Christian Wells, PhD

UNIVERSITY of SOUTH FLORIDA
CENTER FOR BROWNFIELDS RESEARCH & REDEVELOPMENT

UNIVERSITY of SOUTH FLORIDA

CENTER FOR BROWNFIELDS RESEARCH & REDEVELOPMENT

Our mission is to leverage interdisciplinary scientific expertise at the University of South Florida to inform and support community-driven research on environmental contaminants, land use legacies, environmental justice, and sustainable and equitable (re)development.

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Brownfields are defined by the U.S. Environmental Protection Agency as properties—“the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.”

Healthfields are former brownfield properties that have been redeveloped to improve access to healthcare and healthy living, such as health clinics, community gardens, farmers markets, and recreational parks.

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RESEARCH

Florida Brownfields Redevelopment Atlas: A Decision Support Tool

U.S. EPA CERCLA Section 128(a) & 104(k) funding through the Florida Department of Environmental Protection, 2017-2024; FDEP BIL and U.S. EPA TAB funding for student internships

REDEVELOPMENT

Brownfields Redevelopment Planning and Environmental Site Assessments for Tampa Bay Communities

U.S. EPA Brownfields Area-Wide Planning Grant, 2017-2019; Community-wide Assessment Grants, 2019-2022, 2023-2025; Coalition Assessment Grant, 2024-2026; Community Change Grant, 2025-2028

EDUCATION

Environmental Workforce Development and Job Training Programs for East Tampa

U.S. EPA Environmental Workforce Development and Job Training Grant, 2020-2022; Brownfields Job Training Grant, 2023-2025

University Area CDC

Let's grow together!

Redevelopment in the University Area Community

cdc

CORPORATION TO DEVELOP COMMUNITIES OF TAMPA, INC.

Jobs Training in East Tampa

Focus

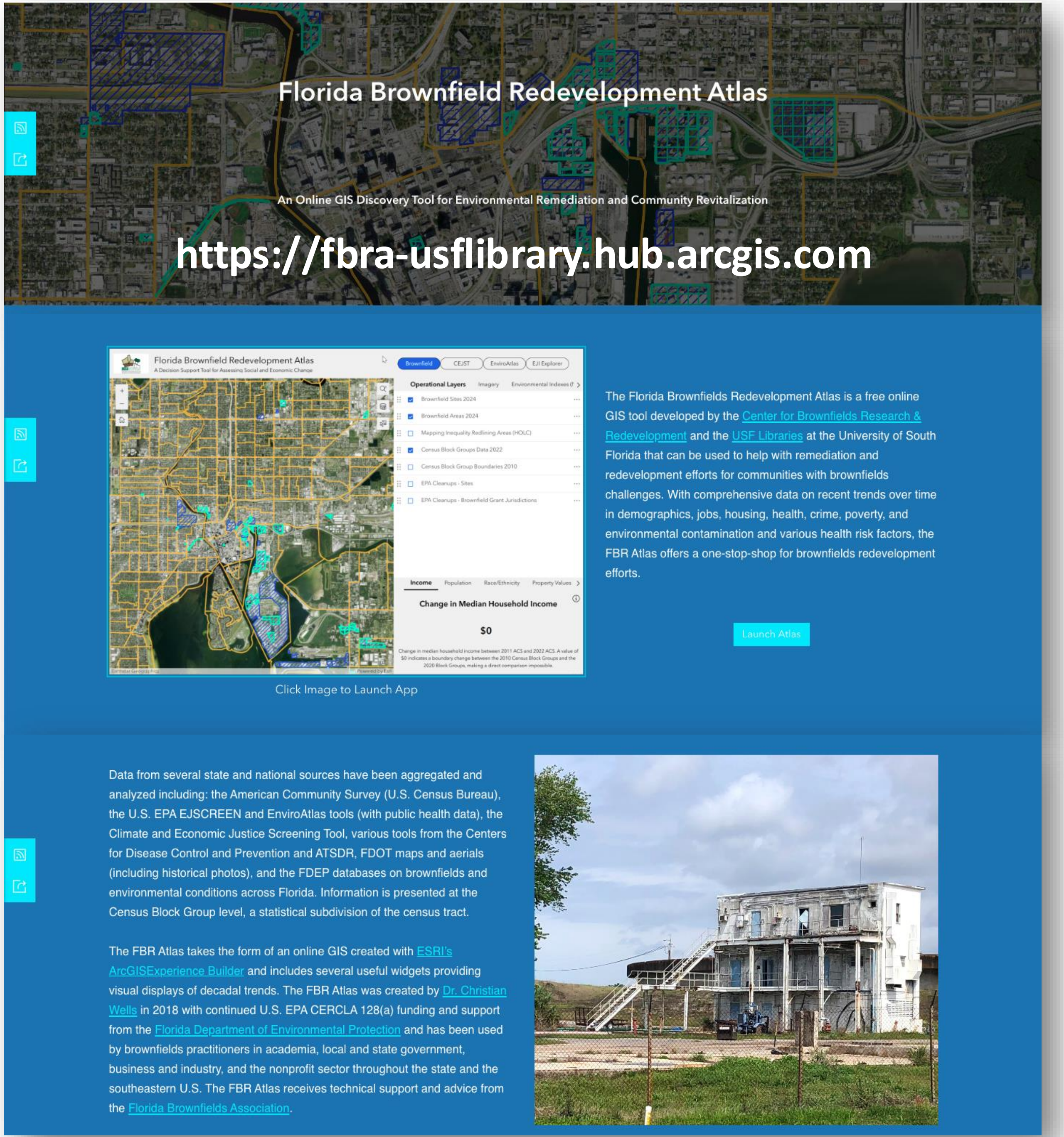
Environmental Assessment & Cleanup in Tallevast

