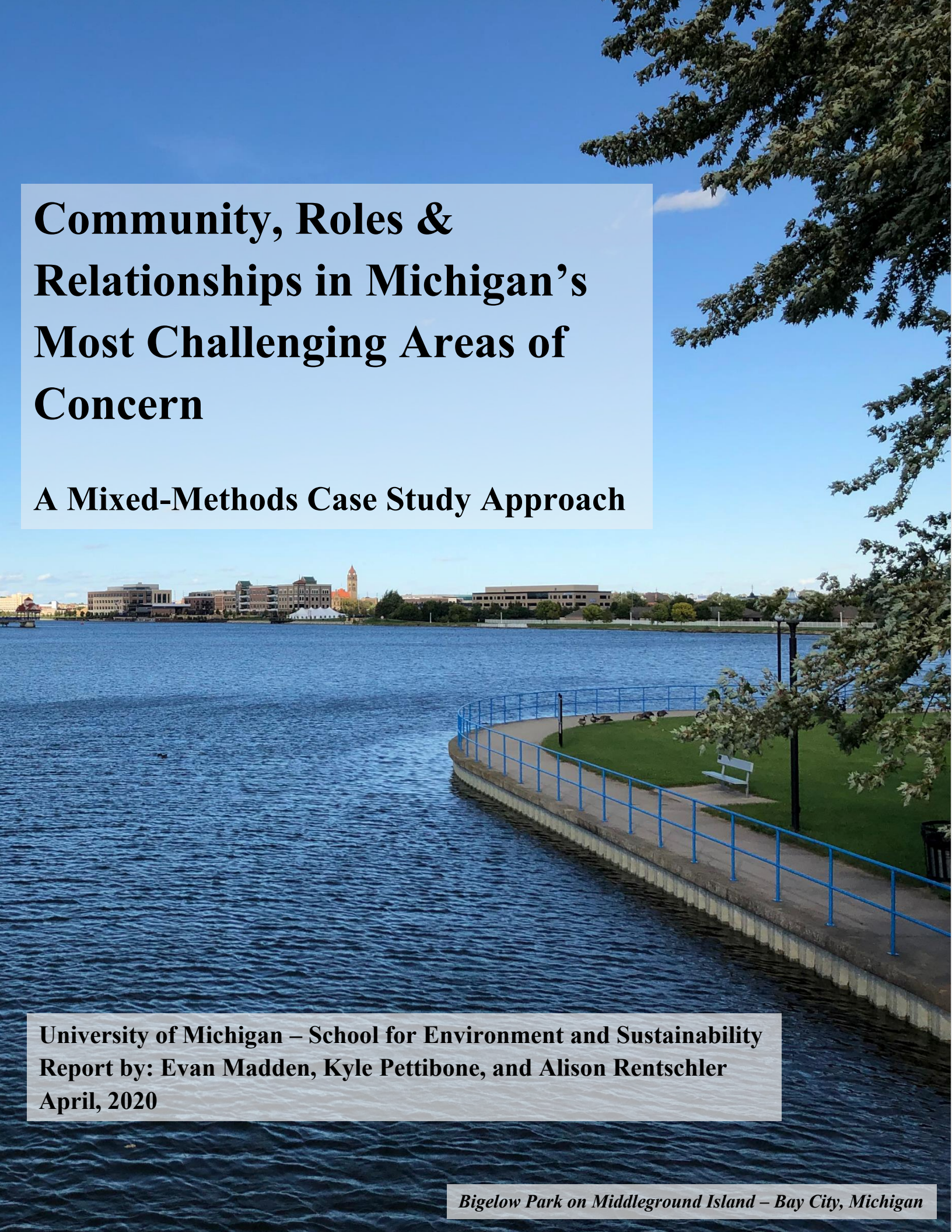
Community, Roles & Relationships in Michigan's Most Challenging Areas of Concern

A Mixed-Methods Case Study Approach



University of Michigan – School for Environment and Sustainability
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Bigelow Park on Middleground Island – Bay City, Michigan

Community, Roles & Relationships in Michigan's Most Challenging Areas of Concern: A Mixed-Methods Case Study

by

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Dedications

To the Great Lakes EPA Duluth Office for hosting us and helping us get started on this year-long adventure, and Dr. Katie Williams especially, for all of your energy and insight.

To Rick Hobrla, John Riley, and Jennifer Tewkesbury for all of the time and effort - and patiently answering our endless questions.

To the KRWC, RRAC and PSBW: thank you for your warm reception and detailed insights. Your passion within your collective watersheds was a beautiful sentiment to observe.

To the communities and community groups of the Kalamazoo, Rouge, and Saginaw AOCs.

To Dr. Paige Fischer for helping us develop and workshop our methods, and for teaching us the power of qualitative data.

To our advisor, Dr. Paul Seelbach, whose wisdom flows like a mighty river.

And lastly, to our friends and family - for all of your support and compassion over the last year. You've prevented us from pulling out a lot of hair.

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Abbreviations

ARC	Alliance of Rouge Communities
AOC	Areas of Concern
BUI	Beneficial Use Impairment
CMU	Central Michigan University
CSO	Combined Sewer Overflow
CAG	Community Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CISMA	Cooperative Invasive Species Management Areas
EMCOG	East Michigan Council of Governments
FOTR	Friends of the Rouge
GLC	Great Lakes Commission
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
IRB	Institutional Review Board
IJC	International Joint Commission
KRWC	Kalamazoo River Watershed Council
KVCC	Kalamazoo Valley Community College
MDEGLE	Michigan Department of Environment, Great Lakes, and Energy
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
MSU	Michigan State University
NFWF	National Fish and Wildlife Foundation

NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NM	Neighborhood Model
OU	Operable Unit
PSBW	Partnership for the Saginaw Bay Watershed
PCB	Polychlorinated Biphenyl
PAH	Polycyclic Aromatic Hydrocarbon
PRP	Potentially Responsible Party
PAC	Public Advisory Council
RAP	Remedial Action Plan
R2R2R	Remediation to Restoration to Revitalization
RC&D	Resource, Conservation & Development
RRAC	Rouge River Advisory Council
SBLC	Saginaw Basin Land Conservancy
WIN	Saginaw Bay Watershed Initiative Network
SVSU	Saginaw Valley State University
SEMCOG	Southeast Michigan Council of Governments
SMLC	Southeast Michigan Land Conservancy
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Services
USGS	United States Geological Survey
WMU	Western Michigan University

Section I. Executive Summary

The 1987 Amendments to the Great Lakes Water Quality Agreement designated 43 Areas of Concern (AOC) which prioritized coastal areas throughout the Great Lakes found to have highly degraded environments, due to decades of unbridled industrial progress. While AOCs have historically struggled to make progress due largely to lack of funding, the introduction of the Great Lakes Restoration Initiative in 2010 has driven historic progress toward Beneficial Use Impairment removal among many AOCs and eventual 'delisting' from the AOC program. While many AOCs are making strides towards delisting, other areas have fallen behind due to substantial contamination, among other complex area-specific factors. We were tasked with investigating three AOCs - the Kalamazoo River, the Rouge River Watershed, and the Saginaw River and Bay - in order to understand the complex narratives embedded in these areas, and offer recommendations to EGLE that could assist with boosting progress. Recognizing that AOC program effectiveness over the long-term is intimately tied to community understanding and support, our objective was to study community engagement and participation within these three AOCs. To address this, we employed a case study approach, consisting of participatory observation research and interview methods, to understand perceptions on relationships, roles, and values, as well as beneficial uses and their respective impairments held by state-level officials, PAC members, and local community members. These data were filtered, sorted, and analyzed using a mixture of inductive and deductive approaches to qualitative data analysis, through the use of the *Neighborhood Model* (Williams et al. 2018).

Through our case studies, we found key themes involving both synergy and discord within roles, relationships, values, and understanding of beneficial uses among state (EGLE), PAC, and community levels of AOC involvement. While our three AOCs of study each possess unique structural and geographic barriers which inhibit the delisting process, we noted profound similarities in barriers to AOC progress; the most prominent involving communication and outreach to the broader community. We found that the communities who live within the neighborhood of AOC waters are largely unaware of the AOC program and its mission to restore their local water resources, due in part to a lack of concerted and organized AOC-specific communication. Through increased AOC-specific outreach, community members will be able to fully realize AOC restoration efforts that provide them benefits to their local water resources, mobilizing their sense of place-based attachment. Given this, our recommendations to EGLE provide suggestions for navigating structural barriers, as well as methods to bolster community outreach within the AOC program.

Section II. Introduction

AOC Program Background

By the 19th century, the Great Lakes had become an industrialized hub of manufacturing and trade. Chicago became one of the most commercialized ports in the United States; wheat was brought eastward from the Windy City, while Wisconsin and Michigan saw an explosion in lumber production and exportation through the St. Lawrence Seaway (Smith, J. 2018). Within the next hundred years, the lumber industry gave way to steel and heavy metals production, fueling the rise of the American automotive industry. Production and commerce within the regions flourished, but this came at the expense of the health of the Great Lakes; iron, steel, salt, chemicals, paper, and other industries exploited the water resources of the Great Lakes and negligently dumped toxic materials. While the Great Lakes brought enormous economic growth and prosperity to the region, two centuries of increasing industrialization had taken its toll on the lakes and their inland waterways.

In 1972, the *Clean Water Act* passed in response to pressure from a burgeoning environmental movement granted the federal government the ability to regulate pollution in the nation's waters (USEPA 2019d). This is often considered the first step towards environmental remediation and restoration in the Great Lakes. By this point, the Rouge River in Detroit, along with the Cuyahoga River in Cleveland, had already become so inundated with toxic industrial discharge that they both caught fire in 1969 (Hartig 2019). Within a year of the *Clean Water Act's* passage, the United States and Canada in conjunction with the International Joint Commission (IJC) signed the *Great Lakes Water Quality Agreement (GLWQA)* to specifically prioritize rehabilitating the welfare of waters within the Great Lakes region (International Joint Commission 2012).

Fifteen years later in 1987, the agreement was amended to include the Great Lakes *Areas of Concern (AOC)* program. The intent of this program was to prioritize specific regions across the Great Lakes that were most impacted by a legacy of industrial pollution. The amendment originally designated 43 Areas of Concern spread across the Great Lakes as prioritized sites for remediation and restoration (International Joint Commission 2012). Michigan itself is home to 14 AOCs; the most of any state involved in the program. The *United States Environmental Protection Agency* (USEPA) was placed in charge of the AOC program and charged listed states to develop *Remedial Action Plans* (RAPs) detailing strategies and best management practices aimed at removing *Beneficial Use Impairments* (BUIs) identified in each respective AOC. GLWQA (2012) further mandated that RAPs be developed "in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public," and

that parties "shall make RAPs and updated RAPs available to the [International Joint Commission] and to the public."

Initially, most AOCs struggled to get federal funding from the USEPA and widespread participation toward completing RAPs, resulting in minimal progress toward restoration over the program's first 20 years. However, with the passing of the *Great Lakes Restoration Initiative* (GLRI) in 2010, the AOC program saw a vast increase in funding. Implemented by the USEPA in conjunction with 15 other federal programs, the initiative allocates $300 million yearly towards general restoration projects in the Great Lakes region - $100 million of which for the USEPA to specifically award AOC projects (White House Council on Environmental Quality 2010). With this influx in funding, many AOCs are now making steady progress towards recovery. Some of these sites - such as Deer Lake and White Lake in Michigan specifically - have seen great success, removing all of their BUIs, meeting criteria to be 'delisted' from the AOC program. Nevertheless, there are also AOCs that continue to struggle because of their high degree of environmental degradation and complex geographical and political environments. These AOCs are expected to be among the last to delist by the USEPA; as a result of this, these AOCs have historically struggled for both funding and attention - they comprise the so-called *Last Bucket AOCs*.

Project Purpose

Michigan's Department of Environment, Great Lakes, and Energy (EGLE) has tasked us with investigating community engagement on three Last Bucket AOCs in Michigan's Lower Peninsula: the Rouge River Watershed, the Kalamazoo River, and the Saginaw River and Bay (*Appendix 1*). These AOCs in particular were selected due to the complex BUIs and legacy sediment contamination that impact each area, and because of their diverse geographies and demographics. By researching the communities of these AOCs, conclusions can be drawn which offer insight into best community engagement strategies EGLE may broadly apply to all 12 remaining AOCs in Michigan, and others throughout the Great Lakes Region.

In particular, EGLE was interested in exploring the effectiveness of community-based ecosystem management practices within individual AOCs via the roles and functions of state-facilitated Public Advisory Councils (PACs). According to Michigan EGLE, "PACs have been established for each AOC to facilitate public participation in the RAP process, identify key issues, help develop cleanup goals, and assist in guiding the development and implementation of restoration activities" (Michigan Department of Environment, Great Lakes, and Energy 2019). As implemented by EGLE, AOC-specific PACs were designed to provide a representative voice for their respective communities, liaising and cooperating with the state in AOC-specific project development. However, EGLE wants to better understand the ways in which they might best support PACs to engage the broader community. In particular, EGLE expressed interest in

exploring supplemental measures to engage the community beyond the PAC model to help in the shared goal of delisting, to encourage further participation in localized efforts at AOC restoration, and increase community knowledge and support for restoration efforts on a larger scale.

In order to address these concerns of EGLE, we worked collaboratively to understand community-level knowledge, perceptions, values, and roles in respective AOC watersheds and communities. Therefore, to begin to paint the story of these communities, we used the *Neighborhood Model* (Williams et al. 2018) as a lens to help us to answer the following research questions:

1. Who is the community and how do they value local water resources? In regard to each Area of Concern, who are the actors in the community? Who is engaged in the AOC process?
2. What is the relationship between area PACs and their respective communities? Does each PAC provide an adequate reflection of the larger community it represents?
3. How can EGLE help PACs form or strengthen relationships with local interests to improve progress toward BUI removal in each of these three AOCs?

The Neighborhood Model

Williams et al. (2018) developed a social science-based research framework known as the Neighborhood Model (NM), seen below in *Figure 1*, which we have adapted for use in our research. This conceptual model works to delineate various governance structures, physical elements, relationships, and values in their association to a corresponding natural feature or region. The NM was originally created with the intention of outlining the potential sources of connectivity or association to a particular resource that motivate decision-making - ultimately mapping out a 'neighborhood.' Outside of the context of this model, these connections to the natural environment are often referred to as ecosystem goods and services - these are the products of value we derive from our relationships with the natural environment. They are a principle motivation for the AOC program and a driver for *R2R2R*, the process by which degraded sites are *remediated* from contaminated sediments, *restored* through habitat projects, and *revitalized* through efforts which attract people to their local water resources. R2R2R in its simplest terms defines the underlying framework behind the overall intention of the AOC program as a whole.

Our analysis involved sorting our data through the lens of the Neighborhood Model to best understand stakeholder viewpoints and AOC community values. This information can then be used to make comparisons across unique stakeholder groups to find common value sets which motivate collective action. Within the context of this project, our team is using the model to

visualize features of individual AOCs to help us better grasp common trends within the AOCs we observed.

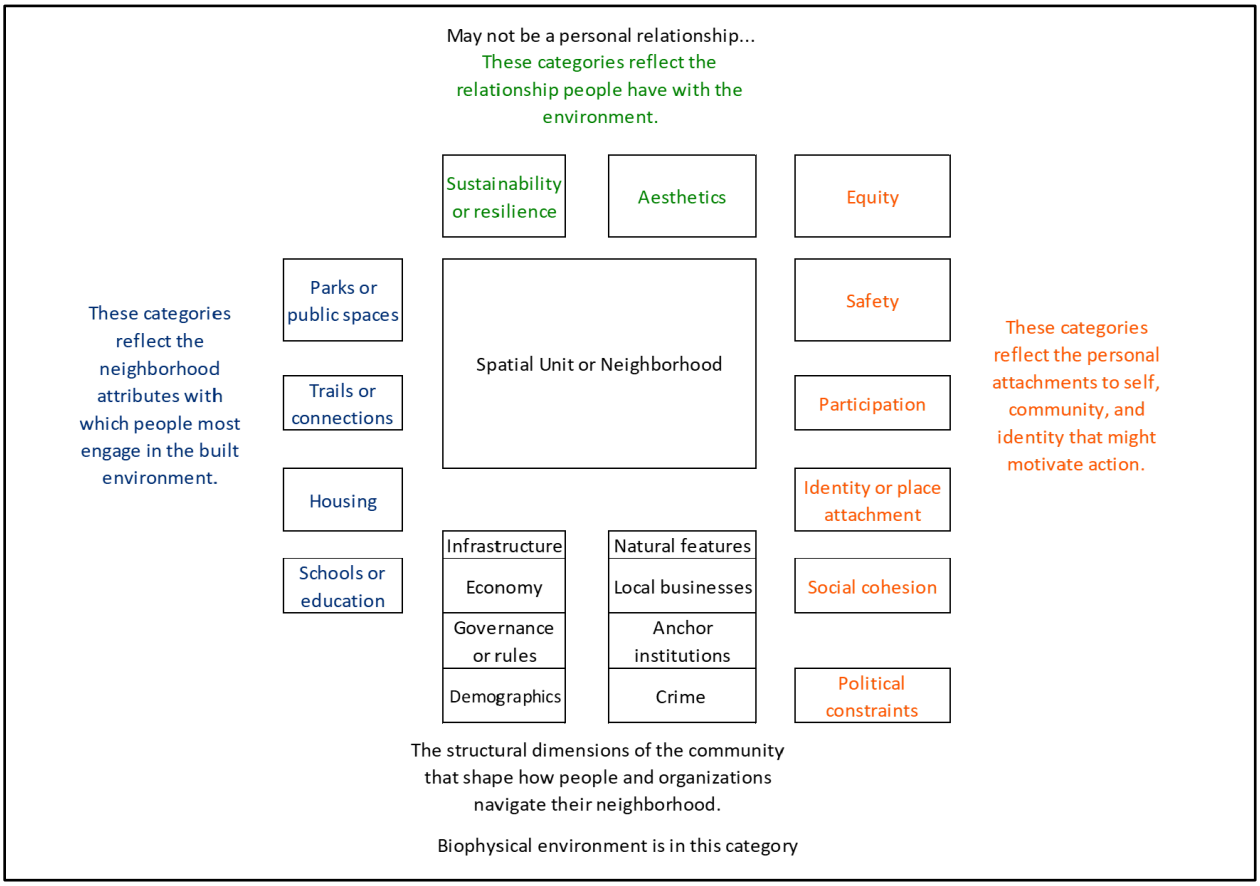


Figure 1 — The four categories of the Neighborhood Model represent ways in which members of a community interact with the given attributes of a 'neighborhood' or place. The orange dimension denotes personal values, or human dimensions; the black dimension denotes structural or physical aspects; the blue dimension denotes aspects of the built environment; and the green dimension denotes interactions attributed to human-environment relationship (Source: Williams et al. 2018).

Section III. Methods

Conceptual Model and Research Workflow

To help determine the nature of community engagement in each AOC, we developed the conceptual model shown below in *Figure 2* to visualize data types and corresponding analyses; this model represents the workflow of our research project. Each of the three respective AOCs, listed at the left of the model, will be examined at hierarchical levels of governance (EGLE, PAC, and community levels) through various methods of data collection and analysis to examine similarities and differences in perceived values, roles, and relationships through different levels of governance across the three AOCs.

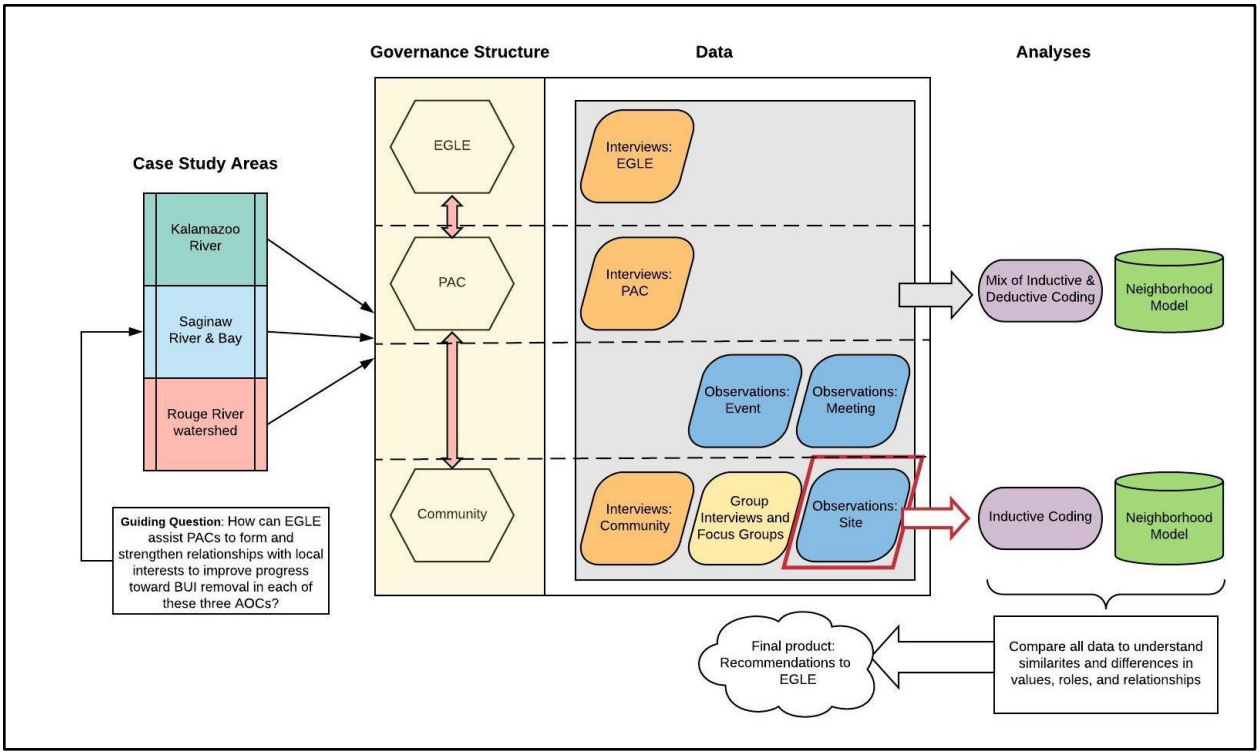


Figure 2 — A conceptualization of our project workflow shows the separation of the Kalamazoo, Saginaw River and Bay, and Rouge River into three case studies that helps us understand the similarities and differences in values, roles, and BUI definitions among the three levels of the Michigan AOC program.

Our methodology was designed to delineate and compare perspectives and involvement between state, PAC, and community-level interests within the AOC program in order to provide EGLE with recommendations of best management practices to cultivate functional relationships among complex AOCs. Divided among three AOCs - each comprising a separate case study - research was directed toward understanding EGLE, PAC, and community relationships within these

respective communities. AOC-specific findings were gathered through a mixed-methods approach, aggregating data collected through in-person interviews and focus groups, as well as socio-physical observations conducted across relevant sites, meetings, and events. Denoted within the *Data* portion of *Figure 2*, interviews and focus groups were broken up between state, PAC and community interests in each AOC, in order to achieve a broad sample of perspectives from various degrees of AOC management and involvement. Using inductive and deductive coding described below in *Methods*, interview data was compiled with site, event, and meeting observations, organized through the lens of the Neighborhood Model, to best study similarities and differences in values, roles, relationships across state, PAC, and community levels in each AOC.

Preliminary Background Research

Our background research aimed to understand the ecological history of each AOC, the BUIs plaguing them, and the specific causes of these impairments. For this, we reviewed government websites and PAC RAPs. Attention was also placed on understanding social relationships within each AOC and mapping key players. These included community groups, municipal interests, corporate interests and other important entities that could help provide perspectives and information helpful to understanding the community. This helped us determine the space of the community and who might be potential candidates to invite to our interviews and focus groups later on in the research process. Furthermore, understanding the geographic extent and demographics of the AOCs and their surrounding communities was given substantial consideration in order to determine public places of significance. Research into key players and significant sites was primarily conducted by navigating through PAC websites, local watershed *Facebook* pages, and Google searches. All results were aggregated and organized in a shared Google folder.

Rationale for Social-Science Research Methods

Our mixed-methods qualitative research framework employed a case study approach that combined data sourced from both participatory observations, as well as semi-structured interviews, group interviews, and focus groups. The two broad data collection methods - participatory observation and interviews - although distinct, produced data designed to inform and complement each other within our case study approach.

Case Study Approach

In order to delve into each of these three AOC communities, we chose to utilize a multiple case study approach. Case studies, as a research method, provide researchers the ability "to study complex phenomena within their contexts," (Baxter & Jack 2008). Case study research is characterized by the use of multiple data sources to cross-reference information in order to

understand the dynamics within a complex system (Cresswell 2007). By utilizing this approach, we combined our data from interviews, focus groups and group interviews; as well as site, meeting, and event observations, in a way that tells a story of each of these three AOC communities - combining themes within and across cases given perspectives of community, PAC, and state entities.

Participatory Observations

Participatory observation research, which further borrows from Williams et al. (2018), employs direct involvement of the researcher in the community and natural environment, in order to gather familiarity with functions, roles, and values - among other community traits. For instance, if one were interested in studying the behavior of a particular indigenous bird, the most effective means of doing so would be to conduct a sample of different observations of behavior within said region. Within the context of our study, we are examining social relationships within the AOCs studied; therefore, collecting a series of observations at various public parks and access sites within each watershed is the most ideal method to understand how people are interacting with local water resources. Ultimately, the goal of participatory observation is to develop an intimate understanding of the community in question, through intensive involvement in community functions and events (Kawulich 2005). Through this methodology, we collected data of three subtypes: site, meeting, and event observations e.g., observations of public parks, PAC board meetings, and annual clean-up events.

Interviews, Group Interviews & Focus Groups

The final research method used within our data framework comes in the form of semi-structured interviews, group interviews, and focus groups. Interview methods such as these are used to gather data on human perspectives and behaviors which are embedded in complex and dynamic systems. In the context of conservation science, interviews are used for many reasons - those of which relevant to our research include "...understanding knowledge, values, beliefs or decision-making processes of stakeholders," (Young et al. 2018). Interview methods were highly suited for our data collection as we sought to understand perspectives of individuals from multiple levels within the complex system of the AOC program. Focus groups and group interviews in particular were used in order to gain a broad sampling of each community's perspective. According to Krueger & Casey (2009), "the purpose of conducting a focus group is to listen and gather information. It is a way to better understand how people feel or think about an issue, product or service." In our case, we used focus groups and group interviews to gain community perspectives primarily in relation to their local water resources and ways in which they interact with them, as well as additional values, feelings, or knowledge they may have in reference to restoration efforts in their areas. Overall, our data collection methods involving interaction with human subjects were granted an exemption by self-determination by the Institutional Review Board (IRB) because the identity of our human subjects remained confidential.

Data Collection

Site Observations

Site observations took place across a diverse array of local areas providing access to water resources (e.g., parks, beaches, boat ramps, and nature preserves, as shown in *Figure 3 below*), in which we observed human actions in addition to general site conditions - this was one method designed to understand how communities connect with water resources, and observe any trends between environmental restoration and public engagement. Sites were selected based upon either site-specific online research or recommendations from local AOC stakeholders, with the goal of visiting a broad range of sites to observe a diverse sample of each AOC. During data collection, notes were taken on standard site observation sheets that sought to capture the surrounding environment, the people using the space, and the opportunities and resources available for people to utilize such (i.e. the spaces of the Neighborhood Model). Pictures were also taken and stored on a shared drive to serve as references and reminders of the visited sites. The data collection sheet used for site observations can be seen in *Appendix 2*.

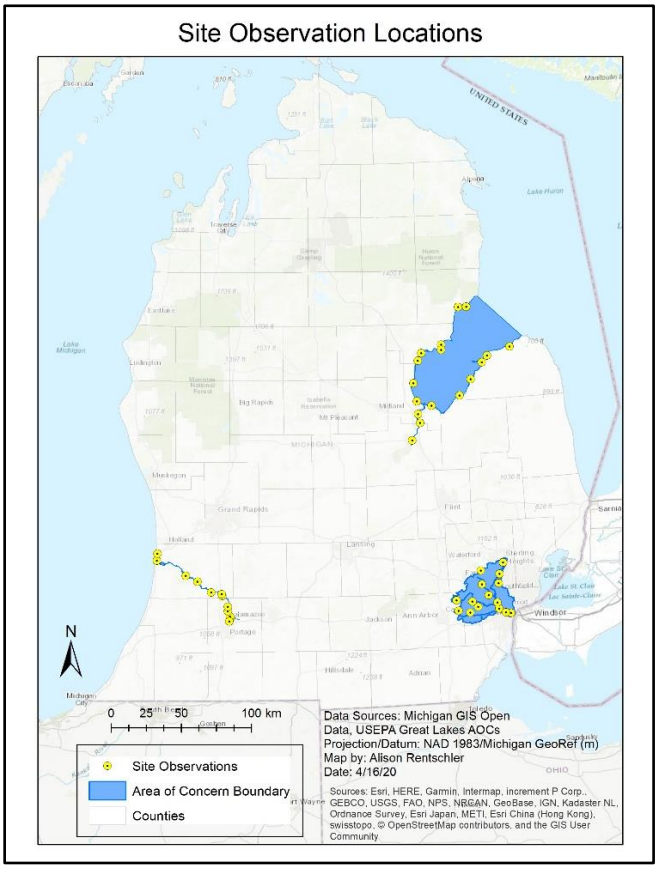


Figure 3 — A map of site observations taken within the three AOCs of study. Concerted efforts were made to visit a diversity of sites that spanned each AOC to capture the surrounding environment, the people using the space, and the opportunities and resources available for people to utilize.

Meeting Observations

Meeting observations examined PAC or local watershed organization meetings, taking note of topics discussed, and how the meetings themselves were structured – allowing us to better understand PAC or AOC stakeholder priorities and functioning. Throughout the extent of the data collection process, at least one PAC meeting was attended and observed within each AOC. Standard meeting observation sheets were used to take notes during the meetings to enable cross-comparisons between different PACs or other watershed groups, examining effective trends of functionality or communication. These data collection sheets used for meeting observations can be seen in *Appendix 3*.

Event Observations

We additionally attended and participated in various watershed events to further outline key stakeholders, further examine ways in which communities interact with their water resources, and understand how watershed groups in these AOCs engage the public. Events were scheduled using watershed group or PAC websites, Facebook groups, relevant email lists or occasionally by invitation from AOC stakeholders. Event observation data sheets were used to collect information about event purpose, logistics, participation, and outcomes. This event observation data sheet was also written in the context of the Neighborhood Model. The data collection sheet used for event observations can be seen in *Appendix 4.*

PAC Member and State-Level Interviews

Through interviews of PAC members as well as staff members within EGLE, we asked individuals in these groups how they understand BUIs in their area, modes of how they connect with the community, and the ways in which they work with various levels of government to gain progress towards delisting. These interviews allowed us to better understand PAC priorities in terms of watershed issues, helped to inform us on how the PACs connect with communities, and aided in our understanding of roles each of these groups have within the AOC program. Between both PAC and EGLE interviews, similar questions were asked in order to discern perceptions of relationships and roles in various governance structures and roles. The set of questions asked during PAC member interviews can be seen in *Appendix 5;* EGLE representative interview questions are listed under *Appendix 6*.

Community Focus Groups and Group Interviews

Community members were recruited through identifying key stakeholder groups and utilizing email and Facebook to directly reach out to these groups and their members. Additionally, participants were invited through canvassing populated natural areas and businesses within each AOC. Given logistical constraints, we were unable to qualify all group interactions as ‘focus groups,’ so we adapted to these conditions by conducting a mixture of ‘group interviews’ and focus groups. Conducting community-level interview data - interviews, group interviews, and focus groups - allowed us to gain another level of understanding of how individuals in these

AOCs understand contamination issues in their area, and the values they derive from water resources. Community members sampled were asked similar questions to that of PAC and EGLE interviews, but slightly simplified to ensure a broad understanding. This was designed to juxtapose PAC members' perceptions against that of community members – specifically aimed at understanding what they care about, and how they understand these issues in their watershed. The set of questions used during community focus groups and group interviews can be seen in *Appendix 7*.

Data Analysis

The paramount piece of this research was in using the Neighborhood Model (NM) as a 'decoder ring,' or translator of qualitative data into meaningful information about the community surrounding an AOC. Organizing information through the lens of the Neighborhood Model allows comparison of data of various places and types. Through deductive coding methods, we organized all of our data based on the categories of this model. Our research, consisting of site, meeting, and event observations, as well as transcribed interview responses, were coded and organized within the four categories, or aspects of a 'neighborhood,' in which community members can interact with, as per the NM. Within these categories, codes were then placed into the smaller bins within these four dimensions, representing specific attributes within each broad category, which allowed us to categorize perceptions of values, roles, and relationships of separate levels of governance within a particular AOC community. These perceptions were then compared within each AOC, yielding AOC-specific themes and trends used to craft area-specific recommendations to EGLE in facilitating efforts and coordinating progress within the communities of the Kalamazoo River, Saginaw River and Bay, and the Rouge River Watershed. Lastly, AOC-specific emerging themes were then juxtaposed among the three areas studied - compared and contrasted in order to develop common themes which were translated into recommendations, providing suggestions for amendments to current state-level management practices which can be applied not only the AOCs studied, but also broadly throughout the entire AOC program.

Interview Coding and Constructing the Codebook

After transcribing interview data, the codebook for this data was inductively constructed through multiple iterations of extracting common themes from different levels of data based on both AOC and governance level within the AOC program. This process consisted of collecting shared quotes and sentiments, organizing by common elements found within these quotes, and manually creating codes or 'bins' which were then uploaded electronically to a qualitative data analysis software, NVivo. Establishing codes which reflected quotes and sentiments concerning *values, identified roles*, or *barriers*, among others, allowed us to compare responses and sentiments directly against each other across specific groups throughout each AOC. In order to ensure data reliability, we first co-coded interviews as a team to establish these criteria across team members,

then proceeded to code the remainder of the transcribed data individually. At such point, all significant quotes fit easily under a pre-existing code. In ensuring data transparency and repeatability, a final version of our codebook can be seen in *Appendix 8*. These codes compiled through our transcription and coding process were then contextualized within the Neighborhood Model - assigning colors and sub-bins from the model to our constructed codes - allowing us to ultimately compare all data types together. By combining all data within the Neighborhood Model, we gained a better understanding of the dynamic of relationships and functional roles among these entities in their relationship to respective AOCs studied.

