Characteristics of 101 Closed WIFIA Loans

Sean Franco* **and Adam Carpenter**

Abstract

The Water Infrastructure Finance and Innovation Act (WIFIA) is a U.S. Environmental Protection Agency (EPA) finance program designed to accelerate nationally or regionally significant water infrastructure projects. The WIFIA program lends at the US Treasury State and Local Government Series (SLGS) rate and offers terms not generally available in the capital markets. This study examines loan data from the program's inception to highlight metrics in loan distributions. Loan amounts vary across project types, but not among project types per capita. Stormwater and drinking water projects typically express lower loan amounts. Wastewater and reuse projects typically express a wider range of loan amounts.

Keywords: WIFIA, water infrastructure, financing
JEL Classification: H4, H7, L95

1 Introduction

Water infrastructure provides drinking water, stormwater and wastewater treatment services for both public and private benefit. Water infrastructure is needed to treat and deliver safe drinking water, collect and treat wastewater, manage stormwater, prepare water for reuse, and other activities. Infrastructure is also built to help meet the requirements of public health and environmental laws such as the Safe Drinking Water Act and the Clean Water Act. Even with such clear public benefits, water infrastructure is typically undervalued socially, which makes public and private financing of water utility projects a challenge (Gebhardt, Ziegler, & Mourant, 2022; Organization for Economic Co-operation and Development, 2017). In most utilities, the principal source of revenue comes from rates and fees charged to customers, or in some cases local tax revenue. Utility expenses include operational and capital expenses. Operational expenses cover day-to-day expenditures critical to delivering daily services. Capital expenses address long term system requirements (Gebhardt et al., 2022; Organization for Economic Co-operation and Development, 2017). When a utility needs to finance capital improvements, a lower interest rate or more generous financing terms will lower the overall cost and thus reduce the amount that will need to be paid back over time by customers.

*sean.franco@gwmail.gwu.edu

State Revolving Funds (SRF) are funded from a combination of federal grants, and required state matching contributions. SRFs typically address water quality projects to mitigate immediate challenges to health, environment, or regulatory compliance, and SRFs are prohibited from financing projects related to infrastructure expansion or repair not related to health or compliance. The Water Infrastructure Finance and Innovation Act (WIFIA) program supplements SRFs with broader project eligibility and annual federal funding sufficient to support loans for much larger projects. (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023, 2020; Gebhardt et al., 2022; Humphreys, 2020; Vedachalam & Geddes, 2017). The WIFIA program can bridge financing gaps for growth projects or programs that require additional financing beyond SRFs funds.

WIFIA was established by congress as a five-year pilot program under the Water Resources Reform and Development Act of 2014 (WRRDA) (U.S. Government Publishing Office, 2013). WIFIA legislation was based on the highly successful Transportation Infrastructure Finance and Innovation Act (TIFIA) passed in 1998 to advance surface transportation capital projects.

1.1 General Terms

The WIFIA program offers loans at a fixed interest rate not less than the yield on United States Treasury State and Local Government Series (SLGS) interest rates (typically 20 to 30 year rates). The WIFIA program was intended to complement financing for water infrastructure projects like tax-exempt dept. The WIFIA program can finance up to 49% of eligible project costs, but the total federal financing contributions to a WIFIA assisted project cannot exceed 80% of total project costs. The program offers a maximum maturity period of 35 years after the substantial completion of the project, with a deferral option of up to five years. Additionally, if projects have combined financing with SRFs, the SRF interest rates will be matched to the project's WIFIA interest rate. There are minimum project sizes established by statute with $5 million for communities serving 25,000 people or less, and $20 million for communities serving greater than 25,000 people. Borrowers can meet these requirements by combining multiple smaller projects under a single loan with a common security pledge. (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023, 2020; Gebhardt et al., 2022; Humphreys, 2020; Organization for Economic Co-operation and Development, 2017; Ryan, 2020, 2023; Vedachalam & Geddes, 2017).

