

GREAT LAKES COASTAL JUSTICE REPORT

URBAN & REGIONAL PLANNING
CAPSTONE REPORT | W'22

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EXECUTIVE SUMMARY

The Great Lakes region faces multiple intersecting challenges including climate change, a legacy of industrial pollution, and a long history of socio-economic disparities. Recent developments in federal policy are directing major investments to the region to address some of these issues. This University of Michigan Urban and Regional Planning Capstone Report, prepared for the Healing Our Water (HOW) Coalition, aims to provide a broad overview and analysis of coastal restoration projects and their implications for social justice and equity specific to the unique coastal environments of the state of Michigan and the Great Lakes region.

The research team used coastal resilience, environmental justice, and social equity frameworks to complete the following tasks:

- Create a definition of coastal justice for the Great Lakes.
- Identify historically disadvantaged communities in coastal areas using socioeconomic criteria.
- Understand the current federal policy landscape relevant to the Great Lakes Restoration Initiative (GLRI).
- Perform a spatial analysis of GLRI projects including their geographic distribution, funding allocations, and types.
- Analyze the grantmaking process of federal agencies for equity considerations.

Our key findings are:

- Current methods for identifying disadvantaged communities could be improved to better include coastal settings and the nuances of historic race-related injustices.
- Almost half of all coastal communities in Michigan have never received GLRI funding.
- Historically disadvantaged communities (HDCs) receive more funding in total and per capita than Non-HDCs. This appears to be due to their proximity to areas of concern (AOCs). However, within the set of communities located near AOCs, HDCs received less funding per capita relative to non-HDCs.
- There is a lack of adequate funding for Indigenous communities since they represent approximately 22% of all GLRI projects but only amount to 5% of the total funding from 2010-2019.
- More funding is allocated to projects in the physical management and research categories, while capacity building and community engagement projects are the least funded.
- There is no consistent set of equity criteria in the grantmaking process of agencies involved with the GLRI. The use of such criteria varies greatly from one agency to another.

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Based on our work, we offer a set of recommendations for the Healing Our Water Coalition that might guide their efforts to advocate for justice and equity in future GLRI's coastal resilience programing. We have grouped those recommendations into five key areas of action:

- 1. Identify Disadvantaged Communities in Coastal Settings:** Addressing equity issues requires first and foremost identifying the communities that are disadvantaged or overburdened by social and environmental factors and thus at higher risk of being impacted by climate hazards.
- 2. Fund Projects More Equitably:** Based on ongoing research on the needs of historically disadvantaged communities, there should be a heightened priority on planning, capacity building, and community engagement projects to ensure more equitable outcomes.
- 3. Build Trust through Meaningful Community Engagement:** Building trust between federal agencies and disadvantaged communities begins with actively listening to the needs of those communities and acknowledging histories of harm.
- 4. Evaluate Outcomes for Justice and Equity:** Federal agencies involved with GLRI projects should create and apply a uniform set of equity criteria to evaluate and assess the process, outputs and outcomes from their projects.
- 5. Break Systemic Barriers through Legislative Advocacy:** There are some legislative barriers to ensuring equitable outcomes such as matching requirements for applicants, which adversely affect under-sourced community-based organizations and municipalities more so than others.



Note: Unless stated otherwise, all images in this report are credited to Alexis Richards or are open source.

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INTRODUCTION

Climate change is disrupting social-ecological systems and the built-environment worldwide. The Great Lakes region is experiencing increased air temperatures, storm-induced inundation, high-energy wave action, and shoreline recession that threatens the livelihoods of more than 34 million people.¹ Nowhere is this danger more evident than in coastal communities. Nearshore coastal development has further placed public and private infrastructure at risk while also degrading sensitive coastal resources such as dunes, wetlands, and other wildlife habitats. Not all people and places, however, are impacted equally by climate change. There is evidence that historically disadvantaged communities—most notably Black, Indigenous, and People of Color (BIPOC) and lower-income households—experience disproportionately high levels of risk from coastal hazards.^{2,3} As with environmental pollution and degradation more broadly, these trends in coastal vulnerability reflect the history of environmental injustice in the United States.⁴

Despite a general recognition of these issues, there has been little research or analysis to date of environmental justice and equity specific to the unique coastal shoreland settings of the Laurentian Great Lakes. At the same time, recent developments in federal environmental policy aim to embed justice and equity considerations throughout federal agencies, especially through their grant-making efforts. The Biden Administration has launched its ambitious “Justice 40” Initiative, promising to deliver at least 40 percent of the overall benefit from federal climate investments to disadvantaged communities.⁵ Moreover, the Infrastructure Investment and Jobs Act (IIJA), passed by Congress in 2021, includes substantial funds to be directed to the Great Lakes Restoration Initiative (GLRI) to address climate and environmental issues in the Great Lakes Region.⁶

In response to the lack of focused research on issues of equity and justice in coastal Great Lakes settings, and to capitalize on the Biden Administration’s recent efforts to embed equity throughout the federal government, this University of Michigan Urban and Regional Planning program capstone project aims to explore the extent to which equity is considered in the distribution of federal funds for coastal resilience projects in the Great Lakes region. Our goal is to develop recommendations to ensure federal funding more effectively catalyzes equitable outcomes in coastal Michigan and other Great Lakes states.

This report was prepared for our client, the Great Lakes Healing Our Waters (HOW) Coalition. The research team began by synthesizing a literature review of equity, justice, and resilience issues unique to the Great Lakes coastal context as well as the current slate of federal policies aimed at addressing these issues. We then created a multipart analysis of GLRI grant funding, including a GIS spatial analysis of distribution and project types, and an analysis of grant request for proposal (RFP) language. This research and analysis informed our recommendations for improving the federal grant distribution process. HOW and other organizations may advance these recommendations to federal agencies and legislative bodies to promote the long-term health of coastal communities and landscapes, with an emphasis on ensuring the well-being of those most impacted by coastal hazards.

GUIDING QUESTION

The research team set out to explore the following question:

How can federal funding destined for Great Lakes coastal resilience projects in the State of Michigan meet the Biden Administration’s Justice40 agenda, which promises to deliver at least 40 percent of the overall benefit from federal investments in climate to disadvantaged communities?

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MICHIGAN'S COAST & HISTORICALLY DISADVANTAGED COMMUNITIES

While issues of equity, justice, and resilience are relevant in all coastal contexts, the research team chose to limit the study area to the coastline of the State of Michigan in order to make our analysis tractable. Nonetheless, this area alone represents nearly 62% percent of all the U.S. coastline within the Great Lakes region, and the analysis presented in this report may be replicated in other Great Lake states.⁷

As summarized in Table 1, over 2.3 million people live within Michigan's coastal zone, representing 24% of the State of Michigan's total population.⁸ Michigan's coastal zone has a household poverty rate of 20%, which is above the Michigan state average of 14%, and roughly 34% of its residents identify as BIPOC, similarly above the state average of nearly 22%.⁹ In terms of population density seen in Figure 1, Michigan's coastal zone is predominantly rural, with concentrations of urban density around the Detroit metropolitan area, Saginaw Bay, City of Muskegon, Traverse City area, and other smaller coastal cities; the majority of BIPOC residents within Michigan's coastal zone live in the four larger urban regions. By comparison, residents who live within the more rural, less dense stretches along Michigan's coasts predominantly identify as non-Hispanic and White.

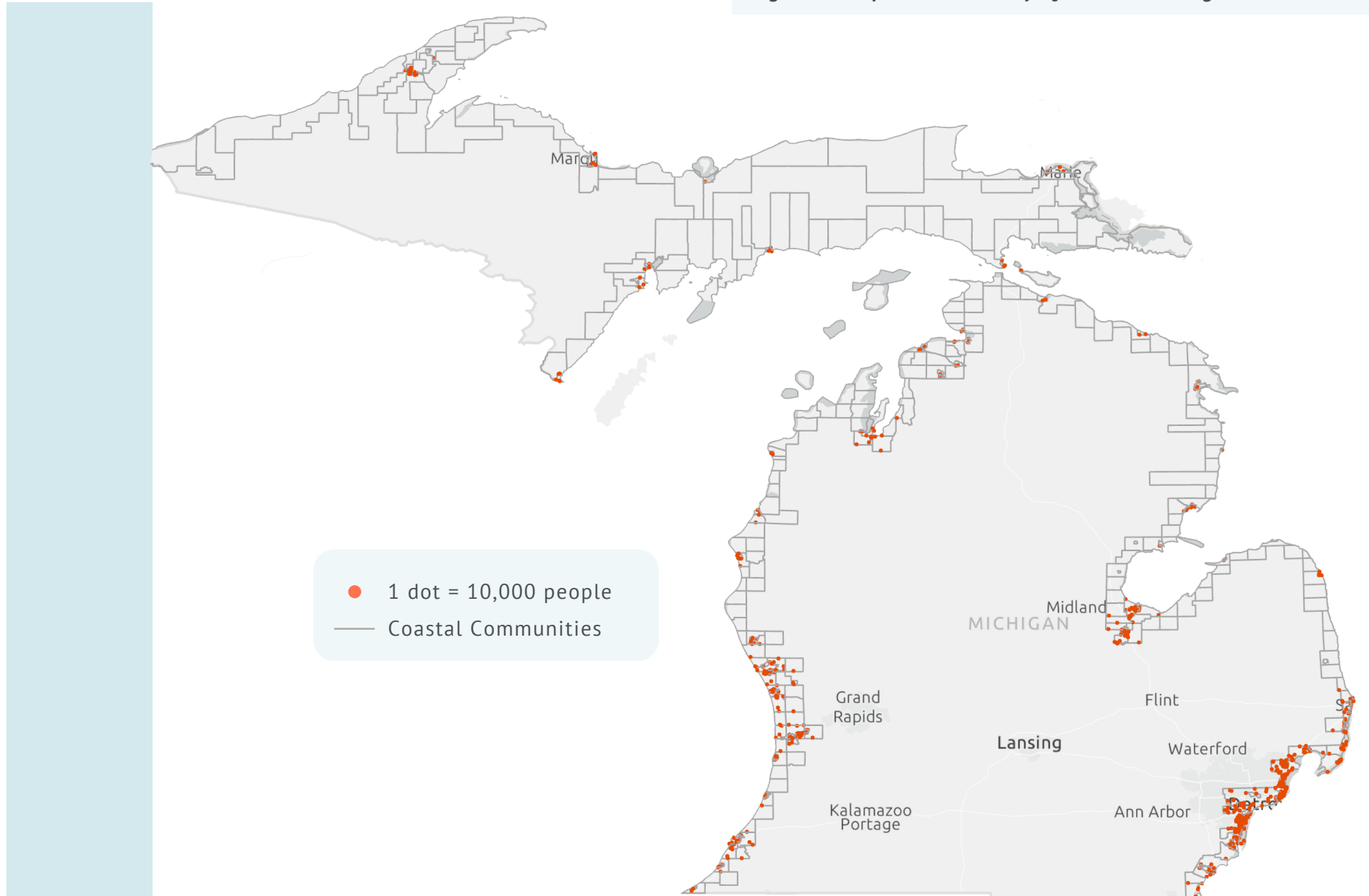
For the purposes of our research, we define Michigan coastal communities with more than 20% of residents identifying as BIPOC and/or those with over 13% of households in poverty as "historically disadvantaged communities (HDCs)" to evaluate the ongoing impacts from past discrimination.¹⁰

Table 1. Comparison Demographics of Coast + Michigan

	MI Coastal Communities		Michigan	
Total Population	2,436,263	24% of MI	9,965,265	100%
Black Residents	697,112	28.6%	1,519,461	20.1%
American Indian, Alaska Native	43,499	1.7%	147,844	1.5%
Asian Residents	46,730	1.9%	377,181	3.8%
Native Hawaiian, Pacific Islander	2,244	0.09%	10,282	0.1%
Latino Residents	149,931	6.2%	507,353	5%
White (non- Hispanic)	1,513,677	62.1%	7,477,400	75%
BIPOC Residents	824,691	34.4%	2,151,510	21.6%
Impoverished Households	482,374	20.1%	1,398,527	14%

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Figure 1: Population Density of Coastal Michigan



BACKGROUND RESEARCH

RESILIENCE, EQUITY, AND JUSTICE IN GREAT LAKES COASTAL SETTINGS

It is important to first understand how resilience, equity, and justice are defined within the specific context of Michigan's Great Lakes coastal environments. As of the publication of this work, there is a lack of consensus on the definition of these terms. Many contradictory interpretations of resilience exist within the research community, and in general the characterizations of resilience in coastal settings fail to address equity and justice considerations.

Defining Resilience

Sarah Dobie et al.'s study, currently under review for publication, surveyed publicly available information from 76 coastal stakeholders involved in natural resource management within the Great Lakes region regarding what 'resilience' meant in their work.¹¹ Two contradictory definitions of coastal resilience in the Great Lakes region emerged: 'structural resilience' and 'socio-ecological resilience.'

Structural resilience definitions generally refer to shoreline management strategies that favor hardening or engineering solutions. This interpretation of resilience is more likely to be advanced by individual property owners who live very near to shorelines since their properties are at direct risk of erosion caused by fluctuating lake levels, or by coastal governments similarly looking to protect critical infrastructure.

Alternatively, socio-ecological definitions of resilience prioritize natural ecological processes by accommodating dynamic changes to the shoreline as lake levels fluctuate. This latter definition is also more applicable at a regional and ecosystem scale, as opposed to individual property owner concerns focused more on a structural definition of resilience. The tension between these contradictory definitions of coastal resilience leads to conceptual ambiguity, in turn making it more difficult to operationalize coastal resilience programs, opening the door for co-optation by political actors.¹²

This report advances a socio-ecological definition of coastal resilience.

This definition focuses on both nature-based approaches and social well-being in coastal restoration efforts, an approach that translates more effectively to the regional and state-wide scale of our study.¹³ A purely 'structural' definition of coastal resilience may undermine justice and equity by putting the needs of individual private property owners, many of whom may be affluent and less historically disadvantaged, above the best interests of coastal communities as a whole and the overall health of the Great Lakes ecosystem.¹⁴ Unsurprisingly, only a handful of definitions reviewed by Dobie et al. included justice and equity in their definitions of resilience. Recent research shows that equity implications are "rarely considered explicitly in restoration projects."¹⁵ Throughout this report, our research and analysis show how a lack of rigorous consideration of equity and justice in the distribution of funds for Great Lakes coastal resilience can undermine efforts intended to bolster equity and justice.

Defining Equity & Justice

As opposed to equality, which assumes that an equal distribution of resources benefits all groups to the same degree, equity is concerned with the fair distribution of resources across different communities, especially those that have been disenfranchised historically (i.e. Black, Indigenous, People of Color, and low-income communities). Equity acknowledges that different groups have different needs, suggesting the limitations of one-size-fits-all solutions that can compound the advantages of privileged groups. Justice can only be achieved when the root causes that produce inequity are addressed and removed, thus enabling all people to live and access resources they need free of any obstructions.¹⁶



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Equity and justice can be understood in distributional, recognitional, and procedural terms. Distributive equity refers to the “distribution of goods and infrastructure, environmental (dis)amenities, services, and opportunities.”¹⁷ Recognitional equity refers to the acknowledgment of the history and underlying societal structures that marginalize certain groups, and respect the lived experiences and traumas of those most impacted by that history.¹⁸ Procedural equity refers to the inclusion of historically disadvantaged community members in decision-making and implementation processes; procedural equity creates members in decision-making and implementation processes; procedural equity creates “a platform for local voices, incorporates traditional knowledge, and ensures fair representation of diverse populations.”¹⁹

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Distributional Equity

In the specific context of the Great Lakes coastal region, distributional justice, or lack thereof, is reflected by the pattern of majority-BIPOC coastal communities disproportionately bearing the legacy of polluted and impaired coastal habitats from industrial activity,²⁰ as seen by the distribution of Areas of Concern (AOCs), discussed more below. AOCs are sites of severe environmental degradation, primarily the result of historical commercial and industrial activities and pollution. The cities of Muskegon and Detroit are two prominent examples, both encompassing AOCs and large BIPOC communities.

Distributional inequity is similarly reflected in the dominance of private property along Great Lakes shorelines,²¹ with roughly 80% of that land owned privately.²² Coastal property is typically expensive, considering not only the cost of the land, but also any structures on the property and coastal risk related expenses. This fiscal barrier creates a socio-economic divide in terms of accessing the coast and its resources. Distributional justice entails remediating impaired coastal environments so all people regardless of race, ethnicity, and income can enjoy coastal resources and recreational opportunities, as opposed to only those who can afford private homes close to the water’s edge.

Recent studies have raised concerns about the “inevitable trade-offs in the beneficiaries of resilience initiatives,” noting that the most vulnerable communities are often not the recipients of these efforts.”²³ As resilience projects are implemented and coastal habitats become healthier, plans and policies should be in place to anticipate the risk of continued displacement of historically disadvantaged communities as property values rise and more affluent individuals are attracted to formerly polluted areas.

Recognitional Equity

Recognitional equity and justice in a coastal Great Lakes context acknowledges the history of industrial contamination, pollution, and segregation that disproportionately impacts low-income and BIPOC communities, and it integrates this history into the planning and implementation of coastal resilience projects. While there are a few references to environmental justice in GLRI Action Plan III—a five-year planning document that guides GLRI priorities across federal agencies and is discussed in greater detail later in this report—references to equity or an acknowledgement of the history of racial discrimination in the Great Lakes region are notably absent.²⁴ Justice requires acknowledging the underlying social structures that contribute to the inequitable distribution of environmental harms.²⁵ Authors Sara Meerow, Pani Pajouhesh, and Thaddeus Miller suggest that recognitional equity in resilience planning entails: “(1) acknowledging community members’ different intersecting identities (e.g. race, gender, class, and age), (2) recognising that these identities are shaped by historical injustices and can shape individual vulnerability to shocks and stresses, ability to access resources, and capacity to participate in decision-making, and (3) fostering respect for different groups.”²⁶

Procedural Equity

Procedural equity and justice in the Great Lakes coastal setting requires the consultation and involvement of historically disadvantaged groups, specifically low-income and BIPOC individuals, in the planning and implementation of resilience projects. An example of procedural equity in Great Lakes coastal resilience work is reflected in the requirement for each AOC site to have a Public Advisory Council (PAC)—a group of voluntary local stakeholders in each AOC community that helps develop its required Remedial Action Plan and guide community priorities throughout the restoration process.²⁷ Issues of procedural equity in the application and awarding of GLRI grants for coastal resilience projects is a core element of this research team's analysis and is elaborated on further in this report. To facilitate procedural equity in this area, historically disadvantaged communities should not only be aware of GLRI grant opportunities, but also have the ability and capacity to submit competitive applications.

Our Definition of Coastal Justice

Drawing from this discussion of resilience, equity, and justice in Great Lakes coastal settings, our research team puts forth the following definition of coastal justice:

“The ability of all people—regardless of race, color, national origin, or income—to access, use, and benefit from the wealth of resources along the coastline of the Great Lakes, be they natural, social, cultural, or economic. As efforts to remediate degraded shorelines and prepare for the impacts of climate change continue, historically disadvantaged communities should be equal partners in the planning and implementation of resilience projects. All people should be able to celebrate healthier coastal environments without fear of further marginalization or displacement as a result of coastal resilience projects.”

* In crafting our definition of coastal resilience in the Great Lakes region, the research team referenced the US Department of Energy's definition of environmental justice²⁸ and the Community-Driven Climate Resilience Planning Framework of the National Association of Climate Resilience Planners.²⁹





Accessing Michigan's Shoreline

Equitable access to Great Lakes shorelines is an important aspect of our definition of coastal justice. The right to walk along the shorelines and beaches of the Great Lakes is enshrined in Michigan's Public Trust Doctrine, which guarantees the public's right to access a portion of the shoreline normally defined as the "discernable line landward at which the water contacts the shore," or more commonly known as the ordinary high-water mark (OHWM).^{30,31} As depicted in Figure 2, the public's access to this portion of shoreline is protected regardless of whether the property landward of that mark is owned publicly or privately.

However, the public's access to the shoreline is challenged when private property owners in nearshore contexts "armor" their beaches in response to erosion. The elusiveness and variability of the shoreline can lull property owners into a false sense of security when the water recedes and the beach is built up, enabling them to build their homes in locations that prove to be dangerously close to the lake mere years later. The turbulent shifts in the lake levels over the previous decades, including recent historically high lake levels, has led many private shoreline owners to desperately seek out solutions to protect their investments.³² Experts in this topic, including researcher Richard Norton, say private shoreline owners are more likely to turn to "hard armoring" solutions such as boulders and jetties, in an attempt to forestall further erosion of their beaches.³³ While concern for one's home is understandable, attempts to counter natural ecological processes tend to be futile in the long term. This reflects the fundamental contradiction between 'structural' and 'socio-ecological' definitions of resilience. Armoring may delay the erosion of the beach for a period of time, but over the long term these efforts will "ultimately fail as those structures

break apart under the relentless assault from high-energy waves," and may even hasten the erosion of neighboring beaches.³⁴ Long-term socio-ecological resilience is at risk when property owners narrowly perceive resilience as an individual act to protect their portion of shoreline from erosion.