University of South Florida 1956

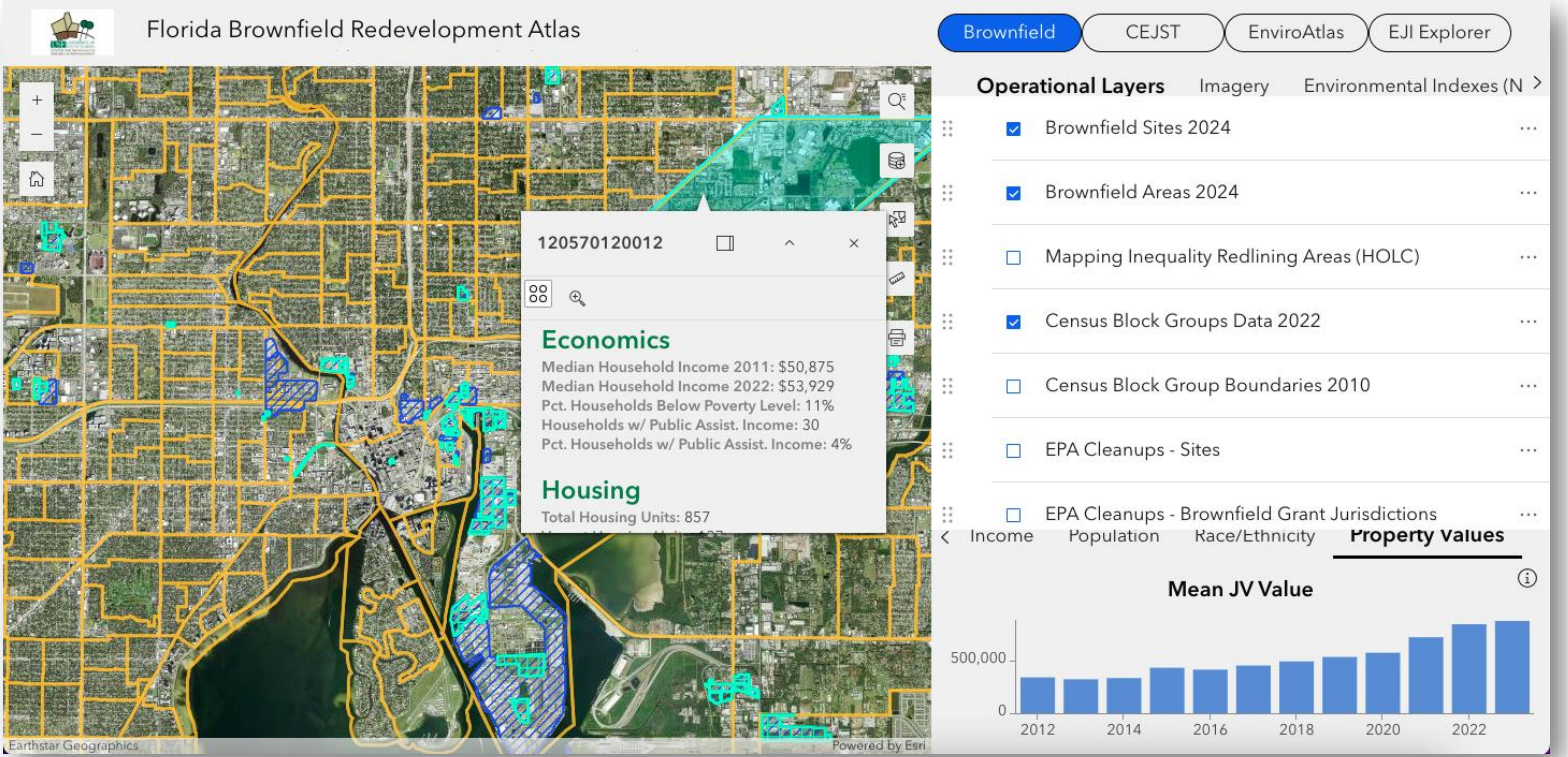
Internships & Curriculum Development at USF

Both the U.S. EPA and Florida DEP would like to better understand the impacts of State and Tribal Response Program funding (made available from CERCLA section 128(a) grants) that are provided to eligible communities who have demonstrated a need for assistance for assessment and remediation work in advance of planned and agreed-upon brownfields redevelopment.

This project evaluates and recommends options for determining social and economic impacts associated with redeveloped brownfield sites across Florida where cleanup activities were funded by the SRP.



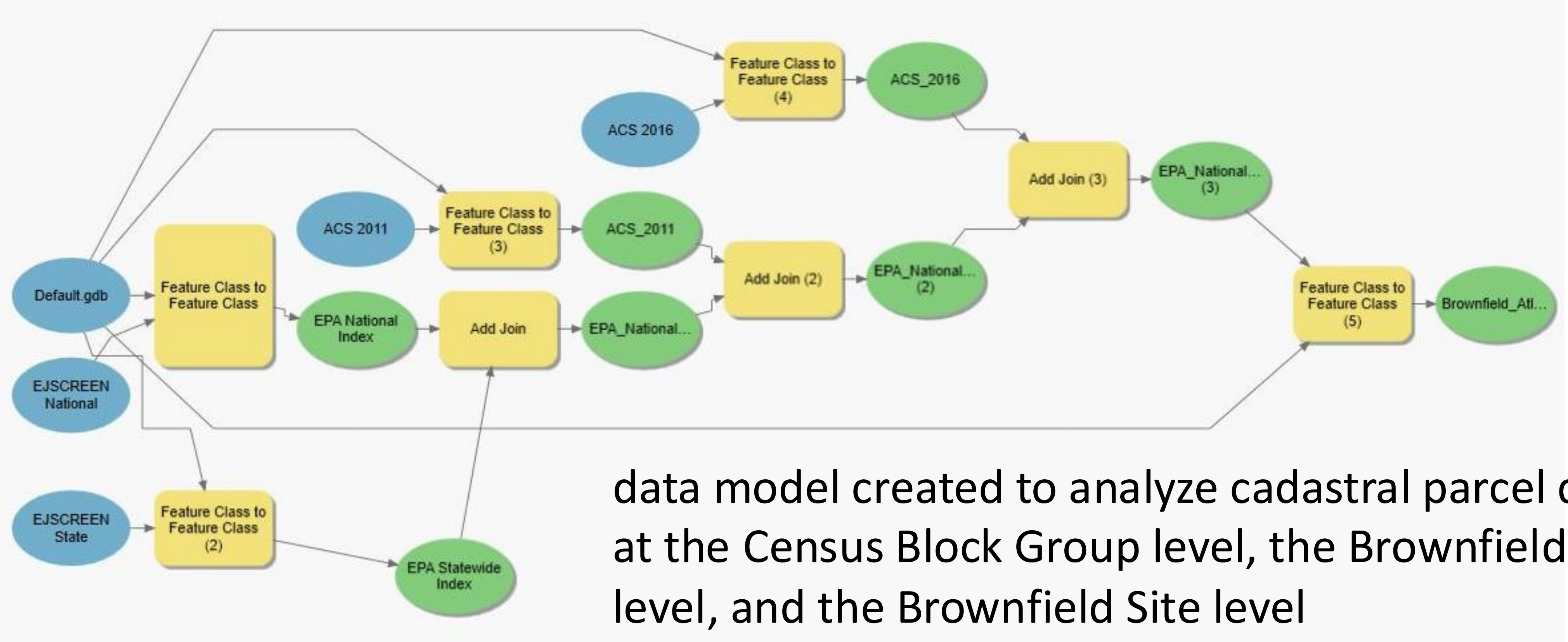
The **Florida Brownfields Redevelopment Atlas** is an online discovery tool that allows users to explore, summarize, and extract various types of environmental and socioeconomic data, with an emphasis on change over time, at the census block group level for the entire state of Florida.



Data are summarized to display trends over time for population, income, ethnicity, property values, crime, and environmental health, among other indicators.

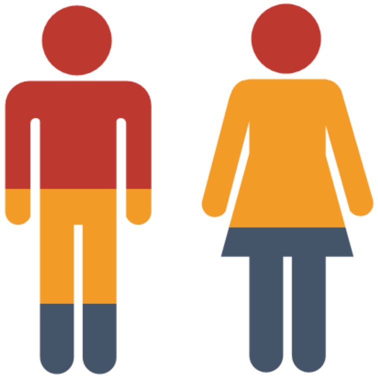
Data for the **Florida Brownfields Redevelopment Atlas** originate from numerous sources:

- National Historical Geographic Information System
- 2012/2018 ACS 5-Year summary datasets for the state of Florida at the census block group level
- Statewide parcel data, digital elevation models (where available), historic aerial imagery, and aerial LiDAR (where available)
- Florida Brownfield area and site layers managed by the FDEP
- EJScreen data on environmental health risks from the U.S. EPA



data model created to analyze cadastral parcel data at the Census Block Group level, the Brownfield Area level, and the Brownfield Site level

Social / Economic / Environmental Data



Demographics: population, number of households, median age, percent under age 5, percent over age 64, percent less than high school education, percent minority, employment growth, crime rates

Economics: median household income, percent households below poverty level, households with public assistance, percent households with public assistance income, total businesses, total employees, sales data

Housing: total housing units, vacant housing units, percent of units vacant, percent of units owned, percent of units rented, percent housing build prior to 1960, mean/median property values

Environmental Health: PM2.5, ozone, NATA diesel PM, NATA cancer risk, NATA respiratory HI, traffic proximity, lead paint indicator, superfund proximity, RMP proximity, hazardous waste proximity, wastewater discharge

Ground-truthing the Atlas

USF Site Number, FDEP Site Number
Site Name, Site Address

1. Can you locate the site?

2. Is there any indication that clean-up is still ongoing?

3. Is there new development observed in the vicinity of the site (NOT ON-SITE)?
    3b. Briefly describe if YES.

4. Type of uses observed on the site.
    4b. Types of uses observed in the area surrounding the site.

5. Are there streetlights present in the area?

6. Are there bus stops present in the area?

7. Are there sidewalks and crosswalks present in the area?
    7b. Briefly describe their condition

8. Are there boarded up or closed buildings in the area?
    8b. Briefly Describe if YES

9. Did you observe any incidents or evidence of crime?
    9b. Briefly describe if YES

10. How might levels of physical activity be impacted by walking and cycling routes to and within the site, and to nearby destinations?