1.2 Application Process

A wide range of loan applicants have secured WIFIA loans, including state, corporate, and private sector utilities. Interested applicants must submit a Letter of Interest (LOI) to EPA addressing project impacts, technical feasibility, and borrower creditworthiness. Project impacts examine how the construction serves EPA's designated priorities. As of 2023, priorities include considerations for economically stressed communities, climate change, drought, and cyber-security. Technical feasibility involves the scope, and the level of engineering planning for particular projects. Borrowers must have an investment

grade creditworthiness which could be performed internally at EPA or at an accredited rating agency. (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023, 2020; Gebhardt et al., 2022; Organization for Economic Co-operation and Development, 2017).

The Office of Management and Budget (OMB) also conducts a budget scoring analysis to ensure compliance with the Federal Credit Reform Act, consistent with OMB's June 2020 guidance on this subject. After evaluation by EPA, and OMB, projects that satisfy all these requirements are invited to apply to the program. With the application, project applicants submit a preliminary rating opinion letter. LOI are a zero-fee appraisal by EPA, in which successful applicants are invited to apply to the program. Currently, the program has successfully awarded over 100 applications with numerous pending applications. EPA reviews applications on a rolling-basis, and holding one WIFIA loan does not preclude an entity from applying for a second should there be another appropriate project. Borrowers have the opportunity to roll unmatured WIFIA loans in a master loan based on additional criteria (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023, 2020).

1.3 Program Impacts

The WIFIA program is dependent upon annual appropriations. Per the budget scoring treatment of the loan programs under the Federal Credit Reform Act, those appropriations need only finance the subsidy cost of the loans (i.e. the calculated risk of loss to the Federal government as lender). As a result, the WIFIA program enjoys bipartisan support for annual funding, due to the program's impactful leveraging of federal funds: every dollar appropriated to this loan program, supports $100 in loan capacity. With WIFIA assistance capped at 49% of project costs, this means each dollar appropriated to the WIFIA program supports over $200 in water investment. The relatively high credit rating of water utilities in the sector is also a factor in reducing the subsidy costs of WIFIA loans and thus increasing leveraging. Every $1 in water infrastructure investment generally stimulates around $6 (in 2018 dollars) of economic activity, and contributes to roughly 3 national jobs (Mortimer & Leongini, 2022; U.S. Government Accountability Office, 2022). Additionally, from 2018 to 2023, the program facilitated a total of $19 billion in credit assistance for essential infrastructure projects, out of total project costs around $43 billion creating 143,000 jobs that serve 63 million people (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023; Humphreys, 2020; Vedachalam & Geddes, 2017). For reference, in 2020, The WIFIA program was appropriated $60 million (nominal) (Humphreys, 2020). This study analyzes awarded application project overviews to showcase project attributes. Dollar amounts were adjusted for inflation to 2023 dollars using the average consumer price index (CPI) from the Bureau of Labor Statistics (BLS) from each project's loan year (*Water Infrastructure Finance and Innovation Act*, 2023; Environmental Protection Agency, 2023; Webster, 2023).

2 Materials and Methods

The analysis included over 100 projects that had been awarded WIFIA assistance through December 2023. Pending project applications under EPA review were not included in this study. Data was gathered using a Python script scraping information from awarded loan project overview Portable Document Format (PDF) files from the U.S. Environmental Protection Agency (EPA) WIFIA website. The script extracted loan amounts, total project costs, population served, number of jobs created, project locations, and the borrower information. Each loan project overview was also analyzed for project type keywords: 'Stormwater', 'Drinking water', 'Wastewater', and 'Reuse'. Project overviews that contained multiple keywords were verified for the most pervasive project type by project description and project benefits section evaluations. Descriptive statistical analyses of project types are found in Tables 1; 2. Maps were created to showcase the distributions of key variables in Figures 3, 4, 5; 6.

TABLE 1
Category Totals by Project type

PROJECT TYPE	COUNTS	JOBS CREATED	WIFIA LOAN	POPULATION SERVED	PROJECT COSTS
Reuse	18	29,415	$5.3 B	22.0 M	$10.8 B
Wastewater	40	46,929	$8.7 B	28.4 M	$18.3 B
Drinking Water	37	40,437	$5.6 B	29.5 M	$12.6 B
Stormwater	10	8,921	$1.4 B	7.5 M	$3.1 B

TABLE 2
Summary statistics of the dataset after outliers were removed.

