CLGFP Report 2026-02

A BALANCING ACT:

MAINTAINING MUNICIPAL WATER SYSTEMS, FISCAL HEALTH, AND WATER QUALITY

Erika Rosebrook, Ph.D.
Director, MSUE Center for Local Government Finance and Policy,
Michigan State University

Mark Skidmore, Ph.D.
Professor and Morris Chair in State and Local Government Finance and Policy
Michigan State University

Yiming Liu
Graduate Assistant, Agriculture, Food, and Resource Economics
Michigan State University

Eric Scorsone, Ph.D.
Center Affiliate, MSUE Center for Local Government Finance and Policy,
Michigan State University

Elizabeth Egbukichi
Graduate Assistant, Agriculture, Food, and Resource Economics
Michigan State University

MSUE Center for Local Government Finance & Policy

CLGFP Report 2026-02

September 30, 2026



The **MSUE Center for Local Government Finance and Policy (CLGFP)** at Michigan State University, located within the MSU Department of Agricultural, Food, and Resource Economics and in partnership with MSU Extension, was founded in 2015 to support communities in their efforts to efficiently deliver critical public services that promote health, safety, and well-being. The Center supports decision-making for public officials in communities of all sizes through a diverse offering of training, engagement, and applied research opportunities.

Table of Contents

A BALANCING ACT: MAINTAINING MUNICIPAL WATER SYSTEMS, FISCAL HEALTH, AND WATER QUALITY **1**
Water Quality: Michigan and Beyond 3
How Do Michigan Cities Compare Nationally? 3
COMPARING SYSTEMS QUANTITATIVELY: METHODS AND RESULTS **4**
Analysis 5
Funding and Fiscal Outcomes 5
Shrinking and Growing Cities 5
Funding and Recorded Water Violations 6
LESSONS FROM MICHIGAN CITIES **6**
Pontiac 7
Demographic Factors 7
Economic Factors 7
Budget and Water System Trends 8
Water Quality and Regional Comparisons 9
Lincoln Park 10
Demographic Factors 10
Economic Factors 11
Budget and Water System Trends 12
Water Quality and Regional Comparisons 13
Flint 13
Demographic Factors 13
Economic Factors 14
Budget and Water System Trends 15
Water Quality and National Comparisons 15
Limited Options for Legacy Cities in Michigan 15
MOVING FORWARD: RECOVERING BALANCE **16**
WORKS CITED **18**
APPENDIX 1: DATA AND VARIABLES **A1-1**
APPENDIX 2: DESCRIPTIVE STATISTICS **A2-1**
APPENDIX 3: REGRESSION MODELING FRAMEWORK **A3-1**
APPENDIX 4: REGRESSION RESULTS **A4-1**

This report is part of an ongoing project funded by the C.S. Mott Foundation designed to better understand the fiscal and operational pressure on municipal community water systems in Michigan, with specific attention to Flint. The first report of the series assembled fiscal data from the comprehensive annual financial reports (CAFR) of 250 water systems for 2008, 2015, and 2022 and illustrated the range of conditions facing Michigan's communities as they face the challenges of population loss, financial crisis, and aging infrastructure. The second report in the series offered evidence for the importance of low-interest loans and technical assistance from Michigan's Drinking Water State Revolving Fund (DWSRF) to maintaining water infrastructure and the fiscal health of municipal community water systems (Rosebrook et al. 2025). It further compared the fiscal and management challenges of urban water systems that have faced water crises and noted how different local and state intervention strategies shaped outcomes.

In this report, we build on the previous work to better understand the connection between fiscal health and water quality and extend our understanding of the specific challenges facing water systems in cities with shrinking populations. We examine:

- the role the Drinking Water State Revolving Fund plays in critical water infrastructure investment and water system fiscal health;
- how population growth or loss might portend future instability/risk;
- the connection between infrastructure and water quality; and
- how the water systems of Flint & some of the other Michigan legacy cities that have experienced emergency management compare;

A Balancing Act: Maintaining Municipal Water Systems, Fiscal Health, and Water Quality

Since 2014, when residents of Flint brought the safety of the city's drinking water to public attention, Michigan has been at the center of public concerns about water quality. The crisis and its aftermath, along with an influx of pandemic-era federal infrastructure funding via the Infrastructure Investment and Jobs Act (IIJA) of 2021,[1] underscored the need for infrastructure investment. A recent report from the National League of Cities (2026) indicates that despite the additional funding over the last five years, city leaders across the country report notably worse water infrastructure conditions than they did in 2022. This tension between increasing need for repair and maintenance, new standards around lead pipe replacement and PFAS contamination, and insufficient funding to support needed investment, makes it increasingly difficult to manage drinking water systems.

Managing a municipal water system relies on balancing a particular set of interests. Residents are concerned about water quality, but they are not always willing to pay for improvements that maintain or improve water quality unless requests for more funding are specific or connected to local or personal experience (Tanellari et al. 2015). In shrinking cities, where the

[1] Also referred to as the Bipartisan Infrastructure Law (BIL).

cost of the system is spread across fewer ratepayers, those aware of the city's population loss are less willing to pay for improvements, though that willingness to pay increases if they are aware of water quality events (Faust et al. 2018; Tariq 2022). At the same time, a gap between the need for investment and the local capacity to finance infrastructure improvements increases the likelihood of failures like water main breaks that can introduce contamination or other water quality issues. Local elected officials, who are largely responsible for governance of water systems, struggle to balance this limited support for increased rates with system costs, debt burden, water affordability, even when they recognize that investment is needed (Hansen and Mullin 2022).

The system within Michigan's state government that monitors and provides some funding for water systems is also faced with a complicated set of challenges. The fragmentation of data and monitoring responsibility across state departments limits the ability to connect issues and address them comprehensively (Bell et al. 2024). Much of the IIJA funding passed through to states was directed to updating water infrastructure and replacing lead service lines, along with recognizing and mitigating specific harms to "disadvantaged communities."[2] States, including Michigan, updated their priorities accordingly, and while the IIJA provided an influx of funding for water infrastructure, the federal government's spending has remained constant or declined as a share of spending on water and wastewater treatment (Greer 2020) If the IIJA is not reauthorized after its 2026 expiration, the reduction in the federal share of spending will deepen: Michigan would lose $286 million in federal funds in the next fiscal year (Lincoln 2026). This shift in funding responsibility is largely a function of structural design and devolution – the federal government has moved its funding commitment primarily to distributing revolving funds to states. As states shoulder more of the responsibility for funding and addressing local infrastructure needs, the number of local governments and community water systems adds further complexity in coordinating necessary maintenance.

In short, state and especially local governments are responsible for providing clean, safe water and managing all of the associated costs and challenges, without the ability to effectively finance and manage infrastructure. At the same time, the federal commitment to providing funding continues to decline.[3] It is no surprise, then, that there are different cost and safety outcomes, even between communities that share a border, as differences between systems, fiscal health, and community capacity to pay reflect larger social, political, and income divides. (Ajasa 2026)

---

[2] Executive Order 14008 centered climate change in federal investments and established the Justice 40 Initiative, a goal that 40% of benefits from federal investments in clean energy; energy efficiency; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of critical clean water infrastructure (Executive Office of the President 2021).

[3] At the time of this writing, the IIJA has been temporarily extended to December 11, 2026, as part of a continuing resolution to fund the federal government through that date. The President's proposed FY 2027 budget calls for funding the DWSRF at $150 million, 13% of its FY 2026 total (Bipartisan Policy Center 2026). For Michigan, this would be an estimated decrease from the $42.85 million federal distribution in FY 2026 to $3.05 million in FY 2027 (United States Environmental Protection Agency 2026).

Water Quality: Michigan and Beyond

Historically, investment in water infrastructure has been linked with declines in waterborne pathogens but modern regulation and financial support has not always directly connected funding to health (Beach 2022). As Michigan and other states revised DWSRF scoring systems in response to the IIJA, however, addressing water quality issues has become more explicitly included in ranking of projects for funding priority.

The DWSRF has been the main source of public financing for drinking water infrastructure since its inception, and in Michigan it awarded over $1.5 billion to support community water systems in its first 25 years (1998-2023) (Michigan Department of Environment, Great Lakes, and Energy 2022). Awards from the fund between FY 2023 and FY 2027 totaled $1 billion, illustrating the scale of the additional federal BIL/IIJA dollars.[4] While this is a much needed investment, the American Society of Civil Engineers estimates $40.5 billion in total investment is still needed to bring Michigan's drinking water infrastructure to an adequate standard, with an annual funding gap of between $860 million and $1.1 billion (American Society of Civil Engineers 2025). As water infrastructure projects become more critical for Michigan communities, the number of projects seeking DWSRF support has increased substantially as well. In FY 2025, over 200 applicants indicated an intent to apply for funding, 153 completed applications were evaluated and ranked, and 26 projects closed loans (Michigan Department of Environment, Great Lakes, and Energy 2026b). Even with the expanded access to subsidized funding provided by the IIJA, the DWSRF could only support 17% of completed applications, which is another indicator of the need in Michigan communities.

How Do Michigan Cities Compare Nationally?

From previous work, we know that affordable infrastructure financing from the DWSRF has improved the financial position of Michigan community water systems, especially for growing cities (Rosebrook et al. 2025). We also know, as evidenced by data from Michigan Department of Environment, Great Lakes, and Energy (2026b) that needs far outpace available resources for communities seeking to invest in their infrastructure, even with an additional $1 billion invested in the last four years..

A comparison of cities within Michigan, however, is not the only evaluation that can shed light on how well or poorly Michigan cities are faring. Legacy cities and post-industrial urban centers across the country face similar challenges: limited available funding; limited capacity to raise resources; and shrinking population. The Lincoln Institute of Land Policy (2023) has standardized data on local government finances for 212 of the largest cities in the country so that they can be compared across state funding and functional contexts. We use that data here to answer two key questions:

[4] The additional BIL/IIJA dollars were provided in 3 grants: DWSRF Supplemental, Lead Service Line Replacement (LSLR), and Emerging Contaminant (EC), so not all funds were general purpose, but they do offer flexibility in areas critical to Michigan water infrastructure (Michigan Department of Environment, Great Lakes, and Energy 2026b).

