



Statewide Water Quality Management Plan



Colorado Department
of Public Health
and Environment

Colorado Department of Public Health and Environment
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Final Version 1.0
June 13, 2011

Contents

Acknowledgements	i
Executive Summary	ii
Acronyms and Abbreviations	iv
1. Introduction and Background	1-1
1.1 Purpose and Overview	1-1
1.2 The Watershed Approach	1-1
1.2.1 Hydrologically Defined	1-2
1.2.2 Stakeholder Involvement	1-2
1.2.3 Strategic Goals	1-3
1.3 Plan Organization.....	1-4
References.....	1-6
2. Water Quality Planning and Management in Colorado	2-1
2.1 Introduction.....	2-1
2.2 Statutory and Regulatory Authority.....	2-1
2.2.1 Federal Clean Water Act.....	2-1
2.2.2 Colorado Water Quality Control Act.....	2-3
2.2.3 Water Quality Standards in Colorado.....	2-4
2.2.3.1 Use Classifications.....	2-5
2.2.3.2 Water Quality Standards.....	2-6
2.2.3.3 Antidegradation and Water Quality-Based Designations.....	2-8
2.2.4 Planning Aspects of the Clean Water Act.....	2-9
2.2.4.1 CWA Sections 205(j) and 604(b)	2-9
2.2.4.2 Continuing Planning Process and CWA Section 303(e)	2-10
2.2.4.3 CWA Section 208 Plans.....	2-10
2.2.4.4 CWA Section 319 Nonpoint Source Planning Activities	2-13
2.2.4.5 Water Quality Management Plans and 40 CFR 130.6.....	2-13
2.3 Statewide Water Quality Management Plan.....	2-13
2.3.1 Water Quality Management Agencies.....	2-16
2.3.1.1 Section 208 Management Entities	2-16
2.3.1.2 Management Agencies in Colorado.....	2-16
2.3.2 Effluent Limitations.....	2-17
2.3.2.1 Types of Effluent Limitations.....	2-17
2.3.2.2 Effluent Limitations and the Permits Program	2-18
2.3.3 Total Maximum Daily Load Development.....	2-19
2.3.3.1 TMDL Background.....	2-19
2.3.3.2 TMDL Program Development Process.....	2-20
2.3.4 Municipal and Industrial Waste Treatment.....	2-21
2.3.4.1 Municipal Waste Treatment.....	2-21
2.3.4.2 Industrial Waste Treatment.....	2-22
2.3.5 Nonpoint Source Management and Control	2-23
2.3.5.1 Background.....	2-23
2.3.5.2 Nonpoint Source Management in Colorado	2-23

2.3.6 Water Quality Management Plan Implementation Measures	2-25
2.3.6.1 Program Implementation Factors.....	2-25
2.3.6.2 Program-Specific Implementation Schedules and Priorities	2-26
2.3.7 Dredge and Fill	2-27
2.3.7.1 Background Information.....	2-27
2.3.7.2 Section 404-related Activities.....	2-28
2.3.7.3 Section 401 Certification Activities.....	2-29
2.3.7.4 Miscellaneous Wetland Protection Activities.....	2-29
2.3.8 Groundwater	2-30
2.3.8.1 Background.....	2-30
2.2.8.2 Colorado’s Groundwater Management Program	2-30
2.3.9 Basin Plans.....	2-31
2.3.10 Documents Incorporated into SWQMP by Reference.....	2-33
References.....	2-36
3. Current Statewide Water Quality	3-1
3.1 Colorado’s Major River Basins and Sub-Basins	3-1
3.1.1 Location and Physical Setting of the State’s Major River Basins	3-2
3.1.2 Ecology	3-3
3.1.3 Climate.....	3-7
3.1.4 Land Ownership and Land Cover/Use.....	3-7
3.1.5 Demographic and Socioeconomic Conditions	3-8
3.1.6 Water Withdrawals	3-10
3.1.7 Hydrography and Hydrology	3-13
3.1.7.1 Surface Geology.....	3-13
3.1.7.2 Surface Water	3-13
3.1.7.3 Wetlands	3-14
3.1.7.4 Groundwater	3-14
3.2 Water Quality Classifications and Standards.....	3-15
3.2.1 Surface Water.....	3-15
3.2.2.1 Regulations	3-15
3.2.2.2 Total Segments, Stream Miles, and Lake Acres	3-15
3.2.2.3 Use Classifications.....	3-16
3.2.2.4 Designations.....	3-17
3.2.3 Lakes	3-17
3.2.3.1 Trophic Status	3-17
3.2.3.2 Fish Tissue Studies	3-18
3.2.4 Wetlands	3-19
3.2.5 Groundwater	3-21
3.2.5.1 Interim Narrative Standard	3-22
3.2.5.2 Site-Specific Classifications and Standards.....	3-22
3.2.5.3 Groundwater Quality	3-23
3.3 Surface Water Quality Stressors and Sources.....	3-23
3.3.1 Impairments	3-23
3.3.2 Segments Listed for Further Monitoring and Evaluation	3-25
3.3.3 Known Sources of Stressors	3-25

