

Ecosystem Benefits Summary

*A brief compendium of co-benefits in support of:
U.S. Army Corps of Engineers South Platte River and Tributaries Project,
Adams and Denver Counties, Colorado*



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Project Overview

The U.S. Army Corps of Engineers South Platte River and Tributaries Project, Adams and Denver Counties, Colorado Project (SPRT, or known locally as Urban Waterways) is a long-term effort with the US Army Corps of Engineers to restore the ecosystem on 6.5 miles of the South Platte River and reduce flood risk on the Weir Gulch and East Harvard Gulch tributaries.

The City and its partners: Mile High Flood District, Colorado Water Conservation Board, and The Greenway Foundation have engaged in a 10+ year effort with the US Army Corps of Engineers to provide ecosystem restoration of the South Platte beginning at 3rd Avenue and extending North into Adams County adjacent to Riverside Cemetery. Two tributaries, Weir Gulch and East Harvard Gulch were also studied with the intent to reduce flood risk to homes and businesses adjacent to these drainageways. The Final Integrated Feasibility Report and Environmental Impact Statement was published by the US Army Corps of Engineers in April 2019 (Final EIS).

The Final EIS was informed by Denver's current land use, transportation, and open space plans and projects such as the National Western, Platte to Park Hill, Heron Pond, and Sun Valley redevelopment. Further, study refinements considered overarching City goals for sustainability, equity, climate change and holistic watershed health. The resulting Final EIS sets the stage for Denver's waterways of the future.

The recommended plan along the South Platte River will restore approximately 160 acres of critical riparian corridor and wetland habitat and nearly 100 acres of aquatic habitat and reconnect an additional 190 acres of existing habitat. Additionally, incidental flood risk management benefits along the South Platte River will remove approximately 100 structures from the regulatory floodplain. The recommended flood risk management plan along Weir Gulch, which includes channel and culvert widening, reduces flood risk for 360 structures located in a neighborhood that has experienced inequities in environmental justice and protection. The recommended flood risk management plan along East Harvard Gulch will implement nonstructural flood risk management measures for approximately 176 structures. In addition to the ecosystem restoration elements described in the Final EIS, it is anticipated that locally funded enhancements will be desired adjacent to the project, such as open space and mobility improvements.

In addition to the well documented ecosystem restoration and flood risk reduction, the project will provide a wide range of complementary benefits.

Ecosystem Benefits

By investing in the South Platte River, metro Denver will realize:

- Improved habitat for wildlife and aquatic life (National Significance)
- Advance goals surrounding equity and environmental justice
- Urban Heat Island mitigation – reductions in surface and radiant temperatures
- Improved tree canopy
- Water quality improvements from floodplain treatment and potential reductions in maximum stream temperature
- CO₂ sequestration
- Air quality benefits, including potential reductions in NO_x, SO₂, ground level O₃ and fine particulate matter
- New Green Jobs and community health and wellbeing benefits
- Direct and indirect economic benefits

National Significance

The South Platte River provides an oasis in an otherwise urbanized landscape for a variety of plants and wildlife. It provides a critical habitat linkage between the Rocky Mountains and Great Plains river systems. In particular, the wetland, riparian, and aquatic habitats are critically important in an arid region that has experienced severe losses and degradation of these habitat types. Wetland, riparian, and aquatic habitats play critical regional, national, and international roles, particularly as part of the Central Flyway, which has seen a 66% decline in waterfowl numbers in the South Platte Region over the last 28 years. This decline is the direct result of the decreased quantity and quality of wetlands. The Central Flyway is one of four major biological flyways in North America where migratory birds generally follow a north-south direction as they migrate between nesting and wintering areas.

The U.S Fish and Wildlife Service's (USFWS) Mountain Prairie region ranks riparian habitats as a critical wildlife resource. **Wetlands and riparian areas represent only about 2 percent of the land area of Colorado, but 80 percent of wildlife species use these habitats.** Colorado has experienced significant habitat losses including over 70 percent for riparian forest and over 50 percent of wetlands statewide with even higher percentages in urban areas. Within the urbanized Denver metropolitan area, wetland habitat is especially rare representing only about 0.7 percent of the land area. Only 5.6 acres of wetlands were identified along a 6.5-mile stretch of the South Platte River through Denver.