11. Are sensitive use sites such as schools, daycare centers, senior centers, residences, and hospitals near high volume roads or stationary pollution sources?
    11b. Briefly describe if YES.

12. Are there people present and using services on the site?

13. Describe the vegetation on the site.
    13b. If there are any physical conditions that would prevent planting of vegetation, please describe them below and include photos where possible

14. In no more than three sentences, describe your impression of the site and its surrounding area as well as any observations made that were not encompassed by this questionnaire.

Former WWTP North Palm Beach

Atlas

10

ROI

Site Visit

10

ROI

US HWY 441
Pahokee

Atlas

3

ROI

Site Visit

2

ROI

Miracle Strip Pkwy.
Fort Walton Beach

Atlas

7

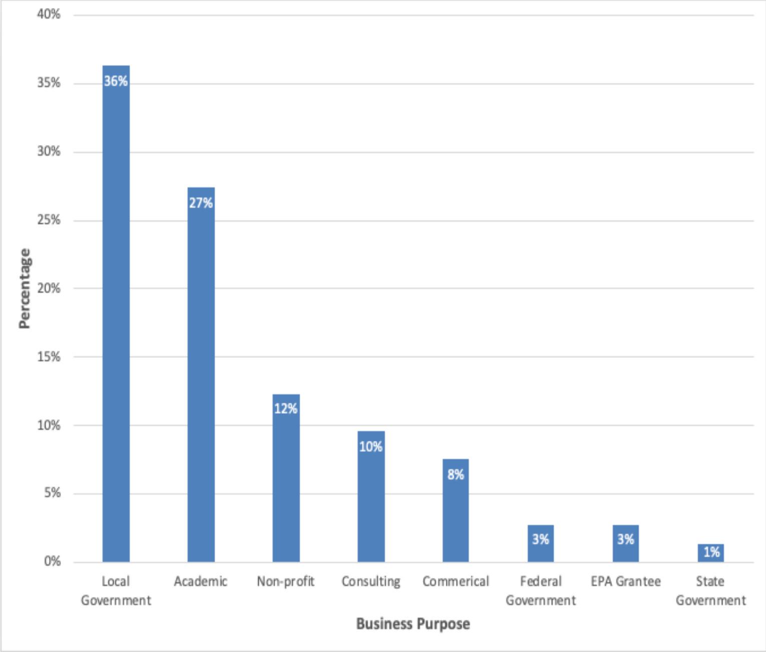
ROI

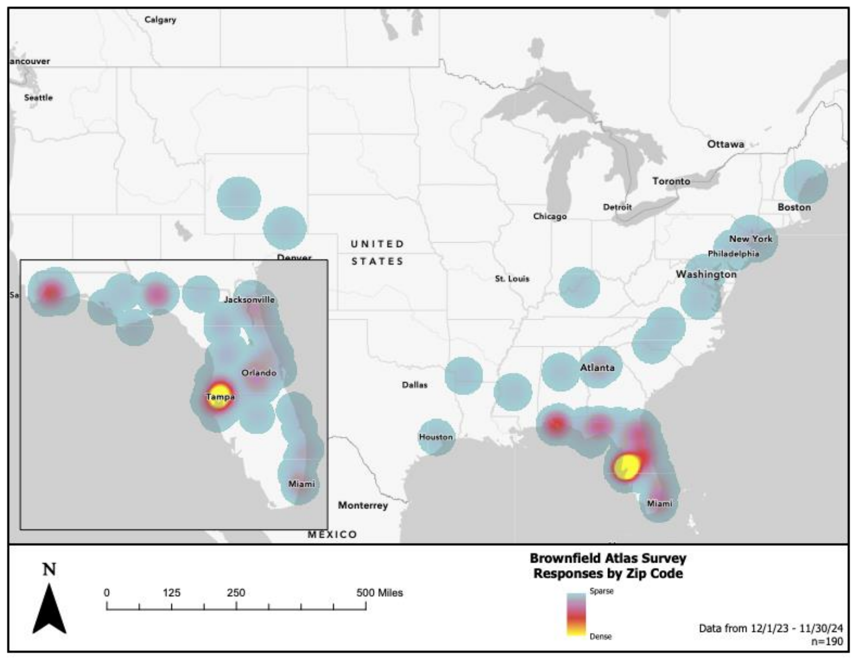
Site Visit

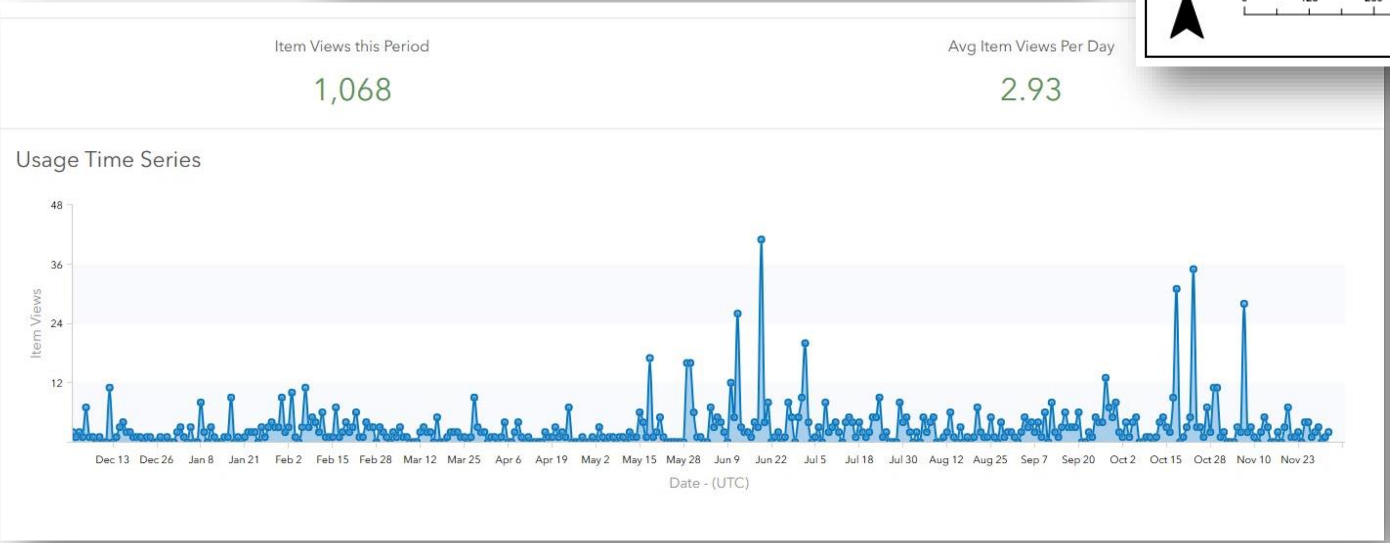
3

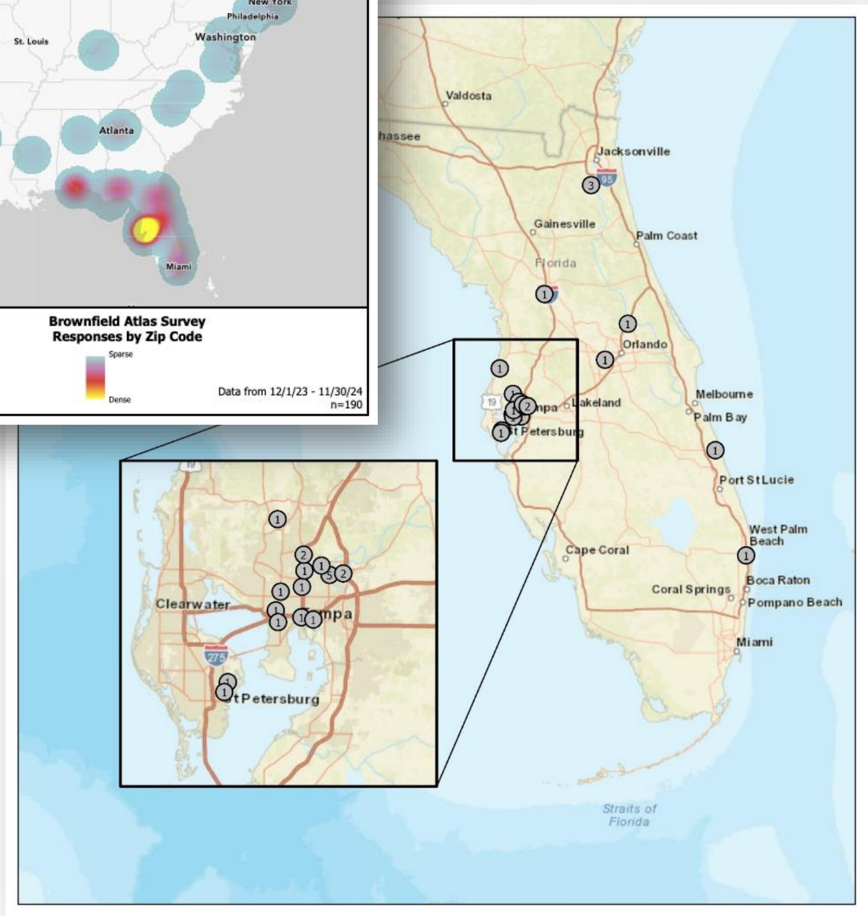
ROI

Florida Brownfields Redevelopment Atlas Usage Analytics

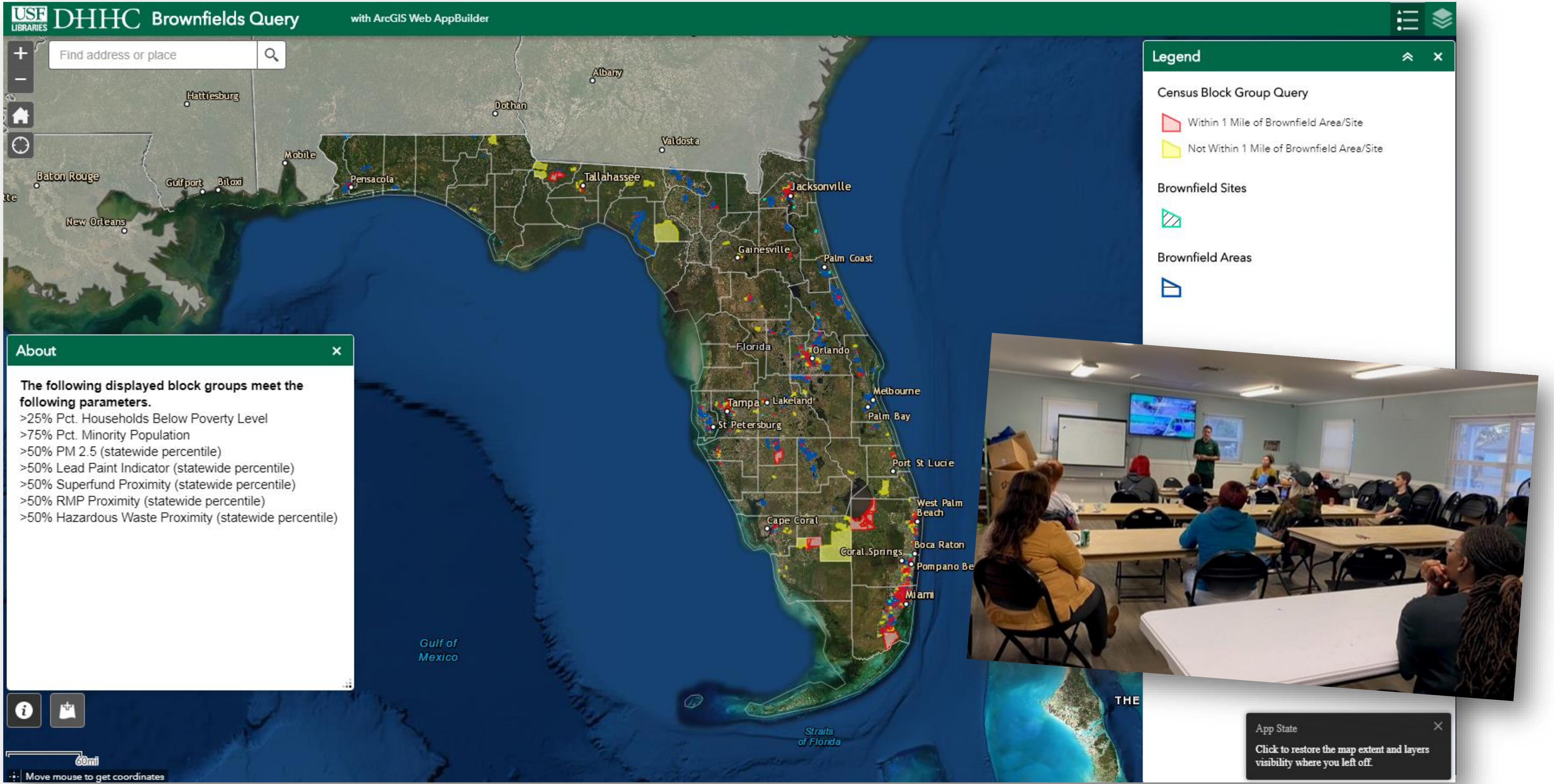








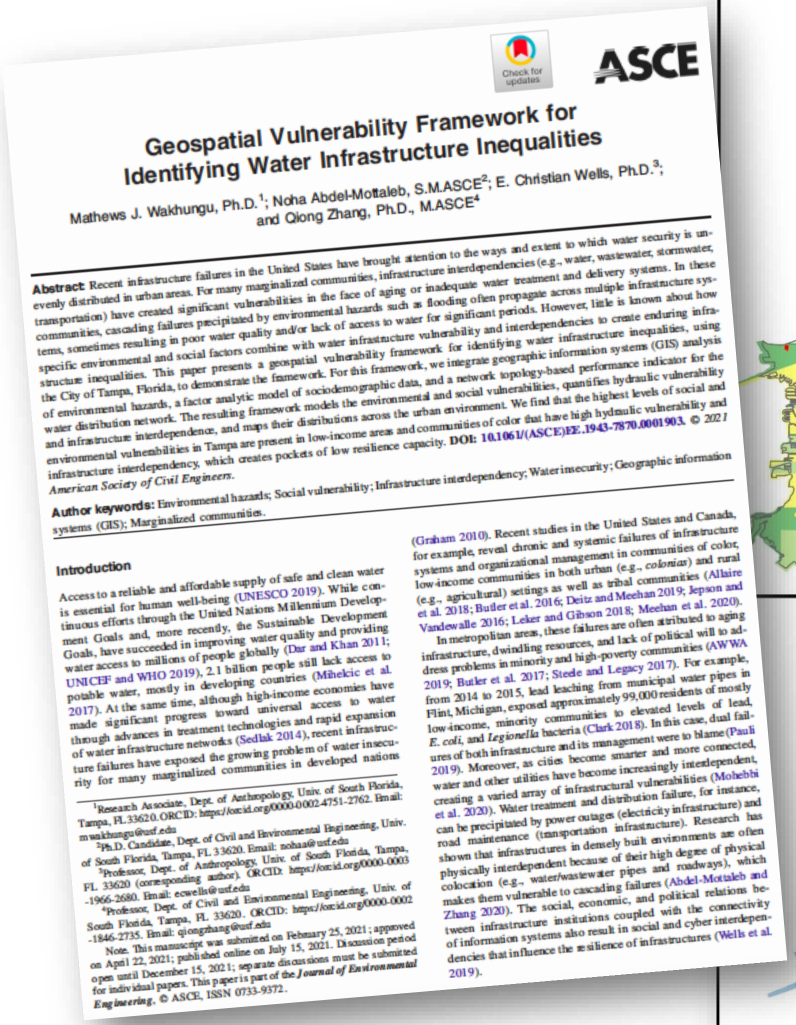
Example: Identifying "Underserved Communities"



Example: Applying for EPA Grants

	Points	% Total
Section 1	45-50 points	ca.30%
1 a. Target Area & Brownfields	(15)	
1.a.i. Background & Description of Target Area	5	
1.a.ii. Description of Priority Brownfield Sites	10	
1.b. Revitalization of the Target Area	(15)	
1.b.i. Reuse Strategy & Alignment with Plans	10	
1.b.ii Outcomes & Benefits of Reuse Strategy	5	
1.c. Strategy for Leveraging Resources	(15)	
1.c.i. Resources needed for Site Reuse	10	
1.c.ii. Use of Existing Infrastructure	5	
Section 2	20-35 points	
2.a. Community Need	(20)	
2.a.ii Community Need for Funding	5	
2.a.ii Threats to Sensitive Populations	15	
2.b. Community Engagement	(15)	
2.b.i. Project Involvement	5	
2.b.ii. Project Roles	5	
2.b.iii. Incorporating Community Involvement	5	
Section 3 (Tasks/Activities & Outputs, Cost Estimates)	50-75 points	ca.30%
Section 4 (Programmatic Capability and Past Performance)	30-35 points	ca. 20%

Example: Assessing Vulnerabilities



Check for updates

ASCE

Geospatial Vulnerability Framework for Identifying Water Infrastructure Inequalities

Mathews J. Wakhungu, Ph.D.[1]; Noha Abdel-Mottaleb, S.M.ASCE[2]; E. Christian Wells, Ph.D.[3]; and Qiong Zhang, Ph.D., M.ASCE[4]