3.4 TMDLs as Water Protection Strategies	3-27
3.4.1 TMDL Basics	3-27
3.4.2 TMDLs Required to be Developed.....	3-27
3.4.3 TMDLs Completed to Date	3-28
3.4.4 TMDL Implementation Strategies	3-30
3.5 Planned Point Source Treatment Upgrades	3-31
3.6 Nonpoint Source Management	3-33
References.....	3-35
4. Strategies for Addressing Water Quality Problems	4-1
4.1 Introduction.....	4-1
4.2 Background.....	4-1
4.3 The Watershed Approach	4-2
4.4 Systems, Stressors, Sources, and Strategies.....	4-3
4.5 Agricultural Strategies	4-7
4.5.1 Erosion and Sediment Control	4-8
4.5.2 Irrigation Water Management.....	4-8
4.5.3 Agricultural Drainage Management	4-9
4.5.4 Nutrient Management on Cropland	4-10
4.5.5 Pesticide Management	4-10
4.5.5.1 Nonpoint Source Pesticide Management Strategies	4-10
4.5.5.2 Point Source Pesticide Management Strategies.....	4-11
4.5.6 Compatible Livestock Operations Management.....	4-12
4.5.6.1 Nonpoint Source Compatible Livestock Operational Strategies	4-12
4.5.6.2 Point Source Compatible Livestock Operational Strategies.....	4-12
4.5.7 Carbon Sequestration.....	4-14
4.6 Forestry Strategies	4-14
4.6.1 Road Construction Management.....	4-14
4.6.2 Bark Beetle Infestation Management.....	4-15
4.7 Hydromodification Strategies	4-16
4.7.1 Minimizing Channelization of Rivers and Streams	4-16
4.8 Land Development/Stormwater Control Strategies	4-17
4.8.1 Unregulated Stormwater (Nonpoint) Control	4-18
4.8.1.1 Low-Impact Design	4-18
4.8.1.2 Other Strategies for Addressing Nonpoint Sources of Stormwater Runoff	4-19
4.8.1.3 Designing Strategies at the Site Level	4-19
4.8.1.4 Strategies for Large-Scale Development or Re-development	4-19
4.8.2 Permitted Stormwater Control	4-20
4.9 Recreational Boating Strategies.....	4-20
4.9.1 Nonpoint Issues and Strategies	4-20
4.9.2 Controlling Aquatic Invasive Species, Pathogens, and Parasites	4-21
4.10 Resource Extraction, Strategies to Address Abandoned Mines.....	4-23
4.10.1 Hydrologic Strategies for Addressing Acid Mine Drainage.....	4-23
4.10.1.1 Diversion Ditches.....	4-23
4.10.1.2 Mine Waste Rock/Tailings Removal and Consolidation.....	4-24

4.10.1.3 Stream Diversions	4-24
4.10.1.4 Erosion Control by Regrading	4-24
4.10.1.5 Capping	4-24
4.10.1.6 Vegetation	4-25
4.10.2 Passive Treatment Strategies for Addressing Acid Mine Drainage.....	4-25
4.10.2.1 Aeration and Settling Ponds.....	4-25
4.10.2.2 Sulfate-reducing Wetlands.....	4-25
4.10.2.3 Oxidation Wetlands	4-26
4.10.2.4 Other Treatment Methods	4-26
4.11 Strategies with Wide-Ranging Applicability to Stressors and Sources	4-27
4.11.1 Monitoring	4-27
4.11.2 Permitting.....	4-28
4.11.3 TMDLs.....	4-28
4.11.4 Compliance Assurance.....	4-29
4.11.5 Sustainable Water and Wastewater Point Source Infrastructure	4-30
4.11.6 Infrastructure Planning for Global Climate Change	4-30
References.....	4-33
5. Information Gaps.....	5-1
5.1 Purpose and Need for Water Quality Planning Data	5-1
5.2 Identified Information Gaps.....	5-1
5.3 Closing Information Gaps in Future SWQMP Updates	5-4
References.....	5-5
6. Arkansas River Basin Plan	6-1
6.1 System Description	6-2
6.1.1 Location and Physical Setting.....	6-2
6.1.2 Ecology	6-2
6.1.3 Climate.....	6-3
6.1.4 Land Ownership and Land Cover/Use.....	6-3
6.1.5 Demographic and Socioeconomic Conditions	6-4
6.1.6 Water Withdrawals	6-5
6.1.7 Hydrography and Hydrology	6-7
6.1.7.1 Surface Geology.....	6-7
6.1.7.2 Surface Water	6-7
6.1.7.3 Groundwater	6-8
6.2 Water Quality Classifications and Standards.....	6-9
6.2.1 Sub-Basin Boundaries.....	6-9
6.2.2 Surface Water.....	6-10
6.2.2.1 Use Classifications	6-10
6.2.2.2 Designations.....	6-11
6.2.2.3 Standards.....	6-11
6.2.3 Lakes	6-11
6.2.3.1 Trophic Status	6-11
6.2.3.2 Fish Tissue Studies	6-12
6.2.4 Wetlands	6-14

6.2.5 Groundwater	6-14
6.2.5.1 Interim Narrative Standard	6-14
6.2.5.2 Site-Specific Classifications and Standards.....	6-15
6.2.5.3 Groundwater Quality	6-16
6.3 Surface Water Quality Stressors and Sources.....	6-17
6.3.1 Impairments	6-17
6.3.2 Segments Listed for Further Monitoring and Evaluation	6-17
6.3.3 Known Sources of Stressors	6-17
6.4 TMDLs as Water Protection Strategies	6-19
6.4.1 TMDL Basics.....	6-19
6.4.2 TMDLs Required to Be Developed.....	6-19
6.4.3 TMDLs Completed to Date	6-22
6.4.4 TMDL Implementation Strategies	6-23
6.5 Planned Point Source Treatment Upgrades	6-23
6.6 Nonpoint Source Management	6-26
References.....	6-27
7. Colorado River Basin Plan.....	7-1
7.1 System Description.....	7-2
7.1.1 Location and Physical Setting.....	7-2
7.1.2 Ecology	7-2
7.1.3 Climate.....	7-3
7.1.4 Land Ownership and Land Cover/Use.....	7-3
7.1.5 Demographic and Socioeconomic Conditions.....	7-4
7.1.6 Water Withdrawals	7-5
7.1.7 Hydrography and Hydrology	7-7
7.1.7.1 Surface Geology.....	7-7
7.1.7.2 Surface Water.....	7-7
7.1.7.3 Groundwater	7-8
7.2 Water Quality Classifications and Standards.....	7-9
7.2.1 Sub-Basin Boundaries.....	7-9
7.2.2 Surface Water	7-10
7.2.2.1 Use Classifications	7-10
7.2.2.2 Designations.....	7-11
7.2.2.3 Standards.....	7-11
7.2.3 Lakes	7-12
7.2.3.1 Trophic Status	7-12
7.2.3.2 Fish Tissue Studies	7-15
7.2.4 Wetlands	7-16
7.2.5 Groundwater	7-18
7.2.5.1 Interim Narrative Standard	7-18
7.2.5.2 Site-Specific Classifications and Standards.....	7-19
7.2.5.3 Groundwater Quality	7-19
7.3 Surface Water Quality Stressors and Sources.....	7-22
7.3.1 Impairments	7-22
7.3.2 Segments Listed for Further Monitoring and Evaluation	7-22