	Min	Q1	Median	Mean	Q3	Max
WIFIA Loan (in $M):						
Reuse	50.6	106.7	243.4	296.1	425.8	884.1
Wastewater	19.3	82.1	190.5	217.9	317.1	852.7
Drinking Water	13.0	37.3	91.7	153.3	217.7	821.5
Stormwater	41.0	50.6	74.5	142.3	104.9	642.9
Project Costs (in $M):						
Reuse	103.4	217.9	526.9	600.0	868.4	1,650
Wastewater	41.1	167.7	394.2	459.3	656.6	1,741
Drinking Water	27.0	76.8	187.0	341.2	463.9	1,582
Stormwater	84.0	111.1	165.3	310.9	216.6	1,469
Population Served:						
Reuse	10,600	185,500	813,000	1.2M	1.7M	6.4M
Wastewater	10,574	189,750	358,500	711,998	762,500	5.0M
Drinking Water	29,302	136,000	277,000	798,010	764,000	5.8M
Stormwater	90,000	192,500	474,431	752,570	1.3M	2.0M
Jobs Created:						
Reuse	266	591	1,265	1,634	2,351	4,800
Wastewater	95	390	1,018	1,173	1,800	3,300
Drinking Water	100	288	565	1,092	1,761	4,745
Stormwater	70	275	454	892	825	4,185

Only two observations were removed. Baltimore's wastewater application projected no additional jobs created (which was confirmed through consulting with an EPA WIFIA analyst). Inclusion of this observation misrepresented the distributions, so it was removed. New Jersey's loan amount finances projects across the state, which was the first awarded State WIFIA (SWIFIA) loan. New Jersey's SWIFIA loan is not comparable on the same scale with the remainder of the projects, so it was excluded from the analysis. For reference, compared to the other observations on job creation, New Jersey's application estimate is about 4 times the next highest amount.

The consumer price index (CPI) from the Bureau of Labor Statistics (BLS) was applied to convert the year of awarded loan dollar amounts to 2023 amounts. To ensure the accuracy of our analysis, we amalgamated borrowers with multiple loans amended into their master loan arrangements. Each loan that is a part of the master loan were adjusted using the corresponding average CPI year adjustment into 2023 dollars (Environmental Protection Agency, 2020; Webster, 2023).

TABLE 3
ANOVA regression results. Model 3 was selected as the best fit.

	Res.Df	RSS	Df	Sum of Sq	F	Pr(>F)
1	103	91.89				
2	102	25.13	1	66.76	306.16	0.0000
3	99	21.59	3	3.55	5.42	0.0017

To showcase the relationship of the variables for each observation, a linear regression was specified based on WIFIA loan amount, population served, jobs created, and project type. Initially a simple linear regression was created, with step-wise inclusions of variables and transformations to determine a best-fit model. An ANOVA test compared each regression with inclusions in Table 3 to determine the best-fit model. A multi-linear regression model was determined as the best-fit model as specified in model 3 of Table 3, as specified in Equation 1.

$$\begin{aligned} \log(\text{WIFIA LOAN}) =& \beta_1 \log(\text{POPULATION SERVED}) \\ &+ \beta_2 \log(\text{JOBS CREATED}) \\ &+ \beta_3 \text{PROJECT TYPE} + \epsilon \end{aligned} \tag{1}$$

Table 4 showcases the regression results. A robust linear regression was also performed at the specifications of model 3 to provide a lower bound range of coefficient results to complement the multiple linear regression model as in Table 4.

3 Results

The four main project types: stormwater, drinking water, wastewater, and reuse projects are referenced in Figure 1 of their WIFIA loan amount distributions, and in Tables 1; 2 for their descriptive statistics. Stormwater, and drinking water project loans have lower medians and a narrower 25% to 75% percentile (inter-quartile) range. Whereas, wastewater and reuse project loans have higher medians and a wider loan inter-quartile range. Reuse project types are a combination of project types which may explain why it