Binning Observation Data with the Neighborhood Model

Data from site, meeting, and event observations were aggregated from each of the three researcher's observation sheets and transcribed into a spreadsheet. As a team, each observation from a site, meeting, or event was assigned a color from the Neighborhood Model to help calibrate the usage of colors. For example, observations pertaining to water access infrastructure were sorted into the built environment quadrant of the model, as this is the mode by which an individual is interacting with the environment or 'neighborhood' space. Once coding was calibrated as a group, the remainder of the observations were assigned a color of the Neighborhood Model independently by each researcher, and to ensure consistency and validity of the color assignments, the assigned colors for each observation were then collectively vetted as a team.

Developing an AOC-Specific Findings Spreadsheet

As a final distillation of the data, we read through the bins and codes where all significant quotes and observations had been grouped under a specific theme. We then synthesized and summarized the important patterns and ideas that emerged in each AOC. For focus group and interview data the result was a spreadsheet containing the codebook codes, specific quotes that define that code, assigned Neighborhood Model colors, and AOC specific conclusions from what themes emerged. For observation data, we collected all observations that fell within a color of the NM together. This helped us visualize the ways in which communities interacted with their environment, through the four quadrants of the NM. All analyzed data was now assigned a color in the NM such that the conclusions and findings in each AOC could be compared and contrasted with each other.

Importance Ranking Using the Neighborhood Model

To compare and contrast the results from different data types across our three AOCs of study, we organized each set of observations and coded quotes within the context of each individual AOC studied by populating an AOC-specific Neighborhood Model. Although AOC-specific data was organized among separate NMs, information was categorized in identical codes and categories, and is thus translatable across different AOCs. In order to determine the relative importance of responses or observations, we tracked the frequency of each occurrence, then scaled this with

respect to other responses or observations in a given code or color yielding primary and secondary findings within an AOC. At this point, common quotes or codes for a given attribute were ranked within each AOC, and then compared the top codes among other AOCs in order to examine any common values or attributes across all areas of study.

In sorting each data type through the lens of the NM, individual quotes or observations were sorted into a color quadrant. As an example, when analyzing a given interview code in our codebook (for example, Human and Ecological Health), we read through each quote sorted into that code and then attributed quotes to the most representative quadrant of the NM. This process is shown below for an example code, quote, and assigned NM color-quadrant:

- **Code:** Human and Ecological Health
  - **Quote:** "*I strongly believe in the environment and protecting it.*"
    - → **NM Quadrant:** *Human Dimensions* (Orange)

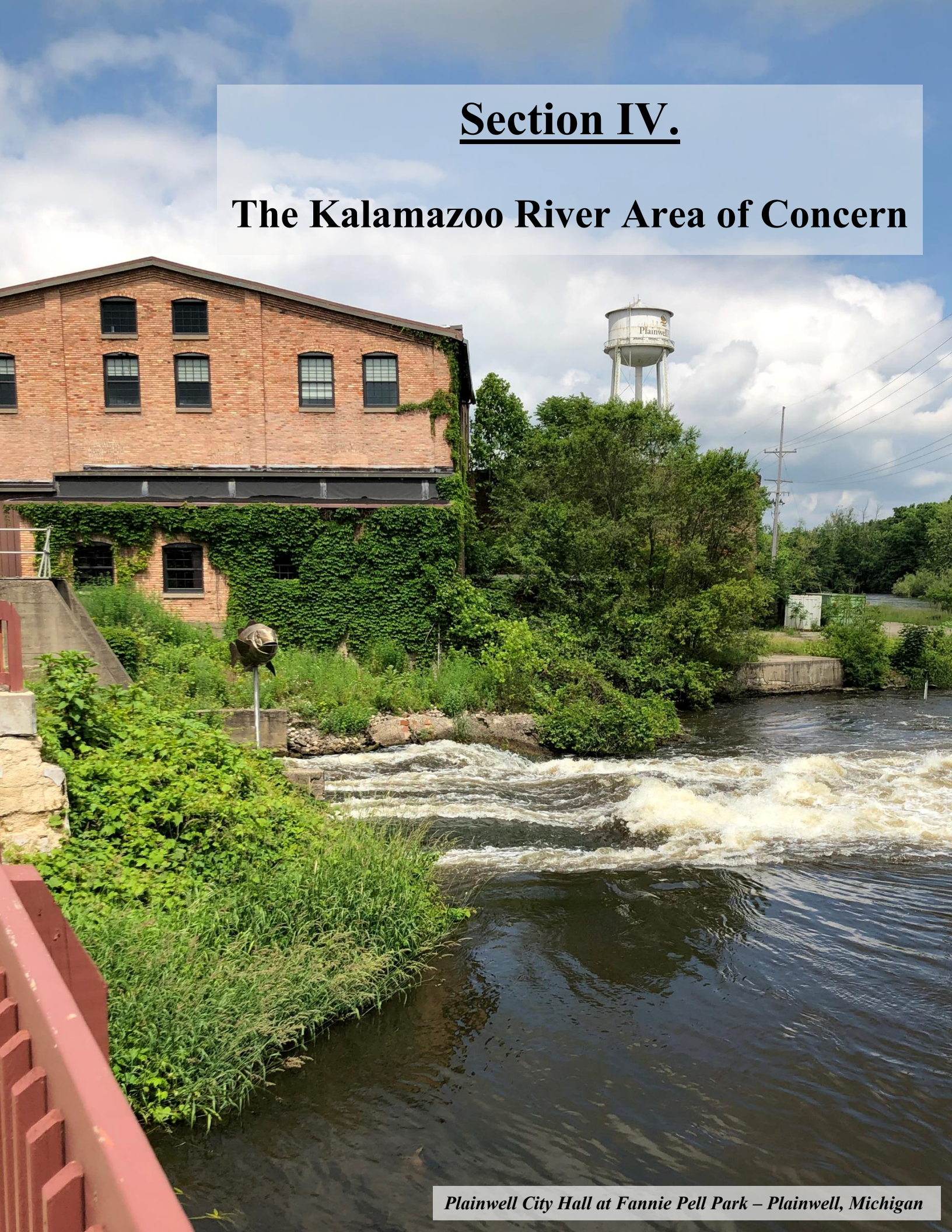
This quote was attributed to the orange quadrant because the stated value in the environment reflects an aspect of personal-attachment which motivates action to protect the environment - a key aspect of the *Human Dimensions* quadrant of the NM. Based on the frequency of quotes in a code that fell within a color of the NM, we were then able to determine the color quadrant of the NM that best fit that code. We followed a similar method in analyzing observation data through the NM, sorting all observations into a quadrant of the NM, with an example of the process shown below:

- **Site:** Fannie Pell Park (Plainwell, MI)
  - **Observation:** Wooden Fishing Pier
    - → **NM Quadrant:** *Built Environment/Infrastructure* (Blue)

This observation was coded *Built Environment/Infrastructure* because the wooden fishing pier is part of the built environment which helps enable people to access water resources. The number of codes or observations pertaining to a specific color of the NM will vary between AOCs and data types, but seeing the frequency in which colors appear allows us to draw important themes or patterns from our data.

Section IV.

The Kalamazoo River Area of Concern



Plainwell City Hall at Fannie Pell Park – Plainwell, Michigan

The Kalamazoo River Area of Concern

Geography

While the overall extent of the Kalamazoo River and watershed span over 130 miles across 10 counties in Michigan's Western Lower Peninsula, the Kalamazoo River Area of Concern, is comprised of an 80-mile stretch of the lower reaches of the Kalamazoo, starting just below Morrow Dam in Comstock Township, running downriver to its mouth on Lake Michigan (*Figure 4*). The Kalamazoo River AOC flows through two counties - Kalamazoo and Allegan - as well as multiple cities and municipalities, with the largest including Comstock Township, Kalamazoo, Parchment, Cooper Township, Plainwell, Otsego, Allegan, the Village of Douglas, and Saugatuck.

The Kalamazoo River AOC boundary mirrors that of the EPA-designated Kalamazoo River Superfund site, which was added to the NPL (National Priorities List) in 1990 as a result of decades of environmental degradation to the watershed due to PCB (polychlorinated biphenyl) contamination from the multitude of paper-producing companies that resided on the Kalamazoo River.

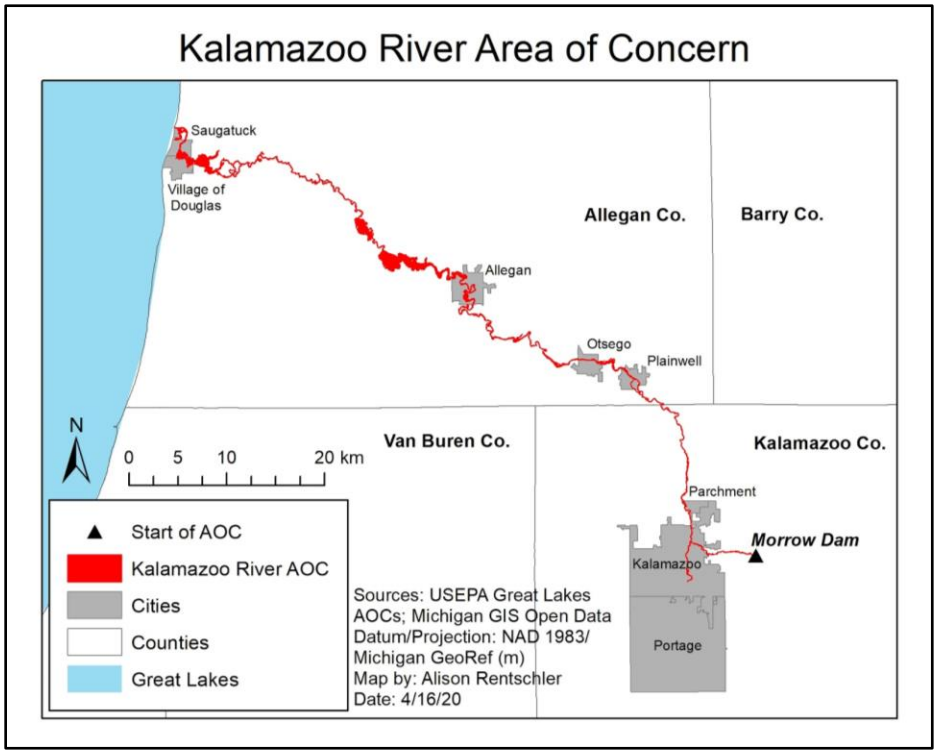


Figure 4 — The boundary of the Kalamazoo River AOC includes the 80-mile stretch of the Kalamazoo below Morrow Dam as well as a lower reach of Portage Creek.

History of Environmental Degradation

The Kalamazoo River Basin has had a storied past with the first evidence of human habitation as early as 11,000 years ago; used as a resource for seasonal hunting and fishing, eventually becoming home to extensive Native American settlements - specifically the *Match-E-Be-Nash-She-Wish* Band of Potawatomi Indians (Gun Lake Tribe 2017). For the next three centuries leading up to today, this waterway would serve European settlers as a valuable port to the Great Lakes (Western Michigan University [WMU] 2020). Through the 1800s, communities grew on the banks of the river as more and more settlers were drawn to the region, and following the outbreak of the American Civil War, Kalamazoo was home to a number of different industries: pharmaceutical, automobile, and notably, cereal and paper production, which grew to dominate local industry. By the mid-1950s, the booming paper industry was so deeply embedded in Kalamazoo's economy that "...approximately 32 percent of the combined sales of all the manufacturing, distributive, and service industries and 24 percent of total personal incomes in Kalamazoo County came directly or indirectly through its activities" (Forist 2005). Using the river for processing water intake and then for waste discharge, this large-scale paper production was especially detrimental to the health of the river. The de-inking process in paper production was a primary source of the substantial PCB contamination that plagues the river as a legacy contaminant today (WMU 2020).

In addition to legacy contamination from industrial presence in the area, more recently in 2010 the Kalamazoo River suffered one of the most severe inland oil spills in American history when a pipeline operated by Enbridge Inc. burst, spilling into Talmadge Creek - ultimately dumping over 800,000 gallons of oil into the upper Kalamazoo River (USEPA 2019a). With the involvement of the USEPA in cleanup efforts, the upper reaches of the Kalamazoo River have been successfully remediated, yet the mark of this disaster will be felt for decades to come. All of this federal involvement however, ran largely independent of statewide efforts to remove contaminated sediments in sections of the river to the west; due to legacy contamination of local industry surrounding Kalamazoo.

AOC Program Involvement

Today, main and lower regions of the Kalamazoo River are dealing with contaminated sediment effectively impounded by dams - a direct result of years of unecological industrial practices in the area - largely by that of the paper industry. Federal efforts through the Superfund program have spearheaded the mammoth task of dredging out river sediments contaminated with PCBs, which complement state government entities such as MDEGLE and MDNR through authorization of dam removals along the 80-mile AOC river stretch. Dams along the Kalamazoo River are aging and deteriorating, as most were built in the mid-1900's in order to generate hydroelectric power (Kalamazoo River Watershed Council [KRWC] 2018a). As these dams

continue to degrade, they pose an immense risk to nearby municipalities and citizens as each dam failure could result in re-suspension of thousands of metric tons of PCB sediment (Michigan Department of Environmental Quality 2012). Oddly enough, the risk of these aging dams creates an opportunity to encourage progress on removal of PCB sediments, as these contaminated sediments must be removed prior to dam removals.

Local efforts of remediation, restoration, and revitalization have been championed by municipalities along the river, along with help from state-funded grants and watershed restoration groups such as the Kalamazoo River Watershed Council (KRWC). Designed to act as a Public Advisory Council, or 'PAC' within Michigan's AOC Program, the KRWC works, "to restore and protect the health of the Kalamazoo River, its tributaries, and its watershed by collaborating with the community, government agencies, local officials, and businesses." Beyond working in an advisory capacity, acting as a liaison between the greater community of the Kalamazoo River and the state, the KRWC also functions in an educational role, engaging the broader community with local waters through events like *Kanoe the Kazoo* and *Krazy for the Kazoo* (KRWC 2018b).

Current BUI Status

The BUIs listed below were designated as a result of PCB contamination in Kalamazoo River sediments. Out of the fourteen possible BUIs, the Kalamazoo AOC began with eight, and has since removed two: *Beach Closings* and *Degradation of Aesthetics* (USEPA 2018a).

Table 1: Existing and Removed Kalamazoo AOC Beneficial Use Impairments

BUI	**Removals**
Restrictions on Fish and Wildlife Consumption	
Degradation of Fish and Wildlife Populations	
Beach Closings	Removed 2011
Degradation of Aesthetics	Removed 2012
Bird or Animal Deformities or Reproduction Problems	
Degradation of Benthos	
Restriction on Dredging Activities	
Loss of Fish and Wildlife Habitat	

Federal Watershed Involvement

Operating in conjunction with efforts of the Areas of Concern program, the USEPA has entered into cooperative agreements with responsible parties in local industry - citing provisions in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or *CERCLA*. Under CERCLA, the USEPA is able to hold large corporations accountable for "releases or threatened releases of hazardous substances that may endanger public health or the environment," which proves useful when dealing with legacy contaminants that can be easily tied to a particular industrial interest (USEPA 2018c).

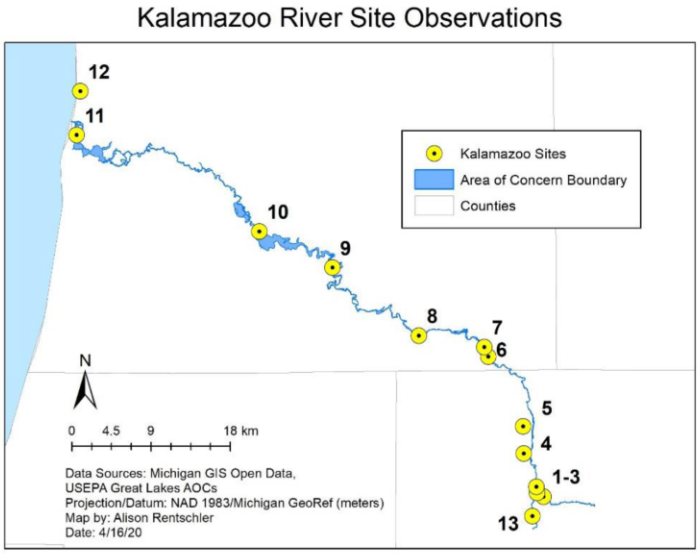
The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site has had substantial progress on sediment remediation within the Kalamazoo River AOC. To date, the USEPA and their partners have remediated three out of six Operable Units (OUs) which constituted three former landfills of PCB sediment (OU2: Willow Boulevard and A-Site Landfill; OU3: King Highway Landfill; and OU4: 12th Street Landfill) (USEPA 2017). A map created by the USEPA of each OU is added can be seen in *Appendix 9*. More progress will be made in the coming years as a result of a $245 million agreement announced in December 2019 which was negotiated between the EPA, and NCR Corp. in order to continue sediment remediation (USEPA 2019b). Since the list of BUIs above have been designated solely due to PCB contaminated sediments, BUI removal within this AOC is highly dependent on completion of EPA Superfund actions to remediate river sediments.

Investigation of the Kalamazoo River Community

To best immerse ourselves in the midst of this AOC, we developed a multifaceted data collection approach spanning a wide array of observation and interview strategies and metrics. Primarily utilizing participatory observation, our strategy was to observe practices of the AOC community, paying close attention to social interactions with the Kalamazoo River, as well as infrastructure and built environment geared toward promoting connectivity with such.

In the Kalamazoo River AOC, 13 site observations, two meeting observations, and one event observation were gathered. Sites were chosen based on recommendations from PAC members as well as Google Map queries for popular or recently restored waterfront areas within the AOC. These sites stretch from downtown Kalamazoo westward to Saugatuck, and to the mouth of the river emptying into Lake Michigan. These locations ranged from public parks and beaches, to boat launches and access points, in order to develop a broad-ranging collection of observed sites; a map of these can be seen in *Figure 5* below. The two meeting observations we attended were monthly board meetings of the KRWC held at the Kalamazoo County Land Bank Building. In this AOC, the event observation collected was at the Fort Custer *Kanoe the Kazoo* event held by the KRWC on June 18, 2019.

In-person interviews were conducted with four Kalamazoo PAC members, as well as an EGLE AOC Program staff member. PAC member interviews were held at locations selected by participants and took approximately 50 minutes to complete. Finally, we held a series of five focus groups and group interviews in attempts of gauging community knowledge and awareness about the health of the river and restoration efforts. Respective focus groups and group interviews were scheduled within libraries in downtown Plainwell and Kalamazoo, and at a brewery on the outskirts of Kalamazoo to address a broad sample of the AOC's community.



ID	Sites
1	Mayors Riverfront Park
2	Arcadia Brewing Company
3	Verburg Park
4	Markin Glen Park
5	Kalamazoo Nature Center
6	Gilkey Elementary School Trails
7	Plainwell City Hall
8	Former Otsego Township Dam
9	Hanson Park
10	Allegan Dam
11	Mount Baldhead Park
12	Saugatuck Dunes State Park
13	Portage Creek

Figure 5 — Site map detailing 13 site observations conducted in the Kalamazoo River AOC.

List of Key Players in the Kalamazoo Area of Concern

All partners mentioned during field surveys:
University groups: Kalamazoo Valley Community College (KVCC); Western Michigan University (WMU); Central Michigan University (CMU); Michigan State University (MSU) Extension; Kellogg Biological Station - MSU
Native American tribes: Nottawaseppi Huron Band of the Potawatomi
Local businesses: HopCat; Arcadia Brewing Company
Local groups: KRWC; Superfund Community Advisory Group (CAG); Boy Scouts of America; Girl Scouts of America; Fort Custer Outfitters; Plainwell Kayak Company; Audubon Society of Kalamazoo; Kalamazoo Nature Center; Kalamazoo Community Foundation; Battle Creek Community Foundation; Southwest Michigan Land Conservancy; River Guardians; Outdoor Discovery Center; Brooks Nature Area; Kalamazoo River Protection Association; Kalamazoo River Cleanup Coalition; Kalamazoo Environmental Council; Freshwater Future; Four-Township Water Resources Council
Consulting firms: Kaiser & Associates; Wood (formerly AMEC Foster Wheeler)

Large Corporations: Georgia-Pacific and other Potentially Responsible Parties (PRPs); Enbridge Inc.
Municipalities and County Government: City of Plainwell; City of Kalamazoo; City of Otsego; City of Allegan; Kalamazoo County Government; Allegan County government; City of Kalamazoo Public Services
State and Federal government agencies and actors: Michigan Department of Natural Resources (DNR); Michigan Department of Environment, Great Lakes, and Energy (EGLE); EPA Superfund/CERCLA; Land & Water Conservation Fund; Great Lakes Commission (GLC); Michigan Department of Transportation (MDOT); Michigan Department of Health and Human Services (MDHHS); Michigan Humanities Council; Wolf Lake Hatchery - DNR; Kalamazoo Conservation District

Emerging Themes in the Kalamazoo River AOC

Roles: Encouraging engagement beyond the Superfund process

A silver lining of the slow-moving Superfund restoration process has been the establishment of clear roles in the minds of both the KRWC and EGLE with respect to the function of the PAC in the Kalamazoo River AOC.

KRWC (PAC-level)
We found that the Kalamazoo River Watershed Council primarily views themselves as, and desires to be as their name implies, the watershed council for the entire Kalamazoo River Watershed. As stated in *The Kalamazoo River: Beauty and the Beast* RAP (Kalamazoo River Watershed Advisory Council 1998), "PAC members are liaisons between the public and the RAP process." Twenty years later, our findings indicate that most of this self-described role is still true for the KRWC. This role extends beyond functioning as the PAC for the Kalamazoo River AOC specifically, and into a broader space of acting as advocate, guardian, educator, and steward of the water resources across the watershed as a whole. They describe themselves as having a high level of community engagement through their communication networks and events focused on the river, although noting that the majority of their salience revolves around their headquarters in the city of Kalamazoo:

"We have ongoing activities all the time. Kanoe the Kzoo, Krazy for the Kzoo is a cleanup or coordinated clean-up activities that have taken place. There are river park type of events that take place that we're involved in, as well as the educational things: the rain gardens, the rain barrels... I think within the City of Kalamazoo is probably the highest awareness of the Kalamazoo River Watershed Council."

It is clear that the KRWC views their role in engaging the public with their water resources as their primary role, despite their designation as a PAC for the AOC program. Furthermore, this view that the AOC program is only part of their role can be corroborated by the fact that no restoration or built environment projects were discussed during the two KRWC board meetings that we attended. However, this is most likely due to the fact that a lot of the AOC work in this area consists of large-scale sediment remediation and habitat restoration projects which the PAC does not directly oversee, due to this work largely falling under EPA or DNR purview.

In our study, we found that the KRWC, looking to strengthen their present role and further their mission in the Kalamazoo River, is currently seeking to broaden its reach to communities beyond their central region which surrounds the City of Kalamazoo. They acknowledged that reaching out to communities like Allegan and those further downstream has been a struggle for them in the past. They envision a 'Kalamazoo River Community' that they help form through creating partnerships and executing a deliberate outreach strategy:

"Somebody in Allegan may know there was an oil spill that befouled 40 miles of the Kalamazoo River, but not really know what it was like. That there isn't a Kalamazoo River community or a Kalamazoo River watershed community. In some ways I think that would be desirable... it would make it easier to achieve environmental protection goals if there was a broader community."

We note that the KRWC desires state assistance in this more holistic goal, despite it being beyond the scope of the AOC program. To this end, the KRWC's perceived role towards building a watershed-wide community lies in promoting safe public recreation on the river, and distribution of relevant watershed information throughout the community. As noted throughout the study's PAC interviews, there is a clear desire for the KRWC to be established as a trusted source of water-related information throughout the greater community.

State

The state has a similar understanding of the role of the KRWC as representatives of the community and a disseminator of important river-related information. Specifically highlighted by EGLE representatives was the 'Do Not Eat the Fish' campaign's clear messaging that helps keep community members and sustenance-fishers safe. EGLE also believes part of the role of community engagement for the KRWC is to recruit important watershed stakeholders who should be involved in the AOC process; to *"...strive for better representation within the PACs to more accurately represent the communities that live in those areas."*

As pertaining to the role of the state within the Kalamazoo AOC, we found agreement among all parties that EGLE is an important source of funding for the KRWC's outreach events. EGLE said that they help the PAC secure funding and resources. EGLE also described their role as a liaison between other state level and federal level agencies and they believe that attending both

KRWC board meetings and SPAC meetings is an important part of this role. This sentiment was affirmed with the presence of an EGLE representative at both KRWC board meetings that we attended. The KRWC agreed that having a state presence at its meetings is important for AOC progress, and state representatives themselves self-identified as negotiators of work plans with PACs. A unique state role in the Kalamazoo River AOC is the strong presence of the MDNR in its responsibility of dam removals and concurrent removal of impounded contaminated sediments with help from federal Superfund work (Devereaux 2019).

Community

Both EGLE and the KRWC see the role of the Kalamazoo community as being engaged with, and advocating for, their water resources. Due to slow-moving Superfund clean-up efforts, these entities believe it is especially important that community members stay engaged with the process. Currently there are not a large number of opportunities for community members to involve themselves with clean-ups that would help remove BUIs from the Kalamazoo River AOC due to the complex nature of sediment dredging. The KRWC sponsors and organizes river cleanups and educational rain garden events, but the broad community's ability to participate in cleanups and provide tangible assistance towards BUI removals is minute compared to the watershed's large, complex sediment-related projects. Despite limited forms of engagement, interview data suggested that community members and groups might play a more important role in reconnecting to the river, as they are the ones that directly benefit from interacting with the river. Our field observations suggest that community members possess a participatory role within the Kalamazoo River Watershed, as we observed individuals kayaking, fishing, and frequenting trails along the river, among other various forms of recreation.

However, a glaring difference between responses at the state and PAC levels was that the KRWC was not identified as a key player in the watershed within any of the community interviews we conducted. Many community respondents were not aware of the KRWC at all, and those that were aware, were unsure of exactly its role with regards to the Kalamazoo River. We hypothesize this might be due to the fragmented nature of the extensive AOC community, resulting in segmentation of watershed perspectives based on place-based identification. For example, community members expressed care about their own spheres of water resources within the watershed based on proximity to specific segments of the watershed, not necessarily associated with the larger AOC or even the Kalamazoo River as a whole. When asked about watershed-wide uses of the Kalamazoo River, a community member responded through a personal lens:

> "*Well I think there's a whole lot more, with the kayaking on my lake in particular. It's fishing and in the winter it's ice fishing. People like to ski across it. Yeah not a whole lot of… mostly pontoon boats."*

The lake that this respondent is referring to is within the Kalamazoo River Watershed but is disconnected from the Kalamazoo River itself. These individuals and organizations that comprise the watershed care mostly about their own sphere of localized water resources, and do not see themselves as belonging to the whole 'Kalamazoo River Community.'

Relationships: Opportunity for relationships from Comstock to Saugatuck

Overall, we found that strong relationships do exist within the Kalamazoo River's environmental community, but these generally lack cohesion throughout the span of the river, and the shared boundary with a Superfund site heavily influences the broader state of relationships within this AOC. EPA Superfund's multi-million dollar dredging work carries substantial media coverage, detracting attention from smaller restoration efforts within the downstream AOC, in turn influencing knowledge and ultimately participation in these efforts.

Our data point to potential for improvement in the relationship between the KRWC and the Kalamazoo community. Community group interview data showed that not many members of the public are aware of the KRWC, and furthermore, no members of the general community were observed at either KRWC board meeting that we attended. Currently, the KRWC and the public primarily interact through events held by the KRWC, which include paddle events and clean-up events. The events we observed were well-attended, with at least several dozen community members participating. During a conversation at the Arcadia Brewing Company *Kanoe the Kazoo* event, community members told us that they first learned about the KRWC and its mission of environmental stewardship by attending this event.

"What do you guys know about the KRWC?
I didn't know about them before today. This is our first time going on it today.
Oh really, what did you guys think of it?
Liked it. We liked it. We're going to go next year. He was talking about when they were doing cleanups, and we think we might participate in that. It sounds like a good time."

The folks that do know about the KRWC are avid supporters, and hosting events like these increases social cohesion and improves perceptions around the river.

The KRWC has taken a concerted effort to engage and educate a diverse population of the community through its 'Don't Eat the Fish' campaign in addition to various educational events across the watershed. English and Spanish signs conveying this message are posted at many access points along the Kalamazoo River (*Figure 6*), and recently the KRWC hired bilingual translators to walk the river telling fishers that the fish are not safe to eat because of contaminated sediments.

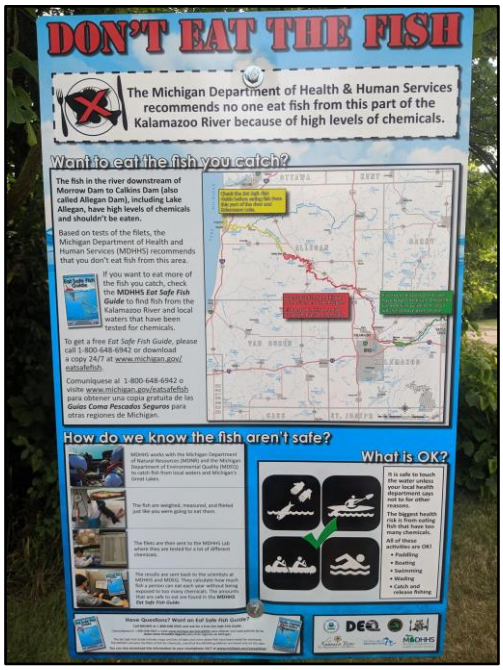


Figure 6 — Informational sign located at Mayors Riverfront Park in the city of Kalamazoo in regard to fish consumption advisories - signage along the Kalamazoo River can be found in Spanish as well.

The KRWC has also implicitly engaged the community with its partnerships with local colleges and universities, which are typically invaluable anchor institutions in a community (Maurrasse 2016). These institutions, like Western Michigan University and Central Michigan University for example, are long standing players that possess strong, positive relationships with the area and watershed, conducting scientifically-driven studies or projects aimed at restoring the river. In the past, the KRWC has partnered with these trusted institutions to disseminate information, and a few recent Kalamazoo River events have been organized specifically to coincide with institutional research. We observed the PAC discuss hosting paddle events which partnered with CMU to offer insight into mollusk-testing research, and others to educate about "Clean Boats, Clean Waters," held in conjunction with MSU Extension at their Gull Lake research facility (Michigan Clean Boats & Clean Waters 2020). Through interviews and interactions, both the KRWC and community members identified MSU Extension as a key player in the Kalamazoo River.

The KRWC do not see themselves as functioning solely as the AOC PAC, despite partially relying on the PAC support grant and state funding. Through the purview of the PAC program, EGLE encourages outreach as a practical measure of PACs, funding KRWC outreach efforts, like *Kanoe the Kazoo*. PACs are designed to act as arms of the state, helping voice community input into implementation of AOC-specific RAPs, and are dependent on state-funded PAC support grants to function. The KRWC specifically values its autonomy and self-sufficiency as the emissary of the state to the entire Kalamazoo River Watershed community. We believe many

of the sticking points in this situation are due to the sluggish nature of both Superfund site remediations and dam removals. PAC members sometimes look either introspectively or to the community for guidance, instead of to the state because they feel that it is more helpful to progress.

"We have an understanding of the most important things and I just laid them out. That's my understanding of the most important things... So I don't bother looking to the top to see what do we need to do here."

The primary mode of interaction between the PAC and the state is at the monthly KRWC board meetings. The AOC coordinator for the Kalamazoo River AOC was present at both board meetings that we attended, and subsequent PAC interview data suggest that these interactions are helpful. Members of the KRWC also said that they desired more regular interactions, especially to help with garnering additional funding. EGLE representatives communicated the fact that federal funding had been delayed due to the government shutdowns and the transition from the Michigan Department of Environmental Quality (MDEQ) to EGLE earlier in the year, and stressed that not giving the KRWC their PAC support grant when it was expected was out of their control. Meeting observations indicated that EGLE emphasized that having a work plan ready to go when this funding did arrive would be helpful. This interaction is a microcosm in the sometimes frustrating "hurry up and wait" process of the complex and challenging Kalamazoo River AOC.

From the community's perspective, there is a well-developed relationship between the state and federal levels. Unfortunately, most comments we received about the government from community members had a negative connotation because of past experiences including the response to the 2010 Enbridge oil spill and the construction of PCB landfills. While these landfills were created in remediating the PCB contaminated sediments in the region, which was largely viewed as a positive effort from the federal government, the proximity of sediment deposits to populated regions of the watershed frustrated the local community (Smith, L. 2013). PAC as well as community respondents shared feelings of mistrust and of being ignored because of a perception of not being prioritized by the state during the 2010 Enbridge oil spill. This highlights what was and remains a view held by some community members - that the Kalamazoo River is polluted. This lingering, negative sentiment toward an AOC plagued with a widely publicized legacy of pollution is a common theme throughout each of the AOCs studied. Community members see the government as reactionary, and only responding when it is mandated or critical, but also acknowledge that some of this bureaucracy stems from a community unwilling to undertake expenditure in order to support preventative government measures:

"And that is that [the community and the state]do not prepare… Government is supposed to go out and prevent problems from occurring. The same people who don't want to pay taxes and cut regulation will then get all upset because there's an oil spill."

An exemplary interaction between USEPA and the Kalamazoo community is the Superfund CAG. The USEPA reports out to the community using the CAG as an outlet as they remediate PCB contaminated sediments in the Superfund-designated area and does not specifically address other local issues.

Values Drawn from Water Resources: Diverging from decades of negative perception

Community values, as related to Kalamazoo River water resources, paint a complex narrative that has been shaped by decades of pollution and the subsequent environmental hardship that has plagued the region. Many community members who live along the Kalamazoo River still retain a negative perception of water resources due to the highly degraded state it was once in, and the fact that legacy contamination still has not been fully removed by remediation efforts to this day. The memory of this degraded state and the stagnation in current remediation progress allow negative perceptions to linger long-term. Some participants noted, in regards to the health of the Kalamazoo River, "*I remember back when you could actually smell the water. It smelled horrible*," or, "*I remember the day you wouldn't put your foot in this wate*r." As these images linger in the community's consciousness, people are unable to form a deep connection to this valuable water resource because it is still seen as something undesirable - even forsaken. Though this is a common perception among community members, they conversely have a generally positive outlook when it comes to the future of this AOC. Despite negative views of the past, most community members expressed optimism for the future and a desire to work collectively to get there. More specifically, their vision of a realistic future involved individuals enjoying and recreating on the water with a variety of access points and opportunities, with one participant saying, "*we will have a more accessible waterfront both for people on the shore and people in the river who want to enjoy the river*."