7.3.3 Known Sources of Stressors	7-23
7.4 TMDLs as Water Protection Strategies	7-25
7.4.1 TMDL Basics.....	7-25
7.4.2 TMDLs Required to Be Developed.....	7-25
7.4.3 TMDLs Completed to Date	7-28
7.4.4 TMDL Implementation Strategies	7-29
7.5 Planned Point Source Treatment Upgrades	7-29
7.6 Nonpoint Source Management	7-33
References.....	7-34
8. Green River Basin Plan.....	8-1
8.1 System Description	8-2
8.1.1 Location and Physical Setting.....	8-2
8.1.2 Ecology	8-2
8.1.3 Climate.....	8-3
8.1.4 Land Ownership and Land Cover/Use.....	8-3
8.1.5 Demographic and Socioeconomic Conditions	8-4
8.1.6 Water Withdrawals	8-5
8.1.7 Hydrography and Hydrology	8-7
8.1.7.1 Surface Geology.....	8-7
8.1.7.2 Surface Water.....	8-7
8.1.7.3 Groundwater	8-8
8.2 Water Quality Classifications and Standards.....	8-9
8.2.1 Sub-Basin Boundaries.....	8-9
8.2.2 Surface Water.....	8-10
8.2.2.1 Use Classifications.....	8-10
8.2.2.2 Designations.....	8-11
8.2.2.3 Standards.....	8-11
8.2.3 Lakes	8-12
8.2.3.1 Trophic Status	8-12
8.2.3.2 Fish Tissue Studies	8-13
8.2.4 Wetlands	8-14
8.2.5 Groundwater	8-15
8.2.5.1 Interim Narrative Standard	8-15
8.2.5.2 Site-Specific Classifications and Standards.....	8-16
8.2.5.3 Groundwater Quality	8-16
8.3 Surface Water Quality Stressors and Sources.....	8-19
8.3.1 Impairments	8-19
8.3.2 Segments Listed for Further Monitoring and Evaluation	8-19
8.3.3 Known Sources of Stressors	8-20
8.4 TMDLs as Water Protection Strategies	8-20
8.4.1 TMDL Basics.....	8-20
8.4.2 TMDLs Required to Be Developed.....	8-21
8.4.3 TMDLs Completed to Date	8-23
8.4.4 TMDL Implementation Strategies	8-23
8.5 Planned Point Source Treatment Upgrades	8-23

8.6 Nonpoint Source Management	8-25
References.....	8-26
9. San Juan River Basin.....	9-1
9.1 System Description	9-2
9.1.1 Location and Physical Setting.....	9-2
9.1.2 Ecology	9-2
9.1.3 Climate.....	9-3
9.1.4 Land Ownership and Land Cover/Use.....	9-3
9.1.5 Demographic and Socioeconomic Conditions	9-4
9.1.6 Water Withdrawals	9-6
9.1.7 Hydrography and Hydrology	9-7
9.1.7.1 Surface Geology.....	9-7
9.1.7.2 Surface Water.....	9-8
9.1.7.3 Groundwater	9-9
9.2 Water Quality Classifications and Standards.....	9-9
9.2.1 Surface Water	9-9
9.2.1.1 Use Classifications	9-9
9.2.1.2 Designations.....	9-10
9.2.1.3 Standards.....	9-11
9.2.2 Lakes	9-11
9.2.2.1 Trophic Status	9-11
9.2.2.2 Fish Tissue Studies	9-12
9.2.3 Wetlands	9-13
9.2.4 Groundwater	9-14
9.2.4.1 Interim Narrative Standard	9-14
9.2.4.2 Site-Specific Classifications and Standards.....	9-15
9.2.4.3 Groundwater Quality	9-15
9.3 Surface Water Quality Stressors and Sources.....	9-15
9.3.1 Impairments	9-15
9.3.2 Segments Listed for Further Monitoring and Evaluation	9-16
9.3.3 Known Sources of Stressors	9-16
9.4 TMDLs as Water Protection Strategies	9-17
9.4.1 TMDL Basics.....	9-17
9.4.2 TMDLs Required to Be Developed	9-17
9.4.3 TMDLs Completed to Date	9-18
9.4.4 TMDL Implementation Strategies	9-19
9.5 Planned Point Source Treatment Upgrades	9-19
9.6 Nonpoint Source Management	9-21
References.....	9-22
10. Rio Grande River Basin.....	10-1
7.1 System Description	10-2
10.1.1 Location and Physical Setting.....	10-2
10.1.2 Ecology	10-3
10.1.3 Climate.....	10-3