The positive impacts from the proposed projects to Denver's portion of the South Platte River cascade as the water flows through the Platte River System continuing to the Missouri and Mississippi Rivers, ultimately entering the Gulf of Mexico.



Denver's Focus on Equity and Inclusion

Figure 1 is a visual representation of Denver's Department of Transportation and Infrastructure (DOTI) 2021 equity index, summarizing some of the socioeconomic, built environment, health care, and health barriers that residents of Denver neighborhoods face in accessing opportunities to lead healthy, productive lives. Note the strong correlation between the SPRT project and impacted residents.

Figure 2 displays the relative heat classes of all street segments in the City and County of Denver. The hottest 25% of streets, shown in orange and red, are deemed to be in the greatest need of heat mitigation. Again, the hottest areas coincide with the South Platte River corridor and the SPRT project extents.

Comparing Figures 1 and 2, it is apparent that many of the hottest streets in Denver generally fall along the South Platte River/I-25 corridor running north/south and the I-70 corridor running east/west coincident with Denver's most vulnerable and poorest residents. Denver's underserved communities are subject to high heat vulnerability, which is summarized in Figure 3.

Reducing impervious area and improving the tree canopy will help mitigate urban heat island effects. This is important especially in the areas adjacent to the restored floodplain, which often borders underserved communities.

In Denver, land surface temperatures are reduced by 2° F for every 10% increase in canopy and reduced by 1.3° F for every 10% decrease in impervious cover.

In addition to heat island mitigation, minimizing directly connected impervious areas will help reduce maximum stormwater runoff and improved tree canopy will help reduce maximum South Platte River temperatures. Connecting the river with the restored floodplain will also remove dissolved and sediment-bound water quality pollutants, protecting Barr Lake and Milton Reservoir, which are both impaired and have a Total Maximum Daily Load regulation.

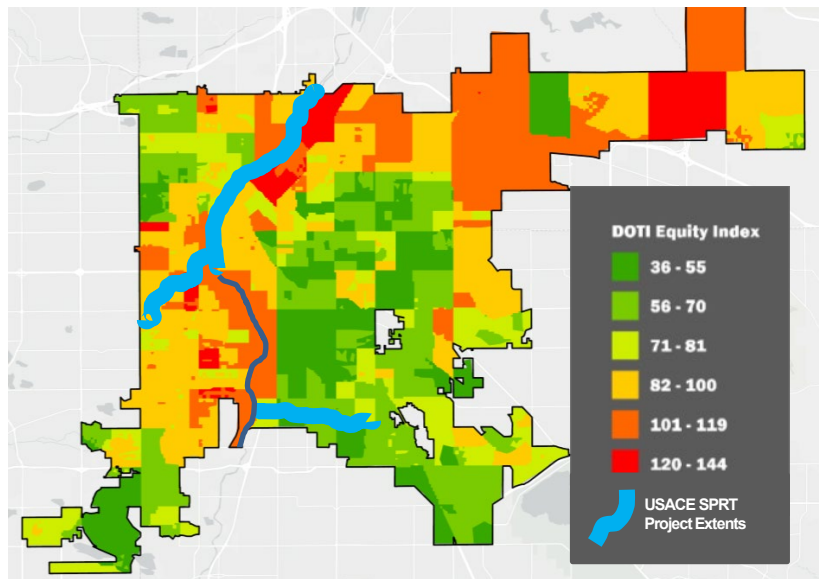


Figure 1. Denver's Department of Transportation and Infrastructure (DOTI) 2021 Equity Index

