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Justice40 and Water Equity in Florida

A case study of climate risk and water infrastructure investment in frontline coastal communities

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Acronyms

AOI	Area of Interest
BIL	Bipartisan Infrastructure Law
CEJST	Climate and Economic Justice Screening Tool
CEQ	White House Council on Environmental Quality
CWA	Clean Water Act
CWI	Critical Water Infrastructure
DEP	Florida Department of Environmental Protection
EPA	Environmental Protection Agency
HAB	Harmful algal bloom
IIJA	Infrastructure Investment and Jobs Act
IUP	Intended Use Plan
JEA	Jacksonville Electric Authority
NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
OMB	White House Office of Management and Budget
OUC	Orlando Utilities Commission
PWS	Public Water System
SDWA	Safe Drinking Water Act
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SLR	Sea level rise
SRF	State Revolving Fund
WASD	Miami-Dade Water and Sewer Department
WMD	Water Management District

Introduction

Critical Water Infrastructure (CWI) (i.e., wastewater, drinking water, and stormwater systems) is severely vulnerable to climate change. Intense storms and flooding overwhelm water treatment facilities and storm drains while sea level rise causes drinking water to be contaminated. Across the United States, CWI is aging and prone to failure, and failing CWI threatens our ocean and coastal waterways, as untreated storm and wastewater flow into water bodies and cause cascading environmental effects. These polluted waters harm coastal communities, especially disadvantaged communities that are more likely to be overburdened by both climate change and impacts to water quality.

To address the legacy of underinvestment in disadvantaged communities, the Biden-Harris administration launched the Justice40 Initiative (Justice40) which instructs federal programs, like the Environmental Protection Agency's Clean Water and Drinking Water State Revolving Funds (SRFs), to "deliver at least 40 percent of the overall benefits from federal investments in climate and clean energy to disadvantaged communities" (White House, 2021). This initiative is the first of its kind, and climate and environmental justice advocates have a rare opportunity to observe, understand, assess and inform how the federal government acts on addressing the intertwined crises of climate change and environmental injustice (see Appendix A for further Justice40 details).

As a trusted convener of federal, state and community partners, Ocean Conservancy is committed to working with others to evaluate how Justice40 benefits can address the dual crises of coastal climate vulnerability and water pollution.

This case study of Justice40 implementation in Florida analyzed the intersection of climate and environmental justice, climate resilience and adaptation, water justice[1] and ocean conservation.

1 Water Justice refers to the right of all humans to have access to clean and safe water resources.

Given its outsized exposure to climate impacts and ocean-based environmental challenges that affect its residents, Florida was an appropriate place to conduct this assessment.

Being a relatively new effort taken on by the Environmental Protection Agency (EPA), state agencies and local governments, substantial knowledge gaps exist about the implementation of Justice40 for CWI resources. This case study identified 1) locations of "disadvantaged communities," as defined by the Biden-Harris administration, exposed to climate hazards and CWI system failures, 2) systemic barriers that prevent Justice40 benefits from being accessible and equitably distributed in Florida and nationally, and 3) geospatially analyzed gaps in funding for disadvantaged communities in three Areas of Interest (AOIs). The AOIs for this study, selected due to severe exposure from climate change hazards, racial and socio-economic diversity, and geographic representations from different parts of the state, are the cities of Jacksonville and Orlando and Miami-Dade County.

Data from the analysis uncovered that a pattern exists between locations in which CWI failures occur and places where disadvantaged communities live. Both failing wastewater infrastructure, like septic systems and treatment facilities, and toxic Superfund sites were identified as major sources of water pollution across the AOIs. With wastewater systems and Superfund sites being exposed to a variety of climate change impacts, the threat of contaminants entering nearby communities and the environment becomes heightened. With 77% of Superfund sites situated in disadvantaged census tracts, communities living here will continue to be disproportionately overburdened by pollution. Of the CWI types studied, drinking water systems fail most often, leaving communities less protected from the contaminants entering drinking water sources. Jacksonville is the AOI experiencing the most CWI systems failure, yet it received the least investment from the Clean Water and Drinking Water SRFs from 2021 and 2023. Miami-Dade County's CWI is the most exposed to climate impacts and has received the most SRF investment. However, much less funding has been dedicated to building climate-resilient CWI in Miami-Dade's disadvantaged communities.

Through these results, Ocean Conservancy provides valuable information and perspective to the Biden-Harris administration, state water resource managers and local justice advocates. True justice will not be realized with a one-dimensional approach to the compounding challenges of systemic racism and discrimination, aging infrastructure, and climate change, and this effort takes a careful look at how Justice40 can confront them in a holistic manner.

Context and Background

Driven by uncurbed fossil fuel emissions, climate change is wreaking havoc across our planet. Inextricably linked to the changing climate, ocean warming is a source of hazards affecting coastal areas, materializing as sea level rise (SLR) and flooding, storm surges, and more intense storm events with heightened precipitation rates and quantities.

These coastal climate impacts compound and amplify each other, threatening shoreline-sustaining ecosystems and vital infrastructure with inundation and degradation, including CWI. Septic systems are increasingly failing as rising sea levels saturate soils, and wastewater and stormwater treatment plants experience overflows during heavy storm and flood events. Drinking water sources in coastal areas are more often being compromised by saltwater intrusion due to SLR (Richter, 2022), and drinking water systems, especially private wells, can also be contaminated by wastewater and septic tank failures.

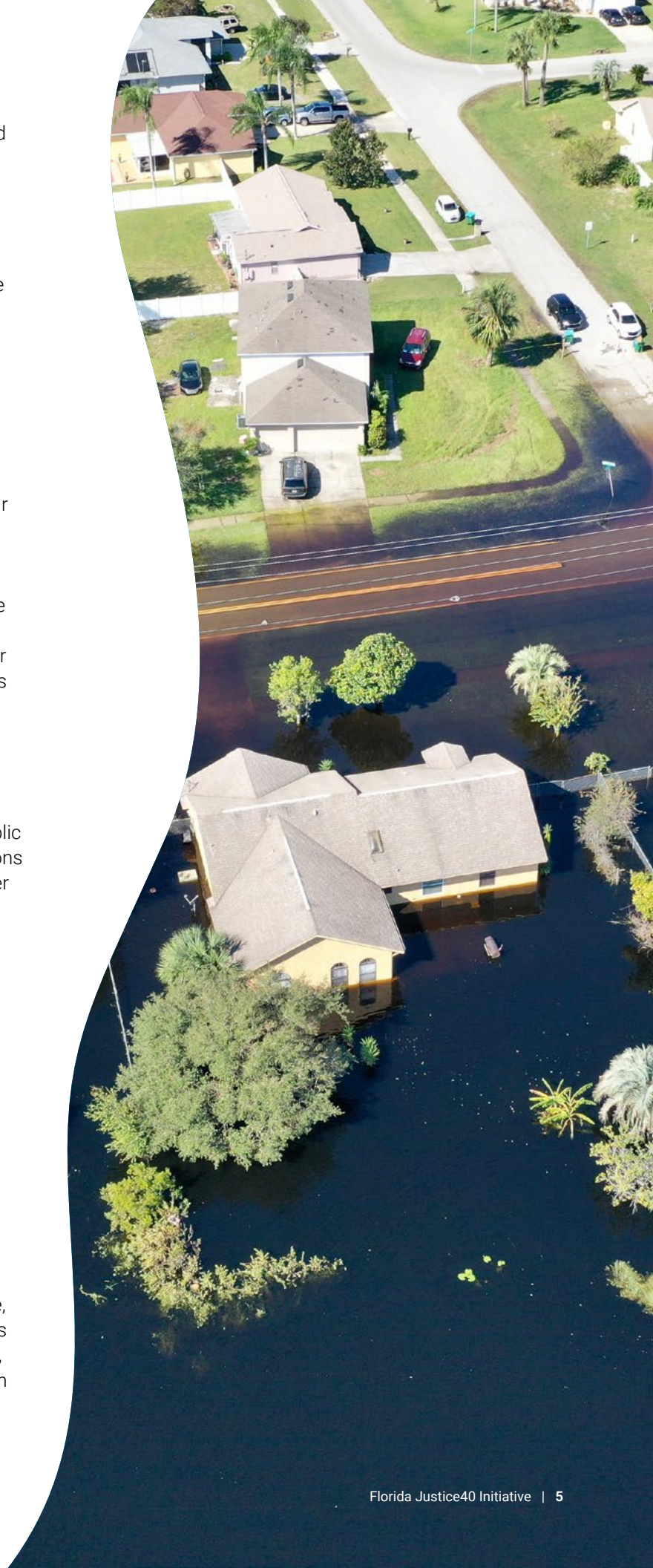
CWI systems are essential to healthy, functional coastal communities and ecosystems. When these systems fail, communities that rely on them can experience costly flooding events and exposure to hazardous waste and toxic drinking water, all of which threaten public health. Wastewater and stormwater pollution devastate ocean life and their habitats. Excess nutrients entering the water, mainly from untreated wastewater and fertilizer run-off, drive harmful algal blooms (HABs) and eutrophication, where oxygen levels in the water are depleted and ocean life struggles to survive. Importantly, HABs and eutrophication are exacerbated by warming ocean waters caused by climate change.

Wastewater pollution also threatens coral reefs, which serve as vital ecosystems and biodiversity hotspots as well as natural buffers to intense wave action that damages the coast.

Overgrowth of macroalgae smothers coral reefs and blocks sunlight from reaching their photosynthetic zooxanthellae. Studies have also shown that corals are more susceptible to bleaching and disease when exposed to excessive levels of Nitrogen and Phosphorous (Wear & Thurber, 2015). Coral bleaching and disease are also worsened by climate change. In July 2023, Florida's record-breaking water temperatures resulted in coral bleaching and death (NOAA, 2023). Additionally, high levels of microplastics, which are hormone disruptors, are found in wastewater and impact reproductive and growth rates of ocean animals.