10.1.4 Land Ownership and Land Cover/Use.....	10-4
10.1.5 Demographic and Socioeconomic Conditions	10-4
10.1.6 Water Withdrawals	10-5
10.1.7 Hydrography and Hydrology	10-7
10.1.7.1 Surface Geology.....	10-7
10.1.7.2 Surface Water	10-8
10.1.7.3 Groundwater	10-9
10.2 Water Quality Classifications and Standards.....	10-9
10.2.1 Surface Water	10-9
10.2.1.1 Use Classifications	10-9
10.2.1.2 Designations.....	10-10
10.2.1.3 Standards.....	10-10
10.2.2 Lakes	10-10
10.2.2.1 Trophic Status	10-10
10.2.2.2 Fish Tissue Studies	10-11
10.2.3 Wetlands	10-12
10.2.4 Groundwater	10-14
10.2.4.1 Interim Narrative Standard	10-14
10.2.4.2 Site-Specific Classifications and Standards.....	10-14
10.2.4.3 Groundwater Quality	10-15
10.3 Surface Water Quality Stressors and Sources.....	10-15
10.3.1 Impairments	10-15
10.3.2 Segments Listed for Further Monitoring and Evaluation	10-16
10.3.3 Known Sources of Stressors	10-16
10.4 TMDLs as Water Protection Strategies	10-17
10.4.1 TMDL Basics.....	10-17
10.4.2 TMDLs Required to Be Developed.....	10-17
10.4.3 TMDLs Completed to Date	10-18
10.4.4 TMDL Implementation Strategies	10-19
10.5 Planned Point Source Treatment Upgrades	10-19
10.6 Nonpoint Source Management	10-21
References.....	10-23
11. Platte River Basin Plan.....	11-1
11.1 System Description	11-2
11.1.1 Location and Physical Setting.....	11-2
11.1.2 Ecology	11-2
11.1.3 Climate.....	11-3
11.1.4 Land Ownership and Land Cover/Use.....	11-3
11.1.5 Demographic and Socioeconomic Conditions.....	11-4
11.1.6 Water Withdrawals	11-5
11.1.7 Hydrography and Hydrology	11-7
11.1.7.1 Surface Geology.....	11-7
11.1.7.2 Surface Water	11-7
11.1.7.3 Groundwater	11-8
11.2 Water Quality Classifications and Standards.....	11-9

11.2.1 Sub-Basin Boundaries.....	11-9
11.2.2 Surface Water.....	11-9
11.2.2.1 Use Classifications	11-9
11.2.2.2 Designations.....	11-11
11.2.2.3 Standards.....	11-11
11.2.3 Lakes	11-11
11.2.3.1 Trophic Status	11-11
11.2.3.2 Fish Tissue Studies	11-14
11.2.4 Wetlands	11-16
11.2.5 Groundwater	11-17
11.2.5.1 Interim Narrative Standard	11-17
11.2.5.2 Site-Specific Classifications and Standards.....	11-18
11.2.5.3 Groundwater Quality	11-19
11.3 Surface Water Quality Stressors and Sources.....	11-24
11.3.1 Impairments	11-24
11.3.2 Segments Listed for Further Monitoring and Evaluation	11-24
11.3.3 Known Sources of Stressors	11-25
11.4 TMDLs as Water Protection Strategies	11-28
11.4.1 TMDL Basics.....	11-28
11.4.2 TMDLs Required to Be Developed.....	11-29
11.4.3 TMDLs Completed to Date	11-32
11.4.4 TMDL Implementation Strategies	11-34
11.5 Planned Point Source Treatment Upgrades	11-34
11.6 Nonpoint Source Management	11-38
References.....	11-40
12. Republican River Basin Plan	12-1
12.1 System Description	12-2
12.1.1 Location and Physical Setting.....	12-2
12.1.2 Ecology	12-2
12.1.3 Climate.....	12-3
12.1.4 Land Ownership and Land Cover/Use.....	12-3
12.1.5 Demographic and Socioeconomic Conditions	12-4
12.1.6 Water Withdrawals	12-5
12.1.7 Hydrography and Hydrology	12-7
12.1.7.1 Surface Geology.....	12-7
12.1.7.2 Surface Water	12-7
12.1.7.3 Groundwater	12-7
12.2 Water Quality Classifications and Standards.....	12-8
12.2.1 Surface Water	12-8
12.2.1.1 Use Classifications	12-8
12.2.1.2 Designations.....	12-9
12.2.1.3 Standards.....	12-9
12.2.2 Lakes	12-10
12.2.2.1 Trophic Status	12-10
12.2.2.2 Fish Tissue Studies	12-10

12.2.3 Wetlands	12-10
12.2.4 Groundwater	12-11
12.2.4.1 Interim Narrative Standard	12-11
12.2.4.2 Site-Specific Classifications and Standards.....	12-12
12.2.4.3 Groundwater Quality	12-12
12.3 Surface Water Quality Stressors and Sources.....	12-14
12.3.1 Impairments	12-14
12.3.2 Segments Listed for Further Monitoring and Evaluation	12-15
12.3.3 Known Sources of Stressors	12-15
12.4 TMDLs as Water Protection Strategies	12-15
12.4.1 TMDL Basics.....	12-15
12.4.2 TMDLs Required to Be Developed	12-16
12.4.3 TMDLs Completed to Date	12-16
12.4.4 TMDL Implementation Strategies	12-16
12.5 Planned Point Source Treatment Upgrades	12-16
12.6 Nonpoint Source Management	12-18
References.....	12-19

