Chapter 14A
Measures Analysis
Section 1: Water Quality

TABLE OF CONTENTS

Section 1: Water Quality 1
TABLE OF CONTENTS 1
TABLE OF FIGURES 10
ISSUE BACKGROUND 11
WATER QUALITY SUMMARY 11
Klamath Mountains Province and Oregon Coast ESUs 15
Southwest Washington and Lower Columbia River ESUs 17
Upper Willamette River ESU 20
Snake River Basin ESU 22
TABLES SUMMARIZING WATER QUALITY DATA 25
FACTORS FOR DECLINE, BIOLOGICAL OBJECTIVES, AND AGENCY MANAGEMENT MEASURES 29
Temperature 29
Factors for Decline 29
Temperature Biological Objective 1: 30
Temperature Biological Objective 2: 30
Temperature Biological Objective 3 30
Temperature Biological Objective 4: 30
Temperature Biological Objective 5: 31
Temperature Biological Objective 6: 31
Temperature Biological Objective 7: 32
Sediment 32
Factors for Decline: 32
Sediment Biological Objective 1: 32
Sediment Biological Objective 2: 32
Sediment Biological Objective 4: 33
Sediment Biological Objective 5: 33
Sediment Biological Objective 6: 33
Sediment Biological Objective 7: 34
Sediment Biological Objective 8: 34
Dissolved Oxygen 34
Factors for Decline: 34
Dissolved Oxygen Biological Objective 1: 34
Dissolved Oxygen Biological Objective 2: 34
Dissolved Oxygen Biological Objective 3: 35
Dissolved Oxygen Biological Objective 4: 35

Dissolved Oxygen Biological Objective 5:....35
Dissolved Oxygen Biological Objective 6:....36
Dissolved Oxygen Biological Objective 7:....36
Total Dissolved Gas....36
Factors for Decline:....36
TDG Biological Objective 1:....36
TDG Biological Objective 2:....36
TDG Biological Objective 3:....37
TDG Biological Objective 7:....37
Biological Conditions....37
Factors for Decline:....37
Bio-criteria Biological Objective 1:....37
Bio-criteria Biological Objective 2:....38
Bio-criteria Biological Objective 4:....38
Bio-criteria Biological Objective 5:....38
Bio-criteria Biological Objective 6:....39
Bio-criteria Biological Objective 7:....39
pH....39
Factors for Decline:....39
pH Biological Objective 1:....39
pH Biological Objective 2:....40
pH Biological Objective 3:....40
pH Biological Objective 4:....40
pH Biological Objective 5:....41
pH Biological Objective 6:....41
pH Biological Objective 7:....41
Stream Fertility....41
Factors for Decline:....41
Stream Fertility Biological Objective 1:....41
Stream Fertility Biological Objective 2:....42
Stream Fertility Biological Objective 3:....42
Stream Fertility Biological Objective 4:....42
Stream Fertility Biological Objective 5:....43
Stream Fertility Biological Objective 6:....43
Stream Fertility Biological Objective 9:....43
Stream Fertility Biological Objective 10:....43
Toxics....44
Factors for Decline:....44
Toxics Biological Objective 1:....44
Toxics Biological Objective 2:....44
Toxics Biological Objective 4:....44
Toxics Biological Objective 5:....45
Toxics Biological Objective 7:....45
Identification of Measures to Achieve Biological Objectives....47