Reliable CWI is growing more important for at-risk coastal communities and ocean health; however, our current systems are vulnerable to climate change and unprepared to withstand more severe climate impacts. The EPA's Clean Water and Drinking Water SRFs, being our nation's largest investors in CWI, are crucial for preparing systems to be more climate resilient. The SRFs are federal programs that partner with states to ensure CWI is protecting communities and the environment by meeting the goals of the Clean Water Act and Safe Drinking Water Act (see Appendix A for further SRF details). Throughout history, urban redlining and segregation have led to startling disparities in all types of infrastructure, leaving marginalized communities experiencing public health crises and vulnerability to hazardous conditions in their own neighborhoods (Hendricks, 2021). Under Justice40, these programs have potential to more equitably distribute benefits of CWI investments to disadvantaged groups with the added benefit of protecting our ocean and coastal spaces.

Due to its long coastline and low elevation, Florida's communities and ecosystems are particularly susceptible to coastal climate impacts. Florida also has a large population of "disadvantaged communities" as indicated by the Biden-Harris administration's Climate and Economic Justice Screening Tool (CEJST) (see Appendix A for further CEJST details). Florida's CWI received a "C" from the American Society of Civil Engineers who rated the state as "needing attention" (ASCE, 2021) (for an overview of Florida's CWI, see Appendix B). The intersection of water resources, climate change, environmental justice and ocean health in Florida, as well as Ocean Conservancy's strong presence there, made it the ideal location for the first stage of Ocean Conservancy's Justice40 research.



Goals and Methods

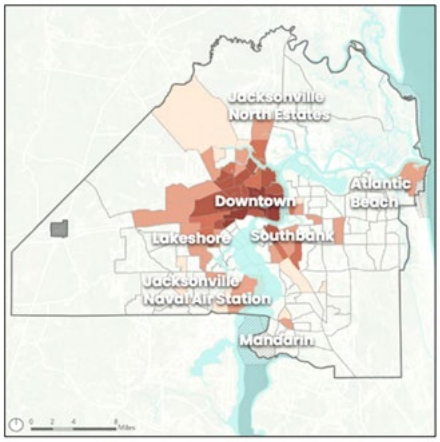
Jacksonville, Orlando and Miami-Dade County all received funds from at least one of the EPA SRF programs. Using quantitative and qualitative research methods, Ocean Conservancy's Justice40 case study focused on four goals:

1. Understanding existing challenges and barriers to accessing infrastructure financing through the Clean Water and Drinking Water State Revolving funds from a local perspective.
2. Capturing the current condition of critical water infrastructure in the AOIs.
3. Identifying climate-related risks to existing critical water infrastructure.
4. Determining and communicating the existence of patterns indicating disparities in access to infrastructure that is prepared to withstand mounting ocean-climate impacts between communities or population segments defined as disadvantaged versus those that do not meet that definition.

This case study combined a geospatial analysis with semi-structured interviews to meet the project goals. The geospatial analysis assessed the AOIs' exposure to climate hazards, instances of CWI failures, locations of and impacts to disadvantaged communities, and allocation of SRF investments to Public Water Systems (PWS) which cover multiple census tracts. To add context to the geospatial findings and uncover challenges associated with accessing investments, Ocean Conservancy conducted ten interviews with decision-makers and community residents to understand 1) climate impacts felt in their communities, 2) the condition of CWI and reliability of service, 3) their understanding of and experience with the EPA's SRFs and Justice40, 4) key challenges associated with accessing CWI investments, and 5) dynamics between community residents and decision-makers in the context of designating CWI projects in the localities (see interview methods in Appendix C).

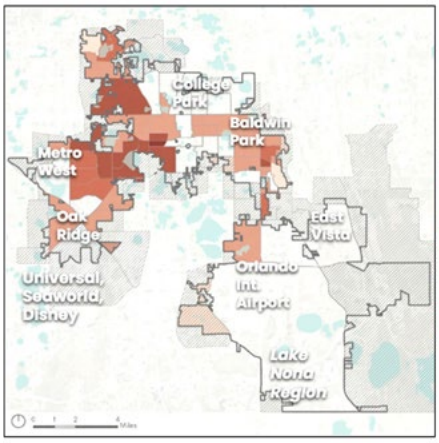
Results and Discussion

Figure 1. Jacksonville Composite Disadvantage



# of Disadvantages Experienced	Jacksonville Tracts
0	99 (60.0%)
1	10 (6.1%)
2	11 (6.7%)
3	12 (7.9%)
4	9 (5.5%)
5	9 (5.5%)
6	7 (4.2%)
7	8 (4.8%)
8	0
> 0	66 (40.0%)

Figure 2. Orlando Composite Disadvantage



# of Disadvantages Experienced	Orlando Tracts
0	37 (45.7%)
1	6 (7.4%)
2	8 (9.9%)
3	13 (16.0%)
4	6 (7.4%)
5	5 (6.2%)
6	5 (6.2%)
7	1 (1.2%)
8	0
> 0	44 (54.3%)

Figure 3. Miami-Dade Composite Disadvantage

# of Disadvantages Experienced	Miami-Dade Tracts
0	179 (34.6%)
1	98 (18.9%)
2	16 (3.1%)
3	29 (5.6%)
4	39 (7.5%)
5	48 (9.3%)
6	58 (11.2%)
7	45 (8.7%)
8	6 (1.2%)
> 0	339 (65.4%)

The evaluation of Justice40 implementation surfaced repeated challenges to implementing Justice40 and evident disparities in funding within the study area.

Key findings of the study are summarized below, and Appendix D includes in-depth geospatial analyses sorted by AOI, in addition to results from the qualitative research.

Overall, there are 2,311,954 people across the study area living in census tracts that meet the criteria for being considered disadvantaged (Figures 1-3). **This is 59.3% of the study area's total population, much higher than the disadvantaged-designation of approximately 33% of the full U.S. population** (Srestha et. al, 2023). Of eight disadvantage indicators identified by the White House (listed in Appendix A), the Water and Wastewater indicator was the most prevalent disadvantage in Jacksonville and fourth and sixth most prevalent in Orlando and Miami-Dade County, respectively, further illustrating the importance of improving CWI in these AOIs.

Climate hazards and infrastructure exposure

Each of the AOIs face exposure to one or multiple flooding-related climate hazards[2], and their unique geographies influence how each area experiences impacts like SLR, storm surge and changing floodplains (Table 1). While Miami-Dade County has the highest percentage of area exposed, all three AOIs have over 94% of their population exposed to climate hazards (Figure 4). Out of the climate hazards, interviewees in Miami-Dade expressed substantial concern about sea level rise (Appendix D).

Figure 4. Miami-Dade Climate Hazards

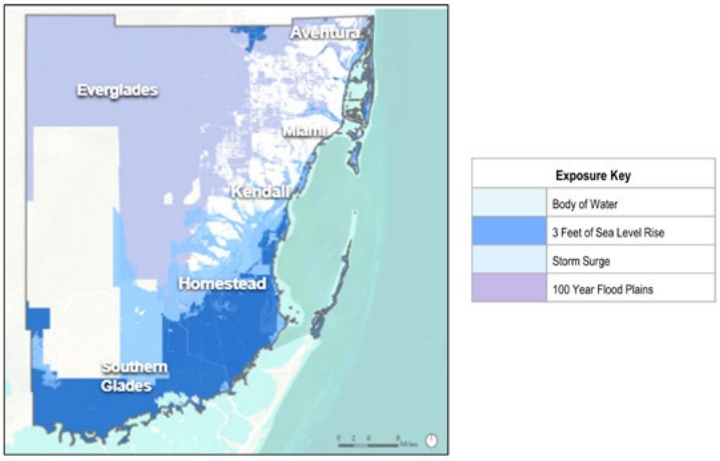
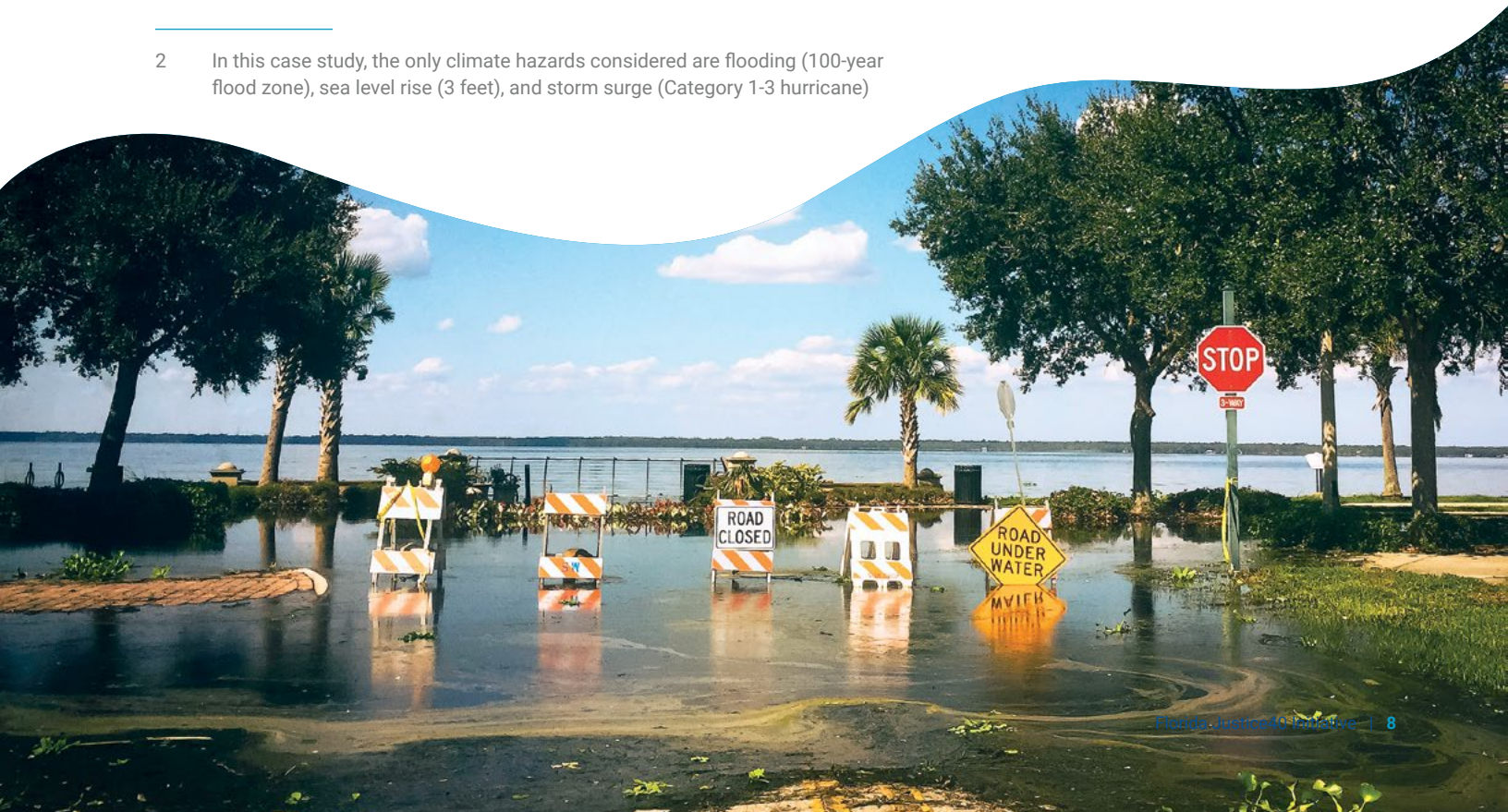