Figure 2: Shoreline access

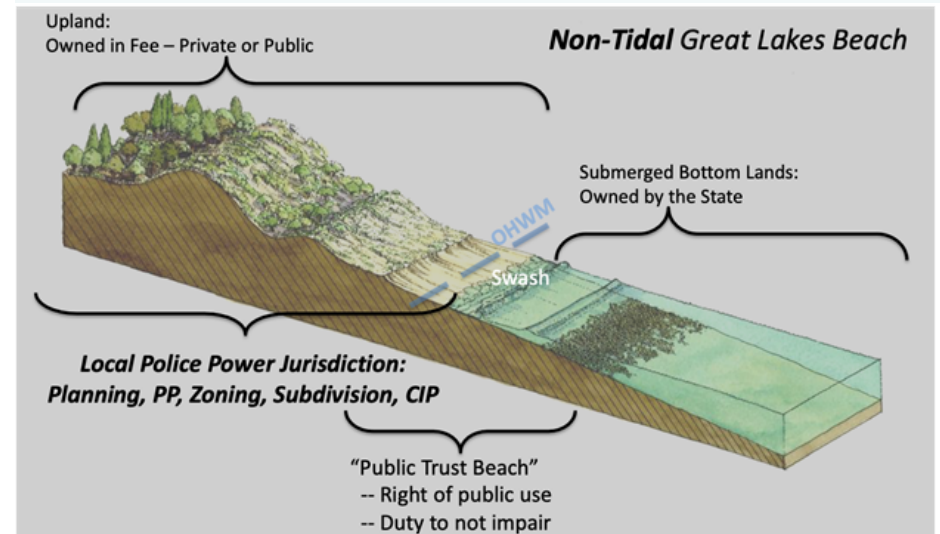


Image Source: Norton, Richard. "Planning for and Managing Resilient Great Lakes Shorelands and Coastal Communities Given Lake Level Fluctuations, Erosion, and Long-Term Shoreline Recession." Lecture, Zoom, Ann Arbor, MI, January 24, 2022

With roughly 80% of Michigan's shoreline under private ownership, the propensity for these property owners to armor their shoreline also raises distributional equity concerns in regards to Michigan's Public Trust Doctrine.³⁵ The predominance of private ownership of the shore can be by itself a barrier to public shoreline access. The acceleration of erosion on adjacent properties as a result of armoring compounds this barrier by threatening the very existence of walkable shoreline both over the long term and at a regional scale. Unfortunately, the drive to armor shorelines is increasing. With lake levels nearing record highs in 2020, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) received nearly 1,800 applications from private shoreline land owners for permits to install

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armoring structures, nearly “quadruple the amount of the same period of 2019.”³⁶

Our analysis suggests that funding for private shoreline armoring largely remains a private endeavor, and confirms that no GLRI project to date has included funds for armoring private landowners’ beaches. Nonetheless, the ongoing dominance of private interests along Michigan’s shoreline is likely to create an inequitable distribution of public access points along Michigan’s Great Lakes, thereby limiting the public’s right to walk along the shoreline. It may also increase pressures to provide public funding for the relief of private shoreland property owners.

Further challenges to public access to Great Lakes beaches and shorelines stem from long standing exclusionary policies affecting lower income and BIPOC communities. One recent study from the Chicago Council of Global Affairs found that several Chicago area beaches particularly those in the “whitest, wealthiest municipalities, have the most restrictive public beach access policies.”³⁷The study found that several of these beaches restricted parking for non-residents or charged

exorbitant parking fees that at times applied to residents and non-residents alike. For example, the City of Lake Forest requires a residency sticker for parking but offers non-residents an annual beach parking pass for \$910.³⁸ These types of restrictions on entry to the beaches makes it very challenging for lower-income individuals to access these public beaches, especially where public transit and pedestrian infrastructure are insufficient. The lack of mass transit options and the high costs of car ownership further compounds the difficulty that historically disadvantaged communities encounter when accessing recreational opportunities along Great Lakes shorelines. Even if visitors have a right to walk along the beach in Michigan once they reach it, there can be many barriers to accessing the beach in the first place.

Our research team highlighted the concern over shoreline armoring because of its potential to degrade the public’s access to the beach and its corresponding effect on equity. As noted in Dobie’s study on conflicting definitions for coastal resilience, there is the potential for public funding to be used in the future to remediate harms caused by over emphasis on structural resilience, which would heavily favor predominantly wealthy private shoreline property owners. Our team’s definition of coastal justice attempts to mitigate these harms by ensuring historically disadvantaged communities have access to the shore and are equal partners in planning coastal resilience projects. This analysis of coastal justice is even more critical given the influx of \$1 billion in federal funding destined for the Great Lakes region.



FEDERAL LANDSCAPE FOR GREAT LAKES COASTAL RESILIENCE

To understand how federal funding destined for coastal resilience projects can produce more equitable outcomes and fulfill President Biden's Justice40 agenda, the research team reviewed the current federal policy landscape. Below is a summary of the most relevant federal programs at the intersection of justice, equity, environmental stewardship, and coastal resilience.

OVERVIEW OF THE GREAT LAKES RESTORATION INITIATIVE

The Great Lakes Restoration Initiative (GLRI) was proposed in 2009 by the Obama Administration and launched the following year with the goal to restore Great Lakes ecosystems under a single federal initiative.³⁹ The Environmental Protection Agency (EPA) is the lead federal agency responsible for managing and administering GLRI. The initiative is the largest investment in Great Lakes restoration efforts in the last decade, totaling over \$3.8 billion to date.⁴⁰ The EPA has the authority to distribute appropriated funds to other federal agency partners who undertake restoration and remediation projects within the Great Lakes region, as well as to organize grant programs for non-federal partners. A federal interagency Great Lakes Task Force oversees the implementation of GLRI funds. The Task Force is also responsible for the creation of the GLRI Action Plan, which determines the goals and priorities of

the GLRI's restoration projects. The current iteration of the Action Plan runs through 2024. As of 2021, approximately 1,666 GLRI projects have been implemented in the State of Michigan.

The goal of the GLRI is to improve the physical, ecological, and biological integrity of the Great Lakes Basin. To do so, the initiative focuses on five key areas: (1) Toxic Substances and Areas of Concern (AOC); (2) Invasive Species; (3) Nonpoint Source Pollution Impacts on Nearshore Health; (4) Habitat and Species; and (5) Foundations for Future Restoration Actions. The AOC program is one of the largest and most significant GLRI projects, comprising 37% of all GLRI funds distributed for fiscal year 2021.⁴¹ Since 2010, around \$1.4 billion of GLRI funds have gone directly to AOCs. The AOC program was explicitly created to address instances of severe environmental degradation within the Great Lakes basin; in the 1980's, 25 locations were identified within the United States via the US-Canada Great Lakes Water Quality Agreement (GLWQA).⁴² Of those, 14 AOC sites are located along the coastline of the State of Michigan as seen in Figure 3. AOC sites are significant because many of these highly polluted areas disproportionately impact the historically disadvantaged groups that live near them.



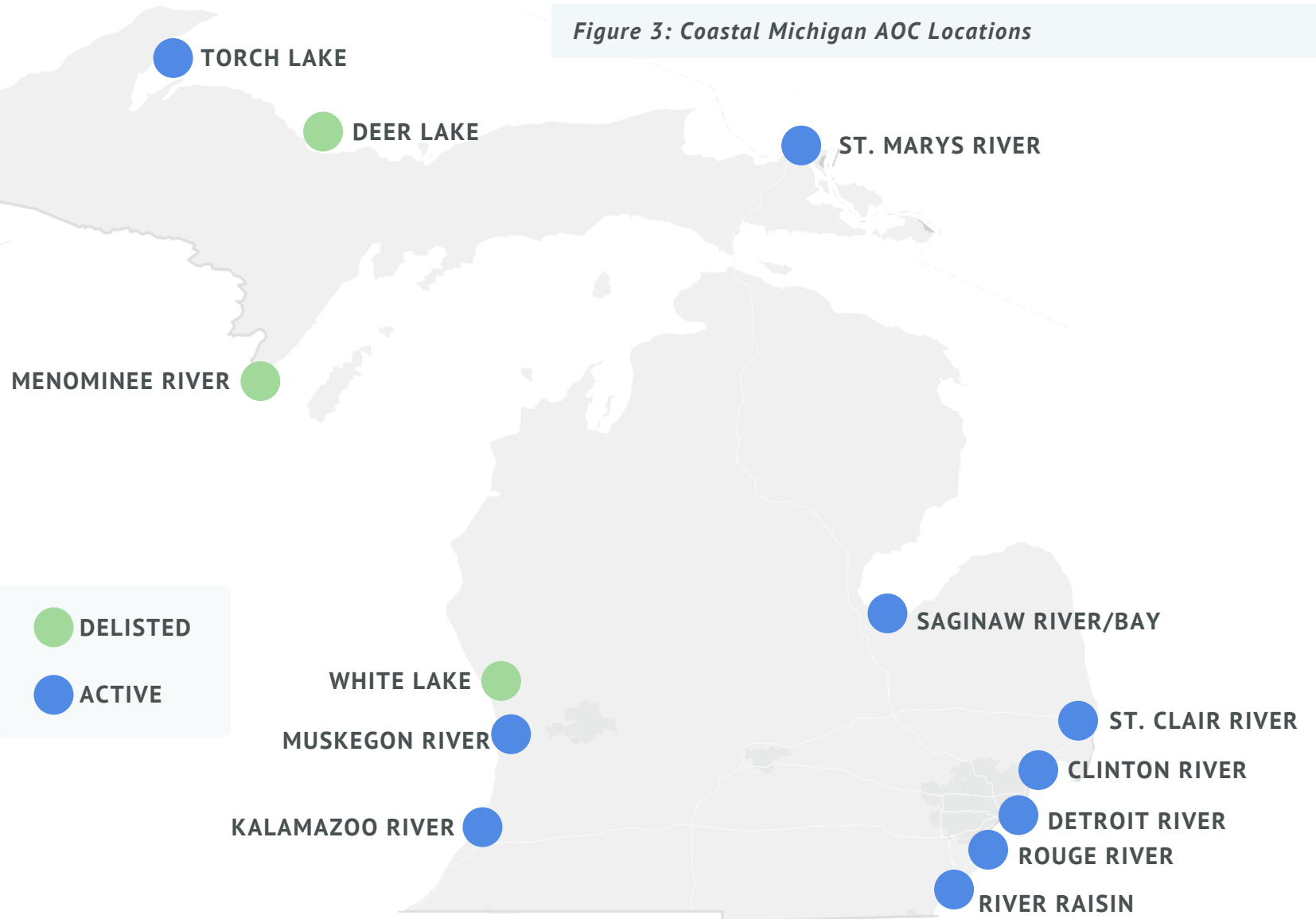
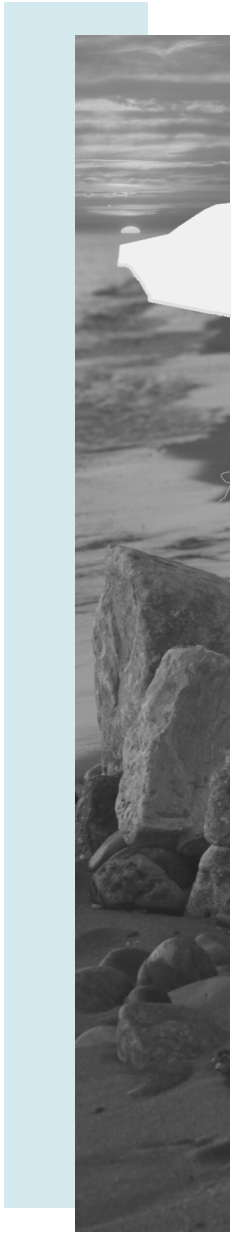
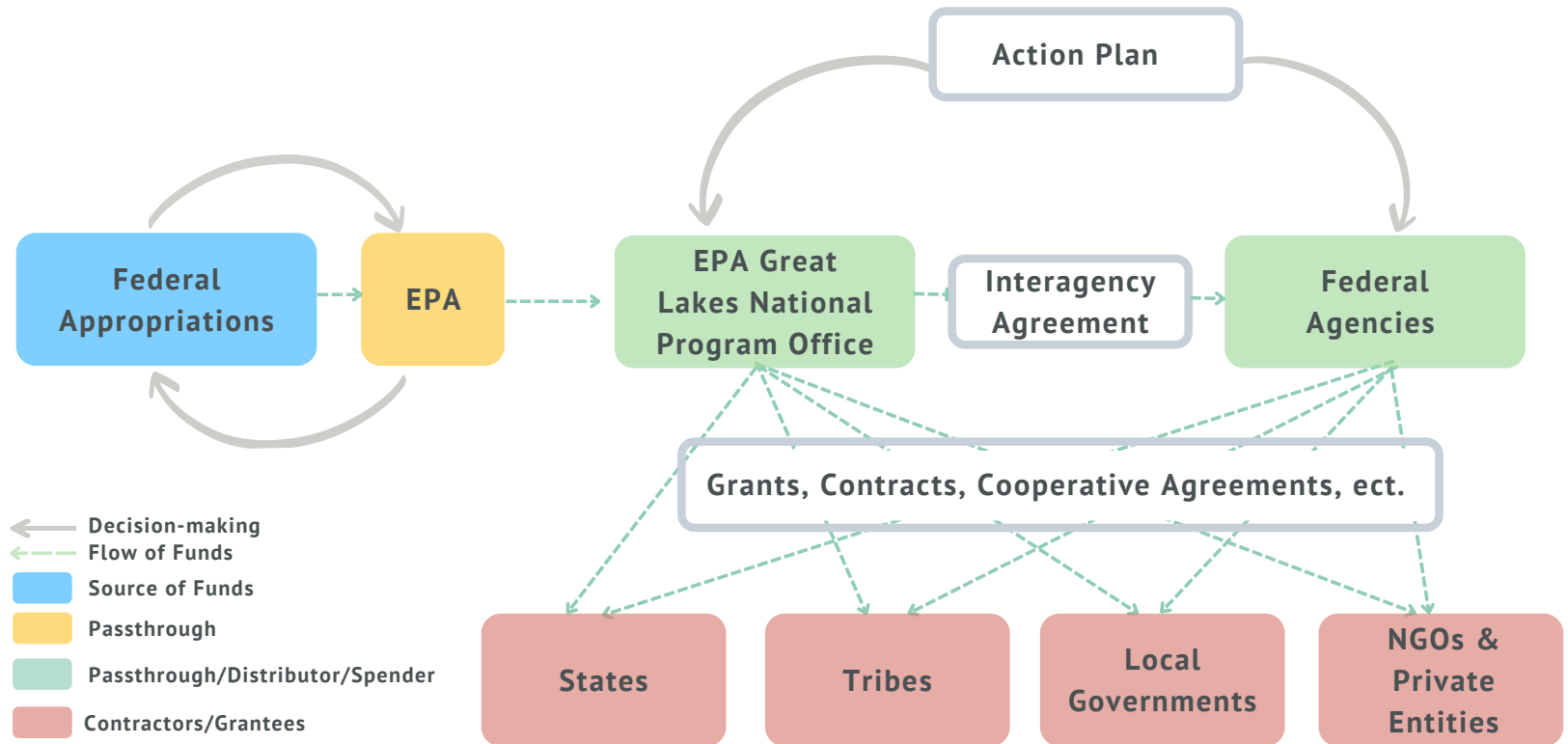


Figure 4: GLRI Funding Pathway



Source: Healing Our Waters

Funding for the GLRI is initiated at the federal level through congressional appropriations. The EPA, through its Great Lakes National Program Office (GLNPO), transfers funds to other federal agencies through Interagency Agreements (IAA). More than half of all GLRI funding since 2010 has gone to non-EPA federal agencies.⁴³ As shown in Figure 4, non-federal entities like States, Tribes, local governments, NGOs, and other private entities can access GLRI funding from a variety of channels, such as competitive awards, grants, cooperative agreements, contracts, project agreements, and more. Some federal agencies and programs require cost-sharing matches from their recipients to be awarded a GLRI grant.

OVERVIEW OF FEDERAL POLICY

In an effort to address environmental injustice, the Biden administration has introduced a slate of new policies that will affect resilience and remediation efforts along the coast of Michigan and throughout the Great Lakes more broadly. These include the landmark “Justice 40” Initiative and the Climate and Economic Justice Screening Tool (CEJST), as well as historic levels of federal funding provided through the Infrastructure Investments and Jobs Act of 2021.⁴⁴ These policies present opportunities to further equity and justice through federal investments. The research team sought to understand how these initiatives can improve the lives of communities that have been historically overburdened by pollution, and that are currently at the frontlines of climate change. Below is a summary of these policies and their potential implications for Michigan’s coastal communities.

Justice 40 (J40)

Justice 40 is President Biden’s signature Environmental Justice policy. On January 27th, 2021, he signed into law Executive Order 14008 titled “Tackling the Climate Crisis at Home and Abroad.”⁴⁵ The goal of Justice 40 is to redirect at least 40% of benefits from climate and environmental investments to disadvantaged communities. There has not been clear guidance, however, on identifying disadvantaged communities or defining what these benefits are. Last summer, the White House published interim guidance for federal agencies on Justice 40 implementation.⁴⁶ Table 2 includes a list of these suggested criteria. Issues relevant to coastal communities in Michigan, including shoreline access and exposure to coastal erosion, are absent, which is not surprising given Justice 40’s national focus. Recognizing this limitation, the research team evaluated the

Justice 40 initiative using the unique socio-economic and environmental characteristics that define Michigan’s Great lakes coastal communities, which are elaborated upon further in our Spatial Analysis.

Table 2: Justice 40 Interim Criteria

Interim Criteria to Identify "Disadvantaged" Communities
Low income, high and/or persistent poverty
High unemployment and underemployment
Racial and ethnic residential segregation, particularly where the segregation stems from discrimination by government entities
Linguistic isolation
High housing cost burden and substandard housing
Distressed neighborhoods
High transportation cost burden and/or low transportation access
Disproportionate environmental stressor burden and high cumulative impacts
Limited water and sanitation access and affordability
Disproportionate impacts from climate change
High energy cost burden and low energy access
Jobs lost through the energy transition
Access to healthcare

Climate & Economic Justice Screening Tool (CEJST)

More recently, the Council of Environmental Quality (CEQ) published an interactive screening tool to help Federal agencies identify what constitutes a ‘disadvantaged community.’ The Climate and Economic Justice Screening Tool (CEJST), currently in its beta version, uses social and environmental-risk indicators to identify communities overburdened by environmental hazards.

For our analysis, the research team delved into the “Climate Change” category specifically. The indices used under this category do not include pressing issues affecting Great Lakes coastal communities, such as exposure to erosion and flooding and public access to shorelines. Furthermore, the social indicators used by the tool, rates of low-income households and enrollment in higher education, are applied broadly across all environmental categories. Yet in addition to income disparity, climate resilience research has identified other groups susceptible to climate change hazards, including: Black, Indigenous peoples, communities of color, immigrant communities with limited English proficiency, and communities with significant amounts of older adults or children.^{47,48,49} Table 3 compares CEJST’s Climate Change criteria against those identified as relevant to the Great Lakes coastal context per our analysis and background research. For our research purposes, we supplemented CEJST criteria to better reflect climate hazard exposure and susceptibility specific to Michigan’s coastal Great Lakes context.

Table 3: Comparison Criteria

CEJST (Climate Change)	Other Indicators in the Literature^{50, 51, 52}
Expected agriculture loss rate	Race & Ethnicity
Expected building loss rate	Poverty Level
Expected population loss rate	English Fluency
Low Income	Elderly Populations
Higher education enrollment	Disabled individuals
	Residents without access to vehicles
	Unhoused individuals
	Waterfront workers

Infrastructure Investments and Jobs Act (IIJA)

The recent passage of the IIJA awarded the GLRI with a substantial \$1 billion dollar investment on top of its normal operating budget.⁵³ This influx of money presents an opportunity to advance equitable and just outcomes in ecological restoration efforts throughout Michigan and the broader Great Lakes region, because it falls under President Biden's Justice40 "covered programs."⁵⁴ Earlier this year, the Environmental Protection Agency (EPA) and President Biden announced an ambitious goal to delist 22 of the 25 AOCs in the US Great Lakes Region by 2030 with the funding provided by the IIJA to the GLRI.⁵⁵

Michigan is the state with the highest presence of AOCs, with 9 of the 22 of the target AOC sites within its territory.

Current National Political Climate & Racial Justice

The United States' Environmental Justice (EJ) movement, born out of the Civil Rights movement of the 1950s and 60s, has in recent years taken a prominent role in environmental policy and politics.⁵⁶ Since its inception, EJ scholarship has explored the intersection between race and environmental outcomes.⁵⁷ However, policy-makers, regulators, and the general public often question the connections between race and issues like pollution, access to green spaces, and ecological restoration. The relationship between race and environmental burdens is evident from the breadth and depth of research in the field of Environmental Justice. For example, it has been established that, on average, people of color breathe more particulate air pollutants than white communities

across all income and geographic locations.⁵⁸ Coastal settings raise a prominent environmental justice issue that is often overlooked: access to beaches and shorelines.⁵⁹ Studies have found, for example, that in urban areas along the Great Lakes like Chicago, Milwaukee, and Detroit there is a disproportionate lack of public beach access for communities of color.⁶⁰

Scientific consensus points to race as a determining factor in this and other environmental disparities.⁶¹

As of this report's publication, the CEJST does not include race as a factor in identifying disadvantaged communities. Based on our literature review and analysis, this could be a barrier to achieving truly just and equitable outcomes in the implementation of federal programs like the GLRI. Color-blind policies can obscure the ongoing discrimination affecting communities of color, lack recognition of justice, and could lead to further disenfranchisement and other undesirable outcomes.⁶² At the same time, it is important to note that many race-conscious policies have been challenged legally and their implementation effectively thwarted. Last year, Congress passed the American Rescue Plan, which included a \$4 billion dollar debt-relief program for minority farmers. Soon after, the Texas Agriculture Commissioner sued the Biden administration on the basis that aid to farmers of color discriminates against white farmers.^{63,64}

Recognizing those competing considerations, it may be necessary for federal agencies to develop a more nuanced set of criteria to identify communities that have been historically disadvantaged in order to better account for the discriminatory impacts felt uniquely by BIPOC and other disadvantaged communities, without relying on basic measures of race or economic status alone. Such criteria might include, for example, additional socio-economic indicators like limited educational attainment, lower life expectancy, or other attributes of pervasive and persistent unjust social outcomes. Recognizing that need, we employ basic measures of race and poverty for our characterization of historically disadvantaged communities, as described above, in order to simplify our analysis for the evaluative purposes of this report.

METHODOLOGY

In order to inform the federal government’s renewed focus on ensuring equity in the distribution of funds for climate resilience, we analyzed the extent to which GLRI funding in coastal Michigan was guided by equity principles between 2010 and 2019. We developed a mixed methods research approach consisting of quantitative spatial analysis and qualitative research. The team developed an indicator to identify and assess the extent to which socially vulnerable populations are receiving GLRI funds, and we performed a multi-step spatial analysis to identify the distribution of GLRI projects by purpose. This was followed by a qualitative analysis of grant Request For Proposal (RFP) language from top federal agencies receiving GLRI funding, as well as informal interviews with experts in coastal resilience and federal agency representatives.