Objective 1: Prevent Degradation of High Quality Waters 47
Objective 2 Restore Degraded Water Quality where Steelhead are Impaired 50
Objective 3 Identify Watersheds not Meeting Water Quality Standards 56
Objective 4 Identify Water Quality Conditions in Unimpaired Reference Sites ...58
Objective 5 Determine Water Quality Status and Trends 58
Objective 6 Evaluate the Effectiveness of Restoration Projects & Plans 59
Objective 7 Regular Review and Update of Water Quality Standards 61
Objective 8: Revise Sediment Water Quality Standards 61
Objective 9: Revise Nutrient Water Quality Standards 61
Objective 10: Use of Salmon Carcasses to Improve Stream Fertility 61
Measures Applying to All Biological Objectives 62
STATE AGENCY MANAGEMENT MEASURES 64
Oregon Department of Agriculture 64
ODA1 - Implement SB1010 Program 66
ODA2 - Implement Confined Animal Feeding Operation (CAFO) Program 70
ODA3 - Oregon's Habitat Restoration Jobs Program (a.k.a. the Hire the Fisher Program) 79
ODA4 - Governor's Watershed Enhancement Board & Soil and Water Conservation District Programs 81
Oregon Economic Development Department 82
OEDD1 - Regional Strategy Board Review of Projects to Avoid Adverse Impacts on Salmon 82
OEDD2 - Reviewing Water and Wastewater Project Applications to Ensure those Funded have No Adverse Effect on Salmon Habitat or Populations 82
OEDD3 - Use of Hazard Mitigation Funding in Restoring Salmon Habitat 82
OEDD6 - Fund Water and Wastewater Projects which Improve Water Quality and Storm Drainage 82
OEDD7 - Assist Dairy Industry to Reduce Nonpoint Source Pollution 83
Department of Environmental Quality 83
DEQ2S - Development of 303(D) List and Identification of Priorities for TMDL Development 83
DEQ4S - Enhanced 401 Certification for Fill and Removal Operations 83
DEQ5S - Revise Water Quality Standard for Sediment 84
DEQ6S - Implement Antidegradation Water Quality Standard 84
DEQ7S - Apply for Instream Water Rights on Streams with TMDLs 84
DEQ8S - Review and Revise Water Quality Standards during Triennial Review Process 84
DEQ13S - Implementation of SDWA Source Water Protection Program 84
DEQ14S - Management of Point Source Discharges through NPDES Permits 85
DEQ15S - Management of Storm Water Discharges through NPDES Permits 86
DEQ16S - Revise SRF Loan Criteria to Help Protect Salmon 86
DEQ17S - Implement On-Site Program to Control Nutrient Loads to Surface Waters 86

DEQ18S - Implement Groundwater Protection Act to Prevent Adverse Impacts to Salmonid-Bearing Watersheds....87
DEQ20S - Coastal Nonpoint Pollution Control Program....87
DEQ21S - Tillamook Bay National Estuary Program....87
DEQ23S - Lower Columbia River Estuary Program....88
DEQ24S - Implementation of Portland CSO Consent Order....88
DEQ25S - Implementation of Three Basin Rule in Clackamas, North Santiam and McKenzie River Basins....89
DEQ27S - Willamette River Basin Project....89
DEQ29S - Section 401 Review of Powerdale Hydropower Project on Hood River90
DEQ30S - Section 401 Review of Hydropower Projects on Snake River....90
DEQ31S - 401 Certification of Grazing leases on Federal Lands....91
DEQ32S - Evaluate and Require Mitigation for the Impacts of Dams and Hydroelectric Projects on Water Quality During Re-licensing or Reauthorization91
DEQ1S - Implementation of Recently Revised Water Quality Standards for Temperature, Dissolved Oxygen, and Sedimentation....91
DEQ3S - Watershed Council Support....92
DEQ9S - Implement Water Quality Standards for Biological Criteria, Nutrients, Toxics and pH....92
DEQ10S - Develop Water Quality Standards for Wetlands....92
DEQ11S - Revise Water Quality Standards for Nutrients....92
DEQ12S - Designation of Salmon Critical Habitat as Outstanding Resource Waters....93
DEQ19S - Water Quality Monitoring and Assessment....93
DEQ22S - Coastal Nonpoint Pollution Control Program in Columbia River Estuary....97
DEQ26S - Development of TMDLs for Temperature and TDG on Lower Columbia and Lower Snake Rivers....98
DEQ28S - Gas Abatement Plan for Hydropower Projects on Mainstem Columbia River....98
DEQ33S - Evaluate and Require Mitigation for the Impacts of Dams and Hydroelectric Projects on Water Quality During Development of TMDLs....99
DEQ34S - Compliance Rate Monitoring Plan....99
Department of Geology and Mineral Industries....101
DOGAMI1 - Sediment Management at Mine Sites....101
DOGAMI2 - Mine Operator Assistance to Watershed Councils....101
DOGAMI3 - Good Mine Operators Award....102
DOGAMI4 - Best Management Practices Manual....102
DOGAMI5 - Storm Water Management at Mine Sites....102
DOGAMI6 - Chemical Management at Mine Sites....102
Oregon Department of Fish and Wildlife....102
ODFW IB2S - Inventory and Monitor Wild Steelhead Habitat and Distribution102
ODFW IB3 - Habitat Restoration Evaluation....103
ODFW ID1 - Use of Volunteers....104

