

Transformative Landscape Change

Agency Action 1.7 State-of-the-Science Report Links

Acknowledgments

The following are published research contracted for this project:

[BBC Research & Consulting The Role of Water Rates and Rate Structures in Promoting Municipal Water Conservation in Colorado](#)

[PlanetScape AI Irrigated Land Cover by Land Use in Colorado](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[Wilson Water Group Turf Replacement Program Potential Water Savings and Consumptive Use Considerations](#)

[Wright Water Engineers Holistic Environmental Considerations for Turf Replacement Initiatives](#)

Report Context

[Urban Landscape Conservation Task Force](#)

[CWCB 2024 Projects Bill](#) (HB24-1435)

[HB 22-1151](#)

[Colorado Landscape Summit](#)

[Colorado Native Grass Guide Website](#)

[BBC Turf Analysis, 2023](#)

[Turf Replacement Grant Program](#)

[Drought Summit](#)

[Executive Order \(EO\) 2023 018](#)

[BBC Exploratory Turf Analysis, 2024](#)

[Urban Landscape Conservation Task Force Final Report](#)

[Department of Personnel and Administration's Energy & Environment links the state facility landscape policy on its landing page](#)

[Senate Bill 24-005](#) (SB 24-005)

[Colorado Water Plan](#)

[Denver Water Xeriscape Principles](#)

[Is less always more? Conservation, efficiency and water education programs](#)

[Resource Central Garden In A Box: Water Savings and Impact Analysis](#)

[Colorado Native Grass Guide](#)

Report Scope

[Urban Landscape Conservation Task Force Final Report](#)

[Colo. Rev. Stat. § 37-99-102](#)

Section 1: Systems Thinking

[Wright Water Engineers Holistic Environmental Considerations for Turf Replacement Initiatives](#)

Section 2: Collaborative Land Use Planning

[The Hidden Value of Landscapes: Implications for Drought Planning](#)

[The Hidden Value of Landscapes Slide Deck](#)

[As development eats away at Denver's green space, the "city within a park" is becoming a concrete metropolis](#)

[MRLC Consortium Enhanced Visualization and Analysis Too](#)

[Colorado Department of Local Affairs: Land Use Best Practices](#)

[Denver Paved Over Paradise and Put up a Parking Lot](#)

[As development eats away at Denver's green space, the "city within a park" is becoming a concrete metropolis](#)

[United States Environmental Protection Agency: Soak up the Rain](#)

The Mile High Flood District provides guidance for engineers, planners, landscape architects, developers, and contractors in selecting, designing, constructing, and maintaining stormwater drainage and flood control facilities in their [Urban Storm Drainage Criteria Manual](#)

[Denver Post: Cutting outdoor water use in Commerce City stymied by “legacy” landscape code](#)

[Policies and Procedures Water Efficient Landscape Policy](#)

[PlanetScape AI: Estimating the Reversion Rate for the Turf Removal Rebate Program: 2020 Update](#)

[How bluegrass lawns became the default for homeowners associations](#)

[Colorado Department of Regulatory Agencies](#)

[Colo. Rev. Stat. § 38-33.3-106.5](#)

[Senate Bill 23-178](#)

Section 3: Balancing Ecosystem Costs and Benefits

[2024 Climate Change in Colorado Report](#)

[Desert Research Institute](#)

[TreesAreGood.org](#)

[The Colorado Sun: Denver neighborhoods without trees can get 9 degrees hotter than the rest of the city](#)

[Variation in estimates of heat-related mortality reduction due to tree cover in U.S. cities](#)

[Colorado State University Extension](#)

[A Study of the Relationship Between Site Conditions and Urban Tree Growth](#)

[University of Nevada, Reno Extension](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[Utah State University Extension](#)

[The impact of urban tree shade on residential irrigation demand in a semi-arid Western U.S. City](#)

[Politico: Trees are casting shade on California’s climate-proofing](#)

