MEMORANDUM OF UNDERSTANDING
BETWEEN
CITY OF JACKSONVILLE, o/b/o ITS ENVIRONMENTAL PROTECTION BOARD
AND
ST. JOHNS RIVERKEEPER, INC.

THIS MEMORANDUM OF UNDERSTANDNG ("MOU") is made and entered into as of this _____ day of _____, 2025 (the "Effective Date"), by and between the **CITY OF JACKSONVILLE**, a consolidated municipal corporation and political subdivision existing under the Constitution and laws of the State of Florida (the "City"), for and on behalf of **CITY OF JACKSONVILLE ENVIRONMENTAL PROTECTION BOARD**, an executive board of the City pursuant to Chapter 73, *Ordinance Code*, whose address is 214 North Hogan Street, Suite 500, Jacksonville, Florida 32202 ("JEPB"), and **ST. JOHNS RIVERKEEPER, INC.**, a Florida not for profit corporation with a principal address at 2800 University Blvd. North, Jacksonville, Florida 32211 ("SJRK") for the provision of environmental quality assessments of the Ribault River and Moncrief Creek watersheds (the "Project").

RECITALS:

WHEREAS, JEPB supports the mission of SJRK and its efforts to improve the quality of life in Jacksonville through conservation and protection of the natural and urban environment, especially the St. Johns River, through education, awareness, facilitation, and compliance; and

WHEREAS, JEPB and SJRK both support the vision of a thriving St. Johns River watershed that sustains healthy ecosystems for future generations; now therefore

IN CONSIDERATION of the foregoing and of other good and valuable consideration acknowledged by the parties to be sufficient, the parties hereby agree as follows:

1. **Recitals.** The Recitals set forth above are accurate, true, and correct and are incorporated herein and made a part hereof by this reference.

2. **Obligations of the City.** The City agrees to:

a. use its best efforts to promote the Project and share information about the Project with the public.

3. **Obligations of SJRK.** SJRK agrees:

a. to accept City funding in the amount of $106,000 according to the payment schedule set forth herein; and
b. to expend the funds only for the Project and to return to the City any funds not used for the Project; and
c. that if the services performed under this agreement are not performed in accordance with the agreement, SJRK shall refund the City funds within fifteen (15) business days of demand by the City and the City may terminate this agreement; and
d. to provide the services necessary to accomplish the Project; and
e. to submit a preliminary report at the conclusion of the first year and a final report within 30 days of the Project's end; and
f. to provide an update on the Project during the 2028 Environmental Symposium.

4. **Term and Renewal.** This MOU shall continue in effect through March 1, 2028, and may be extended only with the agreement of both parties. The City's performance and obligations to pay, if any, under the provisions of this MOU are subject to appropriation by the City Council of the City of Jacksonville. Nothing in this MOU shall be construed as providing SJRK or any third party with a cause of action against the City for failure to obtain or make an appropriation for the Project.

5. **Performance**. SJRK shall ensure that the Project is conducted in a professional manner, using reasonable efforts and abilities on a non-emergency basis. SJRK shall perform the Project in conformity with this MOU, including the Project Scope (**Exhibit A**) and the Project Budget and Payment Schedule (**Exhibit B**).

6. **Safety**. The City and SJRK agree that the safety of all employees, contractors, and the public should always be considered as having priority. Either the City or SJRK personnel may stop the Project immediately due to any safety concerns.

7. **Force Majeure**. SJRK shall not be liable for any failure or delay in the performance of its obligations under this MOU due to a force majeure event, including but not limited to, acts of civil or military authority, acts of courts and/or regulatory agencies, war, riot or insurrection, embargoes, sabotages, strikes or lockouts (provided such strike or lockout does not arise from inequitable labor practices), epidemics, fires, floods, earthquakes, tornadoes, and hurricanes. If any failure or delay results from such causes, upon notice from SJRK within five days of the event giving rise to the delay, the time for performance shall be extended for a period of time reasonably necessary to overcome the effects of such delays. Notwithstanding the foregoing, if SJRK's performance is rendered impossible or ineffective by the event or delay, then all funds distributed to SJRK by the City remaining unspent on the Project shall be returned to the City.

8. **No Waivers.** Failure of the City to take action to enforce compliance by SJRK with any of the terms or conditions of this MOU after having received funds therefor or to give notice or declare this MOU or any authorization granted hereunder terminated shall not constitute a waiver or relinquishment of any term or condition of this MOU, but the same shall be and remain at all times in full force and effect.

9. **Entire MOU.** This MOU constitutes the entire understanding between the parties and supersedes all previous discussion, understandings, and agreements between the parties relating to the subject matter hereof.

10. **Applicable Law.** The MOU shall be construed, interpreted and controlled by the laws of the State of Florida.

11. **Public Records.** The Parties understand and agree that all documents of any kind provided in connection with this MOU are public records and are treated as such in accordance with Florida law.

12. **Limitations of Government Liability**. Nothing in this MOU shall be deemed a waiver of immunity or limits of liability of either party or the City of Jacksonville beyond any statutory limited waiver of immunity or limits which may have been adopted by the Florida Legislature in Section 768.28, Florida Statutes, or other statutes as amended from time to time, and nothing in this MOU shall inure to the benefit of any third party for the purpose of allowing any claim that would otherwise be barred under the doctrine of sovereign immunity or by operation of law.

13. **Maximum Indebtedness.** As required by Section 106.431, *Jacksonville Ordinance Code*, the City's maximum indebtedness for the Project provided pursuant to this MOU for the period of service shall be a fixed monetary amount not to exceed ONE HUNDRED THOUSAND SIX AND 00/100

DOLLARS ($106,000.00).

14. **Amendments.** All changes to, amendments to, modifications of, or additions to this MOU or any of its terms, provisions, and conditions shall be binding only when in writing and signed by the authorized officer, agent, or representative of each of the parties hereto.

15. **Nondiscrimination**. As required by section 126.404, *Jacksonville Ordinance Code*, SJRK represents that it has adopted and will maintain throughout the Term a policy of nondiscrimination against any person with regard to race, color, sex (including pregnancy), sexual orientation, gender identity or expression, religion, political affiliation, national origin, disability, age, marital status, veteran status, or any other impermissible factor in recruitment, hiring, compensation, training, placement, promotion, discipline, demotion, transfers, layoff, recall, termination, working conditions, and related terms and conditions of employment. SJRK agrees that, on written request, it will permit reasonable access to its records of employment, employment advertisement, application forms, and other pertinent data and records by the Executive Director of the Jacksonville Human Rights Commission, or successor agency or commission, for the purpose of investigation to ascertain compliance with the nondiscrimination provisions of this MOU; provided, however, that SJRK shall not be required to produce for inspection records covering periods of time more than one year prior to the Effective Date. SJRK agrees that, if any of the services to be provided pursuant to this MOU are to be provided by a subcontractor, the provisions of this section will be incorporated into and become a part of the subcontract.

16. **Indemnification; Insurance.** SJRK shall indemnify and hold harmless the City in accordance with the indemnification provisions outlined in **Exhibit C**. SJRK shall procure and maintain insurance in the forms and amounts outlined in **Exhibit D**.

17. **Human Trafficking Affidavit**. Contemporaneously with the execution of this Agreement, and as a condition precedent to the enforceability of this Agreement including City's obligations hereunder, SJRK shall deliver to City an executed Human Trafficking Affidavit in compliance with Section 787.06, Florida Statutes in the form attached hereto as **Exhibit E**.

18. **Compliance with Laws**. As required by section 126.107(b), *Jacksonville Ordinance Code*, in providing the Project, SJRK shall comply with all applicable federal, state, and local laws, rules, regulations, and ordinances, as the same exist and may be amended from time to time. Such laws, rules, regulations, and ordinances include, but are not limited to, chapter 119, Florida Statutes (Florida Public Records Law), and section 286.011, Florida Statutes (Florida Sunshine Law). If any of the obligations of this MOU are to be performed by a subcontractor, the provisions of this section will be incorporated into and become a part of the subcontract.

19. **Relationship of Parties**. In performance of this MOU, SJRK is acting in the capacity of an independent contractor and not as an agent, employee, partner, joint venture, or associate of the City. SJRK shall be solely responsible for the labor, supplies, materials, means, methods, techniques, sequences, and procedures utilized to provide the Project in accordance with this MOU.

20. **Public Records**. In accordance with section 119.0701, Florida Statutes, SJRK shall: Keep and maintain public records required by the City to perform the Project. Upon request from the City's custodian of public records, provide the City with a copy of the requested records or allow records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided for in chapter 119, Florida Statutes, or as otherwise provided by law.

a. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of this MOU and following completion of this MOU if SJRK does not transfer the records to the City.

b. Upon completion of this MOU, transfer to the City at no cost all public records in possession of SJRK or keep and maintain public records required by the City to perform the Project. If SJRK transfers all public records to the City upon completion of this MOU, SJRK shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If Data SJRK Bank keeps and maintains public records upon completion of this MOU, SJRK shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City upon request from the City's custodian of public records in a format that is compatible with the City's information technology systems.

The above requirements apply to SJRK only if it is a "Contractor" as defined in section 119.0701, Florida Statutes.

IF SJRK HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO ITS DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS MOU, CONTACT THE CITY'S CUSTODIAN OF PUBLIC RECORDS AT (904) 255-7674; PRR@COJ.NET; CITY OF JACKSONVILLE, PUBLIC RECORDS REQUEST, 214 NORTH HOGAN STREET, SUITE 1180, JACKSONVILLE, FLORIDA 32202.

[Remainder of page left blank intentionally. Signature page follows immediately.]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives as of the Effective Date.

ATTEST:

By: _____
James R. McCain, Jr.
Corporation Secretary

CITY OF JACKSONVILLE

By: _____
Donna Deegan, Mayor

WITNESS:

By_____
Signature

_____
Type/Print Name

_____
Title

ST. JOHNS RIVERKEEPER, INC.

By: _____
Signature

_____
Type/Print Name

_____
Title

Encumbrance and funding information for internal City use:

1Cloud Account for Certification of Funds	Amount

In accordance with the *Ordinance Code*, of the City of Jacksonville, I do hereby certify that there is an unexpended, unencumbered, and unimpounded balance in the appropriation sufficient to cover the foregoing agreement; however, this certification is not, nor shall it be interpreted as an encumbrance of funding under the MOU. Actual encumbrances shall be made by subsequent purchase orders as specified in the MOU.

The stated amount is the maximum fixed monetary amount of the MOU. It shall not be encumbered by the MOU. It shall be encumbered by one or more subsequently issued purchase orders that must reference the MOU. All financial examinations and funds control checking will be made at the time such purchase orders are issued

_____
Director of Finance
City Contract Number_____

Form Approved:

_____
Office of General Counsel

GC-#1685074-v2-Riverkeeper_EPB_MOU_Resilient_Ribault_Clean

LISC JACKSONVILLE

ST. JOHNS RIVERKEEPER®

RESILIENT RIBAULT

Ribault River & Moncrief Creek Environmental Quality Assessment

Proposal to the City of Jacksonville Environmental Protection Board

May 2024

INTRODUCTION

On behalf of Resilient Ribault, St. Johns Riverkeeper submits this proposal to the City of Jacksonville' Environmental Protection Board (EPB) requesting $106,000 for a two-year environmental quality assessment of the Ribault River and Moncrief Creek watersheds. This EPB investment will be matched by $40,000 of Resilient Ribault funds graciously awarded by the Delores Barr Weaver Legacy Fund for community engagement.

RESILIENT RIBAULT OVERVIEW

RESILIENT RIBAULT, a LISC Jacksonville and St. Johns RIVERKEEPER initiative, is designed to provide equitable access to local waterways, identify and advocate for needed infrastructure projects, and address social and environmental vulnerabilities in the Ribault River and Moncrief Creek watersheds and communities.

Some of the most vulnerable census tracts within the St. Johns River watershed are located along the Ribault River and Moncrief Creek, two tributaries of the St. Johns. The residents in these watersheds are vulnerable on three fronts: environmental stressors, socioeconomic disparities, and flood-based impacts.

The proposed **Ribault River & Moncrief Creek Environmental Quality Assessment** seeks to further understand these particularly vulnerable areas specific to environmental and water quality.

This effort will complement the **Ribault River & Moncrief Creek Flood/Stormwater Strategic Review** of historic flood and meteorological data, mapping of infrastructure vulnerabilities and stormwater flow/runoff assessment. (Attachment A)

Together, these studies will provide much-needed information to cohesively address the intersecting vulnerabilities of the region.

Ribault River & Moncrief Creek Environmental Quality Assessment

Background

Both the Ribault River and Moncrief Creek suffer from multiple water quality issues, predominant among them is decades-long **fecal coliform contamination**. As a result of this impairment, Moncrief Creek is managed under a 2010 Basin Management Action Plan (BMAP) for fecal coliform, and Ribault River is managed under a 2014 Bacteria Pollution Control Plan (BPCP).

While some watershed septic tank phase outs are in progress and area stormwater infrastructure improved, both waterways continue to suffer from chronic high levels of fecal indicator bacteria (FIB). Limited work has been conducted to date to determine whether the cause is human-related or to identify the potential public safety risk.

Both waterways are also adjacent to historic municipal incinerator ash sites. From 1910 to the 1960s, the City of Jacksonville (COJ) operated two solid waste incinerators. The incinerator ash was then disposed of at area dump sites or used as fill material for nearby residential and commercial properties. The ash was contaminated with **lead, arsenic, and other metals;** PCBs, dioxin, and other toxic contaminants were also reported. While significant progress has been made in remediating the contaminated sites, some remediation work remains at Lonnie Miller Park along the banks of the Ribault River and along the banks of Moncrief Creek at the former Brown's Dump site. Although the Environmental Protection Agency (EPA) has determined that the remaining ash does not pose a risk to the communities along both waterways (EPA - Brown's Dump, EPA - Jacksonville Ash Site), many residents remain skeptical and are concerned about potential health impacts from exposure.

Data has been collected in connection with clean up efforts to remove the ash, but there has been no systematic investigation of the potential presence or impact of **metals**, either ash-derived or from other sources, to the aquatic ecosystems.

The mouth of Moncrief Creek (WBID 2228A) is impaired for copper, and the entire creek is impaired for iron. The marine and tidal reaches of the Ribault River (WBIDs 2224A and B) are also impaired for iron (FDEP). Although recent metals data is limited, particularly for the Ribault River, average levels of copper and iron in the tidal reach of the Ribault River (2224B) exceeded their respective water quality criteria (WQC) in 2020, and the iron criterion was exceeded again in 2022. According to the EPA as of 2023, there is insufficient metals data to adequately assess their impact on the Ribault River.

A third issue of concern regarding both waterways is **nutrient impairment.** The Ribault River is impaired for nutrients based on **aquatic macrophyte indicators** levels and Moncrief Creek is impaired for nutrients based on **chlorophyll *a*** . A more comprehensive assessment is warranted to determine if the Ribault River and Moncrief Creek is a potential source of nutrients to the nutrient-impaired Trout River which, in turn, is a potential source of nutrients to the

nutrient-impaired Lower St. Johns River. There has been limited systematic data collection to understand nutrient dynamics and sources in the Ribault River or in Moncrief Creek.

Despite numerous efforts, fecal bacteria, certain metals and nutrients continue to exceed water quality standards and undermine the surrounding communities safe use of the Ribault River and Moncrief Creek watersheds. This proposal is designed to complement ongoing City of Jacksonville (COJ) and Florida Department of Environmental Protection (FDEP) efforts by:

1. **Collecting and analyzing supplemental data** to better understand environmental vulnerabilities in the Ribault River and Moncrief Creek watersheds and communities.
2. **Facilitating fact-based conversations with community leaders and area residents** to cohesively address the intersecting vulnerabilities of the region.
3. **Identifying community and data driven solutions** for needed infrastructure investments within the Resilient Ribault project area.