ODFW IVA1 - Provide Technical Assistance to Regulatory Agencies for Habitat Protection 105
ODFW IVA3 - Protect Instream Flows 106
ODFW IVA6 - Promote and Assist Voluntary Habitat Protection Actions 107
ODFW IVA8 - Identify Instream Flow Priorities 108
ODFW IVB2 - Promote Habitat Restoration 109
ODFW IVB3 - Promote Use of Beavers to Restore Salmonid Habitat 111
ODFW IVB4 - Use Hatchery Carcasses to Increase Wild Salmonid Production 112
ODFW IVB7 - ODFW Job Rotations 112
ODFW VA1 - Conduct An Outreach Program 113
Oregon Department of Forestry 114
ODF1S - Road Erosion and Risk Project 114
ODF2S - State Forest Lands Road Erosion and Risk Project 114
ODF3S - Technical and Policy Review of Rules and Administrative Processes Related to Slope Stability 114
ODF4S - Stream Habitat Assessments 114
ODF5S - North Coast Salmonid Habitat Restoration Project 114
ODF6S - Mid-Coast Restoration Project 115
ODF7S - Fund 7 New Fish Biologists to Provide Technical Assistance for Salmonid Habitat Restoration 115
ODF8S - Riparian Hardwood Conversions 115
ODF9S - Northwest State Forest Lands Management Plan 115
ODF10S - Forest Practices Monitoring Program 115
ODF11S - Monitoring of Riparian Management Areas Under the Forest Practice Act 115
ODF12S - Monitoring Effectiveness of BMPs in Protecting Water Quality During Aerial Applications of Forest Pesticides 116
ODF13S - Storms of 1996 Monitoring Project 116
ODF14S - Monitoring Water Temperature Protection BMPs 116
ODF15S - Evaluation of Road and Timber Harvest BMPs to Minimize Sediment Impacts 116
ODF17S - Site-Specific Plans for Vegetation Retention Within RMAs on Northwest and Southwest (Grants Pass) Oregon State Forest Lands 116
ODF18S - Wildlife Tree Placement on State Forest Lands 116
ODF19S - Additional Conifer Retention Along Fish-Bearing Streams in Core Areas 117
ODF20S - Limited RMA for Small Type N Streams 117
ODF21S - Active Placement of LWD During Forest Operations 117
ODF22S - 25 Percent In-Unit Leave Tree Placement and Additional Voluntary Retention 117
ODF23S - BMP Compliance Audit Program 117
ODF24S - State Forest Lands Stream Habitat Assessment and Instream Projects 117
ODF25S - Fish Presence/Absence Surveys and Fish Population Surveys 118
ODF26S - Elliott State Forest Habitat Conservation Plan 118