- What is the relationship between DWSRF funding and city fiscal outcomes?
- What is the relationship between DWSRF funding and drinking water violations? (i.e. is DWSRF funding associated with cleaner drinking water?)

Our analysis, using data from 2010 through 2022, captures the time period before pandemic-era funding and ends with the first year of the American Rescue Plan Act (ARPA) dollars being integrated into state DWSRF.[5] That time period gives us insight into how cities were coping with needs when fewer resources were available and will provide a baseline for comparison once IIJA funds are exhausted.

Comparing Systems Quantitatively: Methods and Results

Our analysis draws on annual financial and drinking water data from 156 cities from 2010 through 2022, allowing for a cross-sectional and longitudinal examination of the relationship between DWSRF funding, city fiscal outcomes, and recorded drinking water violations. First, we examine the relationship between DWSRF funding and a set of variables connected to water system fiscal health: water capital expenditure, utility capital expenditure, and water utility expenditure and revenue. Given the established relationship between municipal population growth or loss, water system fiscal health, and resident willingness to pay (Rosebrook et al. 2025), we also place cities into 3 categories, based on their population change between 2010 and 2022:

- **Growing Cities**: Population growth greater than 3%
- **Shrinking Cities**: Population loss greater than 3%
- **Stable Cities**: Population change between -3% and 3%

Other key measures include:

- **New DWSRF funding**: total new award dollars in a year.[6]
- **Active DWSRF funding**: annual allocation of total DWSRF award across the life of the DWSRF agreement. For example, if a city receives a $1 million award in the year 2000 with a 20-year repayment agreement, active DWSRF funding in a year would be $50,000.[7]

Appendix 1, and Appendix 2 contain variable definitions and data sources along with summary statistics for all key variables. Table 4 provides summary statistics for all cities included in our evaluation for the beginning year (2010) and the ending year (2022). Table 5 provides the same information, but for shrinking and growing cities separately, and summary statistics for

[5] In Michigan, $597.5 million in American Rescue Plan Act (ARPA) funds were integrated into the DWSRF via the FY21-22 Supplemental – (Public Act 53 of 2022 2022).

[6] Note that these are total project award amounts. Communities do not receive that amount in one lump sum. Awards are subject to specific processes and disbursement and repayment rules that are distinct from the total award amount.

[7] See Table A3 in Appendix 1 for more information on specific calculation of this variable.

water violation data are provided in Table 6. While the details are provided and discussed in the appendix, we highlight here a few important observations taken from Table 5, which summarizes data for shrinking and growing cities.

First, DWSRF funding per capita is higher in shrinking cities than growing cities, signifying that shrinking cities receive relatively more support from federal sources than growing cities. Second, note also that water revenue per capita is larger in shrinking cities than growing cities, while at the same time median household income shrinking cities is just two-thirds of median household income in growing cities. Higher water expenditures per capita coupled with lower median household income indicate that the cost burden relative to income is 55% higher in shrinking cities than growing cities.

Analysis

Funding and Fiscal Outcomes

We use regression analysis to evaluate the association between DWSRF funding and fiscal outcomes. A more detailed explanation of our methodology and results is available in Appendices 3 and 4. Based on this analysis, we find that active DWSRF funding is positively associated with water capital, utility capital, and water utility expenditure, as well as water utility revenue. Each $1 million in active funding is associated with $294,745 higher water capital expenditures. The corresponding differences for each $1 million in active funding are $411,787 for utility capital expenditures, $479,030 for water utility expenditures, and $378,223 for water utility revenue. New DWSRF funding is not statistically significant for any of the four fiscal outcomes. These results suggest that the benefits for a water system fiscal health accrue over time rather than in the first year of an award, which is not surprising for large-scale infrastructure projects that take time to build out.

The original model included median household income as a measure of residents' capacity to pay, but with many local finance outcomes connected to property taxes and property values, we replaced median household income with median property value and found similar results. Each $1 million in active DWSRF funding is associated with $301,796 higher water capital expenditures and $378,174 higher water utility revenue. The corresponding difference for water utility expenditures is $484,844.

Shrinking and Growing Cities

In this portion of our analysis, we allow the estimated impacts of the dependent variables to differ across growing and shrinking cities. A more detailed description of these methods is available in Appendices 3 and 4. In these estimates, DWSRF funding plays slightly different roles in cities depending on whether they are shrinking, stable, or growing.

In shrinking cities, active DWSRF funding is positively and significantly associated with all four fiscal outcomes. Each $1 million in active funding is associated with $375,713 higher water capital expenditures, $384,147 higher utility capital expenditures, and $833,847 higher water utility expenditures. Water utility revenue is higher by $473,301. For stable cities, the

corresponding differences in water capital expenditures, water utility expenditures, and water utility revenue are $601,491, $925,604, and $813,001.

For new DWSRF funding, the shrinking city estimates are positive and significant for all three expenditure outcomes. Each $1 million in new funding is associated with $309,744 higher water capital expenditures and $310,542 higher utility capital expenditures. The corresponding difference in water utility expenditures is $594,687.

The analysis offers evidence that DWSRF funding is used to increase spending, but importantly, it also reduces the share of that investment that is shouldered by users. These differences are consistent with previous work that identifies more benefits to stable and growing cities from DWSRF funding (Rosebrook et al. 2025).

Funding and Recorded Water Violations

The final dimension across which we examine the impact of DWSRF funding is its connection to water quality.[8] While water quality violations are somewhat rare events, and formal violations do not capture all incidents or water quality concerns, they do provide an indication of a system's ability to address infrastructure-related concerns before they affect public health. New DWSRF funding per capita is associated with a lower probability of active violations in subsequent years. Each additional $100 per resident is associated with an estimated decrease in the probability of a violation equivalent to 37.8% one year later and 34.8% two years later.[9]

Among cities with existing water quality violations, having active DWSRF funding in a given year is associated with a 56.5% higher probability of a reduction in violations the following year and a 70.5% higher probability of reaching zero recorded violations. Taken together, these models illustrate both the importance and the limitations of DWSRF for cities – funding reduces residents' share of the burden for funding capital improvements, and cities that have faced water quality issues are less likely to have future violations after receiving funding.

Lessons from Michigan Cities

The quantitative comparison above highlights the national importance of DWSRF and highlights that Flint and other Michigan legacy cities are not alone in needing low-cost public financing to support basic needs and public health, regardless of state-specific contexts. Here, we take a deeper look into some of the Michigan cities included in the Lincoln FiSC data and examine how they compare to Flint. We consider the demographic, economic, budget, and water quality trends of Pontiac, Lincoln Park, and Flint, which have all experienced emergency management and long-term population loss, to better understand both the differences in

[8] Appendices 3 and 4 offer a detailed discussion of regression methods and findings.

[9] More detail on specific methods and results is provided in Appendix 3 and Appendix 4.

outcomes for the cities and the shared challenges, which are indicative of systemic forces faced by all cities in Michigan, especially legacy cities, rather than individual local decisions.

Pontiac

Demographic Factors

Population Change (1970-2020)

Pontiac's population peaked at roughly 85,000 in 1970, when the city anchored General Motors manufacturing in the region and served as county seat of Oakland County (Trenkner 2012). By 2020, it had fallen to 61,607, a 27% drop from its peak (U.S. Census Bureau 2024d). The decline over the last two decades was uneven. The city lost about 12% of its population between 2000 and 2010, grew roughly 3-4% from 2010 to 2020, and emerged the two decades down 9% overall (U.S. Census Bureau 2024d).

Oakland County is one of Michigan's most prosperous counties, with a 2020 population of 1.27 million and a median household income of roughly $97,709, nearly 36% above the national median (U.S. Census Bureau 2024c). Pontiac sits inside that wealth but does not share it. Sarzynski and Vicino (2019) call this the "new donut": a legacy industrial city hollowing out while the suburban ring around it keeps growing.

Racial and Age Composition

Pontiac's racial composition shifted substantially through the second half of the 20th century, when deindustrialization, white flight, and decades of housing discrimination rooted in 1930s federal redlining reshaped who lived where. The school desegregation conflict was severe: in 1971, Ku Klux Klan members bombed Pontiac school buses to protest court-ordered busing. White middle-class flight to surrounding suburbs accelerated, taking municipal tax revenue with it. Cities like Pontiac that moved to majority-minority status through this process consistently saw tax base contraction and compounding disinvestment (Martínez-Beltrán and Wilkinson 2021).

By 2020, about 43% of Pontiac residents identified as Black or African American, 26% as white, and 24% as Hispanic or Latino, among the highest Hispanic concentrations in Michigan's legacy industrial cities (SEMCOG 2020). The median age was 36.5, which was lower than the national median of 40.1, suggesting ongoing outmigration of higher-income residents alongside retention or inflow of a younger, lower-income population (U.S. Census Bureau 2024d).

Economic Factors

Income and Poverty

Pontiac's median household income is roughly $44,329, about 45% of Oakland County's $97,709 and 55% of the national median of $80,734 (U.S. Census Bureau 2024d). About

24.4% of residents live below the federal poverty line, nearly double the national rate and more than three times Oakland County's 7.7% rate.

Educational attainment in the city mirrors income. Only 16.1% of Pontiac adults hold a bachelor's degree or higher, against 52.2% of Oakland County residents aged 25 and over, a gap of nearly 40 percentage points (U.S. Census Bureau 2024d, 2024c).

Property Values and Tax Base

The median value of owner-occupied housing in Pontiac for 2024 was approximately $121,700, or about one-third of the Oakland County median of $365,500 (U.S. Census Bureau 2024d, 2024c).

Michigan's Proposal A caps annual increases in taxable property value at the lesser of inflation or 5% (Walcott 2016). Taxable values therefore grow more slowly than State Equalized Values, gradually eroding the tax base in communities where housing demand is already weak (Hodge et al. 2015). For cities in population decline like Pontiac, the combination of falling demand and capped recovery means revenue cannot keep pace with infrastructure costs.