As far as the specifics of exactly what people value about the river, one highly discussed topic was the ability to recreate on the water. Many different types of recreation are valued along the Kalamazoo River, with people describing canoeing/kayaking and fishing as the two major routes of connection. Over 100 people were seen kayaking as a result of two kayak events, both hosted by the KRWC, and fishing was observed at Gilkey Elementary, Allegan Dam, and Plainwell City Hall, with built environments and infrastructure to allow for fishing at Hanson Park, Verburg Park, the Former Otsego Township Dam, Mayor's Riverfront Park, and Markin Glen Park (*Figure 7*); encompassing 8 of our 13 observation sites.

Figure 7 — Built infrastructure providing opportunity to interact with water resources: a wooden fishing pier located at Fannie Pell Park near Plainwell City Hall.

Though both kayaking/canoeing and fishing are popular ways for people to interact with the water, there were a variety of other uses presented in our data that are equally as important including walking, observing, and wildlife watching. People in this region value not only the recreation activity itself, but also the act of being in nature and the corresponding aesthetics associated with this, with one participant saying, "*there are some river walks that are near the Kalamazoo River, which are really nice. You always enjoy seeing the scenery*." Additionally, both downstream tourist towns and mid-river locations exhibited beach-going as a major activity as three of the four highest-attended sites we visited were located on beaches: Mount Baldhead/Oval Beach, Saugatuck Dunes State Park, and Markin Glen Park *(Figure 8, below*). Not surprisingly, participants also discussed water resources in the context of human health, expressing a desire for their drinking water as sourced from the Kalamazoo River to be free and clear of contaminants like PFAS. With the topic of PFAS increasing all over the country, it makes logical sense that people in this community would be worried about this, especially since areas in Kalamazoo County have been determined to be local hotspots for this contaminant.

Figure 8 — Beach-going is an immensely popular activity within the Kalamazoo River AOC, primarily near the mouth of the Kalamazoo River; Saugatuck Dunes State Park serves as a perfect example, as crowds were observed recreating up and down the waterfront.

Community Cohesion: Desire for convergence along the river

As the main objective of our research focused on identifying the communities surrounding each of our AOCs, we asked participants in interviews how they would describe the overall sense of community surrounding the Kalamazoo River. Using this interview data, we were able to learn that there is not one truly cohesive 'AOC community' that has been brought together by the Kalamazoo River, and that this can be explained through multiple lenses. As discussed previously, a large part of the community is still fearful and disgusted by the river due to prior negative associations they have made growing up here or have heard from peers. In the absence of admiration of the resource, there is no drive for people to celebrate - to come together across this river basin that has been shunned in previous years. The second lens was described as the geographical challenge of coming together over a resource that spans an 80-mile stretch of AOC-designated territory. PAC members have expressed a desire to include other communities and have attempted to bring them in by inviting them to join the board, or by hosting events in downstream areas such as Allegan, but over time participation fizzles, with one PAC member saying, "*the case with the Kalamazoo watershed for the outlying people is that its transportation [makes it] difficult to actually accumulate people.*"

Not only are these communities separated by distance, but also by differences in overall concern for sediment contamination. Due to reduced concerns of PCB contamination in downstream areas like Saugatuck and Douglas, these communities do not see their local water resources as something to be feared, but rather embraced. This was evident through our site observations that

spanned the AOC river stretch as well as the beach communities at the outset of the river where two of the most populous sites we visited were these Lake Michigan beaches - Mount Baldhead/Oval Beach and Saugatuck Dunes State Park. Although the Kalamazoo River is one entity, it is not homogenous in landscape, community, activities, or ideas; while it makes sense that a beach town would have beach-goers and that these areas would pose more popular attractions by comparison, these frequented areas still remain part of the Kalamazoo AOC. These differences in geography and values make it difficult for the Kalamazoo PAC to consistently include downstream communities in their efforts to restore the river.

Barriers: Different pages and different priorities - community and Superfund influence on impairment removal

Within the Kalamazoo River AOC, identified barriers to AOC success exist in area-specific socioeconomic and physical constraints as well as internal group dynamics - some of which have emerged as common trends throughout studies in the Rouge River and Saginaw River and Bay AOCs as well. In order to effectively plan for success in these AOCs, it is crucial to first acknowledge site-specific barriers and problems and understand the roots of each respective issue; this will lead to more effective organization and planning of AOC management in respect to such. Within the Kalamazoo River AOC specifically, barriers exist largely as a result of both the geographic extent of the AOC community - spanning a large portion of the Kalamazoo River, across various segmented communities of unique values and perceptions, as well as different perceptions in values and objectives by different groups and layers of governance within the region.

One of the chief objectives in implementing Public Advisory Councils across all of the program's Areas of Concern is to provide accurate representation and a voice for each respective community at hand. To successfully accomplish this, however, it is crucial that PACs foster strong relationships with their communities, either through direct outreach, or using boundary organizations as surrogates in order to publicize conservation efforts and build community-level involvement. While the Kalamazoo River Watershed Council has existed as the PAC in the AOC program, their AOC efforts within the community have been taking place largely outside of public view. Although the KRWC practices community outreach through informational signage, sponsored river recreation or clean-up events, and email publications to its community-level subscribers, there is a belief within the PAC that members of the broader community in the watershed seem to be largely unaware of their presence and efforts of the community:

"So once again you could probably go out and ask 10 people - the same 10 people: do you know what the Superfund Site is? You get 9 no's. Do you know what the Kalamazoo River Watershed Council? You get 9 no's…"

A sample of community members our team canvassed at a watershed council-sponsored paddle event were unfamiliar with this organization's role in relation to the watershed prior to attending this event. Community members can learn about clean-up progress at these events as well as gain a stronger understanding of the KRWC and their functions as the PAC within the AOC program.

An additional barrier the KRWC lies in uniting the set of mixed community values that exist along the Kalamazoo River AOC. Individual community members are described as highly focused on their own section of the river, or respective inland lake, and do not see themselves as part of a larger Kalamazoo River community. With this focus on individual resources, people care deeply about impairments to their local resource but are largely unaware of larger problems afflicting the watershed due to their lack of interest or place-based connection to other areas along the Kalamazoo River. For example, one community member discussed Lake Allegan as their main concern and was hoping to solve their local issue or nuisance algae which prevents them from recreating on the water. Not all community members along the Kalamazoo River have a designated local resource they are able to utilize or care for; because of this lack of connection, caring for the river is outside of their scope of interest which leads to a lack of connection to the overall river community. One PAC member described a future culture shift towards a unified vision of a Kalamazoo River community once water quality improves, and people begin to see the Kalamazoo as an important shared resource.

A clear barrier to broad public engagement throughout the watershed lies in its own geographic expanse; as mentioned, the 130-mile Kalamazoo River spans across a widely diverse collection of cities, towns, and communities. Given this wide-ranging spectrum of communities, the KRWC has a difficult time reaching the entire population of the watershed, or ensuring diverse representation within the PAC itself. Local PAC members have acknowledged the geographic extent of the watershed as an obstacle preventing broader engagement, with one member stating, "*...well, there is no single overall community in 160 miles of watershed. I think that there are big differences area by area and city by city.*" Given the diverse collection of communities in the watershed, reaching out and actively engaging the entire diverse watershed community with one broad messaging strategy will not be fully effective.

Beyond the question of messaging in outreach, another barrier to broader community-level engagement lies in modes of outreach. Although the KRWC does have an official website and Facebook account which see updates and announcements on a regular basis, PAC members have identified that there is no platform for information on detailed restorative efforts, nor a forum for direct public discourse in relation to the AOC.

> *"Michigan EGLE is a repository for a lot of sampling, so I think one of the roles that the PAC can play is sort of be in the spearhead to make that information more accessible. Help people*

understand why it is important; help people understand what gaps in information exist, so how to connect their questions about the resource to a dataset..."

The PAC has expressed desire for increased expertise in web development. This could yield more effective means of transparency and community outreach through a more aggressive, detailed online presence.

In order to consistently update the KRWC website and manage it long-term, PAC members have expressed a need for a designated IT position. However, this is just one aspect of a larger problem that KRWC faces: a lack of funding and personal capital. Additional community engagement strategies that PAC members mentioned which would require additional funding included direct interactions with downstream residents, as well as recruitment and retention of downstream stakeholders. Members expressed that these roles might also better be served at the state level but understand EGLE resources and human capital to be stretched thin between multiple AOCs.

More specific barriers within government structures come from reduced personal capital for EGLE-specific communications and the sluggish nature of a complex Superfund process. EGLE representatives acknowledged the lack of communication positions within EGLE that are focused on sharing AOC-specific content. In particular, they saw a decline in the available lines of communication during the reshuffling of the former MDEQ into EGLE. They also cite more levels of hierarchy within EGLE that slow processes within which the KWRC receives approvals or answers from the state. Although Superfund remains outside the scope and power of the AOC program, PAC members are frustrated by how slow the Superfund clean-up process takes because BUIs related to contaminated sediments cannot be removed until this process is complete. Due to the Superfund system's dependence on lawsuits against PRPs to get settlement money, extensive and expensive legal battles make an already long-term project of dredging and remediating millions of metric tons of sediment take even longer. Even when a settlement is won, it is usually only designated for a specific portion of the river.

Reshuffling and reorganization of agencies and responsibilities observed at the state level fuel perception among the PAC (and to some extent, the community) that the state exists largely in a reactionary capacity. To some extent, this comes as a result of legislative responsibilities and corresponding protocols of state functions - many of which, such agencies can not deviate from, but the PAC and community become frustrated when the state only gets involved in AOC restoration work when it directly falls under such protocols. Ironically, this expressed frustration with the reactionary response of the state is also mirrored by community members themselves, who, rather than strongly support or adhere to preventative measures and programs of the KRWC, "*...don't care about invasive species unless their own lake is affected.*" This prevailing sense of reactionary response, seen both within the AOC community and EGLE, influences

measures geared toward progress in the Kalamazoo River's R2R2R process, a common trend observed through all three AOCs studied.

Communication & Engagement: Utilizing diverse modes of media

As previously discussed, one of the key barriers toward broad community engagement in the Kalamazoo River AOC is the difficulty with involving all socioeconomic and geographic groups within the AOC; this barrier is closely tied to AOC-related communication across these different factions. Fundamental in pursuit of broad engagement and coalition building across diverse groups in favor of a common goal is the development of a broad messaging strategy. Looking simply at television as a medium, for example, if the potential receiver of a message is tuned into a different channel than the broadcast, then the message in question will have failed. When trying to broadcast a message, it is important to utilize communication platforms and target content that is connected and relevant to the intended audience. In the case of the KRWC, PAC members described their primary modes of communication as including signage, email listservs, the KRWC website, and mailings, as well as hosting events and activities. Community members reported the major ways in which they digest their information is primarily through local television news, email, and social media, in addition to mailers, public radio, and through attending events or meetings. While PAC members did not describe social media as a main avenue for communication, they do have a presence on Facebook in which they share information about watershed events they host.

Facebook especially was noted as a common social media platform that is used by community members, with two participants noting they had learned about the KRWC through a *Kanoe the Kazoo* event shared on Facebook. In addition, many local groups surrounding the Kalamazoo River have formed Facebook groups to communicate their own messages about concerns for the health of their watershed, with one example being a group called *Justice for Otsego* where community members can share their concerns about the state of their environment. While Facebook as a medium is well-known and well-utilized by the community, there were some comments from community members that expressed mixed reviews on the platform, as it can allow for unproductive discourse and the spread of misinformation. This shows that community members are able to identify credible sources, which should assist them in trusting information shared by KRWC. In developing a future communication strategy for the Kalamazoo River, it will be crucial moving forward to include various forms of media as described by community members, such as increased social media, so that concerned citizens are able to receive information sent out by the KRWC.

Beneficial Uses and Impairments: Forging community connection to the Kalamazoo River

Through individual and group interviews, we further focused on different perceptions of Beneficial Use Impairments (BUIs) between the broader community, the PAC, and the state in

relation to a particular AOC. These perspectives were gathered through asking similar questions about beneficial uses and impairments about the watershed - identifying positive attributes and uses of a healthy watershed, as well as environmental impairments that stand in the way of these uses.

We found a wide range of understanding of BUIs among the three levels of actors and between the different layers of involvement surveyed. There exists a profound gap in how these program-specified BUIs are understood; within the sample of Kalamazoo River community members surveyed, none could identify any AOC-specific BUIs - in stark contrast to PAC and state interests. The majority of community members cited recreational uses of the river when asked about beneficial uses; whether the watershed is available for kayaking, fishing, or aesthetic viewing. Community members' subsequent responses about perceived Beneficial Use Impairments about the river tended to then play off of these aforementioned uses, citing impairments that are easily seen, and directly affect the river's direct uses themselves. General impairments specified by community members revolved largely around aesthetic-related issues - including excessive algae, 'gross or mucky' water, flooding, high turbidity, or aquatic invasives, among others - which could be tied to AOC-specific BUIs such as *Degradation of Aesthetics, Degradation of Benthos,* or even *Loss of Fish or Wildlife Habitat*. Although the BUI *Degradation of Aesthetics* was removed in 2012, we observed a degree of this impairment through our site observations along the Kalamazoo River - an example of nuisance algae growth at a Kalamazoo park is seen below in *Figure 9*:

Figure 9 — Nuisance algae and visibly degraded aesthetics seen at a boat launch in Verburg Park in the city of Kalamazoo.

In one form or another, the greater community of the AOC best understands Beneficial Use Impairments that they can observe in the physical environment that hinder their use of water resources, such as *Degradation of Aesthetics* or *Eutrophication or Undesirable Algae*. This is in contrast to contaminants which are mostly invisible, and in the case of the Kalamazoo River, would not obstruct direct water contact.

Between PAC members and state interests, there appears to be a stronger degree of accord in relation to overall BUI perception; both parties displayed a deeper understanding of BUIs than community counterparts. To a degree, these responses were expected, as BUIs exist within the work spheres of PAC and state actors. One of the apparent differences in PAC and state BUI interpretation lies in available data and resources for studying and mapping progress toward respective impairment delisting. As a state agency, EGLE is able to consistently monitor water resources throughout the state of Michigan, while the KWRC lacks the budget necessary to conduct comprehensive studies relating to specific BUIs, let alone manage a platform making this data readily available. This was directly addressed by a PAC respondent, acknowledging a gap in communication between BUI monitoring datasets. Ultimately through the purview of the AOC program, the state determines criteria for delisting BUIs, and thus interprets these impairments in their most precise state (Draheim et al. 2018).

Future Visions: Hope for progress in a long-term AOC

Both the community and the KRWC share an optimistic view of the ideal future for the Kalamazoo River. Despite negative views of the past degradation, most community members expressed hope for the future and a desire to work collectively to get there. Dam removals, removal of PCB contaminated sediments, and natural waterfront development were highlighted specifically by the community, and more broadly, the return of area-specific recreation involving the river; fishing, boating and wildlife watching. Consistent with their higher degree of program-specific knowledge and terminology, PAC members expressed ideal visions for the future of the river from a more prescriptive vantage point; dealing largely with addressing AOC specific BUIs, which would be addressed by further dam removals and PCB-contaminated sediment dredging.

Community members retained this hopeful vision for the realistic future of the Kalamazoo River, but PAC members, with firsthand experience in project design and permitting, the AOC program, and the Superfund process understand that progress in R2R2R will be long-term. Community members believe there will be a nicer and more accessible waterfront that has a variety of amenities available to the public. They described the Kalamazoo River clean-up as slow, but making progress. PAC members, however, believe that delisting will likely take decades, due to the large scale and complexity of sediment contamination issues. They are also

concerned that growing populations and an increased impact from farming will threaten progress down the line.

State representatives also share this more conservative notion of the realistic future of the Kalamazoo River because of the large amounts of contaminated sediments left to be cleaned up and the fact that much of the river is still dammed. Similar to PAC perceptions, state representatives also acknowledged that the road ahead would likely be a lengthy process, but there was a marked sentiment that there is forward momentum toward delisting. Across all respondent groups, contaminated sediment dredging - and thus, dam removals, were acknowledged as being paramount to any progress seen within the Kalamazoo AOC.

Kalamazoo River AOC Site-specific Recommendations to EGLE

Recommendation: Outline current capacities within the KRWC to supplement their primary role of communication and outreach to include project development as a mode of engagement

The KRWC currently views themselves as the primary community watershed organization within the Kalamazoo River Watershed, with high functioning efforts in outreach and community engagement. They currently do this by hosting water-related events and implementing informational signage at river access points. Given state perceptions of PAC roles, the KRWC could increase overall functionality by expanding beyond communication and outreach by taking on a project development role within the AOC, creating more accessible points along the river for a variety of recreational use. This allows KRWC to simultaneously reconnect the community to the river and work towards removal of BUIs.

Recommendation: **Work with KRWC to establish functional roles with respect to community engagement, and delegate responsibilities that correspond to each group's strengths**

Both EGLE and the KRWC are in accordance, believing the PAC's role is best served as a community engagement partner. A conversation should be opened on how EGLE can best support the KRWC in a shared strategic community engagement plan. Encourage the PAC to unify the 'Kalamazoo River Community' by developing an AOC-wide engagement and outreach strategy tailored specifically to cultivate shared place-based connection to the AOC.

Recommendation: Ameliorate data gaps between EGLE and the public

MDHHS provides data on fish consumption restrictions through their *Eat Safe Fish Guide*, but there is no specific, publicly available information for the Kalamazoo River other than 'Do Not Eat.' EGLE could encourage KRWC to seek partnerships to cooperate in, or acquire funding toward conducting additional fish PCB monitoring through MDHHS or another third party; there is potential to partner with universities in the AOC region to complete this task. If regular monitoring is currently being conducted within the AOC, locally relevant data should be published in one accessible place, and be made available and easily digestible for the public, potentially facilitated by the PAC. Advertising easily accessible, simplified fish monitoring data will give public insight into specific risks of PCB exposure beyond broad 'Do Not Eat' advisories.

Recommendation: **Work with KRWC to tailor an AOC-specific messaging strategy in ways that are most relevant to the public**

Work with KRWC to boost social media presence, particularly on Facebook, in order to better connect with the community. EGLE should encourage and provide assistance for KRWC to either expand their online presence, or hire a consulting company to do so. EGLE could

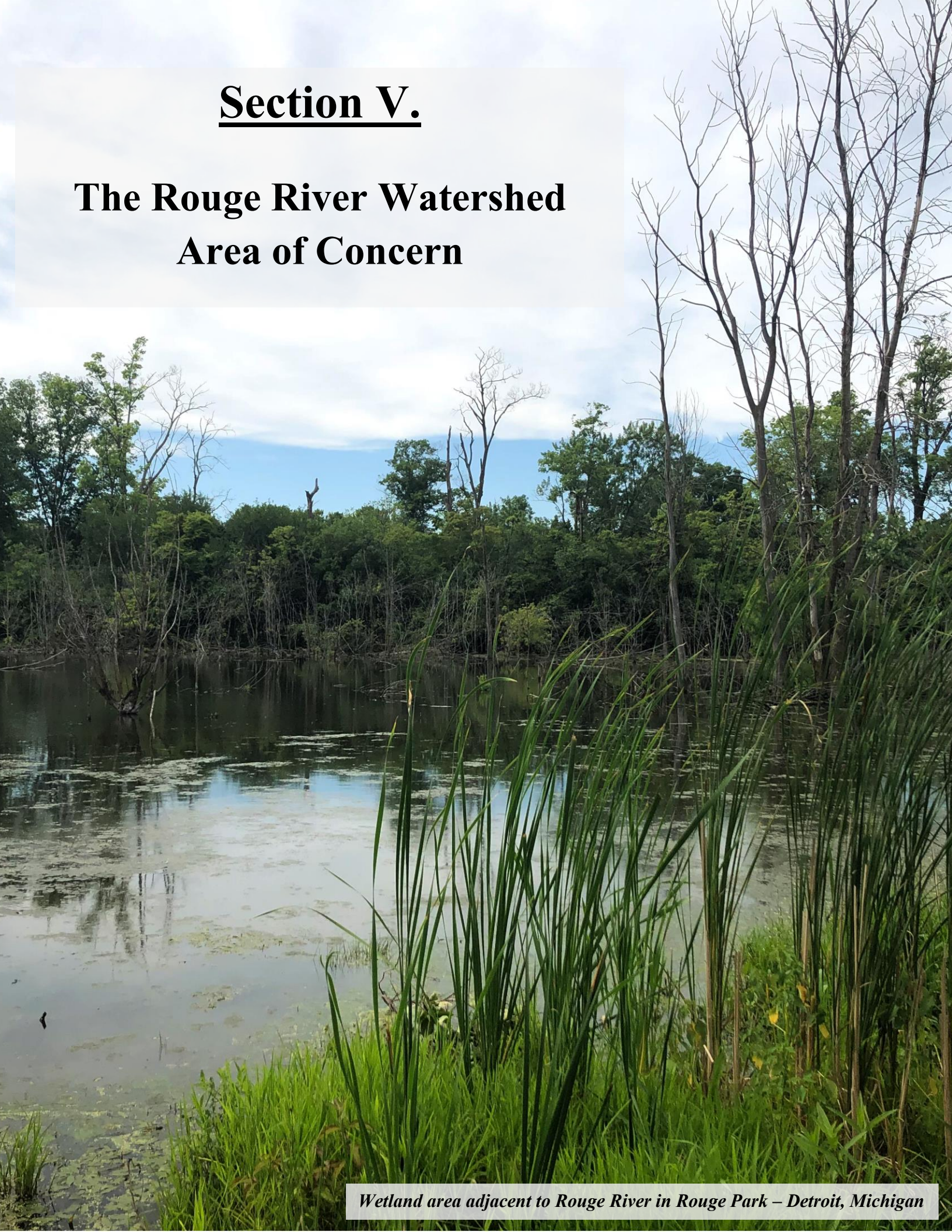
potentially hire a student intern or recent graduate with social media skills and knowledge about the area from surrounding universities. This could better address the lack of information and communication barriers to engagement through locally-relevant messaging and a wider distribution of online marketing.

Recommendation: **Mobilize community-defined beneficial uses when encouraging involvement with the Kalamazoo River**

Community members and PAC members alike reported canoeing, kayaking, and fishing as primary beneficial uses. Help the KRWC write work plans that incorporate building more kayak/canoe launches or catch-and-release fishing access points in the upper reaches of the river that have been remediated. Utilize partnerships in project implementation, potentially involving municipal governments to gain access to parks - an example could be revamping Mayors Riverfront Park in the city of Kalamazoo. This might include advertising the riverfront with obvious signage and built infrastructure for specific recreational activities to draw people in.

Section V.

The Rouge River Watershed Area of Concern



Wetland area adjacent to Rouge River in Rouge Park – Detroit, Michigan

The Rouge River Watershed Area of Concern

Geography

Draining 467 square miles across southeastern Michigan, the Rouge River contains four branches and over 400 lakes, impoundments, and ponds. Spanning across three different counties (Oakland, Washtenaw, and Wayne), 48 different municipalities and hosting a population of nearly 1.35 million, the Rouge Watershed is the most heavily populated and industrialized watershed in the state of Michigan (Alliance of Rouge Communities [ARC] 2012). The watershed extends as far out as Rochester Hills in Oakland County, and snakes its way through highly urbanized land to the Detroit River at Zug Island, an industrial park near the City of Detroit. Designated as an Area of Concern in 1987, the Rouge River Watershed (*Figure 10*) is host to nine different Beneficial Use Impairments, ranging from *Fish Tumors and Deformities* to *Restriction on Dredging Activitie*s (highlighted in Table 2), none of which have been removed at this time (USEPA 2019c).

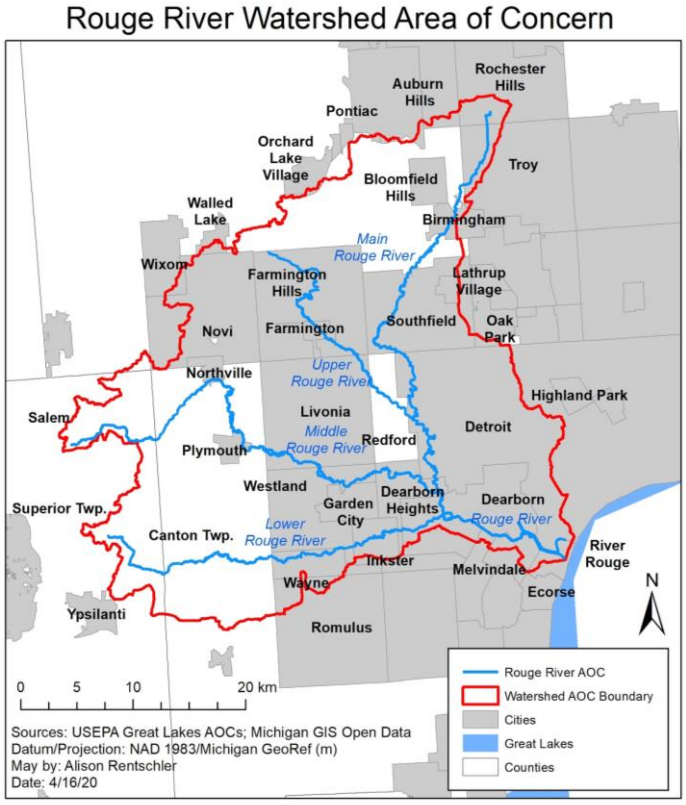


Figure 10 — The boundary of the Rouge River AOC is the entire watershed, which drains tributaries of the upper, middle, lower, and main stem Rouge River.

History of Environmental Degradation

Originally inhabited by members of the *Fox* and *Kickapoo* native tribes, the Rouge Rouge served as a source of food, water, and transportation. Following European settlement in the early 18th century of what would eventually become the Greater Detroit Area, the Rouge River was recognized as a location of strategic importance in commerce and trade, and was given its name by the French fur traders who rushed to populate the region. This initial European settlement would be the start of centuries of migration to an ever-increasing industrial region, with a population of 1.35 million today, and projected to grow by roughly 3.4% by the year 2035 (ARC 2012).

Located in proximity to the city of Detroit, much of the economy in the Rouge Watershed today is heavily industrial - largely due to the rise of the American automotive industry in the early 21st Century. Major portions of the Rouge River have been occupied by large-scale factories and production facilities, and as a result, the river has seen a substantial amount of legacy sediment and water contamination within the last century. Most notably publicized in 1969 when a worker in an industrial corridor of the Rouge dropped an Acetylene torch, the river itself ignited, billowing flames and smoke that rose multiple stories (*Figure 11*) (Graham 2019). In addition to encouraging the modern-day environmental movement, the Rouge River Fire of 1969 brought a local spotlight on the ailing status of the Rouge.

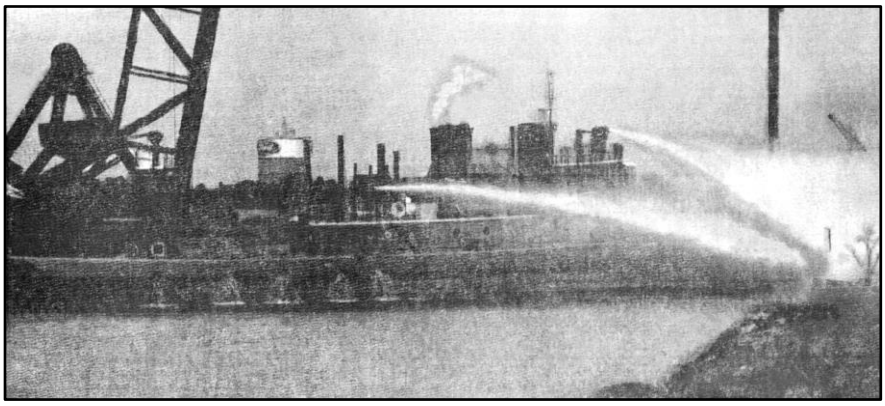


Figure 11 — Plumes of flame emanate from a heavily polluted Rouge River - some rising as high as three stories. (Source: Hartig 2019)

Although strides have been made since the combustion of the River Rouge in the mid-20th Century, antiquated Combined Sewer Overflow (CSO) and drainage systems have made it difficult for the AOC to see substantial progress toward BUI removal - specifically concerning *Degradation of Aesthetics*, *Eutrophication or Undesirable Algae*, and *Degradation of Benthos*. Addressed further in this section, the complex state of affairs in CSO management in the lower portions of the Rouge make large scale AOC projects increasingly difficult for the PAC and EGLE to cooperate on. CSO management concerns a separate department within what is now

EGLE, operating under different protocols than that of the AOC program, often not within direct contact in regular functions. This contemporary CSO problem is further exasperated by increasing development within the watershed, bringing with it a glut of impervious surfaces. Further floodplain building within the Rouge River Watershed encourages higher stormwater runoff, bringing with it greater sediment yields and increased pollutant loads, not to mention increased chances of flash flooding. Today, this unchecked floodplain development and impervious surface construction plays a large role in the pollution of the upper reaches of the river (Ridgway et al. 2019).

AOC Program Involvement

Today, the Rouge River is still host to substantial concentrations of polychlorinated biphenyl (PCB) and polycyclic aromatic hydrocarbons (PAHs), as well as heavy metals, which contributed to the Rouge River's designation as an AOC in the 1987 GLWQA Amendments. Today, a $50 million remedial dredging project near the mouth of the river has been slated by the USEPA, working in cooperation with Honeywell Incorporated (thanks to the Great Lakes Legacy Act) and United States Army Corps of Engineers. Work began in 2018, and is slated to complete by June of 2020 (US Army Corps of Engineers 2018). In addition to federal projects, local watershed advisory groups such as the Alliance of Rouge Communities (ARC) and the Rouge River Advisory Council (RRAC) cooperate with *EGLE* to garner and apportion funding for smaller remediation/restoration projects.

In addition to cultivating corporate partnerships in restorative efforts throughout the Rouge, the AOC program funds watershed restoration projects through mobilizing a variety of state and federal grants. PAC support grants, in this case dispersed directly to the Alliance of Rouge Communities, are further allotted between the RRAC (which is not eligible to receive grants directly) and the *Friends of the Rouge* to upkeep organizational functions, and support projects and outreach. Larger scale efforts within the watershed however are accomplished through mobilization of larger grants, which are advertised by state AOC representatives. One such instance of project funding and organization within the AOC is the state's funding of the *Henry Ford Estate Dam Fish Passage Restoration Project*. Established in 2017, this project mobilized funds from the Great Lakes Restoration Initiative through the state of Michigan, "in effort to delist the Rouge River Area of Concern" (ARC 2013) Within the watershed, the Rouge River Advisory Council serves as community liaisons with the state AOC Program, and the Alliance of Rouge Communities works in project permitting and implementation.

Another extension of these watershed groups works to facilitate involvement at the community level. *Friends of the Rouge* works with corporate sponsors and funding from other watershed groups as well as the state, engaging directly with the community through local cleanup events, and educational and recreational outings on the river. Founded in 1986, Friends of the Rouge

(FOTR) has organized community clean-up and educational events "to restore, protect and enhance the Rouge River watershed through stewardship, education, and collaboration" (Friends of the Rouge 2020). Today, FOTR remains the most well-known watershed organization within the Rouge, and works as a broad instrument of community outreach for municipal interests and watershed advisory groups.

Current BUI Status

The Rouge River Watershed AOC currently has nine BUIs, with none removed. The sources of these BUIs are mainly due to the Rouge River's history of heavy industry and the resulting pollution (USEPA 2019c).

Table 2: Existing and Removed Rouge River AOC Beneficial Use Impairments

BUI	**Removals**
Restrictions on Fish and Wildlife Consumption	
Eutrophication or Undesirable Algae	
Beach Closings	
Degradation of Aesthetics	
Degradation of Benthos	
Restriction on Dredging Activities	
Loss of Fish and Wildlife Habitat	
Degradation of Fish and Wildlife Populations	
Fish Tumors or Other Deformities	

Federal Watershed Involvement

Despite the fact that the Rouge River Watershed contains contaminated sediment, there are no active Superfund sites within the area on the National Priorities List (NPL), which designates priority projects within the program itself. The most recent efforts in the Rouge River Watershed to remediate contaminated sediment involves an ongoing project funded by the EPA and Honeywell International, Inc. through the Great Lakes Legacy Act to dredge 70,000 cubic yards out of the Lower Rouge River Old Channel (Great Lakes Restoration 2018). This project - slated for completion in 2020 - will involve both dredging and capping of sediment adjacent to Zug

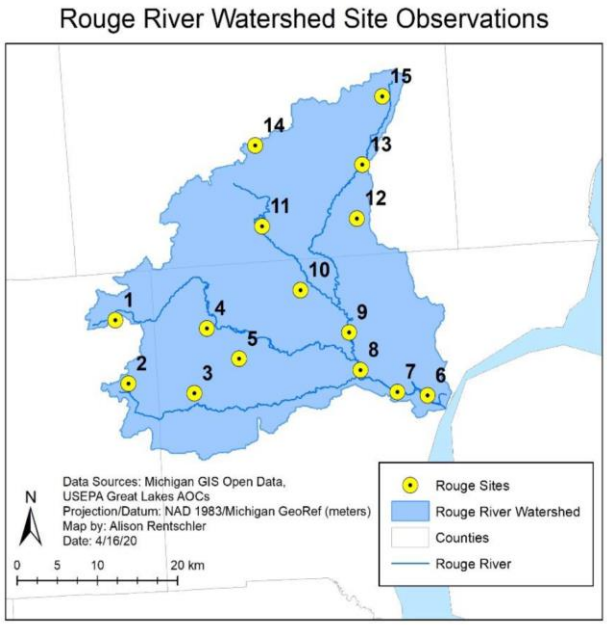
Island which is heavily contaminated primarily with PAHs, PCBs, and various petroleum products as well as large metal debris, most notably vehicles (Hartig 2020).

Investigation of the Rouge River Community

In order to gather as representative a sample of the community surrounding the Rouge River, we prioritized covering a diverse geographic sample of the watershed through both our participatory observation and site surveys. In the Rouge River AOC, 15 site observations, three meeting observations, and five event observations were gathered. Three PAC members, two boundary organization members, as well as a state-level AOC Program representative were interviewed. In addition to individual interviews, two focus groups were held in attempts of gauging community knowledge and awareness about the health of the river and restoration efforts.