ODF27S - Increased Riparian Protection....118
ODF28S - Protection of Significant Wetlands, Including Estuaries....118
ODF29S - Forest Practice Chemical Protection Rules Increased Buffers....118
ODF30S - Large Woody Debris Recruitment Incentives....118
ODF31S - Large Woody Debris Placement Guidelines....118
ODF32S - Fish Presence Survey (OAR 629-635-200(11))....119
ODF33S - Increase Number of Streams and Stream Miles Protected....119
ODF34S - Improve Fish Passage BMPs on Stream Crossing Structures....119
ODF35S - Increase Design for Larger Flows....119
ODF36S - Upgraded Road Construction & Fill Requirements....119
ODF37S - Upgraded Skid Trail Construction and Fill Requirement....119
ODF39S - Lobster Creek Whole-Basin Coordination Restoration Project....119
ODF40S - Upper Siuslaw Enhancement....119
ODF41S - South Siletz Monitoring....120
ODF42S - North Fork Coquille Monitoring Assessment....120
ODF45S - Coquille, Siletz and Sixes Watershed Monitoring....120
ODF47S - Coos, Milliacoma and Upper Siuslaw Rivers Watershed Analysis....120
ODF48S - South Fork Siletz Watershed Analysis....120
ODF49S - Ecola Creek Watershed Analysis....120
ODF50S - Kilchis Watershed Analysis....120
ODF53S - Oregon Professional Logger Program....120
ODF61S - Analysis of "Rack" Concept for Debris Flows....121
ODF62 - Voluntary No-Harvest Riparian Management Areas....121
ODF59S - Integrated Forest Assessment....121
Department of Land Conservation and Development....121
DLCDBP - Statewide Growth Management Program and Periodic Review....121
DLCD1 - Implement The Coastal Nonpoint Pollution Control Program (CNPCP)123
DLCD2 - Riparian Area Technical Assistance....123
DLCD3 - Identify Estuarine Restoration Opportunities....124
DLCD5 - Implement Urban Management Measures Under the CNPCP....124
DLCD4 - Implement New Goal 5 Rules for Riparian and Wetland Protection....124
Lower Columbia River Estuary Program....125
LCREP1 - Lower Columbia River Estuary Program....125
LCREP2 - Long term monitoring for the Lower Columbia River....126
Division of State Lands....126
DSL1 - Develop Standardized Permit Conditions Reflecting Best Management Practices for Removal-Fill Activities....126
DSL5-8 - Revised General Authorizations....126
DSL20 - Reduce Water Pollution from Waterway Leasees....126
Oregon State Marine Board....126
OSMB1 - Increase Number of Streams Adopted through Adopt-A-River Program126
OSMB2 - Increase Number of Boat Waste Pump-Outs and Dump Stations....127
Oregon Department of Transportation....127
ODOT1 - Protection and Replacement of Riparian Vegetation....127

ODOT2 - Erosion and Sediment Management 127
ODOT3 - Protection of Aquatic Habitat 128
ODOT4 - Chemical Management 129
ODOT5 - Stream Fertility 130
FEDERAL AGENCY MANAGEMENT MEASURES 131
Bureau of Land Management and US Forest Service 131
BLM/USFS1 - Watershed/Habitat Restoration 131
BLM/USFS2 - Research 131
BLM/USFS3 - Monitoring and Evaluation 131
BLM/USFS5 - Planning and Assessment 131
BLM/USFS8 - Education/Interpretation/Outreach 131
BLM/USFS10 - Interagency and Tribal Coordination 132
BLM/USFS13 - Hydropower Licensing and Relicensing Coordination 132
BLM/USFS14 - Clean Water Act Section 303 Compliance 132
BLM/USFS15- Safe Drinking Water Act Implementation 132
US Fish & Wildlife Service 132
USFWS1 - Jobs-in-the-Woods Program 132
USFWS2 - Habitat Conservation Plan Development 132
USFWS3 - Aquatic Habitat Conservation Agreement Development and Conservation Activities 132
USFWS4 - Technical Assistance on 1996 and 1997 Floods 132
USFWS5 - Partners for Wildlife (PFW) Program 132
USFWS6 - Greenspaces Program 133
USFWS7 - Assistance to Watershed Councils 133
USFWS8 - Northwest Forest Plan Implementation Assistance 133
USFWS9 - Biological Opinions to Prevent or Reduce Impacts to Listed Species 133
USFWS10 - Fish and Wildlife Coordination Act Reports on Federal Projects ... 133
USFWS11 - Comments and Prescriptions on Federal Energy Regulatory Commission Hydropower Projects 133
USFWS12- Acquisition and Restoration of Coastal Wetlands for National Wildlife Refuges (NWR) 133
USFWS13 -Review of Dredge and Fill Projects 134
USFWS14 - Response to Oil and Hazardous Substances Spills 134
USFWS15 - Natural Resource Damage Assessment 134
USFWS16 -Technical Assistance for Planning 134
USFWS17 - Adopt-A-River and Salmon Watch Programs 134
USFWS18 - Support to Ongoing Educational Programs (Outdoor School and Salmon Camp) 134
USFWS19 - Natural Resource Education and Community Awareness of Aquatic Resources 134
USFWS20 - National Estuary Program 135
USFWS21 - Conservation Strategy for Bull Trout 135
USFWS22 - Avian Predator Management 135
USFWS23 - Environmental Contaminant Investigations 135

