

# Bibliography

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# Appendix 1

## AQUATIC CONSERVATION OBJECTIVES

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.
2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. The network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian dependent species.
3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.
4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.
5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.
6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.
7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.
8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.
9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.





# Endnotes

<sup>1</sup> The boundaries of the study area correspond to the USGS-designated Rock Creek watershed, plus portions of the USGS-designated Gales Creek watershed that were not covered by the Gales Creek Watershed Assessment Project (Breuner 1998).

<sup>2</sup> Derived from GIS analysis of Tualatin River Watershed Information System (TRWIS) 6<sup>th</sup> field watershed layer.

<sup>3</sup> Derived from GIS analysis of Ecotrust's digitized 1:24,000 stream layer.

<sup>4</sup> Derived by GIS analysis of Geology layer included in the Tualatin River Watershed Information System. For the analysis, floodplains were defined as stream-adjacent regions underlain by Quaternary Alluvium (Qal). This area varies from the 100 year floodplain. Width was calculated as (polygon area/ valley length).

<sup>5</sup> Based on precipitation records at Hillsboro.

<sup>6</sup> Based on measured USGS flow at the Tualatin River gage at Farmington.

<sup>7</sup> Most of these determinations, along with the cited figures, were based on data gathered prior to 1996.

<sup>8</sup> A list of these Special Attention Species is given in the *Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (SEIS) of the NFP.

<sup>9</sup> "Four major structural attributes of old-growth Douglas-fir forests are: live old-growth trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory" (NFP page B-2).

<sup>10</sup> Derived from GIS analysis of the 1995 OSU layer (contained in Ecotrust 1998) showing timberland ownership.

<sup>11</sup> Reference conditions are defined as conditions considered representative of the area prior to European settlement. Discussion of reference conditions is provided in Chapter 4.

<sup>12</sup> This was determined by visual estimation of blue line streams mapped on USGS 1:24,000 topographic maps.

<sup>13</sup> The **80% exceedance streamflow** indicates the discharge that can be expected to prevail in a stream 80% of a given period (such as monthly). This is generally based upon historical data and/or modeling.

<sup>14</sup> OWRD subdivides stream systems into **Water availability Basins** (WABs) specifically for the purpose of determining the availability of water rights. Applications for water rights are evaluated relative to water availability within the WAB in which the prospective water right will occur.

<sup>15</sup> Here, **consumptive use** refers to total rights to divert water without replacement. Where consumptive uses exceed streamflow, this indicates a condition where streams could *potentially* go dry if all water rights were used.

<sup>16</sup> For this analysis, water from Henry Hagg Lake was allocated based on the number of TVID-irrigated acres in the watershed divided by the total number of TVID-irrigated acres in the Tualatin Basin. Based on this methodology, 46 cfs of water released from Henry Hagg Lake was allocated to the watershed.

<sup>17</sup> Channels are typed according to their unmodified characteristics. Where channel structure has been extensively modified, the probable type of the unmodified channel was reconstructed based on gradient and floodplain characteristics. Channel modifications are addressed at a separate stage of the OWEB methodology.

<sup>18</sup> Formerly the Governor's Watershed Enhancement Board (GWEB)

<sup>19</sup> Oxygen demand created by decomposition of organic material in the water column is referred to as **biochemical oxygen demand (BOD)**, while decomposition of organic materials stored in sediment creates a **sediment oxygen demand (SOD)**

<sup>20</sup> **Interstitial** gases are those gases stored between sediment particles. **Redds** are the gravel nests into which salmonid eggs are deposited.

<sup>21</sup> *Potamodromous* fish practice seasonal migration within a stream system for spawning purposes, but remain in fresh water throughout their life history.

<sup>22</sup> Special Status Species is a federal term incorporating species that are designated for special treatment or attention on various federal and state lists.

<sup>23</sup> Derived from analysis of Metro and Washington County land cover and zoning GIS data.

<sup>24</sup> These include lands zoned for agriculture and Ag/Forestry uses. Metro recently commissioned the classification of land use based on EOSAT imagery. This classified data indicate that 36% of the watershed is used for agriculture.

<sup>25</sup> It should be noted that the source imagery for this classification was based on Eosat images with a 25 meter pixel resolution. Thus, individual large diameter trees could be present in stands classified within the younger structural stages.

<sup>26</sup> For BLM management purposes, wetland habitats are defined by BLM Manual 6740.

<sup>27</sup> (FLPMA- Section 102(a)(8) &(11) and enhancement planning Executive Order 11990)

<sup>28</sup> Attribute data within the "T6" sixth field watershed shapefile.

<sup>29</sup> It should be noted that this opinion is not unanimous. One reviewer notes that there is evidence that low flows with limited trees may have caused high temperatures. I have been unable to find evidence that these conditions were widespread within the watershed. JTH

<sup>30</sup> This portion of the wetland lies in the Lower Tualatin watershed

<sup>31</sup> Based on comparison of hydric soils with current NWI maps, supplemented by references from Hart and Newcomb (1965) and USACE (1953)

<sup>32</sup> One reviewer noted that this pond had recently been bypassed. However, I did not ascertain by press time whether this bypass was permanent. JTH

<sup>33</sup> These are given in BLM Manual 6840, Appendix J2 of the NFP, and in the Salem District ROD/RMP.