Abstract: Recent infrastructure failures in the United States have brought attention to the ways and extent to which water security is unevenly distributed in urban areas. For many marginalized communities, infrastructure interdependencies (e.g., water, wastewater, stormwater, transportation) have created significant vulnerabilities in the face of aging or inadequate water treatment and delivery systems. In these communities, cascading failures precipitated by environmental hazards such as flooding often propagate across multiple infrastructure systems, sometimes resulting in poor water quality and/or lack of access to water for significant periods. However, little is known about how specific environmental and social factors combine with water infrastructure vulnerability and interdependencies to create enduring infrastructure inequalities. This paper presents a geospatial vulnerability framework for identifying water infrastructure inequalities, using the City of Tampa, Florida, to demonstrate the framework. For this framework, we integrate geographic information systems (GIS) analysis of environmental hazards, a factor analytic model of sociodemographic data, and a network topology-based performance indicator for the water distribution network. The resulting framework models the environmental and social vulnerabilities, quantifies hydraulic vulnerability and infrastructure interdependence, and maps their distributions across the urban environment. We find that the highest levels of social and environmental vulnerabilities in Tampa are present in low-income areas and communities of color that have high hydraulic vulnerability and infrastructure interdependency, which creates pockets of low resilience capacity. **DOI:** 10.1061/(ASCE)EE.1943-7870.0001903. © 2021 *American Society of Civil Engineers.*

Author keywords: Environmental hazards; Social vulnerability; Infrastructure interdependency; Water insecurity; Geographic information systems (GIS); Marginalized communities.

Introduction

Access to a reliable and affordable supply of safe and clean water is essential for human well-being (UNESCO 2019). While continuous efforts through the United Nations Millennium Development Goals and, more recently, the Sustainable Development Goals, have succeeded in improving water quality and providing water access to millions of people globally (Dar and Khan 2011; UNICEF and WHO 2019), 2.1 billion people still lack access