Objective - Collect and Analyze Supplemental Environmental Data

The proposed work will address four major issues of concern in the Ribault River and Moncrief Creek watersheds:

1. For **fecal bacterial contamination**, the proposed work will expand the FDEP and COJ sampling range for routine fecal indicator bacteria (FIB) monitoring to better understand the entire waterway, including areas in heavy use by the public. Highly contaminated areas will be further investigated for human sources.
2. Water samples, sediments, minnows and macroinvertebrates will be measured for **metals** concentrations to determine whether there are legacies of the ash disposal sites or other metals sources and if there are potential food web impacts.
3. **Nutrients** will be systematically assessed to better understand nutrient dynamics of the Ribault River and Moncrief Creek and their impact on the Trout River and the Lower St. Johns River. Potential sources and seasonal trends will be assessed.
4. **Ecosystem Health** will be assessed by examining macroinvertebrate and phytoplankton abundance and diversity providing a baseline that can be compared to other tributaries. Pollution tolerant and sensitive species will also be tracked over time to determine potential impacts of pollutants.

Project Approach

1. **Fecal Indicator Bacteria (FIB)**
    a. Monthly FIB (both *E. coli* and *Enterococci*) sampling at 8 sites will be conducted for two years.
    b. Follow up investigations will be conducted at sites where samples have FIB values exceeding 5,000 CFU, the threshold recommended by FDEP for intensive additional analyses of the contaminated samples. Chemical markers sucralose,

and acetaminophen, and the genetic marker qPCR HF-183 will be measured to identify the biological and physical sources of bacterial contamination.

c. Wet weather events will be targeted for FIB and genetic markers in order to quantify the role of surface water runoff in fecal contamination.

2. Metals

a. Metals analysis of up to 9 metals including arsenic, cadmium, chromium III, copper, nickel, lead, zinc, silver, and iron will be conducted:
   i. Monthly for surface water and minnows at 8 sites.
   ii. Quarterly for sediments and macroinvertebrates at 8 sites.

3. Nutrients

a. Nutrient analyses (Total Nitrogen (TN), Total Phosphorus (TP)) will be conducted for one year every 2 months at 2 sites in each waterway (4 sites total).

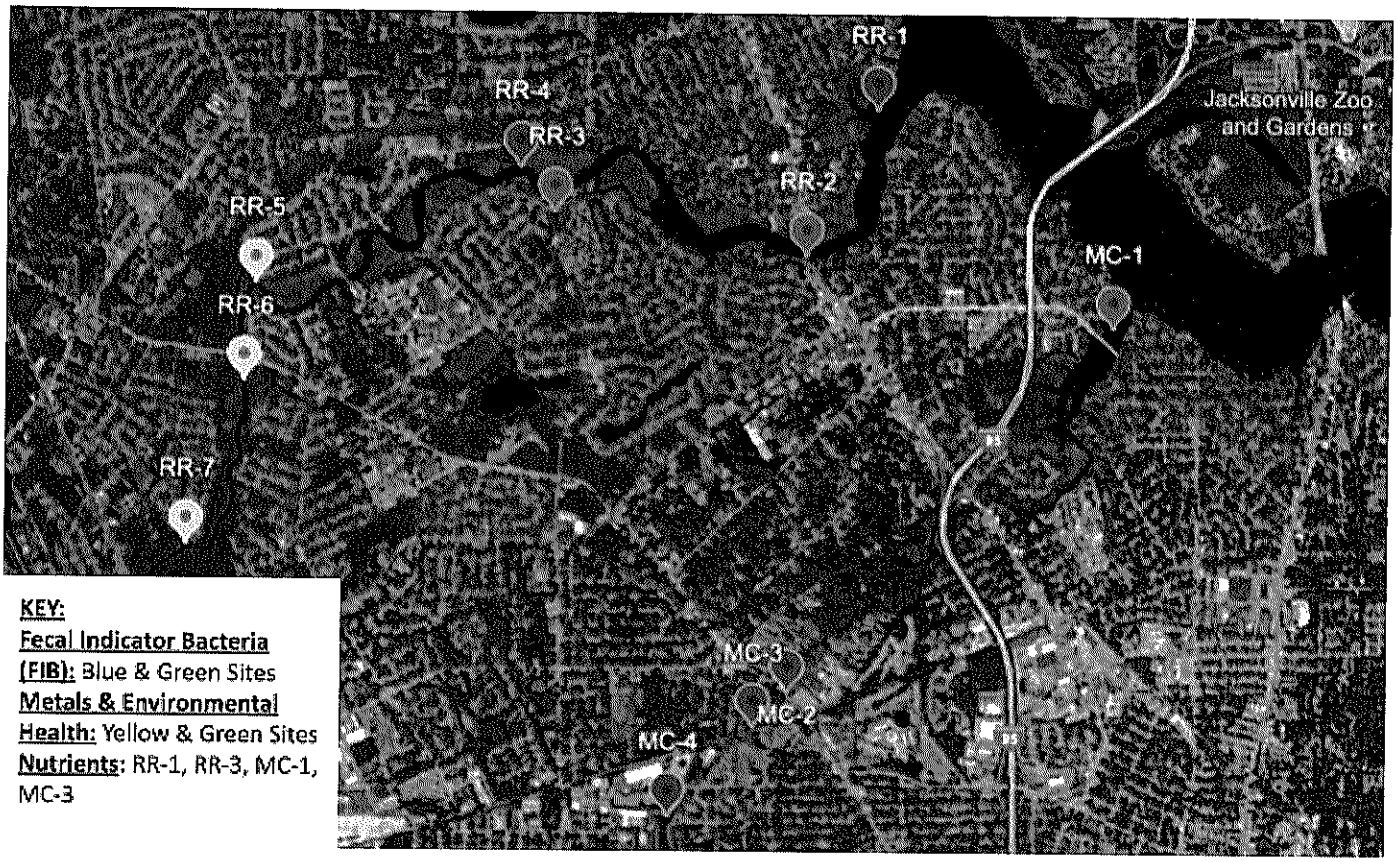
b. Monthly chlorophyll-a assessments will be taken at each of the 11 sites.
   i. Nutrient analysis may be conducted at additional sites if there is consistently high chlorophyll-a.

4. Ecosystem Health

a. Population diversity of macroinvertebrates and phytoplankton will be evaluated for 2 years using the Hilsenhoff Biotic Index and Shannon-Weiner Diversity Index to identify potential ecosystem impacts of metals.
   i. Sediment macroinvertebrate populations will be evaluated monthly at 8 sites for dominance of pollution tolerant species in parallel with the metals analyses of the organisms and sediments.
   ii. Phytoplankton population diversity will also be assessed monthly at 8 sites in parallel with metals in the surface water to evaluate the potential impact of metals.
   iii. Macroinvertebrate and phytoplankton species data in these waterways provides an important baseline for ecosystem information for the region.

Ribault River & Moncrief Creek Environmental Quality Assessment Proposed Sampling Sites:

Sampling site locations chosen based on proximity to incinerator ash sites, septic tanks, existing agency sampling sites, and other high priority areas based on available data.



Ribault River & Moncrief Creek Environmental Quality Assessment - DELIVERABLES

1. Bi-annual COJ/EPB/FDEP reports and meetings as needed
2. Resilient Ribault Community Engagement
    a. **Data-driven conversations with community leaders and area residents will be held regularly** to cohesively understand and address the intersecting vulnerabilities of the region from the resident's perspective.
        i. CPACs, Community Partner Meetings, Resilient Ribault Stakeholders
        ii. Resident-driven process to identify and prioritize solutions
3. Final Project Report including **community, resident and data driven solutions** will demonstrate opportunities to improve environmental health and needed infrastructure investments within the Resilient Ribault project area based on 2-years of documented scientific analysis.

Ribault River & Moncrief Creek Environmental Quality Assessment - 2 Year BUDGET

1. **Environmental Quality Assessment Budget - $91,000**
    a. **Sample Collection (Transportation and Staff) - $11,400**
        i. Monthly - $8,400
        ii. Quarterly - $3,000
    b. **Fecal Indicator Bacteria (FIB) - $34,000**
        i. E.Coli & Enterococci - $25,000
        ii. Genetic Markers - $6,000
        iii. Chemical tracers - $3,000
    c. **Metals - $39,000**
        i. Surface Water and Fish Tissue Analysis - $20,000
        ii. Macroinvertebrate Testing - $5,000
        iii. Sediment Testing - $14,000
    d. **Nutrients - $5,000**
    e. **Ecosystem Health - $1,600**
2. Administrative Costs - **$15,000**
3. **Total Funding Request: $106,000**
4. *Resilient Ribault Community Engagement:* ***$40,000*** *- Delores Barr Weaver Legacy Fund*
5. ***Total Project Costs*** *-* ***$146,000***

Table 1. Environmental Quality Assessment Schedule

Matrix	Analytes	# sites	Frequency	Duration
FIB	E.Coli, Enterococci	8	Monthly	2 years
	FIB Genetic Marker	8	As needed based on FIB level **	2 years
	FIB Chemical Tracer	8	As needed based on FIB level **	2 years
	Water Quality*	11	Monthly	2 years
Nutrients	TN & TP	4	Every 2 months	1 year
Metals	Surface Water & Minnows	8	Monthly	2 year
	Macro	8	Qtrly	2 year
	Sed metals	8	Qtrly	2 year
Ecosystem Health	Macroinvertebrates & Phytoplankton	8	Monthly	2 year

*Water Quality includes: Dissolved Oxygen, Turbidity, Salinity, Temperature

**FIB values exceeding 5,000 CFU

Ribault River & Moncrief Creek Environmental Quality Assessment Team

- **Lisa Rinaman (Principal Investigator)** *St. Johns Riverkeeper*
  - *Project management, team coordination*
- **Dr. Lucy Sonnenberg (Team Technical Advisor)** *Former chair of the City of Jacksonville Environmental Protection Board, retired research professor of chemistry and the former research director of the Millar Wilson Laboratory for Chemical Research (MWL)*
  - *Project management, team coordination, data analysis*
- **Dr. Gretchen Bielmyer-Fraser (Team Scientist)** *Professor of Chemistry; Director of Millar Wilson Laboratory - Jacksonville University Marine Science Research Institute*
  - *Metals in water, minnows, sediment, macroinvertebrates*
- **Dr. Gerry Pinto (Team Scientist)** *Associate Research Scientist - Jacksonville University Marine Science Research Institute, St. Johns River Report Principal Investigator*
  - *Ecosystem Health: macroinvertebrates and phytoplankton*
- **Dr. William Penwell (Team Scientist)** *Chair, Department of Biology and Marine Science - Jacksonville University; Associate Professor of Biology*
  - *Fecal indicator bacteria, genetic markers and chemical tracers*
- **Dr. Ashley Johnson (Team Scientist)** *Associate Professor of Geography - Jacksonville University*
  - *Geographic Information Systems (GIS) Mapping*
- **Dr. Quinton White (Advisor)** *Executive Director - Jacksonville University Marine Science Research Institute*
- **Dr. Bryan Franks (Advisor)** *Interim Executive Director - Jacksonville University Marine Science Research Institute and Director of Marine Science Graduate Program*

ATTACHMENTS

Attachment A: ***Ribault River & Moncrief Creek Flood/Stormwater Strategic Review***

Attachment B : ***Resilient Ribault Prioritization Report***

EXHIBIT B - PROJECT BUDGET and PAYMENT SCHEDULE

Project Budget - Ribault River Environmental Assessment Project			
1. Sample Collection			
Item	Cost	Qty	Total
Monthly	$8,400.00	1	$8,400.00
Quarterly	$3,000.00	1	$3,000.00
Total for Sampling			**$11,400.00**
2. Fecal Indicator Bacteria			
Item	Cost	Qty	Total
E.Coli and Enerococci	$25,000.00	1	$25,000.00
Generic Markers	$6,000.00	1	$6,000.00
Chemical Tracers	$3,000.00	1	$3,000.00
Total for Fecal Indicator Bacteria			**$34,000.00**
3. Metals			
Item	Cost	Qty	Total
Surface Water and Fish Tissue Analysis	$20,000.00	1	$20,000.00
Macroinvertebrate Testing	$5,000.00	1	$5,000.00
Sediment Testing	$14,000.00	1	$14,000.00
Total for Metals			**$39,000.00**
4. Nutrients			
Item	Cost	Qty	Total
Nutirents	$5,000.00	1	$5,000.00
Total for Nutrients			**$5,000.00**
5. Ecosystem Health			
Item	Cost	Qty	Total
Ecosystem health	$1,600.00	1	$1,600.00
Total for Ecosystem Health			**$1,600.00**
Total Cost for Environmental Qualty Assessment			**$91,000.00**
6. Administrative Costs			
Item	Cost	Qty	Total
Project Administration	$15,000.00	1	$15,000.00
Total Administrative Costs			**$15,000.00**
Total Project Cost			**$106,000.00**

EXHIBIT B - PROJECT BUDGET and PAYMENT SCHEDULE

Project Budget - Ribault River Environmental Assessment Project

Proposed Payment Schedule - Ribault River Environmental Assessment Project			
Due upon Council approval			$15,000.00
Four (4) project draws			$91,000.00
6 months from project initiation	$22,750.00		
12 months from project initiation	$22,750.00		
18 months from project initiation	$22,750.00		
upon receipt of final report	$22,750.00		
Total Project Payments			**$106,000.00**

Proposed Project Schedule	
Project Commences	June 2025
1 year preliminary report	June 2026
Final Report Due	June 2027
Presentation at Annual Symposium	February 2028

Exhibit C
INDEMNIFICATION

Contractor shall hold harmless, indemnify, and defend the City of Jacksonville and City's members, officers, officials, employees and agents (collectively the "Indemnified Parties") from and against, without limitation, any and all claims, suits, actions, losses, damages, injuries, liabilities, fines, penalties, costs and expenses of whatsoever kind or nature, which may be incurred by, charged to or recovered from any of the foregoing Indemnified Parties for:

1. General Tort Liability, for any negligent act, error or omission, recklessness or intentionally wrongful conduct on the part of the Indemnifying Parties that causes injury (whether mental or corporeal) to persons (including death) or damage to property, whether arising out of or incidental to the Indemnifying Parties' performance of the Contract, operations, services or work performed hereunder; and

2. Environmental Liability, to the extent this Contract contemplates environmental exposures, arising from or in connection with any environmental, health and safety liabilities, claims, citations, clean-up or damages whether arising out of or relating to the operation or other activities performed in connection with the Contract; and

3. Intellectual Property Liability, to the extent this Contract contemplates intellectual property exposures, arising directly or indirectly out of any allegation that the Services, any product generated by the Services, or any part of the Services as contemplated in this Contract, constitutes an infringement of any copyright, patent, trade secret or any other intellectual property right. If in any suit or proceeding, the Services, or any product generated by the Services, is held to constitute an infringement and its use is permanently enjoined, the Indemnifying Parties shall, immediately, make every reasonable effort to secure within 60 days, for the Indemnified Parties a license, authorizing the continued use of the Service or product. If the Indemnifying Parties fail to secure such a license for the Indemnified Parties, then the Indemnifying Parties shall replace the Service or product with a non-infringing Service or product or modify such Service or product in a way satisfactory to Buyer, so that the Service or product is non-infringing.

If an Indemnified Party exercises its right under this **Contract**, the Indemnified Party will (1) provide reasonable notice to the Indemnifying Party of the applicable claim or liability, and (2) allow Indemnifying Party, at its own expense, to participate in the litigation of such claim or liability to protect its interests. **The scope and terms of the indemnity obligations herein described are separate and apart from, and shall not be limited by, any insurance provided pursuant to the Contract or otherwise. Such terms of indemnity shall survive the expiration or termination of the Contract.**

In the event that any portion of the scope or terms of this indemnity is in derogation of Section 725.06 or 725.08 of the Florida Statutes, all other terms of this indemnity shall remain in full force and effect. Further, any term which offends Section 725.06 or 725.08 of the Florida Statutes will be modified to comply with said statutes.