Budget and Water System Trends

Water System Fiscal Position (2008–2023)

Pontiac's water and sewer situation reflects a core shrinking cities problem: a system built for a larger, more prosperous population cannot be sustained by a smaller, poorer one without outside support. Water and sewer infrastructure requires substantial fixed capital investment, treatment facilities, pipes, pump stations, and distribution networks that must be continuously maintained regardless of how many households they serve. Over the past four decades, water and sewer bills in Michigan have increased faster than any other basic need except health care, producing a dramatic rise in the proportion of household income dedicated to water and wastewater services, with pressures falling disproportionately on lower-income communities (Read et al. 2022).

Pontiac's infrastructure, built for a population of 85,000, is now sustained by a substantially smaller and lower-income base of ratepayers, however, like many communities in Oakland County, its drinking water system is operated by the Oakland County Water Resources Commission and as part of the North Oakland County Water Authority, a partnership between Pontiac, Auburn Hills, Orion Township, and Rochester Hills, which purchases drinking water from the Great Lakes Water Authority (GLWA) (Oakland County Water Resources Commission, n.d.). That combination of a regionalized system and a smaller water authority allows coordination of water system management and spreads the costs over a broader geographic area. Average costs for Pontiac during the time period were much lower than those for Lincoln Park and Flint and reflect a system that is generating the revenue needed to sustain its expenditures:

- Water Utility Revenue for the time period averaged $133 per capita,

- Water Utility Expenditures averaged $131 per capita, and
- Water Capital Expenditures averaged $18 per capita (Lincoln Institute of Land Policy 2023)

Emergency Management and Fiscal Restructuring

The state declared a financial emergency in Pontiac in 2009, triggering three consecutive emergency managers over seven years: Fred Leeb (2009-2010), Michael Stampfler (2010-2011), and Louis Schimmel (September 2011-2013) (City of Pontiac 2013). Under Leeb, the Pontiac Silverdome, built in 1975 for approximately $56 million, was sold at auction for $583,000 (Reindl 2015). Schimmel made the deepest cuts: the city workforce was reduced by more than 80%, police services were contracted to the Oakland County Sheriff's Office, fire protection was transferred to Waterford Township, and annual city spending fell from $57 million to $36 million. These reforms were part of a strategy of outsourcing city services and sharply cutting down on operational costs (Trenkner 2012; Sapotichne et al. 2015)

In 2012, Schimmel sold excess capacity in the City's sewage treatment system to Oakland County for $55 million, which would be used to pay off outstanding debt and end a structural deficit (Office of the Governor 2013). State infrastructure investment followed: Pontiac received $12,750,000 for sewage disposal system improvements under Michigan's Clean Water Plan (Johnston 2024).

A transition board governed from August 2013, when Governor Snyder declared an end to the financial emergency, through March 2016, when the board restored full governance authority to the elected mayor and city council (Office of the Governor 2013; Martindale 2016). The Michigan Department of Treasury formally released Pontiac from state receivership on August 1, 2017 (Office of the Governor 2017). By 2019, the city reported a budget surplus (Williams 2019). The turnaround was real, but it came through service elimination and asset liquidation, not economic recovery, and that distinction matters for understanding what structural vulnerabilities remain.

Water Quality and Regional Comparisons

Emergency Management and Water System Outcomes

Several cities placed under state oversight experienced changes to their municipal drinking water systems, including rate increases, water shutoffs for nonpayment, and the privatization of water services or infrastructure. Further, a city's level of financial distress was a weaker predictor of the likelihood of emergency management than the racial and economic composition of its residents (Hughes et al. 2021). Pontiac, a majority-minority, high-poverty, low-income city, fits many of the characteristics identified in this broader pattern, which helps contextualize the conditions under which the city lost local fiscal governance and direct control of its water and sewer infrastructure.

Water system restructuring in Pontiac involved institutional transfer rather than acute crisis: selling the sewage infrastructure to Oakland County and outsourcing service delivery

(Trenkner 2012; Office of the Governor 2013). While these changes stabilized operations and avoided system failure, they did not resolve the underlying structural challenge, a low-income ratepayer base supporting infrastructure originally built for a larger and more prosperous population. As a result, affordability pressures remain a persistent issue that infrastructure investment alone has not resolved.

Despite receiving meaningful infrastructure investment through state and federal programs, including the sewage disposal improvements already noted, affordability challenges remain for Pontiac residents. Oakland County's Water Resources Commission developed a water affordability plan specifically for Pontiac and Royal Oak Township, with Commissioner Jim Nash noting that approximately 35% of Pontiac households pay more than 4% of their income on water and sewer bills (Oakland County Water Resources Commission 2022; Walton 2022; Nash 2023). Infrastructure conditions and ratepayer affordability are connected but distinct problems that require a range of resources and solutions.

Lincoln Park

Demographic Factors

Population Change (1970-2020)

Lincoln Park is a densely settled working-class suburb in the Downriver region of Wayne County, located directly south of Detroit along the Ecorse River corridor. Its early growth was linked to the growth of the nearby Ford River Rouge Plant and the surrounding steel mills and auto factories. Within its boundaries, the city had relatively little industrial development; it developed mainly as a residential community within the regional industrial economy (Hutchison 2016). That economic structure, rooted in proximity to manufacturing employment rather than internal economic activity, became a structural vulnerability as the broader industrial base contracted across the second half of the 20th century.

Lincoln Park's population peaked at 53,933 in 1960, when Downriver auto employment was near its height and the city's population was behind only Detroit, Dearborn, and Livonia in Wayne County (Rathbun, n.d.). The population declined by about 24% in 2020 to 40,245, but the trajectory was not uniform across the first two decades of the 2000s. Between 2000 and 2010, the city lost approximately 5% of its population; from 2010 to 2020, it recovered modestly, growing by about 5.6% (U.S. Census Bureau 2024a). This partial stabilization occurred alongside growing housing affordability challenges throughout the Detroit metro area, affecting the demand for more affordable housing in various communities (National Low Income Housing Coalition 2026). Lincoln Park's 2022 population was estimated at 39,409, with projections suggesting a further decline to approximately 35,083 over the next two decades (Michigan Department of Environment, Great Lakes, and Energy 2026a).

Lincoln Park sits in Wayne County, which has also experienced sustained long-term population decline and fiscal stress. The county includes Detroit, which experienced the loss

of over half of its population from 1950 to 2020, dropping from about 1,849,568 to 639,111 people (U.S. Census Bureau, 1950; U.S. Census Bureau, 2020a; Detroit News 2021).

Racial and Age Composition

Lincoln Park's demographic profile is distinct within Wayne County legacy cities, particularly in its racial composition. Unlike Detroit or many adjacent communities that transitioned to majority-Black status through the post-war decades, Lincoln Park has remained predominantly white, with approximately 56.7% of residents identifying as non-Hispanic white. The city also has a substantial Hispanic population comprising roughly 25.7% of residents, and approximately 9.5% identify as Black or African American (U.S. Census Bureau 2024a). This reflects Lincoln Park's historical development as a white working-class enclave, which, while not marked by high-profile conflict as in Pontiac or other metro Detroit area cities, was still shaped by redlining and other exclusionary forces (Carpenter, n.d.).

The median age in Lincoln Park is approximately 35 years, well below the state median of 40.1 (U.S. Census Bureau 2024a). Lincoln Park's demographic challenge is less about natural population decrease from aging and more about the economic pressures that drive working-age residents out when better opportunities arise elsewhere.

Economic Factors

Income and Poverty

The economic consequences of regional deindustrialization are visible in Lincoln Park's income and poverty figures. The median household income was approximately $58,616 based on 2024 American Community Survey estimates, substantially below the Michigan state median and approximately 73% of the national median of $80,734. The poverty rate stands at approximately 21.5%, well above both Michigan's rate of 13.4% and the national rate of 12.5% (U.S. Census Bureau 2024a).

The concentration of poverty in Lincoln Park reflects the long-term economic restructuring experienced across manufacturing-dependent communities. As auto and steel employment declined in the Downriver region, replacement jobs have generally been in lower-wage service sectors with weaker wage and benefit structures. Educational attainment also limits economic mobility. Only 11.5% of Lincoln Park adults aged 25 and over hold a bachelor's degree or higher, substantially below the Michigan rate of 33.3% and the national rate of 35.7% (U.S. Census Bureau 2024a).

Property Values and Tax Base

Lincoln Park's housing stock is relatively old and modest in value. Most housing units were constructed in the mid-20th century, particularly between 1940 and 1960 (U.S. Census Bureau 2024a). The median value of owner-occupied housing units was $131,000 in 2024, approximately 39% of the national median of $332,700 and lower than Wayne County's $178,500 (U.S. Census Bureau 2024e).

Lincoln Park faces similar issues to those noted above for Pontiac, where a declining population, limited space for new development, and Michigan's local government revenue structure combine to limit the City's fiscal recovery.

Budget and Water System Trends

Water System Fiscal Position (2008–2022)

Lincoln Park's water system finances reflect the structural pressures documented across Michigan's smaller and lower-income municipalities. Its infrastructure, built for a population of almost 54,000, is now sustained by a substantially smaller and lower-income base of ratepayers. This pressure is reflected in its August 2026 rate increases of 16-28%, which were implemented as a result of facing "significant financial and infrastructure challenges that cannot continue to be postponed," (City of Lincoln Park 2026; Maycock and Estrada 2026). The City noted that in addition to aging infrastructure and maintenance, the rate increases were due to water loss of over 40%, increasing operating costs, lead service line replacements, and state and federal requirements. These are the kinds of challenges that aging systems face with a population that is less able to pay for the needed upkeep. The per capita averages below, while higher than those for Pontiac, are likely an underestimate of the system's current fiscal pressure:

- Water Utility Revenue for the time period averaged $337 per capita,
- Water Utility Expenditures averaged $294 per capita, and
- Water Capital Expenditures averaged $57 per capita (Lincoln Institute of Land Policy 2023)

Lincoln Park's designation as an "overburdened" community under EGLE's DWSRF criteria indicates that its water system user costs, combined with its low median household income, meet the threshold for additional grant support and extended loan terms (Michigan Department of Environment, Great Lakes, and Energy 2026a). This designation reflects a documented pattern of water cost burden relative to income that the standard financing structure cannot address on its own.