Exhibits

Exhibit 1-1. Adaptive Management Cycle.....	1-4
Exhibit 2-2. Colorado Water Quality Planning Regions	2-12
Exhibit 2-3. Statewide Water Quality Management Plan Overview	2-15
Exhibit 2-4. Documents Incorporated into SWQMP by Reference.....	2-34
Exhibit 3-1. Colorado River Basin Apportionments.....	3-39
Exhibit 3-2. Colorado’s Major River Basins and Water Quality Planning Regions (map).....	3-41
Exhibit 3-3. Key Statistics for Colorado’s Major River Basins.....	3-2
Exhibit 3-4. Percentage of Basins in Level III Ecoregions.....	3-3
Exhibit 3-5. Numbers of Endangered and Threatened Species by Type and Basin	3-4
Exhibit 3-6. Land Ownership by Basin.....	3-8
Exhibit 3-7. Colorado Land Cover Data.....	3-8
Exhibit 3-8. Population Projections 2008/2009 to 2050 by Basin, Medium- Growth Scenario.....	3-9
Exhibit 3-9. 2050 Employment Projections by Basin, Medium Growth Scenario.....	3-43
Exhibit 3-10. Total Water Withdrawals by Basin by Water Use Category in 2005 (in Mgal/d).....	3-10
Exhibit 3-11. Municipal and Industrial and Self-Supplied Industrial Water Demand Forecast for Colorado	3-12
Exhibit 3-12. Generalized Geologic Map of Colorado (map)	3-46
Exhibit 3-13. Features and Habitats in the Palustrine System	3-14
Exhibit 3-14. Colorado’s Major Quaternary-Age Alluvial Deposits (map)	3-48
Exhibit 3-15. Location and Extent of Colorado’s Major Sedimentary Rock Aquifers and Structural Basins (map)	3-49
Exhibit 3-16. Major Aquifer Systems within Colorado’s Mountainous Regions (map)	3-50
Exhibit 3-17. Water Quality Regulations by Major River Basin.....	3-15
Exhibit 3-18. Percent of Stream Segments by Drainage Basin	3-52
Exhibit 3-19. Percent of Stream Miles by Drainage Basin.....	3-53
Exhibit 3-20. Assessed Lake/Reservoir Acres.....	3-16
Exhibit 3-21. Use Classifications by Basin (Number of Segments and Stream Miles).....	3-55
Exhibit 3-22. Number of Waterbody Segments and Percent of Stream Miles by Use Classification Category	3-17
Exhibit 3-23. Trophic Status of Measured Lakes and Reservoirs	3-18
Exhibit 3-24. Fish Tissue Sampling by Basin.....	3-18
Exhibit 3-25. Wetlands in Colorado’s Major River Basins (map).....	3-57
Exhibit 3-26. Counties Inventoried by the Colorado Natural Heritage Program (map).....	3-20
Exhibit 3-27. Designated Groundwater Basins in Colorado (map)	3-59
Exhibit 3-28. Number of Site Specific Groundwater Classifications by Major River Basin	3-22
Exhibit 3-29. Potential Sources of Groundwater Contamination	3-23
Exhibit 3-30. Impaired Stream Segments by Basin.....	3-61
Exhibit 3-31. Pollutants Causing Impairments by Basin in Terms of Stream Segments Impacted.....	3-24
Exhibit 3-32. Impairments in Colorado’s Major River Basins (map)	3-64

Exhibit 3-33. Impaired Lake/Reservoir Segments by Basin.....	3-65
Exhibit 3-34. Pollutants Causing Impairments by Basin in Terms of Lake/Reservoir Segments Impacted.....	3-24
Exhibit 3-35. Segments Listed for Further Monitoring and Evaluation by Pollutant and Basin	3-67
Exhibit 3-36. Identified Sources of Impairments for 2010 Listed Waters.....	3-26
Exhibit 3-37. Statewide and Basin Summary of Impairments, Affected Waterbody Segments, and TMDL Priority Development Status.....	3-27
Exhibit 3-38. Summary of TMDLs Completed to Date by River Basin	3-28
Exhibit 3-39. Number of Point Sources by Basin.....	3-31
Exhibit 3-40. Statewide Summary of Scheduled Point Source Improvement Projects	3-32
Exhibit 3-41. Summary of CWA Section 319 Nonpoint Source Grant Projects by Basin.....	3-33
Exhibit 4-1. Example Stressors and Sources	4-5
Exhibit 4-2. Watershed Planning and Funding Sources for Watershed Protection	4-7
Exhibit 4-3. Strategies to Achieve Sustainable Infrastructure	4-31

Each of the basin chapters (chapters 6-12) contains similar maps and exhibits. The following list of exhibits is a representative example of exhibits included in each of these chapters. Some maps and exhibits may be added or excluded from some chapters, due to variations among the basins.

Exhibit 6-1. Arkansas River Basin Physical Location (map)	6-1
Exhibit 6-2. Arkansas River Basin Summary Statistics.....	6-1
Exhibit 6-3. Arkansas River Basin and Major Tributaries (map).....	6-37
Exhibit 6-4. Arkansas River Basin Level III Ecoregions (map).....	6-38
Exhibit 6-5. Arkansas River Basin Endangered and Threatened Species	6-39
Exhibit 6-6. Arkansas River Basin Nonconsumptive Needs Assessment (map).....	6-41
Exhibit 6-7. Arkansas River Basin Precipitation (map).....	6-42
Exhibit 6-8. Arkansas River Basin Land Ownership (map)	6-43
Exhibit 6-9. Arkansas River Basin Land Cover (map).....	6-44
Exhibit 6-10. Arkansas River Basin Land Cover Data.....	6-3
Exhibit 6-11. Arkansas River Basin Population Projections	6-46
Exhibit 6-12. 2050 Arkansas River Basin Employment Projections, Medium Growth Scenario.....	6-4
Exhibit 6-13. Arkansas River Basin Total Water Withdrawals in Colorado, 2005.....	6-6
Exhibit 6-14. Arkansas River Basin Summary of Selected USGS Stream Gauges.....	6-8
Exhibit 6-15. Arkansas River Basin Key Diversions and Streamflow Gauges (map).....	6-48
Exhibit 6-16. Arkansas River Basin Wells and Aquifers (map).....	6-49
Exhibit 6-17. Upper Arkansas River Sub-Basin Classified Waterbody Segments (map)	6-50
Exhibit 6-18. Middle Arkansas River Sub-Basin Classified Waterbody Segments (map).....	6-51
Exhibit 6-19. Lower Arkansas River Sub-Basin Classified Waterbody Segments (map).....	6-52
Exhibit 6-20. Arkansas River Basin Use Classifications for Waterbody Segments.....	6-53
Exhibit 6-21. Upper Arkansas River Sub-Basin Use Classifications by Stream Segment.....	6-54