Table 1. Climate risk exposure to flooding (100-year flood zone), sea level rise (3 feet), and storm surge (Category 1-3 hurricane)

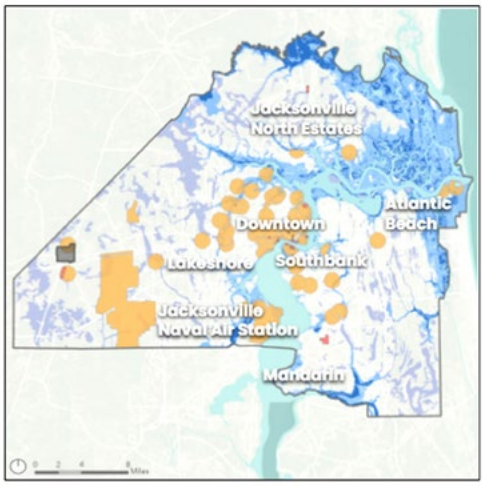
	Exposed Area *(Square miles)*	Exposed Census Tracts	Population in Exposed Tracts *(ACS 2015-2019)*
Jacksonville	244 (29.8%)	156 (94.5%)	858,683 **(96.3%)**
Orlando	26 (21.8%)	72 (88.9%)	325,729 **(95.1%)**
Miami-Dade	1,367 **(68.9%)**	488 (94.2%)	2,558,428 **(94.8%)**
Total	**1,636 (56.0%)**	**716 (93.7%)**	**3,742,840 (95.2%)**

2 In this case study, the only climate hazards considered are flooding (100-year flood zone), sea level rise (3 feet), and storm surge (Category 1-3 hurricane)



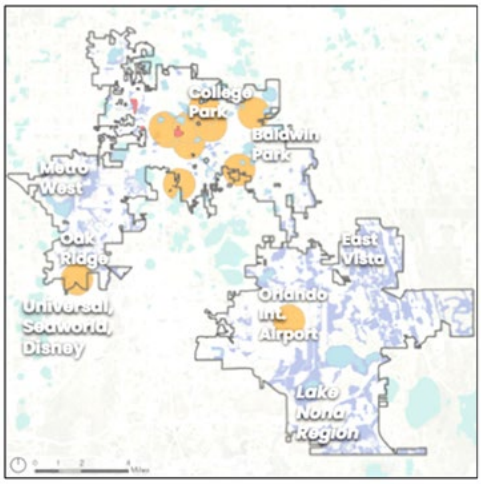
Out of the water pollution sources analyzed, **Superfund sites were the most exposed to climate hazards across the study area, with an average rate of exposure of 94.8% (Figures 5-7).** Toxic Superfund site exposure in each AOI increases the urgency to address at-risk sites and improve CWI to mitigate impacts of heavy rains and flooding events that inundate Superfund sites and spread contaminants throughout the environment. Of the CWI systems analyzed, public drinking water wells and septic tanks are the most exposed to climate impacts.

Figure 5. Jacksonville Pollution Liability Exposure



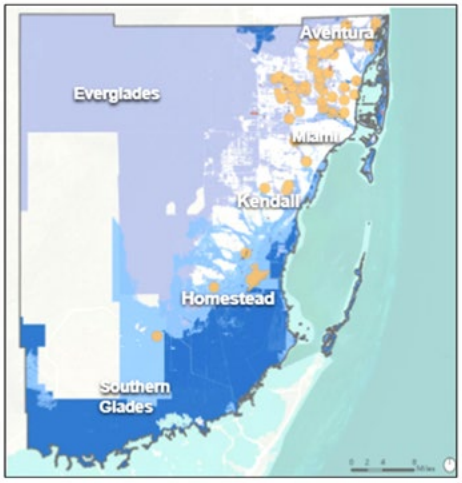
Exposure Key
Body of Water
3 Feet of Sea Level Rise
Storm Surge
100 Year Flood Plains
Exposed Brownfields
Exposed Superfund Sites

Figure 6. Orlando Pollution Liability Exposure



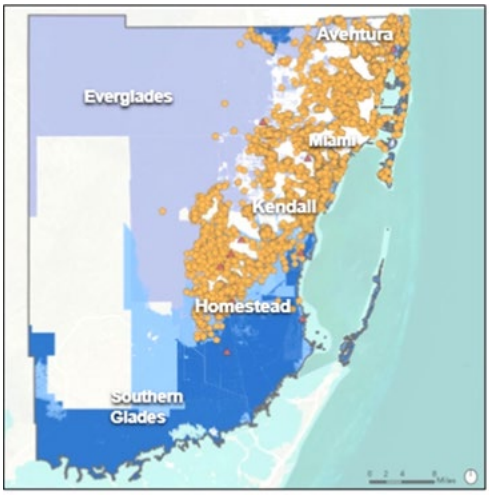
Exposure Key
Body of Water
3 Feet of Sea Level Rise
Storm Surge
100 Year Flood Plains
Exposed Brownfields
Exposed Superfund Sites

Figure 7. Miami-Dade Pollution Liability Exposure



Exposure Key
Body of Water
3 Feet of Sea Level Rise
Storm Surge
100 Year Flood Plains
Exposed Brownfields
Exposed Superfund Sites

Figure 8. Miami-Dade Wastewater Exposure



Exposure Key
Body of Water
3 Feet of Sea Level Rise
Storm Surge
100 Year Flood Plains
Exposed Open Wastewater Facilities
Exposed Septic Tanks

With nearly 70% of brownfields exposed and over 95% of Superfunds exposed, Miami-Dade has 134 exposed sites. Seventy percent of the exposed Superfund sites face one or more climate hazards, and one third of these sites are exposed to all three climate hazards. Septic tanks and wastewater facilities in Miami-Dade are highly vulnerable to inundation from sea level rise, hurricanes and storm surge, and associated flooding events. Over one third of septic tanks are exposed to these climate hazards and nearly half of the county's wastewater facilities are located within an exposure zone (Figure 8). In Jacksonville, 32% of public drinking water plants and 20% of septic tanks are exposed to climate impacts, and most of these exposed systems are situated along the St. Johns River and Atlantic coast. Similarly, over 30 of Jacksonville's Superfund sites and industrial hubs are located along the St. Johns River in tracts that are extremely disadvantaged and flood-prone (Figure 12). **Across the AOIs, 77% of Superfund sites are located in disadvantaged tracts (Figures 9-11).** This clearly demonstrates a disproportionate pollution burden on disadvantaged census tracts, emphasizing the need for intentional investments and interventions to actualize the Justice40 Initiative. In Orlando, an inland city with most septic tanks and treatment facilities situated outside of the floodplain, wastewater infrastructure is not as climate-exposed as in Jacksonville and Miami-Dade County. Heavy rains and hurricanes still impact Orlando and can overwhelm wastewater infrastructure and inundate Superfund sites, causing waste to spill into the surrounding environment.