Water Infrastructure Needs and DWSRF Participation

Lincoln Park has pursued financing through the Drinking Water State Revolving Fund (DWSRF) to address its aging distribution infrastructure. One active project is documented in EGLE environmental review records: a lead service line replacement program with an estimated cost of $5,000,000, of which up to $2,500,000 is eligible for principal forgiveness given the city's overburdened designation. The rate increases enacted in August 2026 were in part to cover the costs associated with debt service for this project.

The challenges faced by Lincoln Park illustrate another challenge of infrastructure financing in overburdened communities: necessary capital investment in aging systems generates debt

service that must be recovered through user rates, placing additional pressure on households already paying a disproportionate share of income toward utility costs.

Water Quality and Regional Comparisons

Lead Service Lines and Compliance History

Lincoln Park purchases water from the Great Lakes Water Authority (GLWA), receiving treated water from the Southwest and Springwells Water Treatment Plants, but owns and operates its own drinking water distribution system. The risk of lead contamination in Lincoln Park arises primarily from the city's distribution infrastructure. The city has approximately 15,100 water service connections, of which an estimated 2,647 are believed to contain lead service lines requiring replacement under the federal Lead and Copper Rule (Michigan Department of Environment, Great Lakes, and Energy 2026a)

Lincoln Park's 2023 Water Quality Report documents a compliance issue during that year: the city collected a required disinfection byproduct (DBP) sample in August 2023 but failed to submit the result to EGLE by the September 10, 2023, deadline. The city was found out of compliance on September 11, 2023, and returned to compliance on November 9, 2023, when the result was submitted (City of Lincoln Park 2023). While this was a reporting compliance issue rather than a water quality failure, it highlights the administrative demands associated with meeting federal and state reporting requirements, particularly for municipalities managing aging infrastructure systems with limited fiscal capacity.

Fiscal Management and External Investment Under Constraint

Lincoln Park was the last Michigan city to be released from state intervention, with then-Governor Snyder officially ending emergency management in December 2015 and the Transition Advisory Board restoring full local control in August 2017 (Pluta 2015; Office of the Governor 2017). Since then, it has remained under elected local governance and has met ongoing financial challenges. Lincoln Park's time under emergency management differed from that of Flint and Pontiac for many reasons, including that it entered state control under a different statutory framework and after many high-profile clashes between the state and cities under emergency management, including the Flint water crisis.

Flint

Demographic Factors

Population Decline (1970-2020)

Flint's population peaked in 1960 at 196,940 residents (Gibson and Jung 2005). By 2020, the city population dropped to 81,252, a 58.7% decline over 60 years (U.S. Census Bureau 2024b). The population of Genesee County peaked at 450,449 in 1980 and declined to 406,211 in 2020, a 10% decline (Michigan Senate Fiscal Agency 2025; U.S. Census Bureau

2026). Flint, at its 1960 peak, comprised 53% of the county's total population, while today it is only 20%.

This trend represents one of the most severe cases of urban population decline in Michigan. This decline was particularly steep in the 1970s and 1980s, when General Motors employment dropped dramatically and middle-class residents, predominantly white, left the city for nearby suburbs. This suburbanization was linked to patterns of racial segregation and differential access to housing opportunities that created high levels of poverty and disinvestment in the city center (Clark 2018; Carpenter, n.d.).

Racial and Age Composition

The demographic change in Flint was quite dramatic over the study period. In 1970, the city was approximately three-quarters white and one-quarter Black. By 2020, the population was at 54% Black and 37% white, with Hispanic and multiracial groups increasing as a share of the population. The median age stayed fairly consistent (mid to late 30s) throughout the study period, due to aging-in-place among the remaining residents and out-migration of younger families, though it remains slightly younger, at 37.9 years, than the state median of 40.1 (U.S. Census Bureau 2024b; Rosebrook et al. 2025).

Economic Factors

Income and Poverty

Flint experienced simultaneous economic decline and population loss, with each reinforcing the other over time. The median household income in Flint between 2020 and 2024 is $37,646, which is half the state median of $72,875 (U.S. Census Bureau 2025). More than 30% of the population lives below the poverty line, with higher rates among children under 18. This is 2.5 times Michigan's state rate of 13.4%, placing Flint among the most economically distressed cities in Michigan.

By 2000, the economic base that sustained Flint through the mid-20th century, automotive manufacturing employment, had largely evaporated. General Motors, which once employed tens of thousands of workers in Flint, had reduced its local workforce to only a few thousand by 2020. This loss of jobs eliminated the middle-class tax base that had historically supported municipal services, such as water infrastructure maintenance (Clark 2018).

Property Values and Tax Base

The median property value in Flint of $53,500 is 23% of the state median property value of $231,600, and only 53% of homes in the city are owner-occupied (U.S. Census Bureau 2025), further illustrating the erosion of the city's tax base and its ability to raise revenue and grow its way into a healthier fiscal position.

Budget and Water System Trends

Water System Fiscal Position (2008-2022)

The fiscal and public health challenges of Flint's water system are well-documented, and the population decline, income of city residents, and loss of industrial ratepayers puts more pressure on Flint's system than that faced by Pontiac and Lincoln Park. As seen below, Flint generates more revenues, spends more, and invests more per capita at levels much higher than the other cities in this analysis.

- Water Utility Revenue for the time period averaged $515 per capita,
- Water Utility Expenditures averaged $678 per capita, and
- Water Capital Expenditures averaged $164 per capita (Lincoln Institute of Land Policy 2023)

Flint's history under emergency management and the water switch to the Flint River in 2014 are also well-documented as contributors to the system's affordability and public health challenges.[10]

Water Quality and National Comparisons

Comparative Analysis with National Peers

Previous work by this research team provided comparisons between Flint and similar water system crises in Newark (NJ), Baltimore (MD), and greater Los Angeles (CA), which illustrated the challenges legacy cities in core urban areas face in maintaining safe and fiscally sound drinking water systems (Rosebrook et al. 2025). The ongoing lead service line replacement and infrastructure improvements implemented post-water crisis have notably improved the condition of Flint's water system, however the underlying fiscal dynamics remain the same: Flint's roughly 81,000 residents need to maintain the infrastructure originally built for a population of around 200,000. Without sustained external funding or significant population recovery, the city remains stuck with high fixed infrastructure costs and a shrinking ratepayer base, creating structural challenges with no clear solution.

Limited Options for Legacy Cities in Michigan

The details above illustrate the complexity of maintaining quality-of life as a place experiences population and economic loss, particularly for managing critical public infrastructure with high fixed costs and expensive maintenance. There are few options that allow cities to properly maintain infrastructure, offer affordable rates, and retain local governance and control of the system.[11] Pontiac, whose population and economic loss is located within one of the most prosperous counties in the state, had many of its services contracted via emergency

[10] For summaries and more detail see reporting from the Flint Journal/MLive: https://www.mlive.com/flintwater/ and other public accounts, including Clark (2018).

[11] See Beecher (2020) for a discussion of the tradeoffs between equity and efficiency in water pricing and Beecher et al. (forthcoming) for a discussion of water system governance models.

management. This strategy raised many concerns about representation, governance, democracy, and racial disparity, however from a purely financial perspective, it resolved many of the systemic issues that led to fiscal distress. Pontiac is now better able to maintain its water system at more affordable rates because it partners with nearby communities and regional organizations to distribute costs of infrastructure maintenance.

Lincoln Park faces a different set of challenges. One of the triggers for its financial emergency and the appointment of an emergency manager was city officials "borrowing" from its water and sewer fund to make pension payments and fund its high level of debt. It emerged from state control without major changes to its water system, though the emergency manager did note that falling property values were a concern as the city wrapped up its time under state control (Coulter 2015). The City's recent water rate increases are emblematic of the options available to a shrinking city that still manages its own water system. Despite successfully securing DWSRF funding, Lincoln Park still had to raise rates to levels that may be unaffordable for much of its population to address its water infrastructure maintenance challenges. With limited options, a largely residential property base, and few neighbor partners available, there is no clear path available to the City to raise the regular revenue it needs to operate and maintain its system.

Flint's situation is similar to that of Lincoln Park, just at a larger scale due to the water crisis and steeper population and economic loss. The City has received substantial state and federal funding to address its lead service lines and other water infrastructure issues, however the scale of damage and need was also deeper. Further, this investment has not provided Flint with a path back to a fiscally healthy water system.

These three cities, while perhaps cases of greater fiscal challenge than other Michigan communities, illustrate the impossible situation faced by shrinking municipalities – without external support there appears to be no way to maintain infrastructure in a fiscally healthy and responsible way once a city's population and economic base enter a trend of decline.

Moving Forward: Recovering Balance

It seems simple on its face that low-cost financing and technical support offered by the Drinking Water State Revolving Fund is important and meaningful to cities, especially legacy cities, across the country. Previous work has isolated the importance of the fund to Michigan community water systems (Rosebrook et al. 2025), and this national comparison provides evidence for the importance of DWSRF funding across different state and local conditions. Low-cost, public infrastructure funding, while insufficient to meet actual need, is a key component of community water systems' ability to maintain affordable, clean water across the country. It is especially important to communities that have had water quality violations in the past and to shrinking and stable cities.

Looking more specifically at Michigan, shrinking cities have few options to exit the cycle of infrastructure decay once it starts. Infrastructure repair gets more expensive as repairs are

postponed, and municipalities are limited by both the financial capacity provided by residents and ratepayers and by state structures as they seek to raise revenue to finance needed improvements (Frug and Barron 2008; Silver 2021). Often Flint and its water crisis are presented as Flint-specific or individual failures only rather than products of funding and regulatory systems that offer few options to cities as they lose population. The cases of Pontiac and Lincoln Park add important context to the range of challenges and limitations legacy cities face.