Observation sites were chosen based on recommendations by the Rouge AOC coordinator and by a member of FOTR. Since the entire Rouge River watershed is designated as the AOC boundary, we made an effort to visit representative sites of community significance throughout the entire watershed. We set additional criteria to sample a gradient of parks in the R2R2R process; urban, suburban, and rural areas; and natural preserves versus developed city parks. Some of the sites were not directly adjacent to the Rouge River itself, but are within the Rouge AOC boundary, as shown in *Figure 12* below. The meetings we attended were a Friends of the Rouge board meeting, a Friends of the Rouge water trail committee meeting, and a Rouge River Advisory Council board meeting. Events we attended were two FOTR rain garden builds (one with the general public and one with Ford Motor Company employee volunteers), *FOTR Trash 2 Art*, *Friends of Eliza Howell Park Discovery Day*, and the *Rouge Cruise* held by FOTR.

In-person interviews were conducted with two board members of the RRAC, two people representing FOTR, one person representing ARC, and an EGLE AOC Program representative for the Rouge River. Interviews were held at locations selected by participants and took approximately 50 minutes to complete. We held two community focus groups at FOTR headquarters in Plymouth each consisting of approximately 12 participants. Focus group participants were canvassed through email, Facebook, acquaintance, personal interaction, and through a FOTR listserv.



ID	Sites
1	Creekshead Preserve
2	Springhill Nature Preserve
3	Canton Heritage Park
4	Kellogg Park
5	Holliday Nature Preserve
6	Forman Park
7	Kessey Fieldhouse
8	Environmental Interpretive Center
9	Rouge Park
10	Bell Creek Nature Preserve
11	Farmington Hills Heritage Park
12	Civic Center Park
13	Linden Park
14	West Bloomfield Woods Nature Preserve
15	Stage Nature Center

Figure 12 — Site map depicting the 15 site observations taken throughout the Rouge River Watershed.

List of Key Players in the Rouge River Area of Concern

All partners mentioned during field surveys:
University groups: Wayne State University; University of Michigan - Dearborn; University of Michigan - Ann Arbor; Lawrence Technological University; Henry Ford Community College; Michigan State University Extension - Sea Grant and Water School
Funding organizations: Fred A. and Barbara M. Erb Family Foundation
Local businesses: Kelly & Kelly, P.C.
Local groups: Friends of the Rouge (FOTR); Friends of Rouge Park; Friends of Patton Park; Friends of Eliza Howell Park; Friends of Maybury State Park; Girl Scouts of America; Boy Scouts of America; Michigan Science Center; River's Edge Gallery; Greening of Detroit; Eastside Community Network; Southwest Detroit Business Association; Southwest Detroit Environmental Vision; Sierra Club - Detroit Outdoors; Detroit Audubon; Land + Water WORKS Coalition; Pure Oakland Water; Southeast Michigan Land Conservancy (SMLC); American Bird Conservancy; Kiwanis Club of Dearborn; West Bloomfield Land Conservancy; Legacy Land Conservancy; Detroit Zoo; Michigan Nature Association; Sidewalk Detroit; Troy Nature Society
Consulting firms: Environmental Consulting & Technology, Inc.; Stantec; Cardno; OHM Advisors; NCS Construction Services; LLC, Hubbell, Roth & Clark, Inc.; Marine Pollution Control; Sorensen Gross Construction Company
Large corporations: Ford Motor Company; General Motors; AK Steel; US Steel; Marathon Petroleum Corporation; Bosch; ITC; Comcast; Honeywell International Inc.; Quicken Loans; Detroit Pistons; AmeriCorps

Municipalities and County Government: 'The 48 communities' - Specific mentions: Canton Township; City of Dearborn; City of Ecorse; City of River Rouge; City of Detroit; City of Melvindale; City of Southfield; City of Farmington Hills; City of Birmingham; City of Troy; City of Plymouth; City of Warren; City of Northville; Dearborn Fire Department; Great Lakes Water Authority; Detroit Water & Sewage Department; Dearborn Public Works; Detroit Parks and Recreation; West Bloomfield Parks and Recreation Commission; Plymouth Municipal Services Department; Dearborn Recreation & Parks Department; Oakland County; Washtenaw County; Wayne County
State and Federal Government agencies and actors: EPA; EGLE; DNR; Detroit District Army Corps of Engineers; United States Geological Survey (USGS); MDOT; Southeast Michigan Council of Governments (SEMCOG); ARC; RRAC

Emerging Themes in the Rouge River Watershed AOC

Roles: Navigating a watershed of diverse interests and socioeconomic segmentation

State
Given that the Rouge River Watershed encompasses one of the most densely populated areas in the state of Michigan, it's no surprise that the watershed is stewarded by a multitude of groups, organizations, and municipalities; all working to restore this Area of Concern. This can make role designation between groups quite difficult, given sheer logistics of collaboration among a multitude of interests. However, the AOC Program in the Rouge River has seen measurable progress in recent years when these groups have come together and cooperate in efforts toward future BUI removals, primarily through implementation of habitat restoration projects. The primary state-level entity, EGLE, has been a key leader in this AOC's progress, specifically through their ability to secure funding for restoration work. They additionally have worked to bring in private-sector partners, most notably Honeywell International, Inc., in order to assist in funding large-scale sediment remediation projects in this region. A PAC member articulated that this partnership may have been the catalyst for the project's establishment, stating:

> "*...the sediment clean-up that they're working on only came about because the state got Honeywell corporation to come to the table. And then the EPA legacy act will match their funding for the clean-up, but until Honeywell was at the table, that wasn't going to happen.*"

While these efforts have been integral to progress in this AOC, much of this work goes unnoticed by community members who noted that they have not seen much participation from state-level entities in their watershed. Despite this, community members identified other, more behind-the-scenes governmental roles that were highly important for maintaining the general ecological integrity of their watershed which included setting environmental standards, tightening regulations on development, and enforcing laws to hold industry accountable.

While the state government's role in this program is paramount to progress, our interviews point out some desired roles of the state government that, if implemented, could allow them to serve their communities more effectively. At the state level, there was an expressed desire for the multiple departments within EGLE to collaborate more effectively, especially in the case of working on CSO-related problems in the Rouge River, since the authority on this issue lies in a EGLE department separate from the AOC Program. Given that CSOs are one of the main contributing factors to a handful of BUIs, specifically *Degradation of Aesthetics*, and *Eutrophication or Undesirable Algae*, it is highly important that departments within EGLE are able to communicate effectively to deal with this problem. PAC members have also expressed frustration with this, with one member saying, "*...the CSO problem needs to be addressed, but it's through a whole different agency and that's very frustrating because we can see clear links with our data.*" PAC members also expressed that more communication from both EGLE and EPA levels would be helpful in making sure all parties are on the same page. Similar to other PACs, members of the RRAC have discussed the importance of the presence of their AOC coordinator at meetings for consistent updates on funding and general progress, so maintaining and potentially increasing this type of interaction could be beneficial. As far as the community's perspective on potential amendments to the state's role, many discussed hopes for increased regulations on development, specifically those that occur in floodplains and riparian corridors as this decreases the community's flood resiliency. Even though changes to such regulations may be outside of the program's scope, this shows that the community cares about conservation and desire for these projects to take precedence over continuing development in the area and that they trust in the state government to take on this role.

ARC/RRAC/FOTR (PAC-Level Organizations)

Just as the Rouge River watershed is unique in its variety of communities and dense population, roles at the PAC-level are complex given the scope of work that must be completed to fully restore this AOC. In order to accommodate the multitude of communities in the Rouge, a group of partnerships have formed between multiple agencies to conduct AOC-related work. At the PAC-level, three major groups are involved in AOC work: two non-profit watershed organizations - the *Alliance of Rouge Communities* (ARC), and *Friends of the Rouge* - and the designated AOC PAC, the *Rouge River Advisory Council* (RRAC). These three groups work in conjunction, with unique and parallel roles, that allow for progress to be made in this AOC. Since the RRAC does not have its own non-profit designation, it operates as the arm of ARC that assists specifically in the AOC sphere, via the attainment of the goals of the Rouge River Remedial Action Plan. As described by one PAC member, the RRAC is strictly an advisory group, with project implementation power coming from the ARC. This can be corroborated from our meeting observation data in that members of ARC primarily conducted the PAC meeting and established the agenda. FOTR is a 501(c)(3) watershed organization that works to connect science and the community through various forms of engagement. Due to their non-profit status

as well as their AOC-specific work, FOTR is eligible for PAC-grant funding, which has allowed them to conduct watershed aquatic monitoring of fish and benthic communities to assess the status of BUIs in the area. The interactions between these three groups have been described by a PAC member as a "*triangle partnership*" that works together to tackle some of the watershed's biggest environmental issues.

As the PAC for the Rouge River AOC, the RRAC operates as an advisory group that is composed of individuals who act as representatives for the community, to the state program. Given the scope of the watershed, PAC members expressed that it is a near impossible task to sufficiently represent the entirety of municipalities and other interest groups in the area. RRAC members described their main roles within the AOC Program as working to facilitate objectives which exist in the governance sphere: planning and implementing restoration projects, creating BUI removal criteria, and ultimately removing BUIs and delisting the Rouge River watershed as an AOC. State level officials described the RRAC's roles in a similar manner, which suggests accord in role understanding. These self-described roles are further corroborated by our observation data of an RRAC meeting in which major topics of discussion included updates on funding and on-going restoration projects. Unlike the Kalamazoo PAC, the KRWC, the RRAC did not describe community engagement as a main role. Instead, in the Rouge River Watershed, community members look to the leading non-profit watershed organization, Friends of the Rouge, as their primary source for local environmental information and engagement. Members of the RRAC have expressed a desire to improve their own organization's ability to share information about the AOC with the general public through increased communications, as their current interaction with the community is minimal. In the past, the RRAC has utilized their connection to FOTR to share information to their thousands of followers throughout the watershed. Given this, there could be room to fortify this connection by increasing the ability of FOTR to share out AOC-specific information, thereby allowing community members to better understand the positive impact this program has on their quality of life.

Community

Members of the Rouge River community describe themselves as having multiple roles within the watershed, most of which center around the concept of being a strong advocate for their water resources. In focus group conversations, there was a large emphasis on the desire for each and every member of the community "*doing their part,*" as one member said, through individual actions in order to maintain a healthy environment. Ways in which citizens could participate include building rain gardens at their home, participating in local river cleanup events, or even preventing peers from behaving in ways that would negatively impact the environment. In this way, the members of the Rouge community take ownership over their own actions and become successful local stewards for the river. In addition to the strong do-it-yourself attitude is the desire to instill these values in youth through environmental education in schools, which would allow for environmental values to grow into adulthood. Community members stated that

increased education would ideally foster a culture surrounding the river and cultivate social norms in which citizens take responsibility for their own environment. The first step, as one community member says, is education:

"I think every individual has a responsibility to - just not mess things up - you know, even if they're not willing to step things up and do something about recovery - you know, dumping fluids down drains or excess fertilization or you know just taking care of yard waste and all - and not importing bizarre plants and things like that, so when it comes to individual people, I think that's the first step this is just getting them educated enough so that they know not to do certain things."

Through education of all ages, communities work to instill environmental values in everyone as they hope that this will lead to a better, healthier future. But for those in the Rouge, it starts with individual choice - each and every person stepping up to the plate to care for the environment. This feeling of personal stewardship responsibility expressed from members of the Rouge River community makes this area unique compared to community perspectives sampled within the other two AOCs.

When discussing community roles from PAC and state perspectives, actors at both levels addressed in depth the different roles that exist even among groups within the Rouge community. Both RRAC and state-level interviews agreed with community members that a major role they take on is highly active in that they have the "*public will*" to participate in caring for their environment through individual action. Further than this, though, the state and PAC perspectives pointed out that a few other more specific groups within the community have other important roles as well: municipalities have a role in implementing restoration projects in their own cities, local industries have a role in providing funding for large-scale projects as well as providing incentives for employees to conduct volunteer work, and local environmental consulting firms have a role in conducting 'boots on the ground' remediation and restoration. The only desired role of the community discussed at the PAC level was increased participation, specifically through representation of all municipalities at RRAC meetings to advocate for restoration projects in their city. The ability and desire for municipalities to come to PAC meetings differs throughout the Rouge, explored further in subsequent sections, which could negatively impact the overall effectiveness of restoration projects in other areas of the Rouge and further, the ultimate status of BUIs.

Relationships: Connecting the dots in a diverse, populated watershed

By far the most populous of the AOCs studied, the Rouge River Watershed is home to 1.3 million residents, spanning 3 counties and 48 municipalities that comprise it. Not surprisingly, the watershed is home to a large collection of interest groups - whether representing watershed

communities or the river itself. Operating as the official Public Advisory Council for the watershed, the Rouge River Advisory Council (RRAC) serves as a representative body in communication and organization with Michigan's EGLE. As noted in designated watershed roles, the *Alliance of Rouge Communities* (or ARC) cooperates with RRAC in project implementation, designing and seeking permit approval for larger projects, and often hiring outside contractors and consultants for assistance. In membership between both RRAC and ARC - as well as FOTR - there is a degree of crossover, with several of the respective groups' board members participating across multiple organizations. This ensures for dissemination of information among these groups, promoting cooperation in project design and implementation.

In their relations with the greater community of the Rouge, the PAC does not conduct direct community outreach beyond providing updates on their website, which is contained within the ARC website (ARC 2019). Regarding social media outreach, an RRAC member stated, "*I don't do that...The PAC doesn't do that. We don't have a Facebook page. We have a website.*" While RRAC meetings are technically open to the public for attendance, they are not advertised, and as a result there is little, if any, participation from members of the greater community in meetings or their subsequent email updates and publications; this was corroborated by our own PAC meeting observations. When asked to describe relations between RRAC and the broader Rouge community, a PAC member stated they "*don't know that there is a relationship.*" This being said, by far the most widely community-recognized watershed organization is *Friends of the Rouge* (FOTR), which uses a robust, multi-platform outreach strategy to inform, educate, and engage members of the broader community. Offering hands-on cleanup and restoration events as well as educational outings and programs for students and adults alike, FOTR's restorative efforts and outreach are clearly broadcast throughout the community across various contemporary mediums and boots-on-the-ground projects - often working with community volunteers in the process. Due to this, FOTR serves as the widest-reaching voice through the watershed; this role in community outreach, organization, and communication could stand to be mobilized much to the advantage of RRAC and ARC in search of greater community input, participation, or representation. Although RRAC, ARC, and FOTR have complimentary roles within the watershed, dealing with project planning, administration and permitting, and public outreach respectively, these groups could cultivate more efficient, complementary relationships with direct communication and delegation of responsibilities.

Beyond cooperation among watershed groups, PAC members have identified that state presence at meetings was valuable, but based on the infrequency of PAC meetings, this face-to-face contact could only occur three or four times per year. Primarily the relationship between EGLE and RRAC is largely fiduciary - similar to the other two AOCs studied within this project. RRAC is tasked with advising local boundary organizations as well as the state, and overseeing project proposals that are mediated through ARC, which the state will fund - ideally seeking out corporate partners for support within the watershed. Between the state and the greater

community, there is not much interaction, exemplified by a lack of identification of both ARC and RRAC from community respondents. This also reflects sentiment from state representatives that community engagement is not their particular responsibility when it comes to serving the AOC. Within the watershed, it is the RRAC's responsibility to essentially serve as a liaison between the community and the state; in the case of the Rouge AOC in particular, this is a situation in which cultivating a strong working relationship between the PAC and popular community-level organizations (in this case, via the FOTR as a boundary agent) would lead to a higher degree of transparency between the community, and the AOC program and its state representative.

Community Cohesion: Mapping out a multitude of interests and actors

Beyond organizational and state relationships, we further explored: the relationship between these organizations and the broad community of the Rouge watershed; and relationships and cohesion within the watershed community itself. As previously discussed, the Rouge Watershed is incredibly populous, containing nearly 50 different municipalities across three counties. Because of this, the "community" of the watershed is nearly impossible to characterize or represent, as it spans a diverse collection of ethnic and socioeconomic sub-communities across different geographic sections of the watershed. Our site observations, conducted throughout the watershed, portray a variety of values and perceptions of the river, largely based on how these respective communities are exposed to the Rouge's waters - or the extent to which they interact with them. Furthermore, the quality of the infrastructure and the biophysical environment present at a site influenced how people were able to use and interact with the space. We observed that sites with a higher degree of urbanization coincided with decreased water quality at access points; for example, the lower-quality water at Kessey Fieldhouse's river access point alongside the channels of the lower Rouge, compared to the well-kept natural space and water within Linden Park in Birmingham, which is located in the upper reaches of the watershed (*Figure 13*). These varying levels of water quality and water access across sites further influence and form a variety of opinions, perceptions and values of each community's relation to the river. In observations throughout far reaches of the watershed - areas which environment near the water was healthy - there was a substantially larger level of observed community engagement than in heavily urbanized, degraded regions of the watershed, in which we observed far less. These different perceptions of the same water body were also heard in our focus groups when two different people were asked about how people interact with the Rouge River:

"How do people interact with the water and how do they use the Rouge River?"

- *"Recreation?"*
- "*I don't think they do use it. Not where we're from - they don't want to get in there.*"
- *"I think they want to kayak and canoe."*
- *"They ain't gonna wanna kayak and canoe there!"*
- *"I think they are, aren't they?"*

This conversation between individuals living in different areas of the watershed shows that they do not experience or think about the Rouge River in the same way - one sees it as unusable due to poor quality, and others view it as highly desirable. Overall, it was clear that there is not one succinct perception or vision about the Rouge River Watershed, across its varying regions of environmental quality spanning through a diverse collection of local communities. These differing values of the Rouge are further evident in community representation within PAC-level organizations within the watershed: RRAC, FOTR and the ARC. While interviews conducted with members of each group indicated a strong desire for adequate representation of watershed communities in organizational membership:

"There has not been a good effort put forward to include all of the Communities [in the PAC]. It's currently overseen by the Alliance of Rouge Communities and they do not reflect the entire watershed. They only reflect and represent those who are part of ARC and so they're missing huge communities like the city of Detroit, like the city of Dearborn, so they're not actually representing them."

This lack of community-wide representation in support of AOC restoration efforts creates a substantial barrier to communication and engagement on a large scale. This forces watershed groups to cater outreach and messaging to a specific audience within the watershed - an audience that understands the river and prioritizes its welfare. Looking more broadly, the watershed community as a whole would not be receptive to uniform messaging or outreach, as the community is composed of a myriad of socioeconomic backgrounds, knowledge and interests.

Figure 13 — A comparison of the river access located on the Lower Rouge River within the concrete channel at Kessey Fieldhouse near Melvindale (left) and the river access located on the Upper Rouge River in Linden Park near Birmingham (right). The differences between these two access points shape community perceptions in regard to local water resources.

Values: Greater Detroit: a rising champion of environmental activism

Through interviews and focus groups, no matter the person, community, or organization there was an apparent sense of pride for the Rouge River and its place in the community. There is an expressed sense of dignity and identity that the Rouge community has in its legacy of contamination and how it continues to work hard to clean-up the river and the stigma surrounding it. This past year marked the fiftieth anniversary of the Rouge River catching fire in 1969 and considerable, tangible improvement since that day was celebrated by the Friends of the Rouge's, *Rouge Burn Anniversary Celebration*. There is hope and optimism for the future of the Rouge River as community members expressed a desire for the river to continue to become a part of the community itself and embrace its existence:

"...when I think of a healthy river, I think of a place that everyone can go. Whether it's for recreational purposes, whether it's aesthetic purposes, whether it's classes, you want somewhere to go to take a break and enjoy some wildlife… to me, a healthy river is one where you feel like you can do activity"

We found that awareness of environmental issues among community participants was incredibly high, supported by the community's stated value of a healthy environment. Many have been

working on these issues long-term and this has fostered a deep sense of connection to restoring the area they grew up in. This then motivates them to volunteer and advocate for the health of the watershed. We found a similar message in the PAC perspective, though more technical, in commitment to habitat restoration in order to remove BUIs. The value of environmental health was also apparent through our site and event observations, where we frequently talked with concerned members of the public about their experiences and passion for the Rouge River. For example, during our site observations in Rouge Park, a community member approached us and enthusiastically told us the history and some of his experiences there. Other ways that individual community members were able to make a direct positive impact on the health of the river were through events held by FOTR such as Rouge Rescue events, indicator species monitoring, and rain garden construction. As mentioned above, FOTR was identified as an important environmental group in the Rouge River Watershed that people can rally around, trust for information, and interact with to get involved with protection and clean-up of the river. We experienced this directly through our participatory observation of a river clean up event hosted by FOTR located at Dearborn Hills Golf Course - community participants were more than willing to jump into murky waters to clear trash from a log jam (*Figure 14*). For these reasons we have identified FOTR, and other trusted watershed institutions such as the University of Michigan - Dearborn Environmental Interpretive Center and local garden clubs, as inherently valuable organizations to the Rouge community.

Figure 14 — Participatory observation taken at a river cleanup event located at Dearborn Hills Golf Course, which converted trash pulled from the river into a local art installation.

In looking towards the future, important ecological values to the Rouge community will be realized as *R2R2R* restores river-based, ecosystem goods and services. Our data suggest that interaction is currently limited on the river itself due to degradation and lack of access among other factors, but there is a push towards bringing back recreation and businesses to the river. The community identified playing on the banks of the river, fishing in the river, kayaking and canoeing, hiking, appreciating nature, walking their dog, and relaxing as potential uses of the Rouge River. The RRAC and state desire people to connect to wildlife, fish, canoe, and recreate in general on the Rouge River, because they believe recreating will help people see progress toward restoring the river's health and ultimately derive value from these restored ecosystem services. In turn, this will help end the persisting community stigma of the river as a highly dirty place that no one would want to recreate in:

> *"When I was a kid in the 60's, sometimes we couldn't even go outside because the stink from the river was so bad. I mean, in the summertime, that smell would come up the hill and right into our house, and it just was awful. And we were told - it probably was an exaggeration - we were told we couldn't wade or even touch the water because it was so full of toxins."*

Currently, FOTR is helping to create the Lower Rouge River Water Trail that allows personal watercraft access. However, the majority of the natural sites we visited in the Rouge River watershed had few or no people present. Oftentimes the Rouge River was inaccessible or hidden from view by overgrowth. However, we do note that many of the nature preserves we visited did not have public parking available, which may impede access. When we did see many people present, they were typically at large parks in the upper parts of the watershed doing other activities such as playing, relaxing, and picnicking but not interacting directly with the Rouge River.

Playing off the theme of increasing place-based value is the importance of youth education related to the Rouge River. More than the other AOCs of study, interview and focus group participants particularly emphasized connecting and educating young people about the river and environmentalism in general. The community cited working with Eagle Scouts on projects that engaged them with the environment, and highlighted a middle school science teacher conducting water quality tests with students as examples of how to connect young people to nature. This was corroborated firsthand by signage publicizing Eagle Scout bat boxes built at the Stage Nature Center in Troy (*Figure 15*). Community members also expressed desire for there to be environmental education mandated and funded in state curricula. One additional advantage of this broad, statewide youth education would be that the students could share this information with their parents. This might help spread knowledge and information to underrepresented communities that have other priorities other than watershed health. Summed up by an AOC PAC member, "*I think that RRAC has kind of a unique message and could do better to actually try to get that information out there.*" This desire for increased messaging and education in regard to

the AOC could be fulfilled by a concerted effort in broadcasting relevant AOC-specific stories and real-world examples of watershed engagement.

Figure 15 — Site marker depicting the location of a nearby bat box built by local Eagle Scouts at Stage Nature Center in the city of Troy.

Barriers: Compounding issues in a densely-populated watershed

The many moving parts in the Rouge River AOC experience friction that impede progress towards BUI removal and delisting. Although the types of barriers found in the Rouge are similar to those of the other AOCs studied; the causes, interrelationships, and outcomes are exaggerated because so many different factors and actors are involved. All of these must be considered within and outside of the system to make sense of, and begin addressing, these barriers to progress in the Rouge River AOC. Many of the barriers discussed here also appear in other sections, but we felt certain aspects of these themes needed to be included here to highlight their current inhibitions and potential for future action.

Our study indicated that the current structure of the AOC program at the state level can be constraining. This may be due to the fact that the state is typically acting as the enforcing body, primarily carrying out what laws and regulations prescribe, or that there is potentially a lack of resources and human capital in the AOC program to perform these prescribed duties to the extent that watershed groups and even state officials desire. The fact that the current state AOC field coordinator for the Rouge River has responsibility for four AOCs in total was cited as a reason face-to-face interaction was limited because they were stretched thin. Regardless of the reason, our interview, focus group, and meeting data suggested that there is a need for more communication, participation, and coordination throughout the Rouge AOC.

As it pertains to inter-agency dynamics, state representatives indicated that there can be a lack of coordination within EGLE. PAC and state-level respondents both identified CSOs as affecting BUIs in the Rouge River AOC, and both perceive that the departments of EGLE which manage the AOC program and manage CSOs are not in great communication:

"...but I think it would be better to have better communication with all the other divisions within EGLE and DNR - but the DNR, we used to have someone from the DNR in on our meetings… They don't do that anymore.... So, it would be nice if there was more - someone from water came in and talked about what's going on with the CSOs"

This led to feelings within the Rouge of being at the mercy of CSOs needing to be fixed before certain BUIs could be addressed, leaving the BUI work in limbo. A lack of coordination between inter-agency groups was also attributed to the channel collapse of the Henry Ford Dam Fish Pass when it was opened too soon. Water resource issues do not exist within the confines of specific department boundaries, it seems that these bureaucratic silos – or only working within the confines of a specific department – has been a challenge to progress within the Rouge River AOC.

We found a similar desire for more clarity in organization and communication at levels above or outside of EGLE. PAC members identified frustration with the constant shuffling of administration and changing of departments at the state level (i.e. the former Michigan Office of the Great Lakes), who oversaw the AOC program got absorbed into EGLE with the change of governor in 2019. PAC members thought that these bureaucratic changes stifled progress, and in particular, caused issues with procuring funding. At the time of our research, the delay in the PAC support grant caused the RRAC to not meet for several months and FOTR to forgo their 2019 fish survey. Currently it appears that the PAC support grant is used by ARC to largely cover the costs to run meetings and maintain basic functions for the RRAC, so any delay in the PAC support grant would effectively disable their potential to meet. We also note that the federal government shutdowns in early 2019 were also believed to have contributed to delays in funding, including the PAC support grant. In the past, it seems federal funding was crucial for increasing participation on the RRAC, as PAC members expressed that funding through *Rouge River National Wet Weather Demonstration Project* allowed government money to be used for eliciting participation in their meetings.

Sometimes, program inaction is not necessarily due to the partitioning of government departments, but to the values of the government as a whole. As perceived by community and PAC-level respondents, the response of the government to environmental problems in the Rouge River is too often reactionary, meaning that action is only taken after the fact or when it is mandated. PAC and community-level respondents wished for more proactive and systemic

leadership from the state level because they believe that only dealing with immediate problems and not addressing the underlying causes only allows large-scale problems within the Rouge River watershed to fester and become more long-term.

At the community level, ARC is a community organization for the watershed, but they only represent 35 of the 48 watershed municipalities. Community focus group participants expressed a desire for involvement from all municipalities in the watershed, and PAC members stated that if city representatives are not at RRAC meetings, then they are less likely to get projects done in their areas. This incomplete coverage of municipalities also results in each community prioritizing environmental health differently. For example, some PAC members expressed frustration at the extensive development happening in urbanized regions of the Rouge Watershed. To them, it seems that some municipalities are prioritizing economic development over environmental health. They feel this hinders their progress towards AOC improvement, because increasing development presents issues with increased runoff, flooding events, and sediment contamination throughout the river system.

Finally, there are barriers to involvement and participation of community members in the Rouge River AOC. These include a sense of disconnect from the Rouge River, inadequate information from watershed groups, and potential environmental justice issues that exclude certain demographics from having a seat at the AOC decision-making table. This was expressed by community members who still live with the stigma of the Rouge, and the Rouge River rarely being a focal point in most sites we visited. Communities like Dearborn and Detroit do not participate in ARC or RRAC, yet have some of the most significant environmental impacts within the Rouge River Watershed which continue to disproportionately affect these communities. They both have large populations and are important players in the Rouge Watershed that are underrepresented in both ARC and RRAC. External factors are key in this underrepresentation, not a reflection of ARC's lack of effort to include these communities.

"...we've actually done better getting more people involved, and getting more communities involved with the RRAC in the past five years...Farmington Hills is at the table now, Livonia is at the table now - some of those bigger communities… Oakland County wasn't part of the RRAC before a year ago, so they've done some pretty good jobs, and I think the ARC kind of facilitates that."

It is a concern that if Detroit and Dearborn do not participate in the Rouge River AOC process, then it might lead to these areas, which are already highly impacted in terms of contamination, remaining degraded instead of being prioritized and protected.

Communication & Engagement: Organizing outreach among watershed organizations

Each river-focused group within the Rouge River AOC has a unique message and a particular audience. However, we observe that many of those interviewed at the PAC and state levels wished their message to be broadcast even further. Statements from those at the community level support this perception that AOC information from the state and PAC is not reaching them. None of the general community members interviewed were aware of the RRAC's contribution to the health and future of the Rouge River, nor its existence. At the time of our research, the PAC did not have an effective vehicle of communication to reach the community, but they believe the full community is indeed an important audience.

While state and PAC-level interviews suggested that the RRAC does not currently prioritize community engagement among core organizational functions, the RRAC does use Facebook, events, meetings, newsletters, and their website to communicate. State officials specified that they want to better communicate with the general public, especially on issues that they are responsible for, such as CSOs or other large projects. They want the community to obtain factual and credible news from the state. EGLE representatives expressed aspirations for more frequent and positive press coverage of the Rouge River; they mentioned specifically pulling cars and shopping carts from the channelized section of the Rouge River near Ford Motor Company facility as an example of a good story that was not covered. EGLE uses primarily website updates and Twitter to communicate progress on issues in the Rouge River AOC. Both the PAC and ARC were cited as lacking in their communication about AOC projects. It appears that Rouge community members turn to organizations like FOTR for information on projects happening in their communities, and FOTR does not always have updates on AOC projects and activities.

"So, people see FOTR as that trusted outlet for knowledge and information, right? They come to us with questions and if [ARC and RRAC] are not including us in the information on your project, we can't deliver quality information."

Within both RRAC and ARC interviews, participants have noted that their community outreach methods are neither regular in occurrence, nor contemporary in medium; and also have questioned whether these methods of outreach would be best done through their organizations. This is contrasted with FOTR, which was noted as an organization that has an extremely well-established engagement and communication strategy, and the most widespread community following relative to other watershed environmental groups. Because of their ability to connect to the community, Friends of the Rouge would serve as an effective conduit for both RRAC and ARC to distribute news and updates across a much larger audience in the watershed. FOTR is viewed as the watershed's environmental rallying point partly because they possess by far the largest online audience; for example, FOTR boasts an audience of over 13,000 on Facebook, 140

on Instagram and 450 on Twitter - an immense social presence, compared to RRAC, which possesses no online presence besides that of their own website, which is jointly shared with the ARC. Furthermore, watershed group interviewees stated data suggests that RRAC had successfully partnered with FOTR to distribute information in the past. We observed how FOTR engages with the local community through the events they held; four of the five events we attended in the watershed were led by FOTR, had at least a dozen community participants, and reached stakeholders ranging from Plymouth Garden Club members to Ford Motor Company employees. FOTR has their finger on the pulse of the local community and they know how to reach the broadest sample of the watershed's population, utilizing popular contemporary means of communication, prioritizing work in social media and digital outreach in addition to traditional methods and published reports.

Finally, we would like to note the modes of engagement of the public and where they overlap and diverge from those used by PAC and state level interests. One mode of engagement that was mentioned exclusively by community members was music festivals held near the river. One example given was the *Detroit Out Loud* festival sponsored by Quicken Loans held at Rouge Park. Community members mentioned getting their information from local news such as the Detroit Free Press and local NPR stations like Michigan Radio. State representatives also identified these as common sources of news for community members, but social media was also listed as an important place in which members of the Rouge community find their news and information. So, those organizations that do use social media to communicate would already be in the sphere of influence for many of those they would like to reach. RRAC, the designated liaison between the community and state, does not currently use social media, reducing their capacity for community engagement.

Beneficial Uses and Impairments: Bridging the gap between practical and technical perception

Similar to the other two AOC communities studied, the Rouge River Watershed's community perception of Beneficial Use Impairments are largely grounded in real-world, physical observations and attributes of the river and its surroundings, rather than prescriptive, technical benchmarks established by the state program. Across PAC and community member respondents, the most common beneficial uses identified in respect to the Rouge River dealt solely with recreation: fishing, canoeing/kayaking and wildlife observation. These uses were identified in interviews separately by both PAC and community members. Observation data, however, paints a different picture of the community perspective. Common activities reported at the greatest number of sites included walking/hiking, eating/picnicking, and observing nature. While observing nature is a common use between observations and interviews, the remaining two top observed uses - walking/hiking and eating/picnicking - were different than those expressed in focus groups. While these were the most widespread observed activities across sites in the Rouge, it is important to note that canoeing/kayaking and community-based restoration efforts

were still observed in our site observations. It is also important to note that sites that had the most visitors were those with multiple activities as well as some aspect of the built environment, usually a park in some form. An example of this was our site observation taken at Heritage Park in the city of Farmington Hills - this was one of the most populated sites and had a variety of available activities including hiking, playing, picnicking and observing wildlife - we even noted water quality testing as evidenced by benthos ID sheets and other sampling equipment near the river access point (*Figure 16*). This represents the variety of activities that community members are interested in throughout the watershed, and demonstrates the importance of multiple-use spaces. It is impairments to these beneficial uses identified by the community that were primarily listed as beneficial use impairments - tied to AOC specific BUIs, these represent *Loss of Fish and Wildlife Populations*, *Degradation of Aesthetics* or *Restrictions of Fish and Wildlife Consumption* - that the community best understands.

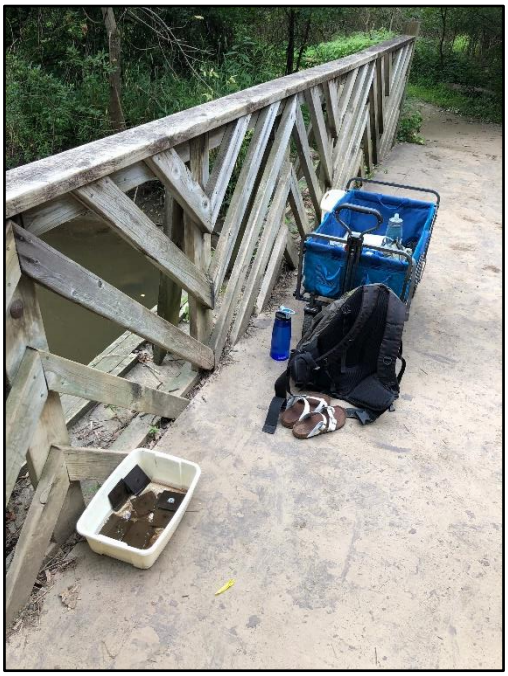


Figure 16 — Benthic invertebrate and water quality sampling equipment near the Rouge River's edge in Heritage Park located in Farmington Hills, demonstrating the variety of beneficial uses in this area.