Procurement Division
INSURANCE REQUIREMENTS

Without limiting its liability under this Contract, Provider shall at all times during the term of this Contract procure prior to commencement of work and maintain at its sole expense during the life of this Contract (and Provider shall require its, subcontractors, laborers, materialmen and suppliers to provide, as applicable), insurance of the types and limits not less than amounts stated below:

Insurance Coverages

Schedule	Limits	
Worker's Compensation	Florida Statutory Coverage	
Employer's Liability	$ 1,000,000	Each Accident
	$ 1,000,000	Disease Policy Limit
	$ 1,000,000	Each Employee/Disease

This insurance shall cover the Provider (and, to the extent they are not otherwise insured, its subcontractors) for those sources of liability which would be covered by the latest edition of the standard Workers' Compensation policy, as filed for use in the State of Florida by the National Council on Compensation Insurance (NCCI), without any restrictive endorsements other than the Florida Employers Liability Coverage Endorsement (NCCI Form WC 09 03), those which are required by the State of Florida, or any restrictive NCCI endorsements which, under an NCCI filing, must be attached to the policy (i.e., mandatory endorsements). In addition to coverage for the Florida Workers' Compensation Act, where appropriate, coverage is to be included for the Federal Employers' Liability Act, USL&H and Jones, and any other applicable federal or state law.

Commercial General Liability	$2,000,000	General Aggregate
	$2,000,000	Products & Comp. Ops. Agg.
	$1,000,000	Personal/Advertising Injury
	$1,000,000	Each Occurrence
	$ 50,000	Fire Damage
	$ 5,000	Medical Expenses

Such insurance shall be no more restrictive than that provided by the most recent version of the standard Commercial General Liability Form (ISO Form CG 00 01) as filed for use in the State of Florida without any restrictive endorsements other than those reasonably required by the City's Office of Insurance and Risk Management. An Excess Liability policy or Umbrella policy can be used to satisfy the above limits.

Automobile Liability $1,000,000 Combined Single Limit
(Coverage for all automobiles, owned, hired or non-owned used in performance of the Services)

Such insurance shall be no more restrictive than that provided by the most recent version of the standard Business Auto Coverage Form (ISO Form CA0001) as filed for use in the State of Florida without any restrictive endorsements other than those which are required by the State of Florida, or equivalent manuscript form, must be attached to the policy equivalent endorsement as filed with ISO (i.e., mandatory endorsement).

Professional Liability $1,000,000 per Claim & Aggregate

The Professional Liability insurance shall include coverage for Technology Errors and Omissions Liability and must be provided on an Occurrence Form or, if on a Claims Made Form, the retroactive date must be no later than the first date of this Agreement and such Claims-made coverage must respond to all claims reported within three years following the period for which coverage is required and which would have been covered had the coverage been on an occurrence basis.

Pollution Liability $1,000,000 per Loss
$2,000,000 Annual Aggregate

Any entity hired to perform services as part of this contract for environmental or pollution related concerns shall maintain Contractor's Pollution Liability coverage. Such Coverage will include bodily injury, sickness, and disease, mental anguish or shock sustained by any person, including death; property damage including physical injury to destruction of tangible property including resulting loss of use thereof, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed; defense including costs charges and expenses incurred in the investigation, adjustment or defense of claims for such compensatory damages; coverage for losses caused by pollution conditions that arises from the operations of the contractor including transportation.

Umbrella Liability $5,000,000 Each Occurrence/Agg.

The Umbrella Liability policy shall be in excess of the above limits without any gap. The Umbrella coverage will follow-form the underlying coverages and provides on an Occurrence basis all coverages listed above and shall be included in the Umbrella policy.

Railroad Protective Liability

In the event that any part of the work to be performed hereunder shall require the Contractor or its Subcontractors to enter, cross or work upon or beneath the property, tracks, or right-of-way of a railroad or railroads, the Contractor shall, before commencing any such work, and at its expense, procure and carry liability or protective insurance coverage in such form and amounts as each railroad shall require.

The original of such policy shall be delivered to the railroad involved, with copies to the Grantor, and their respective members, officials, officers, employee and agents.

Additional Insurance Provisions

A. Additional Insured: All insurance except Worker's Compensation shall be endorsed to name the City of Jacksonville and City's members, officials, officers, employees and agents as Additional Insured. Additional Insured for General Liability shall be in a form no more restrictive than CG2010 and CG2037, Automobile Liability CA2048.

B. Waiver of Subrogation. All required insurance policies shall be endorsed to provide for a waiver of underwriter's rights of subrogation in favor of the City of Jacksonville and its members, officials, officers employees and agents.

C. Provider's Insurance Primary. The insurance provided by the Provider shall apply on a primary basis to, and shall not require contribution from, any other insurance or self-insurance maintained by the City or any City members, officials, officers, employees and agents.

D. Deductible or Self-Insured Retention Provisions. All deductibles and self-insured retentions associated with coverages required for compliance with this Contract shall remain the sole and exclusive responsibility of the named insured Provider. Under no circumstances will the City of Jacksonville and its members, officers, directors, employees, representatives, and agents be responsible for paying any deductible or self-insured retentions related to this Contract.

E. Contractor's Insurance Additional Remedy. Compliance with the insurance requirements of this Contract shall not limit the liability of the Provider or its Subcontractors, employees or agents to the City or others. Any remedy provided to City or City's members, officials, officers, employees, or agents shall be in addition to and not in lieu of any other remedy available under this Contract or otherwise.

F. Waiver/Estoppel. Neither approval by City nor failure to disapprove the insurance furnished by Provider shall relieve Provider of Provider's full responsibility to provide insurance as required under this Contract.

G. Certificates of Insurance. Provider shall provide the City Certificates of Insurance at contract execution, that shows the corresponding City Contract Number in the Description, if known, Additional Insureds as provided above and waivers of subrogation. The certificates of insurance shall be mailed to the City of Jacksonville (Attention: Chief of Risk Management), 117 W. Duval Street, Suite 335, Jacksonville, Florida 32202.

H. Carrier Qualifications. The above insurance shall be written by an insurer holding a current certificate of authority pursuant to chapter 624, Florida State or a company that is declared as an approved Surplus Lines carrier under Chapter 626 Florida Statutes. Such Insurance shall be written by an insurer with an A.M. Best Rating of A- VII or better.

I. Notice. The Provider shall provide an endorsement issued by the insurer to provide the City thirty (30) days prior written notice of any change in the above insurance coverage limits or cancellation, including expiration or non-renewal. If such endorsement is not available then the Tenant, as applicable, shall provide said thirty (30) days written notice of any change in the above coverages or limits, coverage being suspended, voided, cancelled, including expiration or non-renewal.

J. Survival. Anything to the contrary notwithstanding, the liabilities of the Provider under this Contract shall survive and not be terminated, reduced or otherwise limited by any expiration or termination of insurance coverage.

K. Additional Insurance. Depending upon the nature of any aspect of any project and its accompanying exposures and liabilities, the City may reasonably require additional insurance coverages in amounts responsive to those liabilities, which may or may not require that the City also be named as an additional insured.

L. Special Provisions: Prior to executing this Agreement, Provider shall present this Contract and the Insurance Requirements and Indemnification to its Insurance Agent affirming: 1) That the Agent has personally reviewed the insurance requirements of the Contract Documents, and (2)That the Agent is capable (has proper market access) to provide the coverages and limits of liability required on behalf of Provider.

Bonds and Other Performance Security. Design-Builder shall not perform or commence any construction services for a Project until the following performance bond and labor and material payment bond or other performance security have been delivered to Owner: Bonds - In accordance with the provisions of Section 255.05, Florida Statutes, Design-Builder shall provide to Owner, on forms furnished by Owner, a 100% Performance Bond and a 100% Labor and Material Payment Bond for each Project performed under this Agreement, each in an amount not less than the GMP as defined in Article 6 and inclusive of Design-Builder's fees. No qualification or modifications to the Bond forms are permitted.

To be acceptable to Owner as Surety for Performance Bonds and Labor and Material Payment Bonds, a Surety Company shall comply with the following provisions:

1. The Surety Company shall have a currently valid Certificate of Authority, issued by the State of Florida, Department of Insurance, authorizing it to write surety bonds in the State of Florida.

2. The Surety Company shall have a currently valid Certificate of Authority issued by the United States Department of Treasury under Sections 9304 to 9308 of Title 31 of the United States Code.

3. The Surety Company shall be in full compliance with the provisions of the Florida Insurance Code.

4. The Surety Company shall have at least twice the minimum surplus and capital required by the Florida Insurance Code during the life of thisagreement.

   a. If the Contract Award Amount exceeds $500,000, the Surety Company shall also comply with the following provisions:

   b. The Surety Company shall have at least the following minimum ratings in the latest issue of A.M. Best's Key Rating Guide.

CONTRACT AMOUNT	RATING	RATING
$ 500,000 TO $1,000,000	A-	CLASS IV
$1,000,000 TO $2,500,000	A-	CLASS V
$2,500,000 TO $5,000,000	A-	CLASS VI
$5,000,000 TO $10,000,000	A-	CLASS VII
$10,000,000 TO $25,000,000	A-	CLASS VIII
$25,000,000 TO $50,000,000	A-	CLASS IX
$50,000,000 TO $75,000,000	A-	CLASS X

5. The Surety Company shall not expose itself to any loss on any one risk in an amount exceeding ten (10) percent of its surplus to policyholders, provided:

   a. Any risk or portion of any risk being reinsured shall be deducted in determining the limitation of the risk as prescribed in this section. These minimum requirements shall apply to the reinsuring carrier providing authorization or approval by the State of Florida, Department of Financial Services to conduct business in this state.

b. In the case of the surety insurance company, in addition to the deduction for reinsurance, the amount assumed by any co-surety, the value of any security deposited, pledged or held subject to the consent of the surety and for the protection of the surety shall be deducted.

EXHIBIT E

AFFIDAVIT OF COMPLIANCE WITH FLORIDA STATUTE
SECTION 787.06, HUMAN TRAFFICKING

1. I am over the age of 18 and I have personal knowledge of the matters set forth except as otherwise set forth herein.

2. I currently serve as _____ of _____, a _____ (the "Company").

3. The Company does not use coercion for labor or services, as those terms are defined in Florida Statute 787.06.

4. This declaration is made pursuant to Florida Statute 92.525. I understand that making a false statement in this declaration may subject me to criminal penalties. Therefore, under penalties of perjury, I declare that I have read the foregoing Human Trafficking Affidavit and that the facts stated herein are true.

Further Affiant sayeth naught.

Executed to be effective as of _____, 202_.

_____
Signature

_____
Name

_____
Title

_____
Company

_____
Phone Number

STATE OF FLORIDA
COUNTY OF DUVAL

The foregoing instrument was SWORN TO AND SUBSCRIBED before me by means of [_] physical presence or [ ] online notarization, this ____ day of _____, 202_, by _____ as _____ of _____, a _____ corporation, on behalf of said corporation. Said individual [ ] is personally known to me or [ ] has produced _____ as identification.

_____
Name: _____
NOTARY PUBLIC, State of Florida
(SEAL) Serial Number (if any) _____
My Commission Expires: _____

ATTACHMENT A

RESILIENT RIBAULT

Resilient Ribault & Moncrief Creek Flood & Stormwater Strategic Review

May 2024

RESILIENT RIBAULT

Resilient Ribault is a partnership between LISC Jacksonville and St. Johns RIVERKEEPER to connect adjacent communities to area waterways, while creating a framework to coordinate programming and infrastructure investments in the project area's parks and neighborhoods.

The Resilient Ribault project involves the facilitation of dialogue and partnerships with community leaders and residents to provide equitable access to local waterways, identify and advocate for needed infrastructure projects, and address various social and environmental vulnerabilities.

Phase 1 – Ribault River/Moncrief Creek Flood & Stormwater Mapping Proposal

A strategic review of historic flood and meteorological data will be conducted to map out infrastructure vulnerabilities. In addition, a stormwater flow/runoff assessment will be conducted to complement Jacksonville's Compound Flood Model by providing more precise data regarding conditions within the Ribault River and Moncrief Creek watershed.

PHASE 1 - RESILIENT RIBAULT will enhance this city-wide model by increased resolution to the watersheds of interest and identify localized flood hot spots and potential solutions to reduce flood risk in the surrounding community.

1. Analyze and compile historic flood data, records & GIS mapping including:
    a. Flood records – where, how high, rainfall/storm data, anecdotal flood data as well as repetitive losses from FEMA
    b. Land Use and Land Cover Changes - records & field data
    c. Detailed accounts from residents, property owners and businesses
2. Stormwater Flow & Runoff Assessment
    a. Big Flush Community Data Gathering Event
        i. Expert to design the study, through Thriving Earth Exchange Partnership
    b. Develop a baseline assessment of stormwater runoff
        i. To identify infrastructure needs
        ii. To increase awareness of how stormwater runoff from individual properties impacts flooding in their neighborhoods by mapping and quantifying runoff

iii. To identify steps residents can take to reduce runoff and associated flooding

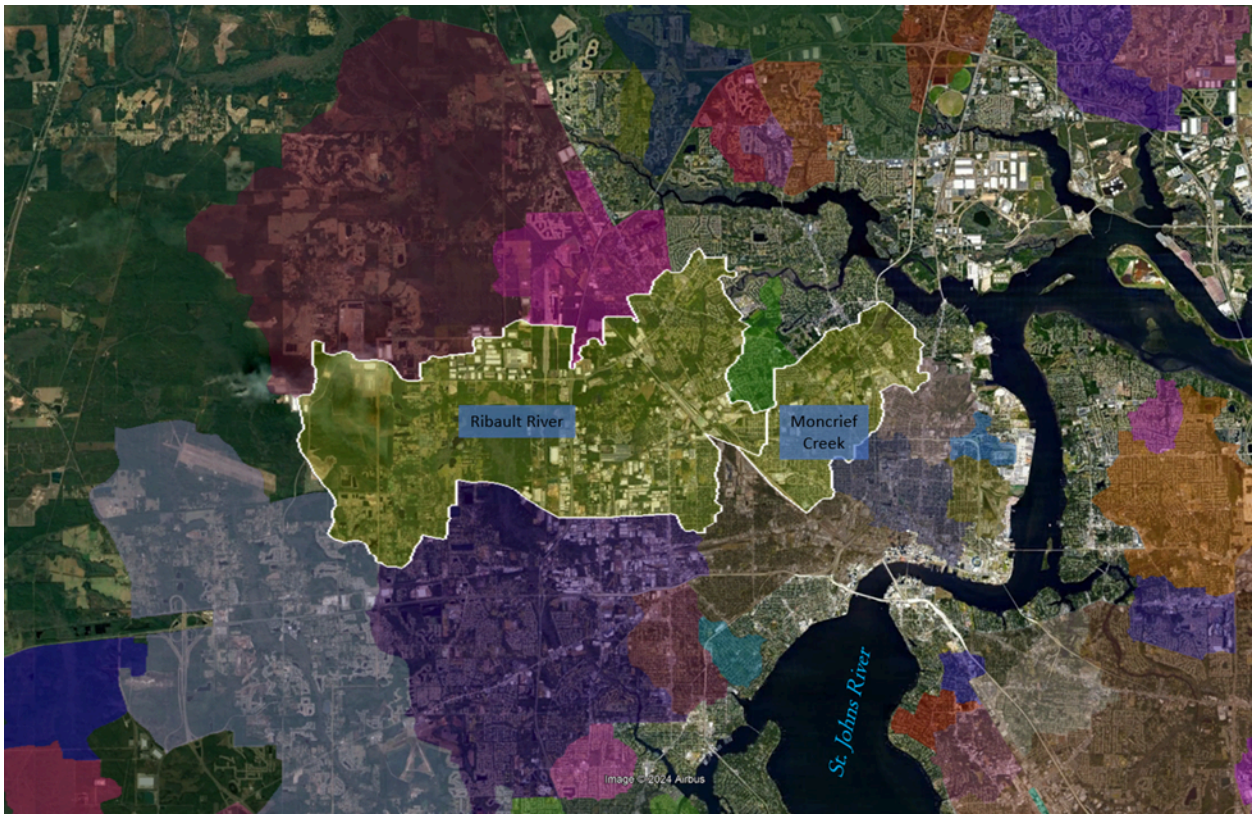


Figure 1. Ribault River and Moncrief Creek watershed location (source: City of Jacksonville, MSMP)

Phase 2 – Develop Ribault River/Moncrief Watershed Model & Green Infrastructure Plan

Following the completion of the Jacksonville Compound Flood Model (Fall 2024) and the **Ribault River/Moncrief Creek Flood & Stormwater Mapping Proposal**, RESILIENT RIBAULT will develop a more detailed, local flood model of the Ribault River and Moncrief Creek watersheds and a **Green infrastructure Plan** to implement strategies to enhance natural systems to reduce flooding, absorb and treat stormwater, mitigate the impacts of sea level rise, sequester carbon, reduce erosion, and provide shade and reduce temperatures.