Key lessons and insight from this work can inform discussions of how to better support communities as they navigate the balancing act of managing their drinking water systems:

- Michigan has used its DWSRF strategically and invested a substantial amount in local infrastructure, yet the need for low-cost financing and infrastructure repair continues to grow. Recent work for GLWA's Water Funding Task Force estimates Michigan's infrastructure gap at $85 billion (Public Sector Consultants 2026) and suggests new funding and revenue options that can help address this need, including issuing new state debt and expanding the sales tax base. Considering these kinds of options is more urgent in the face of pending federal disinvestment and expiration of the IIJA.
- Once the funding boost provided by the IIJA is expended, a retrospective analysis can identify whether the additional dollars and new scoring system support cleaner water and more fiscally healthy community water systems.
- Shrinking municipalities need different solutions than other communities. As the options for revenue and financing identified above are evaluated, leaders must pay attention to the specific needs of communities that cannot grow their way out of problems. The reality of many of our state's communities is that there is no rate structure or revenue source that will allow them to operate and maintain water systems that provide clean, reliable, and affordable drinking water. The cost burden relative to income for residents is 55% higher in shrinking cities than in growing cities. This is more than an individual community problem, it is a statewide, even a nationwide, issue that threatens quality-of-life for many Michigan residents.

Works Cited

Ajasa, Amudalat (New York Focus). 2026. "In NY, Lead Pipe Replacement Is Free For Some, But Not All." September 16. https://nysfocus.com/2026/09/16/new-york-lead-pipe-replacement-drinking-water.

American Society of Civil Engineers. 2025. "Michigan Infrastructure Report Card." *ASCE's 2025 Infrastructure Report Card |*, December. https://infrastructurereportcard.org/state-item/michigan/.

Beach, Brian. 2022. "Water Infrastructure and Health in U.S. Cities." *Regional Science and Urban Economics*, Urban Economics and History, vol. 94 (May): 103674. https://doi.org/10.1016/j.regsciurbeco.2021.103674.

Beecher, Janice A. 2020. "Policy Note: A Universal Equity–Efficiency Model for Pricing Water." *Water Economics and Policy* 06 (03): 2071001. https://doi.org/10.1142/S2382624X20710010.

Beecher, Janice, Gregory Pierce, Erika Rosebrook, Grace Harrison, and Jenniver Gorman. forthcoming. *Creating a Foundational Understanding of Utility Governance Structures*. The Water Research Foundation.

Bell, Emily V., Katy Hansen, and Megan Mullin. 2024. "Assessing Drinking Water Systems to Improve Performance and Capacity." *Journal AWWA* 116 (5): 50–57. https://doi.org/10.1002/awwa.2280.

Bipartisan Policy Center. 2026. "The Next Big Infrastructure Law? How the BUILD America 250 Act Aims to Reshape IIJA." September 10. https://bipartisanpolicy.org/explainer/the-next-big-infrastructure-law-how-the-build-america-250-act-aims-to-reshape-iija/.

Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14 (1): 63–82. https://doi.org/10.1093/pan/mpi014.

Carpenter, Craig W. (Redlining in Michigan). n.d. "Redlining in Michigan: The History and Legacy of Racist Housing Policies." Accessed September 28, 2026. https://www.canr.msu.edu/redlining/.

City of Lincoln Park. 2023. *2023 Water Quality Report and Newsletter*. https://www.citylp.com/Archive/ViewFile/Item/67.

City of Lincoln Park. 2026. "Understanding Lincoln Park's New Water & Sewer Rates." August 10. https://www.citylp.com/DocumentCenter/View/1125/Water-and-Sewer-Rate-Press-Release-PDF?bidId=.

City of Pontiac. 2013. "Emergency Manager Reports." https://www.pontiac.mi.us/departments/finance/transition/emergency_manager_reports.php.

Clark, Anna. 2018. *The Poisoned City: Flint's Water and the American Urban Tragedy*. First edition. Metropolitan Books, Henry Holt and Company.

Colin Cameron, A., and Douglas L. Miller. 2015. "A Practitioner's Guide to Cluster-Robust Inference." *Journal of Human Resources* 50 (2): 317–72. https://doi.org/10.3368/jhr.50.2.317.

Coulter, Brad. 2015. "Emergency Manager Summary of Accomplishments." December 21. https://www.michigan.gov/-/media/Project/Websites/formergovernors/Folder10/Lincoln_Park_EM_Accomplishment_Letter.pdf?rev=66da4250cbff46ebb21bbad1e0bebe44.

Executive Office of the President. 2021. *Executive Order 14008 Tackling the Climate Crisis at Home and Abroad*. Executive Order Nos. 2021–02177. https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad.

Faust, Kasey M., Salvador Hernandez, and Jason Anderson. 2018. "Willingness to Pay for Perceived Increased Costs of Water and Wastewater Service in Shrinking US Cities: A Latent Class Approach." *Journal of Water Resources Planning and Management* 144 (7): 04018033. https://doi.org/10.1061/(ASCE)WR.1943-5452.0000946.

Frug, Gerald E., and David J. Barron. 2008. *City Bound: How States Stifle Urban Innovation*. Cornell University Press.

Gibson, Campbell, and Kay Jung. 2005. *Historical Census Statistics On Population Totals by Race, 1790 to 1990, and by Hispanic Origin, 1970 to 1990, For Large Cities And Other Urban Places In The United States*. U.S. Census Bureau. https://www.census.gov/library/working-papers/2005/demo/POP-twps0076.html.

Greer, Robert A. 2020. "A Review of Public Water Infrastructure Financing in the United States." *WIREs Water* 7 (5): e1472. https://doi.org/10.1002/wat2.1472.

Hansen, Katy, and Megan Mullin. 2022. "Barriers to Water Infrastructure Investment: Findings from a Survey of U.S. Local Elected Officials." *PLoS Water* 1 (1): 1–17. 173374760. https://doi.org/10.1371/journal.pwat.0000039.

Hodge, Timothy R., Mark Skidmore, Gary Sands, and Daniel McMillen. 2015. "Tax Base Erosion and Inequity from Michigan's Assessment Growth Limit: The Case of Detroit." *Public Finance Review* 43 (5): 636–60. https://doi.org/10.1177/1091142114537675.

Hughes, Sara, Andrew Dick, and Anna Kopec. 2021. "Municipal Takeovers: Examining State Discretion and Local Impacts in Michigan." *State and Local Government Review* 53 (3): 223–47. https://doi.org/10.1177/0160323X211038862.

Hutchison, Craig. 2016. "Lincoln Park, Michigan." *Discover Downriver*, July 13. https://www.discoverdownriver.com/lincoln-park-michigan/lincoln-park-michigan/.

Johnston, Jeff. 2024. "Keeping the Tap Running to Renew Michigan's Water Infrastructure." Michigan Department of Environment, Great Lakes, and Energy, May 14. https://www.michigan.gov/egle/newsroom/mi-environment/2024/05/14/keeping-the-tap-running-to-renew-michigans-water-infrastructure.

Lincoln, Clara. 2026. "Is Michigan's Aging Water Infrastructure Ready for Data Center Boom?" *Bridge Michigan*, January 2. https://bridgemi.com/michigan-environment-watch/is-michigans-aging-water-infrastructure-ready-for-data-center-boom/.

Lincoln Institute of Land Policy. 2023. "Fiscally Standardized Cities." https://www.lincolninst.edu/data/fiscally-standardized-cities/.

Martindale, Mike (The Detroit News). 2016. "Pontiac Mayor, Council Have More Powers Restored." March 31. https://www.detroitnews.com/story/news/local/oakland-county/2016/03/31/pontiac-powers-restored/82480312/.

Martínez-Beltrán, Sergio, and Mike Wilkinson. 2021. "Michigan Is More Integrated than Ever. Some Fear More White Flight Will Follow - Bridge Michigan." Bridge Michigan, September 3. https://bridgemi.com/michigan-government/michigan-more-integrated-ever-some-fear-more-white-flight-will-follow/.

Maycock, Khalil, and Richard Estrada (WDIV). 2026. "'Simply Unaffordable': Some Lincoln Park Residents Feel Water and Sewer Hike Is Too High." August 20. https://www.clickondetroit.com/news/local/2026/08/20/simply-unaffordable-some-lincoln-park-residents-feel-water-and-sewer-hike-is-too-high/.

Michigan Department of Environment, Great Lakes, and Energy. 2022. *FY23 Final Drinking Water State Revolving Fund Intended Use Plan*. https://www.cityofvassar.org/DocumentCenter/View/891/FY23-Final-DWSRF-IUP---ALL10422-003.

Michigan Department of Environment, Great Lakes, and Energy. 2026a. *DWSRF Environmental Assessment: Lincoln Park, Wayne County*. https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Funding/State-Revolving-Fund/Environmental-Reviews/DW/2026-03-26-City-of-Lincoln-Park-7913-01-EA.pdf.

Michigan Department of Environment, Great Lakes, and Energy. 2026b. *FY2025 DWSRF Annual Report*. Annual Report. https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Funding/State-Revolving-Fund/DWSRF/Program-Documents/2025/FY2025-DWSRF-Annual-Report.pdf?rev=fb37e60729d94a548484179ea3499466.

Michigan Senate Fiscal Agency. 2025. "Michigan Population by County: 1990-2024." July 1. https://sfa.senate.michigan.gov/economics/michiganpopulationbycounty.pdf.

Nash, Jim. 2023. *Water Affordability Solutions: A Reference Guide for Michigan Policy Makers*. Oakland County Water Resources Commissioner. https://cdn.oaklandcountymi.gov/oakland-sitefinity-prod/docs/default-source/water-resources-commissioner/water-resources-commissioner/affordability/water-affordability-solutions-report-for-policymakers.pdf.