to potable water, mostly in developing countries (Mihelcic et al. 2017). At the same time, although high-income economies have made significant progress toward universal access to water through advances in treatment technologies and rapid expansion of water infrastructure networks (Sedlak 2014), recent infrastructure failures have exposed the growing problem of water insecurity for many marginalized communities in developed nations (Graham 2010). Recent studies in the United States and Canada, for example, reveal chronic and systemic failures of infrastructure systems and organizational management in communities of color, low-income communities in both urban (e.g., *colonias*) and rural (e.g., agricultural) settings as well as tribal communities (Allaire et al. 2018; Butler et al. 2016; Deitz and Meehan 2019; Jepson and Vandewalle 2016; Leker and Gibson 2018; Meehan et al. 2020).

In metropolitan areas, these failures are often attributed to aging infrastructure, dwindling resources, and lack of political will to address problems in minority and high-poverty communities (AWWA 2019; Butler et al. 2017; Steele and Legacy 2017). For example, from 2014 to 2015, lead leaching from municipal water pipes in Flint, Michigan, exposed approximately 99,000 residents of mostly low-income, minority communities to elevated levels of lead, *E. coli*, and *Legionella* bacteria (Clark 2018). In this case, dual failures of both infrastructure and its management were to blame (Pauli 2019). Moreover, as cities become smarter and more connected, water and other utilities have become increasingly interdependent, creating a varied array of infrastructural vulnerabilities (Mohebbi et al. 2020). Water treatment and distribution failure, for instance, can be precipitated by power outages (electricity infrastructure) and road maintenance (transportation infrastructure). Research has shown that infrastructures in densely built environments are often physically interdependent because of their high degree of physical colocation (e.g., water/wastewater pipes and roadways), which makes them vulnerable to cascading failures (Abdel-Mottaleb and Zhang 2020). The social, economic, and political relations between infrastructure institutions coupled with the connectivity of information systems also result in social and cyber interdependencies that influence the resilience of infrastructures (Wells et al. 2019).