USFWS24 - Interior Columbia Basin Ecosystem Management Project 135
National Oceanic and Atmospheric Administration 135
NOAA-NMFS1-Hire the Fisher Habitat Restoration Program.....135
NOAA-NMFS2-Watershed Councils 135
NOAA-NMFS3-Habitat Conservation Plans.....136
NOAA-NMFS4-Habitat Matrix.....136
NOAA-NMFS5-Northwest Forest Plan (NFP) and Regional Ecosystem Office 136
NOAA-NMFS6 - Irrigation Screening and Fishways.....136
NOAA-NMFS7 - Exotic Fishes.....136
NOAA-NMFS8 - Fisheries Harvest.....136
NOAA-NMFS9 - Supplementation 136
NOAA-NMFS10 - Hatchery Research 136
NOAA-NMFS11-Section 404/10 Actions.....136
NOAA-NMFS12-Highway Projects.....136
NOAA-NMFS13-Hydropower Facilities.....137
NOAA-NMFS14-Non-Hydropower Facilities 137
NOAA-NMFS15-Water Supply Projects 137
NOAA-NMFS16 - Fish Passage Research 137
NOAA-NMFS17-National Estuary Program, Columbia River.....137
NOAA-NMFS18-Coastal Change Analysis 137
NOAA-NOS19-Coastal Management and Nonpoint Sources 137
NOAA-NOS20 - South Slough National Estuarine Research Reserve 137
NOAA-NOS21 - Coastal Services Center 137
NOAA-OAR22 - Oregon Sea Grant 137
NOAA-COP23 - Pacific Northwest Coastal Ecosystem Regional Study.....138
NOAA-NMFS24 - Steelhead Genetics.....138
NOAA-NMFS25 - Population Status 138
NOAA-NMFS26 - Estuarine and Ocean Ecology Research.....138
NOAA-COP27 - U.S.Global Ocean Ecosystem Dynamics Program (GLOBEC)138
NOAA-NOS28-Hydrologic and Hydrodynamic Model of Coos Bay and Watershed 138
NOAA-NMFS29 - For the Sake of the Salmon.....138
NOAA-NMFS30 - Snake River Recovery Plan 138
NOAA-NMFS31 - Access Remote Sensing Data through the Global Fiducial Program.....139
NOAA-NOPP32-National Ocean Partnership Program 139
NOAA-OAR33-Effects of El Nino.....139
NOAA-NMFS34 - Data Collection 139
NOAA-NMFS35 - Hazardous Materials Response and Assessment 139
NOAA-NOS36-National Status and Trends Program 139
NOAA-NOS37-Estuary Eutrophication 139
NOAA-NMFS40 - Memorandum of Understanding with the Natural Resource Conservation Service. 139