Figure 9. Jacksonville Legacy Pollution

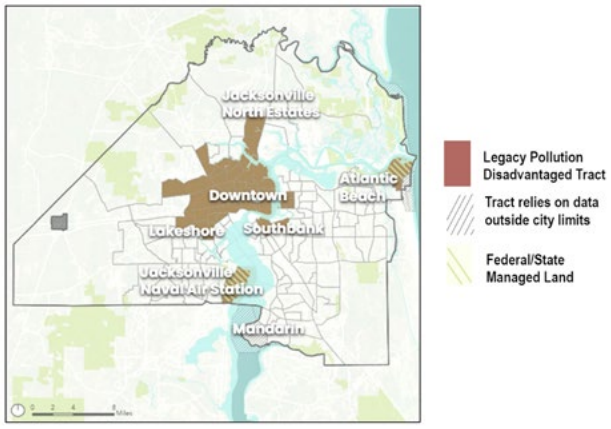


Figure 10. Miami-Dade Legacy Pollution Disadvantage

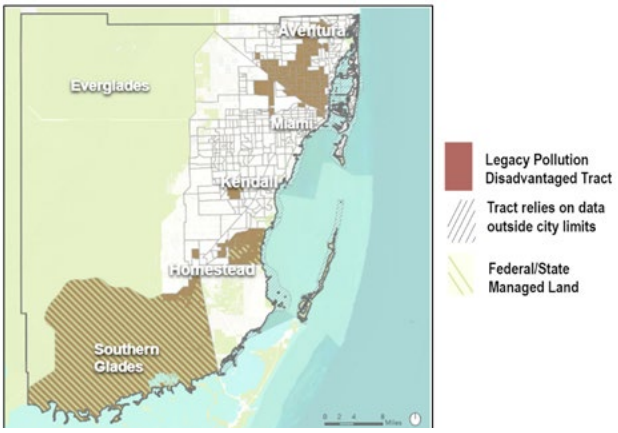


Figure 11. Orlando Legacy Pollution

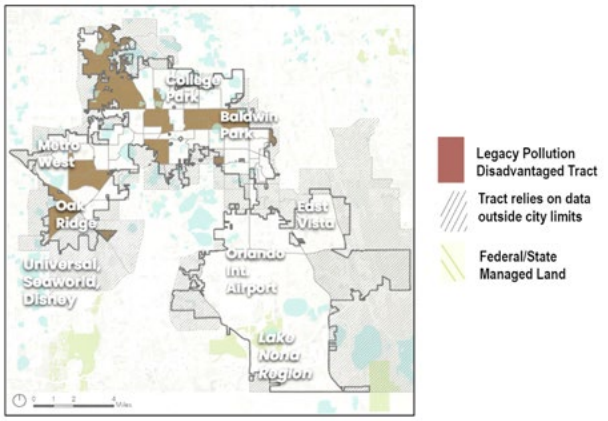


Figure 12. Jacksonville Superfund Sites

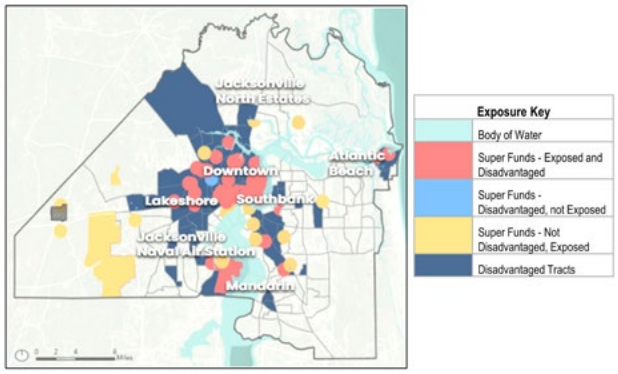
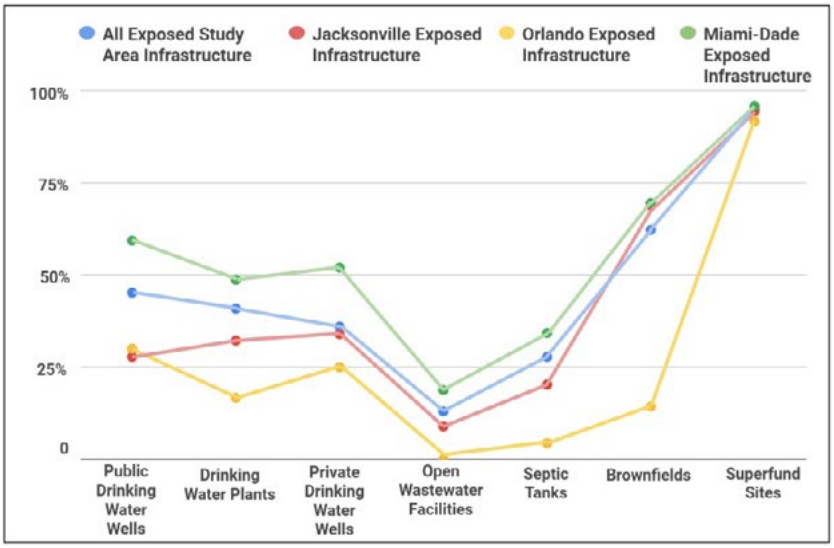


Figure 13. Rates of exposure by infrastructure type, by city. Percentages reflect the proportion of each type of infrastructure that is subject to ocean-climate hazards. Source: GeoAdaptive, 2023.



Infrastructure failure near disadvantaged communities

This case study analyzed three types of CWI failures: wastewater, drinking water and stormwater (see Appendix C for geospatial methodology). The analysis produced a composite of failures experienced by each AOI and identified patterns between the locations of CWI failures and disadvantaged communities (Figures 14-16). Because wastewater failures have particularly negative effects on both communities and the marine environment, this section will focus primarily on wastewater system failures across the AOIs.

Figure 14. Jacksonville System Failure – Disadvantage Cross Analysis

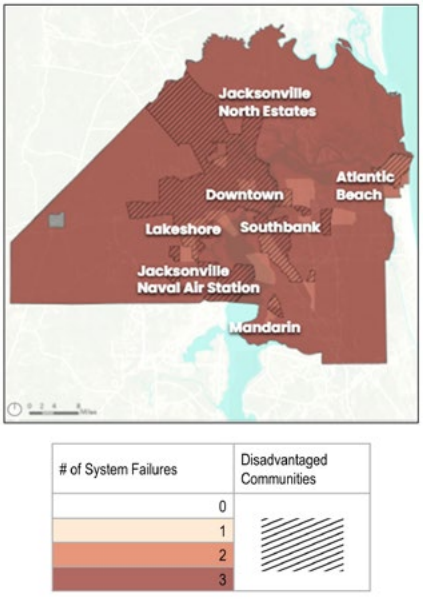


Figure 15. Orlando System Failure – Disadvantage Cross Analysis

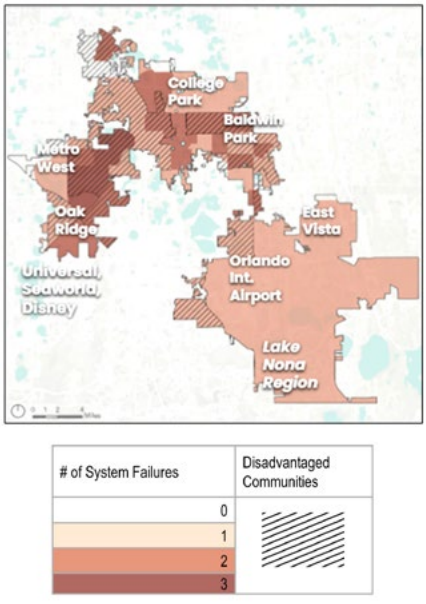
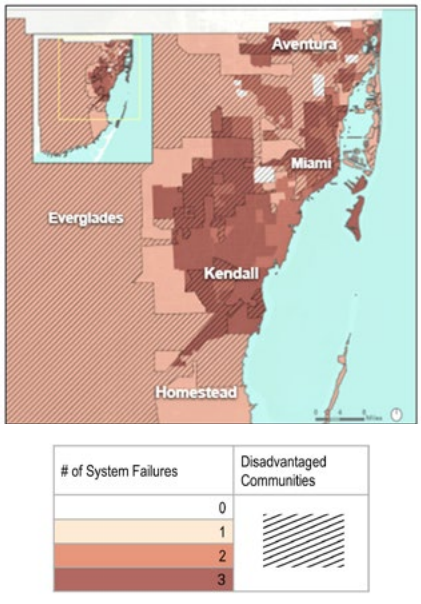
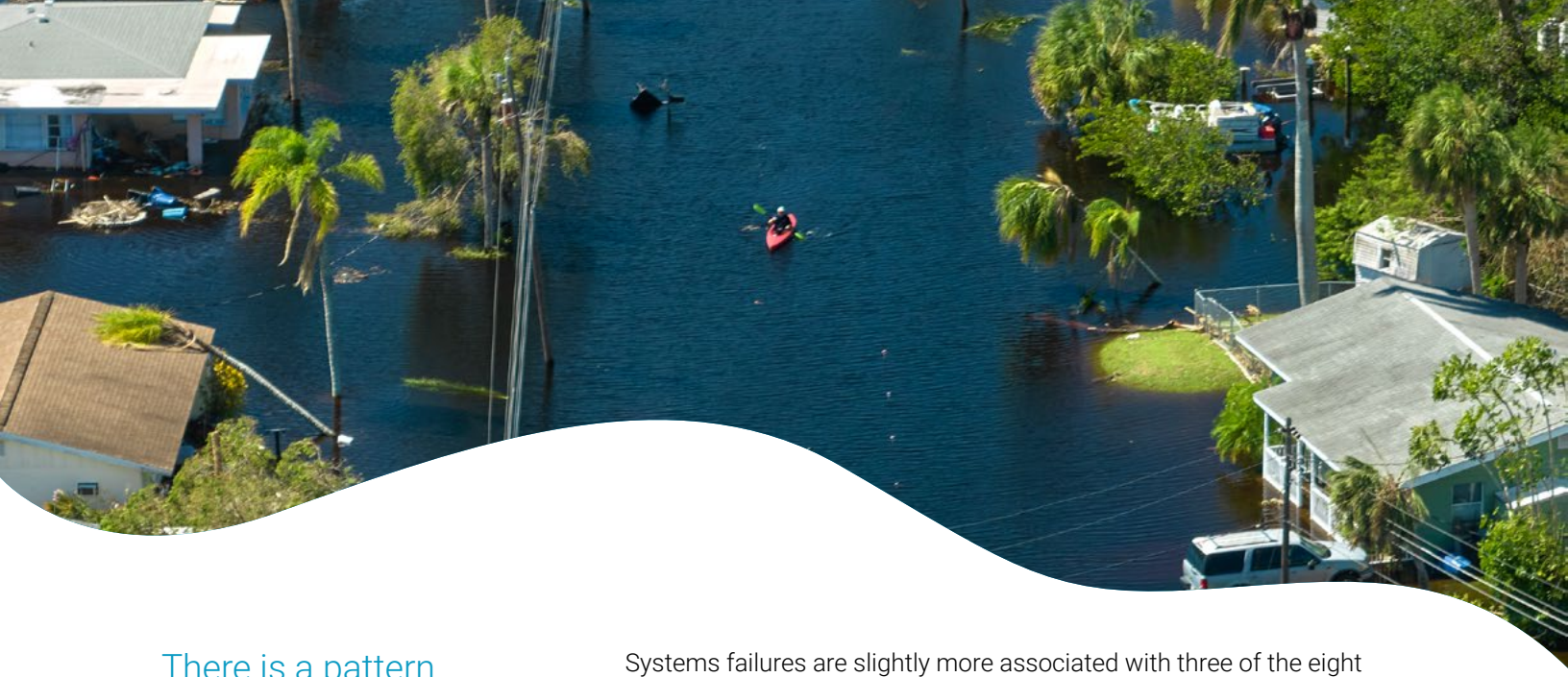


Figure 16. Miami-Dade System Failure – Disadvantage Cross Analysis





There is a pattern between the locations of CWI failures and disadvantaged tracts, especially in Miami-Dade.