[Nevada Current: Southern Nevada at risk of losing tree shade to extreme heat](#)

[CSU Spur Programs](#)

[Colorado State Forest Service Urban & Community Forestry](#)

[CoTreeView](#)

[American Forests Tree Equity Score](#)

[American Forests Colorado Tree Equity Score](#)

[Arbor Day Foundation Network Directory](#)

[Arbor Day Foundation Tree City USA](#)

[Denver Office of the City Forester 2023 Annual Report](#)

[Denver Forestry Education, Outreach & Resources](#)

[Colorado Springs 2019 Urban Tree Canopy Assessment](#)

[Regional Air Quality Council](#)

[Colorado Department of Public Health and Environment](#)

[Lawn Maintenance and Climate Change](#)

[University of Colorado Denver](#)

[Executive Order D 2022 016](#)

[Colorado Office of Sustainability](#)

[Colorado Department of Public Health and Environment: Emission reduction strategies for lawn and garden equipment](#)

[Climate Central](#)

[Denverite: This shape explains Denver's past, present and likely its future](#)

[Denverite: Here's who will suffer most as temperatures rise in Denver](#)

[Denver Climate, Action, Sustainability & Resiliency](#)

[Denver Climate, Action, Sustainability & Resiliency Climate Protection Fund Five-Year Plan](#)

[Climate Central](#)

[Aurora GreatScapes Program](#)

Section 4: Understanding the Metrics

[Alliance for Water Efficiency: Research Review on Outdoor Water Savings](#)

[Public Opinions, Attitudes, and Awareness About Water in Colorado: 2021 Survey and Focus Groups](#)

[Looking for Lawns](#)

[Alliance for Water Efficiency](#)

Section 5: Functional Irrigation

[Irrigation Analysis Efficiency Assessment](#)

[Utah State University Extension: Free Water Checks Available](#)

[Resource Central Slow the Flow](#)

[Utah Slow the Flow Free Water Checks](#)

[Irrigation Analysis Efficiency Assessment](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[Rocky Mountain Sod Growers: How Much Water Does Your Lawn Really Need?](#)

Section 6: Managing Expectations

[Memorandum of Understanding by and among Colorado River Basin Municipal and Public Water Providers August 24, 2022](#)

[BBC Research and Consulting: Updated 2024 Exploratory Analysis of Potential Water Savings, Costs and Benefits of Turf Replacement in Colorado](#)

[Technical Update to the Water Plan](#)

[Colorado Water Plan](#)

[ALCC Turf Replacement Education Matters](#)

[DIY Landscape Transformation Guide](#)

[BBC Research and Consulting: Updated 2024 Exploratory Analysis of Potential Water Savings, Costs and Benefits of Turf Replacement in Colorado](#)

[Los Angeles Department of Water and Power: Water Conservation Potential Study](#)

[Quantifying the Multiplier Effect of Southern California's Turf Removal Rebate Program with Time-Series Aerial Imagery](#)

[Are Water Smart Landscapes Contagious?](#)

Based on 2024 guidance from [Brown and Caldwell](#)

[SWSI Conservation Levels Analysis Final Report](#)

[University of Nebraska-Lincoln](#)

[New Mexico Office of the State Engineer: Water Use and Conservation Bureau](#)

[BBC Research & Consulting The Role of Water Rates and Rate Structures in Promoting Municipal Water Conservation in Colorado](#)

[2024 Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation in Colorado](#)

[City of Steamboat Springs and Mount Werner Water and Sanitation District 2020 Water Conservation Plan](#)

[American Water Works Association: Impacts of Metering on Residential Water Use in California](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[Utah Division of Water Resources Secondary Meter Grants](#)

[PlanetScape AI Irrigated Land Cover by Land Use in Colorado](#)

[Colo. Rev. Stat. § 37-60-135](#)

[Senate Bill 24-005](#)

[Flume Water Monitoring & Leak Detection](#)

Based on 2024 guidance from [ELEMENT Water Consulting](#)