Figure 5. Disaster Risk⁷²

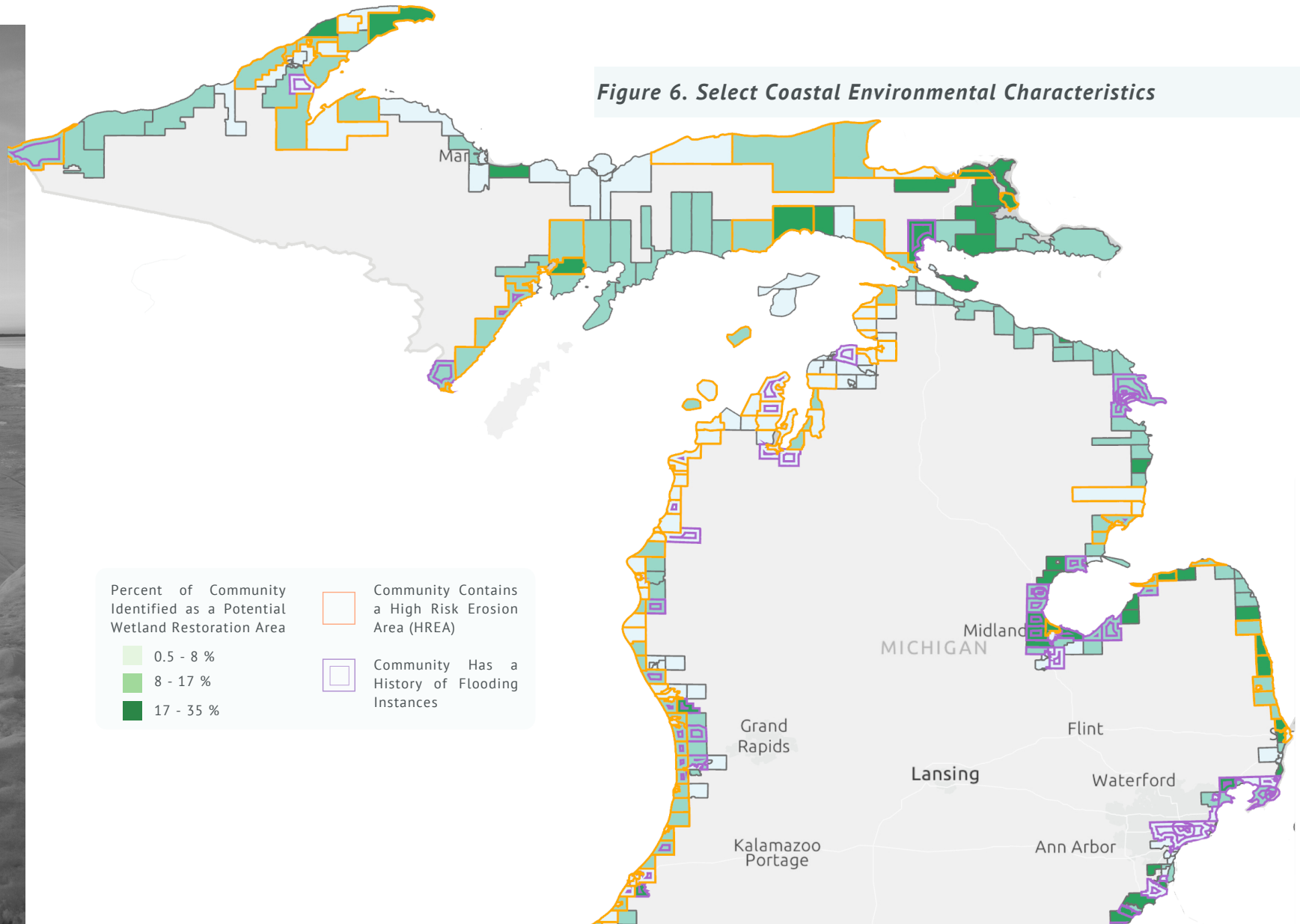


COMPONENTS OF COASTAL RISK: HAZARDS, VULNERABILITY, & EXPOSURE

We contextualized the spatial analysis within a climate risk framework as depicted in Figure 5. Coastal risk can be understood as a product of environmental hazards, the degree of exposure a community has to such hazards, and characteristics of the community that make it more or less vulnerable.^{65,66,67} Based on our literature review of justice and equity scholarship, we focused our spatial analysis on vulnerability. As discussed earlier in the report, we also narrowed our geographic scope to Michigan coastal communities with particular attention to those that have been historically disadvantaged.^{68,69}

Vulnerability can be defined as “susceptibility to harm, powerlessness, and marginality of both physical and social systems.”⁷⁰ In a coastal risk framework, vulnerability is the intersection of adaptive capacity and susceptibility. Adaptive capacity, which tends to decrease vulnerability, is the ability of the physical environment to adapt to changes, or the ability of the community to adapt to new conditions.⁷¹ Susceptibility, which tends to increase vulnerability, measures the characteristics of a population and the built environment. Characteristics of susceptibility include income levels, race and ethnicity, age, educational attainment, and more.

Some of the most pressing environmental and climate hazards in the Great Lakes coasts are erosion, pollution caused by agricultural run-off, invasive species, increased air temperature, severe precipitation, and flooding.⁷³ In addition, climate change may exacerbate the frequency and severity of lake level fluctuations, which present a risk to communities and the built environment. For our spatial analysis of Michigan coastal communities, we selected two climate hazards and one environmental characteristic, respectively: high risk erosion zones, areas with a history of flooding, and potential wetland restoration areas depicted in Figure 6.



DEFINING THE STUDY AREA

We designated Michigan communities as coastal based on the Coastal Management Zone Act's (CMZA) definition of "coastal." The Michigan Department of Environment, Great Lakes, and Energy (EGLE), through its Coastal Management Program (MCMP), defines the coastal zone as the area that "extends a minimum of 1,000 feet from the ordinary high water mark"⁷⁴ with exceptions for natural features. Using that definition, we then identified the US Census county-subdivisions that intersect with this coastal zone. This level of geographic unit reflects townships, cities, and villages as opposed to census tracts, which are smaller units within county-subdivisions. This allows us a smaller number of overall units within the study and focuses on population density representative of local government jurisdictions.⁷⁵

Drawing from our background research on equity and justice, the spatial analysis considers two prominent socioeconomic characteristics: race and income. Our goal is to identify which communities face increased climate risk due to the ongoing legacy of historic disenfranchisement and, therefore, may have a greater need for federal investments in coastal resilience. From this process, we established the designation of Historically Disadvantaged Community(s) (HDCs). An HDC is defined as any county-subdivision with a poverty rate above the state average of 13% and/or a rate of BIPOC individuals above 20%, common thresholds for assessing vulnerable and at-risk populations in the climate resilience literature.⁷⁶ Differentiating HDCs and Non-HDCs enabled us to compare trends in GLRI funding allocation between communities with relatively higher and lower degrees of vulnerability and climate risk susceptibility. Our definition of HDCs is not meant to be descriptive, prescriptive, or normative beyond providing a basic

framework for measuring social-ecological vulnerability, useful in turn for analyzing spatial patterns in coastal resilience projects.⁷⁷

GLRI PROJECT LOCATION, TOTAL FUNDING, & PER CAPITA FUNDING

The first step of the spatial analysis summarized GLRI projects within HDCs and Non-HDCs. We utilized ArcGIS Pro to calculate the number of projects within the two spatial sets, as well as the funding amounts. We then divided each community's total GLRI funds received by its population to determine per capita funding, which was then averaged across HDCs and Non-HDCs. A small set of outliers, areas with high funding and little to no population, were removed to avoid skewing the data. We deemed this correction appropriate primarily because of the high prevalence of public lands in these areas. For comparison, only 33% of Michigan coastal land, as defined by the study, is publicly held. One area that would otherwise be considered a coastal community, Isle Royale above the Upper Peninsula, was an outlier removed from the average per capita spending calculation. Isle Royale has received a total of \$2,026,774 and, due to its designation as a national park in 1940, has no permanent residents.⁷⁹



CODING GLRI PROJECTS BY PURPOSE

The GLRI projects database contains a wealth of information about projects awarded funding since 2010.⁸⁰ In addition to the year of the award, amount, recipient, awarding agency, project name, and focus area, each entry contains a short project description for the project funded. As part of our analysis, we reviewed these project narratives and developed a coding protocol and set of descriptive categories in order to characterize and assess the kinds of projects being funded more precisely, in addition to the recipients and the broad focus areas of the grants awarded. Based on that assessment, we identified and coded five distinct project types for further analysis depicted in Figure 7, including the following:

PURPOSE 1 - PHYSICAL MANAGEMENT

This project type often, but not exclusively, consists of construction projects. Due to the ecological nature of GLRI, there are typically few gray infrastructure projects (i.e. building bridges, pouring concrete), and the vast majority of projects feature green infrastructure and habitat mitigation. Physical management of natural resources could include removing invasive species, building habitat for endangered species, stocking fish, and otherwise *implementing* best practices.

PURPOSE 2 - RESEARCH

This project type consists of research to inform best practices or plans, or to develop databases to further knowledge in a given field. Research does include projects that have a physical management component, if they are employed for experimentation or data collection purposes, as opposed to implementation of best practices. This purpose type may also use language such as observation, documentation, and monitoring, and it includes any other research process that informs future action.

PURPOSE 3 - PLANNING

This project type includes actions that enable future projects, most frequently including the development of plans, designs, or feasibility studies. Because of the fiscal nature of feasibility studies, and the typical overlap in staff performing such studies along with their other planning duties, we included feasibility studies in the planning purpose type despite some resemblance to a research project.

PURPOSE 4 - CAPACITY BUILDING

This project type refers to projects designed to expand or educate a workforce, typically on an internal basis within the governmental body or organization undertaking the GLRI project or partnered experts. This work is performed to increase an organization or community's capacity to perform other resource management tasks, including all of the purposes listed here. The clearest examples include hiring additional staff, developing staff training programs, creating partnerships between organizations - especially between small organizations and larger supporting ones - and training experts and land managers in best practices.

PURPOSE 5 - ENGAGEMENT

This project type is similar to the previous one in that it centers around education, although it is more focused on external entities including primarily the public. The primary goals of this purpose are to engage with the public, expand local knowledge, and lay the groundwork for future capacity increases. Outreach and education are common key terms for identifying this type. Other important examples include k-12 educational programs and field trips, citizen scientist programs, and informative programs that educate the public on best practices like proper electronic waste disposal.

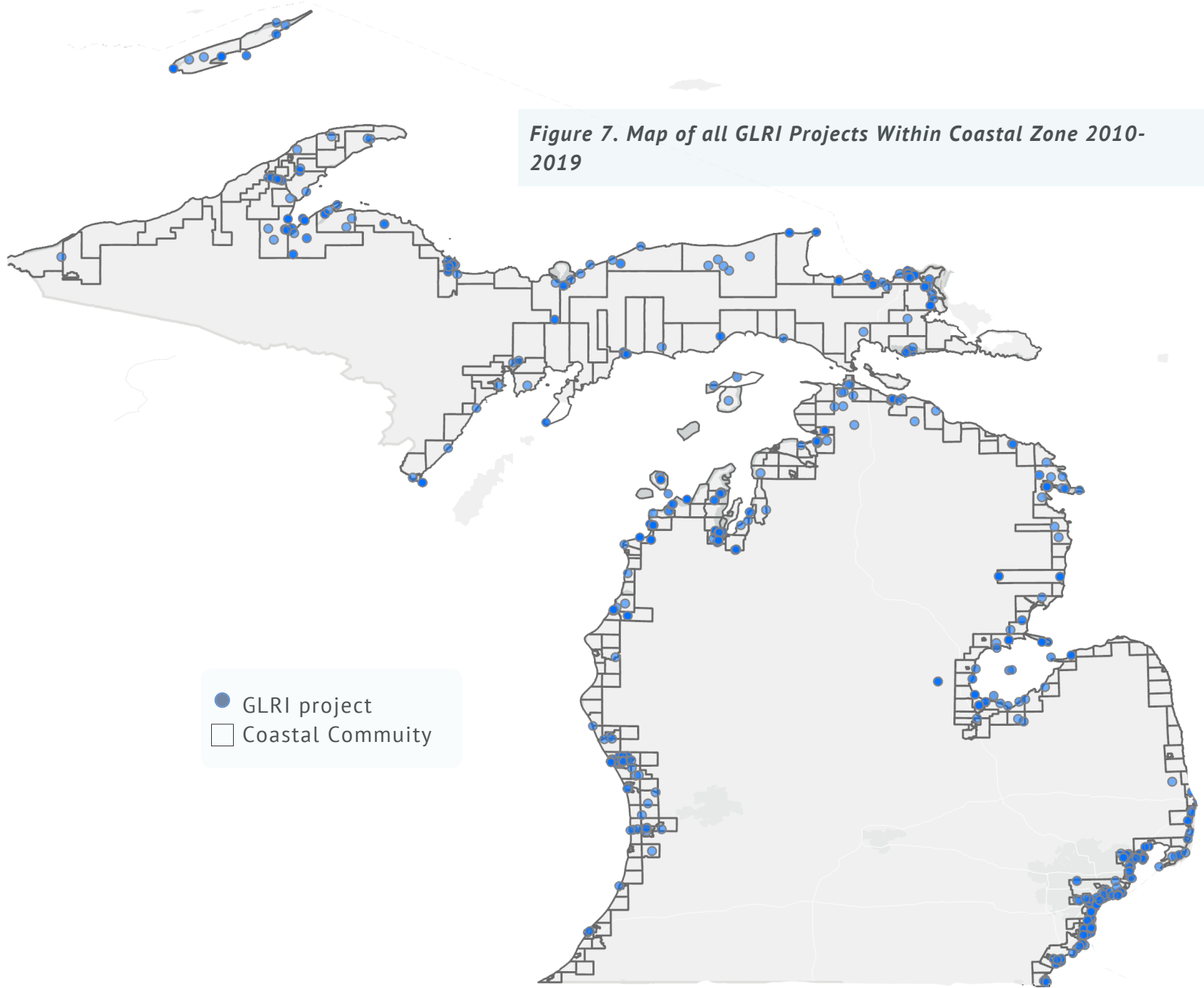


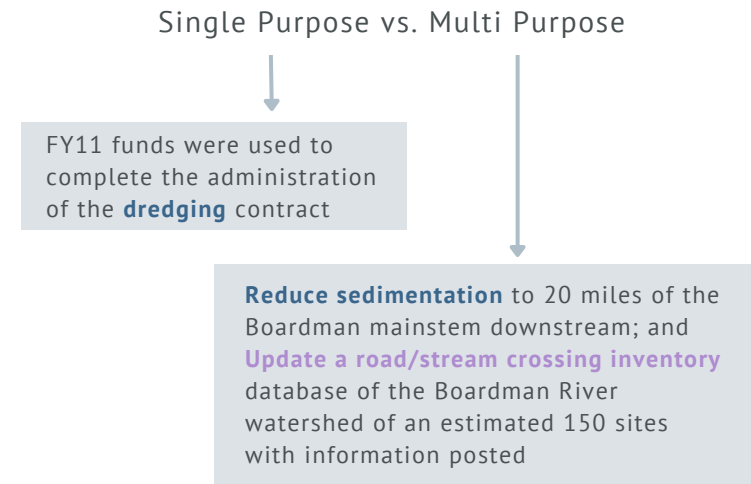
Figure 7. Map of all GLRI Projects Within Coastal Zone 2010-2019

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Using these project types, we coded each project within the identified study area, with each project receiving as few as one and as many as all five classifications, see Figure 8. To help orient the reader, many project descriptions begin with an overview of previous or planned future actions. We disregarded this information and coded the projects based only on the actions identified as directly funded by the GLRI for a specified funding year, to avoid confounding with other points in the dataset. This proved to be important as there are a significant number of projects which received several years of funding.

Figure 8 Description: Example of project descriptions with single and several purposes. Left box contains one type: physical management, indicator in purple. Right box contains 2 types: physical management and research, indicator in purple and pink.

Figure 8. Example Project Descriptions



FEDERAL AGENCY GRANTMAKING ANALYSIS

To complement our spatial analysis, we selected the top five federal agencies that have received GLRI grant funding to date to investigate whether equity is addressed specifically in their grant proposals or federal funding guidelines. The five federal agencies selected were:

1. Department of Interior (DOI) – National Fish and Wildlife Foundation (NFWF)
2. Department of Defense – U.S. Army Corps of Engineers (USACE)
3. Department of Commerce National Oceanic and Atmospheric Administration (NOAA)
4. DOI – U.S. Geological Survey (USGS)
5. U.S. Department of Agriculture (USDA) – Natural Resources Conservation Services (USGS)

For each agency, we analyzed websites that describe GLRI grant or project funding criteria, along with the site grants.gov, to identify the requirements included within their requests for proposals (RFPs). We selected a mixture of RFPs that included GLRI projects as well as general Great Lakes or other coastal resilience grants. Additionally, we conducted informal interviews with two different federal practitioners from the list of our target agencies involved in GLRI projects. These informal conversations allowed the team to gain further insight on the funding criteria and grant-making process of individual agencies. Finally, we compiled our qualitative data into a matrix that tabulates the agency's policies that advance equity in grantmaking, and requirements that could hinder equity, such as cost-sharing or long-term operations and maintenance requirements. Cost-sharing, and required funding for long-term operations and maintenance, likely inhibit any given HDC's ability to receive grant funding as it is less likely to have the

resources or capacity to supply these additional funds.⁸¹ Most agencies detail these types of additional requirements in their grant RFPs.

All of the results and observations obtained, generated, and presented by this report are based on publicly available information from federal agencies, available online or through informal consultation with agency practitioners. Because of the limited time frame for this study, we were not able to collect information on or evaluate internal decision-making processes and criteria that agencies may utilize to assess equity considerations in their grantmaking.

HDC & CEJST COMPARISON

Based on our background research, we expect federal agencies will use the CEJST to help direct GLRI funding to disadvantaged communities in accordance with the Justice40 initiative, at least as an initial step in their efforts. For that reason, we compare spatially the locations of those communities identified by our analysis as HDCs, with those communities identified as disadvantaged by CEJST within our coastal area of study. A key difference between our methodology and that of CEJST relates to the consideration of race explicitly; that is, the characterization of 'HDC' as defined for our analysis expressly incorporates a measure of the BIPOC portion of the community, while the CEJST method does not incorporate such a measure directly. It is also important to note that CEJST uses census tracts while we identified HDC communities in our analysis at the county-subdivision level. This difference may lead to some discrepancies between the datasets.

SPATIAL ANALYSIS

As explained and justified in the discussion of coastal equity considerations above, one of the motivations for this study was the expectation that HDCs in the Great Lakes region may not be enjoying their fair share of access to natural coastal resources, and that GLRI funding might further exacerbate any disparities that exist. This might happen, for example, by dedicating funding toward the armoring of privately owned shorelines in a way that limits public access to those shorelines and degrades coastal resources. It turns out, however, that no GLRI funds have been spent on such armoring structures. It could be that some of the funding going toward restoration projects has been necessitated because of harms caused

by armoring structures, but we have no way of making that determination systematically with the data available. In addition, we did not assess in detail the proximity of HDCs to public coastal resource areas like parks, or to access points that might allow members of HDCs to enjoy the public trust portions of privately owned beaches. The findings and analyses presented here, therefore, focus on broader questions regarding equitable access to and distribution of GLRI funding more broadly to date, without addressing in greater detail issues regarding access to specific coastal resources.

We present the findings from our analysis next, and then discuss the implications of those findings in more detail below.



GLRI GENERAL FUNDING CHARACTERISTICS

Overall, 174 communities, or 54% of all coastal communities in Michigan, have received funding from the GLRI as seen in Table 4. Non-HDCs comprise 65.2% of all Michigan coastal communities, while HDCs make up 34.8% of the total. Of all coastal communities, 121 Non-HDCs, or 58% of all coastal non-HDCs, have received some amount of funding to date, while 53 HDCs, or 47% of all coastal HDCs, have received some amount of GRLI funding. At the same time, with regard to grant funds awarded, non-HDCs (comprising 65.2% of Michigan's coastal zone) have received only 34.3% of all GLRI funding, while HDCs (comprising 34.8% of the coastal zone) have received 65.7% of all GLRI funding in the area. In sum, proportionally fewer non-HDCs received funding relative to the total amount of non-HDCs, as compared to the proportion of HDCs receiving funding, and more funding has gone to HDCs than non-HDCs both in total and per capita as depicted in Table 5. Nonetheless, while the majority of GLRI funding between 2010 and 2019 was awarded to HDCs, when comparing the number of funded (Historically Disadvantaged Communities to non-Historically Disadvantaged Communities) there are more individual non-HDCs receiving funding than HDCs. These findings prompted us to explore in more depth the funding patterns in order to better explain them. Figures 9-13 help visually summarize these findings.