Systems failures are slightly more associated with three of the eight disadvantage indicators identified by the White House: Water and Wastewater, Legacy Pollution and Climate Vulnerability (Appendix A). This is in line with previous research demonstrating that low-income and communities of color have greater proximity to industrial zones and Superfund sites, increasing their likelihood of being considered disadvantaged by CEJST and impacted by water pollution (Clark, Millet, and Marshall, 2014). Over 60% of the population within the study area lives in tracts where wastewater system failures have occurred, which is measured by number of pump failures and sewage spills (Figures 17-19). With high rates of failure, climate exposure and potential to pollute disadvantaged communities, compromised septic tanks and wastewater treatment facilities must be addressed to protect marine environments and strengthen climate resilience while advancing climate justice.

Figure 17. **Jacksonville Wastewater System Failure**

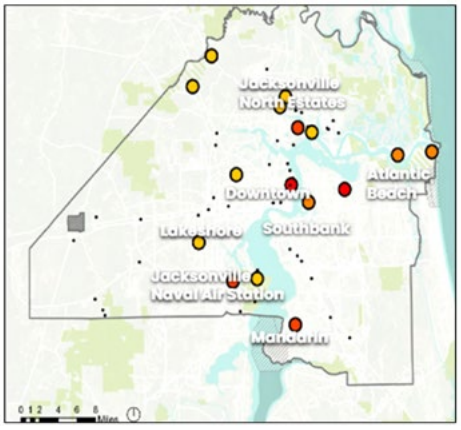


Figure 18. **Orlando Wastewater System Failure**

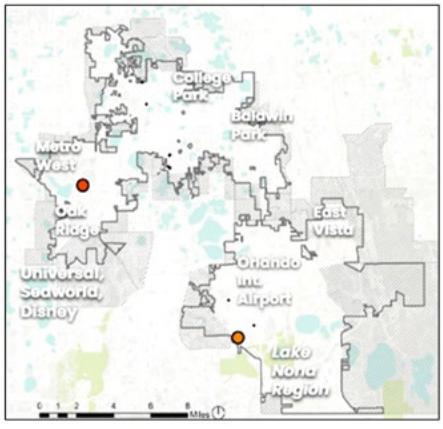
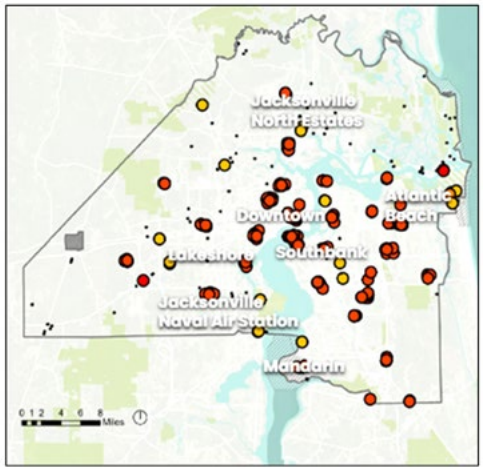


Figure 19. **Miami-Dade Wastewater System Failure**

When all CWI failures across the case study area are compiled, the data shows that **Jacksonville has the highest number of systems failures, with 100% of the population living in tracts exposed to at least one type of failure and up to 76% of the population living in tracts exposed to all three types of CWI failures (Figure 14).** Every public drinking water system in Jacksonville has reported infiltration of hazardous materials and almost all public wastewater systems have reported spills (Figure 20). Several of the most severe drinking water and wastewater system failures have occurred in the urban core along the St. Johns River's north shore, and **eight of the tracts here have communities experiencing seven out of the eight CEJST disadvantaged indicators—a total of 26,097 people.** In four of these eight tracts, Black people make up between 62% to 85% of the population, and in three of the eight tracts, the Black people make up between 87% to 94% of the population. Seven of the eight tracts have low-income populations above the 88th percentile, with two tracts having low-income residents in the 98th and 99th percentiles, respectively.

Figure 20. Jacksonville Wastewater System Failure



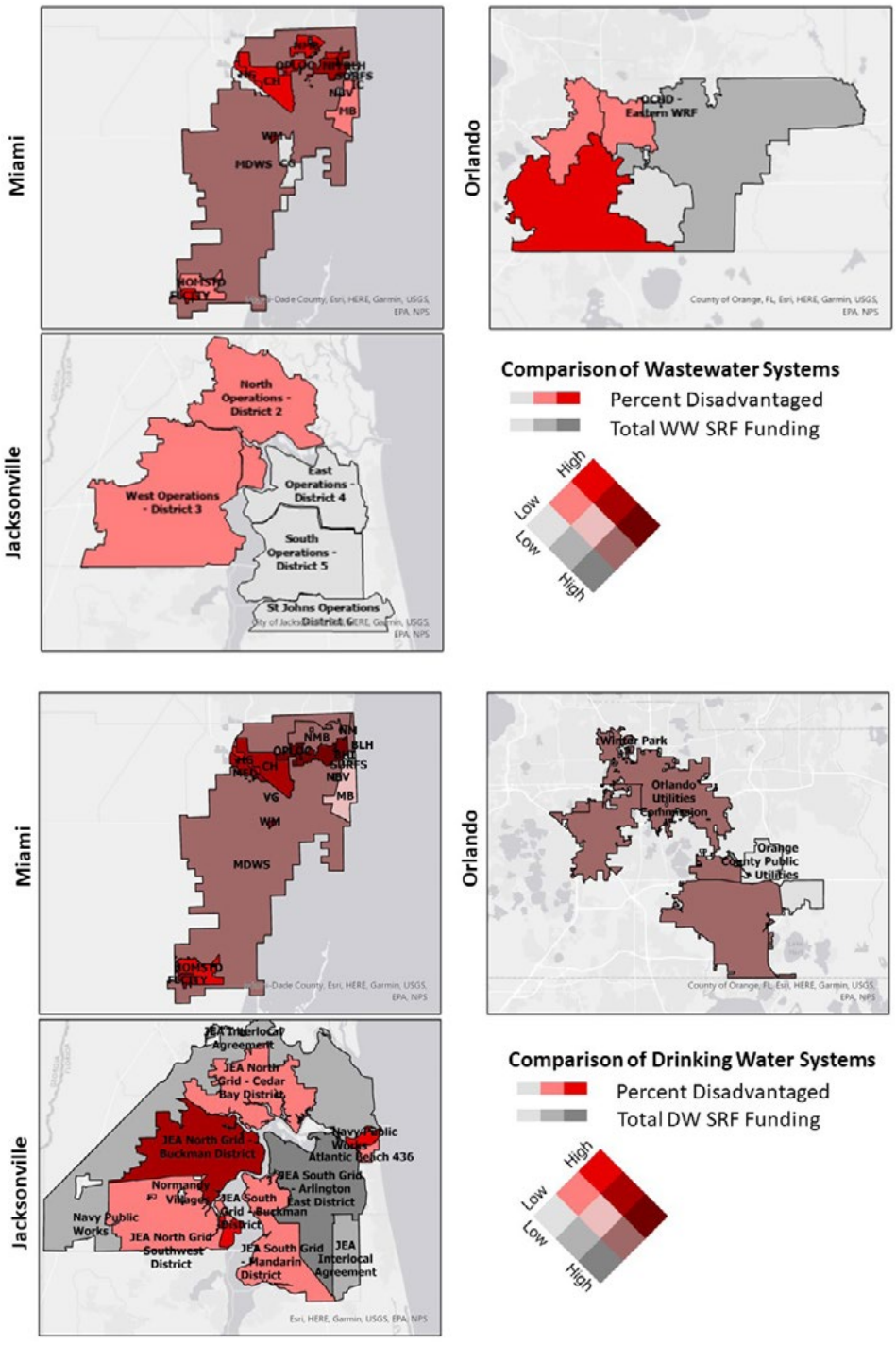
Drinking Water System Failures
No Detected Infiltrations
Up to 50 Mcg per Liter
Between 50 and 75 Mcg per Liter
Between 75 and 100 Mcg per Liter
Between 100 and 115 Mcg per Liter

In comparison, Miami-Dade County and Orlando's wastewater infrastructure fails less often. In Miami-Dade County, of the sixty-five wastewater treatment plants, only three reported spills, and none of them reported more than ten spills over three years, which is unique within the case-study area. However, most at-risk systems are located in the northeastern part of the county near Hialeah and in the southern region around Homestead, which are home to residents experiencing several disadvantages. The people living in and around Hialeah are predominately Hispanic and Latino. In at least six census tracts near Hialeah, Hispanics and Latinos make up between 94% and 98% of the population. In disadvantaged tracts near Homestead, Hispanics and Latinos have the highest representation, although in one tract, Black people make up 43% of the population. These tracts tend to be well over the 90th percentile for low-income residents. Over 96% of Miami-Dade County's population lives in tracts exposed to at least one CWI system failure, most often a drinking water or stormwater system failure. Similarly, many of Orlando's northwestern census tracts experience multiple types of CWI failure, and these tracts are often where communities are experiencing several disadvantages. For example, there are two northwestern tracts where Black people make up 74% and 98% of the population respectively. These tracts also have low-income communities experiencing very high flood risk.

Funding analysis

Overall, wastewater and drinking water PWS serving areas with higher percentages of disadvantaged communities receive less funding with substantial differences in funding between AOIs. The city average exposure was higher for climate hazards in all three AOIs compared to only disadvantaged tracts. One possible explanation is the high cost of water-front property in Florida, though this may shift as sea levels continue to rise and inland areas become more desirable, decreasing the property values of the most climate-vulnerable locations. In all three AOIs, there are PWSs with high disadvantaged populations and low SRF funding, indicating a need to more equitably distribute SRF projects (Figure 21).