Exhibit 6-22. Middle Arkansas River Sub-Basin Use Classifications by Stream Segment	6-57
Exhibit 6-23. Lower Arkansas River Sub-Basin Use Classifications by Stream Segment	6-59
Exhibit 6-24. Number of Streams and Stream Miles by Classified Use.....	6-10
Exhibit 6-25. Number of Lakes and Lake Acres by Classified Use	6-11
Exhibit 6-26. Arkansas River Basin Trophic Status of Lakes and Reservoirs as Measured by the WQCD during the Period 2007 to 2009	6-12
Exhibit 6-27. Arkansas River Basin Lakes and Reservoirs Assessed for Mercury, Selenium, and Arsenic During the Period 2007 to 2009	6-12
Exhibit 6-28. Arkansas River Basin Lakes and Reservoirs for Which an FCA Has Been Issued.....	6-13
Exhibit 6-29. Wetland Types Identified by CDOW Prairie Wetland Focus Area Committee	6-14
Exhibit 6-30. Arkansas River Basin Wetlands (map).....	6-65
Exhibit 6-31. Arkansas River Basin Site-Specific Groundwater Classifications and Standards	6-15
Exhibit 6-32. Upper Arkansas River Sub-Basin; Park Center Water District Wellfield, Fremont County.....	6-67
Exhibit 6-33. Lower Arkansas River Sub-Basin; Crowley County Water System Wellfield, Crowley County	6-68
Exhibit 6-34. Lower Arkansas River Sub-Basin; City of Fountain, Security Water and Sanitation District Stratmoor Hills Water District, and Widefield Homes Water Company Wellfields, El Paso County	6-69
Exhibit 6-35. Lower Arkansas River Sub-Basin; City of La Junta Wellfield, Otero County	6-70
Exhibit 6-36. Lower Arkansas River Sub-Basin; City of Lamar Wellfield, Prowers County	6-71
Exhibit 6-37. Lower Arkansas River Sub-Basin; Town of Springfield Wellfield, Baca County	6-72
Exhibit 6-38. Lower Arkansas River Sub-Basin; Upper Black Squirrel Creek Alluvial Aquifer, El Paso County.....	6-73
Exhibit 6-39. Results for Selected Water Quality Parameters Collected from Monitoring Wells in the Arkansas Valley Network in 2008.....	6-16
Exhibit 6-40. Arkansas River Basin Impaired Stream Segments	6-75
Exhibit 6-41. Arkansas River Basin Impaired Lakes/Reservoirs Segments.....	6-76
Exhibit 6-42. Arkansas River Sub-Basin Impaired Waterbody Segments (map).....	6-77
Exhibit 6-43. Upper Arkansas River Sub-Basin Impairments by Stream Segment	6-78
Exhibit 6-44. Upper Arkansas River Sub-Basin Impairments by Lake/Reservoir Segment	6-80
Exhibit 6-45. Middle Arkansas River Sub-Basin Impairments by Stream Segment.....	6-81
Exhibit 6-46. Middle Arkansas River Sub-Basin Impairments by Lake/Reservoir Segment	6-82

Exhibit 6-47. Lower Arkansas River Sub-Basin Impairments by Stream Segment	6-83
Exhibit 6-48. Lower Arkansas River Sub-Basin Impairments by Lake/Reservoir Segment	6-85
Exhibit 6-49. Arkansas River Basin Summary of Waterbody Segments Listed for Further Monitoring and Evaluation	6-86
Exhibit 6-50. Upper Arkansas River Sub-Basin Waterbody Segments Listed for Further Monitoring and Evaluation	6-87
Exhibit 6-51. Middle Arkansas River Sub-Basin Waterbody Segments Listed for Further Monitoring and Evaluation	6-88
Exhibit 6-52. Lower Arkansas River Sub-Basin Waterbody Segments Listed for Further Monitoring and Evaluation	6-89
Exhibit 6-53. Arkansas River Basin, Summary of Stressors for Impaired Waterbodies	6-18
Exhibit 6-54. Arkansas River Basin Summary of Impairments, Affected Waterbody Segments, and TMDL Priority Development Status	6-20
Exhibit 6-55. Arkansas River Basin Completed and Approved TMDLs	6-22
Exhibit 6-56. Arkansas River Basin Completed and Approved TMDLs (at end of chapter)	6-91
Exhibit 6-57. Arkansas River Basin Summary of Point Sources by County	6-23
Exhibit 6-58. Arkansas River Basin Summary of Scheduled Point Source Improvements	6-25
Exhibit 6-59. Upper Arkansas River Sub-Basin Identified Point Sources and Scheduled Improvements	6-98
Exhibit 6-60. Middle Arkansas River Sub-Basin Identified Point Sources and Scheduled Improvements	6-104
Exhibit 6-61. Lower Arkansas River Sub-Basin Identified Point Sources and Scheduled Improvements	6-107
Exhibit 6-62. Arkansas River Basin Summary of CWA Section 319 Nonpoint Source Grant Projects	6-122

Appendices

Appendix A – Referenced WQCC Regulations, Policies, and Other Actions	A-1
Appendix B - Characteristics of Level IV Ecoregions in Colorado	B-1
Appendix C - Members of SWQMP Citizens Advisory Group.....	C-1
Appendix D – SWQMP Public Outreach Activities	D-1
Appendix E - Potential Prevention and Restoration Strategies for Watersheds	E-1

DISCLAIMER

This Statewide Water Quality Management Plan represents a compilation of internally and externally-derived information, including information produced by a variety of public and other outside sources. As such, the Colorado Department of Public Health and Environment makes no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, or suitability with respect to any information derived from such outside sources. In no event shall the Colorado Department of Public Health and Environment be liable to anyone for special, incidental, consequential, or exemplary damages incurred due to reliance on such information.