Table 4. Summary of Coastal Communities Receiving GLRI Funding

	Total	Received GLRI Funds	% of GLRI Funds Received
Coastal MI	321	174 (54%)	100%
HDCs	112	53 (47%)	65.7%
Non-HDCs	209	121 (58%)	34.3%

Table 5. Comparison of Total Spending & Per Capita Spending within HDCs & Non-HDCs

	Total Spending	Avg. Per Capita Spending
HDCs	\$322,179,685	\$542
Non-HDCs	\$169,599,046	\$290

Figure 9. Number of Coastal Communities Receiving GLRI Funding 2010-2019

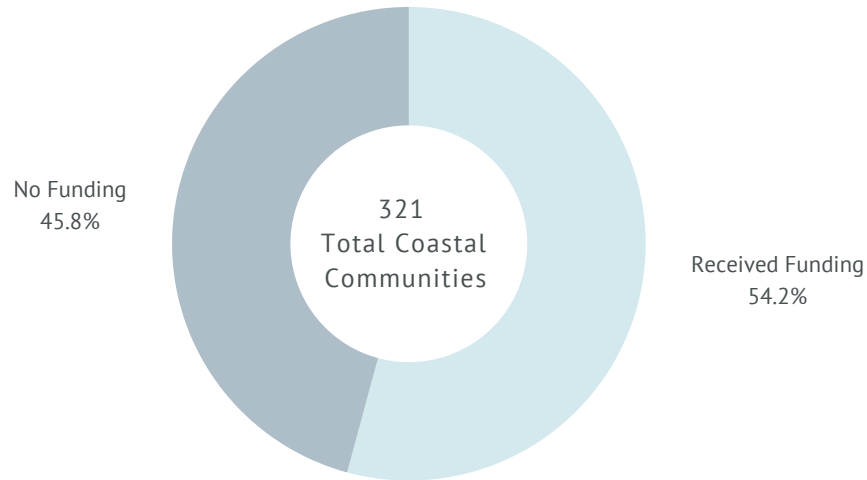


Figure 10. Percentage of Total GLRI Funding Received 2010-2019: HDCs vs Non-HDCs

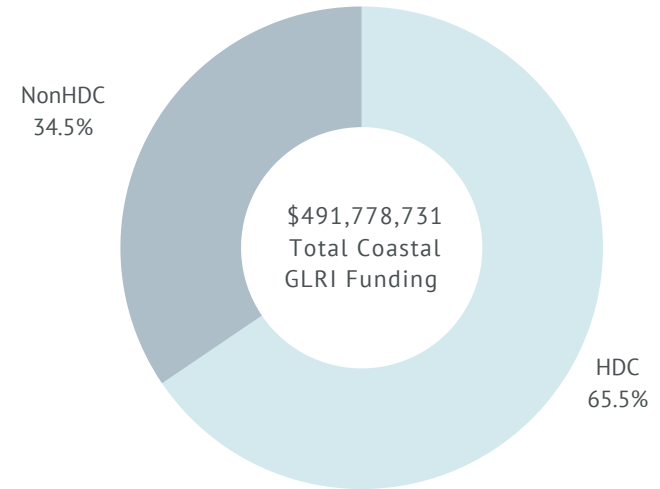


Figure 11. Percentage of Coastal Communities Receiving GLRI Funding 2010-2019: HDCs vs Non-HDC

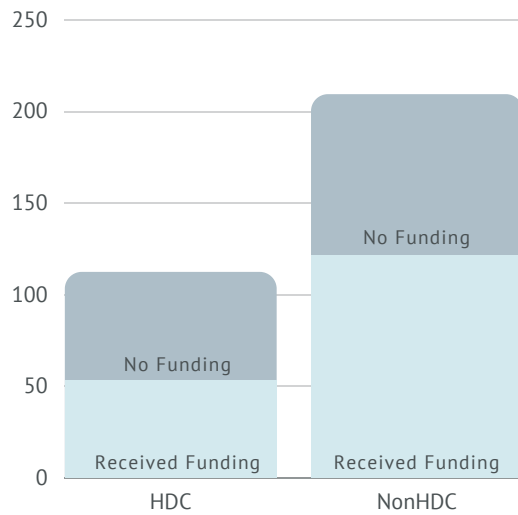


Figure 12. Average Amount of Funding Per Capita 2010-2019: HDCs vs Non-HDCs

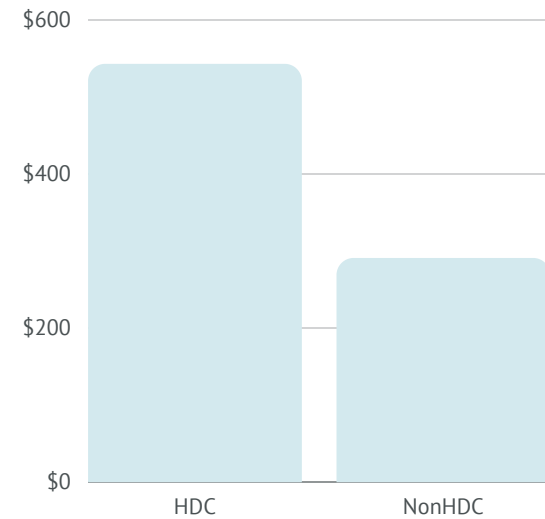


Figure 13. Comparison of HDC vs GLRI Funded Communities

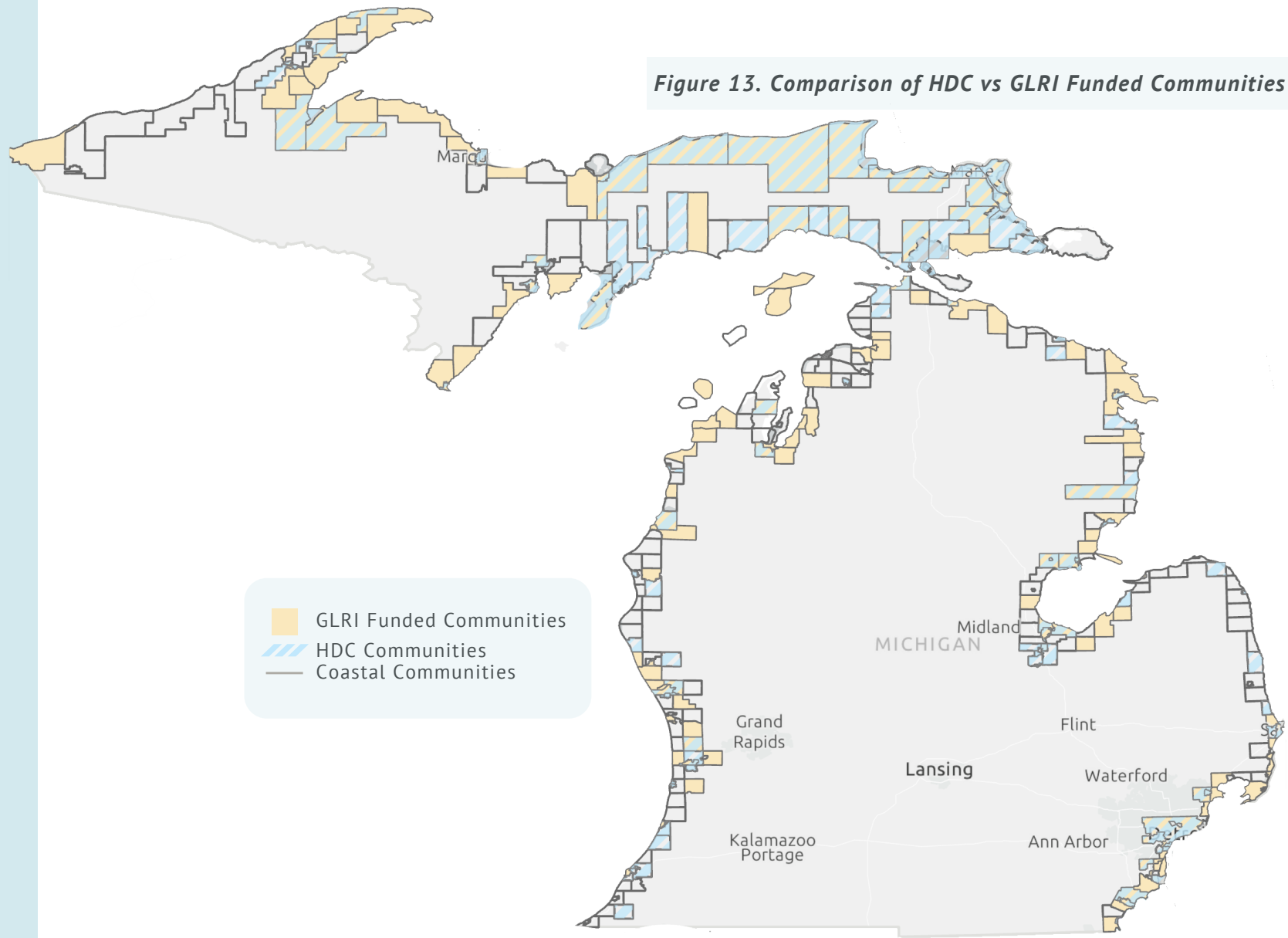
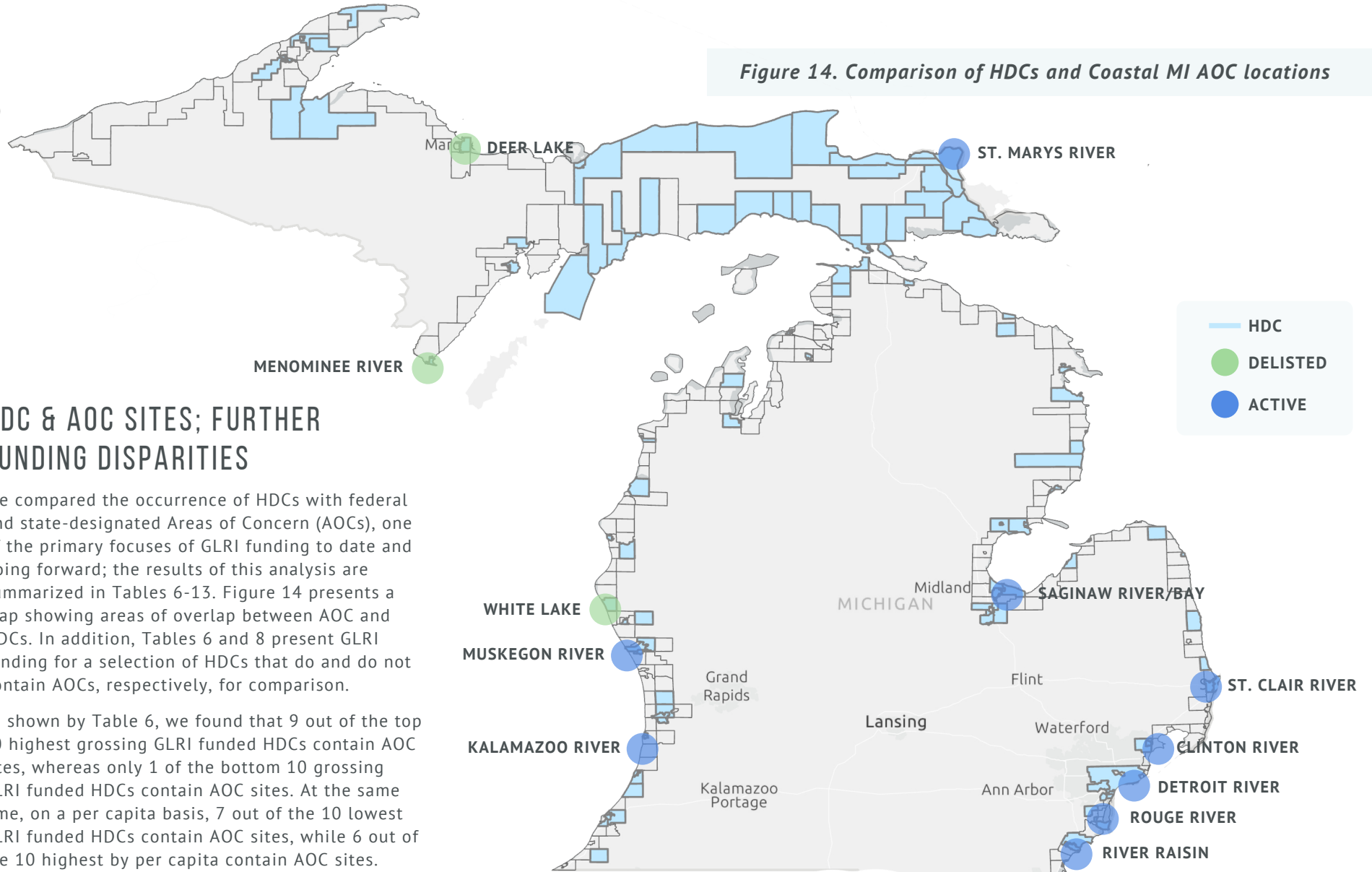


Figure 14. Comparison of HDCs and Coastal MI AOC locations



HDC & AOC SITES; FURTHER FUNDING DISPARITIES

We compared the occurrence of HDCs with federal and state-designated Areas of Concern (AOCs), one of the primary focuses of GLRI funding to date and going forward; the results of this analysis are summarized in Tables 6-13. Figure 14 presents a map showing areas of overlap between AOC and HDCs. In addition, Tables 6 and 8 present GLRI funding for a selection of HDCs that do and do not contain AOCs, respectively, for comparison.

As shown by Table 6, we found that 9 out of the top 10 highest grossing GLRI funded HDCs contain AOC sites, whereas only 1 of the bottom 10 grossing GLRI funded HDCs contain AOC sites. At the same time, on a per capita basis, 7 out of the 10 lowest GLRI funded HDCs contain AOC sites, while 6 out of the 10 highest by per capita contain AOC sites.

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Table 6. Top 10 HDC Locations by Gross Funding

County Subdivision	AOC Site	Total GLRI Funding
Detroit	Detroit River	\$60,976,125
River Rouge	Rouge River	\$30,336,400
Manistique	Manistique River	\$25,536,737
Muskegon City	Muskegon Lake	\$24,992,522
Muskegon Township	Muskegon Lake	\$21,587,817
Monroe	River Raisin	\$20,415,461
Sault Ste. Marie	St. Mary's River	\$18,681,371
Bay Mills	St. Mary's River	\$15,782,323
Soo	St. Mary's River	\$10,156,206
Oscoda	Not Near AOC	\$9,149,850

Table 8. Bottom 10 HDC Locations by Gross Funding

County Subdivision	AOC Site	Total GLRI Funding
Brampton	Not Near AOC	\$7,600
Olive	Not Near AOC	\$40,000
South Haven	Not Near AOC	\$56,057
Escanaba	Not Near AOC	\$58,468
Zilwaukee	Saginaw River/ Bay	\$59,630
St. Ignace Township	Not Near AOC	\$132,461
Garfield, Mackinac	Not Near AOC	\$148,000
Arenac	Not Near AOC	\$153,304
Wawatam	Not Near AOC	\$213,163
Whitefish	Not Near AOC	\$228,371

Table 7. Top 10 HDC Locations by Per Capita Funding

County Subdivision	AOC Site	Per Capita GLRI \$
Bay Mills	St. Mary's River	\$9028.79
Manistique City	Manistique River	\$8748.45
Hendricks	Not Near AOC	\$8247.52
River Rouge	Rouge River	\$4043.77
Soo	St. Mary's River	\$3270.92
Sugar Island	Rouge River	\$2067.80
Fairbanks	Not Near AOC	\$2030.46
Suttons Bay	Not Near AOC	\$1826.95
Burt	Not Near AOC	\$1745.73
L'Anse	Not Near AOC	\$1635.03

Table 9. Bottom 10 HDC Locations by Per Capita Funding

County Subdivision	AOC Site	Per Capita GLRI \$
Detroit	Detroit River	\$90.36
Clinton	Clinton River	\$89.65
Port Huron	St. Clair River	\$86.54
Brownstown	Detroit River	\$79.42
Manistee	Not Near AOC	\$72.62
Dearborn	Rouge River	\$66.71
Hancock	Not Near AOC	\$59.17
Holland	Not Near AOC	\$50.98
Bay City	Saginaw River/Bay	\$21.46
Mount Clemens	Clinton River	\$15.32

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Table 10. Top 10 Non-HDC Locations by Gross Funding

County Subdivision	AOC Site	Total GLRI Funding
Grosse Ile	Detroit River	\$3,164,432
Traverse City	Not Near AOC	\$4,270,000
Laketon	Muskegon Lake	\$5,878,820
Harrison	Not Near AOC	\$6,118,300
Empire	Not Near AOC	\$6,851,060
East Bay	Not Near AOC	\$7,924,749
Erie	River Raisin	\$8,461,480
Clay	Clinton River	\$14,826,400
Wyandotte	Detroit River	\$17,191,485
Lake, Benzie	Not Near AOC	\$40,025,857

Table 12. Bottom 10 Non-HDC Locations by Gross Funding

County Subdivision	AOC Site	Total GLRI Funding
Presque Isle	Not Near AOC	\$1,080
Banks	Not Near AOC	\$9,645
Bearinger	Not Near AOC	\$11,497
Marine City	St. Clair River	\$11,900
Peaine	Not Near AOC	\$12,931
Alabaster	Not Near AOC	\$18,903
Caseville	Not Near AOC	\$50,000
St. Clair	St. Clair River	\$74,900
Akron	Saginaw River/Bay	\$74,937
Manlius	Not Near AOC	\$81,371

Table 11. Top 10 Non-HDC Locations by Per Capita Funding

County Subdivision	AOC Site	Per Capita GLRI \$
Grosse Pointe Shores	Detroit River	\$8266.06
Empire	Not Near AOC	\$6825.80
Gross Ile	Rouge River	\$3939.94
Avron	Not Near AOC	\$3803.11
Lake, Benzie	Not Near AOC	\$3749.33
Glen Arbor	Not Near AOC	\$3600.71
Grant	Not Near AOC	\$3325.31
Laketon	Muskegon Lake	\$1947.77
Erie	River Raisin	\$1407.48
Clark	Not Near AOC	\$1333.11

Table 13. Bottom 10 Non-HDC Locations by Per Capita Funding

County Subdivision	AOC Site	Per Capita GLRI \$
Presque Isle	Not Near AOC	\$0.63
Marine City	St. Clair River	\$2.90
Banks	Not Near AOC	\$6.01
St. Clair Shores	St. Clair River	\$11.71
St. Clair	St. Clair River	\$14.06
Zeeland	Not Near AOC	\$22.40
Fort Gratiot	St. Clair River	\$23.75
Manlius	Not Near AOC	\$25.91
Bear Creek	Not Near AOC	\$26.36
Caseville	Not Near AOC	\$28.65



Table 14. Comparison of Highest Grossing Communities

	Detroit (HDC)	River Rouge (HDC)	Grosse Île (non-HDC)	Traverse City (non-HDC)
Population	674,841	7,502	10,159	15,338
% Impoverished	34%	42%	2%	11%
% BIPOC	89%	68%	5%	9%
Total GLRI \$	\$60,976,125	\$30,336,400	\$40,025,857	\$17,191,485
Per Capita GLRI \$	\$90	\$4044	\$3940	\$1121
# of GLRI Projects	50	13	14	10
Near AOC?	Yes	Yes	Yes	No

The above Table 14 shows the two highest-grossing GLRI recipient communities in our two analysis categories: Detroit and River Rouge (HDCs) and Grosse Île and Traverse City (Non-HDCs). As the table demonstrates, while Detroit received the most amount of funding in total, the per capita funding levels for Traverse City and Grosse Île, neither of which are classified as HDCs, were some 12 and 44 times greater than for Detroit, respectively. Comparing Grosse Ile with River Rouge, communities of similar population densities and located near AOCs, shows that overall Grosse Ile, a Non-HDC received \$10 million dollars more. Both communities have effectively equal per capita funding.

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FUNDING DISPARITY BETWEEN PROJECT PURPOSES

To better understand what types of projects have been most frequently and abundantly funded, and to test the hypothesis that physical management projects have been disproportionately funded, we performed the coding process described in the methodology on all GLRI projects within the bounds of coastal Michigan as shown in Table 15. As detailed above, we assigned each project one or more of the following purpose types: Physical Management, Research, Planning, Capacity Building, and (Community) Engagement.

The results from this assessment confirm that the majority of grants that have been awarded to date have indeed been awarded for physical management (53%) and research (31%) purposes – the most “shovel ready” project types – significantly outnumbering capacity building (18%), engagement (11%) projects; planning projects fell in between (27%). Total funding amounts awarded followed a similar pattern but with even greater disparity, with physical management projects receiving 71%, research 11%, planning 12%, capacity building 4%, and engagement 2%. These patterns are relatively consistent across the averages of both HDCs and Non-HDCs, as shown in Figure 15-20. These patterns are likely to vary by federal agency, which would require further study outside the scope of this report.

Table 15. Breakdown of Funding by Project Type

	Total # of Projects	Purpose 1 (Physical)	Purpose 2 (Resarch)	Purpose 3 (Plan)	Purpose 4 (Capacity)	Purpose 5 (Engage)
All Coastal Communities	930	496 (53%)	287 (31%)	255 (27%)	172 (18%)	101 (11%)
HDC	522	268 (51%)	154 (30%)	142 (27%)	98 (19%)	54 (10%)
Non-HDC	408	210 (51%)	133 (33%)	113 (28%)	74 (18%)	47 (12%)
	Gross Funds	Purpose 1	Purpose 2	Purpose 3	Purpose 4	Purpose 5
All Coastal Communities	\$491,778,731	\$349,340,058 (71%)	\$53,055,685 (11%)	\$57,563,466 (12%)	\$20,152,222 (4%)	\$11,667,301 (2%)
HDC	\$322,179,685	\$235,802,980 (73%)	\$26,819,092 (8%)	\$42,323,341 (13%)	\$10,571,109 (3%)	\$6,663,162 (2%)
Non-HDC	\$169,599,046	\$113,537,078 (67%)	\$26,236,593 (15%)	\$15,240,125 (9%)	\$9,581,113 (6%)	\$5,004,139 (3%)

*Project purposes **do not** total 100%, because one project may be classified as up to five types. Funding calculations **do** total approximately 100%, as project spending was split between purposes as applicable.