ATTACHMENT B

Executive Summary: Resilient Ribault Project Area Prioritization Report

Overview

This report evaluates the Resilient Ribault Project Area (RRPA) in Jacksonville, Florida, spanning approximately 12,000 acres and housing 53,531 residents. It underscores the vulnerabilities faced by this community, primarily related to water quality issues, aging infrastructure, and significant socio-economic disparities. This evaluation is critical for guiding infrastructural improvements and enhancing resilience against environmental and socio-economic challenges.

Key Findings:

- Environmental Concerns: The RRPA is challenged by water pollution, particularly fecal coliform bacteria. Water quality assessments have shown that areas of the Ribault and Trout Rivers are not meeting health and aquatic life standards due to the presence of these bacteria. Of the monitored sites, 50% show fecal coliform exceedances above 62%. Additionally, there are 2,859 active septic tanks that contribute to this contamination. The proximity to both riverine and coastal areas make the region susceptible to flooding, which is compounded by climate change effects such as sea-level rise and increased storm intensities.
- Socioeconomic Disparities: The area of Jacksonville exhibits significant socioeconomic challenges, including high unemployment rates and low-income levels. These are intensified by environmental burdens, making the community highly vulnerable to both ongoing and emerging stressors.
- Infrastructure Needs: Many of the region's septic systems are outdated and failing, contributing to water quality issues. The need for infrastructure upgrades, especially septic system phase-outs, is critical for improving community health and resilience against environmental impacts.
- Vulnerability Indices: Several indices, such as the CDC's Social Vulnerability Index and the U.S. Climate Vulnerability Index, identify the RRPA as one of the most vulnerable regions in the country. These indices highlight the critical need for targeted interventions to reduce flood and heat risk and enhance resilience.
- Justice40 Initiative: The RRPA qualifies for the Justice40 initiative, which aims to channel 40% of specific federal investments towards addressing disparities in historically marginalized communities. Under the Justice40 initiative, the RRPA stands to benefit significantly, with 92.3% of its tracts designated as disadvantaged. This highlights the area's eligibility for federal funding aimed at improving infrastructure and reducing pollution.

Recommendations:

- Infrastructure Improvement: Accelerate septic to sewer conversions to mitigate pollution and improve water quality. This includes prioritizing funding and support for the most vulnerable tracts.
- Enhanced Monitoring and Regulation: Implement stricter monitoring of water quality and enforce regulations to reduce pollution levels, especially from septic systems and industrial sources.
- Community Engagement and Policy Advocacy: Strengthen community engagement processes to ensure that local voices are central in planning and policymaking. Advocate for policies that address both environmental and socioeconomic vulnerabilities effectively.
- Leverage Federal Funds: Utilize Justice40 and other federal funds to address critical infrastructure needs, enhance community resilience, and reduce environmental health risks.
- Long-term Resiliency Planning: Develop and implement a long-term resiliency plan that includes adaptation strategies for climate change impacts such as sea-level rise and increased frequency of extreme weather events.

Conclusion

The RRPA represents a community at a critical juncture, facing severe challenges that require immediate and coordinated action. By addressing the intertwined issues of environmental degradation, socio-economic inequality, and infrastructure resilience, stakeholders along with community partners can significantly improve the living conditions and sustainability of this vulnerable area. This report serves as a foundational tool for mobilizing resources, guiding policy formulation, and fostering community-centric interventions aimed at transforming the RRPA into a resilient and equitable community.

Resilient Ribault Project Area Prioritization Report

Prepared for the St. Johns Riverkeeper by Ashley M. Johnson, Ph.D.

This report was produced for the Resilient Ribault Project, a LISC Jacksonville and St. Johns Riverkeeper initiative to provide equitable access to local waterways, identify and advocate for needed infrastructure projects, and address social and environmental vulnerabilities.

The St. Johns River is the longest river in Florida, flowing 310 miles north from its headwaters in Indian River County to its mouth at the Atlantic Ocean in Jacksonville. The watershed, or land area that drains into the St. Johns, is nearly 9,000 square miles and includes numerous tributaries that flow into the river. The watershed itself is an area of diverse ecological habitats, and a patchwork of land-uses that support some of the highest population densities in the state. In addition, many of the watershed's features have relatively flat topography at low elevation near the coast, which contributes to a high level of vulnerability to climate change impacts[1].

Some of the most vulnerable census tracts in the watershed are located along the Ribault River and Moncrief Creek, two tributaries of the St. Johns. The residents in these census tracks are vulnerable on three fronts: *environmental stressors, socioeconomic disparities, and flood-based impacts*. This report seeks to describe particularly vulnerable areas and highlight specific changes around those vulnerabilities. Many of these areas also face significant socioeconomic challenges and pollution problems, compounding the vulnerabilities facing their communities.

Environmental Pollutant Analysis

Indicators and indices used to map the Resilient Ribault Project Area (RRPA) are described in Table 1. According to the EPA (in blue), there are several environmental indicators applicable to riverine systems and their surrounding watersheds. This research report analyzes each priority neighborhood/area based on environmental pollutant stressors when applicable[2]. Furthermore, some neighborhoods adjacent to the St. Johns River are characterized by sweeping socio-economic inequities. These disparities result in unequal representation in the field of local and regional resiliency policy.

Table 1: RRPA Vulnerability Indicators and Indices, Descriptions, and Figure Numbers.

Indicator/Index	Description	Figures
Water Quality	Fecal Coliform data from FDEP and WIN sampling sites (geocoded), SSOs Data (FDOH, FDEP, and JEA) geocoded, Septic Tanks (count of active and inactive tanks), septic and sewer parcel analysis	2, 3, 4, 5, 6
Septic Tank Phase Out Areas	Neighborhoods identified by JEA for STPO	3, 4, 5, 6, 7, 8
Septic and Sewer Parcel Analysis	Parcels within the RRPA that have been identified based on septic or sewer	4 & 5
Heat Index for Jacksonville, FL	Data interpolated over the Jacksonville area from Rosenblatt et al. (2022) urban heat study	9
Superfund site/ Ash remediation sites	Count of proposed or listed NPL - also known as superfund/ ash sites were digitized from parcels data	11
CDC's SVI (2021)	CDC's Social Vulnerability Index	12
Justice 40 Census Tracts		13

[1] Crist, P.J., Oetting J., White R., Chesnutt M., Scott C., Sutter R., Cutter P., & Dobson, G. (2019) Coastal Resilience Assessment of the Jacksonville and Lower St. Johns River Watersheds. National Fish and Wildlife Foundation.

[2] Some indicators identified in table one fall outside the boundaries of priority areas, even with the 3-mile buffer included.

The U.S. Climate Vulnerability Index[3]	Score combining environmental, social, economic, and infrastructure climate effects on neighborhood-level stability.	14 & 15
First Street Foundation Flood Factor	Risk of flooding projected to 2050	16
J40 and Flood comparison	Side by side map of J40 and FFF projected to 2050	17

Resilient Ribault Project Area

The Resilient Ribault Project Area (RRPA) is comprised of thirteen census tracts on the northwest banks of the St. Johns River for a total area of approximately 12,000 acres (19.53 square miles), and a total 2020 population of 53,531 (Figure 1). In addition, these tracts collectively include almost equal proportions of people who own or rent their homes, with approximately 11,000 homeowners and 10,000 renters. The average age in this area of Jacksonville is 39 years old, and the average household size is 2.55. These census tracts represent some of the most vulnerable in the city in terms of climate changes, flooding, environmental pollutants, and socio-economic standing.

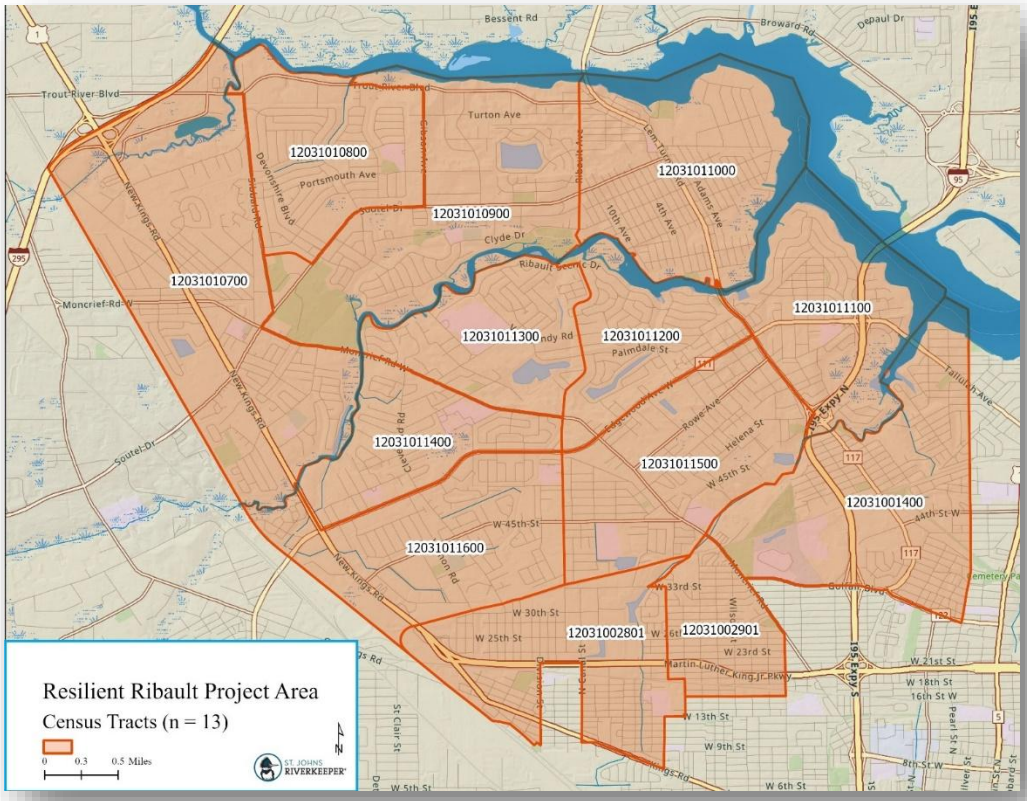


Figure 1: Resilient Ribault Project Area within the Lower St. Johns River Watershed.

Water Quality Analysis

For the Resilient Ribault Project Area the following water quality data were mapped: total maximum daily load by pollutant (Figure 2), these data were obtained by visiting the Florida Department of Environmental Protection Geospatial Open Data (geodata.dep.state.fl.us/). Total maximum daily loads (Figure 2) was obtained

[3] Lewis, P. G. T., Chiu, W. A., Nasser, E., Proville, J., Barone, A., Danforth, C., ... & Craft, E. (2023). Characterizing vulnerabilities to climate change across the United States. *Environment International*, 172, 107772.

from the Florida Geographic Data Library (fgld.org). Septic tank phase out areas were solicited from JEA (Figure 3), the water quality points along the Ribault River, and associated data came from the WIN database, with data analysis completed by Dr. Lucinda Sonnenberg (Figures 4 and 5). Septic tank data and moderate sea level rise projections for 2030 and 2050[4] (livingatlas.arcgis.com) were also mapped (Figure 6). Additional maps for *environmental indicators* include heat index.

Total Maximum Daily Loads

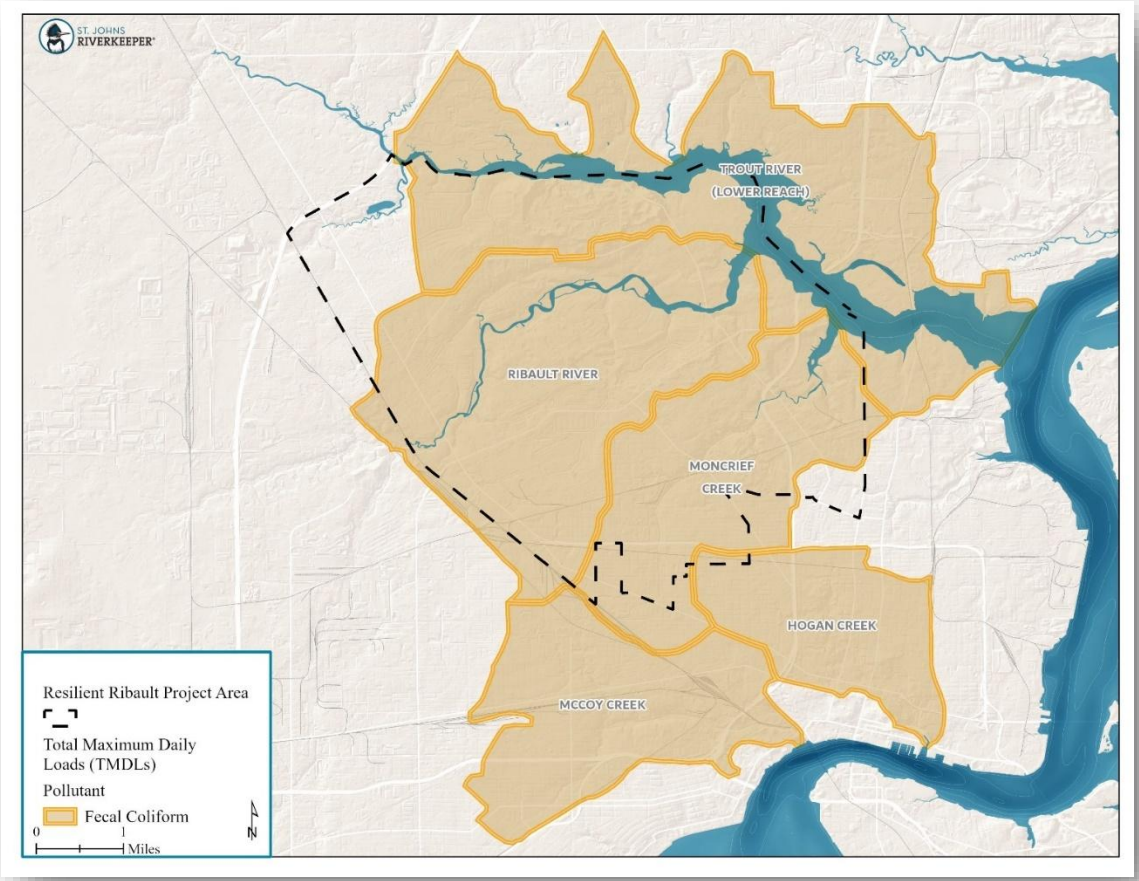


Figure 2: Watersheds impacted by fecal coliform in the RRPA.

A TMDL is the maximum amount of a given pollutant that a surface water can absorb and still meet the water quality standards that protect human health and aquatic life. This area of the Ribault and Trout Rivers was identified as exceeding the maximum amount of ***fecal coliform*** bacteria in 2006, and a plan was developed by the Florida Department of Environmental Protection. However, as of 2021, these areas of the Ribault and Trout Rivers remains under a TDML, meaning that the minimum levels of fecal coliform have not yet been achieved.

Sources of ***fecal coliform*** in surface waters include wastewater treatment plants, septic systems, domestic and wild animal manure, and storm runoff. The presence of fecal bacteria in the river can impact human health through digestive system illness. Additionally, elevated levels of fecal coliform can cause cloudy water, unpleasant odors, and an increased biological oxygen demand which can impact the health of riverine vertebrates and invertebrates.