Acknowledgements

The Colorado Department of Public Health and Environment, Water Quality Control Division (WQCD) would like to acknowledge the following agencies and individuals for their active participation in the development of this first edition of the Statewide Water Quality Management Plan (SWQMP):

- Colorado Water Conservation Board for graciously allowing the use of information, data, and maps from several of its recent publications;
- Members of the Citizen Advisory Group;
- Representatives from the designated 208 planning agencies; and
- the U.S. EPA for its participation throughout the SWQMP development process.

Their participation in scoping meetings and their review and comment of draft SWQMP materials is greatly appreciated.

Numerous WQCD staff assisted on multiple occasions in the development and review of the SWQMP. Staff from the Environmental Data, Restoration and Protection, and Standards Units in the Watershed Program, and the Permits and Engineering Sections of the Water Pollution Control Program provided their subject matter expertise in the compilation of the information. Their input and willingness to contribute to the SWQMP is greatly appreciated.

Executive Summary

The Statewide Water Quality Management Plan (SWQMP) is intended to be a living document that provides a framework for water quality planning based on federal regulations at section 130.6 of title 40 of the *Code of Federal Regulations* (40 CFR 130.6). Within this watershed framework, comprehensive information about current *statewide* water quality is presented to assist water policymakers, managers, and others in setting priorities, developing strategies, and evaluating the progress of water quality protection and restoration efforts. The water quality information is based on readily available, peer reviewed water quality information, particularly the data in the *2010 Integrated Water Quality Monitoring and Assessment Report* (2010 Integrated Report or Clean Water Act (CWA) section 305(b) report)¹. In addition to the statewide aggregation of data, the SWQMP also presents water quality data at a *basin* scale. This information is incorporated into the 40 CFR 130.6 framework as “Basin Plans.”

The other elements defined in 40 CFR 130.6 complete the foundation for the SWQMP and present information about water quality management agencies, effluent limitations, total maximum daily loads, municipal and industrial waste treatment, nonpoint source management and control, water quality management plan implementation measures, dredge and fill, and groundwater. These elements are primarily discussed at a programmatic level, with focus placed on summarizing Water Quality Control Division (WQCD) activities. Existing documents that provide information about how the elements help direct implementation activities in the state are incorporated by reference. A schematic of this framework is provided in exhibit 2-3 in chapter 2.

Therefore, this first edition of the SWQMP:

- ◆ Provides a comprehensive information resource for water policymakers and managers to serve as a foundation for setting priorities, developing strategies, and evaluating the progress of water quality restoration, maintenance, and protection activities previously undertaken.
- ◆ Fulfills the requirements of 40 CFR 130.6 as required by the CWA to develop water quality management plans. These plans are to be developed in accordance with CWA sections 208 (areawide waste treatment management) and 303 (water quality standards and implementation plans). They are used to direct implementation and are updated based on water quality problems identified in CWA section 305(b) reports. The state’s Continuing Planning Process² for water quality management identifies the process and schedule for revising the water quality management plan.
- ◆ Provides a summary of current statewide water quality and includes a discussion of state classifications and standards for surface water, known impairments, and known pollutant sources based primarily on the state’s latest CWA section 305(b) report.
- ◆ Provides a summary of state groundwater classifications and standards and identifies the state’s wetland resources as indicated in the National Wetlands Inventory.

¹ The Integrated Reports are prepared by the WQCD on a biennial basis and are approved by the WQCC as Regulation No. 93: *Colorado’s Section 303(d) List of Impaired Waters and Monitoring and Evaluation List*, 5 CCR 1002-93 (WQCC 2010b; WQCD 2010a).

² Regulation No. 23: *Regulations for State of Colorado Continuing Planning Process*, 5 CCR 1002-23, sets forth the legal and regulatory objectives and requirements of the program, organizational structure, intergovernmental decision-making process, and time relationships required to accomplish the objectives and requirements.

- ◆ Provides a summary of strategies for improving water quality, including contemporary *green strategies* that will also save water and/or energy and reduce greenhouse gas emissions consistent with the goals of the Colorado Climate Action Plan.
- ◆ Provides a basin plan for each of Colorado’s seven major river basins: Arkansas, Colorado, Green, San Juan, Rio Grande, Platte, and Republican. These plans:
 - ❖ Provide a summary of readily available public information regarding each basin’s physical location and setting, ecology, climate, land ownership, land cover/uses, and hydrography and hydrology.
 - ❖ Provide a snapshot of current water quality use classifications and standards, known impairments, and known pollutant.
 - ❖ Identify projected treatment upgrades based on the state’s latest Intended Use Plan³.
 - ❖ Identify implemented CWA section 319 nonpoint source grant projects from the previous five years to address water quality problems.
 - ❖ Summarize other strategies that have been implemented and that have been identified under the state’s total maximum daily loads completed to date.