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Figure 15. Total GLRI Funding by Project Purpose in Thousands

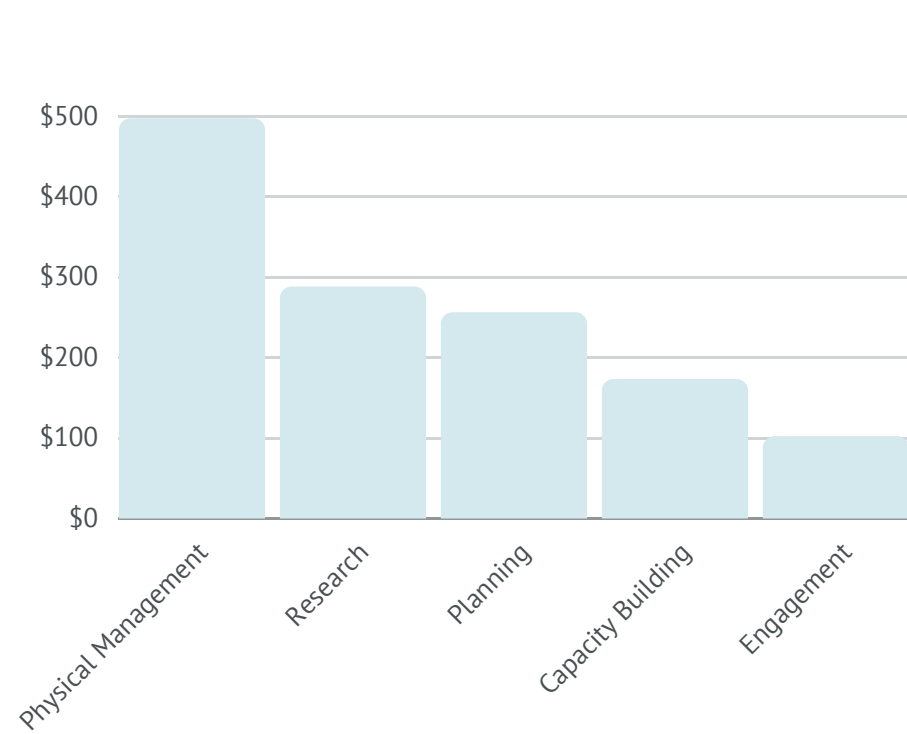
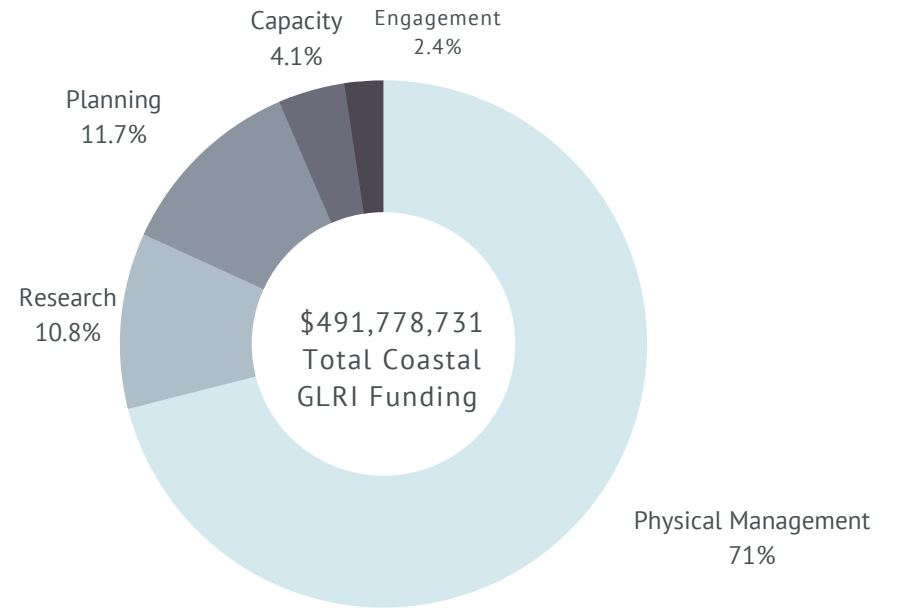


Figure 16. Percentage of Total Funding by Project Purpose



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Figure 17. Number of GLRI Projects by Project Purpose: HDCs

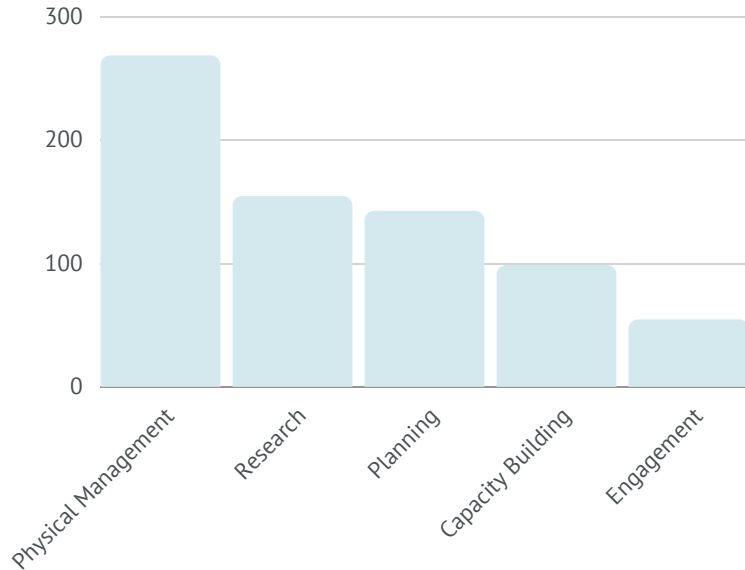


Figure 18. Percentage of Total GLRI Funding by Purpose: HDCs

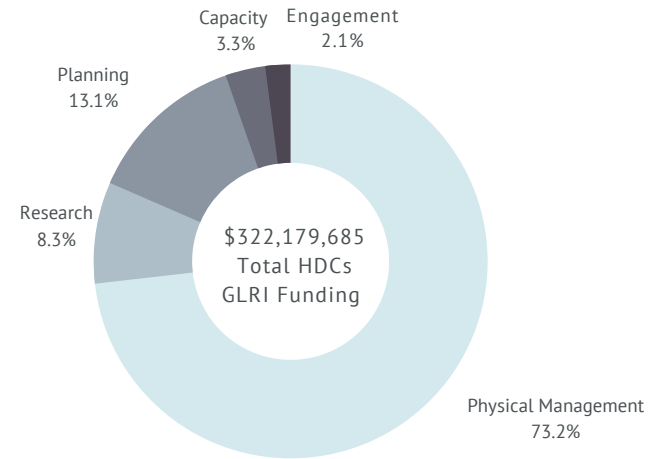


Figure 19. Number of GLRI Projects by Project Purpose: Non- HDCs

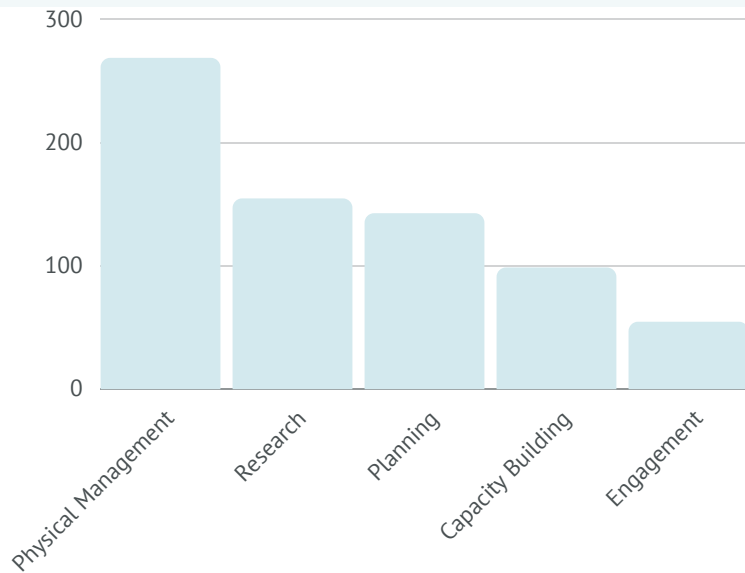
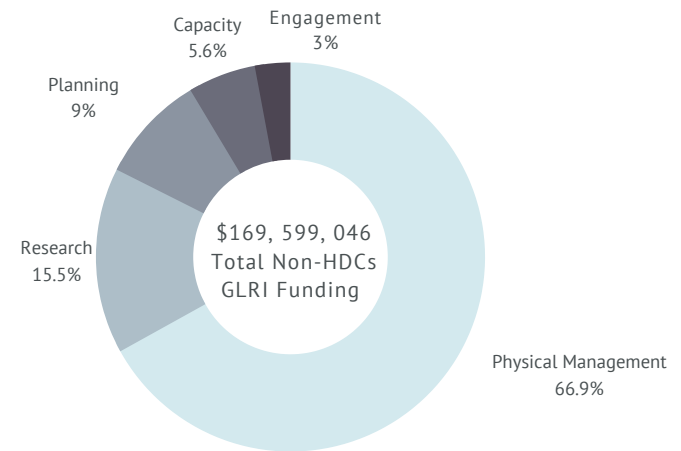


Figure 20. Percentage of Total GLRI Funding by Purpose: Non-HDCs



CASE STUDY: FUNDING DISPARITY IN INDIGENOUS COMMUNITIES

In analyzing the distribution of GLRI funding by Indigenous recipient groups in Table 16 and Figure 21-22, we determined that as of 2019, 22% of all coastal Michigan GLRI projects were executed by Indigenous groups. At the same time, the dollar amounts awarded comprised less than 5% of total GLRI funding in coastal Michigan. We identified Indigenous communities as those groups and communities delineated as such by the GLRI project database. It is important to note, that there are many groups/individuals that are not recognized here and receive no funding. This funding level equates to \$318.6 per capita, which is lower than the average per capita rate of GLRI funding for HDCs (\$542), though higher than the average rate for Non-HDC (\$290).

Figure 21. Percentage of Funding by Project Type in Indigenous Communities

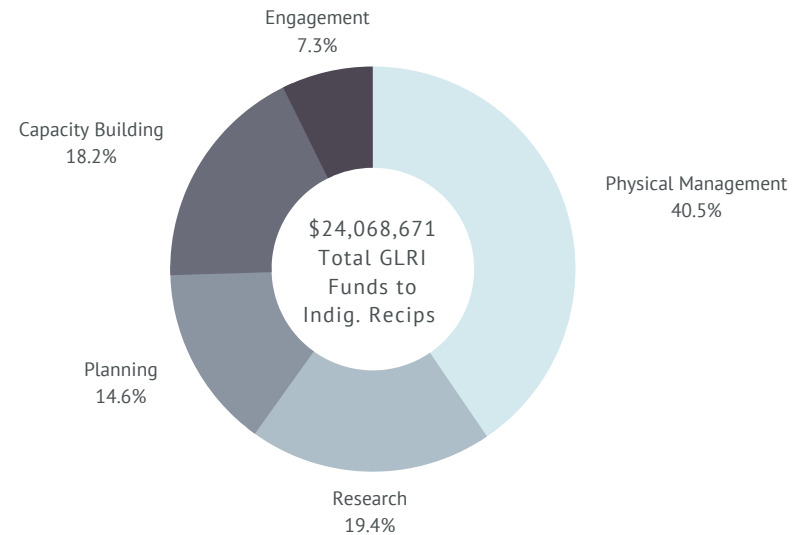
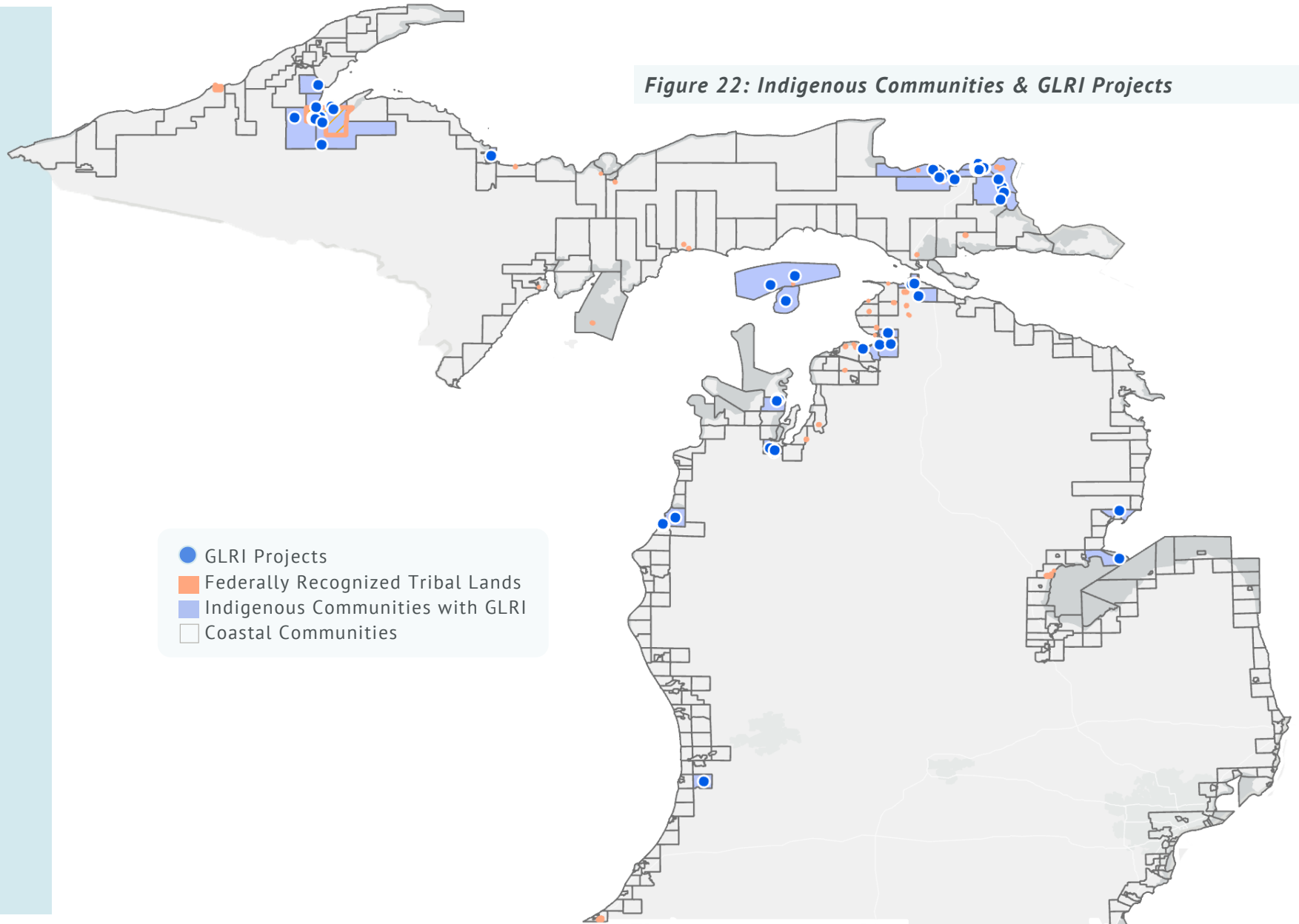


Table 16. Breakdown of Funding by Project Type

	Total # of Projects	Purpose 1 (Physical)	Purpose 2 (Resarch)	Purpose 3 (Plan)	Purpose 4 (Capacity)	Purpose 5 (Engage)
All GLRI	930	496 (53%)	287 (31%)	255 (27%)	172 (18%)	101 (11%)
Indigenous Recip.	209	91 (44%)	73 (35%)	67 (32%)	76 (36%)	31 (15%)
	Gross Funds	Purpose 1	Purpose 2	Purpose 3	Purpose 4	Purpose 5
All GLRI	\$491,778,731	\$349,340,058 (71%)	\$53,055,685 (11%)	\$57,563,466 (12%)	\$20,152,222 (4%)	\$11,667,301 (2%)
Indigenous Recip.	\$24,068,671	\$9,740,637 (40%)	\$4,675,980 (19%)	\$3,519,441 (15%)	\$4,374,563 (18%)	\$1,758,051 (7%)

*Project purposes do not total 100%, because one project may be classified as up to five types. Funding calculations do total approximately 100%, as project spending was split between purposes as applicable. These projects occurred within 25 coastal MI communities.

Figure 22: Indigenous Communities & GLRI Projects



FEDERAL AGENCY GRANTMAKING ANALYSIS

The National Fish and Wildlife Foundation (NFWF), US Army Corps of Engineers (USACE), The National Oceanic and Atmospheric Agency (NOAA), US Geological Survey (USGS), and US Department of Agriculture (USDA) make up the top 5 federal agencies after the EPA (i.e., the lead agency for GLRI), in terms of total GLRI funding received to date, in descending order. We evaluated the extent to which these agencies incorporate equity language and criteria in their grant Request for Proposals (RFP). Table 17 presents the results of our assessment.

Three of the top five agencies that receive GLRI funding do explicitly list equity considerations or requirements in their grant RFPs. For example, NFWF's Sustain Our Great Lakes RFP specifies that all proposals must describe how they will accomplish the program's goals; program priority #5 states that a competitive proposal should "identify and measure community resilience, diversity, equity and inclusion outcomes and the impact of the project for communities engaged in and served by the project."⁸² Additionally, USDA-NRCS augments their Farm Bureau conservation programs with GLRI funding to improve water quality by assisting farmers with conservation practices. NRCS' grant proposal criteria specifically weighs grants that are submitted with equity mentioned of environmental justice (EJ)/ Minority Serving Institutions heavier, especially for grants under \$5 million.⁸³

Nonetheless, it appears that equity is not necessarily advanced by all of the agencies studied, and to the extent that it is, it does not appear to be addressed as

consistently, extensively, or with as much guidance as it could be. Moreover, current grant evaluation criteria and processes may also be creating barriers to advancing equity in project selection. resources or capacity to supply these additional funds. Most agencies detail these types of additional requirements in their grant RFPs. For example, USACE uses interagency agreements with other federal agencies to execute GLRI projects. USACE operates several Great Lakes regional programs under prior legislation, such as the Great Lakes Fishery and Ecosystem Restoration program under Section 506 of the Water Resources Development Act of 2000. USACE augments this program, and several others, with GLRI funding to execute projects. Some legislation may constrain grants and programs with requirements such as cost-sharing, minimum project amounts, long-term operations and maintenance, and monitoring and evaluation. We noted several other agencies with cost-sharing or other requirements attached to grant RFPs such as NOAA, USDA-NRCS, and NFWF. These requirements could negatively affect the selection of projects for municipalities or community-based organizations with limited capacity and funding. Though there are creative methods like in-kind credits to assist municipalities with these burdens, these may drive projects away from HDCs and into wealthier municipalities with more capacity and financial ability to meet matching requirements.



Table 17: GLRI Funding Criteria Findings

	Does the Proposal Have Language related to equity and/or justice?	Are there requirements for construction or physical development?	Is there a funding window (e.g. no less than \$100,000, no more that \$2 million)?	Are the projects habitat restoration related?	Are there multiple levels of organizations who are eligible to apply?	Engagement, public outreach, community development, capacity building requirements included?	Is there a cost sharing or matching component?	Are there long term operations and maintenance requirements?	Is there a monitoring and evaluation requirement?
DOI-USFW	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DOD-USACE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DOC- NOAA	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DOI-USGS	No	No	Yes	Yes	Yes	No	Yes	No	No
USDA-NRCS	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No

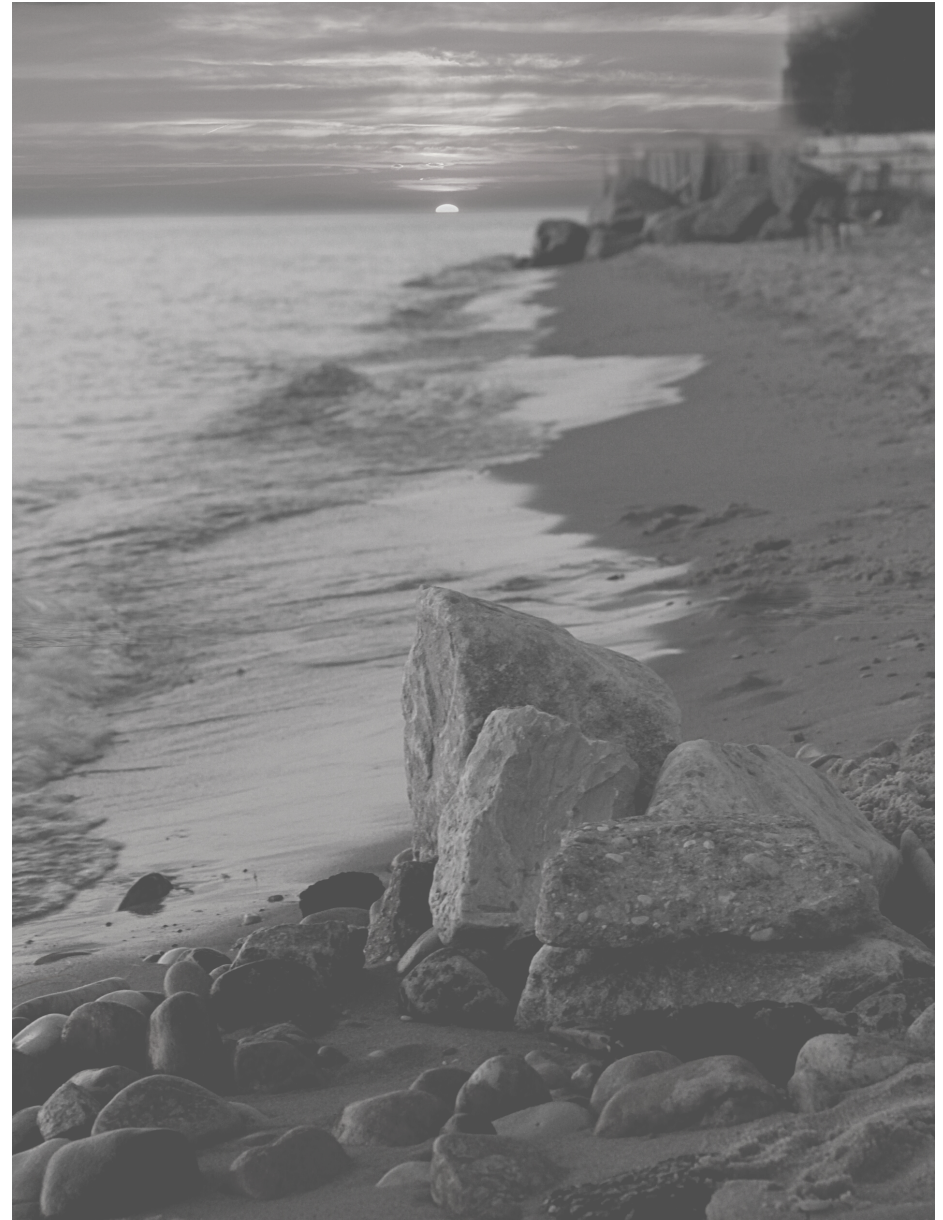
See Appendix 4 for Agency citations.



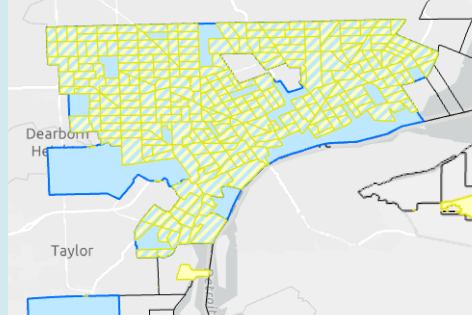
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HDC VS. CEJST

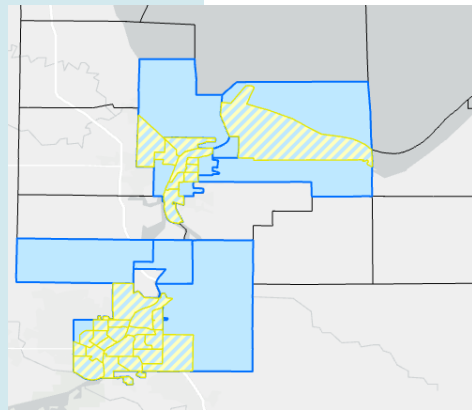
Figure 23 provides a map illustrating Michigan's coastal HDCs, highlighted in blue, with those identified as disadvantaged based on the CEJST, highlighted in yellow. If a community is included in both data sets, it is represented by a blue and yellow hatched-pattern. The analysis determined that only 60 communities on the coast of Michigan are identified both by our method and by CEJST. As shown below in blue, there is a vast area, especially in the Upper Peninsula, which has been identified by our analysis as historically disadvantaged, containing significant BIPOC and low-income communities, that is overlooked by CEJST. Moreover, given that CEJST does not account for the increased climate risk of coastal communities, we would expect the amount of CEJST identified communities along the coast to change after a coastal metric is included.



