

## Section 3. Subbasin Assessment

### Table of Contents

3.1 Subbasin Overview .....	1
3.1.1 General Description .....	1
3.1.1.1 Location .....	1
3.1.1.2 Size.....	4
3.1.1.3 Geology.....	4
3.1.1.4 Climate and Weather.....	6
3.1.1.5 Land Cover.....	9
3.1.1.6 Land Use and Population .....	10
3.1.1.7 Economy .....	13
3.1.1.8 Land Ownership.....	16
3.1.1.9 Human Influences on Aquatic and Terrestrial Environments.....	18
3.1.2 Subbasin Existing Water Resources .....	29
3.1.2.1 Watershed Hydrography and Hydrologic Regime.....	29
3.1.2.2 Water Quality.....	35
3.1.2.3 Riparian Resources .....	44
3.1.2.4 Wetland Resources.....	44
3.1.3 Hydrological and Ecological Trends in the Subbasin.....	45
3.1.3.1 Trends in Climate and Their Effect on Hydrology and Ecology .....	45
3.1.3.2 Trends in Anthropogenic Activities and Their Effect on Hydrology and Ecology .....	47
3.1.4 Regional Context .....	61
3.1.4.1 Relation to the Columbia Basin .....	61
3.1.4.2 Relation to the Ecological Province.....	61
3.1.4.4 Unique Qualities of the Subbasin .....	62
3.1.4.5 NOAA Fisheries Evolutionarily Significant Units .....	65
3.1.4.7 Summary of Out-of-Subbasin Environmental Conditions on Fish and Wildlife .....	66
3.2 Focal Species Characterization and Status .....	68
3.2.1 Fish, Wildlife, Plants, and Invertebrates of Ecological Importance .....	68
3.2.1.1 Species Designated as Threatened, Endangered, or Sensitive.....	68
3.2.1.2 Species Recognized as Rare or Significant to the Local Area.....	74
3.2.1.3 Species with Special Ecological Importance to the Subbasin .....	78
3.2.1.4 Species Recognized by Columbia Plateau Tribes as Having Cultural or Religious Value.....	85
3.2.1.5 Locally Extirpated and Introduced Species .....	86
3.2.2 Focal Species Selection.....	90
3.2.2.1 List of Species Selected .....	90
3.2.2.2 Methodology for Selection .....	90
3.2.3 Aquatic Focal Species and Taxa of Interest: Population Delineation and Characterization .....	96
3.2.3.1 Focal Species Population Data, Life History, and Distribution.....	96

3.2.3.2 Taxa of Interest -- Population Data, Life History, and Distribution.....	140
3.2.3.3 Description of Artificial Production and Captive Breeding Programs .....	146
3.2.3.4 Harvest in the Subbasin .....	153
3.2.4 Terrestrial Focal Species Population Delineation and Characterization.....	159
3.2.4.1 Population Data.....	159
3.2.4.2 Distribution and Condition of Habitat Types Associated with Focal Species .....	170
3.3 Out-of-Subbasin Effects.....	197
3.3.1 Aquatic.....	197
3.3.2 Terrestrial.....	201
3.4 Environment/Population Relationships .....	203
3.4.1 Aquatic.....	203
3.4.2 Terrestrial Wildlife Environment and Population Relationships.....	204
3.4.2.1 Habitat Suitability .....	204
3.4.2.2 Key Environmental Correlates.....	211
3.4.2.3 Functional Redundancy .....	215
3.4.3 Inter-species Interactions .....	220
3.4.3.1 Fish Inter-species Interactions .....	220
3.4.3.2 Wildlife Inter-species Relationships .....	221
3.4.3.3 Fish-Wildlife Interactions .....	221
3.5 Identification and Analysis of Limiting Factors/Conditions and Priority Areas for Action .....	223
3.5.1 Aquatic.....	223
3.5.1.1 EDT and QHA Modeling.....	223
3.5.1.2 Limitations of the Current Analysis .....	226
3.5.1.3 Identification of Limiting Factors .....	229
3.5.1.4 Priority Reaches for Restoration and Protection – Areas in Which Human Intervention can Enhance Focal Species Populations .....	239
3.5.2 Factors Leading to the Decline of Terrestrial Focal Species and Habitats .....	252
3.6 Synthesis and Interpretation.....	255
3.6.1 Aquatic Focal Species Synthesis and Interpretation.....	255
3.6.1.1 Restoration Scenarios and Working Hypotheses.....	255
3.6.1.2 Desired Future Conditions and Properly Functioning Conditions.....	260
3.6.2 Terrestrial Wildlife Synthesis and Interpretation.....	268
Literature Cited.....	287