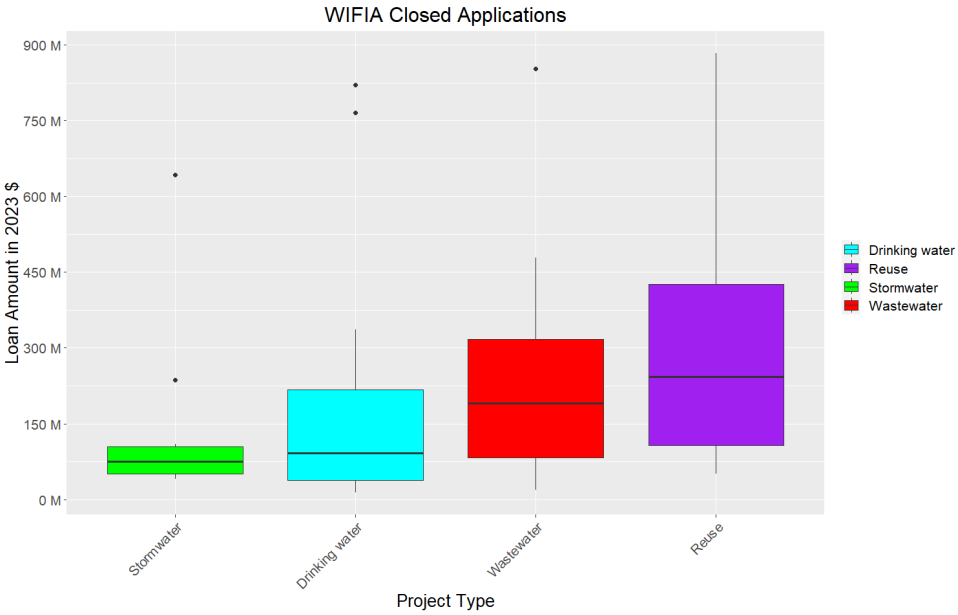

FIGURE 1: Boxplots of WIFIA loan amounts by WIFIA project types.

has the widest loan inter-quartile range as referenced in Figure 1. Within the dataset of successful, closed loan applications, these inter-quartile ranges show ballpark, historic loan ranges.

The bubble plot in Figure 2 showcases how loan amounts vary by project type, and by serviced population sizes. Wastewater and reuse projects incur wider ranges of loan amounts than stormwater and drinking water projects. A range of population served by project type were mapped in Figures 3; 4 which show the distribution of WIFIA loan amounts and populations served by project type throughout the United States. Additionally higher counts of jobs created by project type are observed for reuse wastewater, and drinking water projects in Figure 5. Figure 6 shows per capita loan amounts across all project types. 79% of all projects are below $1,000 per capita served, which suggests that loan per capita are similar among all four project types. However, this also showcases the population density divide, where lower densely populated areas incur similar per capita costs as high density areas.

There are other key information and variables to better predict loan amounts. EPA's evaluation criteria in the LOIs include project impacts, project feasibility, and creditworthiness. In the absence of the specifics of how EPA evaluates these criteria which are not publicly available, our regression (see Equation 1) is the best approximation using available data based on ANOVA testing in Table 3. Jobs created, wastewater, and reuse project types, and the intercept term were significant at the 1% error level. Population served was significant at the 5% error level. Significance suggests that these variables explain the loan amount with minimized false positive or type I errors. Additionally, all else equal, a 10% increase in population served, increases the loan amount by 0.5% to 1.5%.A 10% increase

FIGURE 2: Bubble plot of WIFIA loan amounts by project type and population served.

in jobs created, increases the loan amount by 7.7% to 9.1%. All else equal, wastewater and reuse project types increase the loan amount by approximately 0.2% to 0.4%. These findings offer insight for new applicants in the loan application process based on estimates from successful awarded loan amounts.

4 Conclusions

Investment in water infrastructure generally stimulates economic activity, and contributes to national job creation (Mortimer & Leongini, 2022; U.S. Government Accountability Office, 2022). The WIFIA program offers individualized, low interest federal loans to finance water infrastructure projects. Since its first awarded loan in 2018, the program has provided $19 billion in credit assistance to support $43 billion in total project costs creating 143,000 jobs that serve 63 million Americans (Environmental Protection Agency, 2020, 2023; *Water Infrastructure Finance and Innovation Act*, 2023).