Figure 21. Comparison of SRF funding and the percentage of each PWS that is considered disadvantaged. The brighter the red, the higher the disadvantage percentage and the lower the funding.



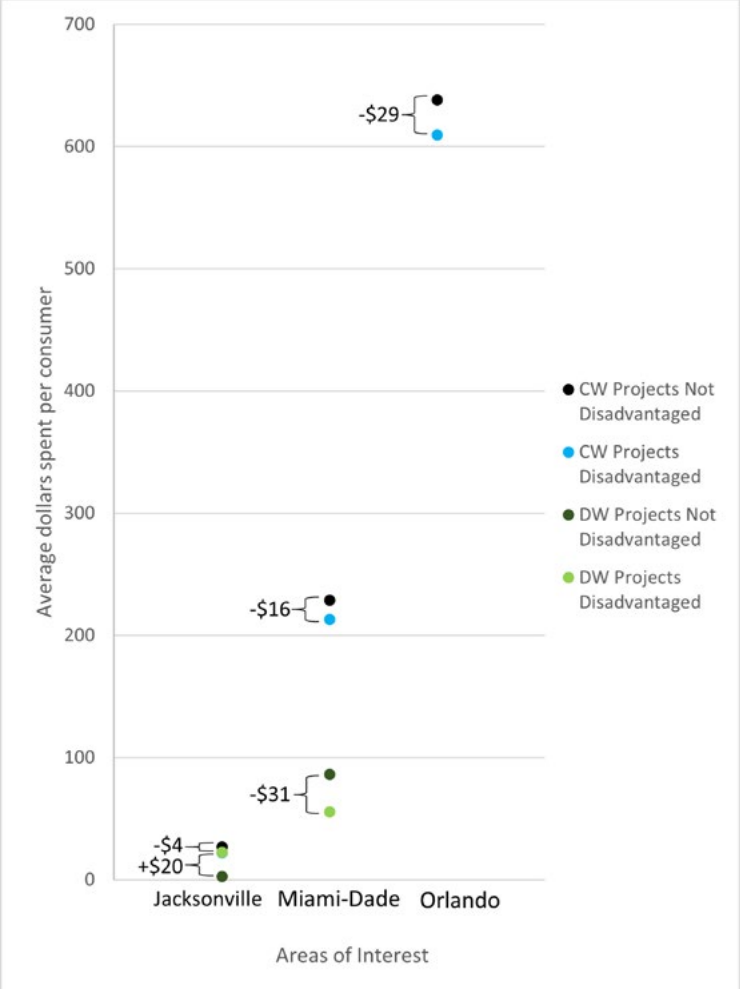
Despite significant climate exposure and CWI failure, Jacksonville has the least number of ongoing SRF projects and the smallest total funding dispensation overall (Table 2). With overlapping climate, CWI and legacy pollution hazards, combined with additional systemic inequities, disadvantaged communities in Jacksonville are in dire need of SRF investments and Justice40 benefits. Interview respondents, including staff from the mayor's office, acknowledge that flooding in Jacksonville is an issue of focus, demonstrating potential to prioritize and secure SRF funding that mitigates both flood risk and infrastructure failure that contribute to water pollution.

Table 2. Total Dispensation

	Projects	CWSRF	Projects	DWSRF
Jacksonville	3	$19,016,399	1	$5,690,330
Orlando	10	$74,367,535	0	$0
Miami-Dade	47	$491,220,584	12	$137,638,090
Total	**60**	**$584,604,518**	**13**	**$143,328,420**

Of all three AOIs, Miami-Dade County has the most ongoing CWI projects and has received the most investments from the Clean Water and Drinking Water SRFs. **Despite receiving the most SRF resources, Miami-Dade has substantial disparities in the distribution of SRF investments from 2021 to 2023 that benefited communities in advantaged tracts (Figure 23).** After Miami-Dade County, Orlando has received the second highest SRF investment to address CWI issues. Overall, Miami-Dade County and Orlando both had gaps in funding for disadvantaged tracts compared to non-disadvantaged tracts. Although Jacksonville received the least amount of funding, the city spends more in disadvantaged tracts than non-disadvantaged tracts per person for drinking water and has the small gap out of all three AOIs for wastewater.

Figure 23. Gap analysis between PWS dispensation per person averaged across disadvantaged and not-disadvantaged tracts in each AOI.



Common challenges inhibiting access to SRF funding

The geospatial analysis highlighted quantitative disparities, while the experiences shared by local stakeholders provided a deeper understanding of where SRF investments are needed, as well as challenges impeding equitable access. The top challenges identified by interview respondents were **limited capacity, political boundaries and silos, a lack of transparency, and deficits in other "Dimensions of Justice"** (Eisenhauer et. al, 2021)**.** For detailed definitions of these concepts, see Appendix D.

The lack of capacity was one barrier discussed most often, especially among decision-makers. Applying for CWI funding can be time-consuming and complex. Challenges encountered during application processes are not unique to the SRF programs, but apply to federal funders across the board, posing difficulties to both local government offices and other stakeholders attempting to access funds. Steep application requirements and rules require applicants to understand their state's annual SRF funding cycle and prepare to apply several months to a year in advance. Not all local offices and non-governmental organizations (NGOs) have grants departments with expertise needed to anticipate SRF program milestones and the capacity to meet application requirements. High rates of staff turnover combine with daily, urgent priorities, or "fires" that demand attention, and eligible entities often struggle to dedicate time and resources to navigating federal programs. Disconnect between water-resource managers within the municipalities is also a driver of disorganization and capacity deficiencies. Further coordination between management entities can improve the sharing of responsibilities and foster more efficiency.

Capacity issues can also contribute to insufficient community engagement and involvement by local governments. When offices are pressed to meet application deadlines and requirements, community engagement becomes less of a priority and more of a "box checking" activity. Without the opportunity to justify the need for SRF projects in their neighborhoods, community residents, particularly those who are disadvantaged, are less likely to receive investments.

Concerns about transparency were often associated with confusion around political and water management boundaries. Similar to the geospatial analysis, which identified many public water utilities with overlapping jurisdictions and different entities managing waste, storm and drinking water, respondents found it difficult to identify which agencies handle certain aspects of water resource management. Both community residents and decision-makers stated that defining roles for and coordinating between multiple agencies is a struggle. One water resource manager, whose role primarily focused on stormwater management, indicated that communication ***within*** offices needs improvement. When asked about the SRFs and investments in CWI projects, they indicated that staff responsible for grants handled that side of operations, showing that not all staff making decisions about stormwater are involved in understanding major funding opportunities or long-term urban planning. Interview respondents also expressed difficulty finding data for CWI systems and local water-pollution risks online.

Highlighting another issue with transparency, both decision-makers and community residents found local and state criteria for CWI project prioritization to be unclear, which impedes processes to propose and secure projects in disadvantaged communities that can have trouble competing at a larger scale. This may partially explain the geospatial results of larger systems, like those in Miami-Dade, receiving the vast majority of SRF awards in the AOIs. As more of the study area becomes exposed to climate impacts, investment needs among water systems of all sizes will increase. Confusion related to water jurisdictions and political boundaries will exacerbate climate challenges by limiting holistic CWI and coastal resiliency planning**.** Several interview respondents raised that SRF funding should be better leveraged with other resources, but this remains a constant challenge as solutions are siloed. For example, Clean Water SRF and IRA funds could be pieced together to address multiple, related water quality issues, creating a larger impact that benefits both community wellbeing and the coastal environment. Community respondents clearly stated that intersectional injustices and CWI problems, which require a creative approach, are often solved in a vacuum, leading to incremental, isolated conservation efforts that should instead amount to multi-benefit solutions.

Many interview takeaways tied to the Dimensions of Justice concept are related to "procedural justice" and "recognitional justice", specifically in the context of community residents feeling as though they do not have a meaningful seat at the table and that their opinions are not taken seriously by decision-makers. Procedural justice and recognitional justice are defined in Appendix D (Eisenhauer et. al, 2021). Across interviews with community residents, perceptions showed that values between the government and communities are often not aligned, with government offices being more concerned about economic growth and development over environmental, social and climate concerns and vulnerabilities in disadvantaged communities. There is a recognized need for deeper education among various city and county departments to truly grasp the serious and interconnected nature of environmental, climate and CWI justice and how a lack of investment is harming overburdened communities. In the same vein, one community resident described a lack of engagement from the government with their community which is "land rich but cash poor" when implementing projects. They explained that there is a significant disregard for respecting communities' cultural legacy to the land they occupy and their valuable knowledge of what is needed to preserve and sustain their homes in the face of coastal climate impacts.

"Engagement fatigue" is a major challenge encountered by community residents advocating for resources that benefit their neighborhoods. This describes a situation where individuals and communities put in consistent effort to participate in and inform processes led by government offices with no positive result. Respondents also described difficulty raising "politically sensitive" topics to decision-makers, like climate change and social justice, which directly impact their daily lives. When residents are constantly convinced that their voices and needs do not matter despite their best efforts, it's often very discouraging. Community residents usually have countless other responsibilities in their lives that require attention, and continuous attempts to engage with unresponsive decision-makers can take a toll on overburdened communities.

Offices might hold a public comment period for a funding opportunity, but comments from communities are not always substantially considered. In the long term, there must be systemic changes in the ways governments design and perceive public comment opportunities, including more frequent and conversational approaches. Entities like EPA Region 4 may be able to assist local governments in designing and hosting equitable public engagement activities, ensuring they are consistent throughout the SRF cycle. However, federal offices often experience their own capacity shortages. In the near term, community allies and intermediaries like Ocean Conservancy or Florida Sea Grant can help shoulder tasks that lift up challenges and solutions voiced by the most impacted residents, helping to foster deeper connections with decision-makers.

Beyond one-off public comment opportunities, which are often held well into the decision-making process, community needs and solutions should be heard early and often, centering their feedback in the initial design and placement of projects. People who are not fluent in English, especially in Miami-Dade County, are highly affected by government neglect in this way. However, as described in detail by one bilingual respondent, there is a remarkable "thirst for knowledge" about climate and CWI threats and solutions within non-English-speaking communities. Despite the significant need for more equitable availability and presentation of information, including utilization of proper community messengers, the communities experiencing isolation still work to navigate these barriers and obtain what information they can.