While community perceptions place beneficial use impairments in a real-world context, PAC and EGLE representatives perceive BUIs in a more technical, scientific manner - addressing environmental impairments to the watershed and river system which often occur beneath the water's surface. PAC and state interests noted the causes of the AOC's underlying impairments; combined-sewer overflows, loss of native habitat and persistent flooding, in addition to legacy pollution and contaminated sediment of the lower reaches of the river which contribute to BUIs such as *Degradation of Benthos*, *Restriction of Dredging Activities*, or *Loss of Fish and Wildlife Habitat*, among others. While these do not represent obvious signs of degradation clearly visible

to the watershed's broader community, these BUIs represent larger, costlier problems within the river, and are immensely complex in nature.

In identifying causation of BUIs throughout the watershed, each level of AOC involvement identified regular and excessive flooding as a source of watershed degradation. It is well documented that the Rouge Watershed suffers from a high degree of flooding, due not only to the sheer amount of impervious surfaces throughout the watershed, but also the amount of development seen within regions of sediment in close proximity to the river. Community members interviewed specified this in particular as a large issue in the health of the watershed:

"If you had stronger laws about: do not build on a floodplain, and define what a floodplain is, that would help and if that would help - you know, that's exactly what you're talking about there, but it's something that from where I grew up, I understand that real well."

Future Visions: A watershed in pursuit of recreational utility

In surveying different tiers of AOC involvement - state-level, PAC-level, and community-level – we found unique perspectives and definitions of what ultimately determine a healthy watershed. While state and PAC-level perspectives yielded similar visions of AOC success, largely dealing with more technical, BUI-related elements of success, they shared a common ideal goal with the greater community: restored use for recreation within the watershed. While the community does not possess the degree of technical expertise involving AOC program terminology, or its multitude of biological and chemical issues, they do possess an understanding of these issues from a real-world, end-user's perspective, thus, the community believes being able to physically see and use a healthy watershed is paramount to the watershed's ideal future. Connecting these physical observations or indicators of a healthy watershed to the technical BUIs they represent, all tiers of AOC involvement appear to be on the same page in their vision of the Rouge River watershed's future.

PAC respondents further specified a higher degree of outreach and environmental education in visions for the area's future. Through increased firsthand engagement with the Rouge, PAC-level interests would see growth in knowledge of the water resource and stewardship behavior as a result, further promoting a cycle of positive environmental behavior and upkeep in the watershed, while improving local economies through increases in recreational utility.

Across all three groups surveyed, perspectives on the future had a more realistic tone. Community-level interests' long-standing perspectives on the impaired health of the river indicated a perceived long road to recovery, although the majority of respondents did indicate a belief that the watershed was on a positive trajectory. To an extent, this same sentiment was mirrored by PAC respondents, which similarly acknowledged that the path to AOC recovery would ultimately be a long one; as one PAC member told us, "*it ain't going to be in my lifetime*

the AOC is going to be delisted." State AOC representatives also acknowledged that the watershed has a difficult road ahead - citing long-standing legacy contamination as well as navigation through various agency and government interests as substantial obstacles on the road to recovery. Overall, in one way or another, each group surveyed did remark that there has been tangible progress in the watershed's restoration, despite the longevity of overall efforts toward complete delisting and watershed revitalization.

Rouge River AOC Site-specific Recommendations to EGLE

Recommendation: Encourage and assist with communication of AOC actions and successes to the Rouge River community

Currently, communications on AOC-specific work, highlighting successes and progress within the program, in the Rouge River Watershed is minimal. Given that Friends of the Rouge has such a broad community network, information about the AOC program could be shared most effectively through FOTR platforms. The state should work with the three operative groups at the PAC level - ARC, RRAC, and FOTR - in order to clearly establish and define an AOC program communication plan.

Recommendation: Help expand RRAC's outreach to the Rouge community through commonly used channels of media, and build partnerships with well-known watershed groups in reaching a broad watershed audience.

Friends of the Rouge exists as the most popular environmental organization exclusively focused on the Rouge River. Helping to establish a working relationship and practicing regular communications with this organization would help RRAC inform a substantially larger watershed population of their existence and efforts, but also working directly with FOTR will form a complementary relationship.

Recommendation: Assist RRAC in cooperating with other well-known boundary organizations to help community members engage with the AOC program through further development of hands-on stewardship events and environmental education

River cleanup events are valued modes of engagement and promote community cohesion within the Rouge AOC. An additional value expressed was in environmental education and partnering in outreach with trusted local organizations as avenues to educate a diverse audience about the AOC program. Combining stewardship and education values in the Rouge, EGLE could assist RRAC and other boundary organizations to help community members engage with the AOC program through active environmental stewardship and communication.

Recommendation: Enable underrepresented communities to have a voice in RRAC and the AOC process

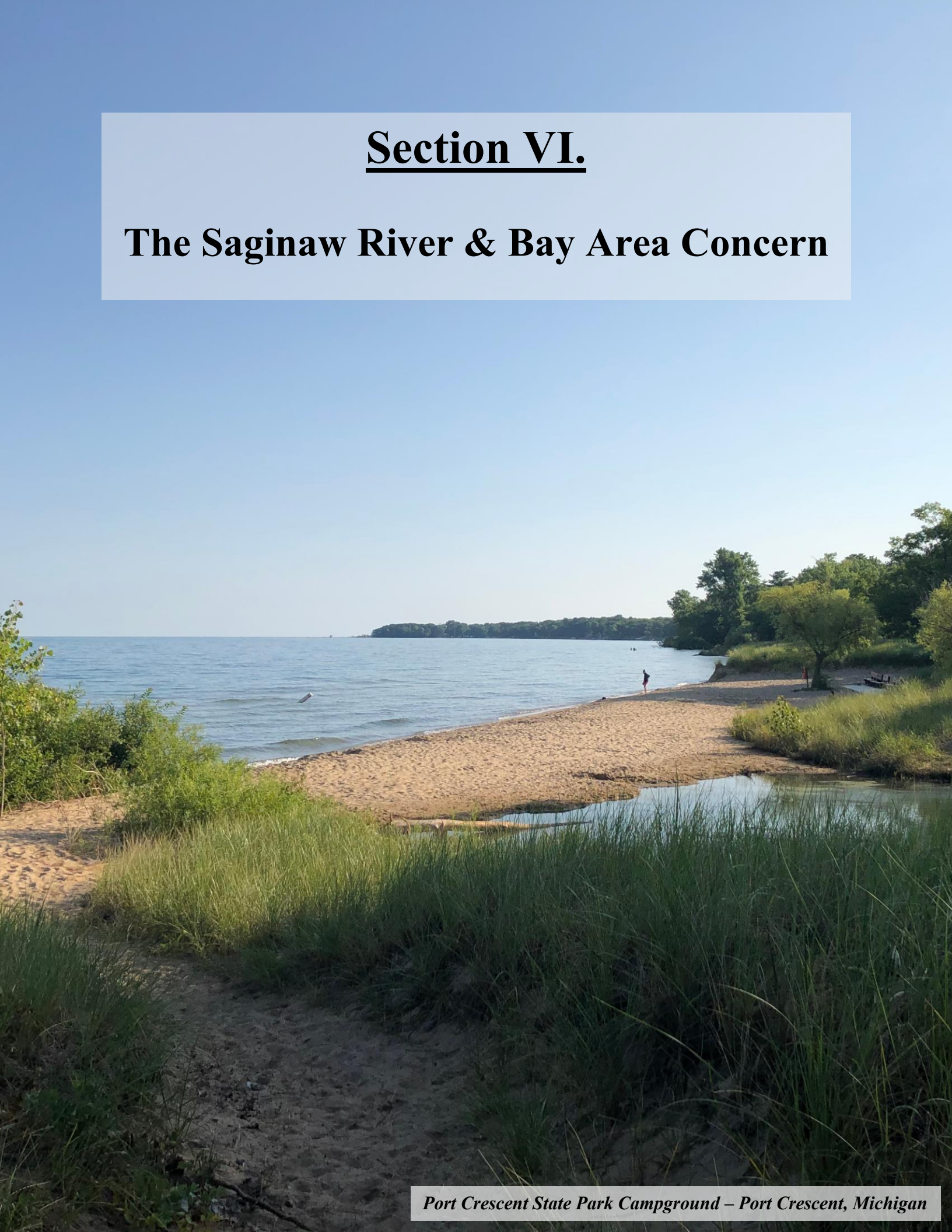
A collection of municipalities and communities within the Rouge River Watershed are not currently involved in either RRAC or ARC. EGLE could work with watershed groups to identify municipalities that are not members, and reach out in effort to forge relationships with these groups - or identify why they are not involved, and take steps to address these impediments to their participation. Lack of adequate watershed representation was highlighted by the RRAC as being in need of improvement - forging connection and seeking representation from as many Rouge communities as possible would ensure the highest degree of representation in RRAC.

Recommendation: Increase coordination among different departments in EGLE in order to address large-scale issues outside of the purview of the AOC program, which impede AOC progress

High degrees of urban development in the Rouge River watershed, coupled with a history of financial troubles in the Detroit Metro Area have exacerbated impairments surrounding CSOs. Increasing inter-agency communication efforts at the state level pertaining to CSO problems will ensure all parties within the AOC program are on the same page in regard to this issue. By increasing inter-agency communication and providing RRAC with relevant updates involving CSO management and other impairments under EGLE's purview, RRAC will gain a sense of agency and inclusion in state efforts outside the scope of the AOC program.

Section VI.

The Saginaw River & Bay Area Concern



Port Crescent State Park Campground – Port Crescent, Michigan

The Saginaw River and Bay Area of Concern

Geography

The Saginaw Bay Watershed drains an 8,700 square-mile basin, forming approximately 7,000 miles of rivers and streams before emptying out into Saginaw Bay on Lake Huron. This watershed houses America's largest contiguous freshwater coastal wetland system (*Figure 17*). The largest of Michigan's 86 major watersheds, the Saginaw Bay Watershed contains over 175 inland lakes and is home to over one million people. Residents live in cities, suburbs and rural communities across the 22 counties (Partnership for the Saginaw Bay Watershed 2020). The Saginaw River and Bay AOC spans the entire 22 miles of the Saginaw River, as well as the entirety of Saginaw Bay with a boundary drawn between Au Sable Point and Pointe Aux Barques (*Figure 18*) (USEPA 2018b). This Area of Concern marks the confluence of six major inland rivers - the Shiawassee, Tittabawassee, Cass, Flint, Pine and the Chippewa - each of key importance to their own respective communities and local ecosystems, which ultimately feed into the Saginaw River. Two major cities lie along the Saginaw River, within the AOC: Saginaw and Bay City.

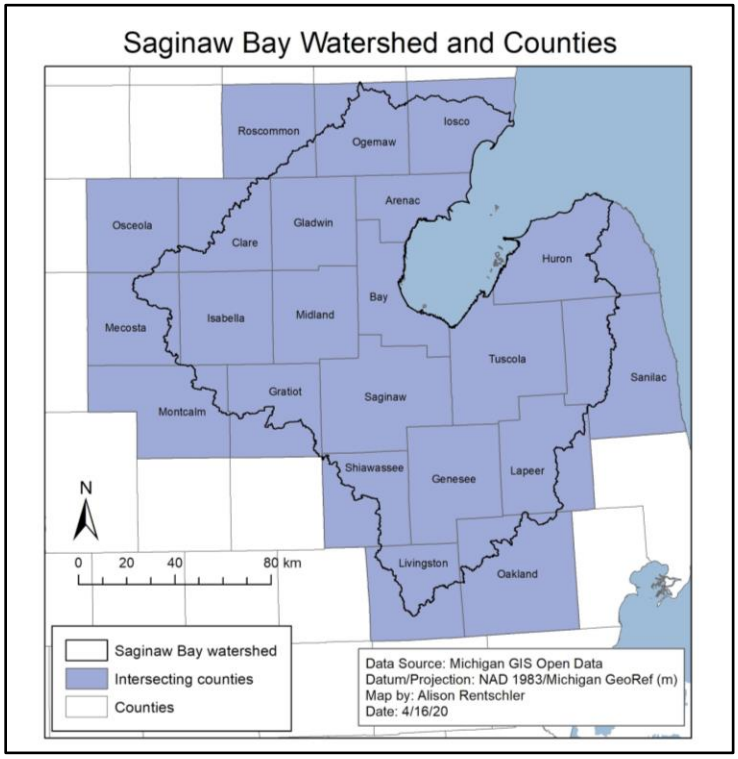


Figure 17 — As the largest major watershed in Michigan, the Saginaw Bay Watershed spans 22 counties and is home to over one million residents.

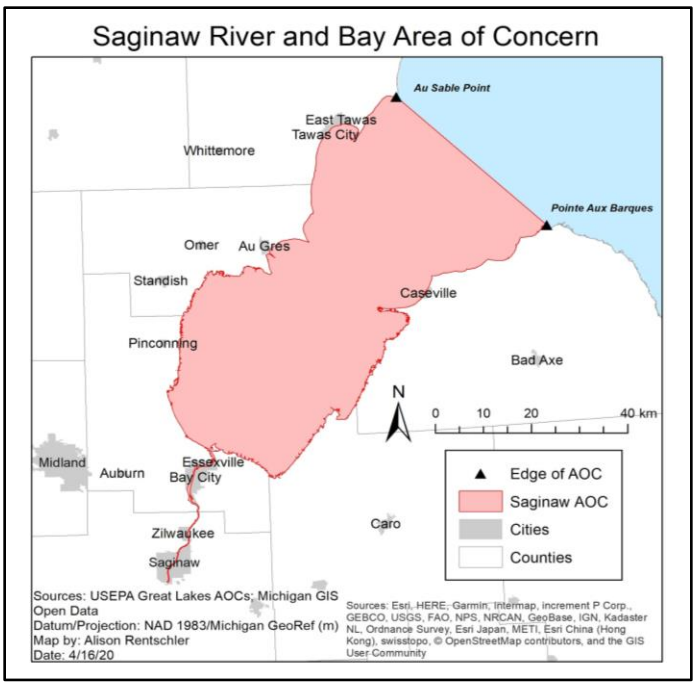


Figure 18 — The boundary of the Saginaw River and Bay AOC encompass the entire Saginaw Bay in Lake Huron and the last 22 miles of the Saginaw River along its former industrial corridor.

History of Environmental Degradation

A prominent example of glacial influence on Michigan's landscape, the Saginaw River and Bay were formed during the retreat of massive glaciers 11,000 years ago - a slow process which ultimately gave Michigan its iconic "mitten" shape roughly 3,000 years ago. First home to a diverse range of terrestrial and aquatic life, humans later followed and settled, hunting native elk, caribou, and even mammoth. These native tribes were joined centuries later by European settlers, drawn to the region by vast natural resources. Logging the region's extensive old-growth forests, settlers used the river as an outlet to transport lumber throughout the Great Lakes; shipping vast quantities of what would ultimately craft the port settlement of Chicago. As the lumber industry boomed in the region, so did the population, and by the early 20th century, an international boom in the automotive industry fueled the growth of many larger cities throughout the watershed, such as Saginaw, Bay City, and Zilwaukee.

Founded in 1897 in Midland, the Dow Chemical Company flourished, utilizing large brine deposits found within the region for chlorides, magnesium, and calcium used in bleach production, in addition to other inorganic compounds initially processed by the company. Throughout the 20th century, Dow grew with the rise of organic chemistry in plastic and polymer production, marketing calcium chloride, magnesium metal, acetylsalicylic acid, and ultimately petrochemicals. This legacy of heavy industry along the Saginaw River and its tributaries has left

behind tens-of-thousands of cubic yards of sediment contaminated with elevated levels of dioxins and PCBs. Currently, these contaminated sediments contribute to fish, wildlife, and benthic related BUIs within the Saginaw River and Bay AOC.

In addition to industrial pollution, the Saginaw Bay Watershed is home to a substantial farming industry; watershed land use is approximately 45% agricultural land (The Nature Conservancy 2018). While commodity crops such as soybean and corn have led to a substantial commercial farming in the area, application of inexpensive synthetic fertilizer has led to high nutrient runoff and river input, which are eventually carried out to the Saginaw Bay, causing summer algae blooms. Biological pollutants also impair the river system, primarily *E. coli*, from CSOs, agricultural runoff, and failing septic tanks, which directly affect water quality in the river proper and at numerous beaches on the Saginaw Bay.

AOC Program Involvement

The Saginaw River and Bay were established as an Area of Concern following the International Joint Commission's development of the program in 1987. Citing legacy contamination from lumber dyeing practices as well as widespread industrial waste discharge throughout the watershed, the Saginaw River and Bay was, and still remains an AOC of particularly complex and substantial degradation.

With federal intervention in a multitude of Superfund-designated projects addressing industrial sites throughout the watershed - in Midland, St. Louis, and Bay City, among others - the USEPA is undertaking a series of multimillion-dollar dredging and sediment removal projects. Although these large federal projects are vastly expensive and require long timelines for completion, local organizations work in conjunction towards R2R2R on a much smaller scale within the watershed. These localized efforts, championed by community-level watershed groups, focus on river and beach cleanups, as well as informing the public about agricultural practices to better address eutrophication throughout the basin.

Community-based watershed conservation groups like *The Saginaw Bay Watershed Initiative Network (WIN)*, *Little Forks Conservancy,* and the *Saginaw Basin Land Conservancy* have worked throughout the Saginaw Basin for decades and are supported by an array of institutions and interests in the region. Each of these community groups have been successful in their own right, organizing volunteer restoration projects and providing environmental education and engagement efforts to the greater watershed community. Beyond these community-centric groups, the *Partnership for the Saginaw Bay Watershed* exists as the respective PAC for the region, operating as a liaison between the Saginaw AOC community and Michigan's EGLE.

Current BUI Status

Both substantial geographically and in the sources of BUIs, the Saginaw River and Bay AOC has 12 out of the 14 possible BUIs, three of which have been removed (USEPA 2018b). Many of the designated BUIs are due to the legacy of industrial sediment contamination within the Saginaw River itself, but those such as *Eutrophication or Undesirable Algae* and *Beach Closings* are due to nutrient loading from watershed runoff.

Table 3 — Existing and Removed Saginaw AOC Beneficial Use Impairments

BUI	**Removals**
Restrictions on Fish and Wildlife Consumption	
Degradation of Fish and Wildlife Populations	
Eutrophication or Undesired Algae	
Beach Closings	
Restrictions on Drinking Water Consumption, or Taste and Odor	Removed 2008
Degradation of Aesthetics	
Tainting of Fish and Wildlife Flavor	Removed 2008
Bird or Animal Deformities or Reproduction Problems	
Degradation of Benthos	
Degradation of Phytoplankton and Zooplankton Populations	
Restriction on Dredging Activities	
Loss of Fish and Wildlife Habitat	Removed 2014

Federal Watershed Involvement

Partially overlapping with the AOC boundary, the Tittabawassee River, Saginaw River and Bay Superfund site has been found to likely hold the highest concentration of dioxin recorded in the Great Lakes' Region (USEPA 2007). This dioxin-contaminated sediment originated primarily from the largest corporation within the boundary of the Saginaw Bay Watershed, Dow Chemical.

Held accountable for decades of toxic runoff and sediment pollution reaching as far as the Saginaw River, Dow has been working to comply with a 2007 USEPA agreement to dredge and remediate dioxin-contaminated sediment in various points along the Tittabawassee. Remedial action has been taken to restore the Tittabawassee River since 2012, and is ongoing under USEPA supervision, with work scheduled to continue through at least 2021.

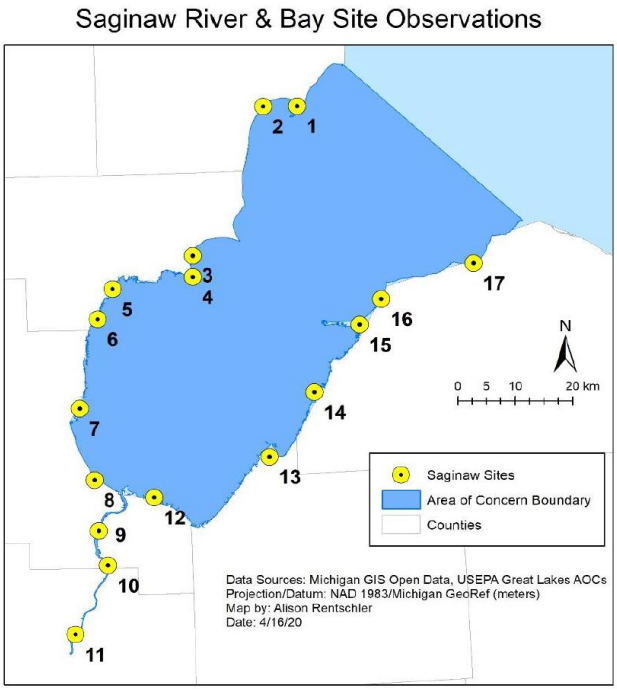
Another Superfund partnership at play within the Saginaw Bay Watershed stretches farther upriver to St. Louis, Michigan, with the Velsicol Chemical Company's influence on the Pine River. Beginning in 1998, DDT-contaminated sediment was dredged from the Pine over 8 years, costing over $100 million for the removal of 750,000 tons of sediment. Beyond sediment in the river, large chemical waste deposits were found beneath the site of the demolished chemical plant; this removal project is slated to cost $350 million and is projected for completion in 2026.

As these large projects throughout the watershed deal with extensive quantities of legacy contaminants in river sediment and nearby soil, the timelines for completion in the majority of Superfund projects in the Saginaw Watershed are lengthy and difficult to determine. These projects certainly affect the region's status as an AOC, contributing to a substantial portion of the Saginaw River and Bay's listed BUIs.

Investigation of the Saginaw River & Bay Community

For the Saginaw River and Bay AOC, we gathered 17 site observations, two meeting observations and two event observations. We used Google Maps to locate areas where citizens can interact with their water resources close to or within the AOC boundary. We chose a variety of sites along the Saginaw River and Bay ensuring a diversity of access types (*Figure 19*). These included wildlife preserves, boat launches, state parks, city parks, county parks, and beaches. Meeting observations were taken at two monthly PSBW board meetings. Event observations were made during an Invasive Species Hike at Averill Preserve near Midland, and at the annual Friends of the Shiawassee River Cleanup in McCurdy Park, Corunna.

Four PAC members, one boundary organization member, and one state AOC program staff member were interviewed. We conducted one focus group and one group interview of community members to gain an understanding of the community's perspective in relation to the AOC program. Community interviews and focus groups took place at local libraries in Saginaw and Bay City. In order to recruit interview participants, we sent email invitations to watershed groups and community groups throughout the Saginaw Bay area; shared Facebook events; and canvassed local parks and other public spaces.



ID	Sites
1	Tawas Point State Park
2	Shoreline Park
3	Point Lookout Harbor
4	Arenac County Park
5	Pine River Boating Access
6	Whites Beach
7	Nayanquing Point State Wildlife Area
8	Bay City State Park
9	Bigelow Park
10	Veterans Park Boat Launch
11	Rust Park
12	Quanicassee State Wildlife Area
13	Fish Point Wildlife Refuge
14	Sumac Island Boat Launch
15	Sand Point Nature Preserve
16	Caseville County Park
17	Port Crescent State Park

Figure 19 — Site map depicting the locations of the 17 site observations we took throughout the Saginaw River and Bay AOC.

List of Key Players in the Saginaw River & Bay Area of Concern

All partners mentioned during field surveys:

University groups: MSU; CMU; Saginaw Valley State University (SVSU); Delta College; Michigan Tech Research Institute; MSU Extension; University of Michigan - Flint

Funding Organizations: The Herbert H. and Grace A. Dow Foundation; The Cook Family Foundation; Land & Water Conservation Fund

Native American tribes: Saginaw Chippewa Indian Tribe of Michigan

Local businesses: Soaring Eagle Casino and Resort; Caseville Chamber of Commerce; J & S Tire; Hankerd Sportswear; VMD & Associates; Matador's Pizza; Foster Coffee Co.; Mancino's; Cheff's Canoe Rental;

Local groups: Saginaw Basin Land Conservancy (SBLC); Saginaw Bay Watershed Initiative Network (WIN); Bay Area Community Foundation; Saginaw Bay Coastal Initiative; Little Forks Conservancy; Saginaw Bay Resource, Conservation and Development (RC&D); Huron Pines; Friends of the Shiawassee River; Bay City Rowing Club; Bay City Yacht Club; Bay-Arenac Community High School; Bay Arts Council; Cass River Greenway Committee; Michigan Alliance for Environmental and Outdoor Education; Trout Unlimited; Chippewa County Land Conservancy; Chippewa Nature Center; 4-H Youth Programs - Bay County; Saginaw Bay Shoreline CISMA; Central Michigan CISMA; Ducks Unlimited; Huron County Community Foundation; The Lone Tree Council; Bay City Lions Club; Huron County Community

Foundation; Fish Point Wildlife Association; Reese Public Schools; Unionville-Sebewaing Area Schools; Michigan Audubon; Au Sable Valley Audubon; Michigan Duck Hunters Association; Tawas Kiwanis Club; BoatUS Foundation; Midland Area Community Foundation; Boy Scouts of America
Consulting firms: Public Sector Consultants; KS Associates, Inc.; Foth
Large Corporations: Dow Chemical Company; Boyce Hydro Power LLC; ITC; General Motors; Oster; Waste Management, Inc.
Municipalities and County Government: Saginaw Conservation District; City of Bay City; City of Saginaw; City of Midland; City of Au Gres; City of Pinconning; City of Caseville; City of Tawas; Village of Sebewaing; Charter Township of Hampton; Bay County; Arenac County; Tuscola County; Iosco County; Huron County; East Michigan Council of Governments (EMCOG); Central Michigan District Health Department; Bay County Health Department; Huron County Health Department; Shiawassee County Health Department; Michigan Economic Development Corporation; Midland County Parks and Recreation; Tuscola Planning Commission; Bay Area Stormwater Authority
State and Federal government agencies and actors: U.S. Fish and Wildlife Service (USFWS); MDNR; EGLE; Partnership for the Saginaw Bay Watershed (PSBW); United States Army Corp of Engineers (USACE); Michigan Department of Community Health; Michigan Sea Grant; National Oceanic and Atmospheric Administration (NOAA); National Fish and Wildlife Foundation (NFWF); GLC

Emerging Themes in the Saginaw River & Bay AOC

Roles: Substantial pockets of stewardship

State
In the Saginaw River and Bay AOC, representatives from EGLE see their role similarly as they do in the other two AOCs studied - their primary objectives consist of liaising between the PAC and the Federal government, negotiating work plans with the PAC, creating statewide BUI removal criteria, and generally assisting PACs with securing resources. This is similar to how members of the PSBW described roles of the state, listing tasks such as providing funding and leadership, giving guidance, and passing information from the state or EPA level. However, it seems in this AOC in particular, the main role of the state from the PAC's perspective is to provide funding; one PAC member said that this is truly the state's primary role in working with the PSBW. Although some PAC members also expressed frustration with the limited and inflexible activities and projects that the state supplied PAC support grant will fund. For example, the PAC grant is unable to fund watershed-wide plans that lie outside of the AOC-designated boundary, which some members believe to be the only way to affect large-scale change in the Saginaw Basin. Though there is frustration, PAC members universally expressed the importance of the state AOC coordinator position, and wished there were more opportunities

for in-person interactions. One member even suggested the possibility of having an additional state representative who visits multiple watershed groups in the region to maintain general cohesion between these groups. The state interviewee identified an additional role that could be created - one that is concerned with facilitation of more diverse and strategic community representation on the PAC.

The community's perspective of the state's role was slightly more negative in comparison to PAC perspectives. Negative comments were mostly referencing frustration directed towards the state regulatory bodies as a whole, in that they tend to only intervene when it is mandated or absolutely necessary - or even when they do solve the problem, it involves implementing the bare minimum. Sentiments such as this likely stem from decades of feeling forgotten or neglected as a result of their river and bay being historically thought of as "*the most convenient place to put your sewage*," as one community member described. Despite a handful of negative comments, one community member who had experience working with EGLE on watershed issues noted that the state government has the ability to bring groups together through leadership and coordination throughout the watershed. This parallels the idea proposed in the above paragraph: the desire for the state entity to step-in to unify the multiple groups working on environmental issues and outreach in the area. In terms of potential desired roles that community members had of the state, these included hopes for greater state involvement in events surrounding the river, and maintaining their current role of enforcing environmental laws to keep the general public safe.

While EGLE serves as the state department coordinating AOC program work around the state, it is also important to note the role of MDNR in this region. As observed in our site data, MDNR has a role in providing access to water resources and protecting valuable ecosystems on the Saginaw Bay. MDNR owns and maintains a substantial number of properties on Saginaw Bay, and most of these sites allow for public access - of the 14 sites we visited on the bay, 9 of these sites were operated by the MDNR (Port Crescent State Park, Bay City State Park, Fish Point Wildlife Area, Nayanquing Point State Wildlife Area, Pine River Boating Access, Point Lookout Harbor, Quanicassee State Wildlife Area, Sumac Island Boat Launch, and Tawas Point State Park). The role of MDNR is incredibly important not only for protecting rare environments on the bay such as wetlands and dunes, but also for allowing the community to have positive interactions with water resources in the area. This access works to restore the public's vision of the bay and thus will allow for citizens to deepen their values for the environment.

PSBW (PAC-level)

The PAC for the Saginaw River and Bay AOC, the Partnership for the Saginaw Bay Watershed (PSBW), is the primary group designated for work at this level in the AOC program. As the PAC, the PSBW's role is to represent the views of the community through advising EGLE on decisions for AOC restoration projects to remove BUIs. A myriad of primary self-identified roles

were described by PAC members which included restoration project planning, prioritizing watershed issues, writing grants, negotiating BUI criteria, and eventual decision-making on delisting. Other roles included tasks such as communication of watershed information to the public, working with local consultants on various projects, and providing a voice for the community to the state government. Despite acknowledging their importance, PAC communication and outreach capabilities were described as minimal compared to other roles, like planning and negotiating on BUI issues. Outreach was described as a role of the PSBW by some members, but others disagreed that this objective is within the scope of the PAC, mostly due to a lack of capacity to take on this role within the entire watershed. There were a number of discrepancies between PAC members when describing roles - in addition to conflicting views on outreach, PAC members also had differing views on the geographic scope of work, with some being content to work only within the AOC boundary while others hoped to implement projects throughout the entire Saginaw Bay watershed. While discrepancies like this are not inherently negative, it is clear that roles within the PAC are not universally understood or openly communicated, leading to confusion and tension between individuals. It would be beneficial to specifically delineate these roles within the PSBW in order to ensure all members are on the same page moving forward.

Community

The role of the community in this AOC was difficult to discern; since community members are largely unaware of the AOC program as a whole, they are unable to envision and undertake specific roles within it. The primary role we identified for the Saginaw River and Bay community is to enjoy the benefits provided by their environment. People gather to enjoy festivals on the water such as the Tall Ships festival in Bay City that showcases traditional sailing vessels, or the annual Cheeseburger Festival in Caseville which brings tens-of-thousands of visitors to Saginaw Bay. The community's role is to get outside, recreate in the watershed as they see fit, and enjoy the unique natural resources they have in their region. Some community members describe caring for their environment and advocating for the resource, though this aspect was not as widely mentioned as it was in the Rouge River AOC. The passive role as described by community and PAC members is more reminiscent of the Kalamazoo River AOC. Despite the community's distant enjoyment of the river and bay, it is clear that the community deeply cares for their water resources as evidenced by the popularity of events and festivals on the water. This is also corroborated by our site observations - people were observed recreating at 16 of 17 sites we visited in the region. PAC members hope that in the future, this passive enjoyment will translate into a more active stewardship for the river and bay through direct participation in addressing watershed issues.

Environmental community organizations in the Saginaw River and Bay area have an important place in their region, especially in support of the mission of the AOC program. Many roles were described for community groups such as WIN, the Bay Area Community Foundation, and the

others shown above in the list of key players. A main role identified for these groups is to create river and bay access points, with a WIN representative mentioning their role in providing kayak and canoe access points throughout the area. Community organizations also have a role in funding spaces for people to recreate - through our site observations, in looking at informational signage posted at the sites, we learned that funding for many of the parks and preserves we visited was provided by organizations in the area - among these were groups such as Ducks Unlimited, Reese Public Schools, and the Tawas Kiwanis Club (*Figure 20*). As water access is provided to community members, people will begin to see that the water quality in the Saginaw River and Bay is gradually improving and that this is truly a valuable resource for citizens in the area. For organizations that work on improving watershed issues specifically, like the Saginaw Basin Land Conservancy and Little Forks Conservancy, a major role is improving water resources in their individual localities which in turn can affect water quality downstream in the Saginaw River and Bay. As a community member with knowledge of Little Forks Conservancy described this organization's role:

> *"...protecting the resource by limiting uncontrolled access, inappropriate access and onto the river with people building where they shouldn't be, in wetlands and that sort of stuff. So, protecting the water higher up so that then protects the water farther down the line."*

In organizing easements on various rivers in the Saginaw Bay Watershed, Little Forks Conservancy is able to protect water quality upstream, which improves water quality not only in that region, but further downstream as well. Community groups can also engage the public in these restoration efforts through organizing river clean up events - we observed and participated in one such event along the Shiawassee River, hosted by Friends of the Shiawassee River. This event brought over one hundred community members to their local river to remove various foreign items like tires and plastics. It is clear that many organizations throughout the watershed have an integral role in fostering community cohesion as well as improving the overall health of the watershed.

Figure 20 — Welcome sign at the front of Sand Point Nature Preserve near Caseville, MI. This sign depicts community organizations and partners that made the creation of this park possible. These groups include Saginaw Basin Land Conservancy, Huron County Community Foundation, Wildlife Habitat Council, and ITC.

Relationships: Coming together over Michigan's largest watershed

Similar to the other AOCs we have studied, relationships within the Saginaw River and Bay pertaining to the AOC program are complex, and shaped by factors including general history of the site, roles within the AOC sphere, and current progress toward delisting. In general, relationships between all levels of the AOC program (community, PAC, and state) in the Saginaw River and Bay do not seem to be as fortified as they are in the other two AOCs we studied. This disjoint is not reflective of a lack of passion by individuals but instead is reflective of an area that has been struggling to get by on minimal resources with a daunting scope of issues that may take decades to solve.