[4] https://oceanservice.noaa.gov/hazards/sealevelrise/noaa-nostechrpt01-global-regional-SLR-scenarios-US.pdf

Septic Systems

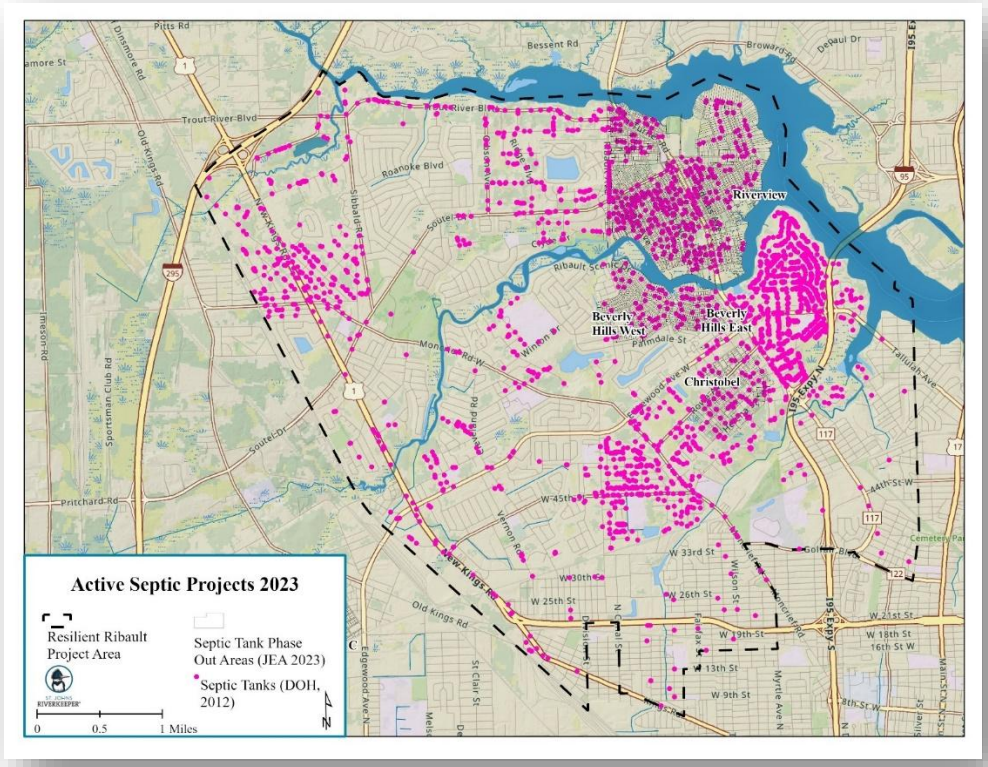
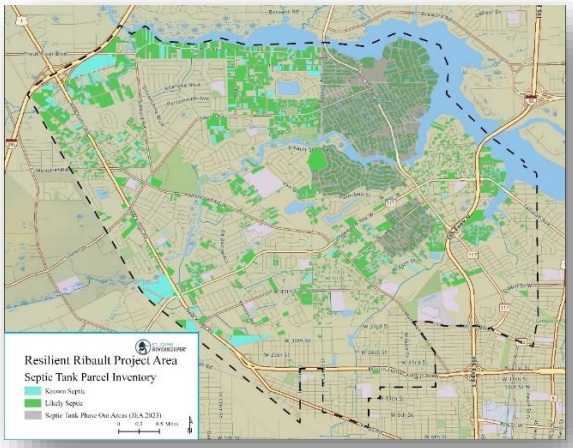


Figure 3: Septic tanks adjacent to the Ribault and Trout Rivers and septic phase out areas.

The latest data available on on-site ***septic systems*** comes from the Department of Health and dates to 2012, this is important to note because in the last ten years there has been additional development in the Resilient Ribault Project Area. Based on the available data, there are 2,874 septic tanks within the project boundary, of those 15 are closed and 2,859 remain active. Septic tanks can be problematic when they fail, releasing fecal waste and contaminating waterways. Figure 3 shows a clustering of septic tanks in residential areas, many of which are located adjacent to the river. Also included in this map are the septic tank phase out areas, these are neighborhoods that have been identified as part of JEA's phase out program. It is estimated that each septic tank conversion will cost approximately $60,000. Conversion costs are funded by JEA and the city through a series of infrastructure grants. Additional septic and sewer analyses were performed at the parcel level (figures 4 & 5).



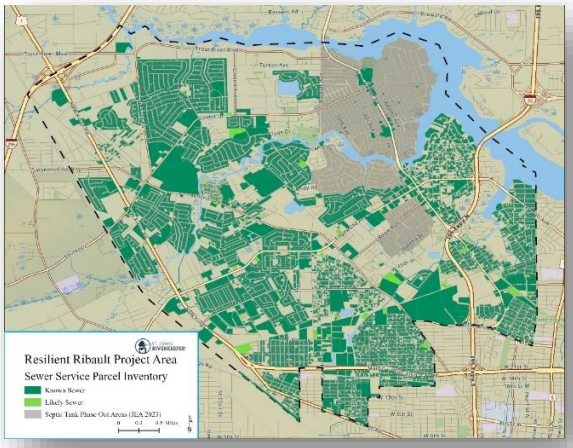


Figure 4 & 5: Septic tank and sewer parcel level analysis in the RRPA.

Notice that the septic tank phase out areas correspond to areas with a high density of septic tank presence and parcels identified as likely and known septic.

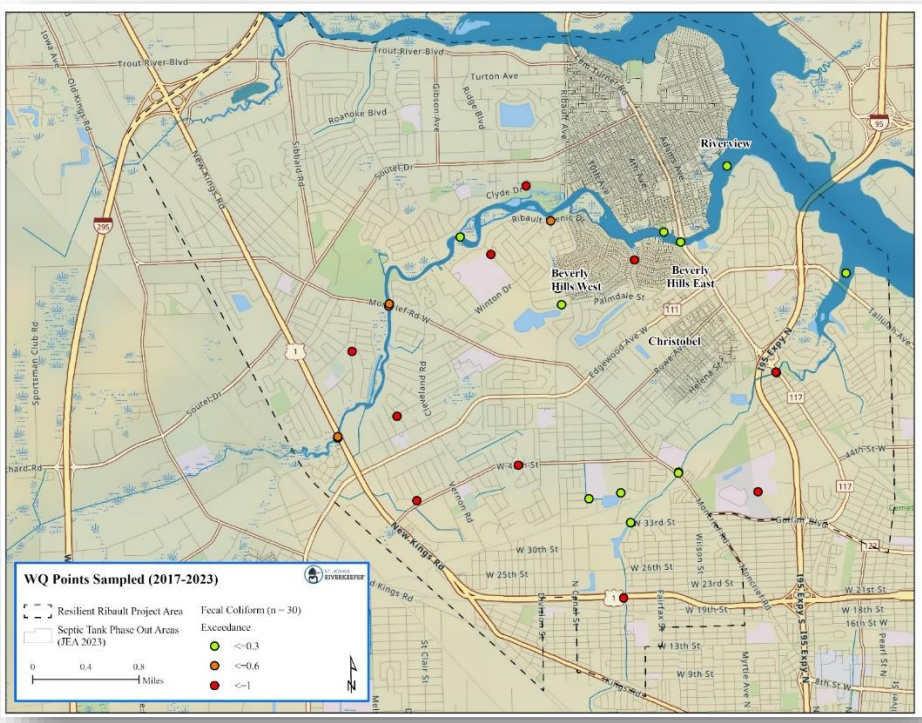


Figure 6: Water Quality Sampling Sites with Fecal Coliform Exceedance Data in the Ribault and Trout River Basins.

Nutrients and pollutants, such as nitrogen, phosphorus, fecal coliform, and total suspended solids (TSS) are contained in the effluent of septic tanks and are either filtered from the drain field into the local water table or are transported by rain to nearby surface waters[5]. These pollutants can sicken swimmers and others who use the

[5] EPA. (2002). Onsite Wastewater Treatment System Manual. www.Epa.Gov/Sites/Production/Files/2015-06/Documents/2004_07_07_septics_septic_2002_osdm_all.pdf

river for recreation or eat raw shellfish or fish. Other potential health effects of septic tank effluent can include diseases of the skin, eyes, ears, and respiratory tract. Eating fish or shellfish harvested from waters with fecal contamination can also result in human illness.[6]

Figure 6 illustrates water quality data compiled from the Watershed Information Network (WIN) database and analyzed by Dr. Lucinda Sonnenberg. An overabundance of ***nutrients*** is present in the watersheds of the Ribault and Trout Rivers. Over-nutrified waterbodies lead to the increase of plant growth in the water column, often causing eutrophication of the waterbody. Eutrophication can impact water quality in a variety of ways, including algal blooms, fish kills, and dangerous swimming and boating conditions. It is important that water quality sampling sites are inventoried for useful data. The WIN data was analyzed using the fecal coliform parameter, fifteen of thirty (50%) points fall within the highest category of exceedances. In other words, fifteen sites have exceeded the parameter for fecal coliform by 62% or higher. Bivariate symbology shows the quantitative relationship between two variables, and figure 7 shows the fecal coliform exceedances and the geomean of the exceedances for each point. According to the Florida DEP, fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes.[7] Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

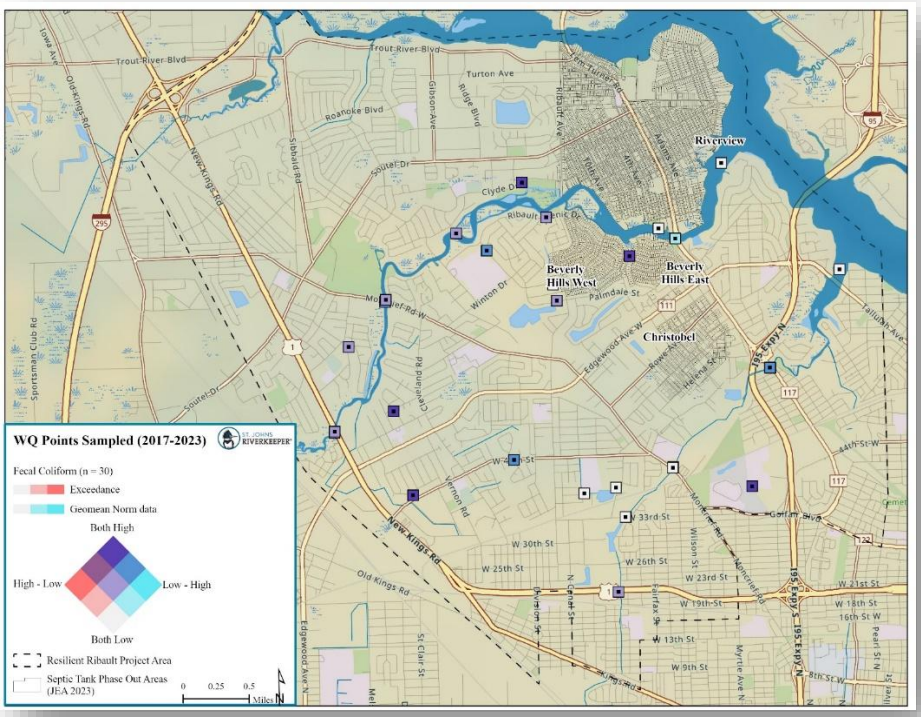


Figure 7: Bivariate display of fecal coliform exceedances in the Resilient Ribault Project.

As riverine and coastal flooding increases so will the number of failing septic tanks. In 2014 the Intergovernmental Panel on Climate Change (IPCC) Assessment Report indicated that flooding is likely to increase from two to seven feet over the next 50 years and the frequency and intensity of tropical storms and hurricanes will increase. The latest findings of the IPCC (2023) are that over the next 2000 years, global mean

[6] EPA (2022) National Aquatic Resource Surveys. Accessed at https://www.epa.gov/national-aquatic-resource-surveys/indicators-enterococci
[7] https://floridadep.gov/TMDL

sea level will rise by about 2–3 m if warming is limited to 1.5°C and 2–6 m if limited to 2°C[8]. Duval County experienced compound flooding in 2017 with Hurricane Irma, which flooded major portions of the city located near the St. Johns River. The onsite sewage treatment and disposal systems regulation[9] states that a septic tank must not be within 75 feet of the mean high-water line or mean annual flood line of a surface water body. However, the statute does not contain any setback standards or language to address climate change impacts and the issues associated with it, such as sea level rise and stronger hurricanes. Figure 8 illustrates intermediate projected sea level rise for 2030 (orange) and 2050 (yellow), note the proximity to many active septic tanks.

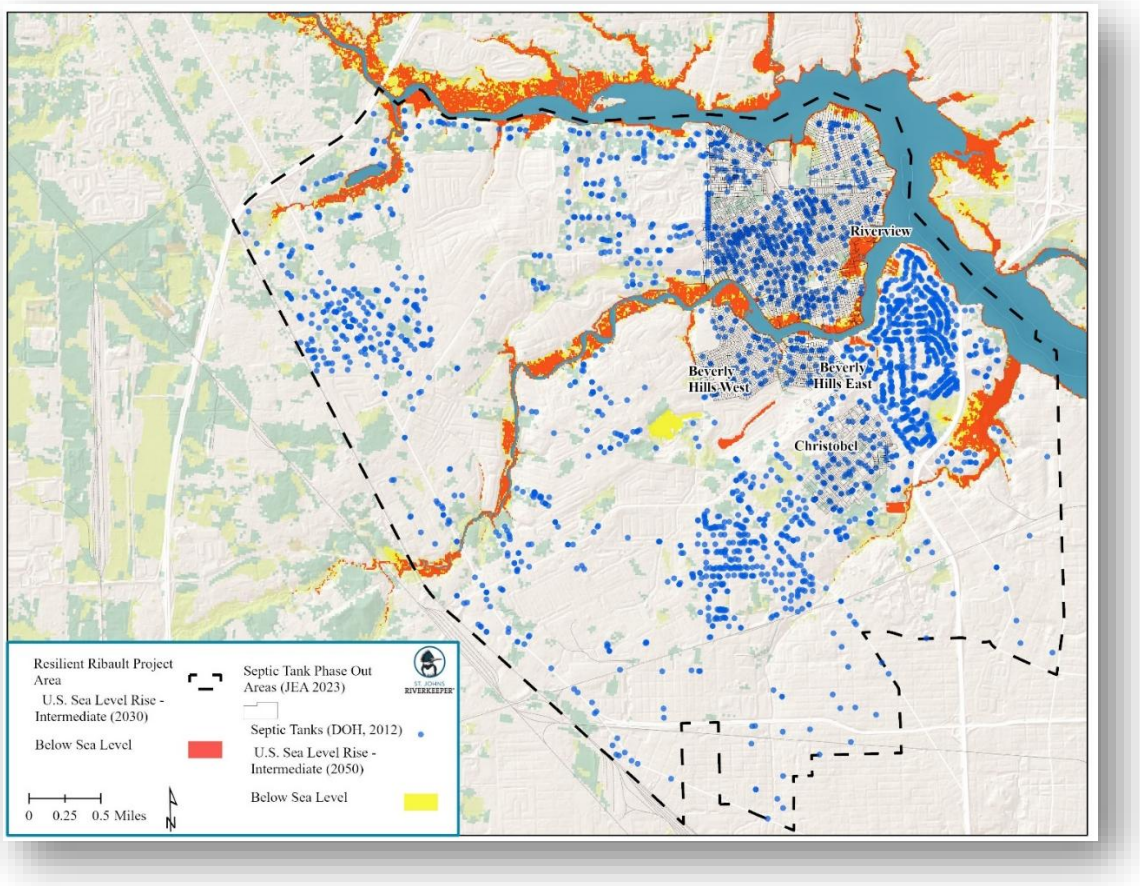


Figure 8: Intermediate projected sea level rise for 2030 (orange) and 2050 (yellow) and active septic tanks.