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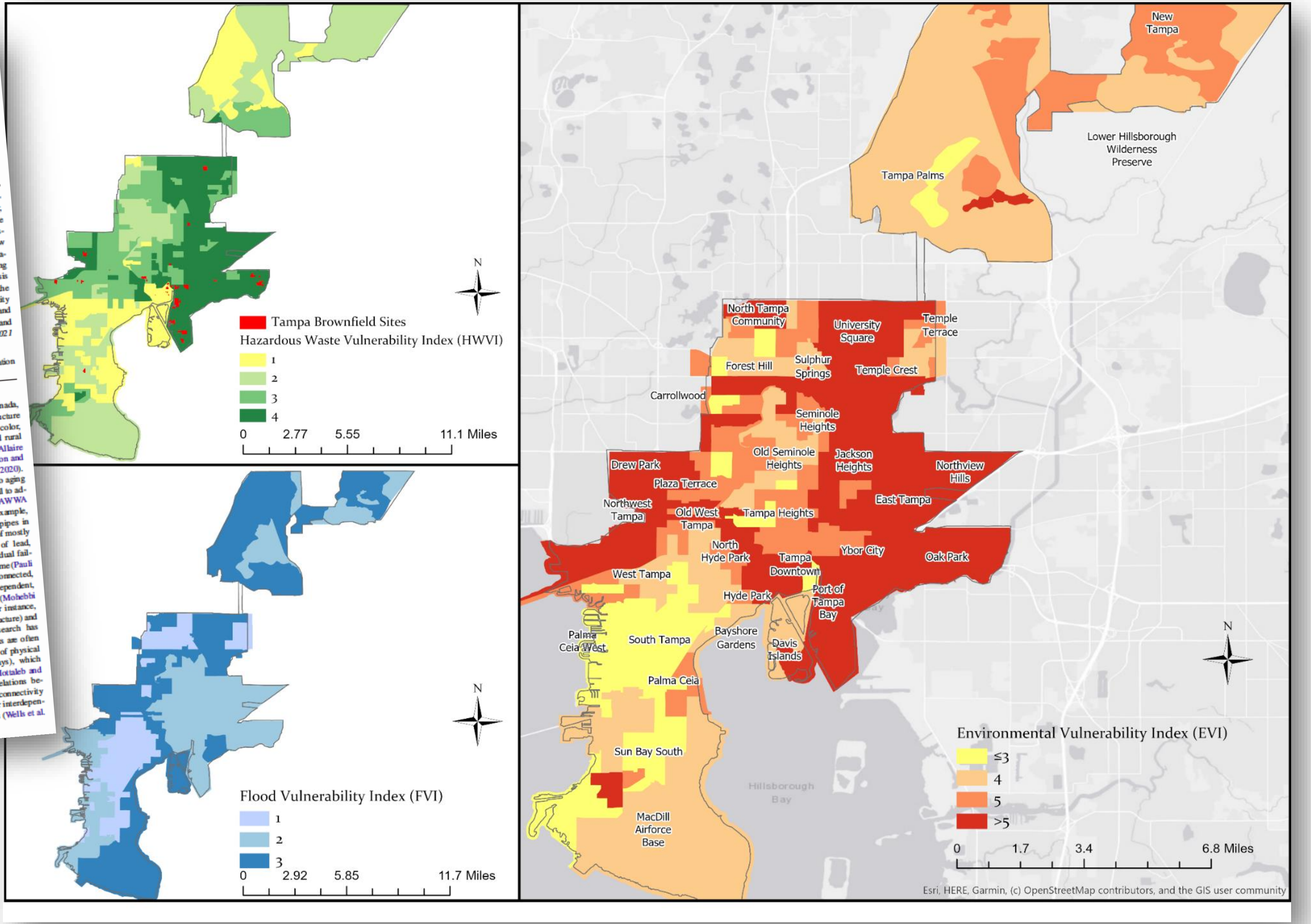