DETROIT



SAGINAW BAY



MUSKEGON

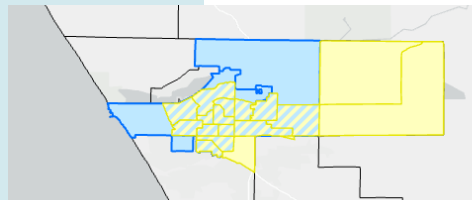
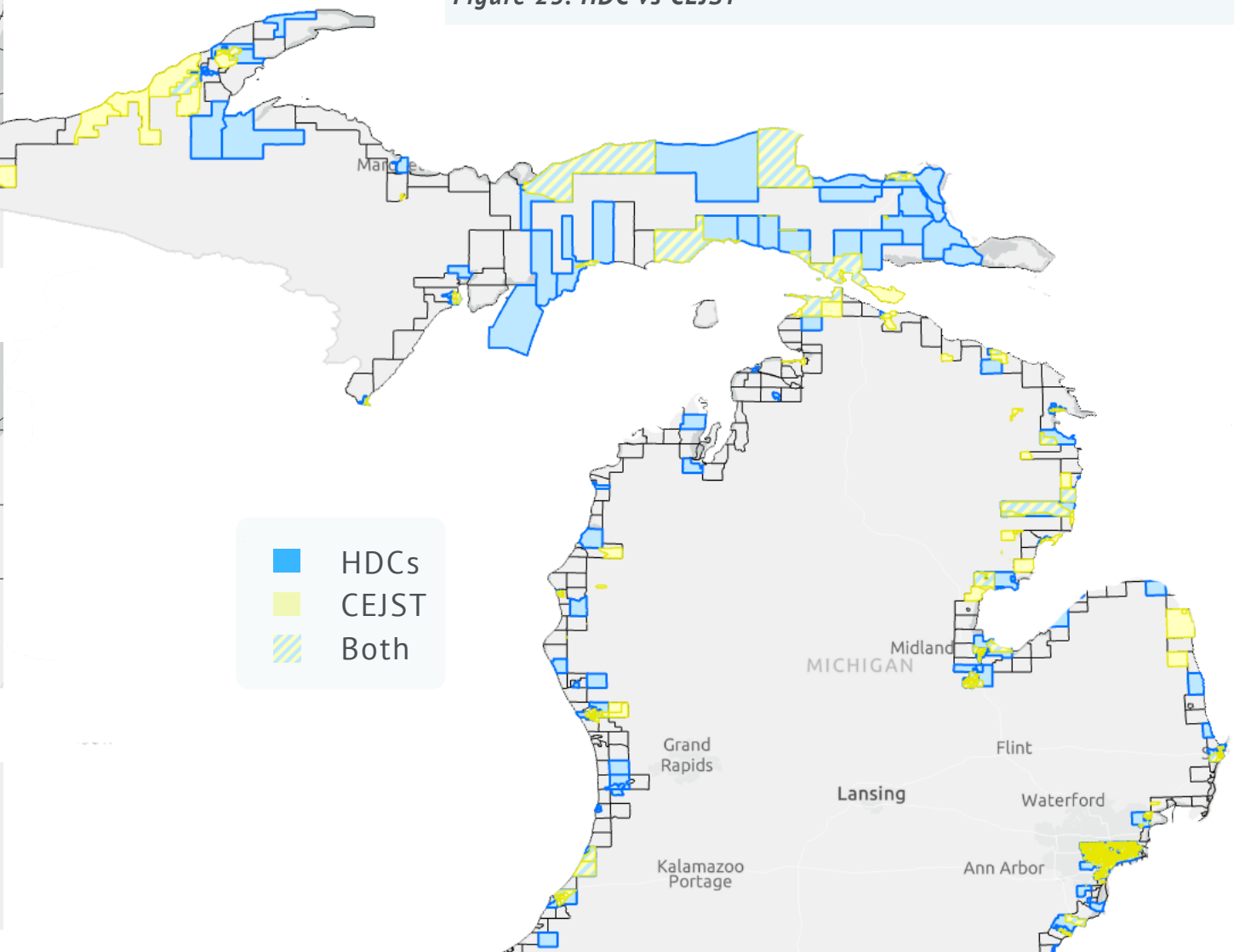


Figure 23. HDCA vs CEJST



KEY ANALYSIS TAKEAWAYS

1. Historically Disenfranchised Communities receive more total funding & average funding per capita than non-HDCs, and HDCs are more likely to contain AOCs.
2. Physical management, or “shovel-ready” projects, receive more funding than capacity building and other long-term outcome oriented projects.
3. There does not appear to be broad, transparent general guidance for equity considerations in the grant-making process.

DISCUSSION

FINDINGS

The findings of our mixed methods analysis indicate the possibility of inequitable outcomes from GLRI funding and show room for improvement in the distribution criteria for grants. We find that the federal government's current methods for allocating funding for coastal resilience projects do not appear to support equity and justice initiatives as well as they could.

Slightly more than half (54%) of coastal communities overall have received GLRI funding, but more non-HDCs (58%) have received funding than have HDCs (47%). At the same time, among communities that have received funding, HDCs have received more funding in total and per capita than non-HDCs. Our analysis revealed that HDCs received a greater share of total GLRI funding dollars (\$321,526,730) than non-HDCs (\$168,173,782). Similarly, when compared on a per capita basis, on average, HDCs received \$542 per capita from GLRI funding—\$252 more per capita than received by non-HDCs (\$290). Funding trends appear to vary from community to community upon closer analysis.

The top 10 HDCs in order of GLRI funds received all contain or are very close to AOC sites, suggesting that funding disparities exist because of the historic legacy of pollution and environmental degradation in these areas (i.e., not in terms of funding dollars awarded, all else held equal). Moreover, additional disparity becomes evident when analyzing locations on a per capita basis. For example, Detroit, the largest city in Michigan with a majority black population, has received the most funding from the GLRI to date. However, on a per capita basis, it



sits among the bottom 10 communities in proximity to AOCs, as shown on Table 9. While a great amount of funding is going toward Detroit generally, the large population of historically disadvantaged individuals residing in Detroit are receiving relatively little compared to other less disadvantaged communities. Great amounts of funding do not necessarily mean equitable distribution across the community or equitable outcomes.

For example, Detroit and the neighboring community of Grosse Ile have vastly different demographics in terms of race and income, but both are located within the Detroit River AOC and each represents the most funded HDC and and the most funded non-HDC, respectively. While it appears that Detroit receives more total funding, Grosse Ile received almost 40 times more funding on a per capita basis. This disparity continues with the second most funded non-HDC: Traverse City. On a per capita basis, Traverse City received

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more than 12 times the funding from GLRI projects than Detroit. In this instance, the large investment in this area cannot be explained due to proximity to an AOC. Furthermore, comparing Grosse Île (population of 10,159) with River Rouge, a community with relatively similar population (7,502), revealed a disparity in funding. These findings suggest that more funding is going to communities that are within AOCs than those outside of AOCs, reflecting the disparities of communities that contain or are near AOCs due to the long term effects of legacy pollution and resource degradation. Beyond that, these findings suggest further that the funding going toward AOC remediation appear to be benefiting more the non-HDCs nearby than the HDCs, further compounding historical disparities. These initial findings merit further investigation

Furthermore, our case study of funding going to Indigenous communities in particular revealed that there is a great disparity of GLRI funds distributed to those recipients, given that they have received a substantial number of funded projects (22%) but a very limited amount of funds awarded (5%). Indigenous people have long had a presence in Michigan, and many GLRI grants have gone to Indigenous governing and environmental groups. Certain cultural practices of Indigenous peoples rely on the continued existence of specific animal and plant species, and the survival of species critical to indigenous practices is threatened as changing climatic conditions introduce new migratory patterns, heightening the risk of extinction.^{84,85,86} It is important that GLRI projects provide sustained efforts towards existing Indigenous groups to steward the environment through both physical management and

capacity building opportunities. These findings taken together strongly suggest that there are disparities in the amount of GLRI funding awarded to date between HDCs and non-HDCs even though, on the whole, it appears that HDCs have received most of the funding to date. While some of these differences could be explained by differing population densities across urban and rural areas of Michigan, our analysis suggests that more funding for coastal restoration is needed in densely populated areas where many BIPOC communities reside. Further research is needed to understand these trends, and to better explain why the availability of funding for HDCs appears not to necessarily translate to equitable and just outcomes from funded projects. In order to create the outcomes in line with Justice40, it will be important to understand how funding is implemented and to invest in projects that empower communities and bolster their resources for further projects.

Another trend addressed by our analysis relates to the type of project that has been funded most often and that has received the highest amounts of GLRI funds. Based on anecdotal information, we hypothesized that “shovel ready” projects, meaning projects ready to be executed, are more likely to have been funded in comparison to projects that focus on investing in the future. Yet projects that bolster a community’s power to implement future projects, or otherwise empower communities in the decision making process, are those that require additional research, planning, and preparation, or interface with the public. We anticipated that these not-yet “shovel ready” projects, nonetheless, were less likely to have been extensively funded. Our analysis of the distribution of GLRI projects across different purposes confirmed that hypothesis, with 71% of GLRI funding from coastal projects going to a physical management project and over 50% of all projects containing a physical management component.

It could be that some of the differences in funds awarded simply reflect the higher costs of mechanically moving dirt, for example, compared to hosting community workshops—although those considerations likely do not explain fully the differences observed. Rather, prioritization of physical management projects may be indicative of a disproportionate societal valuation on advancing physical change and funding things that yield measurable outputs,

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as opposed to making long-term investments with less immediately visible outcomes, such as through capacity building and engagement projects. Physical management projects can also lead to procedural justice that is a check-box as opposed to post-project benefits of reparative and distributive justice, which mostly require a formal summative evaluation. Further study involving communication with community leaders on the ground is necessary to determine whether these prioritizations reflect or counter the needs and desires of individual coastal communities, and to better explain the higher levels of funding for physical management projects to date.

Notably, the distribution of projects by purpose, both in number and funding amount, in Indigenous coastal communities is more evenly spread amongst the five categories than the average HDC or Non-HDC. Through GLRI funding, many Indigenous communities are working towards climate mitigation and adaptation solutions through capacity building and engagement, which we incorporate in our recommendations further in this report.

In addition to our assessment of disparities in funding levels awarded to HDCs versus non HDCs as we have defined them, we conclude that the CEJST does not yet adequately address the nuances of race-related injustice. Our spatial methodology, which highlighted low-income and BIPOC coastal communities through our characterization of HDCs, identified areas within Michigan's coastal zone that are not being recognized correspondingly as 'disadvantaged' in the current iteration of the CEJST. The CEJST's color-blind approach, combined with the lack of attention to coastal climate risks, has the potential to produce inequitable outcomes in funding distribution throughout Michigan and other Great Lakes coastal settings for not accurately identifying those communities most in need. While there are compelling reasons not to incorporate race into the CEJST evaluation criteria directly, race does often intersect with other indicators like poverty and educational enrollment, such that the refinement of the CEJST to incorporate more nuanced measures of those factors may more successfully advance the Biden administration's Justice 40 agenda. This critique is also noted by



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other spatial analysis work using CEJST data.⁸⁷ We elaborate more on possible indicators that agencies might employ, in addition to race, income, and others used by the CEJST, to identify target geographies in our discussion of recommendations below.

Finally, we found that grantmaking criteria vary greatly from one agency to another, and while some agencies have incorporated language related to equity, most do not address equity consistently or as intentionally as necessary to facilitate more equitable outcomes. While agencies should do more to incorporate explicit equity criteria into their RFPs, federal agencies can also support communities in the grant application process in a variety of ways. They may choose to alleviate financial barriers by waiving application fees, reimbursing labor hours used to apply for the grant, or using an eligibility pre screening process. Additionally, agencies may be able to promote equity by more directly soliciting grant applications from historically disadvantaged communities. To do any of these things successfully, the agency should first understand the needs and capacities of these communities.

Capacity building can also occur with funding for grant application assistance, and reimbursement for time spent on denied applications, in addition to funding awarded to grants directly. Communities often face barriers when applying for grants, including a lack of trained staff able to apply for the grants and a means to compensate them. While grants are “a common source of financial support for community projects...[they] are also competitive and require time, training, in order to

create a successful application.”⁸⁵ These requirements can prevent communities from being successful in their grant applications or deter them from applying because “communities that do not have access to individuals with the experience and time to create competitive grant proposals are at a disadvantage compared to organizations and entities that can hire or train grant writers to apply for funds.”⁸⁶ These challenges suggest the need to take express steps designed to identify, support, and encourage a broader array of communities—including HDCs—to apply for GLRI funding support in the first place, rather than to merely rely on funding projects once applications are received.

“

The industry that has arisen around funding has created a circuitous movement of money throughout the grant system: money is used to hire employees to write grant applications, host and attend grant-writing training seminars, develop grant-writing skills, [etc]. Despite the amount of money being spent on these endeavors, when the benefits of the grants trickle down to the community members, often through the organization that applied on the community's behalf, the sums are not always large enough to support the scale of project or program.⁹⁰

”

– Kathryn Sullivan and Lauren White, “Socioeconomic Inequality and Climate Change Hazards: a Focus on the Great Lakes Region.”

RECOMMENDATIONS

Based on our analysis of the current literature on coastal vulnerabilities, social justice, and equity, in combination with our analysis of GLRI funding criteria and patterns to date, we offer a set of recommendations for the HOW Coalition that might guide their efforts to advocate for justice and equity in future GLRI's coastal resilience programing. We have grouped those recommendations into five key areas of action:

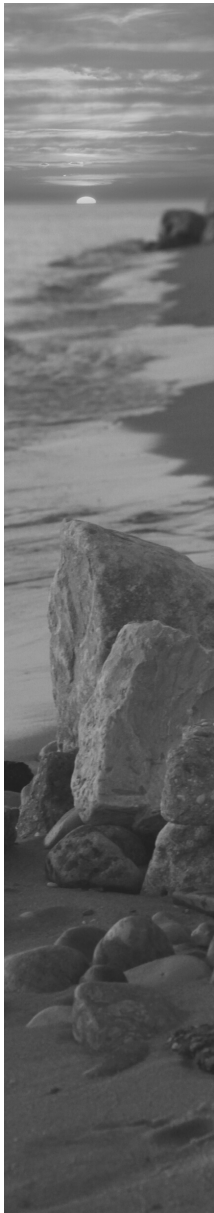
1. IDENTIFY DISADVANTAGED COMMUNITIES IN COASTAL SETTINGS

2. FUND PROJECTS MORE EQUITABLY

3. BUILD TRUST THROUGH MEANINGFUL COMMUNITY ENGAGEMENT

4. EVALUATE OUTCOMES FOR JUSTICE AND EQUITY

5. BREAK SYSTEMIC BARRIERS THROUGH LEGISLATIVE ADVOCACY



1. IDENTIFY DISADVANTAGED COMMUNITIES IN COASTAL SETTINGS

Addressing equity issues requires first and foremost identifying the communities that are disadvantaged or overburdened by social and environmental factors and thus at higher risk of being impacted by climate hazards. This process will help agencies using GLRI funding to prioritize certain geographic locations as they allocate resources for coastal resilience. We presented and discussed above some unique socio-ecological challenges of coastal communities in Michigan, including the intersections of race, income, shoreline access, coastal erosion, and the legacy of industrial pollution. Additionally, literature on coastal resilience also offers other criteria to assess vulnerability, such as age or employment status, which are included in the Center For Disease Control's Social Vulnerability Index (SVI)⁹¹ and Susan L. Cutter, Bryan J. Boruff, and W. Lynn Shirley's Social Vulnerability Index (SOVI).⁹² Proper identification of these at-risk communities is the first step in ensuring equitable outcomes.

RECOMMENDATIONS

- **Federal agencies should use context-specific criteria to identify historically disadvantaged communities in coastal settings:** Agencies should establish their own criteria for disadvantaged communities in addition to those provided by federal and state governments. There is a major gap in the application of climate vulnerability indices in the identification of disadvantaged communities. Many coastal communities in Michigan and other Great Lakes states could be left behind if not properly identified as needing increased investments for coastal resilience, especially since coastal issues specific to a Great Lakes context are not always adequately represented at the national level. We have provided an equity checklist to consider in Appendix 5.
- **Federal agencies should create publicly accessible datasets and maps of historically disadvantaged communities along the coast of the Great Lakes:** Agencies involved in GLRI projects possess a wealth of information about social and environmental vulnerability along the coast of the Great Lakes. This information can be used to create maps to prioritize funding, as well as supplementing information provided in other tools such as CEJST and MI EJ Screen. For reference, our team has generated a map of historically disadvantaged communities or HDCs, as defined for the purposes of this assessment. These communities along the Michigan shoreline, identified by race and income demographics, represent the basis of analysis in this report. Additionally, we have provided a map comparing communities identified as historically disadvantaged by our definition against those identified by CEJST. We recommend that HOW (or the federal agencies administering GLRI funding, working with HOW) develop a refined method for identifying HDCs that can be used by all of the GLRI funding agencies to direct and advance their funding priorities, and that designations of HDC or high-priority communities be revisited periodically to ensure their continued accuracy and applicability.

2. FUND PROJECTS MORE EQUITABLY

As discussed throughout this report, there are disparities in funding of GLRI projects to date for coastal communities that we have identified as historically disadvantaged. On the whole, HDCs received the most amount of total funding. This is not surprising given that a lot of ecological restoration and remediation projects take place in communities that have been more affected by industrial pollution. Our spatial analysis section shows that communities near AOCs receive more funding; yet among communities near or within AOCs, it appears that non-HDCs receive more per capita funding. This suggests some communities such as Detroit are not getting enough funding relative to their population size. Redirecting resources is a first step to address equity concerns, but agencies should understand that money spent has not always necessarily translated directly to more equitable outcomes in coastal projects.⁹³ Justice and equity can only be achieved if all stakeholders are present and have power in the direction of the projects affecting their communities. First and foremost, we recommend further analysis to ensure adequate consideration of the GLRI funding levels that have been made across communities, both in total and per capita, to ensure an equitable distribution of funds specifically across HDCs versus non-HDCs moving forward. In addition, we offer several recommendations related to the kinds of projects most likely to support HDCs equitably over time.

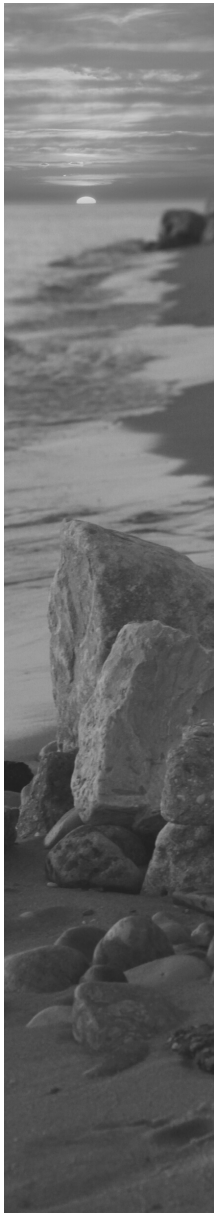
RECOMMENDATIONS

- **Federal agencies should prioritize funding for projects related to education, outreach, and capacity building:** Our team analyzed the types of projects funded through the GLRI. A majority of funding goes to projects in the physical management and research category, while capacity building and community engagement received the least amount of funding. Physical management projects were also the least likely to contain community engagement. Based on needs of historically disadvantaged communities in general, and based on ongoing research regarding those communities, placing heightened priority on planning, capacity building, and education-related projects than has been provided to date would better serve the needs of those communities.
- **Federal agencies should ensure that all GLRI projects, regardless of focus area, include funding for community participation:** To effectively advance equitable outcomes, agencies should ensure that communities are active participants in projects located within their geographies. Many historically disadvantaged communities face economic barriers to participate in planning processes. Providing incentives such as gift cards, food, transportation vouchers or child care support will ensure a wider and more representative participation of community stakeholders.⁹⁴ Incentives do not always have to be material. Other options include providing press coverage or recognition awards.

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- **Federal agencies should offer “how-to-apply” support to increase funding opportunities in disadvantaged communities:** Seeking out and applying for funding can be a challenging process particularly for communities suffering from external stressors such as poverty or racial discrimination. However, these communities are the ones most in need of most funding and remediation projects. To ensure more equitable outcomes by ensuring that communities most in need of support are able to apply for that support in the first place, federal agencies should enhance application guidance, and where possible, free application assistance. If necessary, this support might be provided using a means test to ensure that capacity and resources are directed to those communities with the most need. Other options to ensure a wider applicant pool include: allowing monetary compensation for the time spent in the application as part of budget proposals; allowing in-kind compensation to meet matching requirements; and using a “letter of intent” to pre-screen applications and streamline the process.⁹⁵
- **Federal agencies should consider equity criteria in their grant making process:** Correcting historic harms and disparities can only be achieved through a conscious effort to target disadvantaged communities. Equity is a framework that challenges concepts of equality by recognizing that different groups have different needs in order to achieve parity. In Appendix 5, we provide a Michigan Coastal Equity Checklist. This rubric has been adapted from the Social and Economic Vulnerability Section of the Maine Flood Resilience Checklist to fit the context of Great Lakes coastal communities and to incorporate the components of our equity research: distributional, recognitional, and procedural.⁹⁶ We recommend that HOW (and the federal GLRI grant-making agencies) review this and related sources of potential equity-related grant criteria, and that they modify their grant-making criteria and processes to incorporate measures of equity where possible





3. BUILD TRUST THROUGH MEANINGFUL COMMUNITY ENGAGEMENT

Community engagement is not an easy one-and-done event. To ensure equitable outcomes, this process must include public input in addition to shared decision-making power, as well as conflict resolution in all phases of a project from inception to implementation. Building trust between federal agencies and disadvantaged communities requires acknowledging histories of harm. It is important that agencies start by actively listening to communities, setting aside or bracketing the assumptions that can come with their technical expertise. When done correctly, community engagement creates space for long overdue difficult conversations that bring forth more equitable and just outcomes shared by all stakeholders.