[8] IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647

[9] F.S. 381.0065

Heat Index

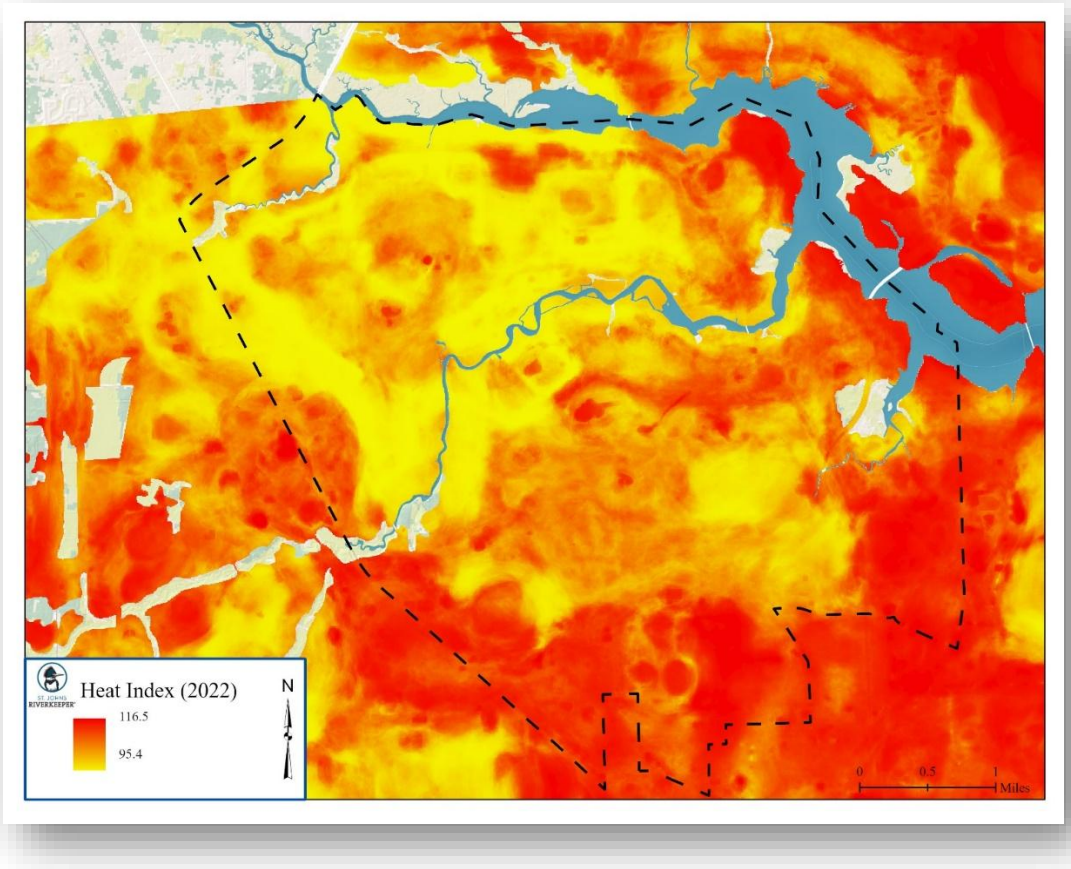


Figure 9: Heat index of Duval County using sensors, June of 2022[10].

Heat plays a major role in the health of communities. Over the span of three decades, federal statistics reveal that the primary factor contributing to weather-related fatalities in the United States is extreme heat. Urban heat islands, intensifying the effects of extreme heat, can result in heightened respiratory challenges, heat exhaustion, and heat stroke. These adverse heat consequences disproportionately impact the most susceptible populations, including children, the elderly, and individuals with preexisting health conditions. Recent findings revealed in the National Conference of Citizenship's (NCoC) Pandemic to Prosperity report in July, the NCoC, a congressionally chartered nonprofit dedicated to promoting civic life in the U.S., reported an alarming 88% surge in heat-related fatalities in Florida between 2019 and 2022[11].

In Florida, heat is an especially acute issue, in the summer of 2021 there were 26 heat related hospitalizations and 213 heat related emergency room visits[12]. In the summer of 2022, a team from the University of North Florida conducted an urban heat study. Figure 9 maps the results of that study, it should be noted that the ***heat index*** overall is quite high, with a minimum temperature of 95.4° and a maximum temperature of 116.5°. The average temperature across the area was 100.5° at the time of data collection. Some of the highest heat indexes correspond to areas of residential and industrial development.

Land Use

[10] https://environment.domains.unf.edu/heatmap/
[11] https://www.pandemictoprosperity.org/
[12] According to the Florida Department of Health Environmental Public Health Tracking data (https://www.floridatracking.com/healthtracking/topic.htm?i=13).

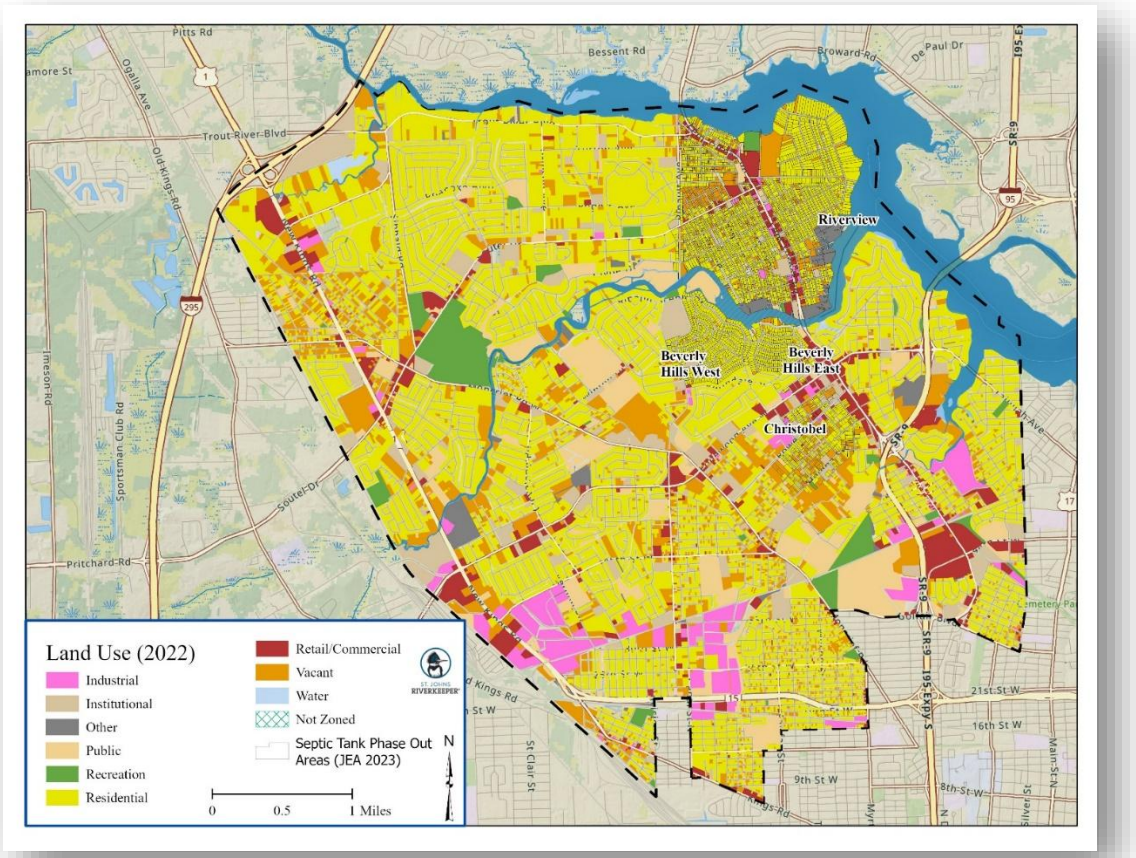


Figure 10: Land use in the Resilient Ribault Project Area.

Much of the landscape in this area is dominated by residential land uses. There are 9,843 acres of zoned real property in the Resilient Ribault Project Area. A little over 50% of those parcels are zoned residential (5,063 acres). Land use is an important source of potential pollutants due to point and non-point source pollution such as surface water runoff.

Superfund and Ash Remediation Sites

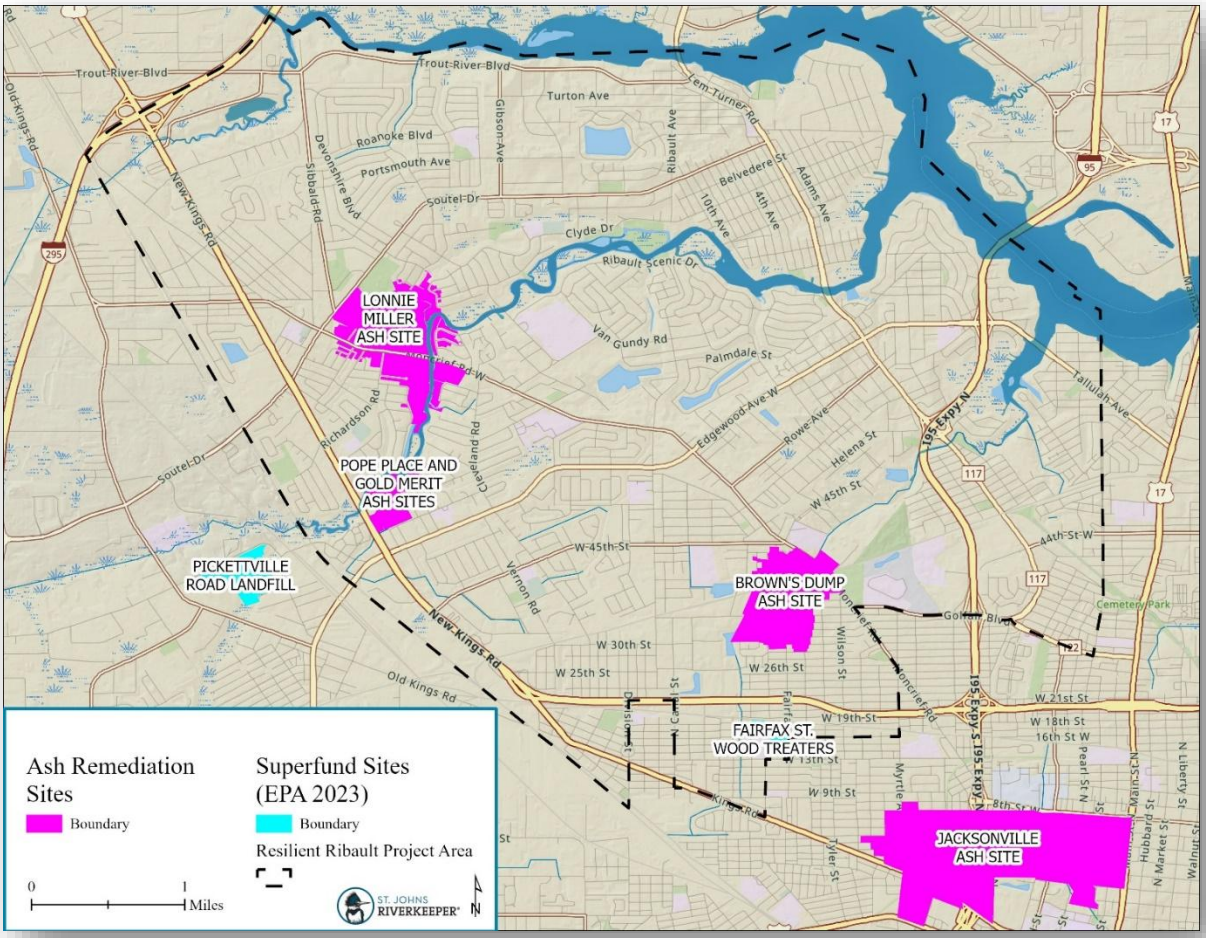


Figure 11: Superfund sites and ash remediation sites for the Resilient Ribault Project Area.

Since 1980, the EPA's Superfund program has been cleaning up lands associated with industrial and commercial activities that produce by-products toxic to the environment and human health. Figure 11 shows major remediation and superfund projects within and adjacent to the project area. There are three ash remediation sites within the project boundary and one large one right outside the boundary. The ash is a product of solid waste incineration that took place in Jacksonville for about 60 years starting in the early 1900s. The ash byproduct was mixed with soil and given away to area residents and used as fill material as well as disposed at several dump sites, some sites have been remediated, however, figure 11 shows the ash sites that are still in need of cleanup. According to the EPA, site investigations found contamination in soil that could potentially harm people in the area. Soil contamination resulted from disposal practices at the site. Primary contaminants of concern include lead, arsenic, dioxins, and polycyclic aromatic hydrocarbons (PAHs)[13]. The two Superfund sites shown are on the National Priorities List (Pickettville Road Landfill and Fairfax St. Wood Treaters).

As stated by the EPA, from 1940 to the mid-1960s, the Pickettville Road Landfill started off as a borrow pit for sand and waste disposal. In 1968, the City of Jacksonville began leasing the property for landfill operations, including the disposal of municipal and industrial waste. In 1971, the landfill no longer accepted municipal waste and accepted hazardous wastes only. In 1977, all waste disposal operations ended, and the City of Jacksonville closed the landfill. In 1983, EPA listed the site on the NPL. The City of Jacksonville remains the

[13] https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0407002

owner of the site, and the site is not currently in use. The EPA continues to monitor and review the site every five years.[14]

Fairfax St. Wood Treaters[15] was recently deleted from the NPL list. The site was used, starting in the 1980s, to pressure treat utility poles, pilings, and other lumber products. The wood treating operations resulted in soil, water and sediment contamination with chromium, copper, and arsenic. When the company went bankrupt in 2010, vats containing high levels of these toxins were left on the property. In 2019 the EPA completed remediation and clean-up efforts at the site and in 2020 the site was removed from the Superfund NPL list. It remains identified in the database due to the recent cleanup efforts, it will remain part of the NPL list until the site is reevaluated in 2025.

Social Vulnerability Maps

Social vulnerability occurs when social, political, and economic processes combine to create increased exposure to, and impact from, hazards for some populations[16]. Recent research has shown discrete hotspots of flood exposure and social vulnerability in the United States and several of those hotspots fall within the St. Johns River watershed[17]. This report details areas, identified using geospatial data, which are vulnerable to not only environmental but also social stressors. The maps and data that follow represent three distinct datasets, the CDC's social vulnerability index published in 2020[18]and updated in 2022[19], the White House's Council on Environmental Quality's Justice 40 analysis published in May of 2022, and the U.S. Climate Vulnerability Index[20] published in 2023. These analyses use census tracts, which are a small unit of geography, that generally have populations of between 1,200 - 8,000 people. The data is also reported in percentiles which show how much burden each tract experiences when compared to other tracts in the United States.

[14] https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0400859#bkground
[15] https://semspub.epa.gov/work/04/11140099.pdf
[16] Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social vulnerability to environmental hazards. *Social Science Quarterly*, 84(2), 242-261.
[17] Tate, E., Rahman, M. A., Emrich, C. T., & Sampson, C. C. (2021). Flood exposure and social vulnerability in the United States. *Natural Hazards*, 106(1), 435-457.
[18] Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index 2020 Database for Florida. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed on 12/27/2022.
[19] https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html
[20] Lewis, P. G. T., Chiu, W. A., Nasser, E., Proville, J., Barone, A., Danforth, C., ... & Craft, E. (2023). Characterizing vulnerabilities to climate change across the United States. Environment international, 172, 107772.