In looking at the relationship between the PSBW and the general community, it is apparent that the majority of the community does not know of the existence of the PAC. This gap was corroborated by the lack of mention of the PSBW from community members when asked to name key players that affect the health of water resources. PAC-organized outreach and communication to the general public is described as minimal or "*almost none,"* by one member and in terms of affecting change, "*we don't have much impact outside of the rooms we meet.*" Despite this, one type of interaction between these two groups has come, although rarely, in the form of youth education about watershed issues through volunteered efforts of PAC members. This deficit in interaction is in part due to some PAC members not seeing community engagement as within the mission of their organization, and in part that it is not directly

mandated from the state level. In addition, PAC members mentioned fewer key players in interviews than community members, when queried about organizations that are involved in watershed work. It is likely that PAC members know more partners than they expressed, as they operate in the local conservation space, but the lack of mentions could point to an overall lack of active partnerships within the region which can hinder progress.

Similar to the relationship between the PAC and the community, communication between EGLE and the community is not well formalized. As noted by one PAC member, minimal information comes down to the community directly from the state. As described in the previous section, some comments made in reference to the state government were negative in that they only do what is required of them to protect the public health of citizens. This negative perception of the state likely stems from decades of pollution and a feeling of neglect from the state of the general population in this sense. The lack of interaction between these two entities likely exacerbates the feeling of distrust, as they are mostly unaware of the positive efforts that EGLE and other state entities are making to restore AOC's around the state.

The relationship and communication between the state-level agency, EGLE, and the Saginaw PAC was described as "*decent*" or "*average*" from two PAC members. The majority of interactions between these two groups comes in the form of an AOC coordinator attending monthly PAC meetings, which we were able to observe at the two PSBW meetings we attended. PAC members described the presence of the AOC coordinator at these meetings as helpful because the coordinator is able to answer questions (particularly about funding), bring PAC concerns back to the state program, and negotiate BUI criteria. However, there is some frustration with this relationship at the PAC level, in that they perceive a lacking ability to affect widespread change within the scope of the AOC program as defined by EGLE. For example, when the PSBW applies for grants in order to complete restoration work in their area, some members feel that grant restrictions are too strict and that this prevents progress. Despite some existing friction between these groups, the role of the AOC coordinator in this AOC is seen as highly important.

In addition to relationships involving state roles, the EPA Superfund is an essential government group in all three of the studied regions. However, in the Saginaw River and Bay AOC, descriptions of not only EPA roles, but also relationships to this entity, were minimal. Comments made were mostly in reference to the EPA Superfund's role in doling out funds from the GLRI in the form of the PAC support grant. The lack of mention of such a large player in this program was very surprising - especially since there is a designated Superfund site connected to the Saginaw River and Bay, which has seen progress in recent years on remediation of contaminated sediments in the Tittabawassee River, upstream of the AOC. In waiting for these efforts to complete on the Tittabawassee, there has been a lack of proposed plans for sediment remediation specifically within the Saginaw River and Bay in recent years - contrasted by the other two

AOCs studied, in which the EPA Superfund has a much larger presence. Though there are no current plans for sediment remediation in the river channel or bay, there are current plans to dredge polluted soils from residences on Middleground Island, which lies in the Saginaw River (Palomeque 2020). The disconnect between EPA Superfund and the Saginaw River and Bay should be examined; the lack of cooperation on removing contaminated sediments in this region could be stalling progress in this AOC.

Community Cohesion: Communities care about localized issues

The community of the Saginaw Bay Watershed spans a massive geographic extent that is segmented across pockets of unique sub-communities of various socioeconomic backgrounds and value sets. As in the Kalamazoo River AOC, we observed community members to not identify with a broader watershed community. As stated by one PAC member, "*I don't think anybody in the Saginaw Bay Watershed thinks of them as part of a watershed-wide community. We are a whole bunch of communities that share the same hydrology.*" The geographic expanse of this watershed proves a barrier in engaging a large, diverse sampling of the community in AOC events, and ultimately in broad AOC-wide representation among the PAC as well. Furthermore, there exist long-standing negative community perspectives on the health of the watershed and river system, largely stemming from decades of legacy contamination from local industry and further emboldened by an apparent feeling of neglect from the state and the EPA: "*I've been around long enough and worked in and around government long enough to know that it's a real mistake – it's naïve to think that the government has the capacity to fix everything.*" Finally, community members noted feeling surprised that individuals living within close proximity to the Saginaw's waters do not interact with them:

"*And I find it's so interesting because I grew up on the water, going to lakes, going to Lake Huron and working in the region and… that going into a school district, the kids might be five miles there inland and have never gone to the lake!*"

Beyond concerns and desire for adequate watershed-wide representation within the PSBW, community cohesion is a crucial element in the development of strong inter-organizational partnerships within the watershed. While the Saginaw Bay Watershed is home to a large collection of boundary organizations, stewardship groups, and anchor institutions (see *List of Players* above), these organizations are geographically partitioned, functioning through separate pockets within the watershed - some existing outside the geographic extent of the AOC altogether. While the PAC has reached out to boundary organizations in the past, they have historically seen limited participation when organizations do work with the PAC: "*...their executive director, who was on the board of the Partnership for a couple of years, and then just moved on.*" This could, to some extent, be due to these organizations not residing near the AOC boundary of the Saginaw River and Bay. This limitation of each groups' functionality beyond their respective areas of interest stifles opportunity for cooperation or clear delegation of roles

and efforts toward more effective combined watershed restoration. Segmentation and lack of partnering among these organizations prevents further cohesion among these organizations, generating overlap in functionality and responsibility through a lack of communication and clear delegation of responsibility.

Values: Mixed feelings regarding the river and bay

Influenced by a tumultuous history of corporate pollution and perceptions of institutional and governmental neglect, community members surveyed within the Saginaw River and Bay expressed largely pessimistic views of the river: "*...everybody in this area knows how dangerous- I don't know about dangerous, but how polluted the water is here."* The majority of community respondents mentioned that they enjoy recreating outside, accessing the river and, in general, passively enjoying nature and the outdoors; the main types of recreation we observed, both in site observations and interviews, involved wildlife watching, hiking/walking, fishing, beach-going, biking, and picnicking. Special to the Saginaw Bay Watershed community are the beaches with access to the bay. These range from large public beaches such as the one at Port Crescent State Park, to small dead-end road access points such as White's Beach behind the Saganing Eagles Landing Casino & Hotel. These beaches draw in many visitors, which was best exemplified at our observation of Caseville County Park (*Figure 21*).

Figure 21 — Beach-goers in the distance enjoying a sunny August day at Caseville County Park.

Rather than motivating the community toward participation and volunteer-based efforts at restoring this AOC, the community's negative perceptions of the watershed exist as barriers - fueling a prevailing sense of apathy toward participation in restorative efforts. In the face of long-held negative stereotypes, community members identified environmental education as a key value in promoting community-level AOC work and restoration:

"...Empowering the future of our society, that way you can see more of these environmental issues being taken care of and it's not a norm to pollute our river, it's not a norm to throw plastic on the ground, or whatever it might be."

While community members largely possessed negative perceptions regarding the health of the AOC, prioritizing environmental education across the watershed, focusing largely on youth through place-based learning, will instill environmental values within families.

PAC self-identified values largely prioritize ecological health of the watershed, citing the importance of promoting watershed health as a driver of various recreational and economic benefits. A PAC member identified personally recreating within the Saginaw Bay, remarking the importance of preserving this resource for future generations: "*...if a relative comes to visit, one of my new go-to's is just to take them to the Saginaw Bay Visitors Center, and walk out and look out at the Saginaw Bay and Lake Huron - which is kind of cool.*" It is the PAC's perspective that promoting recreational benefits of the river and bay through expanded outreach will further encourage the community to engage with the watershed, ultimately leading to a higher degree of stewardship as the water resources become identified as a source of recreational and economic boon. Crucial to this is establishment of partnerships with anchor institutions and boundary organizations throughout the Saginaw River and Bay area, as well as an expressed desire for an increase in AOC-wide representation on the PSBW board, reflecting values of equity and partnerships within the watershed:

"*...and now there's other organizations that are filling some of those roles, so I think there's really - where there's a chance to make the Partnership the most effective, might be kind of tying in to those other groups. Whether it's conservancies, or other organizations working to do the same thing, because we don't want to have a lot of overlap [in function]."*

Barriers: Overcoming complex obstacles to progress

We observed a number of social, environmental, and physical barriers impeding effectiveness of site-specific AOC work. The most prominent barriers revolved around fostering community participation with water resource restoration - either through recreation and engagement, or through participation in community-level efforts. Comprising a portion of the largest watershed in the state of Michigan, the Saginaw River and Bay AOC community is home to a substantial population which lives along, and is separated among tributaries and sprawling coastlines throughout the Saginaw Basin:

"So it's hard to build that sort of capacity to bring more people in, or even just - you know - how do you engage people… and you guys are trying to do this - understand what are people in the watershed - what do [the community] understand?"

As addressed in *Values*, a key concern of the PAC lies in outreach and engagement with the Saginaw River and Bay community and boundary organizations. In regard to the community, PAC members believe they are largely unaware of AOC-specific issues - however, this is not because they believe the community to be apathetic, but because they have other necessities to concern themselves about: *"I'm not trying to be dismissive and at the same time I'm not trying to criticize them – I think that most people in this particular watershed are blue collar workers that don't have time to participate with us."* This lack of AOC knowledge among the community influences a lack of overall participation throughout the community in restoration efforts - even influencing use of the watershed for recreation. Through community interactions, we identified long-standing negative stigmas surrounding the health of the watershed, exacerbated by years of pollution and neglect - a common theme which has presented itself across community and PAC members within each watershed studied, along with perceptions of reactionary response in state and federal interests - that these groups largely act in remediative or restorative capacity only when it is absolutely required of them.

Lack of knowledge and participation throughout the AOC community comes largely from a lack of communication by the PAC, both in direct communication to the AOC community, but also through outreach to other watershed boundary organizations. This has created disconnect within the Saginaw River and Bay community, characterized by an increasingly uninformed public and segmented organizational involvement. As explained by a PAC member:

"…When we think of 25 years ago, people may have been a little more keyed into that - just based on what's more topical and what's coming up when you're hearing about beneficial use impairments. Over time, the community's knowledge has probably decreased considerably about that, because there's probably a little bit less of an effect - so they're not directly impacted aside from like, once again - beach closures and those sort of things."

Beyond the PSBW official website, which offers insight into the organization's history and efforts within the AOC, there currently is not a platform or forum with which to collect and publish relevant environmental data to the broader community.

Watershed organizations adjacent to the AOC could pose as useful allies, both in public outreach and restoration work throughout the Saginaw River and Bay. However, as mentioned, there appears to be a minimal degree of communication across these entities. Not only is there a lack of cooperation limiting the beneficial effects of partnerships, but the disconnect further influences potential overlap in restorative efforts or perceived responsibility of these organizations. This further inhibits accurate watershed community representation within the PAC itself - another area specified by PAC members and state representatives as in large need of improvement. PAC members identified sources for funding from these organizations and institutions in the past:

"We also have worked with a number of teachers on programs that kids are going through in some of the school districts around here. We're not really active anymore, we used to work a lot with these guys and somewhere in their cupboards they have some of the science kits, I guess if you will, educational tools that we used to take out to schools back when we were funded for that specific exercise."

Cultivating working relationships across these different organizations could provide the PSBW with further opportunity for funding - a key barrier identified with the PAC.

Within the PSBW itself, key barriers to efficient function revolve around funding and personal capital. To facilitate day-to-day functions, the PAC relies solely on the state's PAC support grant, paying for one part-time employee to function as administrator for the group, generating emails, and taking notes and meeting minutes. As put by a PAC member, the support grant essentially functions to "*keep the lights on*" at the PSBW. Due to a lack of funding, there is a prevailing feeling among members that the organization as a whole is simply staying afloat - limited in the scope of projects it can undertake, if any at all. This is despite concerted efforts made by EGLE to offer and advertise separate avenues for funding.

"If it's really relevant and important to the AOC program and to the PAC... We've been providing funding support for many, many years and certainly for ten years with GLRI and it's been fairly consistent. And so, we have these discussions every grant cycle, and we put out an RFP that kind of gives them that states what is permissible, and we have these conversations [about funding opportunities]"

This lack of additional funding (and thus "attention") from the state is seen by the PAC as a major barrier to undertaking more extensive projects within the AOC, although they do not themselves prioritize looking elsewhere for this funding. Similar to the other PACs studied, the PSBW operates as a volunteer organization. Like other volunteer community organizations observed, there exists a degree of discord in perceived group function and responsibility. Some PAC members do not utilize contemporary measures of digital marketing, outreach, and communication in project implementation and design, while other members work full-time positions. Although members' outside work may be in relevant fields that pose valuable assets to such an organization, this does not grant them time to fully devote toward leading the group in the majority of day-to-day functions. This reflects meeting observations and PAC interviews alike, where we encountered expressed frustration with the organization of PAC meetings and internal communications, whether in relation to project objectives and PAC stance on issues like agricultural practices, or concerning the PAC's ability for public outreach and engagement. Lack of funding as well as personal capital ultimately influence internal group functionality and overall effectiveness of the PAC as a whole.

PAC members also identified reshuffling and administrative 'red tape' within the state as an obstacle to project financing. Members believe state funding to be largely inflexible, despite insistence of state representatives that much of their funding is flexible in nature, and available for a diverse array of functions and projects, as long as, *"what we help fund them do is the things that helps us to achieve our goals as well that is squarely within the AOC program."* This frustration, however, can be largely due to frustration over grant application rejection, often due to lack of a cohesive restoration plan established by the PAC. Through meeting observations, concerns about when funding would arrive were constantly voiced by PAC members, with state representation specifying the need for an updated BUI work plan in order to "*rise to the top of funding priority.*" Coupled with limited participation of the state in PAC functions - due to split time and responsibility to other neighboring AOCs - there is a sentiment among the PAC that they must compete with other AOCs for funding and attention from the state. This further exacerbated PAC members noting a lack of large potentially responsible corporate partners in regard to substantial restoration work in the watershed:

"*....the advantages that some of the other AOCs have, for instance Muskegon, Deer Lake which has already been delisted, White Lake which has already been delisted, and some of the others is either they've been able to identify a Principally Responsible Party, a PRP, or they have support, like the River Raisin from Edison from Ford from all that. We don't seem to have that.*"

While there is Superfund involvement within the watershed, these efforts have not been able to draw out corporate partnership substantial enough to bolster AOC-specific delisting efforts, leaving the PAC at a perceived disadvantage compared to large corporate involvement throughout their peers within the AOC program.

Communication & Engagement: Opening up channels of outreach

We observed intentional and successful community outreach in the Saginaw River and Bay AOC, although mainly through avenues outside of the AOC sphere. With watershed-wide cohesion being a challenge, we saw local conservation groups and nonprofits spearheading efforts to engage the spatially vast Saginaw Bay Watershed community. One community member acknowledged that, "*Our population [in the Saginaw Bay Watershed] is so segmented, both in terms of age and socio-economic status, but also in terms of technological access and just, frankly, who's got the time to spend to dig deep into an issue…?*"

PSBW members clearly expressed that community outreach is not a current priority for the PAC, although some feel it is an area in which they could improve. At a PSBW board meeting, one member stated, "*this year I want to focus on [the PSBW's] internal and external communication*." The PSBW currently does some community outreach according to meeting and PAC interview data, but it is minimal. This includes educational presentations to local schools,

maintaining a website, sending out newsletters, and holding their monthly board meeting open to the public. Facebook, newspaper, radio, and local events were also mentioned as modes of communication that the PSBW has used in the past. We discovered that some information on the PSBW's website, as well as information on linked partner websites, was inaccurate as we traveled to attend two different meetings that were posted but had been canceled. As a potential means to improve communication to the broad community, PAC members suggested hiring an outside communications consultant to provide a framework that they can follow, and partnering with anchor institutions - in this case, universities - to develop more comprehensive outreach strategies.

Furthermore, we observed the *Beach Closings* BUI and beach closings along the Saginaw Bay as important to PAC members, as the topic was discussed in length at one board meeting. Seen as a success, communication to the public on beach closing in the area is typically pretty quick with a fast turnaround of field-sample-to-notice via BeachGuard, an interactive web platform used by EGLE to offer live updates of beach closings and water quality test results throughout the state of Michigan. However, PAC members expressed disappointment that there was no public beach openings notification to the public after the water was once again deemed safe to swim in at a beach that had been closed. Since BeachGuard is housed under EGLE, this may be an area in which improved inter-agency communication might help bolster community awareness of the Beach Closings BUI and access to Saginaw Bay in general.

While the PSBW has not historically prioritized community engagement as chief functions of the organization, PAC members have acknowledged that engagement is key in cultivating a higher degree of participation in watershed stewardship activity, whether on an individual or organizational level. PAC members specified actions they have taken on an individual level to work toward community engagement, despite the absence of any broad outreach or engagement strategy held by the PAC as a whole. Specifying that direct community engagement is not perceived in the scope of PAC responsibilities, one member discussed individually holding educational presentations at Bay City schools in the past, lamenting the lack of outside environmental education in the state science curriculum. PAC members expressed a collective belief that outreach and engagement should be improved. This sentiment however, comes with uncertainty as to how to increase this engagement; whether through seeking outside consulting on strategic outreach, adopting engagement as more of a responsibility, or forging relationships with boundary organizations to expand outreach and engagement through similar messaging.

Working within the Saginaw Bay Watershed, stewardship organizations and conservancies such as *Little Forks Conservancy, Chippewa Nature Center*, or *Friends of the Shiawassee* practice engagement through various mediums: field notes and email updates, hands-on educational gatherings, or community-level clean up events. Engagement events organized by community groups ranged from *LGBTQ*-friendly nature hikes held by Little Forks Conservancy to Chippewa

Nature Center hosting a children's camp at Bay City State Park where kids can fish and swim. These modes of outreach extend to a wide audience throughout the watershed, gaining followers and participants through repeated events or updates. Working in conjunction with partners and sponsors, both large and small, clean-up and educational events extend the stewardship message to various pockets within the watershed - for example, Dow Chemical sponsoring Autumn Olive removal projects in portions of the AOC, funding removal with help from volunteer participants.

On a more personal level, some community members sampled throughout the AOC highlighted the importance of environmental education in development of positive perspectives of the watershed and a corresponding sense of stewardship - values which mirrored that of PAC members surveyed. A local teacher who participated in one of our focus groups highlighted efforts at addressing such concerns through hands-on educational events. Partnering with BaySail and local farmers, they taught students about the environment through comparing water samples collected in the bay to samples collected from farm culverts. This work with local students helps start the conversation with farmers about the importance best management practices in farming throughout the watershed:

> *"...working with farmers and talking about Best Management Practices within their crops because nutrient runoff is a huge issue and so we are going to start taking samples from farmland culverts and things like that, compare it from there to the river to the bay."*

Their goal is to improve the environmental perceptions of students and community members by giving them a positive experience that they can remember and turn into long-term environmental values. This individual specified the importance of implementing place-based learning techniques in teaching environmental issues, "*...not just teaching my kids - you know, the science behind stuff, but getting them the hands-on experience so that they can see that '[environmental stewardship] is something I can do.*"

Beneficial Uses and Impairments: Restoring Saginaw River & Bay for public use

The Saginaw River and Bay AOC are unique in their wide array of diverse freshwater and coastal habitats, tied to many vital ecosystem goods and services for humans and the environment. No other Michigan AOC overlaps with Great Lakes' waters as much as this AOC, and it is because of this that the Saginaw River and Bay AOC has the only *Degradation of Phytoplankton and Zooplankton Populations* BUI designation in the state. Not only are its impaired ecosystem goods and services varied, but the root causes of those impairments are as equally diverse. A legacy of industrial contamination, overfishing, and nutrient loading continues to pervade the waters and public consciousness of this AOC. This was clear as long-time AOC residents told us that they still remember the negative impact Dow Chemical, General Motors, and other big industrial companies had on the water quality. While these negative perspectives

perpetuate stigma regarding the health of the river, residents also assert community feelings that the AOC was once an area of reverence to local communities, and mark a dissatisfaction with its current environmental state. Thinking optimistically, this sentiment is not completely negative in nature - it provides motivation in striving to restore this watershed to its former glory.

In comparing community perspectives of impairments in the Saginaw River and Bay AOC to PAC understandings of BUIs, there was overlap in the types of impairments listed though described using different terminology. PAC members were more concerned about the technical definitions of BUIs, while community members were more concerned about their effect on obstructing access to the local water resources. Despite differences in language, both PAC members and community members identified many of the same impairments afflicting the Saginaw River and Bay including: heavy metal contaminated sediment; fish consumption restrictions; beach closings due to elevated E. Coli levels; and excess agricultural runoff. From those community members we interviewed, there seems to be a high level of aquatic environmental knowledge, or least an awareness of current and past degradation.

Despite the impairments that lay below the surface of the waters, the Saginaw Bay itself is highly valued for its aesthetics. As noted by one PAC member, "*looking at [the water] is the number one use*". This is corroborated by community members who most commonly mentioned viewing the water as a beneficial use of the Saginaw Bay. Our site observations support this belief that viewing was an important and popular activity by community members. In 8 out of 17 sites we visited, observation or viewing the local water resource was documented (*Figure 22*). Viewing and aesthetics were not the only beneficial uses that both PAC members and community members identified. They also both discussed swimming, drinking water, observing wildlife, and fishing – particularly walleye and smallmouth bass – as important beneficial uses of the Saginaw River and Bay. One EGLE representative agreed that being able to recreate, and in particular, fish and swim on the water was important, "*...to me it's good enough just to be able to go fishing and eat the fish, and to swim and not have to worry about getting sick, and just to be in nature, and to take advantage of those things*."

Another primary beneficial use that all entities mentioned was the economic return that could be seen if the Saginaw River and Bay were restored. The state and PAC perspectives see improved economic activity for the Saginaw area as a main driver for progress. Community members also value increased economic activity and business opportunities provided by clean waters. During the *2019 State of the Bay Conference*, a panel of local business owners highlighted how their own endeavors in the outdoor recreation industry could benefit from restoration efforts - these included *Bay City Boat Lines*, *Go With The Float*, *Jay's Sporting Goods*, and *Johnny Panther Quest Tours*.

Figure 22 — Community members at the end of a DNR boat launch at Quanicassee State Wildlife Area, observing the expanse of Saginaw Bay.

Future Visions: Sailing the long river to recovery

In the words of one PSBW member, "*it took 150 years to screw this place up and it might take 150 years to straighten it back out."* The R2R2R process for the Saginaw River and Bay is most likely to happen over many decades; PAC members do not see delisting as an AOC in the near future. PAC members expressed a realistic future, seeing minimal change in the next 10 years, and potentially one-third of their total environmental goals being accomplished in 20 years from now. Latent contaminated sediments will continue to prevent many BUIs from being removed until they are cleaned-up. But we heard a couple positive comments expressing hope because of all of the local organizations of passionate people that are working on restoring this AOC.

In an idealistic vision of the future, there is a collective optimism for individuals doing their part and community organizations coming together to ensure the protection and health of the Saginaw Bay Watershed. Examples of actions that would lead to this ideal future as communicated by respondents were: increased environmental ethics and education; individual-level stewardship and responsibility; smaller-scale agriculture for better land management; reducing *E. Coli* levels so there are no more beach closings; and decreasing the stigma of degradation so people will be comfortable getting in the water and freely recreating. For the PAC and AOC program to be successful in the long-term future, it is vital to secure consistent funding sources. Furthermore, we also found that increasing diversity on the PSBW board creates the potential for partnership and cooperation with local organizations to promote the iconic Saginaw River and Bay.

Saginaw River & Bay AOC Site-specific Recommendations to EGLE

Recommendation: Consult with PSBW to clearly define and establish the PAC's roles and objectives within the Saginaw River and Bay AOC

Currently, there are different understandings of PAC roles between members of the PSBW with respect to the scope of AOC work. There were conflicting answers in reference to the geographical extent of PSBW work, with some members wanting to work within the entire watershed while others are more focused on AOC-specific issues. There were additional conflicting statements in reference to the capacity to do community outreach with some believing this effort to be outside of the scope of the PAC itself. This divergence in understanding the PSBW's shared role has led to tensions in the PAC and corresponding struggles toward progress. With the help of EGLE, members of the PSBW can delineate specific objectives within the AOC program to collectively work to accomplish.

Recommendation: Guide PSBW in mapping out organizational connections within the watershed, and establish working relationships across these entities

As an organization with resources and capacity to work across the Saginaw Bay Watershed, EGLE can help the PSBW identify key partners that might be able to fill gaps in the PAC's necessary functions to restore the AOC and remove BUIs. Beyond functionality of the PAC, boundary organizations throughout the Saginaw Watershed possess unique resources and abilities which could serve complementary in efforts at both community engagement and the AOC restoration process. By defining specific group functions and encouraging complementary relationships across collective spheres of influence and efforts, these groups can work synergistically toward a healthier AOC and watershed as a whole.

Recommendation: Delineate specific benchmarks and guidelines for the PAC recruitment process and representation within the Area of Concern

Currently, there are no overarching guidelines set by EGLE for PAC member recruitment. In order to expand current PAC capacities, the PSBW could benefit from adding members from additional boundary organizations that work within the AOC border. EGLE could facilitate this by working with the PSBW to establish recruitment criteria - targeting specific skill sets and further working toward broad AOC representation. In aiding PSBW recruitment, EGLE could encourage the PSBW to explore long-standing personal relationships that PAC members hold with members of various organizational networks to cultivate new working relationships with these community organizations.

Recommendation: Collaborate with the PSBW in the design and implementation of strategic communication and outreach to increase saliency in the AOC community

Given the Saginaw River and Bay community is largely unaware of the AOC program, and the benefits that it provides in restoring aquatic ecosystem goods and services, EGLE could encourage the PSBW to publicize progress that has been made within the AOC. This strategic communication would work to reconnect the community to its valuable water resource; informing the public about positive work and efforts, and further reducing negative stigmas surrounding the Saginaw River and Bay in the process. As the AOC community is largely clustered into diverse pockets, collaborative outreach should place concerted efforts in the development of messaging which engages the broadest sample possible; this may be most efficiently achieved by mobilizing PAC-specific EGLE funds to work with an outside consulting group or outreach specialist.

Recommendation: Advertise and consistently share with the PSBW information regarding funding opportunities outside of the AOC program

In terms of funding, the PSBW relies heavily on the PAC support grant to complete AOC work but have stated that this is not enough to complete large-scale projects. The PSBW could benefit from seeking out additional funding sources and grants geared toward specific projects. In aiding this effort, EGLE could provide the PSBW a consistently updated list of potential funding sources or provide assistance with grant writing capacities once a funding source is determined.

Section VII. Case Study Synthesis

In this section, we offer EGLE insight into best management practices which, although derived from our case studies, carry broad applicability across the program's most challenging Areas of Concern and beyond. While some case study observations were unique and area-specific, common themes derived across from our three AOCs of study each correspond to a particular element of the Neighborhood Model (NM). Serving as the decoder for our data analysis, the NM is designed to categorize our observations and findings into four dimensions - or "bins" - in which an AOC community interacts with its natural environment. Highlighted through separate colors in the model itself (shown in *Figure 1*, shown again below), these bins organize AOC community actions by **Structural Dimensions** (noted in **Black**), **Human/Social Dimensions** (**Orange**), **Human-Environment Relationship** (**Green**), or **Built Environment/Infrastructure** (**Blue**). Individual site-specific observations and quotes across Rouge, Saginaw, and Kalamazoo AOCs were organized into these bins, wherein successes and shortcomings were compared and contrasted.

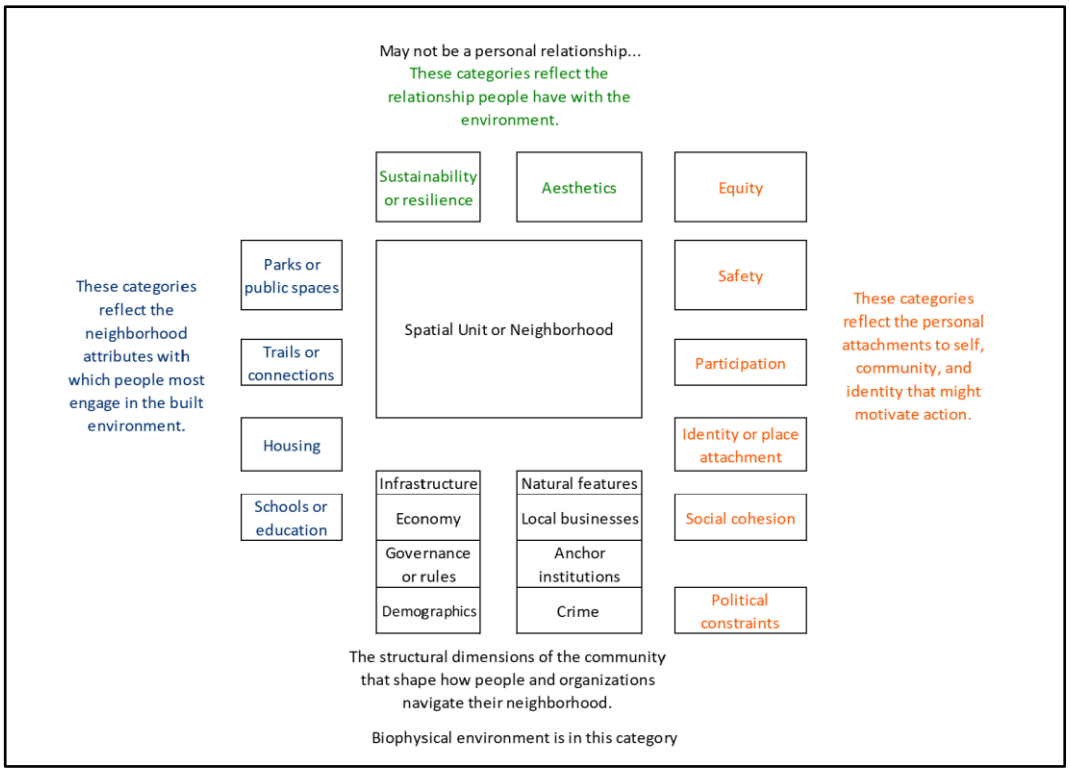


Figure 1 — NM in context of analysis. Quotes and observations get sorted into sub-bins within the four color-dimensions of resource association, so that conclusions can be drawn about how individuals and groups interact with their neighborhood (Source: Williams et al. 2018).

By organizing our data in accordance to these different sections of the NM, we can best compare values and subjects across target AOC community networks by examining data stored within each bin of the model, leaving a systematic framework to be applied to any other AOC. Quadrants within the model allow us to track community, PAC, and government groups in conjunction with specific colors; this enables us to determine where their areas of focus and overall efforts lie for each particular watershed. For example, contrasting differences between community and PAC foci within a particular watershed, like the Saginaw, where the community holds values primarily within the **Human Dimension** (coinciding with roles of participation and engagement), while PAC values are mostly within **Structural Dimensions**, reflecting more governance. Recommendations that emerge from this would involve pushing the PSBW to practice more community-facing efforts involving the **Human Dimension** bin: practicing more community outreach and engagement. Essentially, the NM serves as a color codebook for organization of data, enabling us to track similar findings within AOC players in relation to their respective watershed community; helping us track **Human-Environment Relationship** with **Human-Environment Relationship**, or **Built Environment/Infrastructure** with **Built Environment/Infrastructure**, and so forth. In this section, we provide conclusions and recommendations based on common findings across all three Areas of Concern studied. These conclusions form broadly applicable recommendations on best management practices in addressing our initial proposed research questions:

1. Who is the community? In regard to each Area of Concern, who are the actors in the community? Who should be engaged in the AOC process?
2. What is the relationship between area PACs and their respective communities? Does each PAC provide an adequate reflection of the larger community it represents?
3. How can EGLE help PACs form/strengthen relationships with local interests to improve progress toward BUI removal in each of these three AOCs?

Common trends and differences observed between site-specific case studies' *emerging themes* have been analyzed and compiled below, forming the crux of our data analysis and discussion. Ultimately through viewing these themes within the context of our research questions, we arrived at a series of broad recommendations for management practices geared at strengthening relationships and increasing participation across not only three AOCs studied, but the AOC program as a whole.

Roles: Balancing governance structure and personal values

State

Given that EGLE oversees the AOC program, roles described for the three AOCs studied were fairly similar. Self-identified state-level roles included liaising between the PAC and EPA, negotiating work plans and local BUI criteria with PACs, assisting PACs to secure funding and other resources, and attending regular PAC meetings. These descriptions of roles were sorted

into a combination of **Structural Dimension** and **Human Dimension** quadrants of the NM as they were either in the ***governance/rules*** bin, as the state works to implement program-designated roles, or the ***social cohesion*** bin, as the state works to coordinate with PACs and ensure that both groups are on the same page. An additional defined role of the state, specific to the Rouge River Watershed AOC, was their ability to bring industry partners, such as Honeywell International Inc., to the table in order to provide funding for large-scale dredging projects. This role is important to note as this partnership was key in spurring action to remove contaminated sediments - an issue which all three of our AOCs face. This role could potentially be applied to other AOCs, in particular Saginaw, in which there is room for a larger presence of corporations, most notably General Motors.

PACs across the three AOCs also understood the state role as existing and operating in both **Structural Dimension** and **Human Dimension** quadrants of the model, describing roles like assisting with funding and collaborating on work plans. However, across all PACs, the consensus was that the state operated primarily in the **Structural Dimensions** sphere of the AOC's 'neighborhood,' as their main role is to distribute funding to PACs based on the mandates of the AOC program. While PACs did mention state roles lying in the **Human Dimensions** quadrant like aiding in forming partnerships, and ***participating*** with PACs on various objectives, it was clear the PACs primarily see EGLE's role within the ***governance/rules*** area (in **Structural Dimensions**). Despite this, PACs in general noted a desire for the state entity to expand roles within **Human Dimensions** - these roles included increasing interaction with AOC coordinators, greater participation of the state entity throughout the watersheds, and improved support for outreach and communication through designated funding. PACs overall desire more interaction with state-level representatives, like respective AOC coordinators, as these roles are universally described as helpful to progress. PACs also desire a greater presence and direction from the state within the AOC space, although the details differ for each AOC: for Rouge, this means a greater amount of project oversight to avoid miscommunication among the multitude of organizations involved in AOC-specific work; for Kalamazoo this means providing guidance through funding of communication objectives in relation to the AOC; and finally, in Saginaw this means greater engagement by the state within varying groups in the watershed to maintain cohesion. All of these roles fall in the **Human Dimensions** region of the NM, in bins like ***social cohesion*** and ***participation***. If EGLE implements similar objectives above to increase capacity to operate in the **Human Dimensions** quadrant within their current role, PAC and state perceptions of EGLE's role will be more aligned, which can aid in more efficient and clear interactions between these two entities.