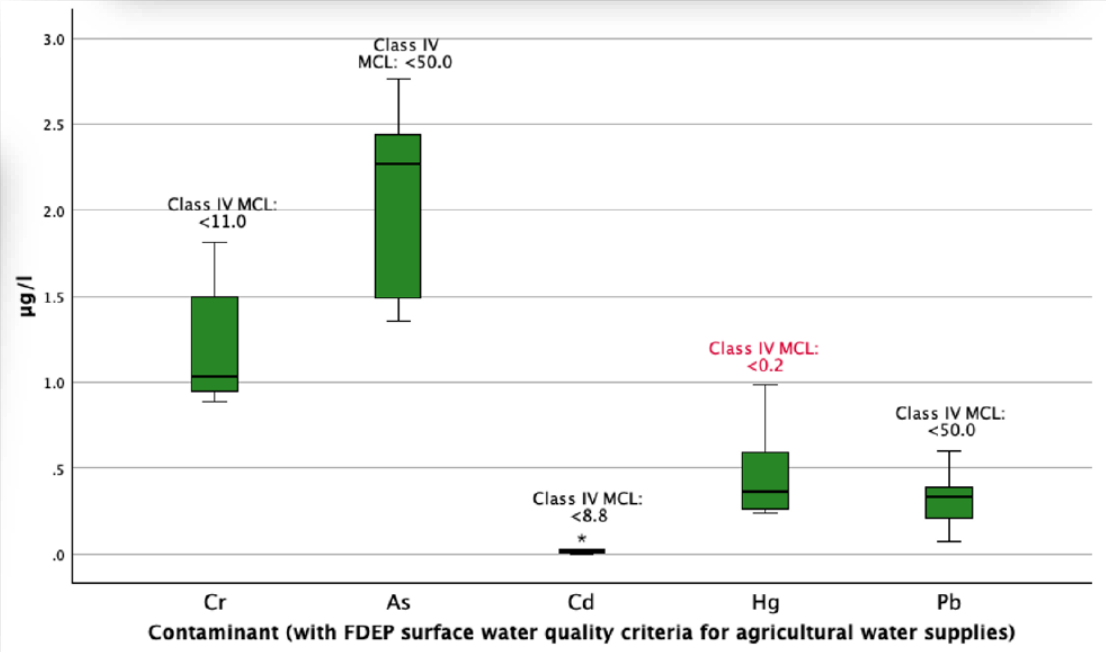
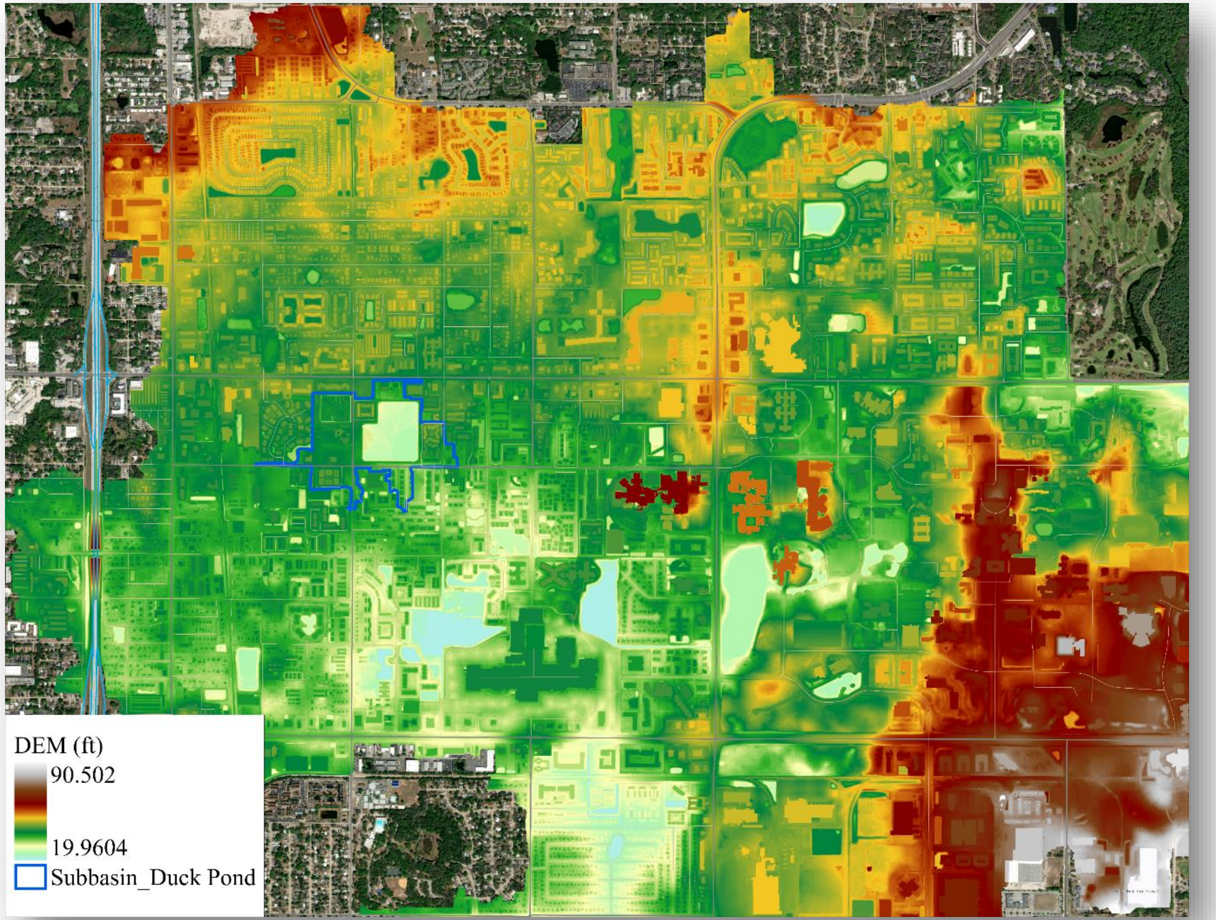
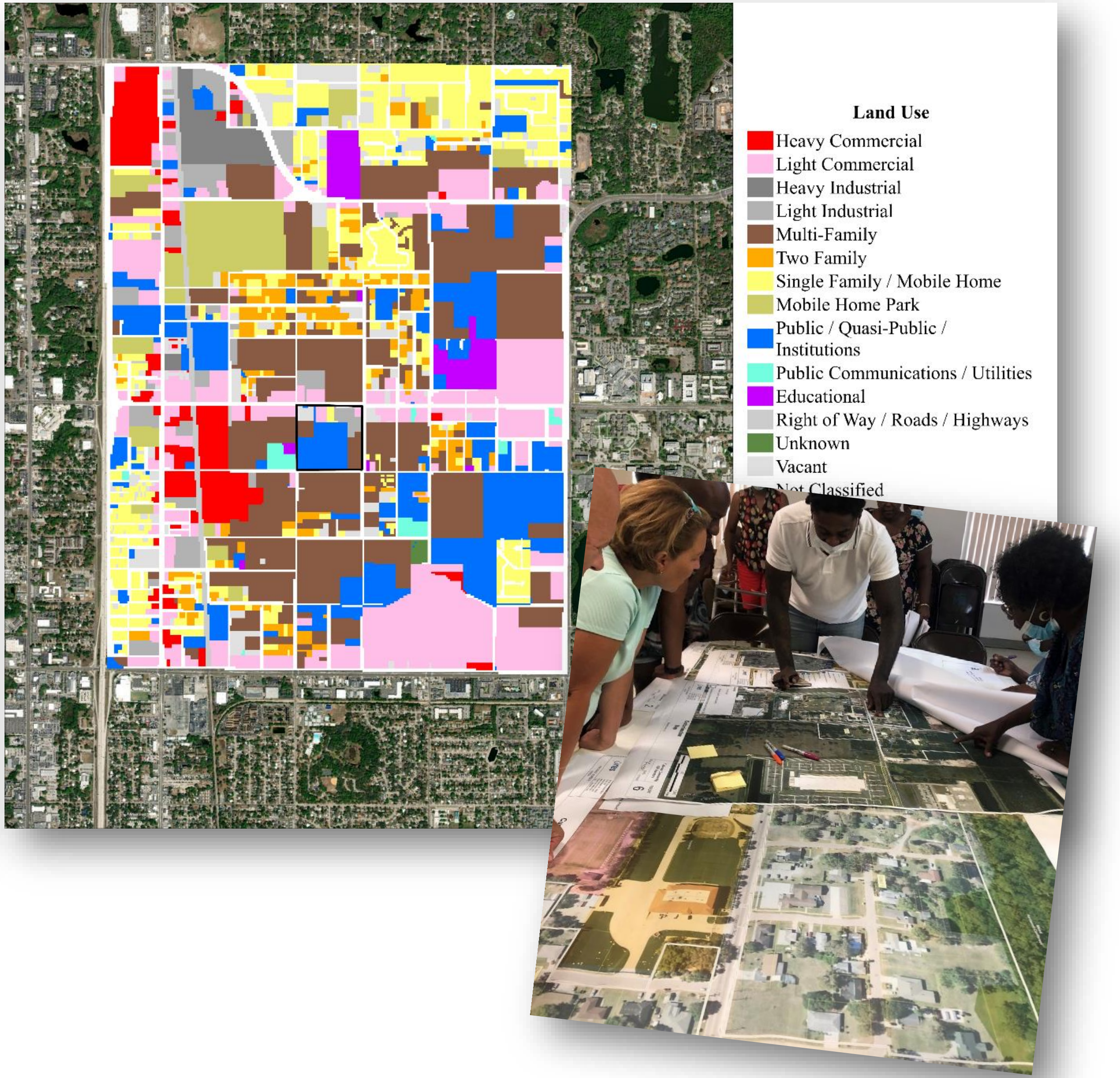