CDC's Social Vulnerability Map

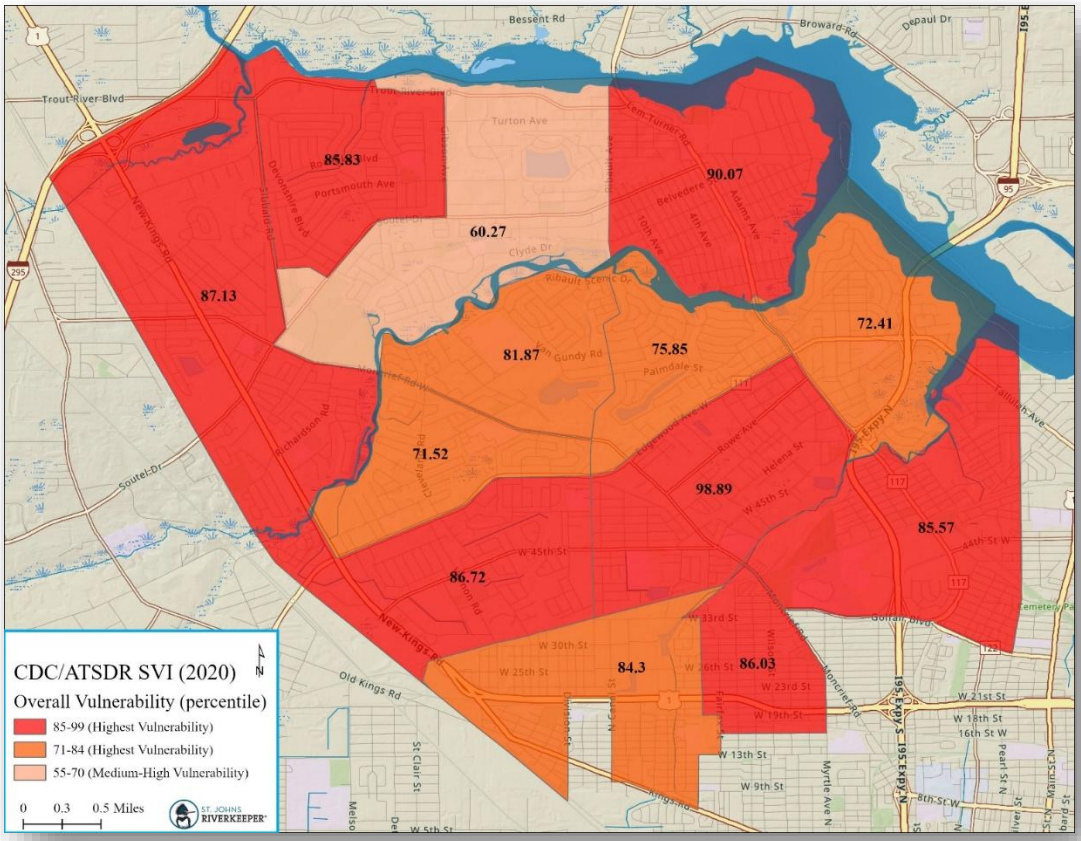


Figure 12: Overall Social Vulnerability Index mapped for the Resilient Ribault Project Area using CDC/ATSDR Social Vulnerability Index (2020).

Figure 12 shows census tracts within the project area rendered on the CDC's social vulnerability index (SVI). The SVI indicates the relative vulnerability of every U.S. census tract[21]. Possible scores range from 0 (lowest vulnerability) to 100 (highest vulnerability). The index evaluates areas based on 15 social factors, including unemployment, minority status, and disability, and groups them into four related themes.

1. Socioeconomic
2. Household Composition & Disability
3. Minority Status & Language
4. Housing Type & Transportation

Figure 12 shows SVI ranks for overall vulnerability (a combination of all four themes) and the thirteen census tracts contained in the project area are labeled with their respective SVI number. This part of Jacksonville contains some of the most vulnerable areas in the city and state, as well as the country (Table 2). The vulnerability of each tract is relative to the United States, meaning that if a tract is indexed at the 90th percentile, only 10% of census tracts in the entire country are considered more vulnerable. The average rank for the Resilient Ribault Project Area is 83rd percentile which indicates that this region of the city is highly vulnerable.

[21] For more information on how the CDC calculates the SVI please visit: https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/SVI_documentation_2020.html.

Table 2: Resilient Ribault River Area Census Tracts Relative Vulnerability to the United States

Tract Number	Percentile (RRA)	Index Rank
107	**87th**	**High Vulnerability**
108	**86th**	**High Vulnerability**
109	**60th**	**Medium to High Vulnerability**
110	**90th**	**Highest Vulnerability**
111	**72nd**	**High Vulnerability**
112	**76th**	**High Vulnerability**
113	**82nd**	**High Vulnerability**
114	**72nd**	**High Vulnerability**
115	**99th**	**Highest Vulnerability**
116	**87th**	**Highest Vulnerability**
28.01	**84th**	**High Vulnerability**
29.01	**86th**	**Highest Vulnerability**
140	**86th**	**Highest Vulnerability**
Average Percentile Ranking	**83rd**	**High Vulnerability**

Justice 40 Initiative

The Justice40 Initiative seeks to invest 40% of certain federal funds into areas that have historically been "marginalized, underserved, and overburdened by pollution"[22]. Justice40 investments include green and clean energy and transit as well as creating resilient infrastructure to climate change impacts. ***Communities are identified as disadvantaged if they are in census tracts that are at or above the thresholds in one or more of eight categories of criteria below.***

1. Climate change
2. Clean energy and energy efficiency
3. Clean transit
4. Affordable and sustainable housing
5. Reduction and remediation of legacy pollution
6. Critical clean water and wastewater infrastructure
7. Health burdens
8. Training and workforce development

Under the current formula, a census tract must meet two criteria:

1. **IF** the census tract is above the threshold for one or more environmental or climate indicators
2. **AND** the census tract is above the threshold for the socioeconomic indicators.

This national dataset was queried resulting in table 3.

Table 3: Justice40 disadvantaged census tracts proportions.

Geography	Number of Disadvantaged Tracts/Total Tracts by Area	Percent
Florida	1,482/4,245	10.4%
St. Johns River Watershed	224/783	28.6%
Duval County	58/195	29.7%
Ribault River Area (RRA)	12/13	92.3%

[22] https://www.whitehouse.gov/environmentaljustice/justice40/

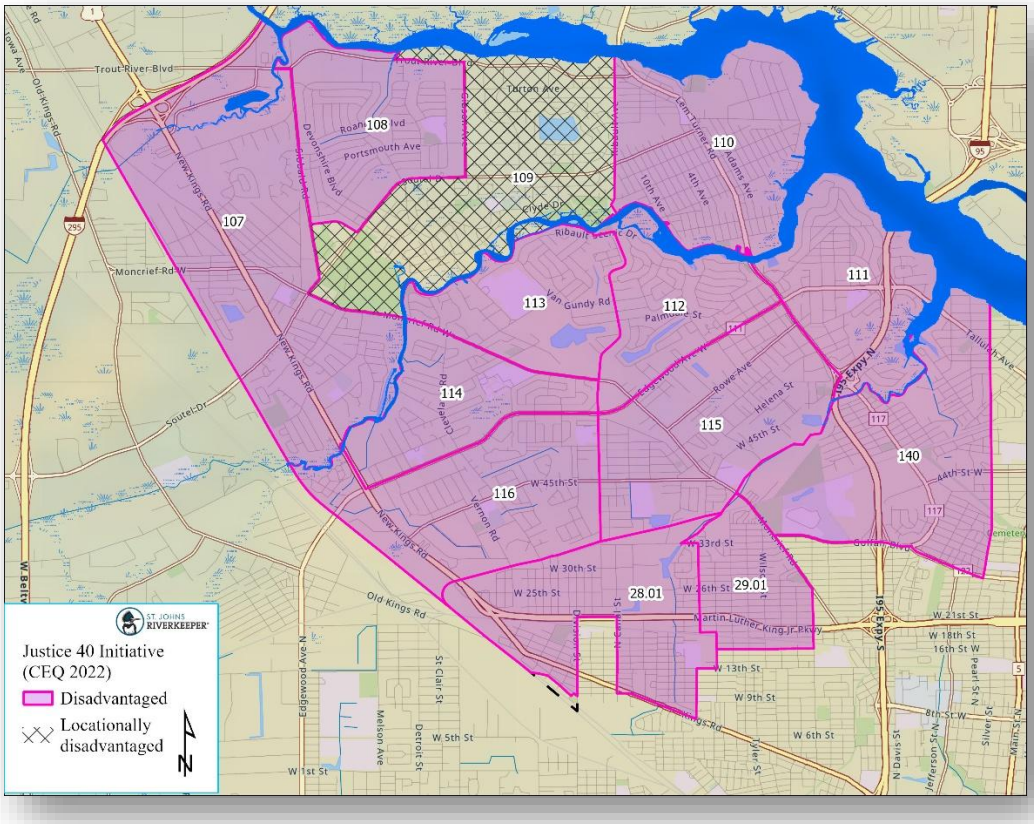


Figure 13: Disadvantaged census tracts in the RRPA mapped by Justice40 data.

Figure 13 displays the RRPA using data from the Justice40 initiative[23]. Each census tract contained in the RRPA was analyzed based on the Justice40 dataset and table 4 contains the results of that analysis. Specific environmental, health, or economic burdens, from the list of eight categories above, are associated with each tract within the RRPA. Low income is defined as people in households where income is less than or equal to twice the federal poverty level, not including students enrolled in higher education. Tract 109 is not technically classified as disadvantaged based on the criteria used, however, since it is surrounded by other disadvantaged census tracts, it has been flagged by the Justice40 initiative.

Table 4: Ribault River Area census tract analysis based Justice40 data.

Tract Number	**Burden(s)** – above 90th percentile	**Low Income** – above 65th percentile	**High School Education**[24] – above 10%	**Unemployment**[25] -- above 90th percentile	**Disadvantaged (Y/N)**	**Rank in the RRSA**[26]
107	**Health** -- diabetes (98th), low life expectancy (98th), and heart disease (93rd) **Legacy Pollution** – proximity to Superfund sites (94th)	68th	15%	97th	Y	3
108	**Health** – diabetes (98th) and heart disease (90th)	85th	14%	38th	Y	2
109	**Health** – diabetes (90th)	51st	16%	75th	Y, locational	1
110	**Health** – diabetes (93rd) and low life expectancy (93rd) **Workforce Development** – unemployment (98th)	89th	22%	98th	Y	4

[23] For more information on thresholds and variables please visit: https://screeningtool.geoplatform.gov/en/methodology
[24] Percent of people ages 25 years or older whose high school education is less than a high school diploma.
[25] Number of unemployed people as a part of the labor force
[26] The number assigned to each tract is based on the quantity and magnitude of each Justice40 social burden. Each tract is compared within the study area and ranked 1-13; with 13 having the most social burdens and 1 sharing the least.

111	**Health** – asthma (91st), diabetes (95th), and low life expectancy (94th) **Legacy Pollution** -- Proximity to Risk Management Plan facilities[27] (93rd) **Transportation** -- Traffic proximity and volume[28] (92nd) **Wastewater** -- Underground storage tanks and releases[29] (92nd) **Workforce Development** – low median income (92nd)	83rd	12%	86th	Y	10
112	**Health** – asthma (92nd), diabetes (99th), low life expectancy (97th), and heart disease (94th) **Legacy Pollution** -- Proximity to Superfund sites[30] (91st) **Wastewater** -- Underground storage tanks and releases (92nd)	83rd	21%	89th	Y	5
113	**Health** -- asthma (95th), diabetes (98th), and heart disease (93rd) **Legacy Pollution** – Proximity to Superfund Sites (94th) **Transportation** – Transportation barriers[31] (93rd) **Workforce Development** – Unemployment (91st)	94th	16%	91st	Y	7
114	**Energy** – energy costs[32] (90th) **Health** – asthma (90th), diabetes (99th), low life expectancy (98th), and heart disease (98th) **Legacy Pollution** -- Proximity to Risk Management Plan facilities (94th), Proximity to Superfund sites (96th) **Wastewater** – Underground storage tanks and releases (94th) **Workforce Development** – low median income (92nd)	88th	17%	77th	Y	6
115	**Energy –** energy costs (91st) **Health –** asthma (95th), diabetes (98th), low life expectancy (99th), and heart disease (91st) **Legacy Pollution --** Proximity to Risk Management Plan facilities (96th), proximity to Superfund sites (95th) **Wastewater –** Underground storage tanks and releases (94th)	93rd	16%	96th	Y	12
116	**Energy –** energy costs (91st) **Health –** asthma (93rd), diabetes (99th), low life expectancy (94th), and heart disease (98th) **Legacy Pollution --** Proximity to Risk Management Plan facilities (99th), proximity to Superfund sites (96th) **Wastewater –** Underground storage tanks and releases (94th)	91st	18%	94th	Y	11
28.01	**Energy** – energy costs[33] (90th) **Health –** asthma (91st), diabetes (98th), low life expectancy (99th), and heart disease (90th) **Housing** -- Historic underinvestment[34] **Legacy Pollution** -- Proximity to Risk Management Plan facilities (99th), Proximity to Superfund sites (98th) **Wastewater –** Underground storage tanks and releases (97th)	92nd	15%	97th	Y	9
29.01	**Energy** – energy costs (96th) **Health –** asthma (96th), diabetes (99th), low life expectancy (97th), and heart disease (97th) **Housing** -- Historic underinvestment (yes), housing costs[35] (91st) **Legacy Pollution** -- Proximity to Risk Management Plan facilities (99th), proximity to Superfund sites (99th) **Wastewater –** Underground storage tanks and releases (94th) **Workforce Development** – low median income (95th), poverty[36] (96th)	96th	21%	71st	Y	8
14	**Energy –** energy costs (89th) **Health –** asthma (90th), diabetes (94th), and low life expectancy (99th) **Housing** – lead paint[37] (85th) **Legacy Pollution** -- Proximity to Risk Management Plan facilities (98th), proximity to Superfund sites (93rd)	87th	16%	75th	Y	13

[27] Count of Risk Management Plan (RMP) facilities within 3 miles of tract
[28] Count of vehicles at major roads within 500 meters
[29] Formula of the density of leaking underground storage tanks and number of all active underground storage tanks within 1500 feet of the census tract boundaries
[30] Count of proposed or listed Superfund (or National Priorities List (NPL)) sites within 3 miles of tract
[31] Average of relative cost and time spent on transportation.
[32] Average annual energy costs divided by household income.
[33] Average annual energy costs divided by household income.
[34] Census tracts with historically high barriers to accessing home loans.
[35] Share of households making less than 80% of the area median family income and spending more than 30% of income on housing
[36] Share of people in households where income is at or below 100% of the Federal poverty level.
[37] Share of homes that are likely to have lead paint.

	Wastewater -- Underground storage tanks and releases (90th), wastewater discharge[38] (92nd) **Workforce Development** – low median income (91st), poverty (86th)					

Climate Vulnerability

Based on research by Lewis and others[39] (2023), the Climate Vulnerability Index (CVI) for the United States was created by incorporating input from community stakeholders, as well as using multiple datasets and existing indices that map public health, social, economic, environmental, and climate data across the U.S. and encompass 184 indicators[40]. This integration of this information resulted in the CVI for the U.S. and comprises four fundamental vulnerabilities (health, social/economic, infrastructure, and environment) and three specific climate change risks (health, social/economic, extreme events). The analysis reveals a significant disparateness in climate change vulnerability as well as highlighting areas with similar climate risks but varying baseline vulnerabilities[41]. These findings underscore the complex nature of climate change impacts: not only are they widespread and diverse across the U.S., but they also exacerbate existing disparities[42].

The CVI data was downloaded in tabular format, and then constrained to the state of Florida using census tract boundaries. Based on Lewis and others (2033) the overall climate vulnerability score combines environmental, social, economic, and infrastructure effects on neighborhood-level stability. The state of Florida ranks 16 out of 51 States and Districts in the U.S. and is classified as having a "higher vulnerability" and is in the 70th national vulnerability percentile[43]. Of the ten most vulnerable census tracts in the state of Florida, seven are within Duval Country and three fall within the RRPA. Putnam and Hillsborough counties share the top ten spots with Duval, Putnam ranked first and third in vulnerability, and Hillsborough ranked ninth. Figures 14 and 15 show the CVI data constrained to the RRPA. The CVI shows what is ***driving*** vulnerability, including chronic diseases, exposure to harmful pollutants and inadequate access to fresh, nutritious foods. Figure 14 maps the overall climate vulnerability scores (.68 is the highest score in Florida)[44]. Figure 15 shows the census tracts in the RRPA with the nationwide percentiles labeled on each tract. These percentiles represent the overall CVI value at a particular rank. For example, census tract 113 is in the 95th percentile, a common interpretation is that only 5% of the census tracts in the country are ranked more vulnerable than 113.

