Table of Contents

Executive Summary E-1

Glossary and Common Abbreviations G-1

Chapter 1 – History, Status, and Draft Recovery Plan Guidance for Bull Trout in the Clackamas River Subbasin 1-1

1.1 Introduction 1-1
1.2 Willamette River Basin Overview 1-6
1.3 Clackamas River Subbasin Overview 1-8
1.4 Historical Distribution of Bull Trout in the Clackamas River Subbasin 1-10
1.5 Overview of Bull Trout Surveys in the Clackamas River Subbasin 1-13
1.6 Causes for Decline of Bull Trout in the Clackamas River Subbasin 1-18
1.7 Curtailment of the Causes for Decline of Bull Trout in the Clackamas River Subbasin 1-22
1.8 Key Recommendations from the Willamette Chapter of the Draft Bull Trout Recovery Plan 1-25

Chapter 2 – Habitat 2-1

2.1 Key Habitat Requirements for Bull Trout 2-1
2.2 Habitat Suitability Analysis 2-5
2.3 Summary and Conclusions 2-40

Chapter 3 – Conservation Genetic Considerations and Donor Stock Suitability 3-1

3.1 Life History Strategies Likely Used by Clackamas River Bull Trout 3-2
3.2 Spatial Processes 3-3
3.3 Synthesis of Potential Donor Populations 3-8
3.4 Summary and Conclusions 3-14

Chapter 4 – Ecological Interactions and Food Web Considerations 4-1

4.1 Potential Interactions Between Bull Trout and Nonnative Brook Trout and Implications to a Reintroduction of Bull Trout in the Clackamas River 4-1
4.2 Adequacy of Prey Base to Support a Reintroduced Bull Trout Population 4-4
4.3 Potential Bull Trout Interactions with Native Fish Species, Predatory Behavior, Dietary Composition, and Consumption Rates of Bull Trout 4-9
4.4 Disease Considerations Associated with an Out-of-Basin Transfer of Bull Trout to the Clackamas River 4-13
4.5 Summary and Conclusions 4-14

Chapter 5 – Summary 5-1

5.1 Overall Summary 5-1
5.2 Additional Areas for Consideration 5-4
5.3 Adaptive Management: Monitoring and Evaluation Considerations 5-5

References References-1

List of Figures

Figure 1.1. Clackamas River Subbasin Vicinity Map 1-2
Figure 1.2. Clackamas River Subbasin Upstream of North Fork Dam 1-5
Figure 1.3. Historic vs. Current Bull Trout Distribution in the Willamette River Basin 1-7
Figure 1.4. Historical Distribution of Bull Trout in the Clackamas River Subbasin 1-12
Figure 2.1. Clackamas River Subbasin Upstream of Collawash River 2-8
Figure 2.2. Extent of Accessible Bull Trout Spawning and Rearing Habitat; Clackamas River Subbasin Upstream of Collawash River 2-10
Figure 2.3. Relationship Between Watershed Size and Stream Size (summer low-flow width) in the Clackamas River Subbasin Upstream of and Including the Collawash River 2-11
Figure 2.4. Extent of Accessible Bull Trout Spawning and Rearing Habitat of Suitable Stream Width; Clackamas River Subbasin Upstream of Collawash River 2-12
Figure 2.5. Daily Maximum Stream Temperature for Extent of Accessible Bull Trout Spawning and Rearing Habitat; Clackamas River Subbasin Upstream of Collawash River 2-14
Figure 2.6. Three-step Process Used for Bull Trout Habitat Suitability Analysis for the Clackamas River upstream of (including) the Collawash River 2-18
Figure 2.7. Suitable Bull Trout Spawning and Rearing Habitat in the Upper Clackamas River Subbasin 2-20
Figure 2.8. Suitable Bull Trout Spawning and Rearing Habitat Patches in the Upper Clackamas River Subbasin 2-21
Figure 2.9. Underlying Geologies for Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-24
Figure 2.10. Landslide Potential for Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-25
Figure 2.11. Road Densities for Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-28
Figure 2.12. Northwest Forest Plan Land Allocations for Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-31
Figure 2.13. Channel Gradients for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-34
Figure 2.14. Pool Habitat Composition (% pool habitat available) for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-34
Figure 2.15. Pool Density (total # of pools per km) for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-35
Figure 2.16. Primary Pool Density (# pools ≥3 ft. max. depth per km) for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-36
Figure 2.17. Large Wood Density (# pieces per km) for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-37
Figure 2.18. Bankfull width to Summer Wetted Width Ratio for Stream Reaches Surveyed in Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-38

Figure 3.1. Bull Trout Evolutionary Lineages in Oregon, Washington, Idaho, Montana, and Nevada 3-4
Figure 3.2. Possible Donor Populations for a Potential Reintroduction of Bull Trout to the Clackamas River 3-7
Figure 4.1. Brook Trout Presence in the Upper Clackamas River Subbasin 4-3
Figure 4.2. Adult Steelhead Fish Counts at North Fork Fish Ladder from 1963 to 2005 4-6
Figure 4.3. Adult Spring Chinook and Coho Fish Counts at North Fork Fish Ladder from 1950 to 2005 4-7

List of Tables

Table 2.1. Summary of Water Temperature Data for River Segments and Streams in the Upper Clackamas River Subbasin 2-16
Table 2.2. Physical Characteristics of Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-23
Table 2.3. Watershed Conditions of Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-27
Table 2.4. Northwest Forest Plan Land Allocations for Suitable Habitat Patches in the Upper Clackamas River Subbasin 2-30
Table 2.5. Amount of Suitable Bull Trout Spawning and Rearing Habitat in the Upper Clackamas River Subbasin 2-33
Table 2.6. Matrix of Patch Interconnectedness for Suitable Habitat Patch Network in the Upper Clackamas River Subbasin: Migration distances between patches (miles) 2-39
Table 3.1. Summary of Potential Local Donor Populations from Five River Basins in the Lower Columbia River Portion of the Coastal Evolutionary Group 3-9

List of Appendices

Appendix A. Causes for Decline of Bull Trout in the Western United States A-1
Appendix B. Hypothesis for Local Extirpation B-1
Appendix C. Overview of Reintroduction Strategies: Artificial Propagation, Captive Rearing, and Transplantation C-1
Appendix D. Genetic Conservation Considerations (excerpt taken from Whitesel et al. 2004) D-1
Appendix E. Population Characteristics of Potential Donor Stocks E-1
Appendix F. Authors' Responses to State of Oregon Independent Multidisciplinary Science Team (IMST) Review of Draft Clackamas River Bull Trout Reintroduction Feasibility Assessment (November 2006) F-1