Example: Supporting Research

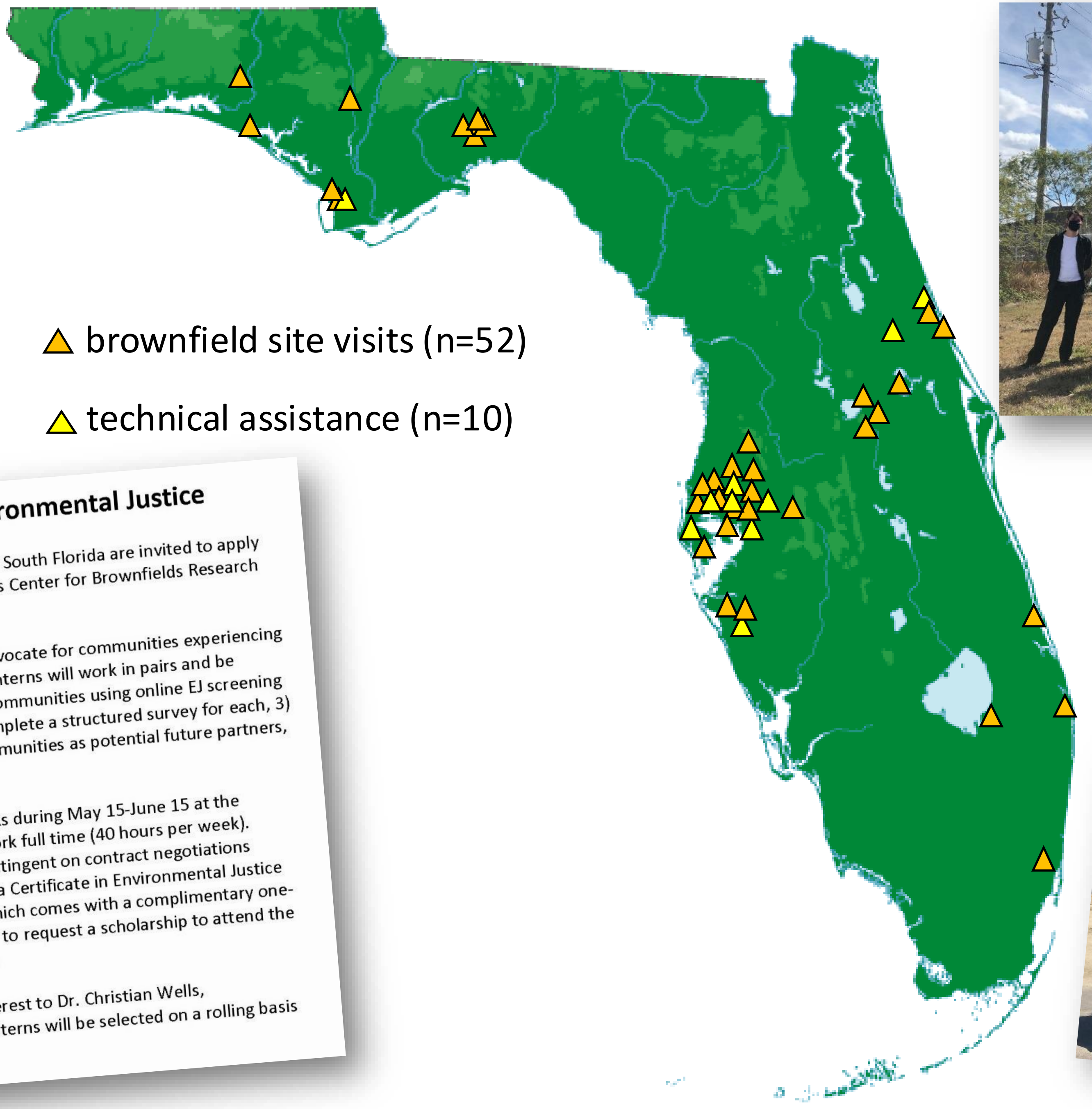


Example: Supporting Redevelopment Planning





USF Brownfields Student Internships RESULTS



NJIT TAB

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

2023 Summer Internships in Environmental Justice

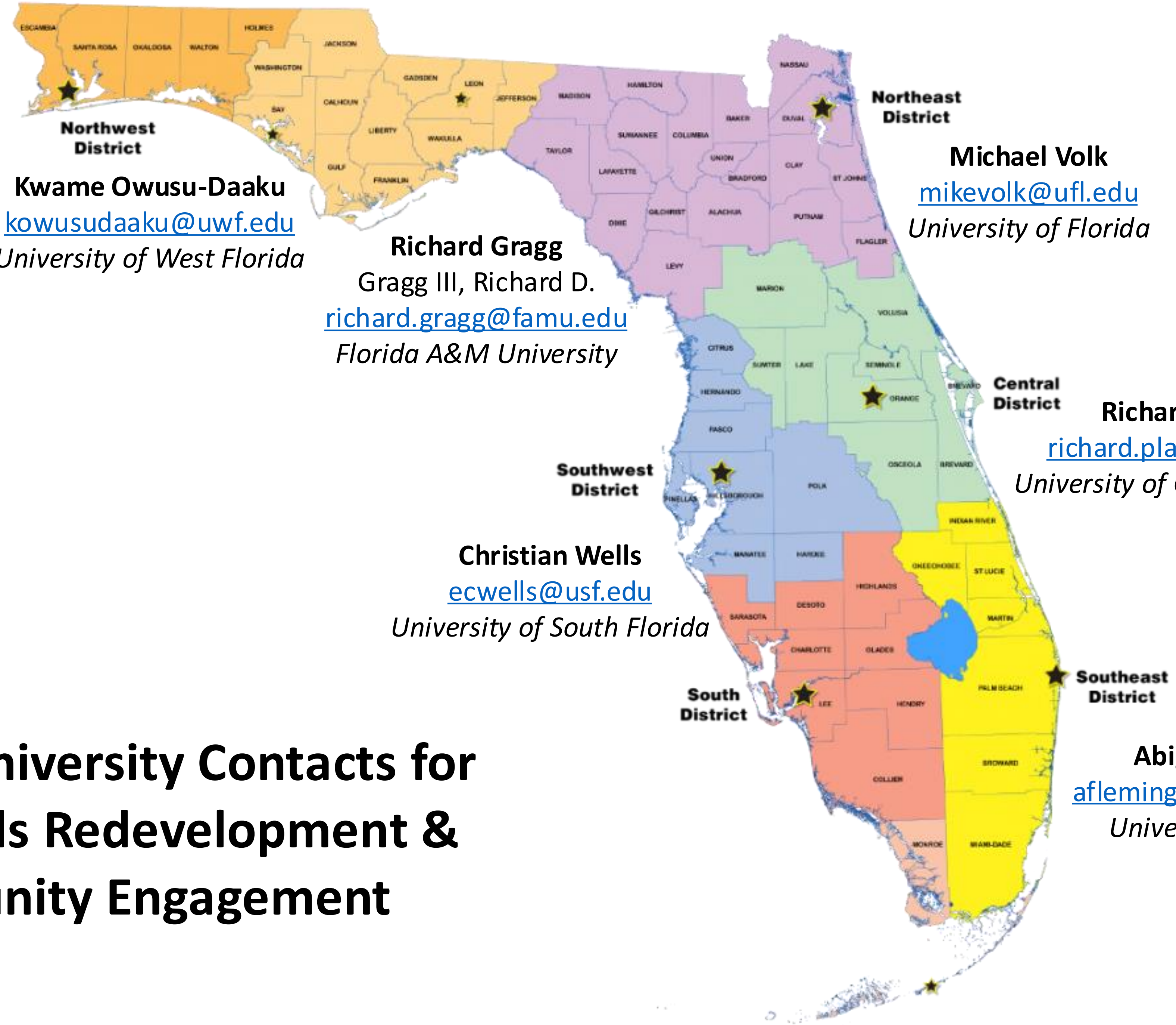
Students (undergraduate and graduate) at the University of South Florida are invited to apply for a summer internship in environmental justice with USF's Center for Brownfields Research and Redevelopment.

The internship will train students how to recognize and advocate for communities experiencing environmental justice challenges in the Tampa Bay area. Interns will work in pairs and be assigned a specific region in which they will: 1) research communities using online EJ screening tools, 2) select and visit at least two communities and complete a structured survey for each, 3) identify community-based nonprofits in the selected communities as potential future partners, and 4) prepare a report of findings.

The internship will take place over two consecutive weeks during May 15-June 15 at the discretion of the intern team. Interns are expected to work full time (40 hours per week). Interns will receive a $1000 stipend (note: funding is contingent on contract negotiations between USF and the FDEP) and be eligible to apply for a Certificate in Environmental Justice Leadership from the Florida Brownfields Association, which comes with a complimentary one-year membership in the association and an opportunity to request a scholarship to attend the association's annual meeting in Orlando on June 19-21.

To apply, send your resume/cv and a brief letter of interest to Dr. Christian Wells, ecwells@usf.edu. Up to 12 internships are available. Interns will be selected on a rolling basis until May 15.

Regional University Contacts for Brownfields Redevelopment & Community Engagement



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THANK YOU!

Reach out! ecwells@usf.edu

Learn more! usf.edu/brownfields

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