[38] Modeled toxic concentrations at parts of streams within 500 meters of tract.
[39] Lewis, P. G. T., Chiu, W. A., Nasser, E., Proville, J., Barone, A., Danforth, C., ... & Craft, E. (2023). Characterizing vulnerabilities to climate change across the United States. *Environment international*, *172*, 107772. (https://www.sciencedirect.com/science/article/pii/S0160412023000454)
[40] Ibid.
[41] Ibid.
[42] Ibid.
[43] https://map.climatevulnerabilityindex.org/report/cvi_overall/florida?mapBoundaries=Tract&mapFilter=9&reportBoundaries=Tract&geoContext=State
[44] Ibid.

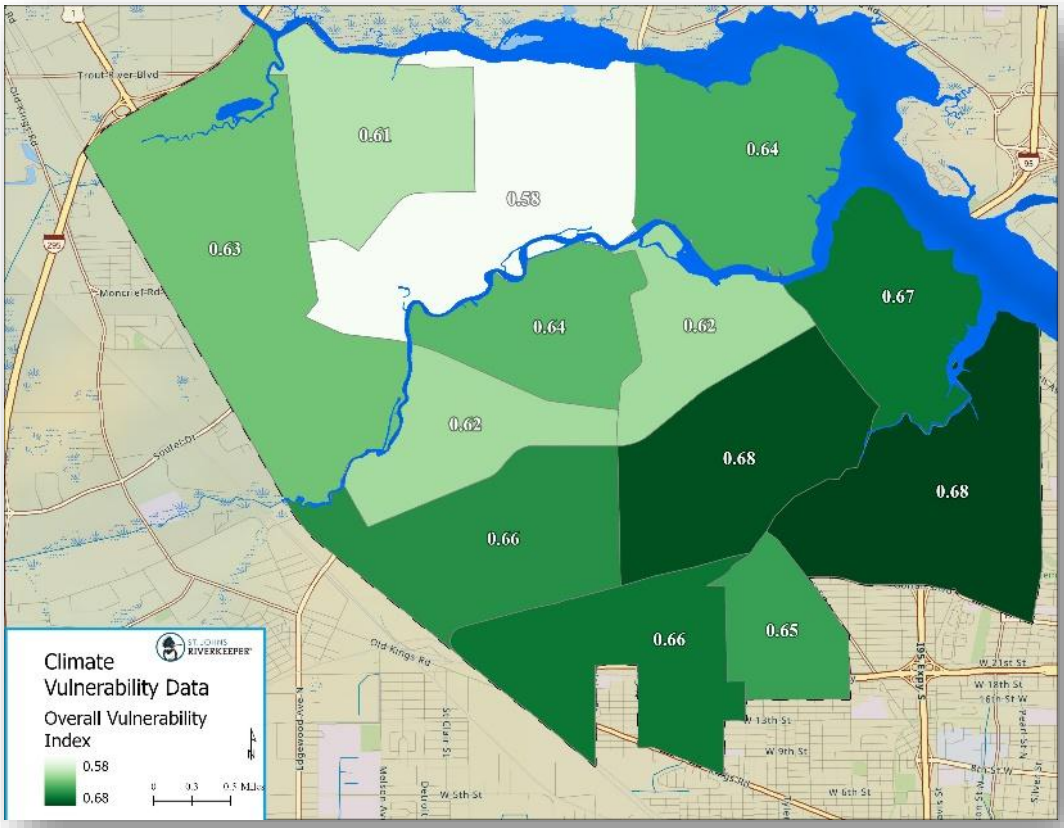


Figure 14 Climate Vulnerability Index by census tracts (Lewis et al. 2023).

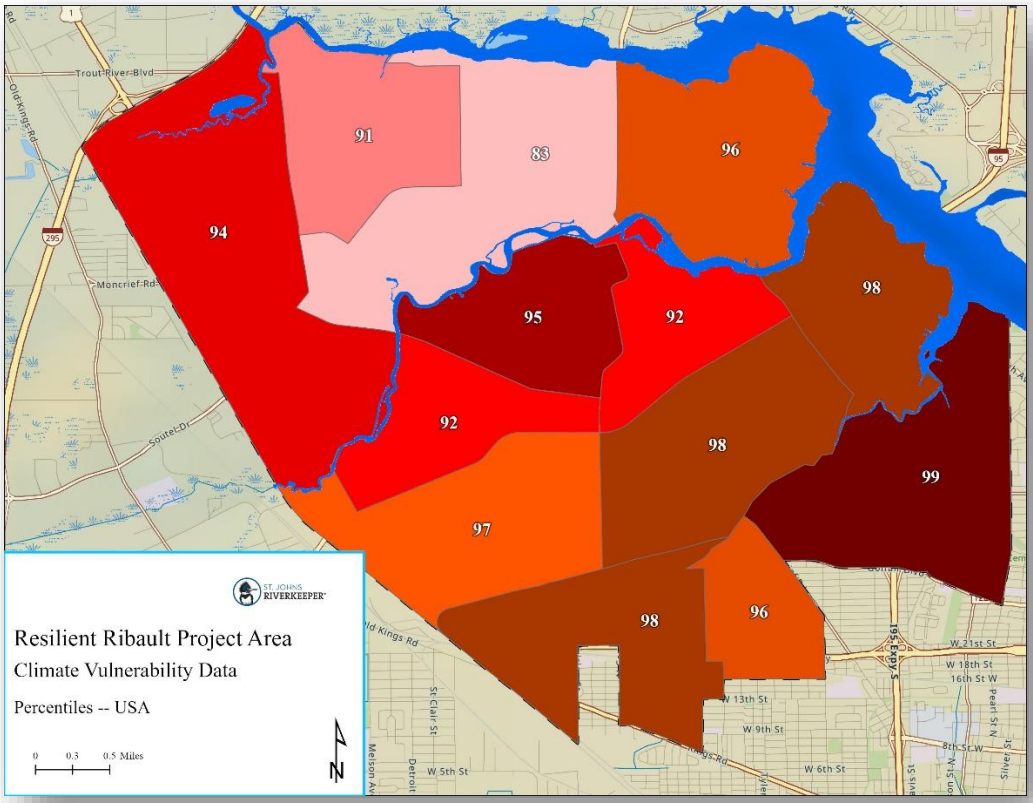


Figure 15: Climate Vulnerability Index percentiles of vulnerability (relative to the entire U.S.)

Flooding Impacts

Flooding along the St. Johns River is commonplace in many areas of the watershed. Unfortunately, increased flood activity across the watershed is predicted, and exacerbated by compound flooding[45]. The RRPA was mapped using the First Street Foundation's Flood Factor model[46] (Figure 16). This methodology incorporates flooding on four fronts: tidal, rain, riverine and storm surge. This is a national dataset, and each census tract is assigned a percentile based on the percent of properties with exposure to flooding in the 100-year flood scenario. Percentiles are relative to all other census tracts in the contiguous United States. This dataset calculates tract-level risk as the share of properties that meet the risk threshold and does not consider property value.

There are several areas of indexed values in the RRPA, and each census tract is labeled (Figure 16). Census tract 110 and 111 are in the highest risk category, falling in the 44th percentile and the 35th percentile respectively. Census tracts 113, 114, and 107 fall between the 22nd and the 25th percentile and are projected to have a moderately high risk of flooding. The remaining census tracts are at moderate risk of flooding, falling beneath the 20th percentile ranking.

[45] See Juárez, B., Stockton, S. A., Serafin, K. A., & Valle-Levinson, A. (2022). Compound flooding in a subtropical estuary caused by Hurricane Irma 2017. Geophysical Research Letters, 49(18), e2022GL099360.
[46] https://firststreet.org/risk-factor/flood-factor/

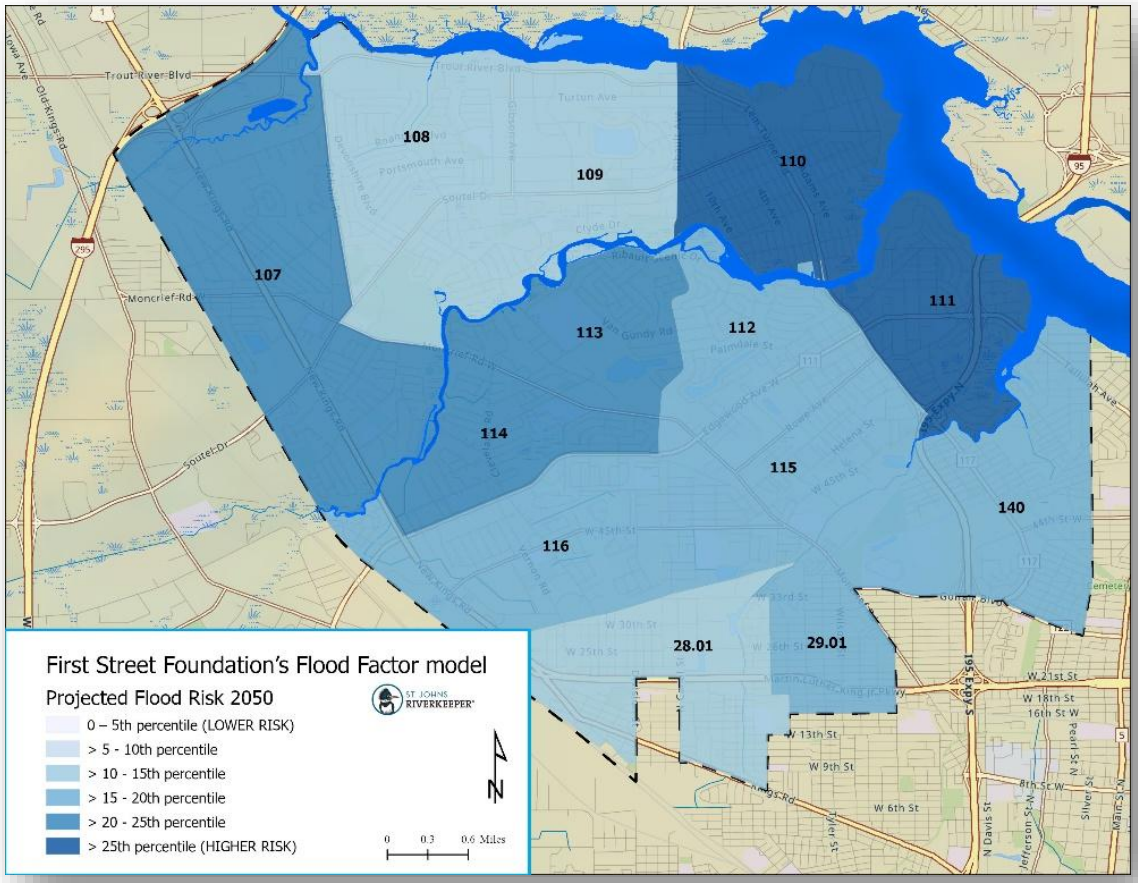


Figure 16: Projected Flood Risk 2050 (FSF 2021)

Prioritization of the Resilient Ribault Project Area

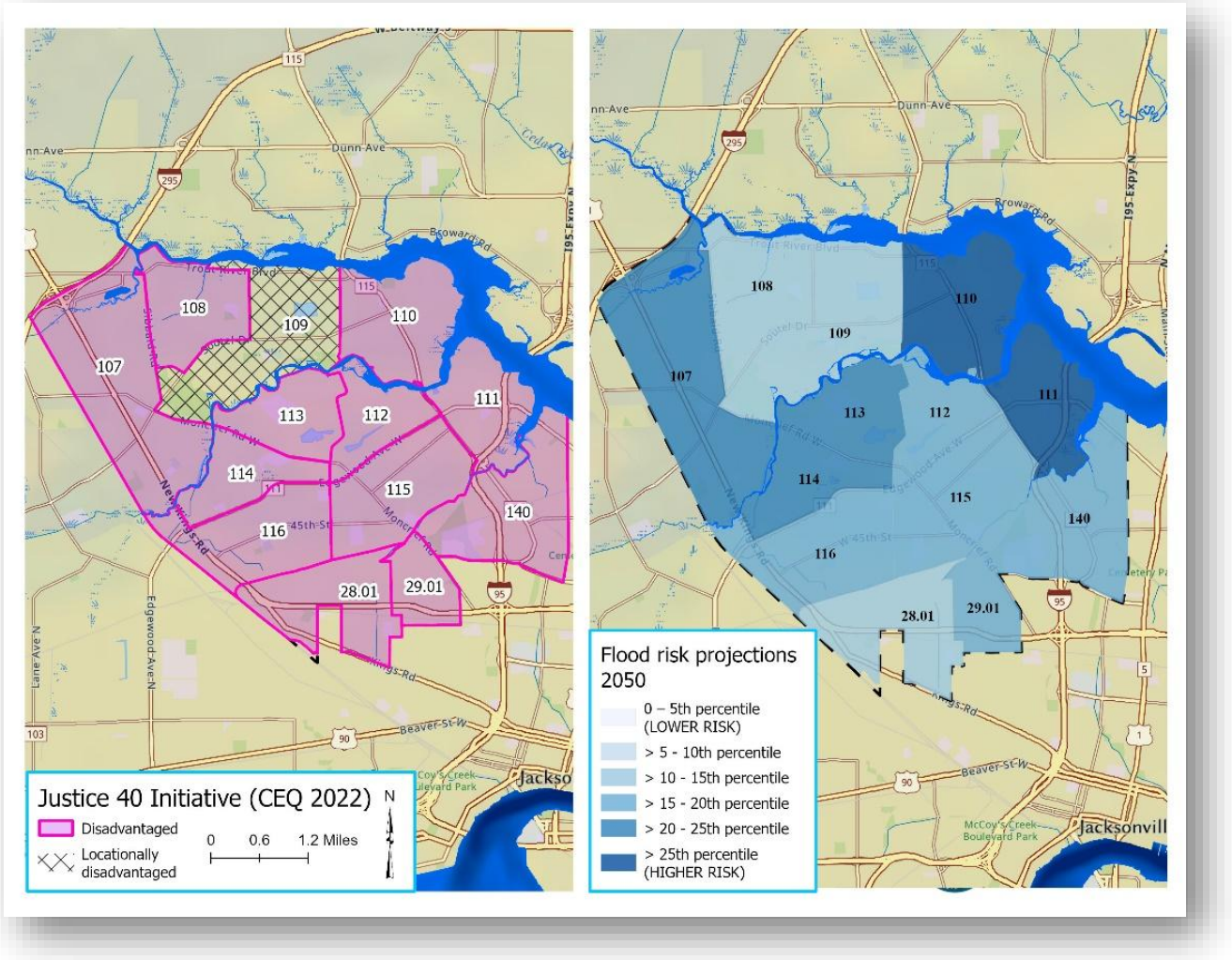


Figure 17: Social Vulnerability and Flood Risk Projections for the RRPA.

Based on initial analysis, the communities adjacent to the Ribault and Trout Rivers are vulnerable on three fronts: environmental stressors (including climate vulnerability), socioeconomic disparities, and flood-based impacts. Census tracts 108 and 112 have the highest indexed values for social vulnerabilities, but all the census tracts in the RRA are indexed at very high values relative to the rest of the Duval County and Florida (Table 2). Census tracts 110 and 111 are particularly vulnerable to flood risk, however, all the census tracts are at risk for some magnitude of flooding. Census tract 111, 113 and 114 have the highest number of burdens based on the Justice40 data, exceeding the thresholds on health, legacy pollution, transportation, energy, workforce development, and wastewater. The CVI (Lewis et al. 2023) placed tract number 140 in the highest percentile for climate vulnerability and ranked it 4th most vulnerable tract in the entire state.

The data shows spatial disparities between climate and social vulnerabilities. As researchers continue to refine these vulnerability indexes, the rankings of census tracts in the RRPA may change, but these thirteen tracts will remain on top of the list of vulnerable census tracts regardless of changes in the parameters and variables in published indices. Without a concerted effort to improve quality of life in the RRPA, this part of the city of Jacksonville will remain vulnerable on many fronts.