Of the four major project types, Reuse projects on average had the largest loans, but also the greatest variety of loan sizes. Wastewater had the second largest loan sizes, followed by drinking water and then stormwater. For each project type, the WIFIA program finances a wide range of utility's populations. Across the four project types, 79% of WIFIA loans were below $1,000 per capita based on amount borrowed per person served by that entity. There is a wide geographic distribution of WIFIA loans with several loan clusters in the Southern and Bay area of California, and the Baltimore-Washington corridor.

Our regression analysis, found that 10% increase in population served, resulted in a 0.5% to 1.5% increase in the loan amount. Similarly, a 10% increase in jobs led to a 7.7% to 9.1% increase in the loan amount. Wastewater and reuse project types increase the loan amount between 0.2% to 0.4%. Analysis provides insight to the range of loans financed by WIFIA, but each applicant enters a tailored loan agreement based on project attributes, and other criteria.

Acknowledgments and Funding

I would like to thank Tracy Mehan, Nate Norris and Kevin Morley from the AWWA DC office, Karen Fligger, and Dallas Shattuck from EPA's WIFIA office, Patty Doersch and Dr. Anthony Kassekert for their support on this project. **Funding:** This work was supported through an internship with the American Water Works Association funded through AWWA's Water Industry Technical Action Fund (WITAF).

References

Environmental Protection Agency. (2020). *Overview of the wifia program & 2020 selection round.* Retrieved from https://www.utah.gov/pmn/files/638995.pdf

Environmental Protection Agency. (2023). *Wifia eligibility webinar.* Retrieved from https://www.epa.gov/sites/default/files/2021-02/documents/wifia_eligibility_webinar.pdf

Gebhardt, J., Ziegler, R. C., & Mourant, A. (2022). Chapter 13 - water infrastructure financing: the experience of the united states. In X. Leflaive, K. Dominique, & G. J. Alaerts (Eds.), *Financing investment in water security* (p. 263-293). Elsevier. Retrieved from https://www.sciencedirect.com/science/article/pii/B9780128228470000144 doi: https://doi.org/10.1016/B978-0-12-822847-0.00014-4

Humphreys, E. H. (2020). *Wifia program: Background and recent developments.* Retrieved from https://crsreports.congress.gov/product/pdf/IF/IF11193

Mortimer, E., & Leongini, M. (2022). *Why water infrastructure investments would make a big splash.* Retrieved from https://www.uschamber.com/infrastructure/why-water-infrastructure-investments-would-make-big-splash (Accessed: 2023-10-16)

Organization for Economic Co-operation and Development. (2017). *Introduction to wifia.* Retrieved from https://www.oecd.org/environment/resources/US-EPA-Introduction-to-WIFIA.pdf

Ryan, J. (2020). *An update on the wifia loan program.* Retrieved from https://waterfm.com/an-update-on-the-wifia-loan-program/ (Accessed: 2023-10-25)

Ryan, J. (2023). *Revisiting wifia sub-ust interest rates for srfs.* Retrieved from https://waterfm.com/revisiting-wifia-sub-ust-interest-rates-for-srfs/

U.S. Department of the Treasury. (2023). *Interest rates and prices.* Retrieved from https://www.treasurydirect.gov/GA-SL/SLGS/selectSLGSDate.htm;jsessionid=EB8F22D07B3A251E452D304C9156D612 (Accessed: 2023-10-16)

U.S. Department of Transportation. (2023). *Tifia program overview.* Retrieved from https://www.transportation.gov/buildamerica/financing/tifia (Accessed: 2023-10-16)

U.S. Government Accountability Office. (2022). *Credit reform: Transparency needed for evaluation of potential federal involvement in projects seeking loans.* Retrieved from https://www.gao.gov/products/gao-22-105280 (Accessed: 2023-10-16)

U.S. Government Publishing Office. (2013). *An act to provide for improvements to the rivers and harbors of the united states, to provide for the conservation and development of water and related resources, and for other purposes.* Retrieved from https://www.govinfo.gov/app/details/PLAW-113publ121 (Accessed: 2023-10-25)

Vedachalam, S., & Geddes, R. (2017). The water infrastructure finance and innovation act of 2014: Structure and effects. *Journal AWWA*, *109*(4), E99-E109. Retrieved

from https://ssrn.com/abstract=2977042 (Accessed: 2023-10-25)
Water Infrastructure Finance and Innovation Act. (2023). Retrieved from https://www.epa.gov/wifia
Webster, I. (2023). *Inflation rate between 1635-2023: Inflation calculator.* Retrieved from https://www.in2013dollars.com/

5 Appendix

TABLE 4
Results: OLS and robust regressions, which are upper and lower coefficient ranges.