RECOMMENDATIONS

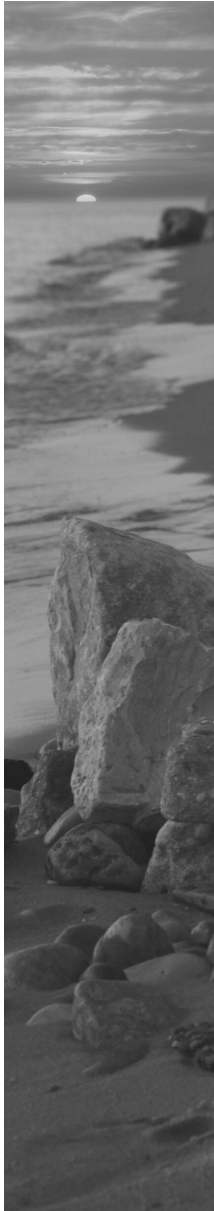
- **Federal agencies should create and publish a public participation process for GLRI projects:** The EPA provides a “Public Participation Guide” that can be tailored to GLRI projects by adding an emphasis on coastal communities and resources.⁹⁷ Agencies can host listening sessions to understand local perspectives and challenges without expecting any particular outcome. Agencies should also be ready to incorporate community feedback meaningfully into their project plans and—especially—to change course based on that feedback; failure to do so, having asked for input, can yield more disenfranchisement and disparity that would have occurred without seeking input in the first place.
- **Federal agencies should hire community relations managers in places identified as historically disadvantaged:** Public participation is a relationship building process that takes time. Agencies should hire staff to serve as facilitators and mediators between local communities and the federal government. Additionally, agencies should identify respected local community leaders to build greater trust when planning and implementing projects. Through our research, we learned that the National Oceanic and Atmospheric Administration (NOAA) already has a dedicated team for government-to-government relations with Tribal groups. Other agencies should follow a similar model and extend it to other disadvantaged communities.
- **Federal agencies should pay special attention to their Tribal relationships:** There is an undeniable history of extractive relationships between government and academia with Indigenous communities. Therefore, agencies should be familiar with the scholarship of Tribal Critical Race Theory⁹⁸ and Culturally Responsive Indigenous Evaluation.^{99,100,101}
- **GLRI Action Plan IV is an opportunity to take these recommendations into action:** The GLRI Interagency Taskforce should target explicitly and with focused attention disadvantaged communities in their outreach and engagement efforts to ensure more diverse representation in their next Action Plan. Action Plan IV is scheduled to guide GLRI investments from fiscal years 2025 to 2029. This represents an opportunity to include historically disadvantaged communities through shared-decision making in the allocation of GLRI projects.

4. EVALUATE OUTCOMES FOR JUSTICE AND EQUITY

Before any justice or equity evaluation occurs, agencies should have an explicit and collective understanding of which communities they seek to improve (See “Area of Action 1” in this report). To ensure a systemic analysis of programs and program impacts, agencies should consider and understand the equity categories they are targeting, such as gender, race, ethnicity, and/or socioeconomic status.¹⁰² After these target categories are identified, we recommend that all GLRI funding agencies select an evaluation methodology appropriate for their programmatic needs, and then create and apply a uniform equity evaluation process to assess the outputs and outcomes from their GLRI-funded projects. Providing a full evaluation of GLRI projects is beyond the scope of work of our report. However, based on our research and analysis, we offer some recommendations of best practices for project evaluation related to GLRI’s current funding patterns, areas of need, and opportunities for improvement.

RECOMMENDATIONS

- Federal agencies should use a formative evaluation process:** This type of evaluation starts alongside the early phases of a project and provides feedback to fine-tune program elements to achieve intended equity outcomes.¹⁰³ As noted earlier, our team has identified capacity issues surrounding community based organizations and municipalities being able to apply for GLRI funding. Formative evaluation is aimed at making sure effective changes are identified early on.
- Federal agencies should use a realist evaluation methodology:** The realist evaluation method is specifically oriented to disaggregate demographic data (e.g., race, gender, age, education attainment, zip code, household income, household size, renters, owners, etc.) to determine who benefits from projects.¹⁰⁴ It is important to note that the realist method is mostly focused on qualitative outcomes. Agencies should consider using this evaluation method alongside other methods that focus on quantitative outcomes such as financial and ecological metrics. Our team has adapted the realist methodology to help program evaluators involved in GLRI projects by providing the following guiding questions:
 - Which specific GLRI programs are working?
 - Why and how are the best GLRI projects working?
 - For which communities do these programs work?
 - To what extent do programs work?
 - For how long do these programs and policies work?
- GLRI Action Plan IV is an opportunity to take these recommendations into action:** Our team recommends that agencies develop and incorporate explicit equity criteria (See our Michigan Coastal Equity Checklist in Appendix 5 as an example) that can be used in the project selection and grantmaking processes for Action Plan IV. This would not be unprecedented, as GLRI Action Plan II committed agencies to create climate resiliency criteria. Similarly, current GLRI Interagency Agreements already include a principle of “Promotion of long-term societal, economic, and ecological sustainability goals.” This principle could be improved by incorporating specific measurable equity criteria that achieves societal sustainability. The inclusion of measurable equity criteria should be cataloged in the GLRI Annual Report. For example, Action Plan III includes the metric “Measure: 5.1.1. Youth impacted through education and stewardship projects.”¹⁰⁵



5. BREAK SYSTEMIC BARRIERS THROUGH LEGISLATIVE ADVOCACY

In our research and analysis of GLRI projects, we found some legislative barriers to ensuring equitable outcomes. For example, some federal agencies have matching requirements for applicants in their request for proposals (RFPs). This requirement is an example of a policy with an unintended outcome. Community-based organizations and municipalities that are under-resourced are the same organizations that would benefit most from these projects, but they often do not have the ability to match these funds. Civil society and advocacy organizations should advocate for legislative change to remove matching requirements for funding projects. These requirements are exclusionary, and favor geographies that are already wealthy and with high-capacity to implement coastal resilience projects.

Furthermore, different agencies involved with GLRI projects have different policies in relation to justice, equity, and inclusion. In Table 17, we provide a matrix showing the results of a review of equity considerations in federal agency RFPs conducted by the research team. As outlined in our section for “Evaluating Outcomes for Justice and Equity,” we recommend that agencies involved in the GLRI create a uniform set of equity considerations. However, this might require a legislative or executive mandate in order to ensure that all agencies are required to weave justice and equity considerations in their projects. Justice 40 is an example of a policy meant to include equity in climate and environmental policy and apply across federal agencies. Nonetheless, it does not provide explicit enforcement and accountability. Civil society and advocacy organizations should continue to advocate for legislative change for direct investments in disadvantaged communities.

CONCLUSION

Coastal justice in a Great lakes setting can only be achieved when equity is integrated into the core of coastal resilience work. All communities, regardless of race, ethnicity, or income, should have access to the wealth of resources along the coastline of the Great Lakes free of barriers—both fiscal and physical. Therefore, if Great Lakes coastal resilience work is to advance coastal justice, it cannot merely focus purely on environmental remediation; it must also address the social vulnerability of communities nearby polluted and impaired environments. A purely ‘structural’ or physical conception of coastal resilience can neglect important social factors that heighten climate risk, such as race, ethnicity, and income, increasing the probability that resilience work will compound existing inequities.

Capacity building, public education, outreach, and community engagement are pathways to greater procedural and recognition equity in resilience work, and therefore coastal justice. Our spatial analysis demonstrated that these types of projects received a smaller share of overall GLRI funding to date. Increasing funding to these project types advances procedural and recognition equity within the GLRI by bolstering historically disadvantaged communities’ adaptive capacity to withstand future climate hazards and shocks. While engagement projects can be difficult to execute due to the ongoing impacts of past racial discrimination and exclusion, effective community engagement can help build a stronger foundation of trust for future work.¹⁰⁶ These less “shovel ready” projects ensure that HDCs have a seat at the decision-making table and their voices are integrated throughout the planning and implementation processes.

The historic \$1 billion investment in the GLRI via the IJA is an incredible opportunity to operationalize equity in Great Lakes coastal resilience work by expanding funding opportunities for education, capacity building, and planning, as demonstrated by the research team’s spatial analysis. Furthermore, there is an opportunity for this historic investment to further distributional equity in GLRI funding for Michigan coastal communities by prioritizing the 59 HDCs our team identified that have never received funding from the GLRI.



FUTURE WORK & LIMITATIONS OF THE STUDY

Our analysis points to the need for Great Lakes National Program Office (GLNPO) and the other agencies to embed more robust evaluation systems into their internal processes. To build upon this work, we recommend that future research teams conduct interviews especially with community leaders and those who work with grant funding, not only regarding the distribution of funds but with regard to their use as well. This work could provide a qualitative narrative to describe funding disparity trends we describe quantitatively in our spatial analysis. Additionally, this analysis has provided a sweeping overview of coastal justice and funding across the entirety of Michigan's coast. We recommend future research to investigate these findings further in the context of both larger regions and individual communities. Such assessment could produce greater insight into the reason observed funding trends are occurring. The research team collected and analyzed publicly available information relating to beach access points to help inform an understanding of the equity issues at play in Great

Lakes coastal settings; however, additional study may also be fruitful. Specifically, we recommend more thorough analysis of public access points along Great Lakes shorelines and the possible ties between funding, environmental cleanup efforts, gentrification, and displacement. We highlight this as an opportunity for future Michigan students to investigate, along with an analysis of organizational capacity amongst GLRI grant recipients to address another element of the risk framework.

Finally, the availability and quality of data has proven to be a limiting factor in our work, especially with regards to environmental characteristics. Future research groups with expertise in environmental fields, as well as the capability to produce new data and measurements, can contribute to this research with additional measures of exposure to hazard, and other related analysis. The team worked with public data available through a variety of sources including the EPA, Michigan DNR, USACE, US Census, NOAA, and the State of Michigan's open data portal. More extensive coastal environmental analysis would be an excellent undertaking for future efforts.



MEET THE TEAM

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Alex Spofford holds a Master of Urban and Regional Planning from the University of Michigan. She completed a Bachelor in Comparative Literature from the University of Washington in her hometown of Seattle. Alex is completed a Master of International and Regional Studies at the University of Michigan, focusing on Czech culture and language. Alex currently works for the City of Detroit's Parks & Recreation Division as a Parks Planner.

EMILY SODERBERG

Emily is earned a Master of Urban and Regional Planning primarily focused on the intersections of climate adaptation, land use, and environmental justice. She came to graduate school following roughly six years of work throughout the food system and sustainability sectors; some of these experiences include working for an industrial compost facility, a rooftop farming company in Washington, D.C., and an independent solar installer in her hometown of Tucson, AZ. Emily also holds a B.S. in Sustainable Built Environments with a minor in Sustainable Plant Systems from the University of Arizona.

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Alexis Richards holds a Master of Urban and Regional Planning from the University of Michigan. She is currently a Policy Associate with Community Development Advocates of Detroit (CDAD) with a focus on housing affordability, compensation for over taxation, and the equitable distribution of CDBG and APRA funds. She received her Bachelor of Science in Biological Sciences from Wayne State University. Alexis is passionate about integrating environmental and social sustainability within planning to promote more equitable and resilient communities.

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Juan Jhong Chung, born in Ica, Peru, is a graduate of the Master of Urban and Regional Planning at the University of Michigan. He is interested in the intersection of sustainability, climate, social justice, and participatory planning in historically marginalized communities. Juan has a Masters of Science in Environment and Sustainability from the University of Michigan and a Bachelor of Science in Electrical Engineering from Boston University. Juan is the Climate Justice Director for Michigan Environmental Justice Coalition, a statewide coalition of grassroots and community organizations that advocate for just and equitable environmental outcomes at the local, state and federal levels.

MEET THE TEAM

MAEGHEN GOODE

Maeghen holds dual Masters degrees from the University of Michigan-Ann Arbor in Urban and Regional Planning and Environmental Justice. Maeghen received her bachelor's degree from Michigan State University studying environmental studies and sustainability. After graduating from her undergraduate program, Maeghen did a service year with AmeriCorps through an organization called public allies where she worked on increasing community capacity.

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Aaron Cohen holds a Master of Urban and Regional Planning from the University of Michigan. He completed a Bachelor's of Arts in Theatre and History from Goucher College (Baltimore, Maryland). Aaron has experience in transportation planning and taken extensive courses on land-use planning while at the University of Michigan. Additionally, through his work with an energy professor, he has gained experience with how energy and zoning are interconnected. Other planning interests include program evaluation for urban planning and the connection between planning and the arts.

ANDRE MONGE

Andre Monge earned a Master of Urban and Regional Planning from the University of Michigan. Monge is originally from the metropolitan Detroit area. He completed a Bachelor's of Arts in History from the University of Colorado at Boulder. Monge also earned a Master's of Arts in Middle East Studies from the University of Michigan. Monge is a retired U.S. Army officer with fluency in the Arabic language. He has professional experience in land use and zoning while working as a planning commissioner and intern in Chelsea, Michigan.

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Richard Norton is a professor of urban and regional planning at the University of Michigan. He teaches graduate and undergraduate courses in land use and environmental planning, coastal area management, and planning law. He has almost 30 years of experience in researching and engaging with communities on a variety of topics related to sustainable and resilient coastal management, much of that effort focused on the Great Lakes.

SARAH DOBIE

Sarah Dobie is a PhD candidate and graduate student instructor of urban and regional planning at the University of Michigan. She holds a BS/MS in Environmental Sustainability, Health, and Safety Management from Rochester Institute of Technology and has over 5 years of experience working for private, public, and non-profit clients on projects related to sustainable development, urban resilience, climate finance, and environmental planning and policy making.



APPENDICES

APPENDIX 1: SUPPLEMENTARY INFORMATION ON GLASS V GOECKEL

In the 2005 case of *Glass v. Goeckel*, the Michigan Supreme Court held that public access to the land below the OHWM for recreational purposes is a protected right. In a conflict between neighbors, Mr. Goeckel did not appreciate his neighbor's (Mrs. Glass') walks along the shoreline abutting his property, believing her to be trespassing on his private property. He claimed he was deeded all the land up to the "meander line of Lake Huron," which was interpreted as the lands seaward of the OHWM. However, the Michigan Supreme Court held that if the State does in fact convey land to a private party below the OHWM, as it appeared to have in Mr. Goeckel's deed, the public trust easement still remains. Ultimately, the Court held that title claiming private property rights was irrelevant in the face of the public trust doctrine. One would assume that based on legal precedence, the public would have access to all Michigan's Great Lakes shorelines under the public trust. However, the erratic nature of shifting shores, erosion, the effects of climate change, and the actions of private property owners, has significantly complicated the public's right to access the shoreline of Michigan's Great Lakes.

APPENDIX 2: SUPPLEMENTARY INFORMATION FOR SPATIAL ANALYSIS METHODOLOGY

As the base geographic unit for the spatial analysis, we chose to use the US Census Bureau's county subdivision classification. For the data sets we utilized, this geographic classification has a lower margin of error than census tracts. To determine which county subdivisions are coastal, a GIS shapefile from the Michigan Department of Natural Resources (DNR) was downloaded containing the Coastal Zone Management Areas (CZMA) as defined by the Coastal Management Act of 1972 by US Congress. The CZMA "outlines three national programs, the National Coastal Zone Management Program, the National Estuarine Research Reserve System, and the Coastal and Estuarine Land Conservation Program," in how coastal areas can receive federal funding, which can be supported through GLRI funding. By using an already existing coastal classification, we align our research with the federal classification system supported by Michigan DNR. Additionally, the CZMAs are managed by The National Oceanic and Atmospheric Administration (NOAA), a large federal agency who receives GLRI funding and is active within coastal planning issues. By using this data set, our results should be easily transferable to NOAA and other HOW coalition members.

APPENDIX 3: LIST OF INDIGENOUS RECIPIENTS OF GLRI GRANTS FOR CASE STUDY

- Bay Mills Indian Community
- Chippewa Ottawa Resource Authority/Inter-Tribal Fisheries & Assessment Program
- Grand Traverse Band of Ottawa and Chippewa Indians
- Keweenaw Bay Indian Community
- Little River Band of Ottawa Indians
- Little Traverse Bay Bands of Odawa Indians
- Match-E-Be-Nash-She-Wish Band of Potawatomi Indians
- Saginaw Chippewa Indian Tribe
- Sault Ste. Marie Tribe of Chippewa Indians.

APPENDIX 4: FEDERAL AGENCIES GLRI GRANT ANALYSIS

References for Grant Matrix:

National Fish and Wildlife Foundation:

Gauchay, Aislinn and Traci Giefer. "Sustain Our Great Lakes 2021 Request for Proposals." *National Fish and Wildlife Foundation*. February 16, 2021. <https://www.nfwf.org/programs/sustain-our-great-lakes-program/sustain-our-great-lakes-2021-request-proposals>.

National Ocean and Atmospheric Administration:

NOAA Coastal Resilience Grant Program. "Announcement of Federal Funding Opportunity." *National Oceanic and Atmospheric Administration*. March 16, 2017. https://coast.noaa.gov/data/coasthome/funding/_pdf/NOAA-NOS-NRPO-2017-2005159-ffo-modification-posted-03.16.2017.pdf

United States Department of Agriculture - National Resource Conservation Services:

National Resource Conservation Service. "USDA-NRCS-NHQ-RCPP-22-NOFO0001136 Announcement for Program Funding for NRCS's Regional Conservation Partnership Program (RCPP) for Federal Fiscal Year (FY) 2022." *United States Department of Agriculture*. Last Updated, January 12, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?oppld=337340>.

National Resource Conservation Service. "USDA-NRCS-COMM-22-NOFO0001139 Partnerships for Climate-Smart Commodities – Building Markets and Investing in America's Climate-Smart Farmers, Ranchers & Forest Owners to Strengthen U.S. Rural and Agricultural Communities." *United States Department of Agriculture*. Last Updated, March 11, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?oppld=337878>.

APPENDIX 4: FEDERAL AGENCIES GLRI GRANT ANALYSIS CONTINUED

United States Army Corps of Engineers:

Detroit District. "Great Lakes Restoration Initiative." *United States Army Corps of Engineers*.

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Restoration-Initiative/>.

Great Lakes Fishery Commission. "Great Lakes Fishery & Ecosystem Restoration Program." *United States Army Corps of Engineers*.

<https://www.lrd.usace.army.mil/Home/Great-Lakes-Fishery-Ecosystem-Restoration-Program/Program-Implementation/>.

Great Lakes and Ohio River Division. "Continuing Authorities Program (CAP) - Overview." *United States Army Corps of Engineers*.

<https://www.lrd.usace.army.mil/Missions/Public-Services/Continuing-Authorities-Program-CAP-Overview/>.

United States Geological Survey:

Geological Survey. "G22AS00255 WATER RESOURCES RESEARCH ACT PROGRAM NATIONAL COMPETITIVE GRANTS FY2022 PROGRAM ANNOUNCEMENT For AQUATIC INVASIVE SPECIES." *United States Department of Interior*. Last Updated, April 19, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?opId=338681>

Geological Survey. "G22AS00247 Cooperative Agreement for affiliated Partner with Great Lakes Northern Forest Cooperative Ecosystem Studies." *United States Department of Interior*. Last Updated, February 28, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?opId=338406>

Geological Survey. "G22AS00244 Cooperative Agreement for CESU-affiliated Partner Great Lakes – Northern Forest Cooperative Ecosystem Studies Unit (CESU)." *United States Department of Interior*. Last Updated, February 25, 2022. <https://www.grants.gov/web/grants/view-opportunity.html?opId=338370>

United States Geological Survey. "Great Lakes Restoration Initiative." *United States Geological Survey*.

<https://www.usgs.gov/special-topics/great-lakes-restoration-initiative>.

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APPENDIX 5: MICHIGAN COASTAL EQUITY CHECKLIST

Instructions: Respond yes or no to the following questions. To score, add one point for "yes" answers, and zero points for "no" answers. If unsure of an answer, do not count it. Sum up the total score and divide it by the number of questions answered. Score will be a decimal number between 0 (not vulnerable) and 1 (extremely vulnerable). Adapted from the Maine Flood Resilience Checklist.¹⁰⁷

Coastal Justice, Equity, and Resilience Criteria		Yes	No	Unsure	Score	Notes
Sensitivity Is this project located within a community with sensitive populations to the effects of climate change?	Black, Indigenous, and People of Color					
	Households below Michigan's poverty level					
	Non-native English speakers					
	Elderly populations					
	Disabled individuals					
	Residents without access to vehicles					
	Unhoused individuals					
	Waterfront workers					
	Other					
Exposure Is this project located in an area at risk of environmental and climate hazards?	Coastal Erosion					
	Flooding					
	Algal Bloom					
	Droughts					
	Heatwaves					
	Other					

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Coastal Justice, Equity, and Resilience Criteria Contin.		Yes	No	Unsure	Score	Notes
Injustice Is this project located within a community with a history of disparate environmental outcomes?	Exposure to hazardous waste					
	Exposure to poor air quality					
	Exposure to lead					
	Legacy to industrial pollution					
	Lack of access to safe drinking water					
	Lack of access to recreation areas including public beaches					
	Other					
Planning Is this project located within a community that lacks human and economic resources to respond to climate threats?	Lack of a shared definition of community resilience					
	Lack of a local master plan that addresses climate risks					
	Lack of professional planners					
	Lack of land use regulations for shorelines					
	Lack of coastal hazard/disaster education plan					
	Lack of economic diversity and mobility (i.e relies heavily on tourism, recreation, and coastal resources)					
	Other					

ENDNOTES

1. Donald Wuebbles, Bradley Cardinale, Keith Cherkauer, Robin Davidson-Arnott, Jessica Hellmann, Dana Infante, Lucinda Johnson, Rob de Loë, Brent Lofgren, Aaron Packman, Frank Seglenieks, Ashish Sharma, Brent Sohngen, Michael Tiboris, Daniel Vimont, Robyn Wilson, Kenneth Kunkel, Andrew Ballinger, “An Assessment of the Impacts of Climate Change on the Great Lakes: by Scientists and Experts from Universities and Institutions in the Great Lakes Region” (Environmental Law and Policy Center, Chicago, 2019), 1.
2. Dean R. Hardy, Richard A. Milligan, and, Nik Heynen, “Racial Coastal Formation: The Environmental Injustice of Colorblind Adaptation Planning for Sea-Level Rise,” *Geoforum* 87, (December 2017): 1.
3. Bob Bolin and Liza C. Kurtz, “Race, Class, Ethnicity, and Disaster Vulnerability,” in *Handbook of Disaster Research*, edited by Havidán Rodríguez, William Donner, and Joseph E. Trainor, 181–203 (Switzerland: Springer International Publishing, 2018), 187.
4. Paul Mohai, David Pellow, and J. Timmons Roberts, “Environmental Justice,” *Annual Review of Environment and Resources* 34, no. 1 (November 1, 2009): 405-430.
5. White House Briefing Room, “Executive Order on Tackling the Climate Crisis at Home and Abroad,” The White House, January 27, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>.
6. United States Environmental Protection Agency, “President Biden, EPA \$1 Billion Investment from the Bipartisan Infrastructure Law Will Accelerate Cleanup Efforts and Benefit Michigan,” News Releases. Environmental Protection Agency, Feb 17, 2022, <https://www.epa.gov/newsreleases/president-biden-epa-1-billion-investment-bipartisan-infrastructure-law-will-1>.
7. Michigan Department of Environment, Great Lakes, & Energy Office of the Great Lakes, “EGLE - Michigan’s Resilient Coast: Living on the Nation’s Longest Freshwater Coastline,” Michigan Department of Environment, Great Lakes, & Energy, Accessed April 11, 2022, https://www.michigan.gov/egle/0,9429,7-135-3313_3677_3696-549387--,00.html.
8. U.S. Census Bureau; American Community Survey, 2019 American Community Survey 5-Year Estimates, Table S1901 and DP05; generated by Alexandria Spoffard; using data.census.gov; April, 2, 2022.
9. U.S. Census Bureau; American Community Survey, 2019 American Community Survey 5-Year Estimates, Table S1901 and DP05; generated by Alexandria Spoffard; using data.census.gov; April, 2, 2022.
10. Sara Hughes, Kirsten Schwarz, Joyce Coffee, Genevieve LaMarr LeMee, Sarah Dobie, Madeleine Lane, Andres Gonzalez, “Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities” (Graham Institute of Sustainability: the University of Michigan, Ann Arbor, 2021).
11. Sarah Dobie, Patrick Doran, Richard, Norton, and Sarah Hughes “Geographies of Resilience: Using a Critical Geography Lens to Demonstrate Contradictory Definitions of Coastal Resilience by Great Lakes Stakeholders,” Submitted to *Journal of Great Lakes Research* special issue on “Assigning Agency: How Communities, Individuals, and Organizations Engage in Environmental Cleanup and Revitalization,” 2022.
12. Sarah Dobie, Patrick Doran, Richard, Norton, and Sarah Hughes “Geographies of Resilience: Using a Critical Geography Lens to Demonstrate Contradictory Definitions of Coastal Resilience by Great Lakes Stakeholders,” 2.
13. Ahjond Garmestani, Robin K. Craig, Herman Kasper Gilissen, Jan McDonald, Niko Soininen, Willemijn J. van Doorn-Hoekveld, and Helena F. M. W. van Rijswijk, “The Role of Social-Ecological Resilience in Coastal Zone Management: A Comparative Law Approach to Three Coastal Nations,” *Frontiers in Ecology and Evolution* 7, (October, 2019): 1-14.