However, the SWQMP does NOT:

- ◆ Replace existing water quality management documents and reports. It simply draws from these materials and synthesizes the information at different scales using a variety of communication tools (e.g., GIS maps, tables, diagrams, and narrative text).
- ◆ Provide conclusions, recommendations, or establish policy.
- ◆ Comprehensively link each specific impairment or problem to sources and strategies except where this information is known.
- ◆ Specify measures of success for various strategies.

The WQCD proposes to use this version of the SWQMP as the foundation for longer-term, iterative, statewide water quality planning. Future updates to the SWQMP will focus on the separate basins in the year following the associated standards triennial review hearing. This approach provides for the latest water quality information and data to be integrated into the SWQMP. For the year following the Regulation No. 31 *Basic Standards and Methodologies for Surface Water*, 5 CCR 1002-31, rulemaking hearing, efforts would concentrate on the non-basin specific portions of the SWQMP, and scheduling of an Administrative Action Hearing with the WQCC to review and approve the five years of cumulative updates.

Both the WQCC and the WQCD are aware of many other water quality data sources. Organizations and other parties with water quality data are encouraged to get involved in “calls for data” for the biennially completed CWA section 305(b) reports. The data sources that are used in forthcoming CWA section 305(b) reports will subsequently be used in future iterations of the SWQMP.

³ The Intended Use Plan in Regulation No. 51: *State of Colorado Water Pollution Control Revolving Fund Rules*, 5 CCR 1002-51, drives the implementation schedule and priorities for the WQCD’s financial solutions unit for processing grant and loan applications under the Water Pollution Control Revolving Fund and the Domestic Wastewater Treatment and Drinking Water Grant Program (WQCC 2009b).

Acronyms and Abbreviations

ADPP	Agricultural Drainage Planning Program
AFO	animal feeding operation
AFY	acre-feet per year
AIS	aquatic invasive species
ARRA	American Recovery and Reinvestment Act
BLM	Bureau of Land Management
BMP	best management practice
BOD	biochemical oxygen demand
BuRec	Bureau of Reclamation
BWA	Blanco Wetlands Area
CAFO	concentrated animal feeding operation
CAG	Citizens Advisory Group
CAMR	Clear Air Mercury Rule
CCR	<i>Code of Colorado Regulations</i>
CDA	Colorado Department of Agriculture
CDMG	Colorado Division of Minerals and Geology
CDPHE	Colorado Department of Public Health and the Environment
CDPS	Colorado Discharge Permits System
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CFR	<i>Code of Federal Regulations</i>
cfs	cubic feet per second
CGS	Colorado Geological Survey
CGWC	Colorado Ground Water Commission
CGWPP	Colorado Ground Water Protection Program
CHP	Combined Heat and Power
CMS	conservation management system
CNHP	Colorado Natural Heritage Program
COGs	Councils of Government
CPP	continuing planning process
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
C.R.S.	<i>Colorado Revised Statutes</i>
CSO	combined sewer overflow
CSS	combined sewer system
CTP	consolidated tailings pile
CUPPS	Checkup Program for Small Systems
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board

CWQCA	Colorado Water Quality Control Act
DHHS	Department of Health and Human Services
DNR	Department of Natural Resources
DRMS	Division of Reclamation, Mining, and Safety
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
EROS	National Center for Earth Resources Observation Systems
FCA	fish consumption advisory
GI/LID	green infrastructure/low-impact development
GIS	geographic information system
gpm	gallons per minute
HGM	hydrogeomorphic
HMP	Hydromodification Management Plan
HSI	Hotspot Site Investigation
HUC	hydrologic unit code
I&I	infiltration and inflow
IBCC	Interbasin Compact Committee
ISDS	individual sewage disposal system
IUP	Intended Use Plan
KDHE	Kansas Department of Health and Environment
KWh	kilowatt-hours
LA	load allocation
LFWS	Lake Fork Watershed Stakeholders
LID	low-impact development
LMDT	Leadville Mine Drainage Tunnel
µg/L	micrograms per liter
M&E	Monitoring and Evaluation
M&I	municipal and industrial
mg/L	milligrams per liter
Mgal/d	million gallons per day
MOS	margin of safety
MRP	Measurable Results Program
MS4	municipal separate storm sewer system
NIWQP	National Irrigation Water Quality Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NRCS	Natural Resources Conservation Service [USDA]
NRD	Natural Resource Damages
NSA	Neighborhood Source Assessment
NWCCOG	Northwest Colorado Council of Governments
NWI	National Wetlands Inventory

NWR	National Wildlife Refuge
PAA	Pervious Area Assessment
PCBs	polychlorinated biphenyls
PCE	Perchloroethylene
pCi/L	picocuries per liter
POTW	publicly owned treatment works
PPA	Performance Partnership Agreement
ppm	parts per million
PVY	Paradox Valley Unit
RC&D	Resource Conservation and Development
SRF	state revolving fund
SSD	Streets and Storm Drains [analysis]
SSI	self-supplied industrial
SSO	sanitary sewer overflow
SWA	State Wildlife Area
SWQMP	Statewide Water Quality Management Plan
SWSI	Statewide Water Supply Initiative
TDS	total dissolved solids
TMDL	total maximum daily load
TPH	total petroleum hydrocarbons
TSS	total suspended solids
TVS	table value standards
U.S.C.	<i>United States Code</i>
UAA	use attainability analysis
USA	Unified Stream Assessment
USDA	United States Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCUP	<i>Voluntary Cleanup and Redevelopment Act</i>
VEIB	Voluntary Environmental Improvement Bond
WCRC	Willow Creek Reclamation Committee
WHEAT	Water Health and Economic Analysis Tool
WLA	waste load allocation
WPCRF	Water Pollution Control Revolving Fund
WQBELs	water quality-based effluent limitations
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
WQM	water quality management
WRP	Wetlands Reserve Program
WWCP	Wetlands Wildlife Conservation Program
WWTF	wastewater treatment facility