National Low Income Housing Coalition. 2026. "Michigan 2026 State Housing Profile." July. https://nlihc.org/sites/default/files/SHP_MI.pdf.

Oakland County Water Resources Commission. 2022. *Water Affordability Solutions: An Inside Look at a Water Utility's Perspective*. https://cdn.oaklandcountymi.gov/oakland-sitefinity-prod/docs/default-source/water-resources-commissioner/water-resources-commissioner/affordability/water-affordability-solutions-report.pdf.

Oakland County Water Resources Commission. n.d. "Drinking Water." Accessed September 29, 2026. https://www.oaklandcountymi.gov/government/water-resources-commissioner/drinking-water.

Office of the Governor. 2013. "Pontiac Financial Emergency Resolved; Governor Appoints Transition Advisory Board." August 19. https://www.michigan.gov/formergovernors/recent/snyder/press-releases/2013/08/19/pontiac-financial-emergency-resolved-governor-appoints-transition-advisory-board.

Office of the Governor. 2017. "Lincoln Park's and Pontiac's Release from Receivership Signals Greater Fiscal Stability, Brighter Future for Residents." State of Michigan, August 1. https://www.michigan.gov/formergovernors/recent/snyder/press-releases/2017/08/01/lincoln-parks-and-pontiacs-release-from-receivership-signals-greater-fiscal-stability-brighter.

Omeyr, Farhad, and Harshita Tanksali. 2026. *Municipal Infrastructure Conditions Report 2026*. National League of Cities. https://www.nlc.org/resource/municipal-infrastructure-conditions-report-2026/.

Pluta, Rick (WEMU-FM). 2015. "City Of Lincoln Park Free From Emergency Management." December 23. https://www.wemu.org/michigan-news/2015-12-23/city-of-lincoln-park-free-from-emergency-management.

Public Act 53 of 2022 (2022). https://legislature.mi.gov/documents/2021-2022/billanalysis/Senate/htm/2021-SFA-0565-N.htm.

Public Sector Consultants. 2026. *The Crisis Beneath Us: Michigan's Water Infrastructure*. Great Lakes Water Authority Water Funding Task Force. https://publicsectorconsultants.com/the-crisis-beneath-us-michigans-water-infrastructure/.

Rathbun, Frank (Lincoln Park Historical Society & Museum). n.d. "The Early History Lincoln Park." Accessed September 28, 2026. https://www.lphistorical.org/early-articles/early-history.

Read, Jennifer, Noah Attal, Elin Betanzo, Ritchie Harrison, and Ashley Stoltenberg. 2022. *WATER SERVICE AFFORDABILITY IN MICHIGAN: A STATEWIDE ASSESSMENT*. University of Michigan Water Center, Graham Sustainability Institute. https://graham.umich.edu/media/files/MI-statewide-water-affordability-assessment-report.pdf.

Reindl, J. C. (Lansing State Journal). 2015. "Pontiac Silverdome to Meet Wrecking Ball." October 29. https://www.lansingstatejournal.com/story/money/business/2015/10/29/pontiac-silverdome-meet-wrecking-ball/74826986/.

Rosebrook, Erika, Mark Skidmore, Sarah Klammer, Eric Scorsone, and Sahithi Sane. 2025. *Assessing the Relationship Between Drinking Water Infrastructure and Socioeconomic Characteristics in Michigan Municipalities*. Nos. 2025–03. MSUE Center for Local Government Finance and Policy. https://www.canr.msu.edu/resources/assessing-the-relationship-between-drinking-water-infrastructure-and-socioeconomic-characteristics-in-michigan-municipalities-clgfp-report-2025-03.

Sapotichne, Joshua, Erika Rosebrook, Eric Scorsone, Danielle Kaminski, Mary Doidge, and Traci Taylor. 2015. *Beyond State Takeovers: Reconsidering the Role of State Government in Local Financial Distress, with Important Lessons for Michigan and Its Embattled Cities*. Michigan State University. http://msue.anr.msu.edu/resources/beyond_state_takeovers.

Sarzynski, Andrea, and Thomas J. Vicino. 2019. "Shrinking Suburbs: Analyzing the Decline of American Suburban Spaces." *Sustainability* 11 (19): 5230. https://doi.org/10.3390/su11195230.

SEMCOG (SEMCOG.Org). 2020. "2020 Census Map: Pontiac." https://maps.semcog.org/2020Census/.

Silver, Jonathan. 2021. "Decaying Infrastructures in the Post-Industrial City: An Urban Political Ecology of the US Pipeline Crisis." *Environment and Planning E: Nature and Space* 4 (3): 756–77. https://doi.org/10.1177/2514848619890513.

Tanellari, Eftila, Darrell Bosch, Kevin Boyle, and Elton Mykerezi. 2015. "On Consumers' Attitudes and Willingness to Pay for Improved Drinking Water Quality and Infrastructure." *Water Resources Research* 51 (1): 47–57. https://doi.org/10.1002/2013WR014934.

Tariq, Miriam. 2022. *Assessing the Impact of Water Contamination Events and Socio-Demographic Drivers on the Willingness to Pay for Improved Water Quality*. January 10. https://doi.org/10.26153/tsw/50596.

Trenkner, Tina (Governing). 2012. "Emergency Financial Managers: Michigan's Unwelcome Savior." April 23. https://www.governing.com/archive/gov-emergency-financial-managers-michigan-municipalities-unwelcome-savior.html.

United States Environmental Protection Agency. 2026. *Fiscal Year 2027 EPA Budget in Brief*. EPA-190-R-26-001. https://www.epa.gov/system/files/documents/2026-04/00_fy-2027-bib_combined_final.pdf.

U.S. Census Bureau. 2010. "2010-2022 American Community Survey." Retrieved from Census API.

U.S. Census Bureau. 2024a. "Priofile: Lincoln Park, Michigan." https://data.census.gov/profile/Lincoln_Park_city,_Michigan?g=160XX00US2647800.

U.S. Census Bureau. 2024b. "Profile: Flint City, Michigan." https://data.census.gov/profile/Flint_city,_Michigan?g=160XX00US2629000.

U.S. Census Bureau. 2024c. "Profile: Oakland County, Michigan." https://data.census.gov/profile/Oakland_County,_Michigan?g=050XX00US26125.

U.S. Census Bureau. 2024d. "Profile: Pontiac City, Michigan." https://data.census.gov/profile/Pontiac_city,_Michigan?g=160XX00US2665440.

U.S. Census Bureau. 2024e. "QuickFacts: Wayne County, Michigan." https://www.census.gov/quickfacts/fact/table/waynecountymichigan/IPE120225.

U.S. Census Bureau (2020-2024 ACS 5-Year Estimates). 2025. "QuickFacts: Flint City, Michigan." https://www.census.gov/quickfacts/fact/table/flintcitymichigan/PST045225.

U.S. Census Bureau (FRED, Federal Reserve Bank of St. Louis). 2026. "Resident Population in Genesee County, MI." March 27. https://fred.stlouisfed.org/series/MIGENE9POP.

Walcott, Eric (MSU Extension Government). 2016. "A Refresher on Proposal A and Local Property Taxes." July 25. https://www.canr.msu.edu/news/a_refresher_on_proposal_a_and_local_property_taxes.

Walton, Brett. 2022. "High Cost of Water Hits Home." *Great Lakes Now*, May 10. https://www.greatlakesnow.org/2022/05/high-cost-water-hits-home-michigan/.

Williams, Candice. 2019. "Pontiac, Mich., On Revival Track as Businesses Move In." Governing, The Detroit News, December 5. https://www.governing.com/news/headlines/Pontiac-Mich-On-Revival-Track-as-Businesses-Move-In.html.

Wooldridge, Jeffrey M. 2010. *Econometric Analysis of Cross Section and Panel Data*. 2nd ed. MIT Press.

Appendix 1: Data and Variables

This appendix contains the sources, definitions, and processing of variables used in tables

Table 1: Sample Identifiers and Fiscal Measures (Lincoln Institute of Land Policy 2023)

Variable Name	Description
Year and city	Annual observations for 2010-2022. The analysis panel contains 156 cities and 2028 city-years. Cities are identified jointly by state and city name; the ACS sample provides the base for the panel merge.
Population	The city_population field supplies the population control, scaled by 100,000. It is also used to reconstruct fiscal totals from FiSC per capita amounts. It remains the denominator for per capita new funding in the violation models.
Water capital expenditure	Capital expenditure on water utilities, reported by FiSC in real per capita dollars ($2022). For fiscal regressions, multiply by that year's city population to recover the city total, then divide by 1,000,000. Totals inherit the precision of the supplied per capita data.
Utility capital expenditure	Capital expenditure for the broader utility category, reported by FiSC in real per capita dollars ($2022). This category includes utilities beyond water. For fiscal regressions, multiply by that year's city population to recover the city total, then divide by 1,000,000. Totals inherit the precision of the supplied per capita data.
Water utility expenditure	Expenditure on water utilities, reported by FiSC in real per capita dollars ($2022). For fiscal regressions, multiply by that year's city population to recover the city total, then divide by 1,000,000. Totals inherit the precision of the supplied per capita data.
Water utility revenue	Revenue from water utilities, reported by FiSC in real per capita dollars ($2022). For fiscal regressions, multiply by that year's city population to recover the city total, then divide by 1,000,000. Totals inherit the precision of the supplied per capita data.
Population change group	Constructed from FiSC population: 100 × (population in 2022 / population in 2010 − 1). Growing cities have changes above 3%; shrinking cities have changes below -3%; stable cities lie between -3% and 3%, inclusive. The sample contains 113 growing, 22 shrinking, and 21 stable cities.