Dependent variable:	log(‘WIFIA LOAN‘)	
	OLS	*robust linear*
	(1)	(2)
log(‘POPULATION SERVED‘)	0.153***	0.057***
	(0.036)	(0.022)
log(‘JOBS CREATED‘)	0.770***	0.907***
	(0.046)	(0.028)
‘PROJECT TYPE:‘Stormwater	0.245	0.161
	(0.168)	(0.102)
‘PROJECT TYPE:‘Wastewater	0.395***	0.218***
	(0.107)	(0.065)
‘PROJECT TYPE:‘Reuse	0.414***	0.227***
	(0.137)	(0.083)
Constant	11.365***	11.757***
	(0.471)	(0.286)
Observations	105	105
R^2	0.814	
Adjusted R^2	0.804	
Residual Std. Error (df = 99)	0.467	0.221
F Statistic	86.429*** (df = 5; 99)	
Note:		*p<0.1; **p<0.05; ***p<0.01

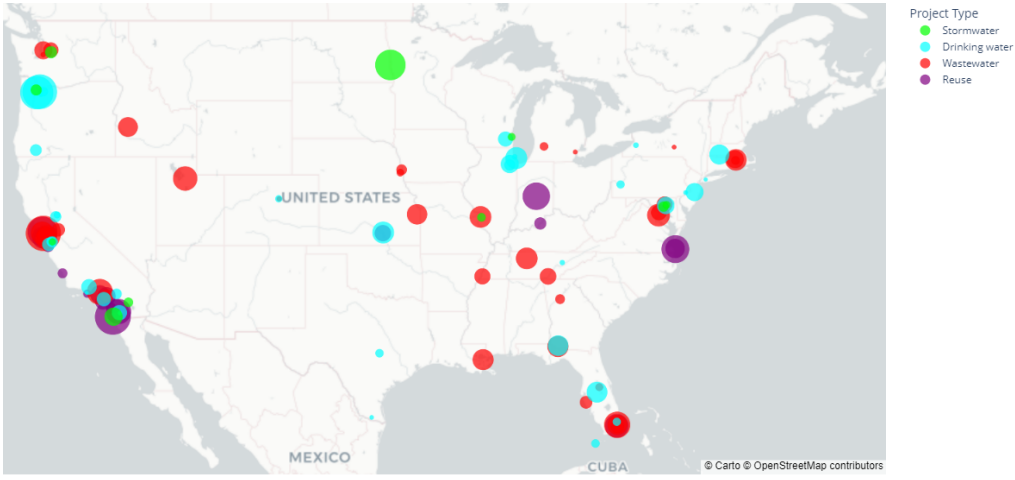

FIGURE 3: Map of WIFIA loan amounts by project types.