Perceptions of the state at the community level were mostly similar across all three AOCs studied, with a mix of positive and negative statements in relation to the state's role. Oftentimes, community members would speak of a general government entity as a whole, as they did not have knowledge about roles within EGLE specifically. Negative comments made were in

reference to the state's reactionary response, opposed to one that is proactive. This is tied to frustration among all communities because of the perceived degraded state of their environment, and their perceptions of a delayed response to such from the state, leading to a lack of trust in their role as leaders in environmental protection. Each of these Areas of Concern has dealt with massive contamination problems for decades which has spawned a sense of mistrust in the government, as they have been unable to make corporations accountable for or control large-scale environmental problems. Despite negative feelings of the general governmental role, community members across AOCs were also able to identify the positive aspects of their role: enforcing regulations; setting standards; and monitoring water quality. Most of the comments discussing the state's role were placed into the **Structural Dimensions** quadrant of the model because the roles listed had to do with ***governance/rules***. Desired roles of the state from the community's perspective were much more positive in connotation; communities across AOCs in general desire more ***participation*** and communication from the state entity, which was described differently in each area depending on their local water contamination issues, as well as certain physical aspects of the community (e.g., ***governance/rules***). Communities want more information about their environment, and on the work being done to solve local contamination. The Kalamazoo River AOC community, long plagued by PCB-laden sediments, wants more insight into dredging efforts, and where this dredged sediment is ultimately going. In the Rouge River Watershed, the community wants to know more information from the state about the multitude of habitat improvement projects that are occurring in the area. Community members in the Saginaw desire that the state leverage their resources to help bring the complex system of local nonprofits and watershed groups together. It is clear that all communities would benefit from knowing more about the state-level efforts, including the AOC program, which work to restore and bring life back to their water resources.

PAC

Self-identified PAC roles across the three AOCs studied, while overall similar in nature, varied based on individual PAC priorities. Roles listed fell either within the **Structural Dimensions** quadrant of the NM or the **Human Dimensions** quadrant, the degrees of which again varying among PACs. This was in accord with the state's perceptions of PAC roles as well, implying a general consensus in understanding of roles at this level. PAC roles listed by both the state and PACs included providing input on restoration projects, reporting to the state, liaising between EGLE and the community, informing the public on water issues, and eventually removing BUIs and delisting. While these roles described fit into either the **Structural Dimensions** or **Human Dimensions** spheres of the NM, there were varying degrees to which individual PACs perform each role within their own AOC. For example, the Kalamazoo PAC described the majority of their roles within the model's **Human Dimensions** sphere, discussing primary objectives of engaging the community through ***participation*** in recreational water events like *Kanoe the Kazoo* and educating the public on watershed issues to increase overall ***social cohesion***. The KRWC's understanding of their own role is to connect the community with their water resources, as one

would expect from a watershed council entity. Given that these were the primary responsibilities described by the KRWC, their PAC duties, like project planning and coordinating BUI criteria, were prioritized secondary to their goals as an organization. This is likely due, in part, to the nature of contamination in this AOC - all BUIs were determined based solely on PCB sediments, and removal of these is highly dependent on Superfund/EPA level actions, not necessarily on PAC-level decision-making. While the KRWC sees their role as mostly within the **Human Dimensions** quadrant, the other two PACs studied understand their role as more in the **Structural Dimensions** sphere with primary roles, including implementing projects and removing BUIs, and secondary roles in communication and outreach falling within **Human Dimension**. While differences exist between priorities of individual PACs, there is not a clear metric to define one PAC as more effective than another; instead the message here is for EGLE to delineate where current priorities and abilities lie within each PAC, and assist with augmenting roles that are seen as secondary in order to match PAC understanding of their own role with state-level expectations of the PACs.

Among all PACs, improving connection to their communities was specified as a desired role; even in PACs like the KRWC that primarily work to connect community members to their water resources, this was described as an area that could be improved. This desired role falls under **Human Dimensions**, as an increased connection to community will improve ***social cohesion*** in the AOC space. PAC members want to be able to better represent the communities they serve by broadening engagement to more distant communities within their AOC, and diversifying board member representation to better reflect composition of the community. PACs have been unable to take on these roles thus far in part due to a lack of funding and staff capacity, and a lack of clear designation of these items as roles within the purview of the AOC Program. If PACs are encouraged to add such roles onto their list of priorities, the connection between PACs and their communities could be strengthened. An additional desired role that was similar among PACs comes from an expressed frustration with the PACs ability to affect change in their AOC due to factors outside of their control in the ***biophysical environment***. For the Rouge River AOC, there was frustration in the PAC's ability to reduce or guide continuing development which negatively impacts water quality in the area, as well as the lack of ability to affect removal of widespread Combined Sewer Overflow (CSO) issues in the area. For both Saginaw and Kalamazoo AOCs, PAC members noted frustration in their decreased ability to affect change with watershed-wide issues outside of the AOC boundary that affect BUIs. This boundary designation reduces flexibility in the nature and scope of grants that are distributed through the AOC program which most PACs rely on for progress. While this type of funding may not feasibly come from the AOC program itself, there are other funding sources available that could be applied to more widespread issues, which could be intentionally advertised to each AOC.

A main barrier to clear perception of PAC roles lies in differences among individual members' understanding and expectations of the overall role of the PAC. While friction between

individuals is expected in any group or organization, disagreements between members on big picture PAC roles impede progress and efficiency towards BUI removals - challenging against unified visions which the AOC program was designated to create. This barrier applies to both the Rouge River Watershed and Saginaw River and Bay AOCs. For the Rouge River Watershed AOC, given that multiple organizations work at the PAC-level, differences between expectations and roles of each of these groups can lead to tension. While these groups have been able to work parallel to one another due to their complementary roles, some interviewees referred to tensions in working between groups that have varying objectives. For the Saginaw River and Bay AOC, some PAC members see outreach and communication as a feasible PAC role, while others do not, since many other groups in the area already have strong connections to community members. In both of these AOCs, there is room to facilitate stronger working relationships in order to diffuse tensions. In some cases, it may be helpful to delineate specific roles within each PAC in order to make it clear to all members where priorities and objectives lie.

Community

While many roles within the state and PAC levels lie in a mixture of **Structural Dimensions** and **Human Dimensions** within the NM, dealing with mostly ***governance/rules*** and ***social cohesion***, perceived community roles span other dimensions of the AOC space. The general community typically operates within **Human Dimensions** and **Human-Environment Relationships**, concerning themselves with **personal values** and their own **connection to the environment**. Community members described their roles within the AOC space similarly across the three areas studied, with certain nuances depending on common locally held values. Overall, communities saw their role through the lenses of ***participation*** and ***recreation*** (recreation is coded within **Human-Environment Relationships** as a way that people can act on their human-environment connection), the balance of the two varies depending on the underlying specific community values. For example, the Rouge River Watershed community values playing a highly active role within their watershed; they take ownership over their area through active participation in restoration through cleanups, installing rain gardens, as well as other voluntary actions. In contrast, the Saginaw and Kalamazoo communities value more passive participation, primarily enjoying and recreating in restored and accessible spaces in preferred ways for each of these communities - in Kalamazoo, people tend to enjoy kayaking on the river or observing wildlife, while Saginaw community members reported viewing the water and fishing as their top forms of recreation. Community members desire roles within the ***participation*** and ***recreation*** bins of the model to deepen through greater participation from the community-at-large, helping to bring attention and life back to the river. The majority of communities desire more advocacy for, stewardship of, and engagement with their local water resources. As more people become aware of programs and activities that are working to restore their water resources, the more communities will collectively cultivate their sense of place attachment and desire to enjoy the spaces that make these areas unique.

Both the PAC and state perspectives across AOCs understand the community's role as operating within the **Human Dimensions** quadrant of the Neighborhood Model, primarily in the ***participation*** mode of interacting with the neighborhood, identifying roles such as advocating for environmental cleanups, staying informed about local issues, and doing their part to care for the environment either through active restoration or participating in environmentally-conscious behaviors. Descriptions of the community's role in the Rouge were distinct in that PACs and state entities were able to outline multiple roles for the different types of community players in the region, e.g., municipalities, corporate interests, and various community groups. Descriptions in Kalamazoo and Saginaw were much more general, as most references were to the overall community. The depth of detail that PAC and state groups were able to describe in the Rouge speaks to this area's high population density and multitude of partners working to solve these large-scale environmental issues. In terms of desired roles of the community, only PAC members had a perspective on this, not the state entity - this could speak to the typical diplomatic nature of the state, or that they do not believe direct community interaction is necessarily part of their role in the AOC program. PACs in general desire that communities improve their role in the ***participation*** sphere, increasing efforts to be involved and learn about environmental work, as well as advocating for their water resources. In order for communities to become more involved in their watershed, there is a need for more educational outreach from PAC and state levels to communities, as well as more opportunities for these community members to interact with spaces that have been historically unsafe due to contamination.

In contrast to the general community's role is the role of community organizations within each AOC. While the general community operates primarily in **Human Dimensions** of the neighborhood through participation, community groups operate in a multidimensional context of the Neighborhood Model with the ability to navigate all spaces - **black**, **blue**, **orange**, and **green**. Any of the major watershed organizations within each of these areas has the ability to do this, but it is better understood through an example - Friends of the Rouge, in the Rouge River Watershed AOC. FOTR is an excellent example of a group that operates in all four spaces, using their resources to communicate effectively with both the community as well as state/PAC level organizations. FOTR clearly operates in both **Human Dimensions** and **Human-Environment Relationships**, as their main efforts engage ***people in their environment*** by creating opportunities for the public to ***participate*** in a myriad of efforts including education, restoration, and events. This watershed group also enables community members to participate in these activities by working in **Built Environment/Infrastructure** and **Structural Dimensions** of the NM. FOTR successfully navigates ***governance/rules*** spaces in order to gain funding, including a portion of the PAC grant to sustain monitoring efforts, to create opportunities for communities to interact in a positive way with water resources through the built environment by constructing river access points including kayak launches and ***trails/connections***. As they operate in all four spaces of a neighborhood, watershed groups like FOTR could have an extremely important role within the AOC program in order to translate work being done at the state or PAC level directly

to communities in effective ways through outreach and education. In the future, PACs should work to partner and form relationships with various watershed councils or other community non-profit groups in order to allow their communities to fully realize the benefits of the AOC program.

Relationships: Cultivating community partnerships and relationships

Community-PAC

One of the most compelling findings of our study is that across all AOCs studied, we found very weak relationships between each AOC's broader community and its respective PAC - relationships fall within **Human Dimensions** of the Neighborhood Model (NM) as they are a function of ***social cohesion***. The vast majority of community members sampled across all AOCs could not successfully identify or describe roles of their PAC. The small collection of community members that were aware of respective PACs also identified as being involved in watershed restoration efforts, or having attended PAC events in the past, but even these community members failed to articulate the functionality of their PAC.

Throughout our five PAC meeting observations, no general community members were observed to be present, despite the fact that all of these meetings were open to the public and publicized in calendar events on PAC websites. Within the Saginaw AOC, only community members with personal relationships with PAC members were able to identify the PSBW. In the Kalamazoo AOC, a similar sample of the community was largely unaware of the KRWC or its efforts in the AOC; the only community members aware of the PAC identified connection based on personal relationships to PAC members, or interaction through PAC events, such as *Kanoe the Kazoo*, or *Krazy for the Kazoo*. Within the Rouge Watershed, the AOC community sees minimal outreach from the RRAC; which was not identified as a priority of the PAC - community members were also unable to identify this as well. Friends of the Rouge, however, has a robust community presence, and was identified by the community for their work in river cleanups, educational outreach, and river events. RRAC and the ARC both have used FOTR as a proxy for outreach in the past, but largely operate independently from one another in daily function.

PAC-Community Organization

The dynamic between RRAC and FOTR serves as an example of a functioning relationship between watershed organizations that delegate distinct roles within an AOC; which can fall within **Human Dimensions**, **Built Environment/Infrastructure Dimensions,** or **Human-Environment Relationship Dimensions**, depending on functionality of these groups. While communication between these two entities is not consistent, these two groups play complementary roles in relation to the Rouge, cooperating in restorative efforts and even exhibiting membership crossover. This is contrasted by groups surrounding the Saginaw AOC, around which there is high fragmentation, due largely to these groups' physical separation

among the geographic expanse of the watershed. As a result, there is limited cooperation between localized watershed groups and the PSBW, with the exception of some personal ties between these groups and the PAC. Within the Kalamazoo AOC, no notable watershed groups were mentioned in community interactions, with the exception of anchor institutions, such as local universities, which partner in research and some outreach. While community groups' relationships largely involve ***Human Dimensions***, **Built Environment/Infrastructure Dimensions** or the **Human-Environment Relationship**, they can also extend to function within the **Structural Dimension** quadrant as well. This variety in function makes watershed organizations invaluable for AOC communities - which is why encouraging PACs to forge working relationships with such organizations is crucial for efficiency in the AOC delisting process.

State-PAC

The relationships between state and PAC interests across AOCs vary largely in accordance to where each respective PAC is in terms of BUI removal. For instance, within the Saginaw AOC, the PAC is still in the process of designing an AOC-centric work plan - while the state exists largely in an advisory capacity. Within the Rouge, the state is cooperating with the RRAC in project implementation - working on the next stage of restoration efforts. All AOCs share the state-PAC relationship involving state-provided funding and consultation. All PACs have expressed value in state participation, and especially funding in project development, both of which coinciding with **Human Dimension** and **Structural Dimension** bins of the Neighborhood Model - dealing with ***participation*** and ***governance/rules*** respectively. While this accord across AOCs depicts a consistent relationship between the state and PACs, there was a collective desire for a higher degree of state-level representation at PAC functions.

State-Community

Across all AOCs, minimum direct communication exists between the state and the respective communities. Within the Saginaw AOC, there has been some identified communication from the state to agricultural communities within the watershed, dealing largely with farming practices, but community respondents from neither the Rouge nor Kalamazoo watersheds identified any direct measures of state communication. Furthermore, some respondents remarked about an inherent distrust of state interests, however this seemed to often stem from sentiments of governmental distrust as a whole. Within the Saginaw and Rouge watershed, the state has made some concerted effort in using watershed organizations to reach the public, but communication as a whole is minimal. Occupying **Human Dimensions** within the Neighborhood Model, the state's relationship with the community is minimal, and AOC communities' mistrust of the state makes them largely unlikely to seek out information from the state, despite desire for more public-facing representation by the state across all AOCs. Outreach in area-specific events and activities were noted as high importance and modes of engagement by both communities and PACs; further representation of the state at local AOC events would not only provide more

salience for EGLE among AOC communities, but this would allow for opportunity in engagement in all three tiers of AOC program management simultaneously.

Superfund-AOC

We found that the EPA Superfund program has markedly different relationships with each of the three AOCs. Occupying **Structural Dimension** NM bins - dealing largely with ***governance/rules***, Superfund occupies different portions of each AOCs respective watershed, other than the Rouge AOC, which represents the entire river's watershed. The AOC program exists primarily on a regional level, and within the scope of the state, and thus lies outside of jurisdictional responsibility of Superfund work, which occurs outside of AOC bureaucratic boundaries. Superfund's relationship with each of these sites deals largely with implementation of large-scale projects and community outreach regarding these efforts. Dredging work in the lower channels of the Rouge River affects the AOC directly, and EPA-funded sediment removal in Kalamazoo is needed in order to see improvements in direct AOC work. Kalamazoo has a Community Advisory Group (or CAG) acting as liaison between the community and the EPA directly; this group deals specifically with Superfund-related work, largely outside of the AOC purview. Although Superfund is completing restoration work within the Tittabawassee River adjacent to the Saginaw AOC, this work also happens outside of the AOC program. This leaves PAC members with a feeling of neglect from the federal government, despite influence work within Superfund may have in tangentially benefitting the AOC itself. This in turn fuels feelings across the Saginaw PAC about being held as a relatively low priority in regard to site-specific restoration efforts.

Given the degree of intersectionality between some Superfund and AOC efforts, EPA and state efforts are intertwined in work within the Rouge River Watershed, which is listed as an AOC in its entirety. Despite these groups not having actual feet on the ground working together, EPA and EGLE work in the Rouge Watershed, collectively affecting the same AOC and community, which is why communication between these two groups is prioritized in cultivating working partnership. Within the Saginaw and Kalamazoo Watersheds however, Superfund operates independently of the AOC program, and little communication between state and federal interests is seen as a result of differing priorities within respective regions.

Community Cohesion: Weaving communities within the AOC program

Characterized solely by **Human Dimension** codes, such as ***participation***, ***identity or place attachment***, or appropriately, ***social cohesion***, community cohesion describes how well the entire community of a particular watershed works together - representing perceived togetherness of an AOC community. Articulated across site-specific case studies, each AOC consisted of unique, diverse communities, composed of various organizations and anchor institutions. Across all of these AOCs, however, we noted that none possessed a strong sense of community cohesion

for AOC-related processes. Due largely to segmentation of groups within respective AOCs - either geographically or socioeconomically, each region is posed with unique obstacles to broad community unification. In addition to area-specific obstacles, long-held negative stigmas in regard to water resource health emerged as common trends across all three AOC's, propagated by a lack of positive coverage and informational publication about respective AOC efforts and watershed health. These perceptions further act as barriers to public engagement and social cohesion among these watersheds, driving apathy and lack of intimate connectivity to AOCs.

Minimal community cohesion was observed within the Kalamazoo River AOC, where only a small sense of a broad community was identified by respondents and observations. This is due, not only to the geographic expanse of the watershed, but more importantly the lack of watershed organizations working exclusively on restoration in the Kalamazoo AOC. Although the KRWC partners with local universities in educational outreach efforts, the geographic expanse of the 80-mile river stretch leaves a multitude of segmented communities comprising the AOC, holding varying perspectives of the river and prioritizing environmental efforts differently as a result. This, coupled with negative lingering perspectives of the Kalamazoo River's health have prevented perception of the river as a rallying point for the broad AOC community.

The Saginaw River and Bay AOC is connected to the state's largest watershed. While a large collection of environmental groups and conservancies are scattered throughout the watershed, these organizations are largely segmented across separate spheres of influence and focus - some operating outside the boundaries of the Saginaw River and Bay AOC altogether. As a result, the PSBW has seen limited interaction and little cooperation with these entities, leading to a lack of cohesive efforts at AOC restoration and fueling the PAC's lack of salience within the watershed community. Coupled with negative community-level perceptions of the watershed's health through negative stigma, this lack of community exposure to PAC efforts leads to minimal perceived community cohesion within the Saginaw River and Bay AOC, as community members are hesitant to celebrate and rally around this resource.

The Rouge River Watershed AOC, while not occupying as large of a geographic expanse as Saginaw or Kalamazoo, still experiences a high degree of segmentation. Not as a result of geographic distance, but rather socioeconomic diversity and a collection of varying governance structures. The Rouge is home to a diverse collection of ethnic and socioeconomic sub-communities across different geographic sections of the watershed. The AOC community is difficult to represent not due to the lack of proximity and connectivity in watershed groups, but rather the sheer amount of diversity within its watershed. As a result, these communities are not well represented among the PAC, RRAC and ARC, making broad community outreach and engagement difficult. Furthermore, the existence of a multitude of municipal, organizational and governing parties throughout the AOC and watershed complicates collective project adoption,

leaving some sections of the river more at risk for developmental and industrial pollution than others.

In conclusion, none of these AOCs were found to possess a cohesive community in regard to water resource appreciation and stewardship appreciation and stewardship, for varying reasons (e.g., geographic, socioeconomic, most valuable and/or proximal water resource). All three AOC communities carry a lingering negative perception of the river, which acts as a barrier to the community rallying together around their shared resource. To some extent, this is exacerbated by gaps in community-wide AOC representation among PACs, which the state could better address through encouraging PAC efforts and outreach geared specifically at positive AOC coverage (addressing these collective AOC stigmas), focusing on garnering further community engagement.

Community Values: Highlighting place-based values in AOC efforts

To best characterize respective communities across study AOCs, community observations and interview questions were tailored to identify site-specific community values in regard to the Kalamazoo, Saginaw, and Rouge AOCs. An improved understanding of community-held values regarding water resources will offer insight into where management and intervention would be best received, thus guiding which areas PACs and EGLE should focus work in community engagement.

Institutions

Primarily existing within **Structural Dimension** and **Human Dimension** quadrants of the NM, various institutions and organizations provide opportunities for local involvement for AOC community members, offering organized events and outreach which were perceived by community members to drive local ***participation*** in AOC-related efforts. Although institutions differ across different AOCs, ranging from universities in Kalamazoo to watershed organizations within the Saginaw and Rouge AOCs, community members expressed value in institutions largely because of their respective efforts in watershed restoration. Community members identified participation with these groups as important in local stewardship, and described this participation as an important way to give back. This community value in participation with these institutions exemplifies the effectiveness that local organizations have in promoting localized clean up efforts, thereby driving community participation - a sentiment which further supports encouraging PACs to further establish working relationships with public-facing institutions throughout respective watersheds.

Human and Ecological Health

Organized within **Human Dimension** and **Human-Environment Relationship** sections of the NM, dealing with ***human-environment connection*** as well as ***personal attachment***, community

values identified in human and ecological health were derived largely from a robust sense of place-based attachment noted across each AOC studied - a broad commonality observed in community responses. Despite negative stigma regarding respective AOCs' environmental health, there remains a prevailing sense of 'hometown pride' attached to these areas. Accompanying this place-based connection was a desire to preserve local water resources so they can be interacted with and used recreationally. Place-based connection represents a compelling argument that watershed groups can more effectively employ in seeking increased engagement from the community level. Community members further noted a connection between local ecological health and how this impacts their own personal health. For example, areas like Saginaw and Kalamazoo referenced concerns about the emerging contaminant group PFAS, as both of these areas have local sources of this chemical. Though outside of the purview of the AOC program, this connection of water health to human health is clearly a motivating factor for community members to restore and maintain the health of the environment.

Environmental Education

Identified by communities as another crucial value in attribution to local watersheds is environmental education. Falling within **Human-Environment Relationship** and **Human Dimension** quadrants of the NM - involving ***human-environment connection*** and ***social cohesion*** - environmental education was identified by community members as crucial in cultivating values of human and ecological health among AOC communities. Across all AOCs, there was an expressed desire for place-based environmental education - specifically about local water issues. Both formal education within school curriculum and hands-on educational outreach by watershed organizations were listed as valued educational practices. Across all AOCs there is a collective belief that a more informed and educated watershed increases engagement and participation within each community.

Recreation

The most common value identified by AOC community members was recreation. Characterized by **Human-Environment Relationship** and **Built Environment/Infrastructure** sections of the NM, recreational watershed values stem from the ***human-environment connection***, and opportunities for recreation are offered by the ***built environment***. When pressed about beneficial uses of an AOC, community responses dealt largely with recreational activities involving the water itself - like kayaking, fishing, or observing nature - with each AOC community acknowledging economic benefits that come with recreational opportunity. Although specific recreational examples differ among AOCs studied, each of these values represent specific avenues respective PACs could take to design projects and make efforts towards more specific means of community engagement in AOC.

Equity

Although the value of ***equity*** across AOC communities was mainly addressed by community members possessing affiliation to watershed organizations, there were some expressed values of equity noted by broader community members within focus groups. These were concerned with ensuring representation of historically marginalized groups and voices in AOC-related efforts. For example, within Saginaw, there was a desire for inclusion of Chippewa tribal representation in restorative decision-making. Values of equity more widely appear through interaction with members of watershed organizations. These respondents acknowledged the importance of diverse representation in community organizations as an important metric in best serving the entire community at hand, a sentiment that is also mirrored by PAC and state interests. Ultimately, the more representative these institutions are of their AOC communities, the more equitable these organization's efforts ultimately are and the more broadly the AOC efforts will be received - a value which appears to be in alignment between community, PAC, and state interests. However, barriers in engagement, outreach, and communication stand in the way of broad community representation among these organizations, which was noted by PAC members across all three AOCs studied.

Communication & Engagement: Flowing along the lines of least resistance

Across all AOCs, communication networks do overlap, but there exist significant gaps in how state and PAC levels communicate to AOC communities. Communication and engagement predominately fall within the **Human Dimension** quadrant of the Neighborhood Model because these represent concepts such as ***social cohesion*** and ***participation***. Mainly, communication from the state and PACs to the community is meant to inform the public about water quality issues that could threaten their safety or restrict their access to water resources. Community engagement as another form of communication, is versatile in nature, and is often implemented by local environmental advocacy organizations - outside of these more formal channels of communication possessed by state and PAC interests.

There are efforts at engagement by current PACs that target the broader community, despite some PAC sentiments that engagement is not their primary role. The PSBW and RRAC mentioned reaching out to the public but also questioned this outreach as a primary organizational role; they have done so voluntarily, but also inconsistently. In contrast, the KRWC does prioritize public outreach, and believes that acting as a trusted source for watershed-wide information is part of its mission. In addition, the KWRC engages the watershed community through active, 'hands-on' outreach events that are focused on recreation, stewardship, and education. This is not the case in the Saginaw and Rouge PACs, as other boundary organizations, such as Little Forks Conservancy in Saginaw and Friends of the Rouge, instead play this role of cultivating community connection to water resources through events. This is an example of local organizations' ability to work in the **Human-Environment**

Relationship space of the Neighborhood Model. The most effective outreach strategy will involve working through groups that are most connected to the community, and this is different in each AOC. Working with trusted local organizations is a key avenue to increase community knowledge and participation within the AOCs.

We found diverse modes of communication within each AOC (*Tables 4-6*) and we identify perceived roles within the watershed and progress in R2R2R as being the main drivers of how PACs are choosing to engage the community. This is because PACs will engage in modes of outreach that are consistent with how they understand their role as communicators, and also that they are limited in the effectiveness of their messaging by the impaired legacy of their water. These may be tangible impairments that affect what types of events can safely and realistically be held, or perceived impairments that are embedded within the community consciousness and make some modes of communication untenable.

The means with which community members received information also varied throughout each AOC, but there were several modes that appeared in all three of study: social media, water related events, local news, and public radio. Communication strategy at the state level was fairly consistent across the three AOCs with using social media and attending board meetings being a common mode.

However, there are also barriers to communication that exist throughout and within these long-term AOCs. Each AOC has at most only two modes of congruent communication that span from the state to the community level. For both Saginaw and Kalamazoo, social media is a platform that all three levels use. Social media is a widely-used and contemporary mode of outreach, but it has its limitations in that there are several different major platforms (Facebook, Twitter, Instagram, etc.) with different user bases and that much of the content is user-generated which has the potential for false information and argumentative discourse.

Overall, we found a strong desire for a more centralized, uniform, and accessible source of AOC information from both organizations and community members. Furthermore, the information and stories published should be factual, promote positive progress, and celebrate successes. The language and tone of the messaging should be in simplified terms, but still be helpful for more technical audiences; community members understand BUIs through actual instances of impaired access that has affected them personally. Being proactive in communication is also key, as having a reactionary response to environmental issues is viewed as negative. Environmental disconnect and lack of place-based ecological attachment has reduced willingness to participate but with widespread, positive, intentional messaging, reconnection will be fostered in these meaningful areas that should be celebrated.

Modes of Engagement Identified in the Kalamazoo River AOC Community

Mode of Engagement	KWRC	Community	EGLE
Attending Meetings	✓	✓	✓
Signage	✓	×	×
Working with Schools	✓	×	×
Activities & Events	✓	✓	×
Third Coast Conversations	✓	×	×
KWRC Website	✓	×	×
Mailings	✓	×	×
Newsletters	×	✓	×
Local Newspapers	×	✓	×
Local TV	×	✓	×
NPR/PBS	×	✓	×
Social Media	❋	✓	✓

❋KRWC does have a Facebook page, but was not mentioned as a mode of engagement by PAC members

Table 4 — Modes of engagement identified in the Kalamazoo River AOC Community. Green rows represent coherence in modes where all three levels of the AOC program communicate, yellow represents modes used by at least two levels, and red represents modes only used by one level. Green modes are recommended as low-hanging-fruit for community engagement, and yellow modes represent potential avenues of communication that can be cultivated if a higher degree of community engagement is desired. The Kalamazoo River is the only AOC with two fully-used modes of communication across the AOC program, but it only has one yellow, high-potential new mode of engagement.

Modes of Engagement Identified in the Rouge River AOC Community

Mode of Engagement	RRAC	Community	Friends of the Rouge	EGLE
Facebook	✓	✓	✓	×
Twitter	×	✓	✓	✓
Other Social Media Websites	×	✓	✓	×
Restoration Events & Projects	✓	✓	✓	×
RRAC Meetings	✓	×	❋	❋
RRAC Website	✓	×	×	×
Contractor Outreach	✓	×	×	×
Newsletters	✓	×	✓	×
Email	✓	✓	✓	✓
Radio/NPR	✓	✓	†	×
FOTR Resources	✓	✓	✓	×
Local Magazines & Newspapers	×	✓	×	×
EGLE Website	×	×	×	✓

❋FOTR and EGLE representatives were present at the RRAC meeting attended on 8/27/19

† Not mentioned as a mode of engagement during interviews but later did an expose on the 50th Anniversary of the Rouge River Fire with Michigan Radio's *The Environment Report* (10/9/19)

Table 5 — Modes of engagement identified in the Rouge River AOC Community. Green rows represent coherence in modes where all three levels of the AOC program communicate, yellow represents modes used by at least two levels, and red represents modes only used by one level. Green modes are recommended as low-hanging-fruit for community engagement, and yellow modes represent potential avenues of communication that can be cultivated if a higher degree of community engagement is desired. Email is currently used by all levels of the Rouge AOC program and there are five high-potential modes of engagement where 3 of the 4 levels already communicate.

Modes of Engagement Identified in the Saginaw River & Bay AOC Community

Mode of Engagement	PSBW	Community	EGLE
PSBW Website	✓	×	×
PSBW Board Meeting	✓	×	✓
Newsletters	✓	×	×
Events	✓	✓	×
Radio/NPR	✓	✓	×
Local TV	✓	✓	×
Local Newspapers	✓	×	×
Facebook & Other Social Media	✓	✓	✓
Place-Based Learning	×	✓	×
Email	×	✓	×
Word-of-Mouth	×	✓	×
Signage	❋	✓	×
Online News Outlets	×	✓	×

❋ PAC members talked about "Don't Feed the Algae" signs but it was unable to be verified that they were ever posted at sites around the watershed

Table 6 — Modes of engagement identified in the Saginaw River and Bay AOC Community. Green rows represent coherence in modes where all three levels of the AOC program communicate, yellow represents modes used by at least two levels, and red represents modes only used by one level. Green modes are recommended as low-hanging-fruit for community engagement, and yellow modes represent potential avenues of communication that can be cultivated if a higher degree of community engagement is desired. Social media is already used across all levels of the AOC program in Saginaw so putting more resources into this mode would impact the broadest audience, and there are four other high-potential modes of engagement where EGLE could engage both the PSBW and the community.

Beneficial Uses and Impairments: Translating BUI language to communities

Through our study, BUIs were studied in these AOC communities by observing how people interact with and derive value from water resources, as well as understanding how progress in R2R2R could restore beneficial uses to community members. Beneficial uses were typically identified within NM quadrants of **Built Environment/Infrastructure** - seen in parks, trails, and access, or **Human-Environment Relationship** - concerning environmental interaction and relationship. Beneficial use impairments always fall within **Human-Environment Relationships** among all levels, but are also perceived as **Structural Dimensions** among the state and PAC. This makes sense, as beneficial use impairments represent environmental degradation to the point where it diminishes ecosystem goods and services, diminishing the ***human-environment interaction*** and that parties directly involved in the AOC program would define BUIs based upon their knowledge of the defined standards and criteria in accordance with the ***governance/rules*** bin of the NM.

In identifying beneficial uses, our site observations provided useful data to corroborate with findings from focus group and interview respondents. In essence, confirming what people actually do at sites is consistent with what site-specific uses are listed; for the most part, we found correlation between uses described by respondents and what we observed during site visits. The top three beneficial uses identified across interviews were viewing/observation, fishing, and canoeing/kayaking. PAC respondents identified many of the same beneficial uses for the community they represent. The top three beneficial uses most seen during our site observations were hiking/walking, viewing/observation, and fishing. Viewing/observation and fishing were both identified and seen in our site observation as important beneficial uses of the local water resources. Canoeing/kayaking was still observed but not as commonly as other uses. Some uses are more important and prevalent to certain AOCs such as beach-going in Saginaw, kayaking in Kalamazoo, and picnicking in Rouge. Overall, there was a trend of observing a greater variety of uses than respondents were able to list. These myriad and sometimes lesser thought-of uses should be considered and included when proposing new restoration. As a graphical summary, *Tables 7-12* show the cross-cutting of our investigation into both beneficial uses and beneficial use impairments for each AOC.

A Comparison of Perceived Beneficial Uses in the Kalamazoo River AOC

	Beneficial Uses		
	Community		PAC/State
	Interviews	*Observations*	*Interviews*
Primary Uses	**Kayaking/Canoeing** **Fishing** **Aesthetic Beauty** **Economic Benefits**	**Walking/Hiking** **Observing/Taking Photos** **Fishing** **Relaxing/Sitting**	**Kayaking/Canoeing** **Fishing**
Other Mentions	Eating the Fish Swimming	Playing Picnicking Running Kayaking/Canoeing Walking Dogs Biking Feeding Fish Boating Socializing	Eating the Fish Improved Habitat Boating Aesthetic Beauty Hiking

Table 7 — Described beneficial uses of the Kalamazoo River. Community beneficial use perceptions and observations are in blue, and PAC/state perceptions are in green. Bolded beneficial uses are those that were most commonly noted or observed. Fishing and kayaking/canoeing are important to both the community and KRWC/EGLE.