One barrier not commonly discussed in interviews, but acknowledged within circles familiar with SRFs, is the Intended Use Plan (IUP) process. Created by the Florida DEP, IUPs contain a "priority project list" that identifies projects to receive SRF funding within a given fiscal year. **The IUP usually aligns with water management goals pre-determined by the state for that year and promoting equity is not a requirement.** One example of a water management goal listed in the fiscal year 2023 IUP of the Florida Department of Environmental Protection (DEP) is to "leverage Clean Water SRF funds by partnering with the various state and federal funding programs" (DEP IUP, 2023). Selection of priority projects is based on a ranking system with pre-determined criteria, and "low-income" is the only equity-focused criteria that can be leveraged. This ignores the wide variety of additional systemic disadvantages that have left Black, Indigenous and people of color severely under-resourced. With the political climate in Florida discouraging decisions being made on the basis of race, high-impact projects with potential to address disparities will continue to be left out (Farrington, 2022)**.** Additionally, one interview respondent disclosed that "pet projects," which benefit tourist destinations and water-front property, are perceived to be prioritized by the state government over ones supporting disadvantaged communities. This is supported by the geospatial findings showing unequal funding allocations in some AOIs. According to ***The Washington Post***, Congress will likely make these inequities worse by redirecting SRF money through earmarks (Romm, 2023). Further changes are needed to alleviate barriers posed by the IUP process and align with disadvantaged community needs.

Although the geospatial findings showed that disadvantaged communities are not ***the most*** exposed to SLR, storm surge and the 100-year floodplain across the AOIs, **geospatial data and local interviews indicate these communities still experience each of the climate hazards combined with countless other injustices, such as legacy pollution, housing insecurity, and economic challenges.** As highlighted by interview respondents of color, disadvantaged communities have been denied resources to prepare for and adapt to environmental and climate threats. One indicator is the failing condition of CWI serving disadvantaged communities, as stated above.

Conclusion

Given that both AOIs with the most wastewater system failures and exposed Superfund sites, Jacksonville and Miami-Dade County, are positioned along the coast with direct connectivity to the ocean and extreme exposure to all three climate impacts, there is high risk of pollutants from wastewater and legacy pollution entering the marine environment. In Jacksonville, there is a lack of CWI investment to mitigate this specific threat to ocean health. Along with cascading, wide-reaching impacts to marine species and habitats, frontline communities will be affected by risks to the ocean. Problems like fisheries collapse, toxic HABs and coastal habitat degradation combine with existing disadvantages and injustices, further overburdening under-resourced coastal communities. Significant gaps in SRF funding, as seen within Miami-Dade County and when comparing Jacksonville to the other AOIs, must be addressed to ensure benefits to environmental and community health are distributed equitably.

Phase 2 of this study aims to ensure these findings are usable for under-resourced communities most impacted by this intersection of issues and decision-makers implementing Justice40. This data could be useful in highlighting tracts with unreliable, climate-vulnerable CWI, large proportions of disadvantaged indicators and a lack of SRF investment as future funding cycles approach. Some community respondents from both City of Miami and the Jacksonville area confirmed that community needs have not been aligned with government priorities for a long time, and Justice40 offers an opportunity to draw attention to funding gaps and severe pockets of overburdened communities while advocating for systemic changes that remove barriers perpetuating disparities.

The remediation of pollution sources, improvement of CWI, and protection of hazard-exposed neighborhoods through existing federal resources can address some local concerns about coastal climate impacts. Systemic improvements such as additional capacity, technical assistance support, community inclusion in decision-making, and transparency in the allocation process could help close the gaps affecting PWS funding and other resources in disadvantaged communities.

The methodology and results of this study could be duplicated in other locations to support community advocacy and identify locations for increased SRF support.

Appendix A

Justice40, CEJST, and State Revolving Funds

Included in the Biden-Harris administration's 2021 Executive Order #14008, *Tackling the Climate Crisis at Home and Abroad*, Justice40 is "a whole-of-government effort to ensure that federal agencies work with states and local communities to make good on President Biden's promise to deliver at least 40 percent of the overall benefits from federal investments in climate and clean energy to disadvantaged communities" (White House, 2021). Soon after the signing of the Executive Order, the Office of Management and Budget (OMB), Council on Environmental Quality (CEQ) and the White House Office of Domestic Climate Policy released interim guidance regarding Justice40, providing implementation instructions to certain "covered" federal programs, including expectations around calculating and reporting the distribution of benefits to "disadvantaged communities" within the scope of these programs (Interim Guidance, 2021). As part of the guidance, the administration identified twenty-one priority "pilot programs" to immediately begin implementation of Justice40.

The administration defines "disadvantaged" as being in a high percentile, typically the 90th, for at least one of the following environmental indicators ***and*** being low-income. Communities, defined geographically by census tract, can also be considered disadvantaged if they are federally recognized tribal lands of Indigenous Peoples, or if a community, despite not being in a high percentile of environmental indicator, is surrounded on all sides by disadvantaged communities and is low income. It's important to note that the administration did not include racial demographics as an indicator, despite race being the strongest predictor of one's proximity to polluting facilities (EPA, 2021). The reason for this omission was to prevent legal challenges related to distributing resources on the basis of race (Friedman, 2022).

Environmental Indicators

Climate Change – Tract is "at or above the 90th percentile for expected agriculture loss rate or expected building loss rate or expected population loss rate or projected flood risk or projected wildfire risk."

Energy – Tract is "at or above the 90th percentile for energy cost or Particulate Matter (PM) 2.5 in the air."

Health – Tract is "at or above the 90th percentile for asthma or diabetes or heart disease or low life expectancy."

Housing – Tract has "Experienced historic underinvestment or [is] at or above the 90th percentile for housing cost or lack of green space or lack of indoor plumbing or lead paint."

Legacy Pollution – Tract has "at least one abandoned mine land OR Formerly Used Defense Sites or [is] at or above the 90th percentile for proximity to hazardous waste facilities or proximity to Superfund sites (National Priorities List (NPL)) or proximity to Risk Management Plan (RMP) facilities."

Transportation – Tract is "at or above the 90th percentile for diesel particulate matter exposure or transportation barriers or traffic proximity and volume."

Water and Wastewater – Tract is "at or above the 90th percentile for underground storage tanks and releases or wastewater discharge."

Workforce Development – Tract is "at or above the 90th percentile for linguistic isolation or low median income or poverty or unemployment," and "more than 10% of people ages 25 years or older whose high school education is less than a high school diploma." (CEJST Methods)

Justice40 also brought about new tools for 1) determining which communities should benefit most from federal investments and 2) measuring government-wide progress in executing the administration's full environmental justice agenda. The Climate and Economic Justice Screening Tool (CEJST) was created using census data, identifying tracts in which Justice40 benefits should materialize using the list of environmental burden indicators above (CEJST). The Environmental Justice Scorecard was developed to promote accountability and transparency in federal agency implementation of environmental justice principles (EJ Scorecard, 2023). The Scorecard tracks and shares the progress of agencies in advancing environmental justice according to specific criteria including Justice40 implementation progress, enforcing environmental and civil rights laws, and embedding environmental justice within the agency. Each of these tools underwent at least one public-comment process to inform their development.

Over two years later, covered programs are continuing to navigate and pursue the goals of Justice40. After the identification of the inaugural "pilot programs," a lengthy list of newly covered programs was released in 2022, which includes programs administered by the National Oceanic and Atmospheric Administration (NOAA)[3] (Covered Programs, 2023)

Many of the early Justice40-covered programs were part of the EPA, which already had an operating Office of Environmental Justice and External Civil Rights (EPA OEJCR). The Clean Water State Revolving Fund and Drinking Water State Revolving Fund and were two of these programs, and they are responsible for providing low-interest loans to states for planning, designing and constructing CWI. The Clean Water SRF and Drinking Water SRF were established through the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA) respectively to protect the environment and promote public health. Utilities can apply to the Drinking Water SRF, and the program offers financial assistance for projects such as installing or upgrading drinking water treatment systems and replacing pipes.

3 NOAA's Jusice40 covered programs include 1) National Integrated Heat Health Information System (NIHHIS)- Extreme Heat Risk Initiative; 2) National Integrated Heat Health Information System (NIHHIS): Urban Heat Island Mapping; 3) Regional Integrated Sciences and Assessments; 4) Habitat Restoration; 5) Fish Passage; 6) Sea Grant; and 7) Coastal Zone Management Grants.

On the other hand, the Clean Water SRF is open to an array of applicants, from local governments to NGOs. This program generally funds projects intended to mitigate water pollution, including stormwater and wastewater system improvements, non-point source pollution and watershed conservation and management. The Clean Water SRF has a Green Project Reserve that specifically funds critical green infrastructure and "environmentally innovative activities."

The SRFs are funded by annual federal appropriations. The EPA distributes money to states according to a formula that considers population size and infrastructure needs, and states are required to contribute a 20% match to the capital improvement grant. Once the funds are allocated, states develop an Intended Use Plan (IUP) that outlines how they will use the funds and prioritize projects. IUPs identify specific projects, set loan terms and establish criteria for project selection. States may consider factors such as public health impacts, environmental benefits and financial need when determining which projects to prioritize. Once the IUP is finalized, states can begin disbursing funds to awardees through loans or other financial assistance mechanisms like grants. The EPA provides oversight and guidance throughout the allocation and implementation process to ensure that funds are used effectively and in accordance with federal regulations.

In November of 2021, the Biden-Harris administration signed into law the historic Bipartisan Infrastructure Law (BIL), also called the Infrastructure Investment and Jobs Act (IIJA). The single-largest investment in our nation's CWI, the BIL provided $50 billion, with most of these dollars—$43 billion—going to the SRFs. With these programs covered under Justice40, BIL funds are positioned to make powerful investments in CWI that benefit low-income areas and communities of Black, brown and Indigenous Peoples.