NOAA-NMFS41 - Integration of Endangered Species Act with Water Quality Management Planning 140
Environmental Protection Agency 140
EPA 1 - Aligning Water Quality Recovery Priorities with Salmon Recovery 140
EPA2 - Development of Water Quality Standards that more Closely Match Salmon Life History Needs 140
EPA3 - Monitoring and Evaluation of Best Management Practices 140
EPA4 - Technical Assistance 140
EPA5 - Funding Assistance 141
EPA6 - Attaining Water Quality Standards for Temperature and Total Dissolved Gas 142
Bureau of Reclamation 142
BOR1d - Technical Assistance for Watershed Council Activities 142
BOR1g - Water Conservation in the Bear Creek Drainage 142
BOR1h - Technical Assistance for the Umpqua River Basin Water Management Program 142
BOR3a - Technical Assistance to Irrigation Districts on Federal Projects 142
BOR3d - Funding for a Water Quality Survey in Bear Creek 142
BOR3e - Funding for Upper Rogue Basin Conservation Districts 143
BOR4b - Demonstration Project for Wetland Construction and Restoration 143
Bureau of Indian Affairs 143
BIA1 - Co-Manager Consultation 143
Natural Resource Conservation Service 143
NRCS1- Conservation Operations 143
NRCS4 - National Resources Inventory (NRI) 143
NRCS5 - Plant Materials Program 143
NRCS6 - Farm Bill Financial Assistance Programs 143
NRCS4 - National Resources Inventory (NRI) 144
NRCS5 - Plant Materials Program 144
NRCS6 - Farm Bill Financial Assistance Programs 144
NRCS9 - Hire-The-Fisher Habitat Restoration Program 144
NRCS10 - Cooperative River Basin and Small Watershed Program 144
NRCS11 - Assistance and Guidance 144
US Army Corps of Engineers 144
COR1 - Develop Annual Operating Plan For Willamette River Basin Dams 144
COR4 - Undertake Willamette Basin Floodplain Restoration Study (for Objective BII-1) 144
Bonneville Power Administration 145
BPA1- Assistance and Funding for Grande Ronde Model Watershed Plan 145
BPA2 - Cooperative Watershed Effort on Wallowa River 145
BPA3 - Funding for Habitat Project Placeholder 145
BPA4 - Funding and Assistance on Wallowa/Nez Perce Salmon Habitat Restoration 145

BPA5 - Monitoring Assistance and Funding for Meadow Creek Habitat Restoration 145
BPA6 - Funding for Habitat Restoration and Projects 145
BPA7 - Assistance on McKenzie Watershed 145
BPA8 - Assist With Mohawk Watershed Plans 145
BPA9- Access to Computer and GIS Data Bases 145
RESEARCH NEEDS 147
REFERENCES 150
APPENDICES
Appendix 1: Map of Steelhead ESUs in Oregon
Appendix 2: Summary of Oregon Water Quality Standards
Appendix 3: Tables Summarizing Water Quality Data

TABLE OF FIGURES

Figure 1: Significant Water Quality Parameters in Klamath Mountains Province and Oregon Coast Steelhead ESUs 15
Figure 2: Land Use Adjacent to Streams in Klamath Mountains Province and Oregon Coast Steelhead ESUs 17
Figure 3: Significant Water Quality Parameters in SW Washington and Lower Columbia River ESUs 18
Figure 4: Land Use Adjacent to Streams in SW Washington and Lower Columbia River Steelhead ESUs 19
Figure 5: Significant Water Quality Parameters in Upper Willamette River Steelhead ESU 21
Figure 6: Land Use Adjacent to Streams in Upper Willamette River Steelhead ESU 22
Figure 7: Significant Water Quality Parameters in Snake River Basin Steelhead ESU 24
Figure 8: Land Use Adjacent to Streams in Snake River Basin Steelhead ESU 25
Figure 9: Percent of Stream Miles Assessed that Meet Water Quality Standards for Temperature, Dissolved Oxygen and pH 46