Table 2: American Community Survey Measures (U.S. Census Bureau 2010)

Variable name	Description and source
Median household income	S1901, Income in the Past 12 Months: S1901_C01_012E in 2010-2022. Multiply the reported estimate by the FiSC CPI conversion factor for its price year to obtain 2022 dollars, then divide by 10,000. The measure remains median household income, not per capita income.
Median property value	DP04, Selected Housing Characteristics: median value of owner-occupied housing units. Use DP04_0088E for 2010–2014 and DP04_0089E for 2015–2022. Convert to 2022 dollars using the FiSC annual CPI factor, then divide by 100,000. This replaces income in the alternative specification.
Unemployment rate	DP03, Selected Economic Characteristics: DP03_0009PE. The measure is the unemployment rate for the civilian labor force. Retain the reported percentage scale (0-100).
Population age 65 or older	DP05, ACS Demographic and Housing Estimates: DP05_0021PE for 2010-2016 and DP05_0024PE for 2017-2022. Retain the reported percentage of the population age 65 or older on a 0-100 scale.

Note: The analysis uses one-year estimates for 2010-2019 and 2021-2022. For 2020, it uses the 2016-2020 five-year estimates, assigned to observation year 2020. These are period estimates, not single-year measurements. Income and property values are converted to 2022 dollars using the FiSC annual CPI conversion factor. The 2016-2020 estimates use 2020 as their price year, consistent with Census guidance on ACS multiyear dollar estimates.

Table 3: Funding and Water Quality Measures

Variable name	Description and source
New DWSRF funding	Initial agreement amounts are multiplied by the FiSC CPI conversion factor for each project's initial agreement year. Amounts for projects beginning in a city-year are summed. Fiscal models use this city total divided by 1,000,000. Violation models divide the total by that year's FiSC population and by 100. Source: project DWSRF agreement records; new_initial_amount.
Active current funding	An agreement-based measure of DWSRF funding constructed for each city-year. Each project's Current Agreement Amount is converted to 2022 dollars using the FiSC CPI conversion factor for its Initial Agreement Year. This converted amount is assigned to every year from the Initial Agreement Year through the Current Agreement Year, inclusive, and summed across qualifying projects. Fiscal models divide this total by 1,000,000, without dividing by population. "Active" denotes this constructed date window, not verified project activity. The initial agreement year is the assumed price year. Because current agreement amounts are assigned retrospectively to earlier years, this measure does not reconstruct historical annual funding commitments or actual disbursements.
Active funding indicator	Equals 1 if active_current_amount is positive and 0 otherwise. This indicator is used in the next-year violation models.
Active violation count	The analysis uses violation_stock_count_active, the annual stock of recorded active health-based violations, aggregated from water systems to city-years. Source: U.S. Environmental Protection Agency, Safe Drinking Water Information System (SDWIS), linked to the project water-system and city records through Public Water System Identification numbers (PWSIDs).
Any active violation	Equals 1 if the active violation count in the city-year is greater than 0 and 0 otherwise.
Lagged new funding	New funding per capita in t−1 or t−2 within the same city. The lag is retained only when the corresponding calendar-year difference is one or two years.
Next-year change in count	Active violation count in t+1 minus the count in t. Defined only when the next observation is the following calendar year. Negative values indicate a net reduction; the eligible sample contains 1872 city-years.
Any reduction next year	Among city-years with a positive active violation count and an observed consecutive next year, equals 1 when the next-year count is lower and 0 otherwise. The eligible sample contains 103 city-years.
Zero violations next year	For the same 103 positive-count city-years, equals 1 when the next-year count is 0.

Appendix 2: Descriptive Statistics

Appendix 1: Data and Variables provides the variable names, definitions, data sources, and construction procedures. Table 4 and Table 5 summarize the fiscal outcomes, funding measures, and controls in levels, by year and population change group. Table 6 separately summarizes the core measures used in the violation analysis. The full panel covers 156 cities over 2010-2022, with 2028 city-year observations.

Table 4 shows that mean total water capital expenditure is $49.35 million over the study period, compared with $146.30 million for utility capital expenditure. Mean new DWSRF funding is $4.17 million, and the constructed active funding measure averages $8.34 million. Mean new funding rises from $2.72 million in 2010 to $8.06 million in 2022, while mean active funding rises from $2.70 million to $14.97 million. All monetary measures are expressed in 2022 dollars.

Table 4: Fiscal and Funding Statistics by Year

Variable	2010		2022		All Years	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Water capital expenditure	104.10	147.16	94.35	120.69	99.81	124.24
Utility capital expenditure	230.74	289.16	182.70	228.80	206.58	247.29
Water utility expenditure	317.10	252.73	317.03	260.88	322.72	243.36
Water utility revenue	261.32	172.47	301.78	194.28	295.98	194.99
New funding per capita	9.38	37.26	21.91	117.75	11.13	55.11
Active funding per capita	9.30	37.16	45.47	163.40	24.25	107.22
Population (100,000 persons)	4.22	7.70	4.52	8.03	4.42	7.94
Median household income ($10,000)	5.73	1.43	6.57	1.89	6.07	1.73
Median property value ($100,000)	2.56	1.52	3.49	2.34	2.73	1.91
Unemployment rate (%)	12.60	3.99	5.17	2.17	8.18	3.92
Population age 65+ (%)	11.30	2.40	14.81	2.57	12.84	2.60
Number of observations	156		156		2,028	

Table 5 shows that the mean of new DWSRF funding is $3.18 million in shrinking cities and $3.28 million in growing cities. The constructed active funding measure averages $9.15 million and $5.26 million, respectively. Shrinking cities have lower mean water and utility capital expenditures, at $86.16 and $122.00 per capita; the corresponding figures for growing cities are $102.78 and $218.65. Mean water utility expenditure and revenue are higher in shrinking cities, at $345.28 and $327.42 per capita, compared with $320.81 and $290.78 in growing cities. Median household income is 36% higher in growing cities than shrinking cities. Thus, the cost burden is considerably higher for residents in shrinking cities.

Table 5: Fiscal and Funding Statistics by Population Change

Variable	Shrinking		Growing	
	Mean	Std. Dev.	Mean	Std. Dev.
Water capital expenditure ($ millions)	86.16	102.55	102.78	118.33
Utility capital expenditure ($ millions)	122.00	116.55	218.65	238.14
Water utility expenditure ($ millions)	345.28	272.17	320.81	224.41
Water utility revenue ($ millions)	327.42	246.74	290.78	179.01
New DWSRF funding ($ millions)	14.36	71.70	10.11	53.44
Active current DWSRF funding ($ millions)	41.58	146.48	20.56	103.43
Population (100,000 persons)	2.62	1.96	4.66	8.30
Median household income ($10,000)	4.67	1.20	6.37	1.64
Median property value ($100,000)	1.45	1.01	2.94	1.79
Unemployment rate (%)	11.20	5.20	7.60	3.43
Population age 65+ (%)	13.18	2.73	12.62	2.33
Number of observations	286		1,469	

Notes: Statistics pool city-year observations from 2010-2022. Shrinking cities have population declines greater than 3% between 2010 and 2022 (22 cities; 286 observations); growing cities have increases greater than 3% (113 cities; 1,469 observations). The 21 stable cities, with changes between -3% and 3% inclusive, are included in Table 4.

Table 6 shows that 48 cities record active violations during 2010-2022, accounting for 109 annual city observations. The mean active violation count is 0.087 per city per year, with a maximum of 8. The constructed active funding measure is positive in 20.1% of the 2028 annual city observations. Among the 103 observations with active violations and available data for the following year, 73.8% show a lower violation count and 65% reach zero recorded violations.

Table 6: Descriptive Statistics for Water Quality Violation Analysis

Variable	N	Mean	SD	Min	Max
Active violation count	2,028	0.087	0.459	0	8
Any active violation	2,028	0.054	0.226	0	1
Any active violation (one-year-lag model sample)	1,872	0.054	0.227	0	1
Any active violation (two-year-lag model sample)	1,716	0.058	0.233	0	1
New funding per capita ($100)	2,028	0.111	0.551	0	14.048
New funding per capita ($100), lag 1	1,872	0.102	0.462	0	9.390
New funding per capita ($100), lag 2	1,716	0.100	0.463	0	9.390
Any active funding	2,028	0.201	0.401	0	1
Next-year change in violations	1,872	0.000	0.436	-5	6
Violations reduced next year	103	0.738	0.442	0	1
Zero violations next year	103	0.650	0.479	0	1

Appendix 3: Regression Modeling Framework

The principal specifications follow a standard panel fixed effects framework described by Wooldridge (2010). City fixed effects account for time-invariant differences across cities, while year fixed effects account for changes common to cities each year. Standard errors are clustered by city to allow for heteroskedasticity and within-city error correlation over time, following Cameron and Miller (2015).

We estimate separate linear regressions for water capital expenditure, utility capital expenditure, water utility expenditure, and water utility revenue. The baseline specification is:

$$Y_{it} = \beta F_{it} + \gamma' X_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (1)$$

Y_{it} is a fiscal outcome for city i in year t, measured in 2022 dollars per capita. F_{it} represents either new DWSRF funding per capita or active current DWSRF funding per capita, entered in separate models. The control vector X_{it} includes population in units of 100,000 residents, median household income in units of $10,000, the unemployment rate, and the percentage of residents age 65 or older. An alternative specification replaces median household income with median property value in units of $100,000. The terms μ_i and τ_t denote city and year fixed effects, and ε_{it} is the error term.

Cities are classified according to population change between 2010 and 2022. Shrinking cities have declines greater than 3%, growing cities have increases greater than 3%, and stable cities have changes between -3% and 3%, inclusive. To examine differences across these groups, we estimate:

$$Y_{it} = \beta F_{it} + \delta_S (F_{it} S_i) + \delta_G (F_{it} G_i) + \gamma' X_{it} + \theta_S' (X_{it} S_i) + \theta_G' (X_{it} G_i) + \mu_i + \tau_t + \varepsilon_{it} \quad (2)$$

S_i and G_i indicate shrinking and growing cities, respectively. Stable cities are the reference group. The funding slope is β for stable cities, β + δ_S for shrinking cities, and β + δ_G for growing cities. Each main control is also interacted with the group indicators. The time-invariant group indicators themselves are absorbed by city fixed effects. Following the interpretation of interaction models described by Brambor, Clark, and Golder (2006), group-specific slopes combine the funding main effect with the relevant interaction coefficient. Their standard errors are calculated using the estimated coefficient covariance matrix. Tests of these slopes assess whether each group's association differs from zero; tests of the interaction coefficients assess differences from stable cities.