Appendix B

Critical Water Infrastructure in Florida

In the ASCE *Report Card for America's Infrastructure*, Florida's CWI was given a C rating, or "needing attention" (ASCE Florida, 2021). With one of the nation's fastest growing populations, millions of visiting tourists each year, and significant vulnerability to climate change, Florida's water resource managers must prepare its CWI to withstand mounting pressure. When making decisions around CWI investments, managers should center improvements that build higher-capacity stormwater systems as precipitation rates and SLR grow, transition away from septic systems in urban areas for safer wastewater management and ensure that eroding drinking water infrastructure is strengthened to meet existing and new demands. In 2021, ASCE communicated that a low number of utilities in Florida inspect over 20% of distribution pipelines annually for leaks, and a few reported inspecting less than 5%. It's important to mention that power outages during storms contribute significantly to wastewater and stormwater system failures, and this can be mitigated by ensuring that backup generators are installed.

Breaking down areas served by different water utilities and systems into jurisdictions for management purposes is often complicated. In Miami-Dade County, the Water and Sewer Department (WASD) is responsible for managing the water supply and wastewater services for the residents of Miami-Dade County. Miami-Dade WASD maintains more than 8,500 miles of underground water lines, as well as over 4,000 miles of sewer lines, serving some 2.4 million residents. It also provides water and wastewater services directly to over 400,000 customers and indirectly through wholesale services to municipal utilities.

In Duval County, the Jacksonville Electric Authority (JEA) is the primary water and sewer utility for the City of Jacksonville and the county. It is a publicly owned utility that manages the water distribution and wastewater treatment systems in the area. JEA services 352,000 water customers and 271,000 sewer customers.

In Orange County, the Orange Utilities Commission (OUC) is the second-largest municipal utility in Florida, providing service to more than 268,100 customers in Orlando, St. Cloud and parts of unincorporated Orange and Osceola counties.

There is no one entity responsible for stormwater and flooding for any resident of Florida, and the lifecycle of stormwater is quite complicated. Stormwater infrastructure is a web of primary systems along roadways, secondary drainage canals often owned and operated by municipalities or local drainage control districts, and large systems that are owned and operated by regional entities. For a resident trying to understand who is responsible for stormwater threatening their home or business, the city, county and Florida Department of Transportation can all maintain separate systems in a few blocks' radius. The Florida Department of Transportation will be responsible for the stormwater system within its rights-of-way and the city and county in theirs. The systems are rarely connected and may be built with different standards, meaning one could be overwhelmed before another.

There are also five Water Management Districts (WMDs) in Florida that have an important role in flood control and drainage, supporting local governments to provide additional flood protection and water-resource management with their designated regions. Miami-Dade County and the city of Orlando are within the South Florida Water Management District (SFWMD), which is responsible for 16 counties across southern Florida. Jacksonville falls within the St. Johns River Water Management District (SJRWMD), which covers northeast Florida and manages water resources in 18 counties. In addition to flood control, WMDs are responsible for:

- Developing and implementing comprehensive water resource plans for their respective regions, including drinking water availability.
- Issuing permits to local governments for various water-related activities, such as construction near wetlands.
- Ensuring water quality standards are met in Florida through monitoring water bodies.
- Implementing projects to restore and conserve natural habitats and wetlands.

The Florida DEP is the overarching body responsible for managing water resources at the state level and exercises authority over all five WMDs. The DEP supervises public drinking water systems across the state, except for six counties, including Miami-Dade.

Appendix C
Methods

Geospatial analysis of critical water infrastructure and community risk

For the geospatial assessment piece of this case study, Ocean Conservancy partnered with GeoAdaptive LLC (GeoAdaptive), a firm specializing in GIS that has prior working experience in Florida. GeoAdaptive supported Ocean Conservancy in determining whether there are patterns of overlapping CWI failure and high coastal climate risk in disadvantaged census tracts and in communicating patterns using maps and other visual tools. This analysis also identified SRF investments distributed in each AOI for drinking water and wastewater systems from 2021 through 2023, comparing investments in disadvantaged tracts to tracts not identified as disadvantaged. GeoAdaptive used demographic data from the 2020 Census, publicly available CWI data and climate risk data from NOAA. For the purpose of this case study, the following definitions were used:

CWI failure

- Wastewater system failures were assessed by number of pump failures and spills of sewage between 2018 and 2023.
- Drinking water system failures were assessed by detections of impurities (heavy metals and turbidity) in drinking water in 2022. Infiltrations were measured in Micrograms per Liter. The most severe drinking water infiltrations are defined as the presence of contaminants between 100 and 115 Micrograms per Liter.
- Stormwater system failures were assessed by misalignment of overland flows and drainage lines.

Climate risk

- SLR risk was measured using NOAA's projection of three feet of SLR expected by 2100.
- Storm surge risk was determined using storm surge predictions for Category 1 through 3 storms.
- Nuisance flooding exposure was determined using projections of area within the 100-year floodplain.

Disadvantaged communities

In order to maintain consistency with the administration's definition of "disadvantaged community," GeoAdaptive used the definition determined by the CEJST, which is listed in the *Justice40 for ocean and coastal communities* section above. To remain consistent with the government's definition of "disadvantaged," race was not included as an indicator in this case study.

Qualitative analysis of lived experiences

With the purpose of supplementing the geospatial findings, researchers conducted a series of semi-structured interviews to capture the lived experiences of decision makers and community residents in each of the AOIs. Interview questions were carefully designed to have respondents share 1) climate impacts felt in their communities, 2) the condition of CWI and reliability of service, 3) their understanding of and experience with the EPA's SRFs and Justice40, 4) key challenges associated with accessing CWI investments, and 5) dynamics between community residents and decision-makers in the context of designating CWI projects in the localities.

In total, researchers conducted ten interviews, each about an hour long. Three were conducted in-person and seven were conducted via Zoom. Researchers committed to maintaining the anonymity of the respondents, so their identities are described as "decision maker" or "community resident". In this initial round of interviews, three of the six community residents were People of Color and three of the four decision makers were People of Color.

In Jacksonville, one community member and one decision-maker were interviewed. Both respondents often mentioned the impacts of stormwater and flooding, while water pollution was discussed in several contexts by the decision-maker.

In Orlando, one community member and one decision-maker were interviewed. Water pollution and stormwater were raised often by both the community resident and decision maker.

In Miami-Dade County, two community members and two decision makers were interviewed. SLR and stormwater were the most discussed issues. SLR was raised by both community residents and both decision-makers, while stormwater was a concern for both community residents and one decision-maker.

In the data analysis stage, Atlas.ai, a coding software, was used to extract key themes from the interview transcripts. After themes from each interview were identified, two researchers conducted a triangulation analysis of the data to compare interpretations of perspectives shared by the interview respondents.

To support the qualitative data analysis process and help Ocean Conservancy researchers dissect the complex CWI authority landscape across each AOI, a partnership with Launch! Consulting (Launch) was initiated. Launch staff have robust expertise in both climate resilience and technical aspects of CWI systems and management.

Appendix D
Qualitative Analysis of Key Challenges

Climate and infrastructure challenges

Across the three AOIs, the top three climate change and CWI-related concerns are as follows:

1. **Water pollution** – Across the board, respondents discussed the impacts of contaminants entering waterways and clean-water resources. Most often, this was in the context of stormwater runoff, HABs and, in Jacksonville, industrial pollution.

2. **SLR** – Respondents often talked about the various ways SLR and, by extension, flooding affect the places where they live. In these conversations, SLR was linked to erosion and land loss, king tides, infrastructure risk and water pollution from runoff.

3. **Failing stormwater and wastewater** – Across the AOIs, it was evident that the impacts of unreliable stormwater and wastewater systems are of concern. These were mentioned in the context of septic system vulnerability, underperforming stormwater management and related flooding, and, for both types of systems, pollution from runoff.

Clear overlap in the priorities of respondents across AOIs, as well as between community residents and decision-makers from the same AOI, indicate a commonality in what locals living in the study area perceive to be pressing climate and CWI challenges. Having a shared set of identified challenges is just the first step in taking action to address them. This research has found that there are a number of barriers limiting the communication and collaboration, trust and support, and access to resources that are necessary to leverage SRF investments and implement solutions that benefit all.

Systemic barriers and other hurdles

1

Transparency. The concept of government transparency involves openness, accountability and accessibility during the decision-making processes and actions of government institutions. This includes providing accessible information, records and proceedings to the public, and enabling active involvement in governance by providing opportunities for thorough examination and oversight. However, the research indicates a lack of transparency, making it challenging for researchers and even government staff who were interviewed to identify agencies responsible for certain water management decisions and to understand how to access data.

2

Capacity. Capacity in the municipal context encompasses the resources and capabilities available to local government entities, including trained staff, sufficient time, comprehensive knowledge, expertise and financial resources. In the community, capacity involves the availability of resources such as time, knowledge, financial contributions and emotional efforts dedicated to addressing social and environmental issues.

3

Political Boundaries and Silos. Political boundaries and silos refer to the divisions and separations that exist among different levels of government, including federal, state, county and city jurisdictions, as well as water agencies. Within these governmental entities are often further divisions and isolated departments or units, commonly called silos, that operate independently with limited communication or coordination between them. This fragmentation can lead to challenges in addressing complex issues that require a multi-level and interdisciplinary approach as well as impeding efficient resource allocation and effective policy implementation.

4

Dimensions of Justice. The Dimensions of Justice include the following: a) **procedural justice,** which ensures fair and inclusive decision-making processes that provide meaningful opportunities for affected communities to participate and have their voices heard; b) **distributional justice**, which refers to the equitable and fair allocation of environmental benefits and burdens among different groups and communities; c) **recognitional justice**, which aims to acknowledge and honor the rights of individuals and communities to participate in decision-making processes that directly impact their lives actively; and d) **capacity justice**, which acknowledges that achieving equity requires attention to the specific contexts in which people live and the provision of resources and opportunities for them to participate in decision-making processes and live their chosen lives (Eisenhauer et. al, 2021).

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