline ambient conditions where seasonal aquatic plant growth has been noted (see CRK1-06 Study Purpose). These edge riverine ecosystems are highly responsive to plant growth and die-off, increased water temperature, and low flow with significant diurnal and seasonal changes in dissolved oxygen. Without additional documentation regarding environmental variables at the monitoring sites, we believe that data from this study should not be utilized to determine impairment for dissolved oxygen in this main stem segment of the Columbia River.

The EIM data record shows only 4 values of 29 separate single sampling days in three years (2007 to 2009) measured at the shoreline of Frenchmen's Bar (Study ID: CRK1-06 and Location ID: CR-SW-FB) yielded dissolved oxygen values potentially less than the criteria (8.0 mg/L) – and only 2 values of 17 samples were below the criteria. It is important to recognize that 3 of these 4 excursion values for dissolved oxygen were within 0.2 mg/L of 8.0 mg/L, and according to the *Water Quality Program Policy 1-11,* "the standards also allow a measurable decrease (0.2 mg/L) in water below natural conditions due to human actions" (page 37 of the *Water Quality Program Policy 1-11*). We believe that there are insufficient data values for a Category 5 listing and a change to a Category 2 listing is warranted.

The EIM data records include 2006 to 2008 sampling data from the shoreline of the Ridgefield National Wildlife Refuge (Study ID: CRK-06 and Location ID: CR-SW-RNWR). Measurements recorded using a specific instrument (listed as SM4500OG) yielded 5 of 8 values in 2006 with dissolved oxygen values slightly less than the criteria (8.0 mg/L), while all measurements recorded by DOWT and DOFM methods were above the criteria. These inconsistencies in field measurements of dissolved oxygen by different methods are an indication that instrument SM4500OG may not have been calibrated prior to uses. In addition, only 2 of 8 measurements in 2006 yielded dissolved oxygen values clearly below the criteria (8.0 mg/L) – and 3 other measurements in 2006 were within 0.2 mg/L of 8.0 mg/L, and according to the *Water Quality Program Policy 1-11,* "the standards also allow a measurable decrease (0.2 mg/L) in water below natural conditions due to human actions" (page 37 of the *Water Quality Program Policy 1-11*). We submit that there are insufficient data values for a Category 5 listing and a change to a Category 2 listing is warranted.

The EIM data records includes sampling data from the East Vancouver Lake Flushing Channel (Study ID: CRK-06 and Location ID: CR-SW-EVFC) and these dissolved oxygen data are representative of water draining from Vancouver Lake and should not be used or considered representative of the Columbia River water.

In 2006, Chapter 2 of Water Quality Program Policy 1-11 was established to ensure the collection of credible and scientifically defensible water quality data. Section 7 of that document identifies the information that should be submitted to Ecology to demonstrate that quality assurance objectives were met to ensure data is reliable and useful as intended. Documentation related to the implementation of a Quality Assurance Project Plan should include complete field notes, instrument accuracy and calibration, and data validation. Studies CRK-06 and CRK1-06 provided data on DO concentrations at multiple locations along the lower Columbia River basin that we are unable to validate through information provided through the Water Quality Assessment web portal.

Dissolved oxygen concentrations reported in 2006 under study CRK-06 and in 2007 to 2009 under study CRK1-06 were slightly less than the 8.0 mg/L standard, but the slight deviation might be attributed to the placement, calibration, precision and accuracy of sampling equipment. Sensors should be deployed in locations that are well-mixed (representative of cross-section conditions), off the streambed, and away from tributary sources. We do not have evidence that sampling locations from the volunteer studies have been vetted as representative of this stream reach.

We are requesting that Ecology provide the supporting documentation for all measurements of dissolved oxygen for Listing 49047 including field logs, calibration records, site sampling photo records, the study QAPP, and any other pertinent records.