The annual count of active health-based violations is modeled using Poisson pseudo-maximum likelihood with city and year fixed effects. PPML accommodates nonnegative outcomes, including zeros, through an exponential conditional-mean specification, as discussed by Santos Silva and Tenreyro (2006):

$$E[V_{it} \mid F_{i,t-k}, X_{it}, \mu_i, \tau_t] = exp(\beta_k F_{i,t-k} + \gamma' X_{it} + \mu_i + \tau_t), \quad k = 0, 1, 2 \quad (3)$$

V_{it} is the active violation count. Separate models include contemporaneous new DWSRF funding, funding lagged one year, or funding lagged two years. Funding uses units of $100 per capita in 2022 dollars. The four main controls enter in levels. The PPML coefficients describe associations with the conditional mean through the exponential specification, rather than additive changes in violation counts.

We also estimate linear probability models for whether a city records any active violation:

$$1(V_{it} > 0) = \beta_k F_{i,t-k} + \gamma' X_{it} + \mu_i + \tau_t + \varepsilon_{it}, \quad k = 1, 2 \quad (4)$$

Each lag enters a separate model. Lags are constructed within cities and require the corresponding calendar-year difference. PPML estimation excludes all-zero city groups, so its estimation samples differ from those of the linear probability models.

Finally, we examine subsequent changes in violations using:

$$Q_{it} = \beta A_{it} + \gamma' X_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (5)$$

A_{it} equals one when active current DWSRF funding is positive. In separate linear fixed effects regressions, Q_{it} represents the next-year change in the violation count, an indicator for a lower count next year, or an indicator for zero violations next year. The count-change model uses all 1872 observations with a consecutive following-year record. The two binary models use the 103 observations with a positive current violation count and an observed following year. These outcomes measure changes in recorded counts rather than the resolution of individual violation records..

Appendix 4: Regression Results

Table 7: Active and Current DWSRF Funding, Panel A

Variable	Water Capital	Utility Capital	Water Expenditure	Water Revenue
Active current DWSRF funding ($ millions)	0.2947** (0.1280)	0.4118* (0.2487)	0.4790*** (0.1705)	0.3782** (0.1579)
Population (100,000s)	34.9777** (14.3609)	-133.0292 (137.7738)	55.9914*** (14.8143)	63.3367*** (14.6654)
Household income ($10,000s)	-22.7476 (18.1368)	27.4605 (17.6861)	-19.4215 (17.4665)	-0.4147 (3.9754)
Unemployment rate	-1.4817 (1.5194)	1.4574 (1.0777)	0.0109 (2.0923)	1.8655 (1.4098)
Population age 65+ (%)	-2.9860 (2.2171)	-8.4950* (4.9323)	-3.6574 (2.2832)	-0.0925 (0.8192)
Observations	2,028	2,028	2,028	2,028
R-squared	0.8225	0.9451	0.9697	0.9825
Within R-squared	0.0707	0.0587	0.0981	0.2164

*** p < 0.01; ** p < 0.05; * p < 0.1. Monetary variables are in 2022 dollars; Standard errors clustered by city are in parentheses.

Table 8: New DWSRF Funding, Panel B

Variable	Water Capital	Utility Capital	Water Expenditure	Water Revenue
New current DWSRF funding ($ millions)	-0.0899 (0.2152)	-0.2043 (0.3878)	-0.0703 (0.2419)	0.0160 (0.1426)
Population (100,000s)	36.2185** (14.9657)	-131.4415 (137.7084)	58.1485*** (16.4788)	65.1723*** (15.0841)
Household income ($10,000s)	-23.0427 (18.1821)	26.9873 (17.6365)	-19.8426 (17.5318)	-0.6918 (3.8849)
Unemployment rate	-1.6044 (1.5372)	1.2749 (1.1175)	-0.1778 (2.1299)	1.7266 (1.4032)
Population age 65+ (%)	-2.9986 (2.2231)	-8.5347* (4.9429)	-3.6566 (2.2950)	-0.0717 (0.8495)
Observations	2,028	2,028	2,028	2,028
R-squared	0.8190	0.9448	0.9684	0.9813
Within R-squared	0.0525	0.0540	0.0608	0.1628

*** p < 0.01; ** p < 0.05; * p < 0.1. Monetary variables are in 2022 dollars; Standard errors clustered by city are in parentheses.

Table 9: Active Funding with Property Value Controls

Variable	Water Capital	Utility Capital	Water Expenditure	Water Revenue
New current DWSRF funding ($ millions)	0.3018** (0.1259)	0.4026 (0.2489)	0.4848*** (0.1722)	0.3782** (0.1573)
Population (100,000s)	38.7733** (16.3350)	-144.1881 (145.5874)	57.3424*** (16.6147)	61.7732*** (14.9399)
Property value ($100,000s)	-20.8584 (17.2735)	34.3182 (25.7068)	-15.1829 (17.3173)	1.8882 (4.6769)
Unemployment rate	-1.0159 (1.2026)	1.0331 (1.1402)	0.4483 (1.8754)	1.9083 (1.4081)
Population age 65+ (%)	-1.8444 (1.5259)	-9.8202* (5.5873)	-2.6675 (1.6638)	-0.0586 (0.7232)
Observations	2,028	2,028	2,028	2,028
R-squared	0.8219	0.9454	0.9695	0.9825
Within R-squared	0.0677	0.0641	0.0917	0.2168

*** p < 0.01; ** p < 0.05; * p < 0.1. Monetary variables are in 2022 dollars; Standard errors clustered by city are in parentheses.

Table 10: Interaction Models, Group-Specific Slopes – Active DWSRF, Panel A[12]

	Water Capital	Utility Capital	Water Expenditure	Water Revenue
Stable	0.6015*** (0.2114)	0.5604 (0.4304)	0.9256*** (0.0699)	0.8130*** (0.0951)
Shrinking	0.3757*** (0.1038)	0.3841*** (0.1258)	0.8338*** (0.1715)	0.4733** (0.1899)
Growing	-0.1056 (0.1208)	-0.1199 (0.2226)	-0.0812 (0.0885)	-0.0686 (0.0708)

Table 11: Interaction Models, Group Specific Slopes - New DWSRF Funding, Panel B

	Water Capital	Utility Capital	Water Expenditure	Water Revenue
Stable	-0.0661 (0.5271)	0.0557 (0.8122)	0.0161 (0.5500)	0.4225 (0.2865)
Shrinking	0.3097** (0.1444)	0.3105** (0.1499)	0.5947*** (0.1466)	0.1191 (0.0951)
Growing	-0.1558 (0.1300)	-0.1686 (0.2442)	-0.1622 (0.1127)	-0.1212 (0.0747)

*** p < 0.01; ** p < 0.05; * p < 0.1. Monetary variables are in 2022 dollars; Standard errors clustered by city are in parentheses; group slope tests use a normal approximation.

[12] Tables 10 and 11 report group-specific funding associations derived from the interaction model in Equation 2. The estimate for stable cities is the funding main effect, while the estimates for shrinking and growing cities combine the main effect with the corresponding interaction term. Estimates come from a single model rather than separate subgroup regressions. Standard errors account for the covariance between coefficients, and significance tests assess whether each group's funding association differs from zero.

Table 12: Active Drinking Water Violations and New DWSRF Funding

Variable	Count Current	Count Lag 1	Count Lag 2	Any Violation, Lag 1	Any Violation, Lag 2
New DWSRF funding per capita ($100)	-0.0542 (0.0935)	—	—	—	—
New DWSRF funding per capita ($100), lag 1	—	-0.1222 (0.1595)	—	-0.0206** (0.0103)	—
New DWSRF funding per capita ($100), lag 2	—	—	-0.1793 (0.1292)	—	-0.0201** (0.0096)
Population (100,000s)	-0.1403 (0.5274)	-0.0900 (0.5761)	-0.1745 (0.5821)	0.0096 (0.0312)	0.0064 (0.0384)
Household income ($10,000s)	-0.4093 (0.3785)	-0.4985 (0.3867)	-0.3857 (0.3568)	-0.0209** (0.0104)	-0.0185 (0.0116)
Unemployment rate	-0.0016 (0.0904)	-0.0141 (0.1029)	-0.0195 (0.0944)	0.0021 (0.0044)	0.0007 (0.0048)
Population age 65+ (%)	0.3536** (0.1667)	0.3787** (0.1755)	0.3679** (0.1735)	0.0154* (0.0088)	0.0160* (0.0093)
City fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	624	552	495	1,872	1,716
Estimator	PPML FE	PPML FE	PPML FE	Linear FE	Linear FE

*** p < 0.01; ** p < 0.05; * p < 0.1. Monetary variables are in 2022 dollars; Standard errors clustered by city are in parentheses.

Table 13: Active DWSRF Funding and Next Year Drinking Water Violations

Variable	Change in Count	Any Reduction	Zero Violations
Any Active DWSRF Funding	-0.0186 (0.0351)	0.4169** (0.1715)	0.4588** (0.2077)
Population (100,000s)	-0.0057 (0.0296)	0.1250 (0.2395)	0.0534 (0.2198)
Household income ($10,000s)	-0.0197 (0.0219)	0.1287 (0.1835)	0.0448 (0.1568)
Unemployment rate	-0.0013 (0.0053)	0.0150 (0.0442)	0.0530 (0.0365)
Population age 65+ (%)	0.0023 (0.0139)	0.0428 (0.1124)	0.0155 (0.0981)
City fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	1,872	103	103
Estimator	Linear FE	Linear FE	Linear FE

*** p < 0.01; ** p < 0.05; * p < 0.1. All outcomes refer to t+1 relative to t. Standard errors clustered by city are in parentheses.