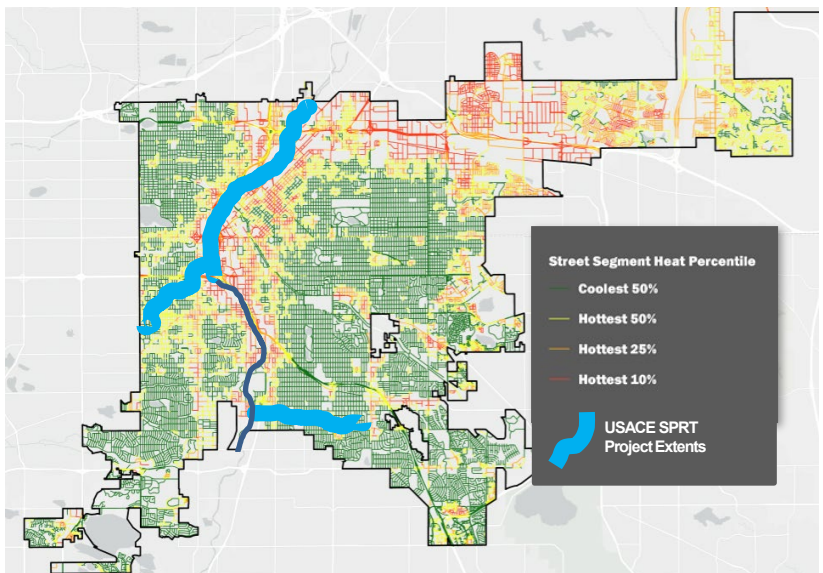


Figure 2. Denver street segments coded by relative heat classes

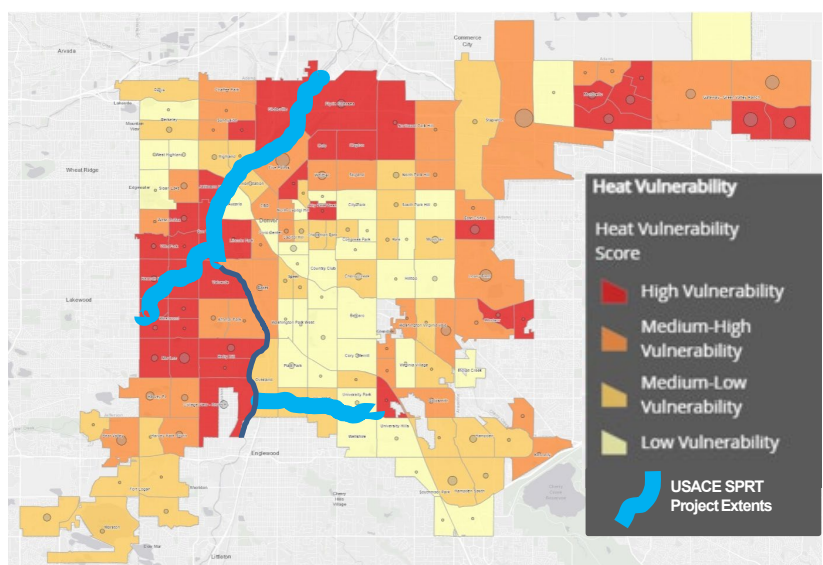


Figure 3. Denver's heat vulnerability map

One Project, Innumerable Benefits

Air Quality Benefits

Scientific studies support the positive effects that nature/green spaces and ecosystem diversity have on outdoor air quality and the additional ecosystem benefits that may be achieved or enhanced. Tree canopy can reduce temperature due to the cooling effects of evapotranspiration. Trees and riparian vegetation also sequester carbon dioxide.