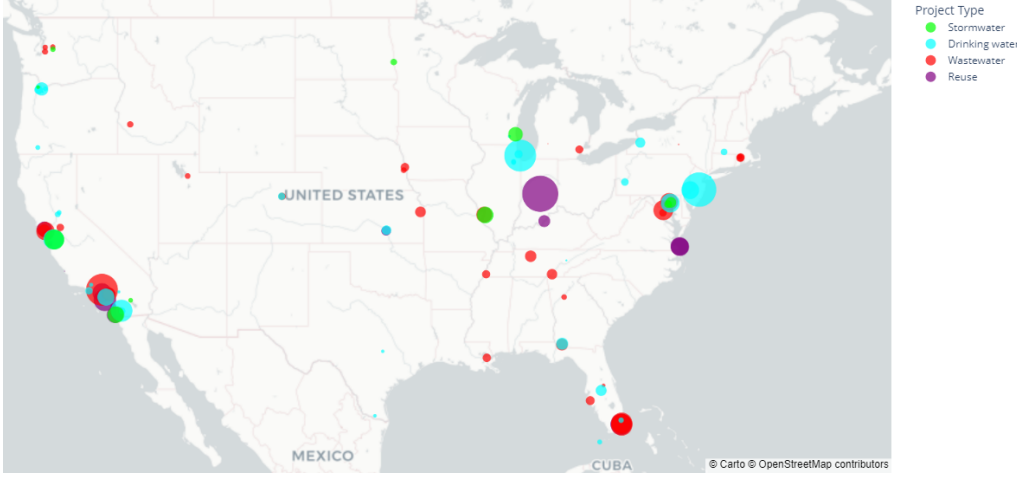

FIGURE 4: Map of population served by WIFIA project types.

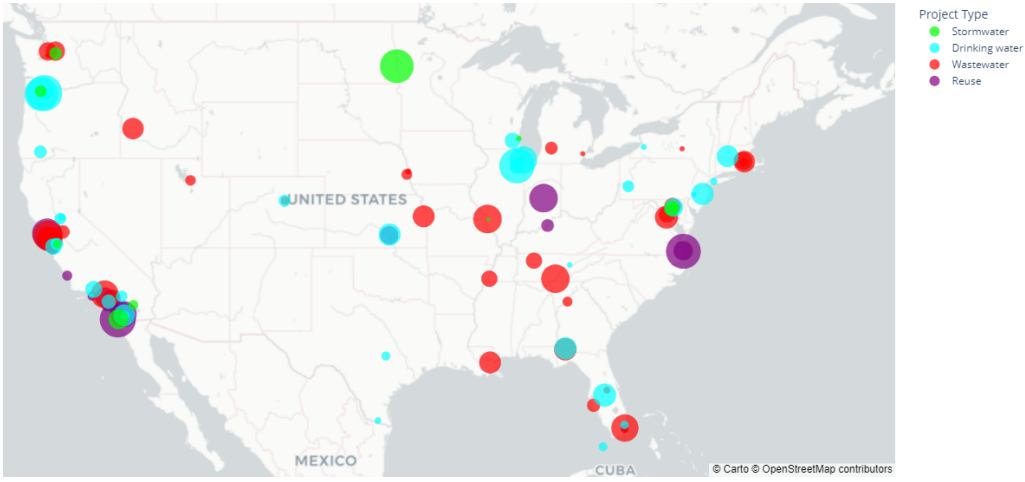

FIGURE 5: Map of jobs created by WIFIA project types.

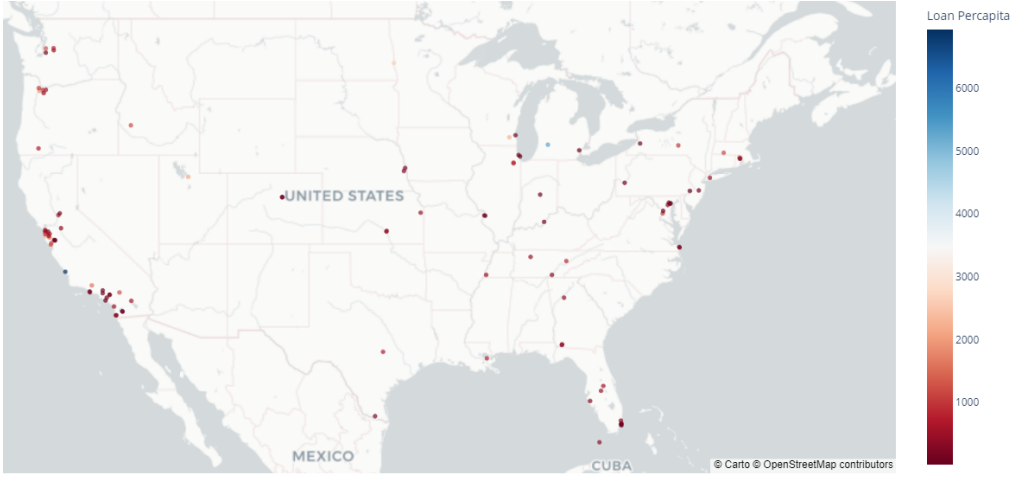

FIGURE 6: Map of WIFIA loan percapita.