A Comparison of Perceived Beneficial Uses in the Rouge River AOC

	Beneficial Uses		
	Community		PAC/State
	Interviews	*Observations*	*Interviews*
Primary Uses	**Observing Wildlife/Nature** **Fishing** **Canoeing/Kayaking**	**Walking/Hiking** **Grilling/Eating/Picnicking** **Observing Nature**	**Fishing** **Observing Wildlife/Nature** **Canoeing/Kayaking** **Swimming** **Hiking**
Other Mentions	Flying Model Airplanes Economics/Tourism Real Estate Swimming Clean Water Biking Hiking	Playing/Outdoor Activities Playing on Playgrounds Dog Walking Exercising Fishing Socializing Relaxing Doing Restoration Work Golfing Doing Emergency Training	Real Estate City Revitalization Biking Sustenance Fishing General Recreation/Playing

Table 8 — Described beneficial uses of the Rouge River. Community beneficial use perceptions and observations are in blue, and PAC/state perceptions are in green. Bolded beneficial uses are those that were most commonly noted or observed. Observing wildlife/nature is important to both the community and RRAC/EGLE; and fishing, canoeing/kayaking, and walking/hiking are also important beneficial uses.

A Comparison of Perceived Beneficial Uses in the Saginaw River & Bay AOC

	Beneficial Uses		
	Community		PAC/State
	Interviews	*Observations*	*Interviews*
Primary Uses	**Viewing the Water** **Observing Wildlife** **Economic Benefit** **Fishing** **Boating**	**Walking/Hiking** **Beach Going** **Biking** **Fishing** **Picnicking** **Observing Wildlife** **Swimming** **Playing** **Boating**	**Observing Wildlife/Nature** **Swimming**
Other Mentions	Recreation Canoeing/Kayaking Ice Fishing Eating Fish Drinking Water Commercial Fishing Biking Walking/Hiking	Socializing Dog Walking Kayaking/Canoeing Restoring Beach Camping Exercising/Running	Fishing Eating Fish Drinking Water Recreation Crop Irrigation Hunting Canoeing/Kayaking Economic Benefit Public Health Biking

Table 9 — Described beneficial uses of the Saginaw River and Bay. Community beneficial use perceptions and observations are in blue, and PAC/state perceptions are in green. Bolded beneficial uses are those that were most commonly noted or observed. Observing/viewing wildlife and nature are important to both the community and PSBW/EGLE; and fishing and swimming are also important beneficial uses.

A Comparison of Beneficial Use Impairments in the Kalamazoo River AOC

	Beneficial Use Impairments (BUIs)	
	Community	*PAC/State*
Identified	Invasive Species **Contaminated Sediment** **<u>Animal Deformities</u>** **<u>Degraded Aesthetics</u>*** **No Swimming** **<u>Limited Fish Species</u>** **<u>Inability to Eat the Fish</u>** PFAS/Drinking Water Quality **High Turbidity** Urban Flooding	Inability to Eat the Fish Degradation of Wildlife Health Failing Dams Lack of Recreation Opportunities Fish Contamination Lack of Fish Habitat Fish Tumors and Other Deformities
AOC Designated BUIs	**Restrictions on Fish and Wildlife Consumption** **Degradation of Fish and Wildlife Populations** **Beach Closings – REMOVED 2011** **Degradation of Aesthetics – REMOVED 2012** **Bird or Animal Deformities or Reproduction Problems** **Degradation of Benthos** **Restriction on Dredging Activities** **Loss of Fish and Wildlife habitat**	

Table 10 — Identified and AOC designated BUIs of the Kalamazoo River. Bolded text represents BUIs identified by the community in their language that directly correspond to an AOC designated BUI of the Kalamazoo River. Those with an * mean that community members perceive a BUI that has already been removed. Underlined BUIs refer to identified BUIs that the community cares about and directly impacts their primary beneficial uses. Many of the BUIs that the Kalamazoo community members identified were the same as the AOC designated BUIs, but had additional concerns about invasive species, PFAS/drinking water quality, and urban flooding.

A Comparison of Beneficial Use Impairments in the Rouge River AOC

	Beneficial Use Impairments (BUIs)	
	Community	*PAC/State*
Identified	**<u>Water Appearing 'Dirty'</u>** Flooding **<u>Foul Odor</u>** Log Jam High Erosion Excess Runoff **<u>Oil/Trash in the River</u>** Impervious Surfaces	CSO Issues Loss of Wildlife Habitat Invasive Species Urbanization Flooding
AOC Designated BUIs	**Restrictions on Fish and Wildlife Consumption** **Eutrophication or Undesirable Algae** **Degradation of Fish and Wildlife Populations** **Beach Closings** **Fish Tumors or Other Deformities** **Degradation of Aesthetics** **Degradation of Benthos** **Restriction on Dredging Activities** **Loss of Fish and Wildlife Habitat**	

Table 11 — Identified and AOC designated BUIs of the Rouge River. Bolded text represents BUIs identified by the community in their language that directly correspond to an AOC designated BUI of the Rouge River. Underlined BUIs refer to identified BUIs that the community cares about and directly impacts their primary beneficial uses. Rouge River community members identified BUIs that correspond to the *Degradation of Aesthetics* BUI. Since observing wildlife/nature is a primary beneficial use identified by the Rouge community, a degradation of aesthetics would significantly impair this beneficial use.

A Comparison of Beneficial Use Impairments in the Saginaw River & Bay AOC

	Beneficial Use Impairments (BUIs)	
	Community	*PAC/State*
Identified	**Industrial Legacy Sediment Contamination** **Fish Consumption Restrictions** **Reduced Fisheries*** Erosion/Sedimentation Flooding Agriculture Runoff **Excess Algae** **Bad Odor** Invasive Species	Beach Closings Excessive Nutrient Runoff from Agriculture Sedimentation/Poor Hydrology Contaminated Sediments (Hg, PCBs, Dioxin) Biological Pollution (*E. Coli*) Bad Odor Invasive Species Septic Tanks
AOC Designated BUIs	**Restrictions on Fish and Wildlife Consumption** **Eutrophication or Undesirable Algae** **Tainting of Fish and Wildlife Flavor – REMOVED 2008** **Restrictions on Drinking Water Consumption – REMOVED 2008** **Degradation of Fish and Wildlife Populations** **Beach Closings** **Degradation of Aesthetics** **Bird or Animal Deformities or Reproduction Problems** **Degradation of Benthos** **Degradation of Phytoplankton and Zooplankton Populations** **Restriction on Dredging Activities** **Loss of Fish and Wildlife Habitat – REMOVED 2014**	

Table 12 — Identified and AOC designated BUIs of the Saginaw River and Bay. Bolded text represents BUIs identified by the community in their language that directly correspond to an AOC designated BUI of the Saginaw River and Bay. Those with an * mean that community members perceive a BUI that has already been removed. Underlined BUIs refer to identified BUIs that the community cares about and directly impacts their primary beneficial uses. Many of the BUIs identified by Saginaw community members are related to two of their primary uses: fishing and observing/viewing wildlife and nature. These correspond to the AOC designated BUIs *Restrictions on Fish and Wildlife Consumption* and *Degradation of Aesthetics*, respectively. But they are also impacted by others such as *Eutrophication or Undesirable Algae*, *Beach Closings*, and *Loss of Fish and Wildlife Habitat* which was removed in 2014.

Overall, we found that viewing/observation, fishing, canoeing/kayaking, and hiking/walking are the top beneficial uses, therefore, creating these opportunities with AOC projects is critical to reconnecting people to their water resources. However, differences in language and understanding surrounding beneficial use impairments creates a gap in communication and ultimately willingness to engage. The most fundamental example of this is: if a person is unaware of the AOC program as a whole, then there is no way that they will understand a 'by-the-book' definition of a BUI. Community members across all AOCs understand beneficial use impairments through the manifestation of the beneficial uses they represent. Community members care about what uses are available to them, and this is a motivator for engagement. BUIs are tied to beneficial uses, thus by removing specific BUIs, it would help restore corresponding beneficial uses that the community cares about. The key is in communicating BUIs in a context that is understandable to the community and doing AOC work that creates types of access they care about - how the AOC program can reconnect them to their world on their own term.

Bureaucratic Barriers: Structural factors that impede progress

Other barriers that cannot be grouped into a broader theme fall within the structural aspects of ***governance/rules***. These barriers exist in **Structural Dimensions** of the NM, but they vary in degree to which they are systematic, immutable, or outside of the control of the AOC program. While we acknowledge that some of these governance structures cannot be changed, we highlight these as barriers as they affect PAC efficacy. They can be condensed down to the 'red tape' of bureaucracy, issues with funding, and a lack of state-level human resources for the AOC program.

There were many cited examples of restrictive or ineffective administration by various levels of government that directly affect progress in the AOC program. Each AOC experiences its own barriers of governance related to their situation. Kalamazoo struggles to maintain consistent progress while inundated with Superfund lawsuits related to PCB contaminated sediments that are the root cause of their listed BUIs. Saginaw has seen recent eliminations of dead-end road beach access points due to municipal decisions; these sometimes small and sequestered beaches were the only form of public access to the Saginaw Bay along miles of privately owned shoreline. Rouge struggles to unify under a single watershed community and affect wide-spread change due to its lack of control over CSO issues and the development priorities of different watershed municipalities. At the state level, reshuffling of environmental quality departments into EGLE caused confusion and bogged down the former Michigan Office of the Great Lakes. And at the federal level, the consequences of changes in power and priority cascaded down when the US government shut down in early 2019; the PAC support grants that many PAC rely on to function were delayed by months.

Although funding from the state through the PAC support grants is necessary for these organizations to keep running, PAC members believe it is not enough for them to make substantial progress. PAC members expressed feelings that they cannot do outreach to the level they would like, and that they cannot fund large-scale projects that would have a big impact and remove BUIs. There was a consensus among PAC members that finding more funding sources would be beneficial. State officials seem eager to help PACs find these additional funding sources; they could help by offering more clear insight into different avenues for funding that these organizations could explore and by helping them establish grant-writing capacities.

Finally, human resources in the AOC program at the state-level is clearly limited; both PAC members and state officials wish there was more interaction and communication between them but acknowledge that the AOC coordinators who currently serve as this conduit are stretched thin by all of their multi-AOC responsibilities. PAC members appreciate the face-to-face interaction they have with AOC coordinators at PAC board meetings, but desire even more frequent communication, and believe doing so would be helpful. PAC members also cite inadequate personal capital within their own organizations. The ability for them to directly interact with the community, write grants, and manage websites are desired skills that PACs think are important but unable to provide for themselves because they are primarily volunteer organizations. Having AOC-designated personnel with these skill sets at the state-level working across the AOC-program would give PACs the personal capital they need while freeing up time for AOC coordinators to work more closely with individuals PACs they oversee.

Future Visions: A collective air of optimism in the face of long-term problems

As a final note within our focus groups and interviews, we asked respondents what the future of their respective AOC would look like. This two-fold question pressed respondents to paint both realistic and idealistic pictures - through this, we sought to reaffirm community, PAC, and state values for each AOC, noting similarities and differences for areas of focus or outreach among the state and the PACs in their interactions with general AOC communities. Values highlighted within these entities both ideal and realistic watershed visions involved all four quadrants of the NM; ranging across ***Human Dimensions***, ***Structural Dimensions***, ***Built Environment/Infrastructure***, and ***Human-Environment Relationship***.

Ideal Visions

Similar to perceptions about beneficial uses and beneficial use impairments, differences in ideal watershed characteristics between PACs and communities varied in degree of technical metrics used. Community members across all AOCs discussed an ideal future in a broad sense: protecting human health; preventative solutions; funding; people being drawn to the water resource - but the overall desire is to have people using and recreating in the water safely without worry of contamination. PAC members, however, had lofty ideal visions with a positive

connotation as well, but they were more concrete in examples: complete removal of contaminated sediments; no restrictions on fish; accessible waterfront development; community doing their part; and restored water for fishing and swimming among others.

Within the Kalamazoo AOC, the community's ideal vision reflected protection of human health in relation to the water. The focus on human health is relevant to Kalamazoo given the high level of PCB contamination in waters near watershed cities like Otsego, Parchment, and Kalamazoo, which were specified by community and PAC members alike. In the Saginaw AOC, community respondents offered similar perspectives in ideal future visions similar to Kalamazoo, largely prioritizing the health of the river from a standpoint of human engagement with the water; if people feel comfortable getting in and around the waters of the river, increased commercial and economic values of the river will be seen as a result. Within the Rouge AOC, the community expressed desire for more consistent funding of watershed groups, noting that their local activities work to foster community involvement in the watershed as a whole. Unique to the Rouge community as well was an expressed desire to address stormwater runoff as an area-specific problem, which was identified as a large cause of flash flooding in the river. This sentiment was mirrored with in PAC visions, which also acknowledged increased floodplain restoration and management in their ideal visions for the watershed.

Throughout each AOC, common ideal watershed visions across all groups surveyed involved restoring recreational use for respective watersheds. While there was a varying degree of program-specific knowledge in responses, all respondents noted the importance of restoring use for respective AOCs as a means of not only fostering deeper connection and involvement between AOC communities and their water resource, but also encouraging regional economic growth surrounding these rivers and watersheds as recreational and even tourist resources. PACs acknowledged BUIs specifically, but addressed these as area-specific impairments in the context of the human-environmental interactions which they inhibit.

Realistic Visions

When asked about what their realistic future would look like respondents generally expressed a more conservative view about R2R2R progress. Reflecting on area-specific degradation, PAC and community members acknowledged they will likely be working towards restoration for many years to come. We see all four colors of the Neighborhood Model factoring into these predictions, as they describe how all parts and players might practically interact towards progress.

PAC members in our study AOCs understand they are in it for the long haul. They are pessimistic about delisting in the near term but are hopeful about the long-term future of their areas. They believe that there will be some improvement to the water quality and some beneficial use impairments removed in the next 10-20 years. Although they are also concerned with factors

outside of the AOC boundary such as agricultural runoff, urbanization, and CSOs hindering progress towards BUI removal. In particular, they see progress in some areas such as habitat restoration but stagnation in more difficult problems like contaminated sediments. Community members' future vision is influenced based on stigma - given negative perceived state of watershed, but still optimistic toward seeing some degree of future progress. Community members think there will be an overall improvement in the water quality leading to increased opportunities for access and recreation.

In the future of the Kalamazoo AOC, KRWC members understand that there will be a larger population living within the watershed, with a corresponding increase in urbanization as well. They also believe agriculture runoff from outside the AOC boundary will continue to have an impact on the Kalamazoo River quality and are concerned that negative outcomes will propagate if not corrected. These and other complex issues mean delisting might not happen for decades. The Kalamazoo community thinks there will be more access and recreational opportunities on the river. They see the realistic future as not being perfect, but making collective progress. In the Saginaw AOC, the PSBW sees themselves accomplishing one-third of the management actions needed to remove all of the BUIs from the Saginaw River and Bay during the next 20 years. They feel that more entrenched issues, such as contaminated sediments and nutrient input might still remain and prevent some BUIs from being removed. As a whole, the community believes work is moving in the right direction because they see increased recreation opportunities and more interest in environmental organizations working across the watershed. In the Rouge AOC, the RRAC has concerns that their work to remove BUIs will be undermined by CSOs and urbanization. Due to a tumultuous recent history in municipal finance, Detroit was granted an extension by the EPA to solve its CSO problems until 2037. They argue progress cannot happen unless there are more stringent laws on development and managing construction projects requiring green infrastructure to reduce flooding and flashiness. It is realistic that there will be better riparian habitat, but it cannot be expected for the Rouge to go back to the way it was before human influence. Rouge community members express a mix of positive and negative impressions of what the future in the Rouge River will realistically look like. Overall, though, general sentiments are that water quality is improving due to local efforts and government regulations.

Section VIII. Conclusion

While the three long-term AOCs we observed possess unique structural and geographic barriers which further inhibit the delisting process, we noted profound similarities in barriers to AOCs progress; the most prolific of which dealt with communication and outreach to the broader community - themes which we believe can be broadly applied to the extent of the AOC program as a whole. Lack of concerted, organized AOC-specific communication among these areas perpetuates a lack of knowledge and ultimately engagement among respective communities. This in turn reduces community involvement in restoration processes, and support for local PACs and state efforts towards R2R2R. The overall findings of our research indicate that helping PACs improve AOC-specific communications, outreach, and education will cultivate local relationships leading to improvement in AOC efforts through: educating respective communities about the AOC program, and its mission to restore their water resources; forging effective working relationships between AOC PACs and respective boundary organizations and anchor institutions; and encouraging a higher level of participation and PAC representation from a more informed, engaged local population. These broad findings form the basis for our recommendations.

Section IX. Recommendations to EGLE

1. **Encourage PACs to form active, working relationships with AOC watershed or community groups**
    a. Help PACs partner with other watershed organizations who already have the capacity and networks to do community outreach
    b. Facilitate PAC partnerships with organizations that are able to create and build more opportunities for people recreate on or near the water
    c. Work with PACs to forge connections with corporate and industrial interests to boost funding and remove more difficult BUIs
    d. Fund PAC outreach and educational events in tandem with schools, universities, municipalities, and nonprofits within AOCs in order to cultivate higher community values of ecological health

2. **Assist in implementing internal PAC-level Standard Operating Procedures**
    a. Assess current understanding of each PAC's roles and responsibilities, and assist in augmenting roles seen as secondary - i.e. aiding with Social Cohesion for Saginaw and Rouge, or project design and implementation for Kalamazoo
    b. Assist PACs in diversifying representation by setting standards and guidelines to better reflect their own community- incorporate members from well-networked and influential community groups for strategic recruitment and staffing
    c. Provide and advertise to PACs a consistently updated list of funding sources outside of the PAC support grant in order to help fill funding gaps
    d. Provide guidance in searching for outside funding and the grant-writing process
    e. Facilitate and define relationships with other boundary organizations at PAC level to increase AOC synergy through delegation and to to diffuse tension among overlapping efforts
    f. Increase the frequency of meetings with PACs to assist in accomplishing co-produced goals, beyond standard AOC coordinator attendance at board meetings
    g. Help PACs develop work plans that target BUIs which directly correlate to community-perceived beneficial uses, and directly benefit their ability to interact with the AOC waters

3. **Cultivate strategic outreach among AOC communities within scope of current PAC functionality and community salience**
    a. Broadcast positive news and generate informational outreach to ameliorate long-held negative water-related stigmas
    b. Address and affirm place-based attachment and community-held values in seeking increased public participation within restorative efforts

c. Advertise and encourage public participation in PAC meetings and functions - i.e. better advertise meeting times, encourage public input and attendance
d. Incorporate community perspectives in the design of AOC projects, in efforts to realize AOC community-defined beneficial uses and visions of the future, while addressing area-specific BUIs

4. **Facilitate PAC communication and outreach strategies that are relevant for communities**
    a. Communicate about BUIs and AOC efforts through channels widely used by AOC community members: Facebook, stewardship events, local news, NPR
    b. Use community-identified Beneficial Uses to better communicate BUIs and prioritize community restoration work
    c. Establish common digital forum and data repositories for AOC-specific data sharing and discussion - accessible to the general public across AOCs

5. **Implement EGLE-specific community outreach strategies for AOC efforts**
    a. Sponsor EGLE representation at local watershed events allowing for potential engagement at all levels of in the AOC
    b. Communicate about the AOC Program through mediums that are specifically relevant to each AOC community

6. **Increase human resource capacity at the state level to provide essential skill sets to PACs**
    a. Allocate or organize positions within EGLE with capacity to assist PACs in grant writing, public outreach, social media, and website management, which will free up time for AOC coordinators to spend more time working with PACs on RAPs and project plans

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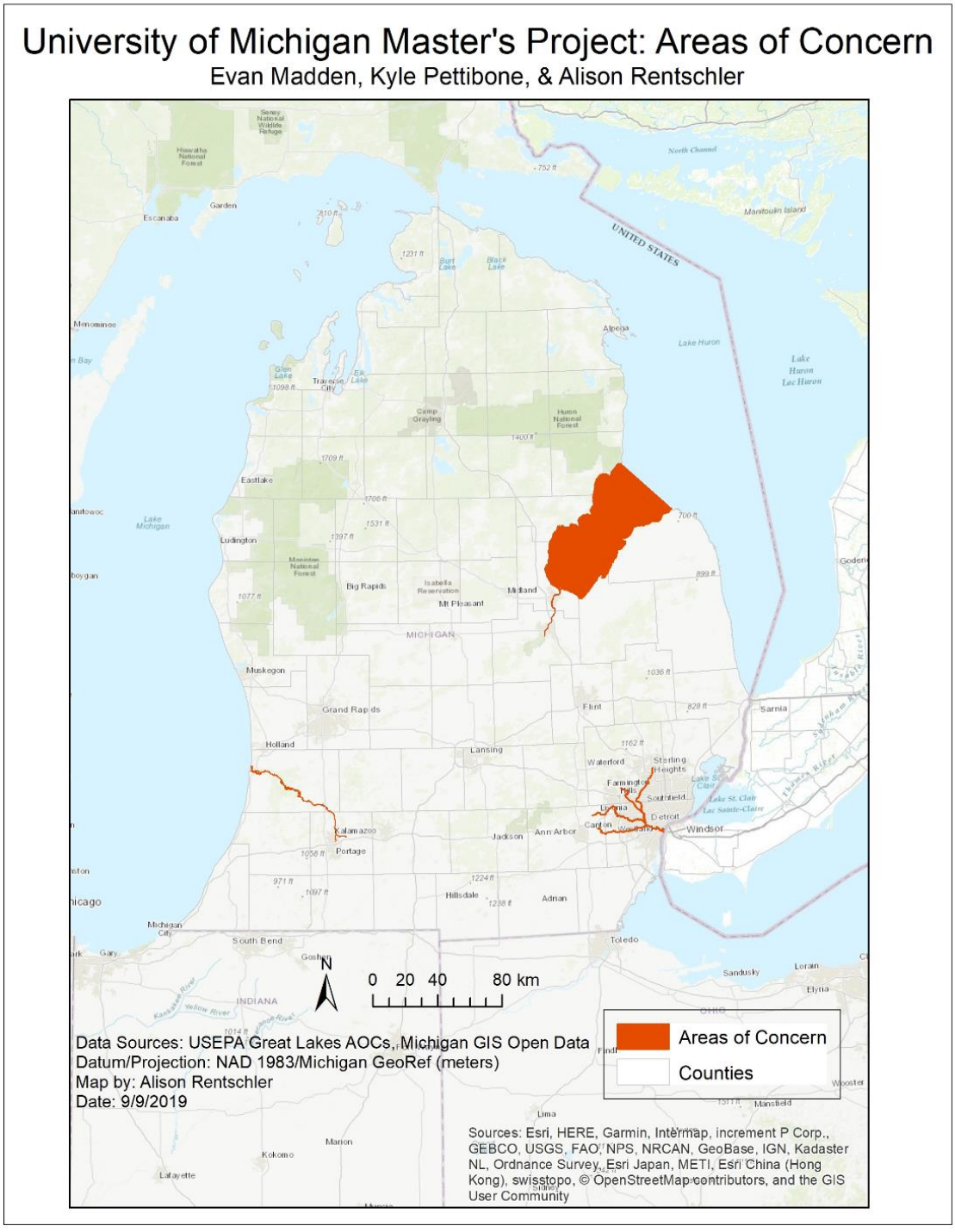
Section XI. Appendices

Contents

Appendix 1. Areas of Concern Map



Appendix 2. Site Observation

Location: **Date:**

Time: **Weather:**

Physical Observations:

- Describe the overall environment/ecology:

- Quality of both land and water:

Restoration:

- Describe the general conditions of surrounding infrastructure or environment.

- Is there evidence of recent restoration environmental efforts? (i.e., newly planted trees, new growth)

People:

- How many people are present?

- Do these individuals seem to be engaged?

- How are they interacting with the space?

Opportunities and outreach:

- Describe the signage and/or other resources that describe the area:

- What types of activities are available for patrons to utilize?

- Describe your own feelings about the site in general:

Additional Comments:

Appendix 3. Meeting Observation

General Info

What: **When:**

Where: **Who:**

Specifics

How many people are in attendance?

Why is this event taking place?

How did you find out about the event? How did people in attendance find out about the event?

How is the meeting/event structured? Does this method appear to be effective?

What groups are in attendance? What possible interests do they appear to represent?

What are the desired outcomes/motivating factors of each of these groups?

Does there appear to be any sort of communication/knowledge gap? Do people seem to be more or less on the same page?

How engaged are members of this meeting? Is there strong participation across all parties? Who, if anyone, appears to dominate the meeting?

Does the content of the meeting seem to adequately address everyone's concerns? Does it seem like any party is left with a bad taste in their mouth?

Any additional comments? Questions? Notable quotes?

Appendix 4. Event Observation

General Info

Who: **What:**

When: **Where:**

Weather:

Specifics

How many people are in attendance? What specific interest groups are in attendance? Demographics (Gender, age, affiliations, PAC/Non-PAC)

How did you find out about the event? How did people in attendance find out about the event?

What's the overall purpose of the event? Why was this specific area designated for an event? How does this promote AOC connection?

Describe the appearance of the site in question (Scale 0-5 land and water)?

Explain - describe the characteristics of land and water

What does it look like compared to what it should *ideally* look like?

How knowledgeable do people seem in regard to the project at hand? Do they seem engaged?

How do you personally feel interacting at this event?

Any additional comments? Observations? Notable quotes?

Appendix 5. PAC Interview Questions

1. **How would you best describe your role as it pertains to [this particular Area of Concern]? What organizations are you a part of in your community?**
    a. In your opinion, what should be the community's role in the [AOC]?
    b. In your opinion, what should be the Public Advisory Council (PAC)'s role in the AOC?
    c. What should be the state's role in the AOC?
2. **How would you describe the community within [your area of concern]? Who do you believe are the key players in your Area of Concern? Commercial interests? Government/Sovereign interests? Volunteer groups/organizations?**
    a. Do you feel as though [this PAC] adequately reflects the larger community in this Area of Concern? If not, how could the PAC better reflect the community?
    b. Do you feel like your community [around this area] is well informed? Why?
    c. How do you think local organizations and players could be better engaged?
    d. How do you think the local community could be better engaged?
3. **When you think of *beneficial uses* for [your area], what comes to mind?**
    a. Natural (What beneficial uses do you see/use in the environment itself?)
    b. Infrastructural (What features have been constructed for this area? Public trails?)
    c. Economic (Do businesses or restaurants use this area as an incentive/attraction?)
    d. What beneficial uses come to mind specifically for you? What values do you get out of [the AOC]?
    e. What about *beneficial use impairments*? What comes to mind?
4. **Do you feel that the state's definitions of BUIs are reflective of the beneficial uses described?**
    a. If so, can you give specific examples? If not, what do you believe is missing?
5. **How would you describe the state of communication/interaction between local, PAC and state interests (Michigan's Office of Environment, Great Lakes and Energy, or EGLE - formerly MOGL)?**
    a. Do differences in communication about AOC problems or BUIs exist between these entities? How much (or what) do you think each of these groups know regarding [the AOC] or its BUIs?
    b. How do you feel the state could better work to build relationships and communicate with more local interests (i.e. PAC, broader AOC communities)?
6. **Through what mediums do you distribute news out to the AOC community?**
    a. Through what mediums do you digest news or current information?
7. **How do you envision the future of [insert AOC here]?**
8. **Are there any other comments or feelings you'd like to address?**

Appendix 6. EGLE Interview Questions

1. **How would you best describe your role as it pertains to [this particular Area of Concern]? Do you believe your role is consistent between both your respective areas of focus?**
    a. Do you believe PAC members within each of these AOCs perceive your role in a similar manner?
2. **In your opinion, what should be the community's role in the [AOC]?**
3. **In your opinion, what should be the Public Advisory Council (PAC)'s role in the AOC?**
4. **What should be the state's role in the AOC?**
5. **Who do you believe are the key players in your Area of Concern? Commercial interests? Government/Sovereign interests? Volunteer groups/organizations?**
6. **Do you feel as though [each PAC] adequately reflects the larger community in this Area of Concern? If not, how could the PAC better reflect the community?**
7. **Do you feel like your community [around this area] is well informed? Why?**
    a. How do you think local organizations and players could be better informed/engaged?
    b. How do you think the local community could be better informed/engaged?
    c. Do you think that each AOC's PAC does an adequate job reaching out to its greater community? If not, how could they improve outreach?
8. **What are some beneficial uses of water resources in your AOCs? These could be....**
    a. Natural (What beneficial uses do you see/use in the environment itself?)
    b. Infrastructural (What features have been constructed for this area? Public trails?)
    c. Economic (Do businesses or restaurants use this area as an incentive/attraction?)
    d. What beneficial uses come to mind specifically for you? What values do you get out of [each of your AOCs]?
9. **Do you feel that the state's definitions of BUIs are reflective of beneficial uses specific to the beneficial uses you just discussed?**
    a. If so, can you give specific examples? If not, what do you believe is missing?
10. **How would you describe the state of communication/interaction between local, PAC and state interests (Michigan's Office of Environment, Great Lakes and Energy, or EGLE - formerly MOGL)?**
    a. Do differences in communication about AOC problems or BUIs exist between these entities? How much (or what) do you think each of these groups know regarding [the AOC] or its BUIs?
    b. How could communication and dissemination of information be improved within this chain of groups?
11. **Through what mediums do you distribute news out to the AOC community?**

a. How do you receive news and information from the EPA? Do you think it is effective?
b. Through what mediums do you digest news or current information?

12. How do you envision the future of [insert AOC here]?

13. Are there any other comments or feelings you'd like to address?

Appendix 7. Focus Group Questions

1. **How would you best describe your role as it pertains to [this particular Area of Concern]? Are you part of any organizations in your community?**
    a. In your opinion, what should be the community's role in the [AOC]?
2. **When you think of *beneficial uses* for [your area], what comes to mind?**
    a. What about *beneficial use impairments*?
    b. Natural (What beneficial uses do you see/use in the environment itself?)
    c. Infrastructural (What features have been constructed for this area? Public trails?)
    d. Economic (Do businesses or restaurants use this area as an incentive/attraction?)
3. **Do you have any involvement in restorative efforts in [the AOC in question]? Do you feel involvement with [this Area of Concern] is important? If not, why not?**
    a. Environmentally, what do you feel in this AOC needs the most specific focus on? Why? What environmental issues are most important to you?
    b. Have you noticed any changes in the local environment in your time working within this AOC? Do you feel as though work has seen any progress?
    c. Have you noticed any changes in the local community as a result of AOC work?
    d. Have you noticed any economic changes in your area as a result of AOC work?
4. **How do you obtain/receive information about current events or news?**
    a. How would you ideally like to receive information about news and events?
5. **How do you envision the future of [insert AOC here]?**
    a. What ideal beneficial uses would you like to see in [AOC]? What features/uses do you feel are missing?
    b. What barriers exist in the way of seeing these beneficial uses?

Appendix 8. Codebook

CODES	DESCRIPTION
1.0 PERSONAL VALUES	Values that are described on a personal level - specific to the respondent
1.10 INSTITUTIONS OR GROUPS	Interest in participation in various institutions/groups (watershed councils, universities, policies, etc.)
1.20 HUMAN AND ECOLOGICAL HEALTH	Interest in ecological or human health/functioning
1.3 RECREATION	Respondent expressed interest in some form of water recreation
1.4 SUSTAINABILITY	Respondent describes sustainability or explicitly says they are interested in sustainability
1.5 EQUITY	Respondent describes the importance of equity, including all people, or having everyone at the table
2.0 IDENTIFIED ROLES	Self-identified roles within the respondent's group
2.10 PAC-PAC	PAC roles as described by PAC members
2.20 PAC-STATE	State roles as identified by PAC members
2.30 PAC-COMM	Community roles as identified by the PAC
2.40 STATE-STATE	Self-identified state roles
2.50 STATE-PAC	PAC roles as identified by state officials
2.60 STATE-COMM	Community roles as identified by the state
2.70 COMM-STATE	State roles as identified by the community
2.80 COMM-COMM	Self-identified community roles
2.90 KEY PLAYERS	Noted organizations that have a stake or role in the AOC community
2.91 COMMUNITY	Community-level organizations identified
2.92 OTHER	Key players at any other level
3.0 DESIRED ROLES	Any description of a role that does not occur but it is desired to occur by some party
3.10 PAC-COMM	Desired roles of the community as stated by the PAC
3.2 PAC-STATE	Desired roles of the state as stated by the PAC
3.3 STATE-COMM	Desired roles of the community as stated by the state
3.4 STATE-PAC	Desired roles of the PAC as stated by the PAC
3.5 COMM-STATE	Desired roles of the state as stated by the community
3.6 COMM-PAC	Desired roles of the PAC as stated by the community
4.0 RELATIONSHIPS	Specific aspects of the relationships between all three levels, and within all three levels (PAC-state-community; NGOs-industry-citizens, etc.)
4.1 PAC-COMM	A relationship between the PAC and the community
4.2 PAC-STATE	A mention of the relationship between the state and the PAC
4.3 COMMUNITY GROUPS	Relationships between community groups
5.0 BARRIERS	Barriers to progress towards BUI removals and delisting
5.1 INTER-AGENCY COORDINATION	Noted lack of industry involvement in the AOC process - can be monetary or otherwise
5.2 DIFFERING VALUES	Groups or members have differing views on a solution or differing priorities that decreases progress
5.3 COMMUNICATION	Communication to the public as a main barrier to progress
5.4 GOVERNANCE-BUREAUCRACY	Mention of political changes or institutions as a barrier to progress
5.5 INTERNAL - PAC	A barrier mentioned due to internal PAC functions
5.6 LACK OF RESOURCES	Some lack of resources is mentioned
5.61 FUNDING	A lack of funding impeding progress
5.62 PERSONAL CAPITAL	A lack of ability/ personal capital within the group as a barrier to progress
5.7 LACK OF KNOWLEDGE	Some lack of understanding as a barrier to progress
5.8 LACK OF PARTICIPATION	Lack of participation from some party as a barrier to progress
5.9 AOC SPECIFIC	This barrier is AOC specific
6.0 BENEFICIAL USES OR IMPAIRMENTS	Discussion of beneficial uses or impairments
6.1 BENEFICIAL USES	Discussion of any benefit gained from a healthy river/water system
7.0 FUTURE	Respondents description of the future in terms of AOC progress
7.1 IDEAL	The ideal image of the respondent's healthy community
7.2 REALISTIC	A realistic view of the future of the respondent's community
8.0 COMMUNICATION	Interviewee describes how their organization conducts outreach
8.1 ENGAGEMENT	Ways in which the community engages with water resources
8.2 MODES	Ways that one group is able to connect or communicate with another group
9.0 OTHER QUOTES	Other notable quotes

Appendix 9. Kalamazoo River Superfund Site: Operable Units Map - EPA