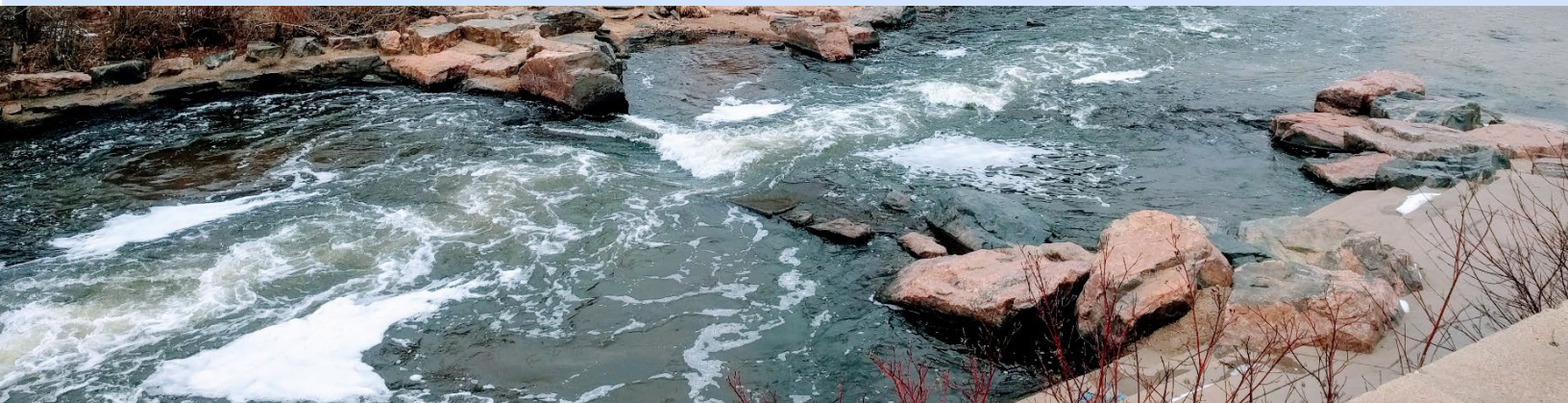
Wellbeing Benefits

Direct and indirect environmental benefits are derived from nature/green spaces and diverse natural environments. Some of the direct environmental services described above provide indirect positive health effects and contribute to overall wellbeing. For example, ecosystem services support heat mitigation and contribute to reductions in air and noise pollution which in turn may reduce chronic inflammatory diseases and improve mental health. In addition, more trails and open space promote physical activity.

A large-scale epidemiological study in Denmark (covering >900,000 people), published in the proceedings of the National Academy of Sciences, demonstrates that childhood exposure to green spaces can provide mental health benefits and possibly lower risk of psychiatric disorders from adolescence into adulthood.

Economic Benefits

Restoration will produce direct and indirect economic benefits. The \$130M invested in floodplain restoration since 1970 has resulted in properties within 0.5 miles of the South Platte River being valued 36% higher than those that are further away from the river. Those same properties were valued 17% less before the investment. This increase in property valuation directly resulted in increased tax revenue for social programs, including \$100M for public schools. All indirect ecosystem services of the South Platte River and associated tributaries, including those mentioned, provide an estimated \$1.4B in economic benefit annually in Denver.



The South Platte River sustains a culturally and nationally significant, fragile ecosystem in an arid climate. Transformative projects, like the U.S. Army Corps South Platte River and Tributaries Project, will lead to corridor revitalization.

Local partners have tirelessly committed to improving the South Platte River. Three master plans, ten projects, and an investment of more than \$90 million in Denver alone are evidence of the local passion and love for the South Platte River. A continued partnership with the U.S. Army Corps of Engineers will allow Denver to accelerate our progress in restoring Colorado's most important river ecosystem. By sustaining this momentum, local and federal partners will realize the ultimate South Platte River transformation.

REFERENCES

- <https://doi.org/10.1016/j.jenvman.2019.110023>
- <https://doi.org/10.1016/j.jenvman.2021.112560>
- <http://dx.doi.org/10.1016/j.ecoser.2014.08.001>
- <http://dx.doi.org/10.1016/j.ejrh.2015.07.002>
- <https://www.oregon.gov/deq/FilterDocs/rogueChapter1andExecutiveSummary.pdf>
- <http://dx.doi.org/10.1016/j.jenvman.2016.12.005>
- https://www.nrs.fs.fed.us/units/urban/local-resources/downloads/Tree_Air_Qual.pdf
- <https://www.nature.com/articles/s41612-020-0115-3>
- <https://academic.oup.com/bmb/article/127/1/5/5051732>
- <https://earthobservatory.nasa.gov/images/145305/green-space-is-good-for-mental-health>
- <https://www.pnas.org/content/116/11/5188>
- <https://www.sciencedirect.com/science/article/pii/S0048969721036779>
- <http://dx.doi.org/10.13140/RG.2.2.33525.60642>
- <https://www.americanrivers.org/wp-content/uploads/2020/06/AR-Economic-Outcomes-Report.pdf>
- City and County of Denver, Department of Transportation and Infrastructure (2021): Denver Green Continuum Streets Guidelines



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