Section 7: Targeting the Highest Users

[Colorado WaterWise, Best Practices Guidebook](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[City of Aspen Integrated Water Resource Plan](#)

[*The Aspen Times: Aspen's water use stays steady*](#)

[Colorado State University Extension](#)

[*The Aspen Time: Snowmass Board looks to conserve water, protect Colorado River*](#)

[Coyote Gulch](#)

[Denver Water: Water Efficiency Plan](#)

[BBC Research & Consulting The Role of Water Rates and Rate Structures in Promoting Municipal Water Conservation in Colorado](#)

[The Role of Water Rates and Rate Structures in Promoting Municipal Water Conservation in Colorado](#)

Section 8: Learning from Existing Programs

[House Bill 22-1151](#)

[Engage CWCB 2023 Turf Replacement Program Funding Summary](#)

[House Bill 24-1435 Final Fiscal Note](#)

The 50k funding limit was removed in the [July 2024 Board-approved Guidelines](#)

[Denver Water: Medians get a makeover in Denver's Central Park](#)

[Quebec Medians Landscape Transformation](#)

[Landscape transformation on the Quebec Street medians in Denver](#)

[Denverite: Weeds, trash and bees: What's happened to the median at Quebec Street?](#)

[Western Resource Advocates](#)

[2023 Exploratory Turf Analysis](#)

[Wilson Water Group Turf Replacement Program](#) Analysis

[CWCB Municipal Water Efficiency Plan Guidance Document](#)

[Municipal Water Efficiency Plan Guidance Document: Step 4](#)

[Colorado State University Extension](#)

[Colorado State University Extension](#)

Section 9: Shifting the Status Quo

[Environmental Protection Agency USEPA Water Conservation Plan Guidelines](#)

[Alliance for Water Efficiency](#)

[BBC Research & Consulting The Role of Water Rates and Rate Structures in Promoting Municipal Water Conservation in Colorado](#)

[EPA: Understanding Your Water Bill](#)

[East Bay Municipal Utility District: New technology reduces home water use by 5 percent](#)

[Denver Water: How does your summer water use measure up?](#)

[Colorado Springs Utilities Water Plan Grant Application: Colorado Landscape Industry Education Plan for Water Conservation](#)

[Western Resource Advocates Water Plan Grant Application: Advancing Water Wise Landscaper Certification](#)

[Denver Water: A hard act to follow: After tackling a toilet, now what?](#)

[Sukle: The local campaign admired around the world](#)

[Denver Water: A hard act to follow: After tackling a toilet, now what?](#)

[Southern Nevada Water Authority 2014-2018 Water Conservation Plan](#)

[Alliance for Water Efficiency: Use and Effectiveness of Municipal Irrigation Restrictions During Drought](#)

[Water Education Colorado: Special Report: Just 53% of Colorado cities use permanent watering restrictions, despite proven savings](#)

[2020 Water Efficiency Watch with Amy Vickers](#)

[Use and Effectiveness of Municipal Water Restrictions During Drought in Colorado](#)

[CWCB 2024 C9 Summit](#)

[EPA: Best Practices to Consider When Evaluating Water Conservation and Efficiency as an Alternative for Water Supply Expansion](#)

[Water Education Colorado: Stressful Mondays at Denver Water as customers embrace heavy morning sprinkling](#)

[Denver Water: You water your yard when?!?](#)

[Water Education Colorado: Stressful Mondays at Denver Water as customers embrace heavy morning sprinkling](#)

[Excessive use charge making impact on top residential water users](#)

[3 billion gallons of water saved in 2023 due to excess use charge policy, LVVWD says](#)

[Top water users hit with \\$12.8 million in excessive use fees](#)

[2024 Urban Landscape Conservation Task Force Final Report](#)

[WaterDM Outdoor Water Use and Savings Potential](#)

[*Fresh Water News: Cash for Grass: Colorado to pay for turf removal, boost water conservation*](#)