Oregon
Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
FAX (503) 229-6124
TTY 711

March 25, 2015

TO: Joint Committee on Ways and Means: Subcommittee on Natural Resources

FROM: Dick Pedersen, Director, Department of Environmental Quality

RE: Follow-up to questions during March 25 hearing

Co-chair Devlin, Co-chair Rayfield and subcommittee members:

Below is information related to questions that came up during the March 25 Department of Environmental Quality hearing. Please let me know if you would like additional information.

What is BOD or Biochemical Oxygen Demand?

BOD or Biochemical Oxygen Demand is a way to measure the amount of organic material in a water sample. This is an important measure because as the organic material decomposes, oxygen in the water is consumed. If a water body has excessive organic material in the water, the dissolved oxygen levels needed to support healthy fish and other aquatic life may become depleted by organic decomposition.

What water quality problems are responsible for declining trends in the Malheur/Powder, Umatilla, and Klamath basins?

Malheur/Powder: In the Malheur and Powder watersheds, nitrogen, phosphorus and bacteria are the primary water quality indicators leading to poor index scores.

Umatilla: Although the parameters driving poor water quality scores in the Umatilla Basin sites are somewhat site dependent, there are some patterns. Sites with the worse water quality scores tended to have poor scores for biochemical oxygen demand, total solids, nitrogen and phosphorus and *E. coli* bacteria.

Klamath: In general, sites with a poor water quality index scores in the Klamath score poorly for nitrogen and phosphorus nutrients as well as biochemical oxygen demand and low dissolved oxygen.

Background: While the waterbodies in these areas may not be meeting water quality standards for a variety of parameters, the declining *trends* tended to be related to higher nutrients levels and lower dissolved oxygen levels. Higher nutrient levels can lead to more vegetation growth in waterbodies which can deplete oxygen at night when photosynthesis stops or when the plants die and decompose.

Nutrients come from a variety of natural and man-made sources. Natural sources of nitrogen that may end up in water come from certain plants like alder and legumes which can “fix” or acquire nitrogen directly from the atmosphere and certain types of soil bacteria can fix nitrogen from the atmosphere and convert it into a nitrogen form that can be used by plants to grow. When plants decompose they release nutrients back to the environment and some of that can end up in water.

Natural phosphorus typically comes from the erosion of minerals that contain phosphates. This natural process and can be an important source of the phosphorus is some watersheds. As stream banks erode or

soil is washes off of the landscape, phosphate can dissolve in water and become available for plant growth.

Human process can also be a contributing factor. Fertilizers can wash off of lawns and agricultural field and into streams where nutrients can promote excessive aquatic plant and algae growth. In turn this can lead to large swings in the dissolved oxygen concentrations and pH values of waterbodies.

Human and animal waste is another source nitrogen and phosphorus that, when not managed properly, can adversely impact stream conditions. Wastewater systems, biosolids applications, confined animal feeding operations, excessive fertilization, munitions dumps and excessive erosion can all contribute to instream nutrient concentrations that promote excessive plant growth and can lead to adverse impacts on water quality conditions and aquatic life.