ENDNOTES

14. Alex Brown, "Rising Waters Threaten Great Lakes Communities," Pew Trusts, September 30, 2020, <https://pew.org/2SncxPT>.
15. Harry B. M. Wells, Elijah H. Kirobi, Cadia L. Chen, Leigh A. Winowiecki, Tor-Gunnar Vågen, Muhammad N. Ahmad, Lindsay C. Stringer, and Andrew J. Dougill, "Equity in Ecosystem Restoration," *Restoration Ecology* 29, no. 5 (July 2021): 1-10.
16. Karen S. Cook, and Karen A. Hegtvedt, "Distributive Justice, Equity, and Equality," *Annual Review of Sociology* 9, no. 1 (August 1983): 217–241.
17. Sara Hughes, Kirsten Schwarz, Joyce Coffee, Genevieve LaMarr LeMee, Sarah Dobie, Madeleine Lane, Andres Gonzalez, "Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities" (Graham Institute of Sustainability: the University of Michigan, Ann Arbor, 2021), 14.
18. Sara Meerow, Pani Pajouhesh, and Thaddeus R. Miller, "Social Equity in Urban Resilience Planning," *Local Environment* 24, no. 9 (September 2, 2019): 796.
19. Sara Hughes, Kirsten Schwarz, Joyce Coffee, Genevieve LaMarr LeMee, Sarah Dobie, Madeleine Lane, Andres Gonzalez, "Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities," 14.
20. Paul Mohai, Paula M. Lantz, Jeffrey Morenoff, James S. House, and Richard P. Mero, "Racial and Socioeconomic Disparities in Residential Proximity to Polluting Industrial Facilities: Evidence From the Americans' Changing Lives Study," *American Journal of Public Health* 99, no. S3 (November 2009): 649–656.
21. Terry Gibb, "Lakes Appreciation Month: The Great Lakes Facts and Features," MSU Extension, July 20, 2015, https://www.canr.msu.edu/news/lakes_appreciation_month_the_great_lakes_facts_and_features.
22. Great Lakes Stewardship Initiative, "Great Lakes Facts Sheet," 2017, https://greatlakesstewardship.org/wp-content/uploads/2017/12/GreatLakes_FactSheet-2.pdf.
23. Sara Meerow, Pani Pajouhesh, and Thaddeus R. Miller, "Social Equity in Urban Resilience Planning," 795.
24. Great Lakes Restoration Initiative, "Great Lakes Restoration Initiative: Action Plan III Fiscal Year 2020 - Fiscal Year 2024," Great Lakes National Program Office, Environmental Protection Agency, 2019, <https://www.epa.gov/sites/default/files/2019-10/documents/glri-action-plan-3-201910-30pp.pdf>.
25. Sara Meerow, Pani Pajouhesh, and Thaddeus R. Miller, "Social Equity in Urban Resilience Planning," 796.
26. Sara Meerow, Pani Pajouhesh, and Thaddeus R. Miller, "Social Equity in Urban Resilience Planning," 796.
27. Terry Gibb, "Public Advisory Councils' Role in the Great Lakes," MSU Extension, March 14, 2014, https://www.canr.msu.edu/news/public_advisory_councils_role_in_the_great_lakes.
28. Energy.gov, "What Is Environmental Justice?," Accessed April 10, 2022, <https://www.energy.gov/lm/services/environmental-justice/what-environmental-justice>.
29. Rosa Gonzalez, "Community-Driven Climate Resilience Planning: A Framework," (National Association of Climate Resilience Planners, New York, 2020), <https://movementstrategy.org/resources/community-driven-climate-resilience-planning-a-framework/>.
30. Melissa K. Scanlan, "Blueprint for the Great Lakes Trail," *Michigan Journal of Environmental and Administrative Law* 4, no. 1 (2014): 68.

31. Richard K. Norton, Guy A. Meadows, Lorelle A. Meadows, “The Deceptively Complicated Elevation Ordinary High Water Mark and the Problem with Using it on a Laurentian Great Lakes Shore,” *Journal of Great Lakes Research*, no. 39 (2013): 527.

32. Kelly House, “Michigan’s Coast is being Armored with Seawalls Making Erosion Worse,” *Bridge Michigan*, July 17, 2020, <https://www.bridgemi.com/michigan-environment-watch/michigans-coast-being-armored-seawalls-making-erosion-worse>.

33. Kelly House, “Michigan’s Coast is being Armored with Seawalls Making Erosion Worse,” *Bridge Michigan*, July 17, 2020, <https://www.bridgemi.com/michigan-environment-watch/michigans-coast-being-armored-seawalls-making-erosion-worse>

34. Richard K. Norton, “Dynamic Coastal Shoreline Zoning: Adapting Fastland Zoning for Naturally Shifting Coastal Shores,” 2.

35. Great Lakes Stewardship Initiative, “Great Lakes Facts Sheet,” 2017, https://greatlakesstewardship.org/wp-content/uploads/2017/12/GreatLakes_FactSheet-2.pdf.

36. Alex Brown, “Rising Waters Threatens Great Lakes Communities,” *Michigan Advance*, October 22, 2020, <https://michiganadvance.com/2020/10/22/rising-waters-threaten-great-lakes-communities/>.

37. Samuel Kling and Lucas Stephens, “The Right to the Shoreline: Race, Exclusion, and Public Beaches in Metropolitan Chicago” (The Chicago Council on Global Affairs, Chicago, 2020), 2.

38. Samuel Kling and Lucas Stephens, “The Right to the Shoreline: Race, Exclusion, and Public Beaches in Metropolitan Chicago,” 10.

39. Pervaze A. Sheikh, “The Great Lakes Restoration Initiative: Background and Issues” (R43249, Congressional Research Service, Washington D.C., 2013).

40. GLRI, “Funding | Great Lakes Restoration Initiative,” Great Lakes Restoration Initiative, August 6, 2021, <https://www.glri.us/funding>.

41. GLRI, “Funding | Great Lakes Restoration Initiative,” Great Lakes Restoration Initiative, August 6, 2021

42. United States Environmental Protection Agency, Region 05, “Restoring Great Lakes Areas of Concern,” Overviews and Factsheets. Environmental Protection Agency, March 11, 2015, <https://www.epa.gov/great-lakes-aocs/restoring-great-lakes-areas-concern>.

43. GLRI, “Funding | Great Lakes Restoration Initiative,” Great Lakes Restoration Initiative, August 6, 2021.

44. White House Briefing Room, “UPDATED FACT SHEET: Bipartisan Infrastructure Investment and Jobs Act,” The White House, August 3, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-investment-and-jobs-act/>.

45. White House Briefing Room, “Executive Order on Tackling the Climate Crisis at Home and Abroad,” The White House, January 27, 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/>.

46. Shalanda D. Young, Brenda Mallory, and Gina McCarthy to Heads of Departments and Agencies, July 20, 2021, Office of Management and Budget, Interim Implementation for the Justice40 Initiative, Executive Office of the President, M-21-28.

47. Anthony Bevacqua, Danlin Yu, and Yaojun Zhang, “Coastal Vulnerability: Evolving Concepts in Understanding Vulnerable People and Places,” *Environmental Science & Policy* 82 (April 2018): 19-29.

ENDNOTES

- 48.** Agency for Toxic Substances and Disease Registry. “CDC/ATSDR Social Vulnerability Index (SVI),” *Centers for Disease Control and Prevention*, March 15, 2022, <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.
- 49.** Barry E. Flanagan, Edward W. Gregory, Elaine J Hallisey, Janet L. Heitgerd, and Brian Lewis, “A Social Vulnerability Index for Disaster Management,” *Journal of Homeland Security and Emergency Management* 8, no. 1 (January 5, 2011): 1-22.
- 50.** Anthony Bevacqua, Danlin Yu, and Yaojun Zhang, “Coastal Vulnerability: Evolving Concepts in Understanding Vulnerable People and Places,” *Environmental Science & Policy*, no. 82 (April 2018): 19-29
- 51.** Barry E. Flanagan, Edward W. Gregory, Elaine J Hallisey, Janet L. Heitgerd, and Brian Lewis, “A Social Vulnerability Index for Disaster Management,” *Journal of Homeland Security and Emergency Management*, January 5, 2011.
- 52.** Agency for Toxic Substances and Disease Registry. “CDC/ATSDR Social Vulnerability Index (SVI),” <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.
- 53.** Taylor Gillespie, “President Biden, EPA \$1 Billion Investment from the Bipartisan Infrastructure Law Will Accelerate Cleanup Efforts and Benefit Michigan,” News Release. Environmental Protection Agency Region 5, February 17, 2022, <https://www.epa.gov/newsreleases/president-biden-epa-1-billion-investment-bipartisan-infrastructure-law-will-1>.
- 54.** Shalanda D. Young, Brenda Mallory, and Gina McCarthy to Heads of Departments and Agencies, July 20, 2021, Office of Management and Budget, Interim Implementation for the Justice40 Initiative, Executive Office of the President, M-21-28.
- 55.** Taylor Gillespie, “President Biden, EPA \$1 Billion Investment from the Bipartisan Infrastructure Law Will Accelerate Cleanup Efforts and Benefit Michigan,” February 17, 2022,
- 56.** White House Briefing Room, “Fact Sheet: A Year Advancing Environmental Justice,” The White House, Statements and Releases, January 26, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/26/fact-sheet-a-year-advancing-environmental-justice/>.
- 57.** Paul Mohai, David Pellow, and J. Timmons Roberts, “Environmental Justice,” 405-430.
- 58.** Christopher W. Tessum, David A. Paoletta, Sarah E. Chambliss, Joshua S. Apte, Jason D. Hill, and Julian D. Marshall, “PM 2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States.” *Science Advances* 7, no. 18 (April, 2021): 1-6.
- 59.** Samuel Kling and Lucas Stephens, “The Right to the Shoreline: Race, Exclusion, and Public Beaches in Metropolitan Chicago,” The Chicago Council on Global Affairs, working paper, September 22, 2020.
- 60.** Jinwon Kim, Seong Ok Lyu, and HakJun Song, “Environmental Justice and Public Beach Access,” *City & Community* 18, no. 1 (March 2019): 49-70.
- 61.** Robert D Bullard, “Environmental Justice in the 21st Century: Race Still Matters,” *Phylon (1960-)* 49, no. 3 (2001): 151-171.
- 62.** Evan P. Apfelbaum, Michael I. Norton, and Samuel R. Sommers, “Racial Color Blindness: Emergence, Practice, and Implications,” *Current Directions in Psychological Science* 21, no. 3 (June 2012): 205-209.
- 63.** Josh Gerstein, and Ximena Bustillo, “Historic Debt Relief for Minority Farmers Faces Legal Juggernaut - POLITICO,” *Politico*, August 3, 2021, sec. Agriculture, <https://www.politico.com/news/2021/08/03/biden-equity-agriculture-502209>.
- 64.** Reese Oxner, “Texas Agriculture Commissioner Sid Miller Alleges Aid to Farmers of Color Discriminates against White Farmers in Suit against Biden Administration,” *The Texas Tribune*, April 27, 2021, <https://www.texastribune.org/2021/04/27/sid-miller-farmers-lawsuit/>.
- 65.** Jagmohan Sharma and Nijavalli H Ravindranath. “Applying IPCC 2014 Framework for Hazard-Specific Vulnerability Assessment under Climate Change.” *Environmental Research Communications* 1, no. 5 (June 1, 2019): 1-8.

ENDNOTES

66. Neil W. Adger, "Vulnerability," *Global Environmental Change* 16, no. 3 (August 2006): 271.
67. Neil W. Adger, "Vulnerability," 271.
68. Neil W. Adger, "Vulnerability," 275.
69. Neil W. Adger, "Vulnerability," 273.
70. Neil W. Adger, "Vulnerability," 268.
71. Neil W. Adger, "Vulnerability," 268-269.
72. Adapted from Rob Swart, Jaume Fons, W. Geertsema, Bert Hove, and C.M.J. Jacobs, "Urban Vulnerability Indicators" A Joint Report of European Topic Centers-Climote, January 1, 2012.
73. Donald Wuebbles, Bradley Cardinale, Keith Cherkauer, Robin Davidson-Arnott, Jessica Hellmann, Dana Infante, Lucinda Johnson, Rob de Loë, Brent Lofgren, Aaron Packman, Frank Seglenieks, Ashish Sharma, Brent Sohngen, Michael Tiboris, Daniel Vimont, Robyn Wilson, Kenneth Kunkel, Andrew Ballinger, "An Assessment of the Impacts of Climate Change on the Great Lakes: by Scientists and Experts from Universities and Institutions in the Great Lakes Region," 1-2.
74. National Oceanic and Atmospheric Administration, "State Coastal Zone Boundaries," February 9, 2012, <https://coast.noaa.gov/data/czm/media/StateCZBoundaries.pdf>.
75. Julie Arsenaault, Pascal Michel, Olaf Berke, André Ravel, and Pierre Gosselin, "How to Choose Geographical Units in Ecological Studies: Proposal and Application to Campylobacteriosis," *Spatial and Spatio-Temporal Epidemiology* 7 (December 2013): 11–24.
76. Sarah Dobie, Patrick Doran, Richard, Norton, and Sarah Hughes "Geographies of Resilience: Using a Critical Geography Lens to Demonstrate Contradictory Definitions of Coastal Resilience by Great Lakes Stakeholders," Submitted to *Journal of Great Lakes Research* special issue on "Assigning Agency: How Communities, Individuals, and Organizations Engage in Environmental Cleanup and Revitalization," 2022.
77. Neil W. Adger, "Vulnerability," 268.
78. Mason Croft, Lisa Johnson, and Julie S Prior-Magee, "Protected Areas Database of the United States (PAD-US) 2.0," Gap Analysis Project, U.S. Geological Survey, 2018.
79. National Park Service Isle Royale National Park, "Isle Royale National Park," United States National Park Service, March 28, 2022. <https://www.nps.gov/isro/learn/nature/index.htm>.
80. —"Projects | Great Lakes Restoration Initiative," Great Lakes Restoration Initiative, <https://www.glri.us/projects>.
81. Helena Garcia, Logan Murphy, Briana Wendland, Tiffany Wu, "Assessing Equity and Environmental Justice in the Great Lakes Restoration Initiative," April 2021, 78, [EquityInGLRI_375_Project.pdf](https://www.umich.edu/~equityinlri/375_Project.pdf) (umich.edu).
82. Aislinn Gauchay and Traci Giefer, "Sustain Our Great Lakes 2021 Request for Proposals," *National Fish and Wildlife Foundation*, February 16, 2021, <https://www.nfwf.org/programs/sustain-our-great-lakes-program/sustain-our-great-lakes-2021-request-proposals>.
83. United States Department of Agriculture and Natural Resources Conservation Service, "Announcement for Program Funding for NRCS's Regional Conservation Partnership Program," Grants.Gov, January 13, 2022, <https://www.grants.gov/web/grants/view-opportunity.html?oppld=337340>.
84. Maria Janowiak, "Bad River Band of Lake Superior Chippewa Indians: Climate-Informed Harvest Prescriptions," *Climate Change Response Framework*, January 17, 2018, <https://forestadaptation.org/adapt/demonstration-projects/bad-river-band-lake-superior-chippewa-indians-climate-informed-harvest>.
85. Stephen Handler, "Pokagon Band of Potawatomi: Dowagiac Tree Translocation," *Climate Change Response Framework*, February 28, 2020, https://forestadaptation.org/pokagon_dowagiac.

ENDNOTES

- 86.** Nicholas J. Reo and Laura A. Ogden, “Anishnaabe Aki: An Indigenous Perspective on the Global Threat of Invasive Species,” *Sustainability Science* 13, no. 5 (September 2018): 1444-1446.
- 87.** Bob Dean, “Justice40 Analysis,” Center for Neighborhood Technology, <https://apps.cnt.org/justice40/>.
- 88.** Kathryn Sullivan and Lauren White, “Socioeconomic Inequality and Climate Change Hazards: a Focus on the Great Lakes Region” (American Meteorological Society, Boston, 2021), 17.
- 89.** Kathryn Sullivan and Lauren White, “Socioeconomic Inequality and Climate Change Hazards: a Focus on the Great Lakes Region” 17.
- 90.** Kathryn Sullivan and Lauren White, “Socioeconomic Inequality and Climate Change Hazards: a Focus on the Great Lakes Region” 17.
- 91.** Agency for Toxic Substances and Disease Registry. “CDC/ATSDR Social Vulnerability Index (SVI),” *Centers for Disease Control and Prevention*, March 15, 2022, <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.
- 92.** Susan L. Cutter, Bryan J. Boruff, and W. Lynn Shirley, “Social Vulnerability to Environmental Hazards: Social Vulnerability to Environmental Hazards,” *Social Science Quarterly* 84, no. 2 (June 2003): 242–61.
- 93.** Sarah Dooling, “Ecological Gentrification: A Research Agenda Exploring Justice in the City,” *International Journal of Urban and Regional Research* 33, no. 3 (September 2009): 628.
- 94.** Chin-Chun Tang, “Enhancing Involvement in Community Planning Using Incentives,” (Center for Land Use Education, Madison, WI, February 2005).
- 95.** Grant Craft and Philanthropic Initiative for Racial Equality, “Grant Making with a Racial Equity Lens,” (Grant Craft, New York, 2007). <https://learningforfunders.candid.org/wp-content/uploads/sites/2/2018/12/equity.pdf>
- 96.** Abbie Sherwin, Peter Slovinsky, Stephen Dickson, Kathleen Leyden, Sue Baker, Ruta Dzenis, Phil Carey, Elizabeth Hertz, “Maine Flood Resilience Checklist: A self-assessment tool for Maine’s coastal communities to evaluate vulnerability to flood hazards and increase resilience” (Maine Department of Agriculture, Conservation and Forestry, Augusta, ME, 2017), https://digitalmaine.com/cgi/viewcontent.cgi?article=1520&context=mgs_publications.
- 97.** Shereen Kandil, “Public Participation Guide,” Overviews and Factsheets, *United States Environmental Protection Agency Office of International and Tribal Affairs*, February 24, 2014, <https://www.epa.gov/international-cooperation/public-participation-guide>.
- 98.** Bryan McKinley Jones Brayboy, “Toward a Tribal Critical Race Theory in Education,” *The Urban Review* 37, no. 5 (December 2005): 425–46. <https://doi.org/10.1007/s11256-005-0018-y>.
- 99.** Waapalaneexkweew (Bowman, N., Mohican/Lunaape), and Carol Dodge-Francis, “Culturally Responsive Indigenous Evaluation and Tribal Governments: Understanding the Relationship,” in *Indigenous Evaluation. New Directions for Evaluation*, ed. F. Cram, K. A. Tibbetts, & J. LaFrance (2018), 17-31.
- 100.** Waapalaneexkweew (Nicole R. Bowman-Farrell, Mohican/Lunaape), “Looking Backward but Moving Forward: Honoring the Sacred and Asserting the Sovereign in Indigenous Evaluation,” *American Journal of Evaluation* 39, no. 4 (December 2018): 543–68.
- 101.** Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples*, Third edition. (London: Zed, 2021).
- 102.** Veronica G. Thomas and Patricia B. Campbell, *Evaluation in Today’s World: Respecting Diversity, Improving Quality, and Promoting Usability*, (Los Angeles: SAGE, 2021), see Chapter 12, “Methods.”

ENDNOTES

- 103.** Dave Guyadeen and Mark Seasons, “Plan Evaluation: Challenges and Directions for Future Research,” *Planning Practice & Research* 31, no. 2 (March 14, 2016): 219.
- 104.** Gill Westhorp, “Realist Impact Evaluation: An Introduction,” *Methods Lab*, ODI Global Think Tank (September 2, 2014). <https://odi.org/en/publications/realist-impact-evaluation-an-introduction/>.
- 105.** Sara Hughes, Kirsten Schwarz, Joyce Coffee, Genevieve LaMarr LeMee, Sarah Dobie, Madeleine Lane, Andres Gonzalez, “Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities” (Graham Institute of Sustainability: the University of Michigan, Ann Arbor, 2021).
- 106.** Veronica G. Thomas and Patricia B. Campbell, *Evaluation in Today’s World: Respecting Diversity, Improving Quality, and Promoting Usability*, (Los Angeles: SAGE, 2021), see Chapter 5, “Social Justice and Evaluation.”
- 107.** *Glass v. Goeckel*, 262 Mich. App. 29, 683 N.W.2d 719 (Mich. Ct. App. 2004)
- 108.** Melissa K. Scanlan, “Blueprint for the Great Lakes Trail,” *Michigan Journal of Environmental & Administration Law*, vol. 4, no 61 (2014), 72.
- 109.** Office for Coastal Management, “NOAA Office for Coastal Management | About the Office,” National Oceanic and Atmospheric Administration, Accessed April 27, 2022, <https://coast.noaa.gov/czm/act/>.
- 110.** Maine Coastal Program, “Maine Flood Resilience Checklist,” Maine Department of Agriculture, Conservation, and Forestry, 2017, https://digitalmaine.com/mgs_publications/521/.